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# वार्षिक प्रतिवेदन

## ANNUAL REPORT (2021-22)

### Part-I: Kharif-2021

अखिल भारतीय समन्वयित अनुसंधान परियोजना  
चारा फसलें एवं उपयोगिता  
(भारतीय कृषि अनुसंधान परिषद)  
भा.कृ.अनु.प.-भा.च.चा.अनु.सं.,  
झाँसी-284 003 (उ.प्र.)

All India Coordinated Research Project on  
Forage Crops & Utilization  
(Indian Council of Agricultural Research)  
ICAR-IGFRI, Jhansi-284 003 (U.P.)

Website: <http://www.aicrponforagecrops.gov.in>

June, 2022



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## AICRP ON FORAGE CROPS AND UTILIZATION

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June, 2022

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### Compilation and Editing

- |                           |                                       |
|---------------------------|---------------------------------------|
| • Crop Improvement        | : A.K. Roy (Project Coordinator)      |
| • Crop Production         | : R.K. Agrawal (PI: Crop Production)  |
| • Crop Protection         | : N.R. Bhardwaj (PI: Crop Protection) |
| • Breeder Seed Production | : A.K. Roy                            |
| • Weather Report          | : R.K. Agrawal                        |

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Project Coordinator  
AICRP on Forage Crops & Utilization,  
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Phone/Fax: 0510-2730029  
Email: pcforage@gmail.com  
Website: <http://www.aicrponforagecrops.gov.in>

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## Foreword

India with only 2.29 % of land area of the world, is maintaining nearly 17.4% of world human population and 10.7% of livestock creating a huge pressure on land, water and other resources. Recent trend in animal husbandry indicates a rapid and considerable increase in the consumption of livestock products. However, deficiency in quality feed and fodder is a major hurdle in achieving desired level of livestock production. The production and quality of feed and fodder will be pivotal in sustaining the incremental growth of the animal husbandry sector. Due to competing land use, area under cultivated fodder has been static for the last two decades and thus, can hardly compete with other sectors of agriculture. Hence, the only option available is to catalyze horizontal increase in underutilized areas and vertical increase in the forage productivity to meet the ever increasing demand of the fodder for economic livestock production. At present the productivity of cultivated fodder crops is low, due to least attention and allocation of minimal production resources on one hand and non-availability of the production techniques to stakeholders involved in the forage resource development. This needs to be tackled by generation of production packages of fodder crops like selection of appropriate forage species, varieties and management techniques to sustain forage yields and soil fertility.



The country has varied agro climatic conditions as well as farming situation. In these circumstances, the objective of improving the forage varieties and forage productivity is complicated. Each crop has to be dealt with in a concise manner to accommodate the information on sowing technique, varieties, nutrient management, water management, crop protection, quality attributes and harvesting. AICRP on Forage Crops & Utilization is pursuing successfully the mandate for development of varieties, technique for raising cultivated forage crops and grasses of annual and perennial nature and eco-friendly crop protection technologies.

I would like to congratulate Project coordinator and other scientists of PC (FC&U) unit who have contributed in the preparation of the Annual Report *Kharif-2021* and helped in achieving the set targets.



(Amaresh Chandra)  
Director  
ICAR-IGFRI, Jhansi (UP)

## PREFACE

The Annual Report (2021-22, Part I–*Kharif-2021*) embodies the results of various research trials conducted in the areas of forage crop improvement, production and protection with the view to develop and test the technologies for better quality/quantity of herbage in different agro climatic situations. This report is the outcome of sincere efforts made by all contributing scientists and staff at the Coordinating Unit and AICRP-FCU Centers. The trials and activities were successfully conducted as per the technical programme fixed for *Kharif-2021*. The forage crops tested during the period under report, included forage cereals and legumes adaptable to a wide range of agro-ecological regions of the country. The report is divided into several chapters, which include Crop Improvement, Crop Production, Crop Protection, Breeder Seed Production etc. The results of multi-locational evaluation of newly developed genetic material for single and perennial forage species are compiled in Crop Improvement chapter. The trials presented in Crop Production chapter focus on bio-fortification of fodder crops, micronutrient management, PGRs and micronutrients for sorghum, silage production in polybags, Precision nitrogen management in forages and nitrogen and cutting management in pearl millet varieties as well as agronomical trial for AVT entries. The chapter on crop protection deals with monitoring of pest and disease dynamics, evaluation of pest/disease resistance level in important Kharif forage crops viz., Pearl millet, Sorghum, Maize, Cowpea, Ricebean etc. as well as generation of technologies for pest management. The information on breeder seed production against the DAC indent is also provided in Breeder Seed Production chapter. Weather data from coordinating and voluntary centers have also been compiled to correlate the growth and yield of forage crops with weather parameters at different sites during crop period. Other chapters include details of in-house breeding activities, other activities etc.



The contribution and sincere efforts made by each and every member of the team and their associates at the centers deserve appreciation and is gratefully acknowledged.

My colleagues at Project Coordinating unit, Dr. R. K. Agrawal, Principal Scientist (Agronomy), Dr. Nitish R. Bhardwaj, Scientist (Plant Pathology) and technical officers, Shri H. K. Agarwal and Shri R.S. Patel, provided support in distribution of seed/planting material, analysis and tabulation of data of trials conducted at various locations. Their contributions are thankfully acknowledged. The efforts of Smt. Priyanka Dixit and Shri Premkushwaha in final report preparation are sincerely acknowledged.

The administrative support and cooperation received from Dr. Amaresh Chandra, Director, IGFR during the period is thankfully acknowledged. I also record my sincere thanks to colleagues at IGFR for their kind support.

Meeting all the targeted activities would not have been possible without the active leadership, support, guidance and encouragement received from Dr. T. Mohapatra, Secretary DARE & DG, ICAR; Dr. T.R. Sharma, DDG (CS); Dr. R. K. Singh, ADG (FFC); Dr. D.K. Yadava, ADG (seed); Dr A K Tyagi ADG (AN&P) and Dr. Ishwar Singh, Principal Scientist (FFC), ICAR. Each and every one in the team at AICRP on Forage Crops & Utilization gratefully acknowledges their guidance and support.

A handwritten signature in blue ink, consisting of stylized, overlapping loops and lines.

A. K. Roy  
Project Coordinator



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## EXECUTIVE SUMMARY

The report provides compilation of the results of the coordinated multi-location trials conducted on crop improvement, crop production, crop protection as well as the breeder seed production, technology demonstrations, tribal sub-plan activities of the different forage crops during Kharif 2021 at different centers in the country. Weather data at different centers are also reported to correlate the growth and yield of forage crops as well as disease prevalence with weather parameters during crop period. Results of other activities carried out by the staff of AICRP units, in-house breeding, research guidance, teaching, extension activities etc. are also included.

### A. FORAGE CROP IMPROVEMENT

In Kharif 2021, multi location trials were conducted across the country to identify the suitable entries for different zones and at national level. Various parameters were considered which includes green and dry forage yield (GFY, DMY), crude protein yield (CPY), crude protein (CP), ADF, NDF, IVDMD, per day productivity, plant height, leafiness etc.

A total of 17 multi locational trials comprising of test entries along with their respective checks were conducted at 34 locations in the country. It included 13 trials under annual and 4 perennial trials. The annual crops include fodder maize, fodder pearl millet, fodder cowpea, fodder rice bean, Dinanath grass, whereas under the perennial system, *Cenchrus ciliaris*, *C. setigerus*, BxN hybrid and *Stylosanthes* were evaluated. A total of 188 trials were allocated out of which data were received from 181 trials making a success rate of 97.07 %. A total of 88 entries including 57 annual and 31 perennial along with national and zonal checks were evaluated.

The results led to identification of promising entries which have recorded their superiority with respect to best zonal/national check. The summarized results of different cultivated annual and perennial forage evaluation trials are as below:

#### Forage Maize

**In Initial Varietal Trial in Forage Maize (IVTM)**, fourteen (14) entries along with three national checks viz., African Tall, J-1006 and COHM-8 were evaluated at 23 locations including 4 each in hill, south and 5 each in north-west, north-east and central zones. For green and dry forage yield, entries CMH-12-686, PJHM-1, MFM-18-2, IIMFC-2 and ADFM-2 showed superiority over the best check by a margin of more than 5% in one zone or at national level. These entries also showed good performance for per day productivity and crude protein. Other entries were either marginally superior or inferior to checks. For crude protein yield, at all India level, entry CMH-12-686 (8.0 q/ha) was best followed by PJHM-1 (7.8 q/ha). The best performer in check category was African Tall (7.3 q/ha). For crude protein, entry PJHM-1 ranked first in hill, entry CMH-12-686 in CZ, entry IIMFC-2 in NEZ. Entry CMH-12-686 was best performer for IVDMD followed by ADFM-2.

**In First Advance Varietal Trial in Forage Maize (AVTM-1)**, six entries along with three national checks viz., African Tall, J-1006 and COHM-8 were evaluated at 23 locations comprising 4 locations each in hill, south and 5 each in north-west, north-east and central zones. For green forage yield (GFY), entry HQPM-28 in HZ, CZ and entry PFM-13 in CZ and for dry matter yield (DMY), entry HQPM-28 in HZ, NWZ and CZ; entry DFH-2 in NWZ showed superiority over the best check.

For per day productivity entry HQPM-28 was best for both green and dry fodder. For crude protein yield (CPY), entry DFH-2 ranked first for NW, HQPM-28 for central, south as well as at all India level. For crude protein, entry PMC-

11 was best performer in NE zone, entry HQPM-28 for south zone. At all India level, entries PFM-13 and PMC-11 and national check African Tall were joint best performers (8.6%).

**Second Advance Varietal Trial in Forage Maize (AVTM-2)** comprising of one entry PFM-12 along with three national checks *viz.*, African Tall, J-1006, COHM-8 was conducted at 11 locations (5 in north-west zone and 6 in central zone). For green fodder yield, dry matter yield and crude protein yield, National check J-1006 was top ranked. For crude protein (%), National check African Tall was top ranked

**Second Advance Varietal Trial in Forage Maize- seed (AVTM-2 seed)** comprising of one entry PFM-12 along with three national checks *viz.*, African Tall, J-1006, COHM-8 was conducted at 6 locations (2 in north-west zone and 4 in central zone). National check African Tall was top ranked in NW zone whereas Check COHM-8 top ranked for central zone as well as combining both zones.

## FORAGE PEARL MILLET

An **Initial Varietal Trial in Forage Pearl Millet (IVTPM)** comprising of eight entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks was conducted at 19 centers (5 in NW, 4 in NE, 4 in south zone and 6 in central zone).

For GFY, entry JPM 18-71 in NWZ, NEZ, SZ, at all India level; entry AFB-54 in NWZ, at all India level; entry ADV175020 in NWZ, NEZ, SZ, at all India level; entry FSB2021-1 in NWZ, NEZ, SZ at all India level, entry FBL-7 in NEZ, at all India level, entry FBL-6 in NEZ, at all India level showed superiority over the best check by a margin of more than 5%. In other cases entries were either marginally superior or inferior over the best check.

For DMY, entry JPM 18-71 in NEZ, at all India level; entry AFB-54 in NWZ, at all India level; entry ADV175020 in NWZ, NEZ, CZ, at all India level; entry FSB2021-1 in NWZ, NEZ, SZ, at all India level. Entry FBL-7 in SZ, at all India level. Entry FBL-6 in NEZ, SZ, at all India level showed superiority over the best check by a margin of more than 5%. In other cases entries were either marginally superior or inferior over the best check. For green and dry forage per day productivity, entry AFB-54 was best performer. For crude protein yield (q/ha), AFB-54 in NWZ, JPM-18-71 in NEZ, ADV175020 in CZ, south zone were best performers. At all India level, entry ADV175020 was best (7.6q/ha) followed by JPM-18-71 (7.1q/ha) and check RBB-1 (7.0q/ha). For crude protein content, AFB-45 and ADV175020 in NWZ, FBL-7 in NEZ, ADV175020 in CZ, entry JPM-18-71 in south zone were best performers. At all India level, entry JPM-18-71 (8.2 q/ha) was best followed by check Giant Bajra (8.0%). For other quality parameters, entry AFB-45 for ADF, check Giant Bajra for NDF was superior. Entry FBL-7 ranked first for IVDMD.

In **First Advanced Varietal Trial on Forage Pearl Millet (AVTPM-1)**, five entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated at 19 locations comprising of 4 situated in south zone, 5 in NW, 4 in NE, 6 in central zone. For GFY, entry 16ADV0111 in NWZ, NEZ, CZ, SZ, at all India level; entry JPM-18-37 in NWZ, SZ, at all India level; entry FBL-4 in SZ, at all India level; entry TSFB-1610 in SZ, at all India level; entry PHFB-5 at all India level showed superiority over the best check by a margin of >5.0%. In other cases entries were either marginally superior or inferior over the best check.



For DMY, entry 16ADV0111 in NWZ, NEZ, CZ, SZ, at all India level, entry JPM-18-37 in NWZ, NEZ, CZ, SZ, at all India level; entry FBL-4 in SZ; entry TSFB-1610 in NWZ, SZ, at all India level; entry PHFB-5 at all India level showed superiority over the best check by a margin of >5.0%. For per day productivity entry JPM-18-37 ranked first for both green and fodder production. For CPY, entry TSFB-1610 in CZ, entry 16ADV0111 in NEZ, SZ and at all India level were best performers. For crude protein content, zonal check AFB-9-1 top ranked in NWZ, BAIF Bajra in CZ, Moti Bajra in SZ, whereas national check Giant Bajra top ranked in NEZ and at all India level. For other quality parameters, entry FBL-4 ranked first for ADF and IVDMD whereas RBB-1 ranked first for NDF.

In **Second Advanced Varietal Trial in Forage Pearl Millet (AVTPM-2)**, four entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated at 19 locations comprising of 4 in south zone, 5 in NW, 4 in NE, 6 in central zone. For GFY, entries 16ADV0055 and JPM-18-7 in NWZ, and at all India level, entry Dev-1 in NWZ, SZ, and at all India level were superior over the best check by a margin of >5.0%. For DMY, entries 16ADV0055 in NWZ, CZ, and at all India level; entry JPM-18-7 in NWZ and at all India level; entry Dev-1 in SZ, CZ and at all India level were superior over the best check by a margin of >5.0%. For per day productivity green and dry fodder), entry JPM-18-7 ranked first. For leaf stem ratio, Dev-1 first ranked first. For CPY (q/ha), entry JPM-18-7 in NWZ, Dev-1 in NEZ, CZ, SZ and at all India level ranked first. For crude protein content, zonal Check AFB-3 in NWZ, APFB-9 in NEZ, entry Dev-1 in CZ, national check Giant Bajra at SZ and at all India level ranked first. For other quality parameters, entry Dev-1 followed by 16ADV0055 for ADF and IVDMD; 16ADV0055 followed by Dev-1 for NDF performed better.

In **Second Advanced Varietal Trial (seed) Forage Pearl Millet (AVTPM-2 Seed)**, four entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated at 9 locations (3 in south zone, 2 in NW, 2 in NE, 2 in central zone). For seed yield zonal check AFB-3 in NWZ, entry 16ADV0055 in NEZ, JPM-18-7 in CZ, Dev-1 in SZ and JPM-18-7 at all India level ranked first. The superiority in SZ over the best check was 26.1% for Dev-1, 23.6% for JPM-18-7 and 11.6% for 16ADV0055. At all India level also entries JPM-18-7 (13.2%), Dev-1 (7.8%) and 16ADV0055 (2.4%) were superior over the best check.

## FORAGE COWPEA

In **Initial Varietal Trial on Forage Cowpea (IVTC)**, eight entries along with two national checks *i.e.* Bundel Lobia-1 and UPC-5286; and respective zonal checks were evaluated at 26 locations (3 in hill, 4 in north-west, 6 in central and 6 in south zone while 7 in north-east zone). Entry UPC-21-1 was superior by a margin of 6.0 % for GFY and 6.7% for DMY over the best check in NEZ. For dry matter yield in central zone, MFC-18-8, MFC-18-10 and PFC-40 were superior over the best check a margins of 11.5%, 14.0% and 7.9% respectively in CZ. In all other zones and all India level, entries were either marginally superior or inferior to best check in the respective zones. For green and dry fodder per day productivity, entry UPC-21-1 ranked first followed by entry MFC-18-8. For CPY, entry UPC-21-1 in NWZ, and NEZ, MFC 18-10 in SZ were top ranked. For crude protein content, at all India level, entry MFC-18-8 was best performer (16.2%) followed by entry PFC-40 and national check UPC-5286 (15.5%).

In **First Advance Varietal Trial Forage Cowpea (AVTC-1)**, two entries along with two national checks namely Bundel Lobia-1 and UPC-5286 and respective zonal checks were evaluated at 6 locations in south zone and 7 locations in NEZ. National or zonal checks showed superiority for GFY, DMY, per day productivity. For crude protein yield, entry HFC-17-9 in SZ, and national check UPC-5286 in NEZ ranked first. For crude protein content, entry HFC-17-9 ranked first in SZ (20.7%) while national check UPC 5286 ranked first in NEZ. Combining both zones, entry HFC 17-9 ranked first (17.1%) as compared to best check UPC 5286 (16.7%). For ADF, NDF and IVDMD, national check Bundel Lobia-1 was best performer.

#### **FORAGE RICE BEAN**

In **Initial Varietal Trial Forage on Rice Bean (IVTRB)**, four entries along with two national checks *i.e.* Bidhan-3 and Bidhan-2 were evaluated at 10 locations. For green and dry forage yield, entry JRBJ 12-9 ranked first showing superiority of 12.3 % for GFY and 12.4% for DMY as compared to best check. For green fodder per day productivity, entry JOR-21-1 and JRBJ-12-9 ranked first, whereas for dry fodder per day productivity, entry JRBJ-12-9 ranked first. For leafiness, entry JRBJ-12-9 ranked first. For crude protein yield, entry JRBJ-12-9 ranked first (9.9 q/ha) followed by entry BRB1-L13P5 (8.7q/ha), JOR-21-1 (8.6 q/ha) as compared to best check Bidhan -2 (8.4 q/ha). For crude protein, entry BRB1-L13P5 was best (16.2%), followed by entry JRBJ-12-9 (15.9%), JOR-21-1 (15.6%) as compared to best check Bidhan -2 (14.9%).

#### **FORAGE DINANATH GRASS**

**Advanced Varietal Trial-2 in Forage Dinanath Grass (AVT-2 Dinanath Grass)** comprising of four entries with one national check *viz.*, Bundel Dinanath-2 was conducted at 8 locations. Check Bundel Dinanath-2 performed best for both green and dry matter yield as well as per day productivity. In quality parameters, for crude protein yield (q/ha), check Bundel Dinanath-2 ranked first followed by JHD 19-4. For CP content, entry BAU-DN-103-18-2 ranked first with value of 8.3 % followed by BAU-DN-110-18-2 (8.1%) as compared to 7.1 % in check Bundel Dinanath-2. For other quality parameters, entry BAU-DN-109-8 ranked first for ADF, NDF and IVDMD.

**Advanced Varietal Trial-2 in Forage Dinanath Grass Seed (AVT-2-Seed-Dinanath Grass)** comprising of four entries with one national check *viz.*, Bundel Dinanath-2 was conducted at 5 locations. Entry JHD-19-4 showed superiority over the best check by a margin of 7.7% for seed yield. All other entries were below par over the best check.

#### **CENCHRUS CILIARIS-2019: (PERENNIAL) – 3<sup>rd</sup> year**

The trial was established in 2019 with 6 entries along with 3 checks (CAZRI-75, IGFRI 3108, and IGFRI-67-365) in three zones. As 3 years have been completed, the entries are now decoded. The performance in third year is as follows. National check IGFRI-67-365 performed best for green fodder yield in all zones and also at all India level. For dry matter yield, entry IG-96-414 was superior over the best check by a margin of 14.1% in NWZ, similarly in SZ, entry RCCB-05 was superior by a margin of 8.4% over the best check. In CZ and at all India level, the national check IG-67-365 was best. For crude protein yield, check IGFRI-67-365 was best whereas for crude protein content, entry RCCB-06 was best (7.9%) followed by RCC-2016-8 (7.6%) and national check IGFRI-67-365 (7.4%). For ADF, national check CAZRI-75 was best whereas entry RCCB-06 performed best for NDF and IVDMD followed by national check CAZRI-75.



### ***CENCHRUS SETIGERUS*-2019 (PERENNIAL) – 3<sup>rd</sup> year**

The trial was established in 2019 with four entries and three national checks (CAZRI 76, TNCS-265 and IG-96-706) at 12 locations across the country. As 3 years have been completed, the entries are now decoded. The performance in third year is as follows. For green fodder yield and dry matter yield, national checks performed best in all zones and at national level. National check TNCS-265 in NWZ, IG-96-706 in south zone and CAZRI-76 in CZ and at all India level were top ranked. For production potential, national check CAZRI-76 ranked first. For leafiness, national check IG-96-706 was top ranked. For crude protein content, entry RCSB-08 ranked first (7.4%) followed by entry IG-97-447 (7.2%) and entry RCSB-09 (7.0%) and national check CAZRI-76 (6.9%). For crude protein yield, national check TNCS-265 ranked first.

### **VTBN-2019: BAJRA NAPIER HYBRID (PERENNIAL) - 3<sup>rd</sup> year**

The trial was established in 2019 with fourteen entries and two national checks (CO-BN-5, BNH-10) at 19 locations across the country. It included 2 locations in hill, 3 in NW, 3 in NE, 5 in central 4 in south zone. The entries are in coded form and will be decoded after completion of trial.

### **STYLOSANTHES**

The trial failed as most of the entries failed to germinate at many locations.

## **B. FORAGE CROP PRODUCTION**

The programme on forage crop production was conducted at 42 locations during Kharif season. In total 10 experiments were conducted, out of which 4 in coordinated, 3 AVT trials and 3 in location specific mode.

Research aspect consisted of bio-fortification of annual cereal fodder crops, response of fodder crops to micronutrient management, effect of PGRs and micronutrients on sorghum, feedstuffs for air evacuating method of silage production in polybags, Precision nitrogen management for in forages and nitrogen and cutting management on performance of forage pearl millet varieties. Besides above, advance varietal trials to evaluate the response of promising entries of pearl millet, maize and Dinanath grass to nutrient supplementation was also conducted and reported.

### **K-20-AST-1a: Response of fodder crops to micronutrient management**

A trial was initiated during Kharif 2020 at five locations i.e., Rahuri, Bikaner, Imphal, Ranchi and BUAT Banda, to study the effect of PGRs and micronutrients on growth, yield and quality of Maize. In Rahuri and Banda the trial was conducted on maize, whereas, at Bikaner, Imphal, Ranchi BxN hybrid was tested. The results indicated that GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly yield.

### **K-20-AST-1 (b): Yield enhancement and bio-fortification of *kharif* forages with PGRs and micronutrients**

A trial was initiated at four locations to study the effect of PGRs and micronutrients on growth, yield and quality of sorghum. On location mean basis soil application of 5 kg Zn + 2

kg B/ha + triacontanol (10 ppm) as foliar spray at 30 DAS recorded significantly higher green fodder (464.1 q/ha), dry matter (122.7 q/ha) and crude protein yield (9.8 q/ha).

#### **K-21-AST-7: Effect of nitrogen and cutting management on performance of forage pearl millet varieties**

Experiment was conducted at Hyderabad, Raipur, Pusa, Ludhiana, Jabalpur and Varanasi to study the effect of nitrogen and cutting management on yield and economics of new pearl millet varieties for prolonged quality fodder availability. Moti Bajra with application of 120 kg/ha nitrogen and three cuts at different intervals *i.e.* first at 50 days after sowing, second at 35 after first cut and last cut at 50% flowering proved best.

#### **K-20-AST-3: Optimizing the feedstuffs for air evacuating method of silage production in polybags**

Field experiment was conducted at Coimbatore to identify suitable fodder crops and additives for polybag method of silage production. Higher quality silage with acetic acid content of 2.5 percent and lactic acid content of 9.0 per cent was produced from fodder maize by air evacuation method with molasses 1%.

#### **K-20-AST-6: Precision nitrogen management for enhancing fodder yield and nitrogen use efficiency in forages**

Production of fodder maize was better with 150 kg N/ha (40% N basal) + remaining based on LCC 5. It recorded 479.12 q green and 137.45 q dry matter yield per hectare.

#### **K-20-AST-5: Evaluation of promising fodder grass varieties under shade conditions**

Experiment was laid out at Vellayani centre to assess the influence of different shade levels on the growth, quality and yield of promising fodder varieties. Highest GFY (2418.7 q/ha) and DFY (604.7 q/ha) were recorded by CO-5 under open condition. Under 25 % and 50 % shade levels, highest GFY and DFY were recorded by guinea grass var. Sulabha.

#### **R- 19-AST-5: Standardization of Magnesium nutrition in Bajra Napier Hybrid**

Field experiment was laid out at Vellayani to assess the impact of varying doses and frequency of application of magnesium on the growth, yield and quality attributes of BN hybrid. Significantly superior values of green fodder (1891.3 q/ha) and dry matter yields (473.0 q/ha) were recorded with application of 100 kg MgSO<sub>4</sub>/ha once in 6 months.

#### **AVT-2 Trials**

##### **K-21-AST-1: Second Advanced Varietal Trial in Forage Pearl Millet (AVTPM-2-1)**

experiment was conducted to find out the response of four promising entries and three checks of pearl millet under three level of nitrogen application *i.e.* 30, 60 and 90 kg/ha. The study was undertaken at ten locations in four zones *i.e.* North West, North East, Central and South Zone. In North West and North East Zone, entry Dev-1 proved superior. In south zone JPM-18-7 produced maximum green, dry as well as crude protein yields. In central zone, entry 16ADV0055 proved higher yielder. Herbage yield and crude protein yield increased consistently with increasing level of nitrogen up to 90 Kg N/ha.

### **K-21-AST-2: Effect of nitrogen levels on forage yield of promising entries of forage maize**

A field trial AVTM-2 was conducted to find out the response of one promising entry and two checks of maize under four level of nitrogen application i.e. 40, 80, 120 and 160 kg/ha. The study was undertaken at three locations in North West Zone and two locations in Central Zone

In central zone the entry PFM-12 (661.7q GFY/ha) out yielded checks COHM and J-1106. In NW zone entry PFM-12 did not perform well. Herbage and crude protein yield increased consistently with increasing level of nitrogen up to 160 Kg N/ha.

### **K-21-AST-3: Effect of nitrogen levels of forage yield of promising of Dinanath grass**

A field trial AVTD-2 was conducted to find out the response of four promising entries of Dinanath grass to three graded doses of nitrogen (30, 60 and 90 kg N/ha). On locational mean basis the national check produced maximum green and dry forage yields of 262.4 and 52.56q/ha, respectively. herbage yield and crude protein content and yield increased consistently with increasing level of nitrogen up to 90 Kg N/ha.

## **C. FORAGE CROP PROTECTION**

The programme on forage crop protection was conducted at 6 locations. In total, 11 trials were conducted. Research aspect consisted of monitoring of pests and diseases in kharif forage crops, evaluation of kharif breeding material for pest and disease resistance, development of suitable crop protection technologies for pests and diseases of economic importance and assessment of yield losses due to pests and diseases in different fodder crops. The trial wise report is summarized below.

### **PPT 1: Monitoring of diseases and insect pests in kharif forage crops**

During *kharif* 2020, study of population dynamics of important diseases and insect pest in *kharif* forages (sorghum, maize, bajra, rice bean, cowpea and Bajra X Napier hybrids) was carried out at different locations.

**At Ludhiana**, in Pearl millet, leaf blast severity was 57.3%. Downy mildew incidence was 27.3%. In sorghum, grey leaf spot severity was 46.3%. Anthracnose severity was 43.6%. In maize, leaf blight severity was 44%. **At Palampur**, wilt-root rot complex (75% incidence) was the major diseases of cowpea. In maize, leaf blight (20%) was the major disease. Sorghum was severely infected with zonate leaf spot (60% severity). Leaf blast (30% severity) in Bajra was observed. **At Rahuri**, incidence of fall army worm in maize was moderate to high (29.8 to 74.8%). Maydis leaf blight infection was 11.1 to 45.3%. In cowpea, low to moderate level of infestation of aphids per plant (ranged-2.4 to 7.6 score) was noticed. The incidence of yellow mosaic virus was low to moderate (2.2 to 23.6%). **At Bhubaneswar**, wilt-root rot complex (24% incidence) and yellow mosaic virus (28% severity) were the major diseases of cowpea. In Maize, leaf blight (24%) and Banded leaf and sheath blight (16%) were the major diseases along with fall armyworm damage of 44%. Bajra was infected with leaf blast having 20% severity. In Rice bean, leaf defoliators (18% damage), root rot (28% incidence) and yellow mosaic virus (14% severity) were observed.

**At Coimbatore**, in sorghum, maximum anthracnose severity observed was 25.3%. In maize, maximum damage of fall armyworm was 30.4%. In cowpea, aphid incidence ranged from 7.33 and 10.66 aphids per plant. **At Jhansi**, Defoliators (44.5% damage) were major insect-pests of cowpea. In Maize, fall armyworm damage was 51.3%. Bajra was severely infected with leaf blast with severity of as high as 59.8 %. Sorghum was severely infected with zonate leaf spot having 62.7% disease severity.

## **PPT-2: Evaluation of kharif breeding materials for their resistance to diseases and insect-pests under natural conditions**

Various contributed entries along with national and zonal checks were screened for the occurrence of diseases and insect pests under natural conditions.

**IVT in Pearl Millet:** At Rahuri, all the entries were resistant to moderately resistant against blast disease. At Ludhiana, all entries were found susceptible to leaf blast. At Bhubaneswar, all the entries were resistant to moderately resistant against blast and defoliators except AFB-54 and RBB-1. At Jhansi, all the entries were resistant to moderately resistant against blast.

**AVT –1 in Pearl Millet:** At Rahuri, all the entries were resistant to moderately resistant against blast disease. At Ludhiana, all entries showed susceptible disease reaction to leaf blast. At Jhansi, all the entries were resistant to moderately resistant against leaf blast.

**AVT– 2 in Pearl Millet:** At Rahuri, all the entries were resistant to moderately resistant against blast disease. At Ludhiana, all entries showed susceptible disease reaction to leaf blast. At Bhubaneswar, all the entries were resistant to moderately resistant against blast and defoliators. At Jhansi, all the entries were resistant to moderately resistant against blast.

**IVT in cowpea:** At Rahuri, entries HFC 17-7, MFC-18-10 and PFC 40 were resistant to aphids, whereas PFC 36, UPC-5286 and TSFC-20-06 were moderately resistant. The entries TNFC 1910, MFC-18-8 and PFC 40 were found resistant to yellow mosaic virus. At Palampur, entries PFC 40 and TSFC-20-06 were found moderately resistant to root rot and wilt complex. At Ludhiana, all the entries were found resistant to cowpea mosaic virus except HFC 17-7, PFC 40 and TSFC-20-06. At Coimbatore, all the entries were resistant to moderately resistant to aphids and yellow mosaic virus infestation. **AVT-1 in Cowpea:** At Bhubaneswar, all the entries were found resistant to moderately resistant to aphid, root rot and mosaic except MFC-16-8. At Coimbatore, all the entries were resistant to aphids and yellow mosaic virus infestation.

**IVT in Maize:** At Rahuri, all the entries were found resistant to moderately resistant to fall armyworm except IIMFC 1, ADC-2 and PJHM-1 which were moderately susceptible. At Palampur, all the entries were resistant to moderately resistant against *Turcicum* leaf blight. At Ludhiana, all entries showed resistant to moderately resistant disease reaction to *Maydis* leaf blight. At Bhubaneswar, all the expressed resistant to moderately resistant reaction to leaf blight except Hybrid - FSM2021-1, IIMFC 2, CMH-12-686 showed moderate susceptibility to leaf blight. At Jhansi, the entries ADFM-3, IIMFC 1, IIMFC 2, ADFM-2, MFM-18-27, CMH-12-686, HPFM-11, and MFM-18-2 were found resistant to *Spodoptera frugiperda*.

**AVT–1 in Maize:** At Rahuri, all the entries were found resistant to moderately resistant to fall armyworm. At Ludhiana, all entries showed moderately resistant disease reaction to leaf blight of maize. At Palampur, all the entries were resistant to moderately resistant against *Turcicum* leaf blight. At Bhubaneswar, all the entries were resistant to moderately resistant against *Turcicum* leaf blight and banded leaf and sheath blight. At Jhansi, the entries PMC-13, PMC-11, COHM-8 were found resistant to *Spodoptera frugiperda*. At Coimbatore, all the entries were found resistant to *Spodoptera frugiperda*.



**AVT –2 in Maize:** At Rahuri, all the entries were found resistant to moderately resistant to fall armyworm and *Maydis* leaf blight. At Ludhiana, all entries showed moderately resistant disease reaction to leaf blight of maize. At Jhansi, all the tested entries were found resistant to *Spodoptera frugiperda*.

**AVT-2 in Dinanath Grass:** At Bhubaneswar, all the entries were resistant to moderately resistant to leaf spot and defoliators except BAU-DN-103-18-2 which was found moderately susceptible to both leaf spot and defoliators.

**VTCC- *Cenchrus ciliaris*:** At Rahuri, entries CAZRI 75, IGfRI 3108, RCCB-05 were resistant while entries RCCB-06 and IG-96-414 were moderately resistant to leaf blight.

**VTCS- *Cenchrus setigerus*:** At Rahuri, IG-96-706 (NC) was resistant to leaf blight.

#### **PPT-25: Validation of best treatments of trial entitled “Non chemical management of *Helminthosporium* leaf blight in fodder maize”**

The experiment was conducted at Ludhiana. Leaf blight severity was observed very less in plots treated with two foliar sprays of chitosan @ 0.05% at 10 days interval with 19.21% respectively with 55.64% disease control as compared to check (43.31% severity). Higher Benefit cost ratio of 3.69 was obtained in two foliar sprays of chitosan @ 0.05% at 10 days interval than other treatments.

#### **PPT-26: Management of leaf blast in forage pearl millet**

The experiment was conducted at Ludhiana, Bhubaneswar, Palampur and Jhansi. Among 11 treatments, at Jhansi, Palampur and Ludhiana, best treatment was T7 [Seed treatment with tebuconazole + trifloxystrobin @ 1 g/kg seed + foliar spray of tebuconazole + trifloxystrobin @ 0.4 g/L]. At Bhubaneswar, best treatment was T10 (seed treatment with tricyclazole @ 0.6 g/kg seed and two sprays of same fungicide @ 0.3 g/l).

#### **PPT-27: Management of invasive insect-pest fall army worm, *Spodoptera frugiperda* L. on Forage Maize**

The experiment was conducted at Rahuri, Ludhiana, Bhubaneswar and Jhansi. Among 10 treatments, at all the locations foliar spray of Emamectin benzoate 5 WG @ 0.5g/L was the most effective treatment in reducing the infestation of fall army in maize at 10 days after spray.

#### **PPT-28: Assessment of crop losses due to diseases and insect-pests in forage Cowpea**

The experiment was conducted at Ludhiana, Bhubaneswar, Palampur, Rahuri and Jhansi. Losses to the tune of 19.25%, 32.98%, 73.02%, 32.14% and 22.94 % in green fodder yield were recorded at Ludhiana, Bhubaneswar, Palampur, Rahuri and Jhansi respectively.

#### **PPT-29: Eco friendly management of Zonate leaf spot of Sorghum**

The experiment was conducted at Palampur. Among all the treatments, three foliar sprays of propiconazole @ 0.1% was found most effective (65.04% disease control with 18.48% increase in the green fodder yield over control). Among the non-chemical methods, three foliar spray of Tamarlasi @ 10% recorded 49.19% disease control with 12.35% increase in the yield over control.

### **PPT-30: Management of root rot and wilt in cowpea**

The experiment was conducted at Bhubaneswar. The chemical seed treatment with tebuconazole 2DAS @ 1g/kg seed along with basal soil application of *T. viride* @ 4kg/ha enriched in FYM @ 250 kg/ha was found the best which reduced the disease by 58.1% and increased the yield by 17.6% compared to control. Among nonchemical treatments, seed treatment with *T. viride* along with basal application of the same bio agent was found superior recording followed by *P. fluorescens*.

### **PPT-31: Estimation of yield losses due to insect-pests in fodder sorghum**

The experiment was conducted at Rahuri and coimbatore. At Rahuri, overall yield losses in sorghum were estimated to be 43.10%. Yield losses due to shootfly alone were estimated to be around 25.62%. Yield losses due to fall armyworm were estimated to be around 5.22%. Yield losses due to aphids were estimated to be around 20.97%. At Coimbatore, overall yield losses in sorghum were estimated to be 32.23%. Yield losses due to shootfly alone were estimated to be around 15.68%. Yield losses due to fall armyworm were estimated to be around 6.14%.

### **PPT-32: Estimation of yield losses due to foliar diseases (anthracnose, gray leaf spot and zonate leaf spot) in fodder sorghum**

The experiment was conducted at Ludhiana, Palampur and Jhansi. At Palampur, maximum green fodder yield loss recorded due to zonate leaf spot was 19%. At Jhansi, maximum green fodder yield loss recorded due to the zonate leaf spot was 16.2%. At Ludhiana, maximum green fodder yield loss recorded due to the diseases (gray leaf spot and anthracnose) was 30%.

## **D. BREEDER SEED PRODUCTION (*Kharif-2021*) [Indent Year *Kharif 2022*]**

In *Kharif-2021*, the indent for breeder seed production (Indent year *Kharif-2022*) was received from DAC, Govt. of India for 20 varieties of 6 forage crops viz., fodder maize, fodder pearl millet, fodder cowpea, fodder Gaur, Hedge Lucerne and Sewan Grass. The total indent for breeder seed production was 78.10q. The indent was allotted to Twelve SAUS/ICAR/NGO institutes. Among the quantity allotted for different forage crops, maximum was for forage maize (60.20q) followed by cowpea (15.90 q), pearl millet (1.55 q), fodder Guar (0.25 q), Hedge Lucerne (0.10q) and Sewan Grass (0.10q).

Variety wise scenario indicates that in Forage Maize, 04 varieties were indented and report from 08 centers indicate that the production was more or equal to indented quantity in all 4 varieties. Total production was 81.48 q as against the indent of 60.20 q making a surplus of 21.28 q (35.34%). In Forage pearl millet, indent was received for 6 varieties which were allocated to 5 centers. Production was surplus in GAFB-4, Raj Bajra-1, BAIF Bajra-1, FBC-16, and PCB-165 whereas it met the target in HC-20. Total production was 7.65q as against the indent of 1.55 q thereby making a surplus of 6.10 q (393.55%). In Forage cowpea, indent was received for 7 varieties which were allocated to 7 centers. Production was surplus in EC-4216, MFC-09-1, CL-367, UPC 628, UPC 8705, whereas it met the target in TNFC-0926. The production was deficit in Bundel Lobia-2, where the crop was reported to be damaged due to heavy rain. UAS Bengaluru reported production of 2.00 q seed of cowpea variety MFC-08-14 which was not indented. Total production was 22.75q as against the indent of 15.90q, thereby making a surplus of 6.85 q (43.08%).

In case of Sewan grass, indent of 0.10q was received for one variety RLS-11-50. Production was 11.00 q thereby making a surplus of 10.90q (10900%). In case of fodder guar, indent of 0.25q was received of one variety Bundel Guar-3. Production was nil as crop was reported to be damaged due to heavy rain. In case of hedge Lucerne, indent of 0.10 q was received for one variety TDN 1308 which was produced by TNAU, Coimbatore. ICAR-IGFRI Jhansi also reported production 0.20q seed of Guinea grass variety PGG 518 which was not indented.

Thus variety wise scenario indicates that production was equal or more in 18 varieties and deficit in 2 varieties as compared to indented quantity. The overall breeder seed production in forage crops was 123.18q as against the indent of 78.10q indicating that surplus production was 123.08q or 45.08q (57.72%) higher than the indented quantity.

**ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS & UTILIZATION**  
**ZONE, COORDINATED CENTERS AND TESTING LOCATIONS**

Zone	Coordinated Centers				Testing Locations		
	S.N.	Location	Establishment Year	State / Union Territory	S.N.	Location	State/Union Territory
I. Hill State/UT States = 3 Locations = 5	1.	Palampur, CSKHPKV	1970	Himachal Pradesh	1.	Almora, ICAR-VPKAS*	Uttarakhand
	2.	Srinagar, SKUAS&T-K	2010	Jammu & Kashmir	2.	Rajouri, SKUAST-J	J & K
II. North West States = 5 Locations = 14					3.	Bajoura (Kullu), CSKHPKV RRS	H P
	3.	Ludhiana, PAU	1989	Punjab	4.	Meerut, SVBPUA&T	Uttar Pradesh
	4.	Hisar, CCS HAU	1970	Haryana	5.	Ballowal Sankhari, PAU,RRS	Punjab
	5.	Pantnagar, GBPUAT	1995	Uttarakhand	6.	Avikanagar, IGFRI-RRS*	Rajasthan
	6.	Bikaner, SKRAU	1995	Rajasthan	7.	Jodhpur, ICAR-CAZRI*	Rajasthan
					8.	Bhilwara Arjia/DFRS,MPUAT	Rajasthan
					9.	Udaipur, MPUAT	Rajasthan
					10.	Pali-Marwar, ICAR-CAZRI-RRS*	Rajasthan
					11.	Jaisalmer, ICAR-CAZRI-RRS*	Rajasthan
					12.	Fatehpur Shekhawati/ARS SKNAU	Rajasthan
					13.	Jalore, SKRAU ARS	Rajasthan
III. East/North States = 9 Locations = 11	7.	Ayodhya, ANDUAT	1982	Uttar Pradesh	14.	Umiam (Barapani), ICAR Res. Complex for NEH Region*	Meghalaya
	8.	Ranchi, BAU	1970	Jharkhand	15.	Visva Bharti, Shantiniketan	West Bengal
	9.	Kalyani, BCKV	1972	West Bengal	16.	Medziphema, Nagaland University	Nagaland
	10.	Bhubaneswar,OUAT	1987	Orissa	17.	Sabour, BAU	Bihar
	11.	Jorhat, AAU	1970	Assam			
	12.	Imphal, CAU	2010	Manipur			
	13.	Pusa, RPCAU	2017	Bihar			

Zone	Coordinated Centers				Testing Locations		
	S.N.	Location	Establishment Year	State / UT	S.N.	Location	State/Union Territory
IV. Central States = 5 Locations = 11	14.	Anand, AAU	1970	Gujarat	18.	Kanpur, CSAU&T	Uttar Pradesh
	15.	Jabalpur, JNKVV	1970	Madhya Pradesh	19.	Jhansi, ICAR-IGFRI*	Uttar Pradesh
	16.	Rahuri, MPKV	1971	Maharashtra	20.	Dhari, JAU	Gujarat
	17.	Urulikanchan, BAIF	1982	Maharashtra	21.	Karjat, RARS, BSKKV	Maharashtra
	18.	Raipur, IGKV	2010	Chhattisgarh	22.	Akola, PDKVV	Maharashtra
					23.	Dapoli, COA	Maharashtra
V. South States/UT = 6 Locations = 9					24.	Palghar, ARS,DBSKKV	Maharashtra
	19.	Mandya, UAS (B)	1986	Karnataka	25.	Dharwad, ICAR-IGFRI-RRS*	Karnataka
	20.	Coimbatore, TNAU	1976	Tamil Nadu	26.	Karaikal, PJLNCA & RI,	Puducherry
	21.	Vellayani, KAU	1971	Kerala	27.	Tirupati/Guntur, ANGRAU	Andhra Pradesh
	22.	Hyderabad, PJTSAU	1970	Telangana	28.	Raichur, UAS,	Karnataka
					29.	Mattupetty, KLDB	Kerala

Summary: Zone = 5, States/UT = 27, Coordinating Centers = 22, Testing Locations = 29

\*ICAR Institute



## Entries Code for Kharif-2021

1. IVTM				4. AVTM-2 (Seed)			
S.N.	Contributor	Entry name	Code name	S.N.	Contributor	Entry name	Code name
1	IARI RS Dharwad	ADFM-3	IVTM- 1	1	(NC)	J-1006	AVTM-2- S-1
2	IARI, Delhi	AH-1645	IVTM- 2	2	(NC)	African Tall	AVTM-2- S-2
3	IIMR	IIMFC 1	IVTM- 3	3	(NC)	COHM-8	AVTM-2- S-3
4	IARI RS Dharwad	ADC-2	IVTM- 4	4	PAU Ludhiana	PFM-12	AVTM-2- S-4
5	(NC)	African Tall	IVTM- 5	5. IVTPM			
6	Foragen seeds pvt ltd	Hybrid - FSM2021-1	IVTM- 6	S.N.	Contributor	Entry name	Code name
7	IARI, Delhi	PJHM-1	IVTM- 7	1	JNKVV, Jabalpur	JPM-18-71	IVTPM-1
8	(NC)	J-1006	IVTM- 8	2	(ZC-NWZ)	AFB-3	IVTPM-2
9	IIMR	IIMFC 2	IVTM- 9	3	(ZC-NEW)	APFB-9-1	IVTPM-2
10	IARI RS Dharwad	ADFM-2	IVTM- 10	4	(ZC-CZ)	BAIF Bajra 1	IVTPM-2
11	ZARS, Mandya	MFM-18-27	IVTM- 11	5	(ZC-SZ)	Moti Bajra	IVTPM-2
12	TNAU, Coimbatore	CMH-12-686	IVTM- 12	6	PAU, Ludhiana	FBL-7	IVTPM-3
13	CSKHPKV, Palampur	HPFM-11	IVTM- 13	7	PAU, Ludhiana	FBL -6	IVTPM-4
14	ZARS, Mandya	MFM-18-2	IVTM- 14	8	AAU, Anand	AFB-45	IVTPM-5
15	GBPUAT, Pantnagar	DFH -4	IVTM- 15	9	NDUAT, Ayodhya	NDFB-942	IVTPM-6
16	SKUAST-K, Srinagar	KDFM -7	IVTM- 16	10	AAU, Anand	AFB-54	IVTPM-7
17	(NC)	COHM-8	IVTM- 17	11	(NC)	Giant Bajra	IVTPM-8
2. AVTM-1				12	(NC)	RBB-1	IVTPM-9
S.N.	Contributor	Entry name	Code name	13	Advanta Seeds Pvt Ltd	ADV175020	IVTPM-10
1	(NC)	African Tall	AVTM-1- 1	14	(Foragen Seeds)	Hybrid - FSB2021 - 1	IVTPM-11
2	SKUAST-K, Srinagar	KDFM-6	AVTM-1- 2	6. AVTPM-1			
3	(NC)	J-1006	AVTM-1- 3	S.N.	Contributor	Entry name	Code name
4	PAU, Ludhiana	PFM-13	AVTM-1- 4	1	PAU, Ludhiana	FBL 4	AVTPM-1-1
5	CCSHAU,RS Karnal	HQPM 28	AVTM-1- 5	2	(NC)	RBB-1	AVTPM-1-2
6	GBPUAT, Pantnagar	DFH-2	AVTM-1- 6	3	(ZC-NWZ)	AFB-3	AVTPM-1- 3
7	MPUAT, Udaipur	PMC-13	AVTM-1- 7	4	(ZC-NEW)	APFB-9-1	AVTPM-1- 3
8	MPUAT, Udaipur	PMC-11	AVTM-1- 8	5	(ZC-CZ)	BAIF Bajra 1	AVTPM-1- 3
9	(NC)	COHM-8	AVTM-1- 9	6	(ZC-SZ)	Moti Bajra	AVTPM-1- 3
3. AVTM-2				7	PJTSAU, Hyderabad	TSFB-1610	AVTPM-1- 4
S.N.	Contributor	Entry name	Code name	8	Advanta Ltd	16ADV0111	AVTPM-1- 5
1	(NC)	J-1006	AVTM-2- 1	9	JNKVV, Jabalpur	JPM 18-37	AVTPM-1- 6
2	(NC)	African Tall	AVTM-2- 2	10	(NC)	Giant Bajra	AVTPM-1- 7
3	(NC)	COHM-8	AVTM-2- 3	11	PAU, Ludhiana	PHBF-5	AVTPM-1- 8
4	PAU Ludhiana	PFM-12	AVTM-2- 4				

7. AVTPM-2				10. AVTC-1			
S.N.	Contributor	Entry name	Code name	S.N.	Contributor	Entry name	Code name
1	(ZC-NWZ)	AFB-3	AVTPM-2-1	1	HAU, Hisar	HFC17-9	AVTC-1- 1
2	(ZC-NEW)	APFB-9-1	AVTPM-2-1	2	(NC)	UPC-5286	AVTC-1- 2
3	(ZC-CZ)	BAIF Bajra 1	AVTPM-2-1	3	(ZC-NEZ)	UPC-628	AVTC-1- 3
4	(ZC-SZ)	Moti Bajra	AVTPM-2-1	4	(ZC-SZ)	MFC-8-14	AVTC-1- 3
5	JNKVV, Jabalpur	JPM-18-7	AVTPM-2-2	5	(NC)	Bundel Lobia-1	AVTC-1- 4
6	BAIF, Urulikanchan	BAIF Bajra-7	AVTPM-2-3	6	ZARS Mandya	MFC-16-8	AVTC-1- 5
7	(NC)	RBB-1	AVTPM-2-4	11. IVT Rice bean			
8	Advanta Ltd	16ADV0055	AVTPM-2-5	S.N.	Contributor	Entry name	Code name
9	Crystal Corp Ltd	Dev-1	AVTPM-2-6	1	(NC)	Bidhan-2	IVTRB- 1
10	(NC)	Giant Bajra	AVTPM-2-7	2	BCKV, Kalyani	BRB1-L13P5	IVTRB- 2
8. AVTPM-2 (Seed)				3	AAU, Jorhat	JOR-21-1	IVTRB- 3
S.N.	Contributor	Entry name	Code name	4	JNKVV, Jabalpur	JRBJ-12-9	IVTRB- 4
1	(NC)	Giant Bajra	AVTPM-2-S-1	5	AAU, Jorhat	JOR-21-2	IVTRB- 5
2	JNKVV, Jabalpur	JPM-18-7	AVTPM-2-S-2	6	(NC)	Bidhan-3	IVTRB- 6
3	BAIF, Urulikanchan	BAIF Bajra-7	AVTPM-2-S-3	12. AVT-2 Dinanath Grass			
4	(NC)	RBB-1	AVTPM-2-S-4	S.N.	Contributor	Entry name	Code name
5	(ZC-NWZ)	AFB-3	AVTPM-2-S-5	1	IGFRI, Jhansi	JHD-19-4	AVT-2-DN-1
6	(ZC-NEW)	APFB-9-1	AVTPM-2-S-5	2	BAU, Ranchi	BAU-DN-103-18-2	AVT-2-DN-2
7	(ZC-CZ)	BAIF Bajra 1	AVTPM-2-S-5	3	BAU, Ranchi	BAU-DN-109-8	AVT-2-DN-3
8	(ZC-SZ)	Moti Bajra	AVTPM-2-S-5	4	NC	Bundel Dinanath-2	AVT-2-DN-4
9	Crystal Corp Ltd	Dev-1	AVTPM-2-S-6	5	BAU, Ranchi	BAU-DN-110-18-2	AVT-2-DN- 5
10	Advanta Ltd	16ADV0055	AVTPM-2-S-7	13. AVT-2 Dinanath Grass (Seed)			
9. IVTC				S.N.	Contributor	Entry name	Code name
S.N.	Contributor	Entry name	Code name	1	IGFRI, Jhansi	JHD-19-4	AVT-2 DN-S-1
1	(ZC-HZ)	UPC-622	IVTC-1	2	BAU, Ranchi	BAU-DN-103-18-2	AVT-2 DN-S-2
2	(ZC-NWZ)	Bundel Lobia-2	IVTC-1	3	BAU, Ranchi	BAU-DN-109-8	AVT-2 DN-S-3
3	(ZC-NEZ)	TNFC 0926	IVTC-1	4	NC	Bundel Dinanath-2	AVT-2 DN-S-4
4	(ZC-CZ)	UPC-9202	IVTC-1	5	BAU, Ranchi	BAU-DN-110-18-2	AVT-2 DN-S-5
5	(ZC-SZ)	MFC-09-1	IVTC-1	14. VT Cenchrus ciliaris-2019 3 <sup>rd</sup> Year			
6	PAU, Ludhiana	PFC 36	IVTC- 2	S.N.	Contributor	Entry name	Code name
7	TNAU, Coimbatore	TNFC 1910	IVTC- 3	1	SKRAU, Bikaner	RCCB-06	VTCC19-1
8	UAS B ZARS, Mandya	MFC-18-8	IVTC- 4	2	MPKV, Rahuri	RCC-2016-8	VTCC19-2
9	GBPUAT, Pantnagar	UPC 21-1	IVTC- 5	3	IGFRI RRS, Avikanagar	IG-67-1263	VTCC19-3
10	CCS HAU, Hisar	HFC 17-7	IVTC- 6	4	CAZRI, Jodhpur	CAZRI-327	VTCC19-4
11	UAS B ZARS, Mandya	MFC-18-10	IVTC- 7	5	(NC)	IGFRI-67-365	VTCC19-5
12	(NC)	Bundel Lobia-1	IVTC- 8	6	(NC)	CAZRI 75	VTCC19-6
13	(NC)	UPC-5286	IVTC- 9	7	(NC))	IGFRI 3108	VTCC19-7
14	PAU, Ludhiana	PFC 40	IVTC- 10	8	SKRAU, Bikaner	RCCB-05	VTCC19-8
15	PJTSAU, Hyderabad	TSFC-20-06	IVTC- 11	9	IGFRI RRS, Avikanagar	IG-96-414	VTCC19-9

<b>15. VT Cenchrus setigerus -2019 3<sup>rd</sup> Year</b>			
<b>S.N.</b>	<b>Contributor</b>	<b>Entry name</b>	<b>Code name</b>
1	IGFRI RRS Avikanagar	IG-97-433	VTCS19-1
2	SKRAU, Bikaner	RCSB-09	VTCS19-2
3	(NC)	IG-96-706	VTCS19-3
4	IGFRI RRS Avikanagar	IG-97-447	VTCS19-4
5	(NC)	TNCS-265	VTCS19-5
6	SKRAU, Bikaner	RCSB-08	VTCS19-6
7	(NC)	CAZRI-76	VTCS19-7
<b>Entries Code Agronomy Kharif-2021</b>			
<b>1. (AVTM-2) Maize (Agronomy)</b>			
<b>S.N.</b>	<b>Contributor</b>	<b>Entry name</b>	<b>Code name</b>
1	(NC)	J-1006	AVTM-2-Ag-1
2	(NC)	African Tall	AVTM-2-Ag-2
3	IIMR hybrid	COHM-8	AVTM-2-Ag-3
4	PAU Ludhiana	PFM-12	AVTM-2-Ag-4
<b>2. (AVTPM-2) Pearl Millet (Agronomy)</b>			
<b>S.N.</b>	<b>Contributor</b>	<b>Entry name</b>	<b>Code name</b>
1	(NC)	Giant Bajra	AVTPM-2-1-Ag-1
2	JNKVV, Jabalpur	JPM-18-7	AVTPM-2-1-Ag-2
3	BAIF, Urulikanchan	BAIF Bajra-7	AVTPM-2-1-Ag-3
4	Rajasthan check	RBB-1	AVTPM-2-1-Ag-4
5	(ZC-NWZ)	AFB-3	AVTPM-2-1-Ag-5
6	(ZC-NEW)	APFB-9-1	AVTPM-2-1-Ag-5
7	(ZC-CZ)	BAIF Bajra 1	AVTPM-2-1-Ag-5
8	(ZC-SZ)	Moti Bajra	AVTPM-2-1-Ag-5
9	Crystal Corp Ltd	Dev-1	AVTPM-2-1-Ag-6
10	Advanta Ltd	16ADV0055	AVTPM-2-1-Ag-7
<b>3. AVT-2 Dinanath Grass (Agronomy)</b>			
<b>S.N.</b>	<b>Contributor</b>	<b>Entry name</b>	<b>Code name</b>
1	IGFRI, Jhansi	JHD-19-4	AVT-2-DN-Ag-1
2	BAU, Ranchi	BAU-DN-110-18-2	AVT-2-DN-Ag-2
3	BAU, Ranchi	BAU-DN-109-8	AVT-2-DN-Ag-3
4	NC	Bundel Dinanath-2	AVT-2-DN-Ag-4
5	BAU, Ranchi	BAU-DN-103-18-2	AVT-2-DN-Ag-5

## 1. IVTM: INITIAL VARIETAL TRIAL IN FORAGE MAIZE

(Reference Tables: 1.1 to 1.9)

An Initial Varietal Trial in Forage Maize comprising of fourteen (14) entries with three national checks *viz.*, African Tall, J-1006, COHM-8 was conducted at 23 locations in five zones of the country. There were 4 locations each in hill, south and 5 each in north-west, north-east and central zones.

For green forage yield (q/ha), entry CMH-12-686 showed superiority over the best check by a margin of 10.8% in HZ, 6.8% in CZ, 7.8% in SZ, and 4.4% at all India level. Entry PJHM-1 showed superiority of the best check by a margin of 7.0% in HZ and 1.5% at all India level. Entry MFM-18-2 showed superiority of 7.2% over the best check in SZ. In other zones and at all India level, other entries were either marginally superior or inferior to checks for GFY.

For dry matter yield (q/ha), entry PJHM-1 was superior by a margin of 4.2% in HZ, 7.0% in NWZ, 6.3% in CZ and 5.7 % at all India level. Entry CMH-12-686 showed superiority over the best check by a margin of 5.5% in CZ, and 6.1% at all India level. Entry IIMFC-2 showed superiority of 8.6% over the best check in NEZ. Entry ADFM-2 showed superiority of 6.0% over the best check in NEZ. Hybrid FSM 2021-1 showed superiority of 5.9% in NEZ. In other zones and at all India level, other entries were either marginally superior or inferior to checks for GFY.

For green fodder per day productivity (q/ha/day), entry CMH-12-686(6.55 q/ha/day) was best followed by PJHM-1 (6.50 q/ha/day) and national check J-1006 (6.24 q/ha/day). For dry fodder per day productivity, entry PJHM-1(1.71 q/ha/day) was best followed by CMH-12-686 (1.67 q/ha/day), AH-1645 (1.61 q/ha/day), Best national check J-1006 showed productivity of 1.56q/ha/day only.

For plant height, African Tall (203.4 cm) was adjudged best performer followed by entry MFM-18-27 (201.1 cm).For leafiness, entries CMH-12-686 and AH 1645 were joint first (0.53)

For crude protein yield (q/ha), entry PJHM-1ranked first in HZ, entry CMH-12-686 in NWZ and CZ, entry IIMFC-2 in NEZ, and National check African Tall in SZ. At all India level, entry CMH-12-686 (8.0 q/ha) was best followed by PJHM-1 (7.8 q/ha). The best performer in check category was African Tall (7.3 q/ha).

For crude protein (%), entry PJHM-1 ranked first in hill, national check African Tall in NWZ and SZ, entry CMH-12-686 in CZ, entry IIMFC-2 in NEZ, and National check African Tall in SZ. At all India level African Tall (8.7 %) was best performer. For other quality parameters, Checks J-1006 and COHM-8 ranked first for ADF and NDF respectively, while CMH-12-686was best performer for IVDMD followed by ADFM-2.

**Table 1.1 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	Hill Zone						
	Palampur	Srinagar	Rajouri	Almora	Average	Rank	Superiority%
ADFM-3	329.6	465.3	459.9	297.3	388.0	7	
AH-1645	339.2	447.0	485.8	263.9	384.0	8	
IIMFC 1	251.8	463.7	441.4	118.1	318.7	16	
ADC-2	447.3	457.0	468.1	152.8	381.3	9	
Hybrid - FSM2021-1	338.5	483.7	431.0	194.5	361.9	10	
PJHM-1	477.7	493.3	423.6	277.8	418.1	2	7.0
IIMFC 2	268.1	448.3	466.1	159.7	335.6	15	
ADFM-2	463.7	421.7	402.6	291.7	394.9	4	1.0
MFM-18-27	442.2	505.3	459.9	173.6	395.3	3	1.1
CMH-12-686	460.7	488.0	468.1	315.3	433.0	1	10.8
HPFM-11	364.4	457.3	414.0	208.4	361.0	11	
MFM-18-2	459.2	431.7	366.2	173.6	357.7	12	
DFH -4	214.1	447.3	448.8	93.1	300.8	17	
KDFM -7	402.9	463.3	362.9	132.0	340.3	14	
African Tall (NC)	396.3	481.7	497.3	187.6	390.7	6	
J-1006 (NC)	351.8	463.3	408.1	340.2	390.8	5	
COHM-8 (NC)	435.5	446.0	363.2	159.7	351.1	13	
<b>Mean</b>	<b>379.0</b>	<b>462.6</b>	<b>433.3</b>	<b>208.2</b>	<b>370.8</b>		
<b>CD at 5%</b>	<b>76.1</b>	<b>44.4</b>	<b>2.8</b>	<b>51.9</b>			
<b>CV (%)</b>	<b>12.0</b>	<b>5.8</b>	<b>10.7</b>	<b>18.0</b>			



**Table 1.1 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	North West Zone						Rank
	Ludhiana	Hisar	Pantnagar	Jalore	**Udaipur	Average	
ADFM-3	348.4	271.1	265.4	179.6	62.6	266.1	11
AH-1645	481.8	331.7	254.9	163.0	51.0	307.8	4
IIMFC 1	259.5	278.3	222.2	244.4	52.1	251.1	14
ADC-2	335.7	264.9	196.6	207.4	71.3	251.2	13
Hybrid - FSM2021-1	361.1	257.5	220.5	234.3	56.7	268.3	8
PJHM-1	526.2	322.7	319.8	222.2	63.7	347.7	2
IIMFC 2	227.8	220.8	193.4	129.6	64.2	192.9	16
ADFM-2	380.2	283.4	263.5	146.3	82.3	268.3	8
MFM-18-27	361.1	224.0	318.1	169.0	53.4	268.1	9
CMH-12-686	405.6	305.4	309.3	307.9	57.1	332.1	3
HPFM-11	310.3	289.8	333.3	278.7	59.0	303.0	6
MFM-18-2	392.8	303.6	281.9	238.4	88.1	304.2	5
DFH -4	215.1	264.0	184.7	108.8	65.5	193.2	15
KDFM -7	335.7	303.6	227.1	172.7	65.1	259.8	12
African Tall (NC)	303.9	296.7	238.3	228.2	66.1	266.8	10
J-1006 (NC)	551.6	376.3	311.5	236.6	60.0	369.0	1
COHM-8 (NC)	430.9	314.0	246.4	134.3	63.8	281.4	7
<b>Mean</b>	<b>366.3</b>	<b>288.7</b>	<b>258.1</b>	<b>200.1</b>	<b>63.6</b>	<b>278.3</b>	
<b>CD at 5%</b>	<b>33.0</b>	<b>49.8</b>	<b>26.6</b>	<b>67.3</b>	<b>13.6</b>		
<b>CV (%)</b>	<b>6.2</b>	<b>10.4</b>	<b>9.8</b>		<b>12.8</b>		

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 1.1 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	North East Zone							
	Bhubaneswar	Ranchi	Pusa	Ayodhya	Imphal	Average	Rank	Superiority%
ADFM-3	254.1	449.3	393.3	281.8	406.0	356.9	10	
AH-1645	284.3	472.9	360.0	273.6	451.4	368.4	9	
IIMFC 1	370.8	385.4	313.3	232.8	456.0	351.7	13	
ADC-2	239.6	384.0	323.3	224.6	403.0	314.9	16	
Hybrid - FSM2021-1	204.1	488.2	453.3	465.5	428.1	407.9	2	2.5
PJHM-1	335.4	447.9	353.3	302.2	510.4	389.8	6	
IIMFC 2	219.8	496.5	430.0	420.6	509.0	415.2	1	4.3
ADFM-2	251.0	486.8	366.7	330.8	602.2	407.5	3	2.4
MFM-18-27	321.8	491.7	300.0	289.9	577.3	396.1	5	
CMH-12-686	212.5	493.7	383.3	343.0	439.9	374.5	7	
HPFM-11	234.3	450.7	340.0	232.8	350.0	321.6	15	
MFM-18-2	316.6	387.5	296.7	200.2	577.9	355.8	11	
DFH -4	279.1	487.5	310.0	175.6	313.1	313.1	17	
KDFM -7	309.3	490.3	283.3	220.5	413.4	343.4	14	
African Tall (NC)	380.2	436.1	376.7	200.1	596.5	397.9	4	
J-1006 (NC)	367.7	484.7	356.7	249.1	395.4	370.7	8	
COHM-8 (NC)	306.2	483.3	323.3	200.1	460.9	354.8	12	
<b>Mean</b>	<b>287.5</b>	<b>459.8</b>	<b>350.8</b>	<b>273.1</b>	<b>464.1</b>	<b>367.1</b>		
<b>CD at 5%</b>	<b>32.8</b>	<b>38.1</b>	<b>11.7</b>	<b>51.8</b>	<b>42.0</b>			
<b>CV (%)</b>	<b>6.9</b>	<b>5.0</b>	<b>12.3</b>	<b>11.1</b>	<b>5.4</b>			

**Table 1.1 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	Central Zone							
	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority%
ADFM-3	324.1	423.3	222.0	416.7	253.7	328.0	13	
AH-1645	342.6	444.2	258.4	517.2	187.0	349.9	9	
IIMFC 1	363.4	465.0	268.5	446.9	161.1	341.0	12	
ADC-2	254.6	312.3	261.2	352.1	313.0	298.7	16	
Hybrid - FSM2021-1	324.1	340.1	233.9	400.3	292.6	318.2	14	
PJHM-1	361.1	451.1	317.7	638.1	335.2	420.6	2	2.8
IIMFC 2	261.6	305.4	231.3	333.3	263.0	278.9	17	
ADFM-2	331.0	569.1	243.8	474.7	231.5	370.0	8	
MFM-18-27	375.0	659.3	235.6	482.9	235.2	397.6	4	
CMH-12-686	344.9	617.7	277.7	567.0	375.9	436.6	1	6.8
HPFM-11	314.8	416.4	281.0	402.0	166.7	316.2	15	
MFM-18-2	273.2	652.4	235.2	396.3	161.1	343.6	11	
DFH -4	423.6	610.7	328.4	357.0	261.1	396.2	5	
KDFM -7	284.7	374.8	278.4	506.5	298.1	348.5	10	
African Tall (NC)	365.7	423.3	290.0	525.3	331.5	387.2	6	
J-1006 (NC)	365.7	451.1	333.8	592.3	301.9	409.0	3	
COHM-8 (NC)	326.4	589.9	309.5	447.7	238.9	382.5	7	
<b>Mean</b>	<b>331.6</b>	<b>476.8</b>	<b>271.0</b>	<b>462.1</b>	<b>259.3</b>	<b>360.1</b>		
<b>CD at 5%</b>	<b>83.3</b>	<b>1.8</b>	<b>50.4</b>	<b>101.7</b>	<b>110.7</b>			
<b>CV (%)</b>	<b>15.1</b>	<b>13.8</b>	<b>11.2</b>	<b>13.2</b>	<b>25.7</b>			

**Table 1.1 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	South Zone							All India		
	Hydera- bad	Coimb- atore	Man- dya	Karai- kal	Aver- age	Ra- nk	Superi- ority%	Aver- age	Ra- nk	Superi- ority%
ADFM-3	310.2	490.7	415.7	330.0	386.7	12		344.9	11	
AH-1645	488.0	569.4	471.2	320.2	462.2	3	3.0	373.1	7	
IIMFC 1	433.4	472.2	374.1	380.7	415.1	10		336.5	14	
ADC-2	441.7	467.6	301.2	273.0	370.9	14		321.9	15	
Hybrid - FSM2021-1	372.3	472.2	320.6	300.4	366.4	15		346.2	10	
PJHM-1	355.6	675.9	334.0	317.4	420.7	9		399.9	2	1.5
IIMFC 2	443.6	393.5	324.6	289.6	362.8	16		319.8	16	
ADFM-2	444.5	555.6	379.8	313.9	423.4	8		374.3	6	
MFM-18-27	481.5	527.8	435.3	300.5	436.3	5		380.3	4	
CMH-12-686	549.1	592.6	452.5	340.6	483.7	1	7.8	411.4	1	4.4
HPFM-11	473.2	546.3	396.3	293.8	427.4	7		343.4	12	
MFM-18-2	585.2	601.9	438.8	297.9	481.0	2	7.2	366.7	8	
DFH -4	451.9	254.6	355.3	270.5	333.1	17		311.6	17	
KDFM -7	463.0	476.9	376.6	287.0	400.9	11		339.2	13	
African Tall (NC)	474.1	634.3	369.2	317.1	448.7	4		379.5	5	
J-1006 (NC)	454.7	518.5	376.8	380.3	432.6	6		394.0	3	
COHM-8 (NC)	349.1	481.5	379.9	317.1	381.9	13		352.0	9	
<b>Mean</b>	<b>445.4</b>	<b>513.6</b>	<b>382.5</b>	<b>313.5</b>	<b>413.7</b>			<b>358.5</b>		
<b>CD at 5%</b>	<b>92.6</b>	<b>46.3</b>	<b>43.1</b>	<b>42.4</b>						
<b>CV (%)</b>	<b>12.5</b>	<b>5.4</b>	<b>8.0</b>	<b>7.8</b>						

**Table 1.2 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	Hill Zone					
	Palampur	Srinagar	Almora	Average	Rank	Superiority%
ADFM-3	103.9	114.3	76.3	98.2	8	4.2
AH-1645	107.3	105.0	58.9	90.4	13	
IIMFC 1	82.4	109.0	32.8	74.7	16	
ADC-2	144.4	108.6	49.7	100.9	5	
Hybrid - FSM2021-1	105.8	118.0	49.7	91.2	12	
PJHM-1	163.0	111.3	65.3	113.2	1	
IIMFC 2	85.5	106.3	42.9	78.2	15	
ADFM-2	141.0	96.3	63.6	100.3	6	
MFM-18-27	134.7	108.3	52.5	98.5	7	
CMH-12-686	146.3	105.3	65.5	105.7	3	
HPFM-11	121.4	114.6	54.3	96.8	9	
MFM-18-2	152.2	107.0	51.8	103.7	4	
DFH -4	69.2	99.3	29.5	66.0	17	
KDFM -7	128.8	102.0	35.4	88.7	14	
African Tall (NC)	126.3	112.6	51.3	96.7	10	
J-1006 (NC)	119.3	110.6	96.1	108.7	2	
COHM-8 (NC)	146.0	100.0	41.0	95.7	11	
<b>Mean</b>	<b>122.2</b>	<b>107.6</b>	<b>53.9</b>	<b>94.6</b>		
<b>CD at 5%</b>	<b>27.7</b>	<b>10.9</b>	<b>7.6</b>			
<b>CV%</b>	<b>13.6</b>	<b>6.1</b>	<b>10.3</b>			



**Table 1.2 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	North West Zone						Superiority%
	Ludhiana	Hisar	Pantnagar	Jalore	Average	Rank	
ADFM-3	94.0	32.1	50.4	31.0	51.9	9	7.0
AH-1645	137.4	36.5	47.0	28.0	62.2	4	
IIMFC 1	70.1	29.0	41.5	41.7	45.6	13	
ADC-2	100.7	30.8	40.4	35.4	51.8	10	
Hybrid - FSM2021-1	101.1	29.9	41.8	39.9	53.2	8	
PJHM-1	152.6	42.3	60.6	38.1	73.4	1	
IIMFC 2	44.5	29.5	37.1	21.9	33.2	16	
ADFM-2	104.7	38.3	45.2	25.0	53.3	7	
MFM-18-27	72.2	26.1	59.5	28.9	46.7	12	
CMH-12-686	115.7	39.7	63.4	52.4	67.8	3	
HPFM-11	93.1	36.7	61.6	47.7	59.8	6	
MFM-18-2	64.9	35.4	53.0	39.2	48.1	11	
DFH -4	52.8	39.2	37.7	19.2	37.2	15	
KDFM -7	85.7	47.8	44.5	29.5	51.9	9	
African Tall (NC)	60.8	35.7	44.5	39.1	45.0	14	
J-1006 (NC)	121.4	54.4	57.5	40.9	68.6	2	
COHM-8 (NC)	129.3	42.6	48.0	23.3	60.8	5	
<b>Mean</b>	<b>94.2</b>	<b>36.8</b>	<b>49.0</b>	<b>34.2</b>	<b>53.6</b>		
<b>CD at 5%</b>	<b>6.3</b>	<b>12.2</b>	<b>5.5</b>	<b>10.6</b>			
<b>CV%</b>	<b>7.0</b>	<b>19.6</b>	<b>6.9</b>				

**Table 1.2 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	North East Zone							Superiority%
	Bhubaneswar	Ranchi	Pusa	Ayodhya	Imphal	Average	Rank	
ADFM-3	62.2	97.3	93.3	68.9	77.1	79.8	11	2.1
AH-1645	70.8	141.1	80.0	69.7	83.3	89.0	5	
IIMFC 1	92.8	82.9	77.0	66.3	73.0	78.4	13	
ADC-2	60.3	87.7	80.0	60.5	82.7	74.2	15	5.9
Hybrid - FSM2021-1	51.3	113.9	104.0	111.7	80.8	92.3	3	
PJHM-1	81.2	103.8	80.0	71.0	94.6	86.1	7	
IIMFC 2	55.6	118.3	91.7	107.1	100.5	94.7	1	8.6
ADFM-2	61.2	113.6	85.0	89.3	112.8	92.4	2	6.0
MFM-18-27	81.6	117.2	75.0	75.4	71.7	84.2	8	2.2
CMH-12-686	53.7	130.8	86.7	96.0	78.2	89.1	4	
HPFM-11	55.3	94.6	75.0	61.6	60.3	69.4	17	
MFM-18-2	78.8	83.3	75.7	48.9	101.6	77.7	14	
DFH -4	69.4	131.6	79.0	44.2	42.0	73.3	16	
KDFM -7	76.3	114.4	70.3	57.3	100.1	83.7	9	
African Tall (NC)	94.8	84.3	90.0	52.9	113.8	87.2	6	
J-1006 (NC)	95.9	99.4	83.3	60.9	53.7	78.6	12	
COHM-8 (NC)	75.9	112.0	80.0	48.6	91.1	81.5	10	
<b>Mean</b>	<b>71.6</b>	<b>107.4</b>	<b>82.7</b>	<b>70.0</b>	<b>83.4</b>	<b>83.0</b>		
<b>CD at 5%</b>	<b>8.7</b>	<b>26.8</b>	<b>7.2</b>	<b>12.5</b>	<b>11.6</b>			
<b>CV%</b>	<b>7.3</b>	<b>3.5</b>	<b>11.5</b>	<b>7.6</b>	<b>8.4</b>			

**Table 1.2 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	Central Zone							
	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority%
ADFM-3	74.8	99.6	47.7	77.2	73.5	74.6	11	
AH-1645	75.6	105.4	60.6	92.4	44.8	75.8	9	
IIMFC 1	85.1	110.3	47.6	59.2	33.8	67.2	15	
ADC-2	59.9	73.3	52.5	57.6	77.8	64.2	16	
Hybrid - FSM2021-1	80.6	78.6	48.5	90.5	71.0	73.8	12	
PJHM-1	88.4	108.7	61.8	110.3	95.2	92.9	1	6.3
IIMFC 2	65.8	71.7	39.7	57.4	56.0	58.1	17	
ADFM-2	81.0	137.6	45.3	106.9	64.2	87.0	5	
MFM-18-27	93.9	161.8	39.0	69.0	45.9	81.9	6	
CMH-12-686	84.2	151.0	59.1	86.0	80.7	92.2	2	5.5
HPFM-11	76.3	99.8	60.1	73.7	47.1	71.4	14	
MFM-18-2	71.9	159.5	35.6	78.8	31.4	75.4	10	
DFH -4	110.4	148.8	57.9	60.5	74.4	90.4	3	3.4
KDFM -7	69.4	88.7	53.3	87.2	69.2	73.6	13	
African Tall (NC)	77.7	99.5	46.7	114.7	69.7	81.7	7	
J-1006 (NC)	92.0	108.7	65.0	99.6	71.9	87.4	4	
COHM-8 (NC)	74.6	143.6	57.9	75.2	54.3	81.1	8	
<b>Mean</b>	<b>80.1</b>	<b>114.5</b>	<b>51.7</b>	<b>82.1</b>	<b>62.4</b>	<b>78.2</b>		
<b>CD at 5%</b>	<b>21.1</b>	<b>0.4</b>	<b>9.4</b>	<b>17.7</b>	<b>26.0</b>			
<b>CV%</b>	<b>15.9</b>	<b>13.8</b>	<b>11.0</b>	<b>12.9</b>	<b>25.0</b>			

**Table 1.2 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	South Zone							All India		
	Hydera- bad	Coimb- atore	Man- dya	Karai- kal	Aver- age	Ra- nk	Superi- ority%	Aver- age	Ra- nk	Superi- ority%
ADFM-3	51.1	113.6	98.4	110.4	93.4	7	4.3	78.4	9	5.7
AH-1645	83.4	124.8	118.5	98.5	106.3	1		84.2	4	
IIMFC 1	73.4	94.4	73.7	122.0	90.9	10		71.3	14	
ADC-2	74.8	101.2	72.6	84.5	83.3	13		73.1	13	
Hybrid - FSM2021-1	63.6	108.8	70.0	77.0	79.8	15	1.7	77.9	10	6.1
PJHM-1	58.6	153.6	78.2	83.6	93.5	6		90.6	2	
IIMFC 2	71.0	83.6	74.0	74.8	75.8	17		68.3	16	
ADFM-2	75.4	116.8	84.1	82.0	89.6	11		84.2	4	
MFM-18-27	79.1	110.5	113.0	84.9	96.9	5	1.7	81.0	6	6.1
CMH-12-686	87.5	121.3	106.6	99.0	103.6	2		90.9	1	
HPFM-11	81.6	114.5	90.0	84.0	92.5	8		76.4	12	
MFM-18-2	91.8	119.3	115.3	77.3	100.9	4		79.6	8	
DFH -4	89.6	56.7	85.6	72.2	76.0	16	1.7	70.0	15	6.1
KDFM -7	79.6	97.4	89.6	90.0	89.2	12		77.0	11	
African Tall (NC)	81.1	140.9	81.0	104.6	101.9	3		82.0	5	
J-1006 (NC)	57.2	120.5	87.7	103.0	92.1	9		85.7	3	
COHM-8 (NC)	58.0	95.6	98.2	77.9	82.4	14	1.7	79.7	7	6.1
<b>Mean</b>	<b>73.9</b>	<b>110.2</b>	<b>90.4</b>	<b>89.8</b>	<b>91.1</b>			<b>79.4</b>		
<b>CD at 5%</b>	<b>17.4</b>	<b>14.4</b>	<b>16.4</b>	<b>19.7</b>						
<b>CV%</b>	<b>14.1</b>	<b>5.6</b>	<b>13.0</b>	<b>12.7</b>						

**Table 1.3 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha/day)**

<b>Entries</b>	<b>Palampur</b>	<b>Srinagar</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Pantnagar</b>	<b>Bhubaneswar</b>	<b>Ranchi</b>	<b>Pusa</b>	<b>Ayodhya</b>
ADFM-3	5.22	5.66	4.41	6.12	4.21	3.72	8.42	8.14	4.61
AH-1645	5.38	5.45	6.10	7.21	3.98	4.26	7.75	7.25	4.14
IIMFC 1	3.73	5.12	3.28	5.31	2.96	5.68	5.99	5.31	3.27
ADC-2	6.64	5.22	4.25	5.69	3.02	3.69	6.44	6.55	3.11
Hybrid - FSM2021-1	4.97	5.55	4.57	5.30	3.45	3.38	8.23	8.95	6.94
PJHM-1	7.25	5.56	6.66	6.67	5.08	5.19	7.38	6.88	4.37
IIMFC 2	3.72	6.01	2.88	4.19	2.51	3.30	7.60	7.25	6.18
ADFM-2	6.90	5.47	4.81	6.17	4.25	3.92	8.44	7.19	4.65
MFM-18-27	6.78	5.85	4.57	4.09	4.36	4.90	7.37	5.03	4.39
CMH-12-686	6.67	5.65	5.13	6.64	4.83	3.48	8.18	7.37	5.27
HPFM-11	5.74	5.5	3.93	6.94	5.21	3.66	8.72	6.94	3.42
MFM-18-2	6.17	5.18	4.97	5.36	3.76	4.34	6.12	5.09	3.12
DFH -4	3.00	5.21	2.72	4.64	2.53	4.50	8.04	5.74	2.78
KDFM -7	5.76	5.46	4.25	6.41	3.49	4.69	7.66	5.18	3.55
African Tall (NC)	5.60	5.26	3.85	5.91	3.09	5.33	6.64	6.38	2.81
J-1006 (NC)	5.24	5.40	6.98	6.33	4.51	5.87	7.61	6.33	3.55
COHM-8 (NC)	6.60	5.39	5.45	6.63	3.85	4.97	8.33	6.26	2.81
<b>Mean</b>	<b>5.61</b>	<b>5.47</b>	<b>4.64</b>	<b>5.86</b>	<b>3.83</b>	<b>4.40</b>	<b>7.58</b>	<b>6.58</b>	<b>4.06</b>

**Table 1.3 IVTM: Initial Varietal Trial in Forage Maize: Green Forage Yield (q/ha/day)**

<b>Entries</b>	<b>Rai- pur</b>	<b>Rah- uri</b>	<b>Urulikan- chan</b>	<b>Jha- nsi</b>	<b>Hydera- bad</b>	<b>Coimb- atore</b>	<b>Man- dya</b>	<b>Karai- kal</b>	<b>Aver- age</b>	<b>Ra- nk</b>
ADFM-3	7.05	4.41	6.83	4.24	4.96	8.92	6.76	4.33	5.77	7
AH-1645	6.85	5.20	8.48	3.08	7.50	10.17	7.27	4.32	6.14	4
IIMFC 1	6.27	4.88	7.33	2.71	6.94	7.05	5.94	5.17	5.11	15
ADC-2	5.30	5.02	5.77	5.08	7.31	7.67	5.21	3.64	5.27	14
Hybrid - FSM2021-1	6.90	4.06	6.56	4.74	5.94	7.74	5.18	3.98	5.67	10
PJHM-1	6.94	5.85	10.46	5.63	5.77	10.90	5.53	4.41	6.50	2
IIMFC 2	4.51	3.85	5.46	4.02	7.48	5.96	5.86	4.03	4.99	16
ADFM-2	6.76	4.84	7.78	3.78	7.09	9.11	6.60	4.02	5.99	5
MFM-18-27	6.47	3.80	7.00	3.65	7.64	7.88	7.44	4.20	5.61	11
CMH-12-686	6.90	5.14	9.30	6.39	8.80	9.56	7.59	4.41	6.55	1
HPFM-11	6.56	5.11	6.59	2.72	7.67	9.42	6.34	3.91	5.79	6
MFM-18-2	4.71	4.20	5.74	2.58	8.89	9.12	7.14	3.88	5.32	13
DFH -4	7.30	5.47	5.85	4.32	7.18	4.11	5.88	3.75	4.88	17
KDFM -7	5.69	5.25	8.30	4.79	7.37	7.45	5.81	3.91	5.59	12
African Tall (NC)	6.31	4.94	7.61	5.18	7.41	9.47	6.32	4.39	5.68	9
J-1006 (NC)	7.17	5.93	9.71	4.86	7.08	7.98	6.33	5.24	6.24	3
COHM-8 (NC)	6.53	6.07	7.34	4.03	5.43	7.64	6.18	4.27	5.75	8
<b>Mean</b>	<b>6.37</b>	<b>4.94</b>	<b>7.42</b>	<b>4.22</b>	<b>7.09</b>	<b>8.24</b>	<b>6.32</b>	<b>4.23</b>	<b>5.70</b>	

**Table 1.4 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha/day)**

<b>Entries</b>	<b>Palampur</b>	<b>Srinagar</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Pantnagar</b>	<b>Bhubaneswar</b>	<b>Ranchi</b>	<b>Pusa</b>	<b>Ayodhya</b>
ADFM-3	4.14	1.29	1.19	0.72	0.80	0.91	1.83	1.93	1.12
AH-1645	4.23	1.25	1.74	0.79	0.73	1.06	2.31	1.61	1.05
IIMFC 1	3.05	1.19	0.89	0.55	0.55	1.42	1.29	1.02	0.93
ADC-2	5.34	1.25	1.27	0.66	0.62	0.93	1.47	1.62	0.84
Hybrid - FSM2021-1	3.88	1.4	1.28	0.61	0.65	0.85	1.92	2.45	1.66
PJHM-1	6.19	1.33	1.93	0.88	0.96	1.26	1.71	1.56	1.02
IIMFC 2	2.96	1.31	0.56	0.56	0.48	0.83	1.81	1.88	1.57
ADFM-2	5.24	1.38	1.33	0.83	0.73	0.96	1.97	1.67	1.25
MFM-18-27	5.16	1.35	0.91	0.48	0.81	1.24	1.76	1.26	1.14
CMH-12-686	5.35	1.25	1.46	0.86	0.99	0.88	2.17	1.67	1.47
HPFM-11	4.78	1.43	1.18	0.88	0.96	0.86	1.83	1.53	0.90
MFM-18-2	5.11	1.25	0.82	0.62	0.71	1.08	1.32	0.99	0.76
DFH -4	2.42	1.34	0.67	0.69	0.52	1.12	2.17	1.20	0.70
KDFM -7	4.59	1.25	1.08	1.01	0.68	1.16	1.79	1.25	0.92
African Tall (NC)	4.47	1.27	0.77	0.65	0.58	1.33	1.28	1.53	0.74
J-1006 (NC)	4.43	1.45	1.54	1.09	0.83	1.53	1.56	1.48	0.87
COHM-8 (NC)	5.56	1.26	1.64	0.90	0.75	1.23	1.93	1.55	0.67
<b>Mean</b>	<b>4.52</b>	<b>1.31</b>	<b>1.19</b>	<b>0.75</b>	<b>0.73</b>	<b>1.10</b>	<b>1.77</b>	<b>1.54</b>	<b>1.04</b>

**Table 1.4 IVTM: Initial Varietal Trial in Forage Maize: Dry Matter Yield (q/ha/day)**

Entries	Raipur	Rahuri	Urulikanchan	Hyderabad	Coimbatore	Mandya	Karaikal	Average	Rank
ADFM-3	1.63	0.95	1.27	0.82	2.07	1.60	1.45	1.48	8
AH-1645	1.51	1.22	1.51	1.28	2.23	1.83	1.33	1.61	3
IIMFC 1	1.47	0.87	0.97	1.18	1.41	1.17	1.66	1.23	14
ADC-2	1.25	1.01	0.94	1.24	1.66	1.25	1.13	1.40	12
Hybrid - FSM2021-1	1.71	0.84	1.48	1.02	1.78	1.13	1.02	1.48	8
PJHM-1	1.70	1.14	1.81	0.95	2.48	1.29	1.16	1.71	1
IIMFC 2	1.13	0.66	0.94	1.20	1.27	1.34	1.04	1.22	15
ADFM-2	1.65	0.90	1.75	1.20	1.92	1.46	1.05	1.58	4
MFM-18-27	1.62	0.63	1.00	1.25	1.65	1.93	1.19	1.46	9
CMH-12-686	1.68	1.09	1.41	1.40	1.96	1.78	1.28	1.67	2
HPFM-11	1.59	1.09	1.21	1.32	1.97	1.44	1.12	1.51	7
MFM-18-2	1.24	0.64	1.14	1.39	1.81	1.88	1.01	1.36	13
DFH -4	1.90	0.97	0.99	1.43	0.91	1.42	1.00	1.22	15
KDFM -7	1.39	1.01	1.43	1.27	1.52	1.39	1.23	1.44	10
African Tall (NC)	1.34	0.80	1.66	1.27	2.10	1.39	1.45	1.41	11
J-1006 (NC)	1.80	1.15	1.63	0.88	1.85	1.48	1.42	1.56	5
COHM-8 (NC)	1.49	1.13	1.23	0.90	1.52	1.60	1.05	1.53	6
<b>Mean</b>	<b>1.54</b>	<b>0.95</b>	<b>1.32</b>	<b>1.18</b>	<b>1.77</b>	<b>1.49</b>	<b>1.21</b>	<b>1.46</b>	



**Table 1.5 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein Yield (q/ha)**

Entries	Hill Zone		North West Zone				
	Palampur	Rank	Ludhiana	Hisar	Pantnagar	Average	Rank
ADFM-3	9.4	13	7.5	2.9	4.4	3.7	7
AH-1645	10.3	11	12.0	3.6	4.5	4.0	6
IIMFC 1	7.4	15	5.8	3.1	4.0	3.6	8
ADC-2	12.2	9	8.8	3.1	3.5	3.3	10
Hybrid - FSM2021-1	9.6	12	9.1	3.2	3.7	3.4	9
PJHM-1	18.1	1	13.9	3.7	4.8	4.2	4
IIMFC 2	8.2	14	2.7	3.1	3.2	3.2	11
ADFM-2	12.6	7	9.6	4.2	4.0	4.1	5
MFM-18-27	13.1	5	6.8	2.6	5.7	4.2	4
CMH-12-686	15.8	3	10.6	4.1	6.1	5.1	1
HPFM-11	12.8	6	7.8	4.1	5.4	4.8	2
MFM-18-2	16.1	2	4.7	3.8	4.6	4.2	4
DFH -4	7.0	16	4.0	4.3	3.0	3.6	8
KDFM -7	12.8	6	7.0	4.8	3.9	4.3	3
African Tall (NC)	12.1	10	5.7	3.7	4.7	4.2	4
J-1006 (NC)	12.5	8	9.7	4.6	4.0	4.3	3
COHM-8 (NC)	14.5	4	8.5	4.4	4.2	4.3	3
<b>Mean</b>	<b>12.0</b>		<b>7.9</b>	<b>3.7</b>	<b>4.3</b>	<b>4.0</b>	

**Table 1.5 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein Yield (q/ha)**

Entries	North East Zone						Central Zone					
	Bhuban- eswar	Ran- chi	Ayod- hya	Imp- hal	Aver- age	Ra- nk	Rai- pur	Jabal- pur	Rah- uri	Urulikan- chan	Aver- age	Ra- nk
ADFM-3	4.7	5.6	5.2	4.9	5.1	12	6.5	7.5	3.1	7.3	6.1	10
AH-1645	5.2	8.9	5.3	5.2	6.2	6	6.5	8.0	4.3	8.5	6.8	8
IIMFC 1	6.8	5.5	5.0	6.1	5.8	8	8.3	8.4	3.4	4.8	6.2	9
ADC-2	4.3	5.8	4.5	5.9	5.1	12	5.9	5.5	3.7	4.5	4.9	13
Hybrid - FSM2021-1	3.8	9.2	8.9	5.7	6.9	3	6.7	5.9	3.9	7.0	5.9	12
PJHM-1	6.2	7.1	5.5	6.6	6.3	5	8.2	8.3	4.5	8.2	7.3	6
IIMFC 2	4.0	10.4	8.7	8.9	8.0	1	5.1	5.4	3.8	4.7	4.7	14
ADFM-2	4.6	9.4	7.8	8.8	7.7	2	8.1	10.6	4.0	10.0	8.2	2
MFM-18-27	5.9	10.3	6.0	5.5	6.9	3	9.3	13.0	3.8	5.7	8.0	3
CMH-12-686	3.9	11.3	7.2	5.0	6.8	4	8.3	11.9	5.8	8.2	8.5	1
HPFM-11	4.6	7.4	4.8	4.4	5.3	11	6.2	7.6	5.3	5.0	6.0	11
MFM-18-2	5.8	5.9	3.9	7.2	5.7	9	6.8	12.6	2.4	6.1	7.0	7
DFH -4	5.1	12.9	3.3	3.0	6.1	7	10.7	11.7	6.0	3.7	8.0	3
KDFM -7	6.2	9.5	4.5	7.0	6.8	4	5.8	6.7	4.7	7.3	6.1	10
African Tall (NC)	7.0	6.6	4.2	7.2	6.2	6	6.4	7.5	3.8	10.3	7.0	7
J-1006 (NC)	6.8	7.1	4.3	4.1	5.5	10	9.2	8.3	5.1	9.2	7.9	4
COHM-8 (NC)	5.6		3.8	5.9	5.1	12	6.5	11.1	5.8	6.3	7.4	5
<b>Mean</b>	<b>5.3</b>	<b>8.3</b>	<b>5.5</b>	<b>5.9</b>	<b>6.2</b>		<b>7.3</b>	<b>8.8</b>	<b>4.3</b>	<b>6.9</b>	<b>6.8</b>	

**Table 1.5 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein Yield (q/ha)**

Entries	South Zone					All India	
	Coimbatore	Mandya	Hyderabad	Average	Rank	Average	Rank
ADFM-3	11.5	7.7	3.9	7.7	4	6.1	11
AH-1645	11.0	10.9	6.7	9.5	2	7.4	4
IIMFC 1	11.1	5.5	4.8	7.1	9	6.0	12
ADC-2	11.0	4.8	5.7	7.2	8	5.9	13
Hybrid - FSM2021-1	10.4	5.8	4.6	6.9	10	6.5	10
PJHM-1	13.5	5.1	3.9	7.5	6	7.8	2
IIMFC 2	7.4	5.3	5.3	6.0	13	5.7	14
ADFM-2	9.7	7.0	5.2	7.3	7	7.7	3
MFM-18-27	10.2	6.9	4.9	7.3	7	7.3	5
CMH-12-686	9.0	6.9	6.1	7.3	7	8.0	1
HPFM-11	10.1	6.3	6.5	7.6	5	6.5	10
MFM-18-2	12.5	10.1	5.7	9.4	3	7.2	6
DFH -4	5.0	5.7	6.4	5.7	15	6.1	11
KDFM -7	8.6	5.9	4.8	6.4	12	6.6	9
African Tall (NC)	17.3	6.8	6.7	10.3	1	7.3	5
J-1006 (NC)	8.9	6.2	4.5	6.5	11	7.0	7
COHM-8 (NC)	7.9	5.7	3.8	5.8	14	6.7	8
<b>Mean</b>	<b>10.3</b>	<b>6.6</b>	<b>5.3</b>	<b>7.4</b>		<b>6.8</b>	

**Table 1.6 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein (%)**

Entries	Hill Zone		North West Zone				
	Palampur	Rank	Ludhiana	Hisar	Pantnagar	Average	Rank
ADFM-3	9.0	7	8.0	9.2	8.8	8.6	10
AH-1645	9.6	6	8.7	9.8	9.6	9.4	5
IIMFC 1	9.0	7	8.2	10.8	9.6	9.6	3
ADC-2	8.5	9	8.7	10.1	8.8	9.2	6
Hybrid - FSM2021-1	9.0	7	9.0	10.8	8.8	9.5	4
PJHM-1	11.1	1	9.1	8.8	7.9	8.6	10
IIMFC 2	9.6	6	6.1	10.6	8.8	8.5	11
ADFM-2	8.9	8	9.2	10.9	8.8	9.6	3
MFM-18-27	9.6	6	9.4	10.0	9.6	9.7	2
CMH-12-686	10.8	2	9.2	10.2	9.6	9.7	2
HPFM-11	10.5	3	8.4	11.2	8.8	9.5	4
MFM-18-2	10.5	3	7.3	10.6	8.8	8.9	8
DFH -4	10.2	4	7.5	10.9	7.9	8.8	9
KDFM -7	9.9	5	8.2	10.0	8.8	9.0	7
African Tall (NC)	9.6	6	9.4	10.4	10.5	10.1	1
J-1006 (NC)	10.5	3	8.0	8.4	7.0	7.8	12
COHM-8 (NC)	9.9	5	6.6	10.4	8.8	8.6	10
<b>Mean</b>	<b>9.8</b>		<b>8.3</b>	<b>10.2</b>	<b>8.9</b>	<b>9.1</b>	

**Table 1.6 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein (%)**

Entries	North East Zone						Central Zone					
	Bhuban- eswar	Ran- chi	Ayod- hya	Imp- hal	Aver- age	Ra- nk	Rai- pur	Jabal- pur	Rah- uri	Urulikan- chan	Aver- age	Ra- nk
ADFM-3	7.5	5.8	7.5	6.3	6.8	13	8.5	7.5	6.6	9.5	8.0	8
AH-1645	7.4	6.3	7.6	6.3	6.9	12	8.6	7.6	7.1	9.2	8.1	7
IIMFC 1	7.4	6.6	7.5	8.3	7.4	8	9.7	7.6	7.1	8.1	8.1	7
ADC-2	7.1	6.6	7.5	7.1	7.1	11	9.9	7.5	7.1	7.9	8.1	7
Hybrid - FSM2021-1	7.3	8.1	8.0	7.1	7.6	6	8.3	7.5	8.1	7.7	7.9	9
PJHM-1	7.6	6.8	7.8	6.9	7.3	9	9.3	7.7	7.3	7.5	7.9	9
IIMFC 2	7.3	8.8	8.1	8.8	8.2	1	7.7	7.5	9.6	8.1	8.2	6
ADFM-2	7.5	8.3	8.8	7.8	8.1	2	10.0	7.7	8.8	9.3	9.0	2
MFM-18-27	7.3	8.8	7.9	7.6	7.9	4	9.9	8.0	9.8	8.3	9.0	2
CMH-12-686	7.3	8.6	7.5	6.4	7.5	7	9.9	7.9	9.8	9.5	9.3	1
HPFM-11	8.2	7.8	7.8	7.3	7.8	5	8.1	7.7	8.8	6.8	7.8	10
MFM-18-2	7.4	7.1	7.9	7.1	7.4	8	9.6	7.9	6.8	7.8	8.0	8
DFH -4	7.4	9.8	7.6	7.1	8.0	3	9.7	7.8	10.3	6.1	8.5	4
KDFM -7	8.1	8.3	7.8	7.0	7.8	5	8.3	7.5	8.8	8.4	8.3	5
African Tall (NC)	7.4	7.8	8.0	6.3	7.4	8	8.2	7.5	8.1	8.9	8.2	6
J-1006 (NC)	7.1	7.1	7.0	7.5	7.2	10	10.0	7.7	7.8	9.3	8.7	3
COHM-8 (NC)	7.4		7.8	6.5	7.2	10	8.7	7.7	10.1	8.4	8.7	3
<b>Mean</b>	<b>7.4</b>	<b>7.7</b>	<b>7.8</b>	<b>7.1</b>	<b>7.5</b>		<b>9.1</b>	<b>7.7</b>	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	

**Table 1.6 IVTM: Initial Varietal Trial in Forage Maize (New): Crude Protein (%)**

Entries	South Zone					All India	
	Coimbatore	Mandya	Hyderabad	Average	Rank	Average	Rank
ADFM-3	10.1	7.8	7.7	8.5	4	8.0	8
AH-1645	8.8	9.2	8.0	8.7	2	8.2	6
IIMFC 1	11.8	7.4	6.5	8.6	3	8.4	4
ADC-2	10.9	6.5	7.6	8.3	5	8.1	7
Hybrid - FSM2021-1	9.6	8.3	7.1	8.3	5	8.3	5
PJHM-1	8.8	6.5	6.6	7.3	10	8.0	8
IIMFC 2	8.8	7.4	7.5	7.9	6	8.3	5
ADFM-2	8.3	8.3	6.9	7.8	7	8.6	2
MFM-18-27	9.2	6.1	6.1	7.1	11	8.5	3
CMH-12-686	7.4	6.5	7.0	7.0	12	8.5	3
HPFM-11	8.8	7.0	8.0	7.9	6	8.3	5
MFM-18-2	10.5	8.7	6.3	8.5	4	8.3	5
DFH -4	8.8	6.6	7.1	7.5	8	8.3	5
KDFM -7	8.8	6.5	6.0	7.1	11	8.2	6
African Tall (NC)	12.3	8.3	8.3	9.6	1	8.7	1
J-1006 (NC)	7.4	7.0	7.8	7.4	9	8.0	8
COHM-8 (NC)	8.3	5.7	6.4	6.8	13	8.0	8
<b>Mean</b>	<b>9.3</b>	<b>7.3</b>	<b>7.1</b>	<b>7.9</b>		<b>8.3</b>	

**Table 1.7 IVTM: Initial Varietal Trial in Forage Maize (New): Plant Height (cm)**

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Bhubaneswar	Ranchi	Pusa	Ayodhya	Imphal
ADFM-3	211.0	240.0	191.2	208.3	189.6	157.2	205.2	210.0	178.0	223.9
AH-1645	199.3	252.3	187.2	187.3	182.8	169.5	190.1	205.0	184.0	200.8
IIMFC 1	207.3	273.6	171.4	212.7	198.2	190.3	164.8	188.3	197.0	245.0
ADC-2	205.7	265.6	172.3	131.7	185.9	148.7	174.0	172.6	174.0	235.7
Hybrid - FSM2021-1	189.3	245.3	270.2	166.0	181.3	138.5	162.6	184.3	187.0	183.0
PJHM-1	198.7	242.6	184.5	183.3	195.2	184.2	194.5	185.0	172.0	240.9
IIMFC 2	224.3	243.0	170.2	207.7	208.6	126.5	179.4	195.0	186.5	190.3
ADFM-2	213.0	252.0	209.5	211.0	188.9	154.3	187.7	190.0	185.0	181.3
MFM-18-27	211.7	272.0	185.4	216.0	218.3	178.3	188.2	201.6	174.5	155.1
CMH-12-686	218.0	251.6	160.5	209.3	189.5	143.5	195.5	203.3	169.5	233.9
HPFM-11	201.7	268.6	160.8	214.7	194.3	129.9	185.8	185.0	168.0	210.4
MFM-18-2	190.7	238.6	242.3	214.3	206.9	173.2	179.8	180.3	180.5	206.9
DFH -4	218.7	267.3	200.1	200.3	205.6	163.5	170.9	180.3	171.5	187.3
KDFM -7	203.0	266.3	170.9	182.0	190.2	175.1	162.9	210.0	169.0	228.7
African Tall (NC)	207.7	252.0	248.6	156.0	212.5	202.6	155.4	220.0	166.0	245.4
J-1006 (NC)	242.0	269.0	200.3	205.0	178.8	186.5	170.9	200.0	163.5	208.6
COHM-8 (NC)	210.0	270.0	187.5	192.0	175.5	176.1	209.5	190.0	164.0	205.7
<b>Mean</b>	<b>208.9</b>	<b>257.0</b>	<b>194.9</b>	<b>194.0</b>	<b>194.2</b>	<b>164.6</b>	<b>181.0</b>	<b>194.2</b>	<b>175.9</b>	<b>210.8</b>

**Table 1.7 IVTM: Initial Varietal Trial in Forage Maize (New): Plant Height (cm)**

Entries	Rai-pur	Jabal-pur	Rah-uri	Urulikan- chan	Jha- nsi	Hydera- bad	Coimb- atore	Man- dya	Kara- ikal	**Udai- pur	Aver- age	Ra- nk
ADFM-3	201.7	165.3	212.3	230.3	166.3	134.0	237.0	169.1	214.8	151.4	197.1	7
AH-1645	187.2	175.8	188.3	205.1	150.4	133.3	220.0	160.4	185.9	120.3	187.6	15
IIMFC 1	235.7	175.9	189.7	243.1	196.0	177.2	221.5	130.1	198.0	112.9	200.8	4
ADC-2	202.1	154.8	192.3	222.6	176.0	131.6	210.3	164.6	177.3	151.7	184.1	17
Hybrid - FSM2021-1	216.0	154.4	211.6	203.9	161.9	145.0	210.0	138.8	189.4	121.8	186.2	16
PJHM-1	188.3	200.7	211.0	212.1	160.6	133.8	260.0	185.9	173.4	130.2	195.1	10
IIMFC 2	257.1	158.6	207.0	233.8	175.8	177.1	222.5	162.0	179.1	136.1	195.0	11
ADFM-2	191.4	201.1	212.3	226.9	169.1	162.5	228.0	157.0	197.7	150.0	195.7	9
MFM-18-27	247.9	232.2	206.8	210.4	190.7	173.4	220.6	167.3	170.4	115.9	201.1	2
CMH-12-686	202.3	225.5	191.3	208.7	193.3	167.0	230.5	142.7	194.9	122.5	196.4	8
HPFM-11	223.2	176.3	183.6	233.8	171.1	148.0	242.5	157.9	203.2	131.3	192.6	14
MFM-18-2	247.2	230.8	147.5	218.5	184.9	204.8	218.0	173.3	178.3	152.1	200.9	3
DFH -4	243.2	207.6	160.8	207.9	179.6	164.3	218.0	154.7	194.0	138.7	194.5	12
KDFM -7	212.0	173.6	191.0	212.2	180.0	171.4	231.0	161.7	187.3	138.0	193.6	13
African Tall (NC)	245.2	162.2	174.3	249.8	182.4	176.7	247.0	182.2	181.0	139.8	203.5	1
J-1006 (NC)	202.1	176.4	212.6	212.8	179.0	188.9	225.0	142.7	201.5	128.1	198.2	6
COHM-8 (NC)	214.5	202.0	206.7	221.1	195.6	166.5	228.0	159.8	202.8	153.2	198.8	5
<b>Mean</b>	<b>218.6</b>	<b>186.7</b>	<b>194.1</b>	<b>220.8</b>	<b>177.2</b>	<b>162.1</b>	<b>227.6</b>	<b>159.4</b>	<b>189.9</b>	<b>134.9</b>	197.1	



**Table 1.8 IVTM: Initial Varietal Trial in Forage Maize (New): Leaf Stem Ratio**

Entries	Palam- pur	Sri- nagar	Ludh- iana	His- ar	Pant- nagar	Bhuban- eswar	Ran- chi	Pu- sa	Ayo- dhya	Imp- hal
ADFM-3	0.28	0.43		0.56	0.41	0.74	0.59	0.62	0.59	0.70
AH-1645	0.48	0.50	0.20	0.92	0.42	0.84	0.52	0.60	0.63	0.89
IIMFC 1	0.40	0.43	0.18	0.49	0.43	0.72	0.77	0.58	0.61	0.84
ADC-2	0.61	0.42	0.14	0.44	0.54	0.58	0.59	0.59	0.63	0.78
Hybrid - FSM2021-1	0.49	0.44	0.23	0.77	0.48	0.76	0.51	0.68	0.77	0.77
PJHM-1	0.62	0.39	0.22	0.49	0.47	0.89	0.53	0.62	0.61	0.82
IIMFC 2	0.39	0.46	0.25	0.34	0.43	0.56	0.65	0.66	0.74	0.90
ADFM-2	0.34	0.45	0.10	0.55	0.44	0.60	0.56	0.59	0.76	0.67
MFM-18-27	0.39	0.40	0.22	0.31	0.46	0.78	0.46	0.56	0.71	1.04
CMH-12-686	0.62	0.40	0.16	0.50	0.52	0.87	0.65	0.61	0.67	0.81
HPFM-11	0.39	0.43	0.24	0.47	0.47	0.57	0.54	0.55	0.74	0.95
MFM-18-2	0.35	0.41	0.09	0.44	0.43	0.55	0.48	0.45	0.59	1.02
DFH -4	0.55	0.40	0.10	0.37	0.53	0.80	0.91	0.50	0.56	0.93
KDFM -7	0.56	0.41	0.29	0.47	0.51	0.65	0.77	0.44	0.61	0.67
African Tall (NC)	0.61	0.46	0.16	0.50	0.66	0.69	0.78	0.61	0.59	0.72
J-1006 (NC)	0.50	0.52	0.26	0.55	0.45	0.68	0.78	0.61	0.63	0.91
COHM-8 (NC)	0.44	0.37	0.18	0.43	0.47	0.54	0.49	0.59	0.51	0.82
<b>Mean</b>	<b>0.47</b>	<b>0.43</b>	<b>0.19</b>	<b>0.51</b>	<b>0.48</b>	<b>0.70</b>	<b>0.62</b>	<b>0.58</b>	<b>0.64</b>	<b>0.84</b>

**Table 1.8 IVTM: Initial Varietal Trial in Forage Maize (New): Leaf Stem Ratio**

Entries	Rai- pur	Jabal- pur	Rah- uri	Urulikan- chan	Jha- nsi	Hydera- bad	Coimb- atore	Man- dya	Karai- kal	Aver- age	Ra- nk
ADFM-3	0.33	0.73	0.40	0.58	0.33	0.26	0.23	0.38	0.65	0.49	4
AH-1645	0.38	0.83	0.40	0.59	0.37	0.18	0.30	0.45	0.56	0.53	1
IIMFC 1	0.31	0.90	0.39	0.58	0.27	0.14	0.23	0.41	0.38	0.48	5
ADC-2	0.36	0.54	0.39	0.47	0.41	0.16	0.30	0.37	0.51	0.46	7
Hybrid - FSM2021-1	0.31	0.66	0.38	0.50	0.29	0.19	0.27	0.34	0.35	0.48	5
PJHM-1	0.40	0.98	0.48	0.44	0.40	0.16	0.24	0.42	0.64	0.52	2
IIMFC 2	0.29	0.54	0.38	0.47	0.21	0.20	0.23	0.32	0.71	0.46	7
ADFM-2	0.37	1.00	0.37	0.53	0.41	0.25	0.28	0.42	0.65	0.49	4
MFM-18-27	0.32	1.20	0.43	0.66	0.34	0.21	0.24	0.43	0.75	0.52	2
CMH-12-686	0.40	1.05	0.44	0.59	0.37	0.18	0.26	0.39	0.58	0.53	1
HPFM-11	0.33	0.94	0.33	0.56	0.27	0.12	0.20	0.43	0.49	0.47	6
MFM-18-2	0.35	1.09	0.41	0.66	0.40	0.16	0.23	0.43	0.63	0.48	5
DFH -4	0.33	1.02	0.30	0.44	0.20	0.16	0.30	0.32	0.52	0.49	4
KDFM -7	0.34	0.83	0.43	0.68	0.32	0.19	0.26	0.41	0.44	0.49	4
African Tall (NC)	0.37	0.69	0.40	0.62	0.27	0.21	0.28	0.37	0.51	0.50	3
J-1006 (NC)	0.42	0.94	0.42	0.65	0.37	0.15	0.24	0.41	0.47	0.52	2
COHM-8 (NC)	0.35	1.02	0.39	0.59	0.35	0.37	0.29	0.38	0.37	0.47	6
<b>Mean</b>	<b>0.35</b>	<b>0.88</b>	<b>0.40</b>	<b>0.57</b>	<b>0.33</b>	<b>0.19</b>	<b>0.26</b>	<b>0.39</b>	<b>0.54</b>	<b>0.49</b>	

**Table 1.9 IVTM: Initial Varietal Trial in Forage Maize (New): ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)			
	Ludhiana	Rank	Ludhiana	Rank	Hisar	Ludhiana	Average	Rank
ADFM-3	39.9	9	68.4	7	56.2	51.0	53.6	10
AH-1645	34.9	2	69.1	8	46.8	52.0	49.4	17
IIMFC 1	39.7	8	69.8	10	59.3	54.8	57.0	3
ADC-2	41.0	12	71.0	12	57.3	54.8	56.0	5
Hybrid - FSM2021-1	37.0	4	65.8	4	50.2	58.7	54.4	8
PJHM-1	38.4	6	64.7	3	53.9	56.8	55.3	6
IIMFC 2	41.8	13	73.2	15	48.1	51.8	50.0	16
ADFM-2	35.2	3	63.9	1	55.9	58.7	57.3	2
MFM-18-27	39.4	7	67.7	6	52.5	55.6	54.0	9
CMH-12-686	38.4	6	64.2	2	55.5	59.8	57.6	1
HPFM-11	40.3	10	70.2	11	58.4	51.4	54.9	7
MFM-18-2	42.5	15	72.0	14	54.8	50.2	52.5	11
DFH -4	41.9	14	71.9	13	47.6	54.7	51.1	14
KDFM -7	39.4	16	69.4	9	51.3	53.4	52.3	12
African Tall (NC)	37.3	5	67.2	5	56.5	57.2	56.9	4
J-1006 (NC)	33.8	1	70.2	11	50.3	53.7	52.0	13
COHM-8 (NC)	40.5	11	63.9	1	50.6	50.2	50.4	15
<b>Mean</b>	<b>38.9</b>		<b>68.4</b>		<b>53.2</b>	<b>54.4</b>	<b>53.8</b>	

## 2. AVTM-1: FIRST ADVANCED VARIETAL TRIAL IN FORAGE MAIZE

(Reference Tables: 2.1 to 2.9)

First Advance Varietal Trial in Forage Maize (AVTM-1) comprising of six entries along with three national checks viz., African Tall, J-1006, COHM-8 was conducted at 23 locations in five zones of the country. There were 4 locations each in hill, south and 5 each in north-west, north-east and central zones.

For Green Forage Yield, Entry HQPM-28 showed superiority over the best check by a margin of 4.6% in HZ, 5.2% in CZ, 1.7% at all India level. Entry PFM-13 showed superiority over the best check by a margin of 8.7% in CZ. In other zones and at all India level, other entries were either marginally superior or inferior to checks for GFY.

For Dry Matter Yield, Entry HQPM-28 showed superiority over the best check by a margin of 5.5% in HZ, 5.9% in NWZ and 11.3% in CZ and 3.9% at all India level. Entry DFH-2 showed superiority over the best check by a margin of 16.3% in NWZ. In other zones and at all India level, other entries were either marginally superior or inferior to checks for GFY.

For green fodder per day productivity (q/ha/day), entry HQPM-28 (6.25 q/ha/day) was best followed by national check J-1006 (5.98 q/ha/day). For dry fodder per day productivity, entry HQPM-28 (1.53 q/ha/day) national check J-1006 (1.36 q/ha/day).

For plant height, entry PMC-13 (208.0 cm) was adjudged best performer followed by African Tall (207.5 cm). For leafiness, PFM-13 (0.50) ranked first followed by national check African Tall (0.49).

For crude protein yield (q/ha), entry DFH-2 ranked first for NW zone, Check J-1006 for NE zone, HQPM-28 for central, south as well as at all India level. For crude protein (%), national check J-1006 was top ranker for Hill, NW zones whereas check African Tall top ranked for central zone, Entry PMC-11 was best performer in NE zone, entry HQPM-28 for south zone. At all India level Entries PFM-13 and PMC-11 and national check African Tall were joint best performers (8.6%). For other quality parameters, check J-1006 for ADF, check African tall for NDF and IVDMD performed best.

**Table 2.1 AVTM-1: Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	Hill Zone							North West Zone							
	Palam- pur	Sri- nagar	Rajo- uri	Alm- ora	Aver- age	Ra- nk	Superi- ority%	Ludh- iana	His- ar	Pant- nagar	Jal- ore	**Udai- pur	Aver- age	Ra- nk	Superi- ority (%)
KDFM-6	275.0	490.0	287.6	243.7	324.1	7	4.6	374.3	253.4	256.3	306.9	61.0	297.7	7	3.9
PFM-13	307.4	460.0	266.7	232.8	316.7	8		435.2	252.0	298.5	425.5	50.0	352.8	4	
HQPM 28	437.0	477.3	279.8	480.4	418.6	1		500.0	255.4	336.4	490.7	53.0	395.6	1	
DFH-2	297.2	444.0	299.2	211.6	313.0	9		416.2	224.7	488.8	415.7	55.0	386.3	2	
PMC-13	385.1	462.3	281.8	249.7	344.7	4		381.9	279.4	244.6	322.2	74.0	307.0	6	
PMC-11	436.1	466.3	254.0	199.5	339.0	6		332.4	276.1	249.8	270.8	62.0	282.3	8	
African Tall (NC)	389.8	524.0	243.3	294.2	362.8	3		305.7	243.5	275.5	213.9	56.0	259.6	9	
J-1006 (NC)	367.6	485.7	316.7	430.5	400.1	2		519.1	296.0	329.8	377.8	69.0	380.7	3	
COHM-8 (NC)	335.1	468.0	260.9	298.4	340.6	5		488.6	260.1	348.7	184.3	62.0	320.4	5	
Mean	358.9	475.3	276.6	293.4	351.1			417.0	260.1	314.3	334.2	60.2	331.4		
CD at 5%	78.7	41.8	2.1	40.8				25.3	36.2	32.8	117.0	10.8			
CV (%)	12.6	5.0	8.2	9.7				7.6	8.2	8.4		10.4			

Note: \*\* Data is not included in zonal and all India average due to low yield of data

**Table 2.1 AVTM-1: Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	North East Zone							Central Zone							
	Bhuban- eswar	Ran- chi	Pu- sa	Ayod- hya	Imp- hal	Aver- age	Ra- nk	Rai- pur	Jabal- pur	Rah- uri	Urulikan- chan	Jha- nsi	Aver- age	Ra- nk	Superi- ority%
KDFM-6	231.3	417.5	346.0	208.3	647.1	370.0	7	231.4	454.1	361.1	321.1	207.4	315.0	8	5.2
PFM-13	355.3	439.3	350.0	345.0	458.2	389.6	2	277.0	544.3	352.9	454.3	442.6	414.2	1	
HQPM 28	295.9	354.2	370.0	232.8	638.2	378.2	4	340.0	547.7	432.5	374.2	311.1	401.1	2	
DFH-2	325.6	420.2	310.0	224.6	361.6	328.4	9	269.2	575.5	319.3	345.6	326.9	367.3	4	
PMC-13	274.6	414.2	390.0	406.3	385.3	374.1	5	217.2	516.5	342.6	369.3	236.1	336.4	6	
PMC-11	344.9	328.5	398.0	263.4	515.8	370.1	6	228.2	516.5	317.4	404.4	230.6	339.4	5	
African Tall (NC)	309.0	371.2	405.0	273.6	569.1	385.6	3	302.2	416.0	320.1	338.2	151.9	305.7	9	
J-1006 (NC)	377.2	437.4	330.0	430.8	623.6	439.8	1	303.8	530.4	376.4	355.4	339.8	381.2	3	
COHM-8 (NC)	255.3	310.1	380.0	210.3	591.8	349.5	8	210.9	533.9	365.1	318.6	171.3	320.0	7	
Mean	307.7	388.1	364.3	288.3	532.3	376.1		264.4	515.0	354.2	364.6	268.6	353.4		
CD at 5%	30.0	35.2	16.8	42.3	32.9			54.4	2.6	50.5	66.9	42.2			
CV (%)	5.6	5.2	8.6	8.9	3.6			11.9	9.1	8.2	10.5	9.1			

**Table 2.1 AVTM-1: Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	South Zone						All India		
	Hydera- bad	Coimb- atore	Man- dya	Kara- ikal	Aver- age	Ra- nk	Aver- age	Ra- nk	Superi- ority%
KDFM-6	357.1	513.9	350.7	280.4	375.5	6	337.0	9	1.7
PFM-13	312.4	500.0	289.6	283.6	346.4	8	367.4	3	
HQPM 28	506.5	486.1	438.8	283.3	428.7	2	403.1	1	
DFH-2	342.6	431.9	300.1	279.1	338.4	9	346.8	6	
PMC-13	353.7	555.5	355.7	275.5	385.1	5	350.0	4	
PMC-11	410.4	470.8	317.3	354.2	388.2	3	344.8	7	
African Tall (NC)	463.7	600.0	443.2	230.8	434.4	1	349.3	5	
J-1006 (NC)	314.3	594.4	305.4	280.6	373.7	7	396.5	2	
COHM-8 (NC)	448.7	472.2	351.2	268.8	385.2	4	342.4	8	
<b>Mean</b>	<b>389.9</b>	<b>513.9</b>	<b>350.2</b>	<b>281.8</b>	<b>384.0</b>		<b>359.7</b>		
<b>CD at 5%</b>	<b>46.4</b>	<b>38.4</b>	<b>27.2</b>	<b>28.5</b>					
<b>CV (%)</b>	<b>6.8</b>	<b>4.3</b>	<b>10.5</b>	<b>5.4</b>					

**Table 2.2 AVTM-1: Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	Hill Zone						North West Zone						
	Palam-pur	Sri-nagar	Alm-ora	Aver-age	Ra-nk	Superi- ority%	Ludh- iana	His- ar	Pant- nagar	Jal- ore	Aver- age	Ra- nk	Superi- ority%
KDFM-6	93.2	119.0	70.9	94.4	7	5.5	82.3	30.6	47.4	53.2	53.4	7	16.3
PFM-13	101.3	111.7	64.3	92.4	8		92.4	30.5	60.9	73.7	64.4	6	
HQPM 28	145.9	115.3	99.8	120.3	1		115.0	28.6	73.3	85.1	75.5	2	
DFH-2	96.4	108.0	69.7	91.4	9		115.6	36.8	107.1	72.1	82.9	1	
PMC-13	128.4	109.7	56.2	98.1	6		100.0	52.1	51.6	55.7	64.8	5	
PMC-11	148.9	113.7	59.3	107.3	4		64.2	25.9	49.0	46.7	46.4	9	
African Tall (NC)	124.5	121.0	77.4	107.6	3		62.7	35.5	54.0	37.3	47.4	8	
J-1006 (NC)	120.7	117.3	104.3	114.1	2		113.6	40.8	65.0	65.7	71.3	3	
COHM-8 (NC)	111.6	125.0	63.8	100.1	5		122.1	36.0	73.2	32.0	65.8	4	
<b>Mean</b>	<b>119.0</b>	<b>115.6</b>	<b>74.0</b>	<b>102.9</b>			<b>96.4</b>	<b>35.2</b>	<b>64.6</b>	<b>58.0</b>	<b>63.6</b>		
<b>CD at 5%</b>	<b>31.0</b>	<b>9.0</b>	<b>8.5</b>				<b>3.4</b>	<b>9.8</b>	<b>8.2</b>	16.9			
<b>CV%</b>	<b>14.9</b>	<b>4.5</b>	<b>8.0</b>				<b>8.6</b>	<b>16.4</b>	<b>11.6</b>				

**Table 2.2 AVTM-1: Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	North East Zone							Central Zone							
	Bhuban- eswar	Ran- chi	Pu- sa	Ayod- hya	Imp- hal	Aver- age	Ra- nk	Rai- pur	Jabal- pur	Rah- uri	Urulikan- chan	Jha- nsi	Aver- age	Ra- nk	Superi- ority%
KDFM-6	56.4	75.5	84.3	50.0	105.4	74.3	7	57.5	103.0	70.4	57.5	58.5	69.4	6	11.3
PFM-13	85.8	66.8	85.5	84.5	68.9	78.3	3	69.3	126.8	58.6	73.6	103.0	86.3	3	
HQPM 28	74.0	58.9	90.8	61.6	97.5	76.6	5	87.0	125.7	111.8	70.3	86.1	96.2	1	
DFH-2	81.7	80.7	79.6	60.6	65.4	73.6	8	67.1	134.1	61.4	64.3	89.0	83.2	4	
PMC-13	68.3	62.3	91.5	105.6	71.2	79.8	2	54.9	117.3	63.1	56.1	58.1	69.9	5	
PMC-11	84.0	53.6	88.5	72.4	87.4	77.2	4	56.8	117.2	54.4	59.7	55.2	68.7	8	
African Tall (NC)	77.6	59.4	92.6	71.1	79.7	76.1	6	78.9	92.8	41.9	63.5	32.5	61.9	9	
J-1006 (NC)	94.5	65.8	82.2	107.7	101.9	90.4	1	79.9	120.7	66.3	72.0	93.2	86.4	2	
COHM-8 (NC)	60.1	48.1	86.6	55.7	101.0	70.3	9	51.7	122.5	69.2	51.6	51.5	69.3	7	
Mean	75.8	63.4	86.8	74.3	86.5	77.4		67.0	117.8	66.3	63.2	69.7	76.8		
CD at 5%	7.8	19.1	5.4	11.7	10.6			14.8	0.60	9.1	11.3	15.9			
CV%	5.9	3.2	7.3	6.5	7.1			12.7	9.1	7.9	10.3	13.2			

**Table 2.2 AVTM-1: Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	South Zone						All India		
	Hydera- bad	Coimb- atore	Man- dya	Karai- kal	Aver- age	Ra- nk	Aver- age	Ra- nk	Superi- ority%
KDFM-6	69.6	111.9	69.8	75.9	81.8	6	73.5	8	3.9
PFM-13	61.9	116.2	70.9	71.1	80.0	8	79.9	4	
HQPM 28	101.3	105.3	102.2	75.5	96.1	1	91.0	1	
DFH-2	70.0	100.7	78.7	75.8	81.3	7	81.6	3	
PMC-13	63.8	130.3	64.6	71.8	82.6	3	77.7	5	
PMC-11	77.7	104.7	68.4	101.9	88.1	2	75.7	6	
African Tall (NC)	91.0	121.8	114.8	56.8	96.1	1	75.6	7	
J-1006 (NC)	59.8	135.1	64.5	69.1	82.1	4	87.6	2	
COHM-8 (NC)	86.6	107.2	74.5	59.9	82.0	5	75.7	6	
<b>Mean</b>	<b>75.7</b>	<b>114.8</b>	<b>78.7</b>	<b>73.1</b>	<b>85.6</b>		<b>79.8</b>		
<b>CD at 5%</b>	<b>12.8</b>	<b>8.6</b>	<b>5.8</b>	<b>9.3</b>					
<b>CV%</b>	<b>9.6</b>	<b>4.3</b>	<b>10.1</b>	<b>6.8</b>					



**Table 2.3 AVTM-1: Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha/day)**

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Bhubaneswar	Ranchi	Pusa	Ayodhya
KDFM-6	3.86	6.70	4.74	5.46	3.61	3.54	7.08	6.41	3.20
PFM-13	4.82	5.91	5.51	5.18	4.26	5.38	7.62	6.48	5.00
HQPM 28	6.16	5.82	6.33	5.85	5.34	4.80	6.77	7.55	3.42
DFH-2	4.27	5.78	5.27	4.85	7.19	5.04	7.20	5.78	3.35
PMC-13	5.83	5.72	4.83	5.55	3.54	4.38	6.94	7.41	5.88
PMC-11	6.61	5.72	4.21	5.64	3.47	5.39	5.41	7.51	4.11
African Tall (NC)	5.18	6.55	3.87	4.15	3.58	4.63	5.68	7.56	4.08
J-1006 (NC)	5.40	6.30	6.57	6.17	4.78	5.55	7.86	6.27	6.15
COHM-8 (NC)	4.94	6.12	6.18	5.86	5.45	4.01	5.03	7.76	3.37
<b>Mean</b>	<b>5.23</b>	<b>6.07</b>	<b>5.28</b>	<b>5.41</b>	<b>4.58</b>	<b>4.75</b>	<b>6.62</b>	<b>6.97</b>	<b>4.28</b>

**Table 2.3 AVTM-1: Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha/day)**

Entries	Raipur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Mandya	Karaikal	Average	Rank
KDFM-6	4.45	7.04	5.18	3.15	5.39	7.79	6.12	3.87	5.15	9
PFM-13	5.23	6.38	7.83	7.22	5.04	7.58	4.92	3.66	5.77	3
HQPM 28	6.94	8.43	6.80	5.55	7.84	7.72	7.48	3.47	6.25	1
DFH-2	5.49	5.95	6.17	5.76	5.20	7.08	5.22	3.78	5.49	6
PMC-13	4.34	6.31	6.37	3.49	5.30	8.68	6.30	3.52	5.55	4
PMC-11	4.56	5.74	6.97	3.68	6.51	7.36	5.93	4.97	5.52	5
African Tall (NC)	5.04	5.34	5.46	2.13	7.40	9.23	7.06	3.02	5.29	8
J-1006 (NC)	5.84	7.06	5.92	5.51	4.91	8.87	5.09	3.41	5.98	2
COHM-8 (NC)	4.22	6.60	5.69	2.95	7.08	7.74	6.45	3.49	5.47	7
<b>Mean</b>	<b>5.12</b>	<b>6.54</b>	<b>6.27</b>	<b>4.38</b>	<b>6.07</b>	<b>8.00</b>	<b>6.06</b>	<b>3.69</b>	<b>5.61</b>	

**Table 2.4 AVTM-1: Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha/day)**

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Bhubaneswar	Ranchi	Pusa	Ayodhya
KDFM-6	2.12	1.50	1.04	0.66	0.67	0.86	1.28	1.56	0.76
PFM-13	2.53	1.53	1.17	0.63	0.87	1.30	1.16	1.58	1.22
HQPM 28	3.30	1.56	1.46	0.66	1.16	1.20	1.13	1.85	0.91
DFH-2	2.18	1.56	1.46	0.79	1.57	1.26	1.38	1.49	0.91
PMC-13	3.13	1.46	1.27	1.03	0.75	1.09	1.04	1.74	1.52
PMC-11	3.68	1.60	0.81	0.53	0.68	1.31	0.88	1.67	1.13
African Tall (NC)	2.58	1.16	0.79	0.61	0.70	1.16	0.91	1.73	1.06
J-1006 (NC)	2.82	1.36	1.44	0.85	0.94	1.39	1.18	1.56	1.53
COHM-8 (NC)	2.63	2.16	1.55	0.81	1.14	0.94	0.78	1.77	0.88
<b>Mean</b>	<b>2.77</b>	<b>1.54</b>	<b>1.22</b>	<b>0.73</b>	<b>0.94</b>	<b>1.17</b>	<b>1.08</b>	<b>1.66</b>	<b>1.10</b>

**Table 2.4 AVTM-1: Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha/day)**

Entries	Rai-pur	Rah-uri	Urulikan- chan	Hydera- bad	Coimb- atore	Man- dya	Karai- kal	Aver- age	Ra- nk
KDFM-6	1.11	1.37	0.93	1.05	1.81	1.22	1.05	1.19	7
PFM-13	1.31	1.06	1.27	1.00	1.94	1.20	0.92	1.29	5
HQPM 28	1.78	2.18	1.28	1.57	1.81	1.74	0.92	1.53	1
DFH-2	1.37	1.14	1.15	1.06	1.94	1.37	1.03	1.35	3
PMC-13	1.10	1.16	0.97	0.96	1.96	1.14	0.92	1.33	4
PMC-11	1.14	0.98	1.03	1.23	1.85	1.28	1.43	1.33	4
African Tall (NC)	1.32	0.70	1.02	1.45	1.69	1.82	0.74	1.22	6
J-1006 (NC)	1.54	1.24	1.20	0.93	1.89	1.08	0.84	1.36	2
COHM-8 (NC)	1.03	1.25	0.92	1.37	1.89	1.37	0.78	1.33	4
<b>Mean</b>	<b>1.30</b>	<b>1.23</b>	<b>1.09</b>	<b>1.18</b>	<b>1.86</b>	<b>1.36</b>	<b>0.96</b>	<b>1.33</b>	

**Table 2.5 AVTM-1: Advanced Varietal Trial in Forage Maize: Crude Protein Yield (q/ha)**

Entries	Hill Zone		North West Zone					North East Zone					
	Palam-pur	Ra-nk	Ludh-iana	His-ar	Pant-nagar	Aver-age	Ra-nk	Bhuban-eswar	Ran-chi	Ayod-hya	Imp-hal	Aver-age	Ra-nk
KDFM-6	9.2	8	6.2	2.6	4.6	4.5	7	4.3	4.5	3.4	9.8	5.5	8
PFM-13	10.6	6	9.2	2.6	5.3	5.7	6	7.1	5.7	5.7	5.8	6.1	3
HQPM 28	14.8	1	8.3	2.6	7.7	6.2	4	5.4	4.6	4.6	7.8	5.6	7
DFH-2	10.4	7	8.7	3.2	9.4	7.1	1	6.0	7.7	4.1	5.2	5.7	6
PMC-13	11.6	4	8.4	4.4	4.5	5.8	5	5.1	5.7	7.5	5.5	5.9	4
PMC-11	14.8	1	4.5	2.6	3.9	3.7	8	6.9	5.8	5.3	6.9	6.2	2
African Tall (NC)	13.1	3	5.3	3.5	4.7	4.5	7	5.7	6.9	4.6	6.1	5.8	5
J-1006 (NC)	13.4	2	10.8	3.4	6.3	6.8	2	6.9	5.1	7.8	8.9	7.2	1
COHM-8 (NC)	11.1	5	9.2	3.4	7.0	6.5	3	4.7	3.9	4.1	8.0	5.2	9
<b>Mean</b>	<b>12.1</b>		<b>7.8</b>	<b>3.1</b>	<b>5.9</b>	<b>5.6</b>		<b>5.8</b>	<b>5.6</b>	<b>5.2</b>	<b>7.1</b>	<b>5.9</b>	

**Table 2.5 AVTM-1: Advanced Varietal Trial in Forage Maize: Crude Protein Yield (q/ha)**

Entries	Central Zone						South Zone					All India	
	Rai-pur	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Ra-nk	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Ra-nk	Aver-age	Ra-nk
KDFM-6	4.4	8.0	5.1	5.3	5.7	8	10.7	4.9	4.8	6.8	5	5.9	7
PFM-13	6.2	10.1	5.8	6.5	7.1	2	10.7	4.7	4.9	6.8	5	6.7	3
HQPM 28	8.3	10.0	9.9	6.1	8.6	1	9.7	8.5	8.3	8.8	1	7.8	1
DFH-2	5.5	11.2	7.7	4.1	7.1	2	8.0	4.8	4.7	5.8	8	6.7	3
PMC-13	4.2	9.2	5.9	5.0	6.0	7	10.8	5.4	4.8	7.0	4	6.5	5
PMC-11	4.5	9.1	6.2	5.4	6.3	5	8.7	5.4	6.0	6.7	6	6.4	6
African Tall (NC)	7.8	7.1	4.5	5.2	6.2	6	8.5	8.5	7.1	8.0	2	6.6	4
J-1006 (NC)	7.8	9.5	5.3	5.5	7.0	3	10.0	4.8	4.8	6.5	7	7.4	2
COHM-8 (NC)	3.8	9.7	7.8	4.3	6.4	4	8.9	5.9	6.8	7.2	3	6.6	4
<b>Mean</b>	<b>5.8</b>	<b>9.3</b>	<b>6.5</b>	<b>5.2</b>	<b>6.7</b>		<b>9.6</b>	<b>5.9</b>	<b>5.8</b>	<b>7.1</b>		<b>6.7</b>	

**Table 2.6 AVTM-1: Advanced Varietal Trial in Forage Maize: Crude Protein (%)**

Entries	Hill Zone		North West Zone				
	Palampur	Rank	Ludhiana	Hisar	Pantnagar	Average	Rank
KDFM-6	9.9	5	7.5	8.7	9.6	8.6	4
PFM-13	10.5	3	9.9	8.5	8.8	9.0	2
HQPM 28	10.2	4	7.2	9.1	10.5	8.9	3
DFH-2	10.8	2	7.5	8.7	8.8	8.3	6
PMC-13	9.0	6	8.4	8.4	8.8	8.5	5
PMC-11	9.9	5	7.0	10.2	7.9	8.3	6
African Tall (NC)	10.5	3	8.4	9.8	8.8	9.0	2
J-1006 (NC)	11.1	1	9.5	8.3	9.6	9.1	1
COHM-8 (NC)	9.9	5	7.5	9.5	9.6	8.9	3
<b>Mean</b>	<b>10.2</b>		<b>8.1</b>	<b>9.0</b>	<b>9.1</b>	<b>8.7</b>	

**Table 2.6 AVTM-1: Advanced Varietal Trial in Forage Maize: Crude Protein (%)**

Entries	North East Zone						Central Zone					
	Bhuban-eswar	Ran-chi	Ayod-hya	Imp-hal	Aver-age	Ra-nk	Rai-pur	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Ra-nk
KDFM-6	7.5	6.0	6.9	9.3	7.4	6	7.6	7.8	7.3	9.2	8.0	7
PFM-13	8.3	8.6	6.8	8.4	8.0	3	8.9	8.0	9.8	8.8	8.9	3
HQPM 28	7.4	7.8	7.5	4.0	6.7	7	9.6	8.0	8.8	8.6	8.7	4
DFH-2	7.3	9.6	6.7	7.9	7.9	4	8.2	8.3	12.6	6.4	8.9	3
PMC-13	7.4	9.1	7.1	7.7	7.8	5	7.7	7.8	9.3	8.9	8.4	5
PMC-11	8.3	10.8	7.3	7.9	8.6	1	7.9	7.8	11.3	9.0	9.0	2
African Tall (NC)	7.3	11.6	6.4	7.6	8.2	2	9.8	7.7	10.8	8.1	9.1	1
J-1006 (NC)	7.3	7.8	7.2	8.7	7.8	5	9.8	7.9	8.1	7.6	8.3	6
COHM-8 (NC)	7.8	8.1	7.4	7.9	7.8	5	7.3	8.0	11.3	8.3	8.7	4
<b>Mean</b>	<b>7.6</b>	<b>8.8</b>	<b>7.0</b>	<b>7.7</b>	<b>7.8</b>		<b>8.5</b>	<b>7.9</b>	<b>9.9</b>	<b>8.3</b>	<b>8.7</b>	

**Table 2.6 AVTM-1: Advanced Varietal Trial in Forage Maize: Crude Protein (%)**

Entries	South Zone					All India	
	Coimbatore	Man-dya	Hyderabad	Average	Rank	Average	Rank
KDFM-6	9.6	7.0	6.9	7.8	5	8.1	5
PFM-13	9.2	6.6	7.9	7.9	4	8.6	1
HQPM 28	9.2	8.3	8.2	8.6	1	8.3	3
DFH-2	7.9	6.1	6.7	6.9	8	8.2	4
PMC-13	8.3	8.3	7.6	8.1	2	8.3	3
PMC-11	8.3	7.9	7.7	8.0	3	8.6	1
African Tall (NC)	7.0	7.4	7.7	7.4	7	8.6	1
J-1006 (NC)	7.4	7.4	8.0	7.6	6	8.4	2
COHM-8 (NC)	8.3	7.9	7.9	8.0	3	8.4	2
<b>Mean</b>	<b>8.4</b>	<b>7.4</b>	<b>7.6</b>	<b>7.8</b>		<b>8.4</b>	

**Table 2.7 AVTM-1: Advanced Varietal Trial in Forage Maize: Plant Height (cm)**

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Udaipur	Bhubaneswar	Ranchi	Pusa	Ayodhya	Imphal
KDFM-6	151.7	276.0	196.4	209.0	180.6	148.0	162.3	253.3	220.0	178.3	211.0
PFM-13	164.0	234.6	236.8	206.3	184.8	139.0	194.3	218.6	180.3	225.5	196.1
HQPM 28	173.7	247.3	180.9	188.3	186.9	137.0	178.3	200.7	200.0	210.5	194.7
DFH-2	130.3	249.6	182.4	219.7	187.5	145.0	185.7	223.7	191.0	197.3	158.4
PMC-13	228.0	255.6	170.5	240.0	198.3	159.0	174.6	213.6	208.3	230.0	195.1
PMC-11	170.3	247.6	194.9	245.3	205.8	125.0	190.6	218.4	216.6	201.3	217.7
African Tall (NC)	175.7	277.6	185.6	205.0	209.4	160.0	182.2	271.0	230.0	189.9	252.3
J-1006 (NC)	182.0	274.6	178.4	210.7	177.7	131.0	198.7	231.7	186.6	270.5	209.0
COHM-8 (NC)	208.0	266.3	209.8	211.3	186.5	131.0	165.1	219.2	205.0	200.5	185.3
<b>Mean</b>	<b>176.0</b>	<b>258.8</b>	<b>192.9</b>	<b>215.1</b>	<b>190.8</b>	<b>141.7</b>	<b>181.3</b>	<b>227.8</b>	<b>204.2</b>	<b>211.5</b>	<b>202.2</b>

**Table 2.7 AVTM-1: Advanced Varietal Trial in Forage Maize: Plant Height (cm)**

Entries	Rai-pur	Jabal-pur	Rah-uri	Urulikan- chan	Jha- nsi	Hydera- bad	Coimb- atore	Man- dya	Kara- ikal	Aver- age	Ra- nk
KDFM-6	214.4	201.0	174.0	199.9	187.1	195.1	275.0	199.8	229.2	203.1	5
PFM-13	210.2	240.0	168.0	222.8	189.1	163.3	252.0	177.6	218.2	201.1	7
HQPM 28	195.1	227.3	162.5	202.7	175.7	189.1	242.0	171.6	201.9	193.3	9
DFH-2	198.5	294.3	172.0	195.6	172.2	180.1	210.5	205.9	224.3	196.2	8
PMC-13	212.2	218.0	169.0	236.3	198.9	188.0	240.2	197.2	226.7	208.0	1
PMC-11	212.5	215.0	187.0	236.6	201.0	188.5	238.0	183.2	250.5	207.3	3
African Tall (NC)	237.1	197.7	156.5	182.3	194.1	188.5	254.0	214.4	186.4	207.5	2
J-1006 (NC)	201.9	219.7	171.2	200.7	186.7	192.2	235.0	196.9	235.9	204.6	4
COHM-8 (NC)	191.1	225.3	176.5	208.2	177.8	201.5	264.0	192.8	210.1	201.8	6
<b>Mean</b>	<b>208.1</b>	<b>226.5</b>	<b>170.7</b>	<b>209.4</b>	<b>187.0</b>	<b>187.4</b>	<b>245.6</b>	<b>193.3</b>	<b>220.4</b>	<b>202.5</b>	

**Table 2.8 AVTM-1: Advanced Varietal Trial in Forage Maize: Leaf Stem Ratio**

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Bhubaneswar	Ranchi	Pusa	Ayodhya	Imphal
KDFM-6	0.40	0.43	0.18	0.50	0.51	0.54	0.82	0.58	0.43	0.79
PFM-13	0.41	0.48	0.17	0.38	0.33	0.78	0.83	0.55	0.61	0.75
HQPM 28	0.32	0.4	0.17	0.36	0.29	0.64	0.63	0.61	0.58	0.85
DFH-2	0.37	0.44	0.30	0.33	0.63	0.75	0.67	0.52	0.56	0.58
PMC-13	0.58	0.43	0.12	0.40	0.48	0.52	0.68	0.65	0.63	0.75
PMC-11	0.40	0.45	0.18	0.44	0.44	0.67	0.76	0.66	0.57	0.87
African Tall (NC)	0.45	0.41	0.28	0.67	0.56	0.71	0.72	0.69	0.44	0.96
J-1006 (NC)	0.45	0.42	0.26	0.39	0.38	0.81	0.81	0.56	0.66	0.77
COHM-8 (NC)	0.34	0.39	0.20	0.46	0.32	0.59	0.83	0.62	0.60	1.02
<b>Mean</b>	<b>0.41</b>	<b>0.43</b>	<b>0.21</b>	<b>0.44</b>	<b>0.44</b>	<b>0.67</b>	<b>0.75</b>	<b>0.60</b>	<b>0.56</b>	<b>0.82</b>

**Table 2.8 AVTM-1: Advanced Varietal Trial in Forage Maize: Leaf Stem Ratio**

Entries	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Mandya	Karaikal	Average	Rank
KDFM-6	0.38	0.38	0.39	0.74	0.35	0.16	0.26	0.39	0.55	0.46	5
PFM-13	0.38	0.73	0.44	0.76	0.36	0.27	0.25	0.53	0.47	0.50	1
HQPM 28	0.33	0.71	0.32	0.49	0.33	0.15	0.27	0.37	0.38	0.43	6
DFH-2	0.31	1.14	0.39	0.53	0.28	0.12	0.20	0.32	0.40	0.47	4
PMC-13	0.34	0.53	0.35	0.52	0.31	0.17	0.21	0.36	0.64	0.46	5
PMC-11	0.35	0.46	0.36	0.63	0.30	0.18	0.24	0.33	0.38	0.46	5
African Tall (NC)	0.44	0.27	0.47	0.61	0.24	0.25	0.24	0.41	0.54	0.49	2
J-1006 (NC)	0.37	0.58	0.46	0.66	0.34	0.15	0.26	0.36	0.35	0.48	3
COHM-8 (NC)	0.27	0.68	0.39	0.51	0.35	0.21	0.22	0.35	0.47	0.46	5
<b>Mean</b>	<b>0.35</b>	<b>0.61</b>	<b>0.40</b>	<b>0.61</b>	<b>0.32</b>	<b>0.18</b>	<b>0.24</b>	<b>0.38</b>	<b>0.46</b>	<b>0.47</b>	

**Table 2.9 AVTM-1: Advanced Varietal Trial in Forage Maize: ADF (%) & NDF (%)**

Entries	ADF (%)							NDF (%)						
	Palam-pur	Rah- uri	Ludh- iana	Pant- nagar	Ran- chi	Aver- age	Ra- nk	Rah- uri	Ludh- iana	Pant- nagar	Palam- pur	Ran- chi	Aver- age	Ra- nk
KDFM-6	59.0	51.7	38.7	58.2	53.2	52.2	8	73.0	67.1	65.0	65.8	71.6	68.5	8
PFM-13	58.4	45.2	36.5	57.4	46.3	48.8	5	66.8	65.4	67.8	68.2	69.2	67.5	6
HQPM 28	57.2	43.4	38.1	57.8	44.1	48.1	3	63.2	66.4	68.2	68.6	64.3	66.1	3
DFH-2	55.8	45.9	39.8	56.6	47.2	49.1	6	67.1	68.7	65.4	65.8	70.3	67.5	6
PMC-13	56.6	45.1	36.4	57.6	46.2	48.4	4	66.7	68.5	67.0	66.6	68.3	67.4	5
PMC-11	58.6	44.7	40.1	59.0	45.4	49.6	7	65.3	67.4	68.2	65.4	68.2	66.9	4
African Tall (NC)	56.2	43.3	36.4	57.4	44.3	47.5	2	59.8	64.5	66.0	67.0	66.5	64.8	1
J-1006 (NC)	54.6	44.8	35.6	55.8	45.1	47.2	1	65.5	63.4	67.0	66.0	68.2	66.0	2
COHM-8 (NC)	57.4	44.4	36.4	57.0	46.7	48.4	4	63.8	69.8	67.0	67.8	69.4	67.6	7
<b>Mean</b>	<b>57.1</b>	<b>45.4</b>	<b>37.6</b>	<b>57.4</b>	<b>46.5</b>	<b>48.8</b>		<b>65.7</b>	<b>66.8</b>	<b>66.8</b>	<b>66.8</b>	<b>68.4</b>	<b>66.9</b>	

**Table 2.9AVTM-1: Advanced Varietal Trial in Forage Maize: IVDMD (%)**

Entries	IVDMD (%)					
	Hisar	Rahuri	Ludhiana	Ranchi	Average	Rank
KDFM-6	42.0	48.8	53.4	46.9	47.8	8
PFM-13	48.7	53.9	58.8	52.4	53.4	3
HQPM 28	51.0	55.3	50.2	54.1	52.7	4
DFH-2	50.4	53.3	52.4	51.7	51.9	7
PMC-13	47.9	53.9	55.4	52.4	52.4	5
PMC-11	50.9	54.3	51.2	53.1	52.4	5
African Tall (NC)	50.8	55.3	54.7	53.9	53.7	1
J-1006 (NC)	49.8	54.2	56.6	53.3	53.5	2
COHM-8 (NC)	47.8	54.5	54.7	52.1	52.3	6
<b>Mean</b>	<b>48.8</b>	<b>53.7</b>	<b>54.2</b>	<b>52.2</b>	<b>52.2</b>	



### **3. AVTM-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE MAIZE**

**(Reference Tables: 3.1 to 3.9)**

Second Advance Varietal Trial in Forage Maize (AVTM-2) comprising of one entry PFM-12 along with three national checks *viz.*, African Tall, J-1006, COHM-8 was conducted at 11 locations in two zones of the country. There were 5 locations in north-west zone and 6 in central zone.

For green fodder yield, dry matter yield and crude protein yield (q/ha), National check J-1006 was top ranked in both NW and central zone as well as combining both zones. For green and dry fodder per day productivity (q/ha/day), National check J-1006 was top ranked in both NW and central zone as well as combining both zones

For crude protein (%), National check African Tall was top ranked in both NW and central zone as well as combining both zones. For ADF check COBHM-8 and for NDF and IVDMD check African Tall were best perfumers.

For leafiness, check COHM-8 was best performer.

### **4. AVTM-2 (seed): SECOND ADVANCED VARIETAL TRIAL IN FORAGE MAIZE (SEED)**

**(Reference Tables: 4.1)**

Second Advance Varietal Trial in Forage Maize (AVTM-2) comprising of one entry PFM-12 along with three national checks *viz.*, African Tall, J-1006, COHM-8 was conducted at 6 locations in two zones of the country. There were 2 locations in north-west zone and 4 in central zone.

National check African Tall was top ranked in NW zone whereas Check COHM-8 top ranked for central zone as well as combining both zones.

**Table 3.1 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	North West Zone						
	Ludhiana	Hisar	Pantnagar	Jalore	**Udaipur	Average	Rank
PFM-12	404.3	234.7	349.5	220.8	67.0	302.3	2
J-1006 (NC)	443.1	254.8	542.3	245.8	65.0	371.5	1
African Tall (NC)	280.8	235.7	428.8	233.3	58.0	294.7	3
COHM-8 (NC)	399.7	243.6	338.6	151.7	65.0	283.4	4
<b>Mean</b>	<b>382.0</b>	<b>242.2</b>	<b>414.8</b>	<b>212.9</b>	<b>63.8</b>	<b>313.0</b>	
<b>CD at 5%</b>	<b>12.8</b>	<b>26.5</b>	<b>53.6</b>	<b>61.9</b>	<b>5.1</b>		
<b>CV (%)</b>	<b>7.81</b>	<b>7.5</b>	<b>13.3</b>		<b>5.8</b>		

Note: \*\* Data is not included in zonal and all India average due to low yield of data

**Table 3.1 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha)**

Entries	Central Zone								All India	
	Anand	Jabalpur	Rahuri	Urulikanchan	Raipur	Jhansi	Average	Rank	Average	Rank
PFM-12	372.3	522.6	302.2	391.9	194.2	250.5	338.9	4	324.3	4
J-1006 (NC)	473.7	514.3	387.0	514.0	326.7	334.0	424.9	1	403.6	1
African Tall (NC)	431.7	616.3	337.5	503.4	360.0	291.0	423.3	2	371.9	2
COHM-8 (NC)	384.2	499.7	311.6	408.6	241.7	315.0	360.1	3	329.4	3
<b>Mean</b>	<b>415.5</b>	<b>538.2</b>	<b>334.6</b>	<b>454.5</b>	<b>280.6</b>	<b>297.6</b>	<b>386.8</b>		<b>357.3</b>	
<b>CD at 5%</b>	<b>54.2</b>	<b>4.1</b>	<b>36.0</b>	<b>67.1</b>	<b>20.7</b>	<b>42.9</b>				
<b>CV (%)</b>	<b>9.5</b>	<b>12.6</b>	<b>7.8</b>	<b>10.6</b>	<b>5.3</b>	<b>10.5</b>				

**Table 3.2 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	North West Zone					
	Ludhiana	Hisar	Pantnagar	Jalore	Average	Rank
PFM-12	92.9	24.4	69.2	38.6	56.3	3
J-1006 (NC)	97.5	40.7	93.3	43.0	68.6	1
African Tall (NC)	56.1	34.7	79.8	41.2	52.9	4
COHM-8 (NC)	102	44.7	65.4	27.0	59.8	2
<b>Mean</b>	<b>87.1</b>	<b>36.1</b>	<b>76.9</b>	<b>37.4</b>	<b>59.4</b>	
<b>CD at 5%</b>	<b>3.2</b>	<b>8.6</b>	<b>6.4</b>	11.3		
<b>CV%</b>	<b>8.0</b>	<b>16.1</b>	<b>7.6</b>			

**Table 3.2 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha)**

Entries	Central Zone								All India	
	Anand	Jabalpur	Rahuri	Urulikanchan	Raipur	Jhansi	Average	Rank	Average	Rank
PFM-12	62.9	117.8	56.1	52.2	43.6	56.9	64.9	4	61.5	3
J-1006 (NC)	79.8	108.0	68.7	85.7	79.4	73.6	82.5	1	77.0	1
African Tall (NC)	76.0	133.2	50.2	61.6	82.8	52.4	76.0	2	66.8	2
COHM-8 (NC)	66.8	110.6	61.5	57.5	55.4	77.0	71.5	3	66.8	2
<b>Mean</b>	<b>71.4</b>	<b>117.4</b>	<b>59.1</b>	<b>64.3</b>	<b>65.3</b>	<b>65.0</b>	<b>73.7</b>		<b>68.0</b>	
<b>CD at 5%</b>	<b>11.6</b>	<b>0.6</b>	<b>6.1</b>	<b>9.3</b>	<b>4.4</b>	<b>12.7</b>				
<b>CV%</b>	<b>11.8</b>	<b>11.1</b>	<b>7.5</b>	<b>10.4</b>	<b>4.9</b>	<b>14.2</b>				

**Table 3.3 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Green Forage Yield (q/ha/day)**

Entries	Ludhiana	Hisar	Pantnagar	Anand	Rahuri	Urulikanchan	Raipur	Jhansi	Average	Rank
PFM-12	5.12	5.16	4.99	6.21	5.21	7.13	3.73	4.15	5.21	4
J-1006 (NC)	5.61	4.39	7.86	8.03	6.47	9.34	5.83	5.41	6.62	1
African Tall (NC)	3.55	4.86	5.17	6.08	6.01	7.75	5.81	4.04	5.41	3
COHM-8 (NC)	5.06	5.32	5.37	7.39	5.97	7.43	4.93	5.54	5.88	2
<b>Mean</b>	<b>4.84</b>	<b>4.93</b>	<b>5.85</b>	<b>6.93</b>	<b>5.91</b>	<b>7.91</b>	<b>5.08</b>	<b>4.79</b>	<b>5.78</b>	

**Table 3.4 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Dry Matter Yield (q/ha/day)**

Entries	Ludhiana	Hisar	Pantnagar	Anand	Rahuri	Urulikanchan	Raipur	Average	Rank
PFM-12	1.18	0.54	0.99	1.05	0.97	0.95	0.84	0.93	4
J-1006 (NC)	1.23	0.70	1.35	1.35	1.15	1.56	1.42	1.25	1
African Tall (NC)	0.71	0.72	0.96	1.07	0.89	0.95	1.34	0.95	3
COHM-8 (NC)	1.29	0.98	1.04	1.28	1.18	1.05	1.13	1.14	2
<b>Mean</b>	<b>1.10</b>	<b>0.74</b>	<b>1.09</b>	<b>1.19</b>	<b>1.05</b>	<b>1.13</b>	<b>1.18</b>	<b>1.07</b>	

**Table 3.5 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Crude Protein Yield (q/ha)**

Entries	North West Zone					Central Zone							All India	
	Ludhiana	Hisar	Pantnagar	Average	Rank	Anand	Jabalpur	Rahuri	Urulikanchan	Raipur	Average	Rank	Average	Rank
PFM-12	7.9	2.5	6.7	5.7	3	3.1	8.3	4.0	4.8	3.3	4.7	4	5.1	4
J-1006 (NC)	8.2	4.0	9.0	7.0	1	3.9	7.6	5.2	8.6	7.5	6.6	1	6.7	1
African Tall (NC)	4.7	3.8	8.4	5.6	4	3.7	9.6	4.8	5.1	8.3	6.3	2	6.0	2
COHM-8 (NC)	8.7	4.9	6.9	6.8	2	3.3	7.6	4.5	5.1	4.5	5.0	3	5.7	3
<b>Mean</b>	<b>7.4</b>	<b>3.8</b>	<b>7.7</b>	<b>6.3</b>		<b>3.5</b>	<b>8.3</b>	<b>4.6</b>	<b>5.9</b>	<b>5.9</b>	<b>5.6</b>		<b>5.9</b>	

**Table 3.6 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Crude Protein (%)**

Entries	North West Zone					Central Zone							All India	
	Ludh-iana	His-ar	Pant-nagar	Aver-age	Ra-nk	Ana-nd	Jabal-pur	Rah-uri	Urulikan-chan	Rai-pur	Aver-age	Ra-nk	Aver-age	Ra-nk
PFM-12	8.5	10.0	9.6	9.4	2	4.9	7.1	7.1	9.2	7.6	7.2	3	8.0	4
J-1006 (NC)	8.4	9.7	9.6	9.3	3	4.9	7.0	7.6	10.1	9.5	7.8	2	8.3	2
African Tall (NC)	8.4	11.0	10.5	10.0	1	4.9	7.2	9.6	8.3	10.0	8.0	1	8.7	1
COHM-8 (NC)	8.5	10.9	10.5	10.0	1	4.9	6.9	7.3	8.9	8.2	7.2	3	8.2	3
<b>Mean</b>	<b>8.5</b>	<b>10.4</b>	<b>10.1</b>	<b>9.6</b>		<b>4.9</b>	<b>7.0</b>	<b>7.9</b>	<b>9.1</b>	<b>8.8</b>	<b>7.5</b>		<b>8.3</b>	

**Table 3.7 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Plant Height (cm)**

Entries	Ludh-iana	His-ar	Pant-nagar	Ana-nd	Jabal-pur	Rah-uri	Urulikan-chan	Rai-pur	Jha-nsi	**Udai-pur	Aver-age	Ra-nk
PFM-12	208.9	235.5	191.7	213.4	220.0	207.3	207.1	227.1	183.7	149.0	210.5	4
J-1006 (NC)	200.4	231.8	222.6	220.7	243.2	206.2	218.2	248.7	206.4	142.0	222.0	2
African Tall (NC)	263.8	211.3	282.4	241.4	244.8	218.6	235.3	279.1	213.2	129.0	243.3	1
COHM-8 (NC)	210.8	229.3	186.2	220.0	226.6	201.3	217.9	231.5	193.8	145.0	213.0	3
<b>Mean</b>	<b>221.0</b>	<b>226.9</b>	<b>220.7</b>	<b>223.9</b>	<b>233.7</b>	<b>208.4</b>	<b>219.6</b>	<b>246.6</b>	<b>199.3</b>	<b>141.3</b>	<b>222.2</b>	

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 3.8 AVTM-2: Second Advanced Varietal Trial in Forage Maize: Leaf Stem Ratio**

Entries	Ludhiana	Hisar	Pantnagar	Anand	Jabalpur	Rahuri	Urulikanchan	Raipur	Jhansi	Average	Rank
PFM-12	0.24	0.42	0.48	0.80	0.58	0.40	0.90	0.34	0.35	0.50	4
J-1006 (NC)	0.27	0.45	0.49	0.81	0.73	0.41	0.82	0.36	0.37	0.52	3
African Tall (NC)	0.23	0.56	0.47	0.77	1.02	0.48	0.76	0.32	0.30	0.55	2
COHM-8 (NC)	0.86	0.37	0.50	0.72	0.92	0.38	0.86	0.32	0.38	0.59	1
<b>Mean</b>	<b>0.40</b>	<b>0.45</b>	<b>0.49</b>	<b>0.78</b>	<b>0.81</b>	<b>0.42</b>	<b>0.84</b>	<b>0.34</b>	<b>0.35</b>	<b>0.54</b>	

**Table 3.9AVTM-2: Second Advanced Varietal Trial in Forage Maize: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)					NDF (%)					IVDMD (%)				
	Rah- uri	Ludh- iana	Pant- nagar	Aver- age	Ra- nk	Rah- uri	Ludh- iana	Pant- nagar	Aver- age	Ra- nk	Ludh- iana	Rah- uri	His- ar	Aver- age	Ra- nk
PFM-12	47.2	32.7	57.4	45.8	3	73.1	68.7	66.4	69.4	4	58.9	52.3	47.7	53.0	3
J-1006 (NC)	46.2	34.7	57.0	46.0	4	70.5	65.4	67.4	67.8	3	59.0	53.1	50.6	54.2	2
African Tall (NC)	44.0	36.5	56.4	45.6	2	64.7	63.8	68.0	65.5	1	60.0	54.8	51.5	55.4	1
COHM-8 (NC)	44.1	33.9	56.6	44.9	1	69.4	67.7	65.0	67.4	2	57.4	54.7	46.7	53.0	3
<b>Mean</b>	<b>45.4</b>	<b>34.5</b>	<b>56.9</b>	<b>45.6</b>		<b>69.4</b>	<b>66.4</b>	<b>66.7</b>	<b>67.5</b>		<b>58.8</b>	<b>53.7</b>	<b>49.1</b>	<b>53.9</b>	

**Table 4.1 AVTM-2 (Seed): Second Advanced Varietal Trial in Forage Maize (Seed): Seed Yield (q/ha)**

Entries	North West Zone				Central Zone						All India	
	Ludh-iana	Pant-nagar	Aver-age	Ra-nk	Rai-pur	Jabal-pur	Ana-nd	Urulikan-chan	Aver-age	Ra-nk	Aver-age	Ra-nk
PFM-12	15.9	20.7	18.3	4	27.4	49.1	22.8	20.6	30.0	3	26.1	3
J-1006 (NC)	18.6	21.7	20.1	2	22.4	67.7	24.7	20.6	33.8	2	29.3	2
African Tall (NC)	25.3	24.8	25.1	1	17.7	40.5	9.2	14.7	20.5	4	22.0	4
COHM-8 (NC)	20.5	18.2	19.4	3	29.6	59.1	30.8	21.1	35.1	1	29.9	1
<b>Mean</b>	<b>20.1</b>	<b>21.3</b>	<b>20.7</b>		<b>24.3</b>	<b>54.1</b>	<b>21.9</b>	<b>19.2</b>	<b>29.9</b>		<b>26.8</b>	
<b>CD at 5%</b>	<b>2.6</b>	<b>2.4</b>			<b>3.6</b>	<b>0.3</b>	<b>4.9</b>	<b>3.0</b>				
<b>CV (%)</b>	<b>9.2</b>	<b>11.5</b>			<b>10.7</b>	<b>13.6</b>	<b>16.2</b>	<b>11.4</b>				

## 5. IVTPM: INITIAL VARIETAL TRIAL IN FORAGE PEARL MILLET

(Reference Tables: 5.1 to 5.9)

An Initial Varietal Trial in Forage Pearl Millet comprising of eight entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks was conducted at 19 centres located in four zones of the country. It included 5 locations in North-west, 4 in north- east, 4 in south zone, and 6 in central zone.

For green forage yield (q/ha), Entry JPM 18-71 showed superiority over the best check by a margin of 5.7% in NWZ, 19.9% in NEZ, 8.6% in SZ, 18.9 % at all India level. Entry AFB-54 showed superiority over the best check by a margin of 6.8% in NWZ, 5.1 % at all India level. Entry ADV175020 showed superiority over the best check by a margin of 23.9% in NWZ, 18.0% in NEZ, 33.6% in SZ, 26.6 % at all India level. Entry FSB2021-1 showed superiority over the best check by a margin of 11.9% in NWZ, 21.4% in NEZ, 32.3% in SZ, 20.5 % at all India level. Entry FBL-7 showed superiority over the best check by a margin of 7.9% in NEZ, 3.5% in SZ, 9.2 % at all India level. Entry FBL-6 showed superiority over the best check by a margin of 9.2% in NEZ, 6.3 % at all India level. In other cases entries were either marginally superior or inferior over the best check.

For dry matter yield (q/ha), Entry JPM 18-71 showed superiority over the best check by a margin of 20.6% in NEZ, 8.4 % at all India level. Entry AFB-54 showed superiority over the best check by a margin of 10.5% in NWZ, 10.8 % at all India level. Entry ADV175020 showed superiority over the best check by a margin of 41.4% in NWZ, 20.0% in NEZ, 8.8% in CZ, 4.6% in SZ, 27.1 % at all India level. Entry FSB2021-1 showed superiority over the best check by a margin of 21.5% in NWZ, 18.4% in NEZ, 10.7% in SZ, 14.7 % at all India level. Entry FBL-7 showed superiority over the best check by a margin of 4.7% in NEZ, 5.3% in SZ, 5.9 % at all India level. Entry FBL-6 showed superiority over the best check by a margin of 11.1% in NEZ, 5.3% in SZ, 6.6 % at all India level. In other cases entries were either marginally superior or inferior over the best check.

For green and dry forage production potential (q/ha/day), entry AFB-54 (7.58 and 1.54 q/ha/day respectively) was best performer.

In growth parameters, FSB-2021-2 was best for plant height (230.1 cm) followed by NDFB-942 (225.7 cm). Entry FBL-7 ranked first (value 0.54) for leafiness.

In quality parameters, for crude protein yield (q/ha), AFB-54 in NWZ, JPM-18-71 in NEZ, ADV175020 in CZ, south zone were best performers. At all India level, entry ADV175020 was best (8.7q/ha) followed by JPM-18-71 (7.8q/ha) and AFB-45 (7.4q/ha). For crude protein content (%), AFB-45 and ADV175020 in NWZ, FBL-7 in NEZ, ADV175020 in CZ, entry JPM-18-71 in south zone were best performers. At all India level, entry JPM-18-71 and ADV175020 (8.9q/ha) was best followed by Hybrid-FSB2021-1 (8.6%). For other quality parameters, entry AFB-45 for ADF (42.6 %), check Giant Bajra for NDF (68.4%) was superior. Entry FBL-7 ranked first for IVDMD (50.4%).



**Table 5.1 IVTPM: Initial Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Hisar	Bikaner	Jalore	Avikanagar	Average	Rank	Superiority%
JPM-18-71	816.7	448.8	537.3	282.9	345.0	486.1	4	5.7
FBL-7	600.0	430.8	500.1	403.7	305.0	447.9	8	
FBL -6	643.1	452.1	463.4	335.7	275.4	433.9	9	
AFB-45	688.9	478.9	662.6	229.2	208.7	453.7	6	
NDFB-942	726.4	420.9	584.0	328.2	203.0	452.5	7	
AFB-54	697.2	431.6	720.9	338.0	268.5	491.2	3	6.8
ADV175020	684.7	394.4	581.9	458.8	730.2	570.0	1	23.9
Hybrid - FSB2021 – 1	877.8	394.4	470.0	350.5	482.0	514.9	2	11.9
RBB-1 (NC)	504.2	376.7	482.6	334.3	184.6	376.5	11	
Giant Bajra (NC)	580.6	373.9	504.9	300.9	317.6	415.6	10	
AFB-3(ZC-NWZ)	619.4	477.1	634.1	298.6	270.7	460.0	5	
<b>Mean</b>	<b>676.3</b>	<b>425.4</b>	<b>558.3</b>	<b>332.8</b>	<b>326.4</b>	<b>463.9</b>		
<b>CD at 5%</b>	<b>67.3</b>	<b>83.9</b>	<b>107.5</b>	<b>87.5</b>	<b>5.0</b>			
<b>CV%</b>	<b>11.1</b>	<b>11.6</b>	<b>11.2</b>		<b>12.5</b>			

**Table 5.1 IVTPM: Initial Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North East Zone						
	Ayodhya	Pusa	Bhubaneswar	Ranchi	Average	Rank	Superiority%
JPM-18-71	351.2	366.7	349.9	410.4	369.5	2	19.9
FBL-7	183.8	370.0	345.8	430.5	332.5	5	7.9
FBL -6	216.4	400.0	392.7	336.8	336.5	4	9.2
AFB-45	163.3	310.0	276.0	366.0	278.8	11	
NDFB-942	191.9	356.7	319.7	417.4	321.4	6	4.3
AFB-54	228.7	343.3	260.4	402.1	308.6	7	0.1
ADV175020	338.9	386.7	364.5	363.9	363.5	3	18.0
Hybrid - FSB2021 - 1	289.9	410.7	353.1	443.0	374.2	1	21.4
RBB-1 (NC)	216.3	300.0	272.9	372.2	290.4	9	
Giant Bajra (NC)	134.8	333.3	369.7	300.0	284.5	10	
APFB-9-1 (ZC-NEZ)	220.5	356.7	310.4	345.1	308.2	8	
<b>Mean</b>	<b>230.5</b>	<b>357.6</b>	<b>328.6</b>	<b>380.7</b>	<b>324.4</b>		
<b>CD at 5%</b>	<b>24.4</b>	<b>14.4</b>	<b>36.6</b>	<b>46.3</b>			
<b>CV%</b>	<b>9.3</b>	<b>8.8</b>	<b>6.5</b>	<b>7.2</b>			

**Table 5.1 IVTPM: Initial Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	Central Zone							Rank
	Anand	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	
JPM-18-71	800.5	534.7	694.0	380.4	540.0	385.6	555.9	2
FBL-7	813.9	493.1	596.8	358.1	443.6	333.8	506.5	4
FBL -6	707.9	544.0	541.3	358.1	439.6	325.0	486.0	6
AFB-45	729.6	280.1	520.5	358.1	392.2	457.9	456.4	10
NDFB-942	744.4	460.7	548.3	358.1	301.5	355.1	461.3	8
AFB-54	713.0	311.6	437.2	496.8	403.6	381.5	457.3	9
ADV175020	808.3	525.5	562.1	348.9	499.2	446.8	531.8	3
Hybrid - FSB2021 - 1	708.8	409.7	478.9	327.3	633.2	446.3	500.7	5
RBB-1 (NC)	435.2	219.9	416.4	372.3	380.7	488.9	385.6	11
Giant Bajra (NC)	680.1	358.8	492.7	399.1	382.4	460.6	462.3	7
BAIF Bajra 1 (ZC-CZ)	830.6	409.7	610.7	415.3	735.3	507.9	584.9	1
<b>Mean</b>	<b>724.8</b>	<b>413.4</b>	<b>536.3</b>	<b>379.3</b>	<b>468.3</b>	<b>417.2</b>	<b>489.9</b>	
<b>CD at 5%</b>	<b>180.9</b>	<b>36.6</b>	<b>2.3</b>	<b>57.5</b>	<b>35.7</b>	<b>46.5</b>		
<b>CV%</b>	<b>14.7</b>	<b>5.2</b>	<b>15.8</b>	<b>8.9</b>	<b>13.2</b>	<b>8.6</b>		

**Table 5.1 IVTPM: Initial Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	South Zone							All India		
	Coimbatore	Hyderabad	Mandya	Raichur	Average	Rank	Superiority%	Average	Rank	Superiority%
JPM-18-71	419.0	240.9	259.0	402.8	330.4	3	8.6	450.8	3	18.9
FBL-7	425.9	301.2	275.3	256.9	314.8	4	3.5	414.1	4	9.2
FBL -6	398.1	329.0	339.1	159.7	306.5	5	0.7	403.0	5	6.3
AFB-45	319.4	333.6	318.2	119.0	272.6	10		379.6	8	0.1
NDFB-942	340.3	236.3	302.0	110.0	247.2	11		384.5	7	1.4
AFB-54	407.4	278.0	303.5	154.6	285.9	8		398.8	6	5.1
ADV175020	516.2	278.0	328.4	503.2	406.5	1	33.6	480.0	1	26.6
Hybrid - FSB2021 - 1	463.0	338.2	326.5	483.3	402.7	2	32.3	457.2	2	20.5
RBB-1 (NC)	250.0	324.3	249.7	294.9	279.7	9		340.8	10	
Giant Bajra (NC)	344.9	356.8	304.9	210.7	304.3	6		379.3	9	
Moti Bajra (ZC-SZ)	385.2	319.7	278.5	232.4	304.0	7				
<b>Mean</b>	<b>388.1</b>	<b>303.3</b>	<b>298.6</b>	<b>266.1</b>	<b>314.0</b>			<b>408.8</b>		
<b>CD at 5%</b>	<b>40.0</b>	<b>55.4</b>	<b>21.8</b>	<b>29.7</b>						
<b>CV%</b>	<b>6.1</b>	<b>10.7</b>	<b>8.1</b>	<b>45.5</b>						

**Table 5.2 IVTPM: Initial Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Hisar	Bikaner	Jalore	Avikanagar	Average	Rank	Superiority%
JPM-18-71	111.9	41.3	90.4	49.1	66.2	71.8	6	
FBL-7	87.0	36.3	117.8	69.9	56.3	73.5	4	
FBL -6	102.1	47.8	103.5	57.8	48.7	72.0	5	
AFB-45	101.3	39.4	117.8	39.0	35.4	66.6	9	
NDFB-942	110.1	50.6	115.1	56.5	35.0	73.5	4	
AFB-54	114.3	56.6	129.7	57.9	47.4	81.2	3	10.5
ADV175020	108.7	37.6	127.3	78.9	166.9	103.9	1	41.4
Hybrid - FSB2021 – 1	135.0	33.4	111.3	60.1	106.6	89.3	2	21.5
RBB-1 (NC)	81.3	44.1	114.8	57.3	39.6	67.4	8	
Giant Bajra (NC)	96.8	35.8	107.1	56.7	57.8	70.8	7	
AFB-3 (ZC-NWZ)	79.4	57.4	131.6	51.8	47.3	73.5	4	
<b>Mean</b>	<b>102.5</b>	<b>43.7</b>	<b>115.1</b>	<b>57.7</b>	<b>64.3</b>	<b>76.7</b>		
<b>CD at 5%</b>	<b>27.5</b>	<b>13.3</b>	<b>21.0</b>	<b>15.7</b>	<b>1.0</b>			
<b>CV%</b>	<b>8.7</b>	<b>17.9</b>	<b>10.6</b>		<b>12.8</b>			

**Table 5.2 IVTPM: Initial Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North East Zone						
	Ayodhya	Pusa	Bhubaneswar	Ranchi	Average	Rank	Superiority%
JPM-18-71	78.9	90.2	88.0	43.3	75.1	1	20.6
FBL-7	40.4	92.3	86.5	41.7	65.2	5	4.7
FBL -6	46.3	98.5	98.3	33.7	69.2	4	11.1
AFB-45	37.5	73.3	69.7	43.3	56.0	11	
NDFB-942	46.1	86.5	80.9	43.7	64.3	6	3.3
AFB-54	41.4	81.2	68.2	46.3	59.3	8	
ADV175020	80.4	92.5	91.7	34.4	74.7	2	20.0
Hybrid - FSB2021 - 1	66.7	99.7	87.7	40.8	73.7	3	18.4
RBB-1 (NC)	45.3	70.6	69.9	43.2	57.2	10	
Giant Bajra (NC)	30.2	78.4	94.4	30.0	58.2	9	
APFB-9-1 (ZC-NEZ)	51.7	86.5	75.3	35.6	62.3	7	
<b>Mean</b>	<b>51.4</b>	<b>86.3</b>	<b>82.8</b>	<b>39.6</b>	<b>65.0</b>		
<b>CD at 5%</b>		<b>7.2</b>	<b>10.1</b>	<b>37.4</b>			
<b>CV%</b>	<b>10.1</b>	<b>8.3</b>	<b>7.2</b>	<b>5.1</b>			

**Table 5.2 IVTPM: Initial Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	Central Zone								
	Anand	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority%
JPM-18-71	136.3	113.8	156.4	67.9	106.8	79.6	110.1	4	
FBL-7	124.1	133.7	135.5	62.0	89.6	98.2	107.2	6	
FBL -6	135.2	117.1	119.6	67.8	88.1	109.7	106.3	7	
AFB-45	193.3	59.2	114.3	68.1	85.3	136.1	109.4	5	
NDFB-942	124.5	107.6	121.2	67.2	59.7	101.9	97.0	10	
AFB-54	178.2	97.5	95.6	100.8	76.4	147.7	116.0	2	2.0
ADV175020	132.0	154.7	141.3	57.4	110.2	146.8	123.7	1	8.8
Hybrid - FSB2021 - 1	104.3	101.3	107.9	61.0	127.5	131.9	105.6	8	
RBB-1 (NC)	114.5	44.8	97.3	84.6	77.0	118.1	89.4	11	
Giant Bajra (NC)	124.5	96.3	108.0	69.9	75.8	138.0	102.1	9	
BAIF Bajra 1 (ZC-CZ)	109.1	122.4	139.1	59.8	138.2	113.9	113.8	3	
Mean	134.2	104.4	121.5	69.7	94.1	120.2	107.3		
CD at 5%	37.6	10.4	0.5	10.6	7.0	34.0			
CV%	16.4	5.9	13.9	8.9	13.0	16.6			

**Table 5.2 IVTPM: Initial Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	South Zone						All India		
	Coimbatore	Hyderabad	Mandya	Average	Rank	Superiority%	Average	Rank	Superiority%
JPM-18-71	79.2	48.8	64.8	64.3	9		84.1	4	8.4
FBL-7	85.0	63.6	57.8	68.8	6	1.6	82.1	6	5.9
FBL -6	74.8	70.1	68.9	71.3	2	5.3	82.7	5	6.6
AFB-45	65.9	66.8	75.5	69.4	4	2.5	79.0	7	1.8
NDFB-942	65.0	48.9	63.6	59.2	10		76.9	9	
AFB-54	82.1	56.2	69.3	69.2	5	2.2	85.9	3	10.8
ADV175020	99.7	57.8	55.0	70.8	3	4.6	98.5	1	27.1
Hybrid - FSB2021 - 1	94.2	68.1	62.7	75.0	1	10.7	88.9	2	14.7
RBB-1 (NC)	47.8	66.9	59.3	58.0	11		70.9	10	
Giant Bajra (NC)	66.2	70.9	58.7	65.3	8		77.5	8	
Moti Bajra (ZC-SZ)	75.3	68.0	59.8	67.7	7				
<b>Mean</b>	<b>75.9</b>	<b>62.4</b>	<b>63.2</b>	<b>67.2</b>			<b>82.6</b>		
<b>CD at 5%</b>	<b>8.1</b>	<b>12.3</b>	<b>7.0</b>						
<b>CV%</b>	<b>6.3</b>	<b>11.5</b>	<b>12.3</b>						

**Table 5.3 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Green Forage Yield (q/ha/day)**

Entries	Ludh-iana	His-ar	Bika-ner	Avika-nagar	Ayod-hya	Pu-sa	Bhuban-eswar	Ran-chi	Ana-nd	Rai-pur	Rah-uri	Urulikan-cha	Jha-nsi	Coimb-atore	Hydera-bad	Man-dya	Aver-age	Ra-nk
JPM-18-71	10.90	7.48	8.02	5.10	6.50	5.73	5.53	5.67	14.04	7.53	6.75	8.06	5.70	8.06	4.66	5.88	7.23	4
FBL-7	8.00	6.99	6.25	4.62	2.96	5.78	5.16	6.04	14.03	6.94	6.21	6.62	5.69	7.89	5.81	5.86	6.55	7
FBL -6	8.60	7.51	6.02	4.17	3.79	6.29	6.01	4.98	12.00	7.66	6.14	6.56	5.08	7.11	5.38	8.09	6.59	6
AFB-45	9.20	9.90	9.89	4.01	3.14	5.34	4.60	6.57	15.86	5.49	7.26	6.43	7.43	6.66	6.59	6.36	7.17	5
NDFB-942	9.70	8.18	8.00	3.15	3.36	5.66	4.87	7.11	12.62	6.49	6.43	4.50	6.02	6.42	4.14	6.16	6.43	8
AFB-54	9.30	9.01	10.76	5.02	4.57	6.48	4.44	7.63	15.17	6.11	9.68	6.62	6.43	7.69	5.39	6.91	7.58	1
ADV175020	9.10	6.88	7.28	10.04	4.77	5.95	5.41	4.87	13.94	6.41	6.16	7.45	7.57	8.19	5.49	6.71	7.26	2
Hybrid - FSB2021 – 1	11.70	7.45	5.95	6.74	5.36	6.52	5.35	5.73	12.22	5.00	5.78	9.45	6.63	7.72	6.94	7.42	7.25	3
RBB-1 (NC)	6.70	8.37	7.20	3.45	4.21	5.26	4.50	7.20	9.89	4.40	7.35	6.24	8.15	5.21	6.52	6.08	6.30	9
Giant Bajra (NC)	7.70	6.15	6.92	4.67	2.17	5.29	5.96	4.97	10.97	5.05	7.09	5.71	6.77	6.39	7.16	6.64	6.23	10
AFB-3 (ZC-NWZ)	8.30	10.45	9.46	5.21														
APFB-9-1 (ZC-NEZ)					3.67	5.70	4.78	5.92										
BAIF Bajra 1 (ZC-CZ)									14.08	5.00	7.60	10.97	8.02					
Moti Bajra (ZC-SZ)														7.41	6.46	6.05		
<b>Mean</b>	<b>9.02</b>	<b>8.03</b>	<b>7.80</b>	<b>5.11</b>	<b>4.05</b>	<b>5.82</b>	<b>5.15</b>	<b>6.06</b>	<b>13.17</b>	<b>6.01</b>	<b>6.95</b>	<b>7.15</b>	<b>6.68</b>	<b>7.16</b>	<b>5.87</b>	<b>6.56</b>	<b>6.86</b>	

**Table 5.4 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Dry Matter Yield (q/ha/day)**

Entries	Ludh-iana	His-ar	Bika-ner	Avika-nagar	Ayod-hya	Pu-sa	Bhuban-eswar	Ran-chi	Ana-nd	Rai-pur	Rah-uri	Urulikan-cha	Coimb-atore	Hydera-bad	Man-dya	Aver-age	Ra-nk
JPM-18-71	1.50	0.69	1.35	0.98	1.46	1.41	1.39	0.60	2.39	1.60	1.21	1.59	1.52	0.94	1.47	1.34	4
FBL-7	1.20	0.59	1.47	0.85	0.65	1.44	1.29	0.58	2.14	1.88	1.08	1.34	1.57	1.22	1.23	1.24	7
FBL -6	1.40	0.79	1.34	0.74	0.81	1.55	1.51	0.50	2.29	1.65	1.16	1.31	1.34	1.15	1.64	1.28	5
AFB-45	1.40	0.82	1.76	0.68	0.72	1.26	1.16	0.78	4.20	1.16	1.38	1.40	1.37	1.32	1.51	1.40	2
NDFB-942	1.50	0.99	1.58	0.54	0.80	1.37	1.23	0.75	2.11	1.52	1.21	0.89	1.23	0.86	1.30	1.19	8
AFB-54	1.50	1.19	1.94	0.89	0.82	1.53	1.16	0.88	3.79	1.91	1.96	1.25	1.55	1.09	1.58	1.54	1
ADV175020	1.40	0.66	1.59	2.30	1.13	1.42	1.36	0.46	2.28	1.89	1.01	1.65	1.58	1.14	1.13	1.40	2
Hybrid - FSB2021 – 1	1.80	0.63	1.41	1.49	1.23	1.58	1.33	0.53	1.80	1.24	1.08	1.90	1.57	1.39	1.42	1.36	3
RBB-1 (NC)	1.10	0.98	1.71	0.74	0.88	1.24	1.15	0.84	2.60	0.90	1.67	1.26	1.00	1.35	1.45	1.26	6
Giant Bajra (NC)	1.30	0.59	1.47	0.85	0.48	1.24	1.52	0.50	2.01	1.36	1.24	1.13	1.23	1.42	1.28	1.17	9
AFB-3 (ZC-NWZ)	1.10	1.26	1.97	0.91													
APFB-9-1 (ZC-NEZ)					0.86	1.38	1.16	0.61									
BAIF Bajra 1 (ZC-CZ)									1.85	1.49	1.09	2.06					
Moti Bajra (ZC-SZ)													1.45	1.38	1.30		
<b>Mean</b>	<b>1.38</b>	<b>0.84</b>	<b>1.60</b>	<b>1.00</b>	<b>0.89</b>	<b>1.40</b>	<b>1.30</b>	<b>0.64</b>	<b>2.50</b>	<b>1.51</b>	<b>1.28</b>	<b>1.43</b>	<b>1.40</b>	<b>1.21</b>	<b>1.39</b>	<b>1.32</b>	

**Table 5.5 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Crude Protein Yield (q/ha)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Ayodhya	Bhubaneswar	Ranchi	Average	Rank
JPM-18-71	6.6	4.0	6.8	5.8	9	6.0	6.4	3.6	5.3	1
FBL-7	5.1	3.9	7.9	5.7	10	3.0	6.4	4.1	4.5	4
FBL -6	5.8	5.1	9.0	6.6	7	3.3	7.2	2.6	4.4	5
AFB-45	7.4	4.3	12.6	8.1	3	2.9	5.1	3.5	3.8	9
NDFB-942	6.6	4.9	9.7	7.1	6	3.9	5.9	3.5	4.4	5
AFB-54	7.5	5.3	15.9	9.6	1	3.4	4.8	4.1	4.1	7
ADV175020	8.3	4.1	13.2	8.5	2	6.0	6.7	2.3	5.0	3
Hybrid - FSB2021 - 1	8.1	3.8	10.7	7.5	5	5.1	7.1	3.4	5.2	2
RBB-1 (NC)	6.3	4.2	9.0	6.5	8	3.5	5.0	3.1	3.9	8
Giant Bajra (NC)	6.9	3.9	9.1	6.6	7	2.4	6.8	1.8	3.7	10
AFB-3 (ZC-NWZ)	4.9	6.0	12.8	7.9	4					
APFB-9-1 (ZC-NEZ)						4.1	6.0	2.8	4.3	6
<b>Mean</b>	<b>6.7</b>	<b>4.5</b>	<b>10.6</b>	<b>7.3</b>		<b>4.0</b>	<b>6.1</b>	<b>3.2</b>	<b>4.4</b>	

**Table 5.5 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Crude Protein Yield (q/ha)**

Entries	Central Zone							South Zone					All India	
	Ana-nd	Rai-pur	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Ra-nk	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Ra-nk	Aver-age	Ra-nk
JPM-18-71	12.1	11.3	11.2	8.7	9.4	10.6	2	10.1	7.4	5.3	7.6	3	7.8	2
FBL-7	12.4	7.2	9.7	6.9	6.9	8.6	7	11.1	4.8	5.2	7.0	6	6.8	5
FBL -6	13.4	9.1	8.2	5.8	8.2	8.9	5	9.8	6.3	6.4	7.5	4	7.2	4
AFB-45	20.2	6.8	7.7	5.7	7.4	9.5	4	9.8	5.6	5.2	6.9	7	7.4	3
NDFB-942	11.9	4.3	8.3	5.6	5.3	7.1	11	6.8	5.3	3.8	5.3	9	6.1	7
AFB-54	15.5	6.0	6.2	9.4	7.0	8.8	6	10.4	4.8	3.8	6.3	8	7.4	3
ADV175020	14.3	14.7	10.2	6.9	8.9	11.0	1	16.5	4.6	5.0	8.7	1	8.7	1
Hybrid - FSB2021 – 1	9.1	7.2	7.7	6.6	11.5	8.4	8	11.6	5.7	6.2	7.8	2	7.4	3
RBB-1 (NC)	9.8	2.7	6.2	10.2	7.4	7.3	10	6.3	4.1	5.5	5.3	9	6.0	8
Giant Bajra (NC)	11.3	7.2	7.2	5.6	6.1	7.5	9	9.0	5.9	7.6	7.5	4	6.5	6
BAIF Bajra 1 (ZC-CZ)	11.8	7.9	10.1	7.2	12.6	9.9	3							
Moti Bajra (ZC-SZ)								11.2	5.2	5.6	7.4	5		
<b>Mean</b>	<b>12.9</b>	<b>7.7</b>	<b>8.4</b>	<b>7.2</b>	<b>8.2</b>	<b>8.9</b>		<b>10.2</b>	<b>5.4</b>	<b>5.4</b>	<b>7.0</b>		<b>7.1</b>	

**Table 5.6 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Crude Protein (%)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Ayodhya	Ranchi	Average	Rank
JPM-18-71	5.9	9.7	7.5	7.7	8	7.3	7.6	8.3	7.7	5
FBL-7	5.9	10.8	6.7	7.8	7	7.4	7.4	9.8	8.2	1
FBL -6	5.7	10.7	8.7	8.4	5	7.3	7.2	7.8	7.4	6
AFB-45	7.3	10.8	10.7	9.6	1	7.3	7.8	8.1	7.7	5
NDFB-942	6.0	9.7	8.4	8.0	6	7.3	8.5	8.1	8.0	3
AFB-54	6.6	9.4	12.2	9.4	2	7.0	8.3	8.8	8.0	3
ADV175020	7.6	10.8	10.3	9.6	1	7.3	7.5	6.8	7.2	7
Hybrid - FSB2021 - 1	6.0	11.4	9.6	9.0	3	8.2	7.7	8.3	8.1	2
RBB-1 (NC)	7.8	9.5	7.9	8.4	5	7.2	7.8	7.1	7.4	6
Giant Bajra (NC)	7.1	11.0	8.5	8.8	4	7.2	7.9	6.0	7.0	8
AFB-3 (ZC-NWZ)	6.2	10.5	9.7	8.8	4					
APFB-9-1 (ZC-NEZ)						7.9	8.0	7.8	7.9	4
<b>Mean</b>	<b>6.6</b>	<b>10.4</b>	<b>9.1</b>	<b>8.7</b>		<b>7.4</b>	<b>7.8</b>	<b>7.9</b>	<b>7.7</b>	

**Table 5.6 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Crude Protein (%)**

Entries	Central Zone							South Zone					All India	
	Ana-nd	Rai-pur	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Ra-nk	Man-dya	Hydera-bad	**Coimb-atore	Aver-age	Ra-nk	Aver-age	Ra-nk
JPM-18-71	9.0	9.9	7.2	12.8	8.8	9.5	2	11.4	10.9	12.7	11.1	1	8.9	1
FBL-7	9.9	6.7	7.2	11.1	7.7	8.5	6	8.3	8.2	13.1	8.3	5	8.2	5
FBL -6	9.9	9.4	6.9	8.6	9.3	8.8	4	9.2	9.0	13.1	9.1	3	8.4	3
AFB-45	10.6	7.1	6.7	8.3	8.6	8.3	7	7.4	7.7	14.9	7.6	7	8.3	4
NDFB-942	9.6	9.5	6.9	8.3	8.8	8.6	5	8.3	7.7	10.5	8.0	6	8.2	5
AFB-54	8.7	6.1	6.5	9.3	9.1	7.9	8	7.0	6.6	12.7	6.8	8	8.1	6
ADV175020	11.0	9.5	7.2	12.1	8.1	9.6	1	8.3	8.6	16.6	8.5	4	8.9	1
Hybrid - FSB2021 - 1	8.8	7.1	7.1	10.8	9.0	8.6	5	9.2	9.0	12.3	9.1	3	8.6	2
RBB-1 (NC)	8.5	6.0	6.4	12.1	9.6	8.5	6	7.0	8.2	13.1	7.6	7	8.1	6
Giant Bajra (NC)	9.3	7.5	6.7	8.1	8.0	7.9	8	10.1	10.6	13.6	10.3	2	8.3	4
BAIF Bajra 1 (ZC-CZ)	10.8	6.5	7.2	12.1	9.1	9.1	3							
Moti Bajra (ZC-SZ)								8.7	8.3	14.9	8.5	4	<b>8.4</b>	
<b>Mean</b>	<b>9.6</b>	<b>7.8</b>	<b>6.9</b>	<b>10.3</b>	<b>8.7</b>	<b>8.7</b>		<b>8.6</b>	<b>8.6</b>	<b>13.4</b>	<b>8.6</b>			

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 5.7 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Plant Height (cm)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Ayodhya	Pusa	Bhubaneswar	Ranchi
JPM-18-71	265.0	244.7	212.0	194.7	231.2	231.6	202.1	181.9
FBL-7	270.0	248.3	185.2	202.3	123.0	245.0	195.7	184.7
FBL -6	255.0	240.0	227.8	185.3	224.4	231.6	228.7	152.0
AFB-45	265.0	243.7	210.7	164.5	176.2	233.3	175.7	211.3
NDFB-942	285.0	246.7	259.8	178.0	234.9	230.0	190.4	203.1
AFB-54	250.0	238.0	215.2	178.5	213.4	225.0	163.1	220.6
ADV175020	240.0	230.3	201.4	236.0	185.4	240.0	210.2	202.4
Hybrid - FSB2021 – 1	280.0	238.3	207.2	255.7	142.4	226.6	204.5	203.6
RBB-1 (NC)	250.0	253.3	201.1	182.9	166.2	210.0	168.4	191.4
Giant Bajra (NC)	255.0	224.7	205.0	192.7	184.6	205.0	219.4	182.8
AFB-3 (ZC-NWZ)	285.0	229.0	216.6	160.0				
APFB-9-1 (ZC-NEZ)					171.4	226.6	180.2	173.2
<b>Mean</b>	<b>263.6</b>	<b>239.7</b>	<b>212.9</b>	<b>193.7</b>	<b>186.6</b>	<b>227.7</b>	<b>194.4</b>	<b>191.5</b>

**Table 5.7 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Plant Height (cm)**

Entries	Ana-nd	Rai-pur	Jabal-pur	Rah-uri	Urulikan-chan	Jha-nsi	Coimb-atore	Hydera-bad	Man-dya	Rai-chur	Aver-age	Ra-nk
JPM-18-71	233.7	270.8	193.3	176.5	248.6	265.0	265.0	228.7	162.1	176.1	221.3	4
FBL-7	232.6	266.3	238.7	131.3	244.9	250.7	256.0	206.4	147.8	169.6	211.0	7
FBL -6	235.7	278.2	200.0	156.6	203.0	262.3	245.0	178.6	176.7	167.9	213.8	6
AFB-45	221.9	192.7	188.7	160.4	202.7	298.3	225.0	203.3	151.4	166.1	205.0	8
NDFB-942	244.2	276.1	242.3	180.3	209.6	260.3	253.0	230.9	158.2	180.1	225.7	2
AFB-54	227.3	193.7	157.7	151.1	179.7	270.7	257.2	209.6	137.0	170.6	203.2	9
ADV175020	218.6	329.1	261.7	177.1	214.6	270.7	275.3	237.0	147.0	167.2	224.7	7
Hybrid - FSB2021 - 1	201.5	310.2	299.3	188.7	250.9	311.3	264.0	236.2	155.0	166.3	230.1	1
RBB-1 (NC)	227.2	197.2	177.0	159.2	176.6	244.7	250.2	202.6	127.8	166.3	197.3	10
Giant Bajra (NC)	218.3	272.8	254.3	166.5	236.8	313.7	249.0	166.8	171.8	170.3	216.1	5
BAIF Bajra 1 (ZC-CZ)	208.4	313.3	224.7	183.3	227.3	297.7						
Moti Bajra (ZC-SZ)							247.0	199.2	124.0	153.5		
<b>Mean</b>	<b>224.5</b>	<b>263.7</b>	<b>221.6</b>	<b>166.5</b>	<b>217.7</b>	<b>276.8</b>	<b>253.3</b>	<b>209.0</b>	<b>150.8</b>	<b>168.6</b>	<b>214.8</b>	



**Table 5.8 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Leaf Stem Ratio**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Ayodhya	Pusa	Bhubaneswar	Ranchi
JPM-18-71	0.67	0.54	0.68	0.58	0.50	0.51	0.74	0.71
FBL-7	1.22	0.48	0.46	0.55	0.47	0.54	0.74	0.53
FBL -6	0.63	0.47	0.27	0.53	0.60	0.58	0.85	0.92
AFB-45	0.47	0.43	0.78	0.73	0.61	0.40	0.55	0.64
NDFB-942	0.64	0.45	0.61	0.58	0.58	0.48	0.71	0.82
AFB-54	0.61	0.43	0.61	0.56	0.63	0.47	0.64	0.52
ADV175020	0.52	0.35	0.42	0.55	0.65	0.56	0.89	0.76
Hybrid - FSB2021 – 1	0.64	0.61	0.48	0.48	0.66	0.60	0.77	0.69
RBB-1 (NC)	0.54	0.41	0.40	0.66	0.70	0.45	0.60	0.56
Giant Bajra (NC)	0.59	0.56	0.37	0.54	0.69	0.45	0.80	0.62
AFB-3 (ZC-NWZ)	0.54	0.71	0.52	0.69				
APFB-9-1 (ZC-NEZ)					0.52	0.48	0.66	0.72
<b>Mean</b>	<b>0.64</b>	<b>0.49</b>	<b>0.51</b>	<b>0.59</b>	<b>0.60</b>	<b>0.50</b>	<b>0.72</b>	<b>0.68</b>

**Table 5.8 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): Leaf Stem Ratio**

Entries	Anand	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Coimbatore	Hyderabad	Mandya	Average	Rank
JPM-18-71	0.79	0.25	0.84	0.52	0.42	0.22	0.26	0.23	0.22	0.51	3
FBL-7	0.74	0.25	1.02	0.68	0.51	0.33	0.27	0.22	0.23	0.54	1
FBL -6	0.73	0.26	0.77	0.42	0.54	0.29	0.26	0.21	0.21	0.50	4
AFB-45	0.85	0.34	0.64	0.27	0.39	0.36	0.29	0.17	0.23	0.48	6
NDFB-942	0.47	0.27	0.77	0.33	0.44	0.32	0.23	0.22	0.25	0.48	6
AFB-54	0.75	0.33	0.68	0.29	0.46	0.38	0.25	0.21	0.24	0.47	7
ADV175020	0.58	0.20	0.86	0.43	0.48	0.33	0.26	0.17	0.18	0.48	6
Hybrid - FSB2021 - 1	0.73	0.26	0.84	0.47	0.52	0.32	0.25	0.19	0.25	0.52	2
RBB-1 (NC)	0.75	0.32	0.67	0.27	0.47	0.31	0.26	0.21	0.22	0.46	8
Giant Bajra (NC)	0.70	0.27	0.72	0.45	0.51	0.37	0.21	0.31	0.20	0.49	5
BAIF Bajra 1 (ZC-CZ)	0.75	0.23	1.03	0.81	0.47	0.32					
Moti Bajra (ZC-SZ)							0.20	0.18	0.22		
<b>Mean</b>	<b>0.71</b>	<b>0.27</b>	<b>0.80</b>	<b>0.45</b>	<b>0.47</b>	<b>0.32</b>	<b>0.25</b>	<b>0.21</b>	<b>0.22</b>	<b>0.49</b>	

**Table 5.9 IVTPM: Initial Varietal Trial in Forage Pearl millet (New): ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)			
	Ludhiana	Rank	Ludhiana	Rank	Ludhiana	Hisar	Average	Rank
JPM-18-71	48.7	8	73.5	9	47.0	47.1	47.0	7
FBL-7	48.9	9	73.2	8	48.2	52.5	50.4	1
FBL -6	46.2	4	72.3	5	53.2	44.0	48.6	5
AFB-45	42.6	1	69.8	2	50.8	47.0	48.9	4
NDFB-942	48.7	8	71.5	4	45.2	52.6	48.9	4
AFB-54	46.8	5	72.6	7	46.6	47.9	47.2	6
ADV175020	47.2	6	72.5	6	52.9	46.1	49.5	3
Hybrid - FSB2021 – 1	48.7	8	73.5	10	45.6	42.6	44.1	9
RBB-1 (NC)	45.6	3	71.4	3	51.2	39.9	45.5	8
Giant Bajra (NC)	43.2	2	68.4	1	54.1	45.5	49.8	2
AFB-3 (ZC-NWZ)	47.8	7	74.6	11	42.5	39.7	41.1	10
<b>Mean</b>	<b>46.8</b>		<b>72.1</b>		<b>48.8</b>	<b>45.9</b>	<b>47.4</b>	

## 6. AVTPM-1: FIRST ADVANCED VARIETAL TRIAL IN FORAGE PEARL MILLET

(Reference Tables: 6.1 to 6.9)

In Forage Pearl Millet, five entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated in First Advanced Varietal Trial conducted at 19 locations comprising of 4 locations situated in south zone, 5 in NW, 4 in NE, 6 in central zone.

For green forage yield (q/ha), Entry 16ADV0111 showed superiority over the best check by a margin of 5.4% in NWZ, 6.9% in NEZ, 8.1% in CZ, 34.5% in SZ, 18.2 % at all India level. Entry JPM-18-37 showed superiority over the best check by a margin of 13.4% in NWZ, 13.9 % in SZ, 12.0 % at all India level. Entry FBL-4 showed superiority over the best check by a margin of 32.8% in SZ, 7.9 % at all India level. Entry TSFB-1610 showed superiority over the best check by a margin of 16.3% in SZ, 8.0 % at all India level. Entry PHFB-5 showed superiority over the best check by a margin of 5.0 % at all India level. In other cases entries were either marginally superior or inferior over the best check.

For dry matter yield (q/ha), Entry 16ADV0111 showed superiority over the best check by a margin of 10.6 % in NWZ, 13.6 % in NEZ, 11.8 % in CZ, 29.0 % in SZ, 19.2 % at all India level. Entry JPM-18-37 showed superiority over the best check by a margin of 9.4% in NWZ, 7.9 % in NEZ, 6.7% in CZ, 11.6% in SZ, 13.0 % at all India level. Entry FBL-4 showed superiority over the best check by a margin of 30.0 % in SZ. Entry TSFB-1610 showed superiority over the best check by a margin of 6.0% in NWZ, 4.9% in CZ, 16.5% in SZ, 12.1 % at all India level. Entry PHFB-5 showed superiority over the best check by a margin of 5.7 % at all India level. In other cases entries were either marginally superior or inferior over the best check.

For green and fodder production potential (q/ha/day), entry JPM-18-37 (7.39 and 1.41 q/ha/day respectively) ranked first

For plant height, PHBF-5 (220.9 cm) ranked first followed by JPM-18-37 (213.4 cm). For leaf stem ratio, check RBB-1 ranked first.

For CPY (q/ha), check Giant Bajra in NWZ, entry TSFB-1610 in CZ, entry 16ADV0111 in NEZ, SZ and at all India level were best performers. For crude protein content, Zonal check AFB-9-1 top ranked in NWZ, BAIF Bajra in CZ, Moti Bajra in SZ, whereas national check Giant Bajra top ranked in NEZ and at all India level. For other quality parameters, entry FBL-4 ranked first for ADF and IVDMD whereas RBB-1 ranked first for NDF.

**Table 6.1 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Hisar	Bikaner	Avikanagar	Jalore	Average	Rank	Superiority (%)
FBL 4	688.9	483.1	484.1	229.6	451.4	467.4	6	
TSFB-1610	725.0	470.9	408.8	295.0	494.4	478.8	3	1.9
16ADV0111	712.5	501.9	462.4	210.3	590.3	495.5	2	5.4
JPM 18-37	705.6	523.2	618.7	359.2	458.3	533.0	1	13.4
PHBF-5	737.8	471.7	513.9	398.3	266.7	477.7	4	1.6
RBB-1 (NC)	618.1	411.1	470.2	347.8	250.7	419.6	8	
Giant Bajra (NC)	744.2	447.7	506.6	380.9	270.8	470.0	5	
AFB-3 (ZC-NWZ)	677.8	457.9	448.4	261.1	418.1	452.6	7	
<b>Mean</b>	<b>701.2</b>	<b>470.9</b>	<b>489.1</b>	<b>310.3</b>	<b>400.1</b>	<b>474.3</b>		
<b>CD at 5(%)</b>	<b>42.6</b>	<b>87.3</b>	<b>77.4</b>	<b>8.1</b>	<b>137.8</b>			
<b>CV (%)</b>	<b>9.2</b>	<b>10.9</b>	<b>8.9</b>	<b>12.5</b>				

**Table 6.1 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North East Zone						
	Pusa	Bhubaneswar	Ranchi	Ayodhya	Average	Rank	Superiority (%)
FBL 4	375.7	346.5	383.7	304.2	352.5	6	
TSFB-1610	390.3	390.2	485.8	294.0	390.1	3	2.2
16ADV0111	380.2	310.5	466.0	475.7	408.1	1	6.9
JPM 18-37	410.0	337.6	403.8	410.4	390.5	2	2.3
PHBF-5	370.4	365.7	340.6	269.5	336.6	7	
RBB-1 (NC)	345.0	317.8	374.3	224.6	315.4	8	
Giant Bajra (NC)	360.3	378.3	517.0	271.5	381.8	4	
APFB-9-1 (ZC-NEZ)	350.0	309.0	405.6	385.9	362.6	5	
Mean	372.7	344.4	422.1	329.5	367.2		
CD at 5(%)	11.7	31.5	42.7	56.8			
CV (%)	6.9	5.2	5.8	13.1			

**Table 6.1 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	Central Zone								
	Anand	Jabalpur	Raipur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority (%)
FBL 4	923.6	395.6	370.8	323.5	391.0	293.3	449.6	4	8.1
TSFB-1610	712.2	520.5	398.6	363.6	380.2	275.7	441.8	6	
16ADV0111	938.1	395.6	654.2	377.9	388.3	297.7	508.6	1	
JPM 18-37	783.9	447.6	440.3	329.8	369.8	307.6	446.5	5	
PHBF-5	864.2	447.6	422.2	328.1	446.1	289.1	466.2	3	
RBB-1 (NC)	548.1	295.0	284.7	371.1	231.0	302.4	338.7	8	
Giant Bajra (NC)	516.1	461.5	447.2	359.4	295.2	286.7	394.3	7	
BAIF Bajra 1 (ZC-CZ)	792.8	298.4	620.8	365.8	443.2	301.8	470.5	2	
<b>Mean</b>	<b>759.9</b>	<b>407.7</b>	<b>454.9</b>	<b>352.4</b>	<b>368.1</b>	<b>294.3</b>	<b>439.5</b>		
<b>CD at 5(%)</b>	<b>218.6</b>	<b>2.3</b>	<b>56.6</b>	<b>37.7</b>	<b>85.9</b>	<b>19.2</b>			
<b>CV (%)</b>	<b>16.4</b>	<b>10.1</b>	<b>7.1</b>	<b>6.1</b>	<b>13.2</b>	<b>5.2</b>			

**Table 6.1 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	South Zone							All India		
	Coimbatore	Hyderabad	Man-dya	**Rai-chur	Average	Rank	Superiority%	Average	Rank	Superiority%
FBL 4	499.7	402.6	299.3	165.2	400.5	2	32.8	424.8	4	7.9
TSFB-1610	408.3	394.3	249.6	125.9	350.7	3	16.3	425.4	3	8.0
16ADV0111	495.8	336.0	385.1	203.9	405.6	1	34.5	465.5	1	18.2
JPM 18-37	411.4	313.8	304.9	160.5	343.4	4	13.9	440.9	2	12.0
PHBF-5	405.3	263.8	242.3	130.6	303.8	5	0.8	413.5	5	5.0
RBB-1 (NC)	227.5	244.3	220.2	123.7	230.7	8		338.0	7	
Giant Bajra (NC)	391.7	227.7	224.6	121.5	281.3	7		393.7	6	
Moti Bajra (ZC-SZ)	440.8	224.9	238.8	138.3	301.5	6				
<b>Mean</b>	<b>410.1</b>	<b>300.9</b>	<b>270.6</b>	<b>146.2</b>	<b>327.2</b>			<b>414.5</b>		
<b>CD at 5(%)</b>	<b>38.2</b>	<b>50.0</b>	<b>19.1</b>	<b>4.4</b>						
<b>CV (%)</b>	<b>5.3</b>	<b>9.4</b>	<b>10.7</b>	<b>17.3</b>						

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 6.2 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Bikaner	Avikanagar	Jalore	**Hisar	Average	Rank	Superiority (%)
FBL 4	97.0	118.8	50.0	78.0	47.0	86.0	5	2.1
TSFB-1610	111.5	95.0	63.8	86.7	36.5	89.3	3	6.0
16ADV0111	99.0	120.1	50.3	103.1	41.8	93.1	1	10.6
JPM 18-37	99.4	121.2	68.5	79.4	50.1	92.1	2	9.4
PHBF-5	117.5	106.0	78.2	46.8	34.7	87.1	4	3.5
RBB-1 (NC)	92.2	121.9	66.3	43.8	54.6	81.1	7	
Giant Bajra (NC)	103.2	111.4	75.2	47.0	44.9	84.2	6	
AFB-3 (ZC-NWZ)	99.7	78.4	48.9	73.1	43.3	75.0	8	
<b>Mean</b>	<b>102.4</b>	<b>109.1</b>	<b>62.6</b>	<b>69.7</b>	<b>44.1</b>	<b>86.0</b>		
<b>CD at 5(%)</b>	<b>19.5</b>	<b>17.0</b>	<b>1.6</b>	<b>21.3</b>	<b>9.2</b>			
<b>CV (%)</b>	<b>7.9</b>	<b>8.8</b>	<b>12.5</b>		<b>12.3</b>			

Note: \*\* Data is not included in zonal and all India average due to low yield of data

**Table 6.2 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North East Zone						
	Pusa	Bhubaneswar	Ranchi	Ayodhya	Average	Rank	Superiority (%)
FBL 4	91.6	86.6	76.7	68.4	80.8	5	
TSFB-1610	92.2	97.2	104.1	64.7	89.6	2	
16ADV0111	90.6	76.4	101.4	108.9	94.3	1	13.6
JPM 18-37	94.8	83.8	93.7	86.2	89.6	2	7.9
PHBF-5	76.4	91.0	68.1	66.0	75.4	7	
RBB-1 (NC)	85.4	77.5	91.6	53.5	77.0	6	
Giant Bajra (NC)	78.3	89.8	105.9	58.3	83.1	3	
APFB-9-1 (ZC-NEZ)	83.3	75.9	81.1	90.7	82.7	4	
<b>Mean</b>	<b>86.6</b>	<b>84.8</b>	<b>90.3</b>	<b>74.6</b>	<b>84.1</b>		
<b>CD at 5(%)</b>	<b>4.8</b>	<b>7.8</b>	<b>37.8</b>	<b>2.2</b>			
<b>CV (%)</b>	<b>6.9</b>	<b>5.3</b>	<b>4.4</b>	<b>7.9</b>			

**Table 6.2 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	Central Zone								
	Anand	Jabalpur	Raipur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority (%)
FBL 4	122.1	84.9	80.5	56.8	45.4	58.6	74.7	7	
TSFB-1610	100.7	114.7	84.7	62.6	75.6	75.8	85.7	4	4.9
16ADV0111	124.4	84.8	146.2	56.2	58.2	78.1	91.3	1	11.8
JPM 18-37	114.3	96.7	130.7	55.8	53.1	72.5	87.2	3	6.7
PHBF-5	132.4	96.7	92.8	55.4	69.1	88.9	89.2	2	9.2
RBB-1 (NC)	99.4	62.6	60.3	85.3	35.1	74.4	69.5	8	
Giant Bajra (NC)	75.1	101.7	89.4	65.1	37.6	87.2	76.0	6	
BAIF Bajra 1 (ZC-CZ)	97.2	63.8	128.3	52.6	77.6	70.6	81.7	5	
Mean	108.2	88.2	101.6	61.2	56.5	75.8	81.9		
CD at 5(%)	NS	0.5	16.7	6.8	12.9	17.5			
CV (%)	19.2	9.9	9.4	6.4	12.9	13.2			

**Table 6.2 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	South Zone						All India		
	Coimbatore	Hyderabad	Mandya	Average	Rank	Superiority%	Average	Rank	Superiority%
FBL 4	98.9	87.8	58.8	81.9	1	30.0	80.1	5	5.3
TSFB-1610	81.2	86.8	51.9	73.3	3	16.5	85.3	3	12.1
16ADV0111	96.2	73.2	74.2	81.2	2	29.0	90.7	1	19.2
JPM 18-37	84.6	72.5	53.7	70.3	4	11.6	85.9	2	13.0
PHBF-5	80.4	53.8	46.9	60.4	6		80.4	4	5.7
RBB-1 (NC)	47.0	53.8	47.9	49.6	8		70.5	7	
Giant Bajra (NC)	75.0	48.2	44.4	55.9	7		76.1	6	
Moti Bajra (ZC-SZ)	89.7	49.4	49.7	62.9	5				
<b>Mean</b>	<b>81.6</b>	<b>65.7</b>	<b>53.4</b>	<b>66.9</b>			<b>81.3</b>		
<b>CD at 5(%)</b>	<b>7.0</b>	<b>9.8</b>	<b>4.5</b>						
<b>CV (%)</b>	<b>4.9</b>	<b>8.5</b>	<b>12.8</b>						

**Table 6.3 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha/day)**

Entries	Ludh- iana	His- ar	Bika- ner	Avika- nagar	Pu- sa	Bhuban- eswar	Ayod- hya	Ran- chi
FBL 4	9.20	7.92	6.05	3.02	6.00	5.33	5.07	6.03
TSFB-1610	9.70	8.20	5.31	4.34	6.20	6.07	6.00	6.91
16ADV0111	9.50	8.52	5.78	2.92	5.71	4.66	7.20	6.27
JPM 18-37	9.40	9.90	9.10	5.31	6.58	5.36	6.83	7.25
PHBF-5	9.80	7.82	6.85	6.04	5.85	5.74	4.21	5.61
RBB-1 (NC)	8.20	8.88	6.91	6.69	7.50	4.87	3.03	6.97
Giant Bajra (NC)	9.90	7.55	6.85	5.71	5.72	5.85	4.17	9.63
AFB-3 (ZC-NWZ)	9.00	10.01	6.60	4.86				
APFB-9-1 (ZC-NEZ)					5.59	4.68	6.54	7.33
<b>Mean</b>	<b>9.34</b>	<b>8.60</b>	<b>6.68</b>	<b>4.86</b>	<b>6.14</b>	<b>5.32</b>	<b>5.38</b>	<b>7.00</b>

**Table 6.3 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha/day)**

Entries	Ana- nd	Rah- uri	Urulikan- chan	Rai- pur	Jha- nsi	Coimb- atore	Hydera- bad	Man- dya	Aver- age	Ra- nk
FBL 4	16.8	5.11	6.63	6.39	4.86	8.47	6.43	7.19	6.91	3
TSFB-1610	12.5	6.61	6.44	6.99	4.04	7.29	6.54	5.47	6.79	5
16ADV0111	14.4	6.13	6.58	7.79	4.17	9.01	5.61	8.89	7.07	2
JPM 18-37	14.0	6.00	6.27	7.72	4.99	7.76	5.26	6.55	7.39	1
PHBF-5	14.9	5.76	7.56	7.28	4.64	7.37	4.82	5.81	6.88	4
RBB-1 (NC)	12.8	7.05	3.98	6.19	4.26	4.55	4.54	5.16	6.35	7
Giant Bajra (NC)	8.8	5.80	5.00	7.85	4.51	6.99	4.32	5.97	6.54	6
BAIF Bajra 1 (ZC-CZ)	12.6	5.90	7.51	8.50	4.21					
Moti Bajra (ZC-SZ)						8.01	3.97	5.35		
<b>Mean</b>	<b>13.34</b>	<b>6.04</b>	<b>6.25</b>	<b>7.34</b>	<b>4.46</b>	<b>7.43</b>	<b>5.19</b>	<b>6.30</b>	<b>6.85</b>	



**Table 6.4 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha/day)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Pusa	Ayodhya	Ranchi	Bhubaneswar
FBL 4	1.30	0.77	1.49	0.66	1.46	1.13	1.21	1.33
TSFB-1610	1.50	0.64	1.22	0.94	1.46	1.32	1.48	1.51
16ADV0111	1.30	0.72	1.50	0.70	1.36	1.65	1.36	1.15
JPM 18-37	1.30	0.95	1.69	1.01	1.52	1.43	1.68	1.33
PHBF-5	1.60	0.58	1.38	1.18	1.21	1.03	1.12	1.43
RBB-1 (NC)	1.20	1.18	1.71	1.27	1.86	0.72	1.71	1.19
Giant Bajra (NC)	1.40	0.76	1.47	1.13	1.24	0.89	1.97	1.39
AFB-3 (ZC-NWZ)	1.30	0.95	1.09	0.91				
APFB-9-1 (ZC-NEZ)					1.33	1.53	1.47	1.15
<b>Mean</b>	<b>1.36</b>	<b>0.82</b>	<b>1.44</b>	<b>0.98</b>	<b>1.43</b>	<b>1.21</b>	<b>1.50</b>	<b>1.31</b>

**Table 6.4 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha/day)**

Entries	Anand	Rahuri	Urulikanchan	Raipur	Coimbatore	Hyderabad	Mandya	Average	Rank
FBL 4	2.22	0.90	0.77	1.39	1.68	1.40	1.41	1.27	5
TSFB-1610	1.77	1.14	1.28	1.49	1.45	1.44	1.14	1.32	3
16ADV0111	1.91	0.91	0.99	1.74	1.75	1.22	1.76	1.33	2
JPM 18-37	2.04	1.01	0.90	2.29	1.60	1.22	1.15	1.41	1
PHBF-5	2.28	0.97	1.17	1.60	1.46	0.98	1.13	1.28	4
RBB-1 (NC)	2.31	1.62	0.61	1.31	0.94	1.00	1.12	1.32	3
Giant Bajra (NC)	1.27	1.05	0.64	1.57	1.34	0.92	1.18	1.21	6
BAIF Bajra 1 (ZC-CZ)	1.54	0.85	1.31	1.76					
Moti Bajra (ZC-SZ)					1.63	0.87	1.11		
<b>Mean</b>	<b>1.92</b>	<b>1.06</b>	<b>0.96</b>	<b>1.64</b>	<b>1.48</b>	<b>1.13</b>	<b>1.25</b>	<b>1.31</b>	

**Table 6.5 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Crude Protein Yield (q/ha)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Ayodhya	Ranchi	Average	Rank
FBL 4	8.1	5.3	5.4	6.3	7	6.4	5.4	7.8	6.5	5
TSFB-1610	7.1	4.0	8.3	6.4	6	7.2	5.2	9.2	7.2	3
16ADV0111	7.7	4.3	5.7	5.9	8	5.7	9.3	9.2	8.1	1
JPM 18-37	6.0	4.7	11.8	7.5	3	6.2	6.7	9.0	7.3	2
PHBF-5	9.4	3.5	6.9	6.6	5	6.7	5.0	6.0	5.9	7
RBB-1 (NC)	5.9	6.0	11.9	7.9	2	6.0	4.7	8.3	6.3	6
Giant Bajra (NC)	7.3	4.4	12.5	8.1	1	7.1	4.5	10.4	7.3	2
AFB-3 (ZC-NWZ)	7.3	4.4	9.3	7.0	4					
APFB-9-1 (ZC-NEZ)						5.8	7.9	6.7	6.8	4
<b>Mean</b>	<b>7.4</b>	<b>4.6</b>	<b>9.0</b>	<b>7.0</b>		<b>6.4</b>	<b>6.1</b>	<b>8.3</b>	<b>6.9</b>	

**Table 6.5 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Crude Protein Yield (q/ha)**

Entries	Central Zone							South Zone					All India	
	Ana-nd	Jabal-pur	Rah-uri	Urulikan-cha	Rai-pur	Aver-age	Ra-nk	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Ra-nk	Aver-age	Ra-nk
FBL 4	13.8	6.0	5.9	3.1	7.8	7.3	5	12.2	5.9	9.0	9.0	2	7.3	2
TSFB-1610	10.0	8.1	6.0	7.8	6.4	7.7	1	8.2	5.9	9.5	7.9	5	7.3	2
16ADV0111	13.8	5.7	5.2	5.8	6.5	7.4	4	11.0	9.1	8.8	9.6	1	7.7	1
JPM 18-37	13.1	6.8	5.9	3.2	0.0	5.8	8	10.0	6.1	7.8	8.0	4	6.9	3
PHBF-5	12.5	6.7	4.3	5.6	9.2	7.7	2	8.1	4.7	5.4	6.1	6	6.7	5
RBB-1 (NC)	11.1	4.1	7.7	2.8	3.9	5.9	7	5.1	4.0	4.8	4.6	8	6.2	6
Giant Bajra (NC)	7.8	7.1	7.9	3.0	6.0	6.4	6	7.9	4.5	4.8	5.7	7	6.8	4
BAIF Bajra 1 (ZC-CZ)	11.4	4.3	5.4	7.8	9.2	7.6	3							
Moti Bajra (ZC-SZ)								11.8	6.4	6.2	8.1	3		
<b>Mean</b>	<b>11.7</b>	<b>6.1</b>	<b>6.0</b>	<b>4.9</b>	<b>6.1</b>	<b>7.0</b>		<b>9.3</b>	<b>5.8</b>	<b>7.0</b>	<b>7.4</b>		<b>7.0</b>	

**Table 6.6 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Crude Protein (%)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Ayodhya	Ranchi	Average	Rank
FBL 4	8.3	11.3	4.6	8.0	7	7.4	7.9	10.1	8.5	1
TSFB-1610	6.4	10.9	8.7	8.7	4	7.4	8.0	8.8	8.1	5
16ADV0111	7.8	10.3	4.8	7.6	8	7.5	8.5	9.1	8.4	2
JPM 18-37	6.0	9.3	9.8	8.3	5	7.4	7.8	9.6	8.3	3
PHBF-5	8.0	10.2	6.5	8.2	6	7.4	7.6	8.8	7.9	6
RBB-1 (NC)	6.4	10.9	9.8	9.0	3	7.7	8.8	9.1	8.5	1
Giant Bajra (NC)	7.1	9.8	11.2	9.4	2	7.9	7.7	9.8	8.5	1
AFB-3 (ZC-NWZ)	7.3	10.3	11.9	9.8	1					
APFB-9-1 (ZC-NEZ)						7.7	8.7	8.3	8.2	4
<b>Mean</b>	<b>7.2</b>	<b>10.4</b>	<b>8.4</b>	<b>8.6</b>		<b>7.5</b>	<b>8.1</b>	<b>9.2</b>	<b>8.3</b>	

**Table 6.6 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Crude Protein (%)**

Entries	Central Zone							South Zone					All India	
	Ana-nd	Jabal-pur	Rah-uri	Urulikan-chan	Rai-pur	Aver-age	Rank	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Rank	Aver-age	Rank
FBL 4	11.4	7.1	10.3	6.9	9.7	9.1	1	12.3	10.1	10.2	10.9	4	9.1	2
TSFB-1610	10.0	7.0	9.6	10.4	7.2	8.8	2	10.1	11.4	10.9	10.8	5	9.0	3
16ADV0111	11.1	6.7	9.3	10.0	7.0	8.8	2	11.4	12.3	12	11.9	2	9.1	2
JPM 18-37	11.7	7.0	10.6	6.1	8.5	8.8	2	11.8	11.4	10.8	11.3	3	9.1	2
PHBF-5	9.6	6.9	7.8	8.1	9.9	8.5	3	10.1	10.1	10.1	10.1	7	8.6	5
RBB-1 (NC)	11.3	6.5	9.1	7.9	6.4	8.2	4	10.9	8.3	8.9	9.4	8	8.7	4
Giant Bajra (NC)	10.3	7.0	12.1	8.0	6.8	8.8	2	10.5	10.1	9.9	10.2	6	9.2	1
BAIF Bajra 1 (ZC-CZ)	11.7	6.7	10.3	10.0	7.0	9.1	1							
Moti Bajra (ZC-SZ)								13.1	12.7	12.5	12.8	1		
<b>Mean</b>	<b>10.9</b>	<b>6.9</b>	<b>9.9</b>	<b>8.4</b>	<b>7.8</b>	<b>8.8</b>		<b>11.3</b>	<b>10.8</b>	<b>10.7</b>	<b>10.9</b>		<b>9.0</b>	

**Table 6.7 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Plant Height (cm)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Pusa	Bhubaneswar	Ranchi	Ayodhya
FBL 4	275.0	213.3	206.0	151.5	200.0	206.5	274.0	228.3
TSFB-1610	255.0	189.7	193.0	146.8	220.0	224.1	225.3	239.0
16ADV0111	215.0	237.7	215.0	125.3	185.0	197.4	212.1	189.5
JPM 18-37	260.0	209.0	257.0	166.3	226.6	208.2	258.8	231.8
PHBF-5	265.0	237.7	254.2	193.3	213.3	219.7	252.5	225.3
RBB-1 (NC)	255.0	236.0	224.4	160.0	208.3	201.2	226.8	207.5
Giant Bajra (NC)	250.0	219.7	212.6	177.0	215.0	213.6	217.5	238.5
AFB-3 (ZC-NWZ)	270.0	145.0	209.8	145.7				
APFB-9-1 (ZC-NEZ)					225.0	194.1	217.6	235.3
<b>Mean</b>	<b>255.6</b>	<b>211.0</b>	<b>221.5</b>	<b>158.2</b>	<b>211.7</b>	<b>208.1</b>	<b>235.6</b>	<b>224.4</b>

**Table 6.7 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Plant Height (cm)**

Entries	Ana-nd	Jabal-pur	Rah-uri	Urulikan- chan	Rai-pur	Jha-nsi	Coimb- atore	Hydera- bad	Man- dya	Rai- chur	Aver- age	Ra- nk
FBL 4	216.8	221.7	177.1	133.6	248.5	281.7	236.5	215.2	167.8	156.6	211.7	5
TSFB-1610	214.9	282.3	165.0	180.2	242.8	291.0	215.5	202.2	181.1	159.1	212.6	4
16ADV0111	221.3	207.7	146.2	169.9	299.1	290.7	230.5	196.9	155.1	153.3	202.6	7
JPM 18-37	220.9	237.3	149.4	184.6	240.0	258.3	237.5	192.7	151.4	151.5	213.4	2
PHBF-5	219.1	225.3	183.0	186.5	268.2	275.3	235.0	207.1	162.8	153.0	220.9	1
RBB-1 (NC)	226.4	176.3	169.0	169.9	228.1	289.3	215.0	200.5	148.3	159.5	205.6	6
Giant Bajra (NC)	218.7	244.7	175.6	195.4	266.9	286.7	227.5	164.0	151.7	154.7	212.8	3
BAIF Bajra 1 (ZC-CZ)	206.3	183.0	165.3	171.0	291.8	281.7						
Moti Bajra (ZC-SZ)							232.5	192.8	145.4	161.6		
<b>Mean</b>	<b>218.1</b>	<b>222.3</b>	<b>166.3</b>	<b>173.9</b>	<b>260.7</b>	<b>281.8</b>	<b>228.8</b>	<b>196.4</b>	<b>158.0</b>	<b>156.2</b>	<b>211.4</b>	

**Table 6.8 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Leaf Stem Ratio**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Pusa	Bhubaneswar	Ranchi	Ayodhya
FBL 4	0.54	0.73	0.41	0.62	0.50	0.74	0.74	0.58
TSFB-1610	1.00	0.31	0.38	0.53	0.52	0.86	0.61	0.68
16ADV0111	1.00	0.36	0.33	0.70	0.49	0.65	0.68	0.69
JPM 18-37	0.59	0.38	0.52	0.59	0.55	0.70	0.67	0.66
PHBF-5	0.92	0.58	0.40	0.53	0.45	0.79	0.62	0.75
RBB-1 (NC)	1.00	0.51	0.47	0.76	0.41	0.69	0.50	0.61
Giant Bajra (NC)	0.54	0.31	0.31	0.60	0.40	0.83	0.66	0.73
AFB-3 (ZC-NWZ)	1.00	0.55	0.59	0.66				
APFB-9-1 (ZC-NEZ)					0.42	0.63	0.62	0.65
<b>Mean</b>	<b>0.82</b>	<b>0.47</b>	<b>0.43</b>	<b>0.62</b>	<b>0.47</b>	<b>0.74</b>	<b>0.64</b>	<b>0.67</b>

**Table 6.8 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: Leaf Stem Ratio**

Entries	Anand	Jabalpur	Rahuri	Urulikanchan	Raipur	Jhansi	Coimbatore	Hyderabad	Mandya	Average	Rank
FBL 4	0.86	0.75	0.36	0.67	0.34	0.35	0.23	0.21	0.19	0.52	2
TSFB-1610	0.98	0.68	0.30	0.44	0.40	0.29	0.23	0.22	0.22	0.51	3
16ADV0111	0.91	0.71	0.54	0.49	0.26	0.36	0.27	0.18	0.23	0.52	2
JPM 18-37	0.87	0.80	0.40	0.58	0.42	0.28	0.23	0.14	0.24	0.51	3
PHBF-5	0.65	0.80	0.43	0.65	0.34	0.30	0.20	0.18	0.23	0.52	2
RBB-1 (NC)	1.28	0.67	0.34	0.57	0.30	0.35	0.24	0.19	0.23	0.54	1
Giant Bajra (NC)	0.78	0.87	0.32	0.56	0.31	0.35	0.22	0.19	0.23	0.48	4
BAIF Bajra 1 (ZC-CZ)	0.45	0.70	0.52	0.67	0.23	0.28					
Moti Bajra (ZC-SZ)							0.20	0.19	0.23		
<b>Mean</b>	<b>0.85</b>	<b>0.75</b>	<b>0.40</b>	<b>0.58</b>	<b>0.33</b>	<b>0.32</b>	<b>0.23</b>	<b>0.19</b>	<b>0.23</b>	<b>0.51</b>	

**Table 6.9 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)					NDF (%)					IVDMD (%)					
	Rah- uri	Ludh- iana	Ran- chi	Aver- age	Ra- nk	Rah- uri	Ludh- iana	Ran- chi	Aver- age	Ra- nk	Rah- uri	Ludh- iana	His- ar	Ran- chi	Aver- age	Ra- nk
FBL 4	46.5	40.2	47.9	44.9	1	71.3	65.6	74.3	70.4	4	52.9	55.6	53.4	51.1	53.2	1
TSFB-1610	50.5	43.8	51.3	48.5	7	70.1	69.8	73.2	71.0	3	49.8	54.2	51.6	48.4	51.0	5
16ADV0111	49.0	42.6	51.2	47.6	5	65.8	66.8	68.3	67.0	5	50.9	51.2	45.5	48.5	49.0	7
JPM 18-37	45.8	43.5	48.2	45.8	3	63.8	70.1	66.4	66.8	6	53.4	49.8	49.7	50.9	50.9	6
PHBF-5	48.5	39.8	49.6	46.0	4	75.0	66.5	75.6	72.4	2	51.3	55.4	52.8	49.8	52.3	3
RBB-1 (NC)	48.3	45.5	49.6	47.8	6	74.8	67.5	75.6	72.6	1	51.5	51.2	52.5	49.8	51.2	4
Giant Bajra (NC)	46.1	42.5	47.3	45.3	2	65.7	67.2	68.2	67.0	5	53.2	49.2	58.4	51.6	53.1	2
AFB-3 (ZC-NWZ)		41.6					69.4					53.6	52.8			
APFB-9-1 (ZC-NEZ)			49.3					74.3						50.0		
BAIF Bajra 1 (ZC-CZ)	47.5					72.5					52.1					
<b>Mean</b>	<b>47.8</b>	<b>42.4</b>	<b>49.3</b>	<b>46.6</b>		<b>69.9</b>	<b>67.9</b>	<b>72.0</b>	<b>69.6</b>		<b>51.9</b>	<b>52.5</b>	<b>52.1</b>	<b>50.0</b>	<b>51.6</b>	

## **7. AVTPM-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE PEARL MILLET**

**(Reference Tables: 7.1 to 7.9)**

In Forage Pearl Millet, four entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated in second Advanced Varietal Trial conducted at 19 locations comprising of 4 locations situated in south zone, 5 in NW, 4 in NE, 6 in central zone.

For green fodder yield (q/ha), entries 16ADV0055 was superior over the best check by a margin of 10.6% in NWZ, 1.4% in CZ, 3.0% in SZ and 11.5% at all India level. Entry JPM-18-7 was superior over the best check by a margin of 10.5% in NWZ, 0.7% in NEZ, 3.1% in SZ and 10.1% at all India level. Entry Dev-1 was superior over the best check by a margin of (8.7% in NWZ, 4.9% in NEZ, 11.7% in SZ, 0.6% in CZ and 15.2% at all India level.

For dry matter yield (q/ha), entries 16ADV0055 was superior over the best check by a margin of 10.6% in NWZ, 6.0% in CZ, and 10.2% at all India level. Entry JPM-18-7 was superior over the best check by a margin of 8.4% in NWZ, 3.0% in CZ, 2.9% in SZ and 11.9% at all India level. Entry Dev-1 was superior over the best check by a margin of (2.1 % in NWZ, 1.7% in NEZ, 13.8% in SZ, 18.8% in CZ and 19.0% at all India level.

For per day productivity, green fodder (q/ha/day), entry JPM-18-7 (7.27q/ha/day) ranked first followed by Dev-1 (7.17) in comparison to best check (6.25). For dry matter per day production potential (q/ha/day) also, entry JPM-18-7 (1.45 q/ha/day) ranked first followed by check RBB-1 (1.31).

For plant height, entry Dev-1 (231.6 cm) ranked first followed by JPM-18-7 (225.7 cm). For leaf stem ratio, Dev-1 first ranked first with a value of 0.55.

For CPY (q/ha), entry JPM-18-7 in NWZ, Dev-1 in NEZ, CZ, SZ and at all India level ranked first. For crude protein content, zonal Check AFB-3 in NWZ, APFB-9 in NEZ, entry Dev-1 in CZ, national check Giant Bajra and BAIF Bajra-7 at SZ and at all India level Dev-1 ranked first. For other quality parameters, entry Dev followed by 16ADV0055 for ADF and IVDMD; 16ADV055 followed by Dev-1 for NDF performed better.

## **8. AVTPM-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE PEARL MILLET (SEED)**

**(Reference Table: 8.1)**

In Forage Pearl Millet, four entries along with two national checks *i.e.* Giant Bajra and RBB-1 and respective zonal checks were evaluated in second Advanced Varietal Trial (seed) conducted at 9 locations comprising of 3 locations situated in south zone, 2 in NW, 2 in NE, 2 in central zone.

For seed yield zonal check AFB-3 in NWZ, entry 16ADV0055 in NEZ, JPM-18-7 in CZ, Dev-1 in SZ and JPM-18-7 at all India level ranked first. The superiority in SZ over the best check was 26.1% for Dev-1, 23.6% for JPM-18-7 and 11.6% for 16ADV0055. At all India level also entries JPM-18-7 (13.2%), Dev-1 (7.8%) and 16ADV0055 (2.4%) were superior over the best check.

**Table 7.1 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Hisar	Bikaner	Avikanagar	Jalore	Average	Rank	Superiority (%)
JPM-18-7	609.0	589.0	576.8	358.6	269.9	480.7	2	10.5
BAIF Bajra-7	403.5	504.1	457.4	339.6	297.2	400.4	7	
16ADV0055	649.6	561.9	475.4	444.5	272.7	480.8	1	10.6
Dev-1	702.4	537.8	485.3	298.1	339.4	472.6	3	8.7
RBB-1 (NC)	491.3	474.2	542.5	234.0	426.9	433.8	5	
Giant Bajra (NC)	500.0	511.0	447.2	232.0	325.0	403.0	6	
AFB-3 (ZC-NWZ)	528.1	520.1	574.8	301.4	250.0	434.9	4	
<b>Mean</b>	<b>554.8</b>	<b>528.3</b>	<b>508.5</b>	<b>315.5</b>	<b>311.6</b>	<b>443.7</b>		
<b>CD at 5(%)</b>	<b>73.2</b>	<b>115.2</b>	<b>68.7</b>	<b>69.6</b>	<b>119.5</b>			
<b>CV (%)</b>	<b>8.7</b>	<b>12.8</b>	<b>9.0</b>	<b>14.9</b>				

**Table 7.1 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	North East Zone						
	Pusa	Bhubaneswar	Ranchi	Ayodhya	Average	Rank	Superiority (%)
JPM-18-7	388.3	273.0	344.8	449.0	363.8	2	0.7
BAIF Bajra-7	361.2	389.7	331.0	345.0	356.7	4	
16ADV0055	351.6	371.0	251.0	314.0	321.9	7	
Dev-1	415.4	380.3	360.4	359.0	378.8	1	4.9
RBB-1 (NC)	370.7	297.0	322.9	335.0	331.4	6	
Giant Bajra (NC)	405.6	345.9	306.8	386.0	361.1	3	
APFB-9-1 (ZC-NEZ)	370.7	324.1	238.0	418.0	337.7	5	
<b>Mean</b>	<b>380.5</b>	<b>340.1</b>	<b>307.9</b>	<b>372.3</b>	<b>350.2</b>		
<b>CD at 5(%)</b>	<b>11.8</b>	<b>33.1</b>	<b>24.5</b>	<b>51.3</b>			
<b>CV (%)</b>	<b>7.4</b>	<b>6.6</b>	<b>5.4</b>	<b>10.3</b>			



**Table 7.1 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	Central Zone							Rank	Superiority (%)
	Anand	Jabalpur	Raipur	Rahuri	Urulikanchan	Jhansi	Average		
JPM-18-7	813.8	491.9	329.2	354.1	486.6	302.5	463.0	4	
BAIF Bajra-7	720.4	455.4	272.9	404.7	423.4	295.6	428.8	5	
16ADV0055	912.1	551.7	421.9	366.6	492.4	299.2	507.3	1	1.4
Dev-1	912.7	512.7	452.1	361.0	478.3	304.6	503.6	2	0.6
RBB-1 (NC)	423.8	432.0	137.5	363.0	290.5	297.5	324.0	7	
Giant Bajra (NC)	629.2	494.5	281.3	368.7	430.8	296.0	416.8	6	
BAIF Bajra 1 (ZC-CZ)	864.6	530.9	424.0	375.4	507.1	300.0	500.3	3	
<b>Mean</b>	<b>753.8</b>	<b>495.6</b>	<b>331.3</b>	<b>370.5</b>	<b>444.1</b>	<b>299.3</b>	<b>449.1</b>		
<b>CD at 5(%)</b>	<b>145.3</b>	<b>3.1</b>	<b>34.7</b>	<b>37.7</b>	<b>55.0</b>	<b>27.8</b>			
<b>CV (%)</b>	<b>13.0</b>	<b>13.0</b>	<b>7.1</b>	<b>6.1</b>	<b>8.3</b>	<b>6.3</b>			

**Table 7.1 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha)**

Entries	South Zone							All India		
	Coimbatore	Hyderabad	Mandya	**Raichur	Average	Rank	Superiority%	Average	Rank	Superiority%
JPM-18-7	450.0	322.1	294.3	179.9	355.5	2	3.1	427.9	3	10.1
BAIF Bajra-7	442.7	277.7	300.7	162.4	340.4	5		390.1	4	0.4
16ADV0055	439.6	338.8	287.1	233.8	355.1	3	3.0	433.4	2	11.5
Dev-1	503.1	366.5	285.4	177.6	385.0	1	11.7	447.5	1	15.2
RBB-1 (NC)	263.7	230.5	250.6	185.4	248.3	7		343.5	6	
Giant Bajra (NC)	472.9	311.0	250.2	199.8	344.7	4		388.6	5	
Moti Bajra (ZC-SZ)	453.1	266.6	296.1	149.4	338.6	6				
<b>Mean</b>	<b>432.2</b>	<b>301.9</b>	<b>280.6</b>	<b>184.0</b>	<b>338.2</b>			<b>405.2</b>		
<b>CD at 5(%)</b>	<b>33.0</b>	<b>45.2</b>	<b>26.8</b>	<b>7.6</b>						
<b>CV (%)</b>	<b>5.1</b>	<b>8.3</b>	<b>9.2</b>	<b>23.2</b>						

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 7.2 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North West Zone							
	Ludhiana	Hisar	Bikaner	Avikanagar	Jalore	Average	Rank	Superiority (%)
JPM-18-7	87.0	64.2	138.8	72.8	48.6	82.3	2	8.4
BAIF Bajra-7	55.3	42.6	105.2	62.5	53.4	63.8	7	
16ADV0055	89.0	64.9	113.4	103.6	48.8	83.9	1	10.6
Dev-1	97.6	49.5	109.5	70.4	60.8	77.5	3	2.1
RBB-1 (NC)	69.2	53.0	130.0	51.5	75.9	75.9	4	
Giant Bajra (NC)	73.5	49.0	111.4	43.9	59.4	67.4	5	
AFB-3 (ZC-NWZ)	73.4	49.7	104.3	61.2	45.1	66.7	6	
<b>Mean</b>	<b>77.8</b>	<b>53.3</b>	<b>116.1</b>	<b>66.5</b>	<b>56.0</b>	<b>73.9</b>		
<b>CD at 5(%)</b>	<b>18.7</b>	<b>14.7</b>	<b>15.9</b>	<b>14.8</b>	<b>23.1</b>			
<b>CV (%)</b>	<b>7.2</b>	<b>16.3</b>	<b>9.1</b>	<b>14.9</b>				

**Table 7.2 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	North East Zone						
	Pusa	Bhubaneswar	Ranchi	Ayodhya	Average	Rank	Superiority (%)
JPM-18-7	87.8	67.4	76.1	98.8	82.5	3	1.7
BAIF Bajra-7	84.4	98.3	66.2	72.4	80.3	4	
16ADV0055	80.6	92.8	54.2	64.4	73.0	6	
Dev-1	92.8	94.0	77.3	77.3	85.3	1	
RBB-1 (NC)	86.7	73.6	70.3	8.4	59.7	7	
Giant Bajra (NC)	89.9	85.4	65.8	94.5	83.9	2	
APFB-9-1 (ZC-NEZ)	90.6	78.7	49.5	98.3	79.3	5	
Mean	87.5	84.3	65.6	73.4	77.7		
CD at 5(%)	6.4	7.8	NS	14.9			
CV (%)	8.6	6.2	6.2	7.1			

**Table 7.2 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	Central Zone								
	Anand	Jabalpur	Raipur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority (%)
JPM-18-7	131.6	103.7	71.2	62.7	116.8	75.8	93.6	3	3.0
BAIF Bajra-7	129.4	96.3	60.1	68.1	72.5	85.2	85.3	5	
16ADV0055	118.5	120.3	107.0	56.5	94.3	81.9	96.4	2	6.0
Dev-1	174.3	109.6	107.7	66.4	105.2	85.0	108.0	1	18.8
RBB-1 (NC)	91.1	90.7	27.8	81.9	56.0	80.4	71.3	7	
Giant Bajra (NC)	91.4	105.0	68.8	60.8	81.5	74.2	80.3	6	
BAIF Bajra 1 (ZC-CZ)	110.5	118.1	97.2	58.0	92.9	69.0	90.9	4	
<b>Mean</b>	<b>121.0</b>	<b>106.2</b>	<b>77.1</b>	<b>64.9</b>	<b>88.5</b>	<b>78.8</b>	<b>89.4</b>		
<b>CD at 5(%)</b>	<b>24.6</b>	<b>0.7</b>	<b>9.2</b>	<b>9.0</b>	<b>3.9</b>	<b>15.9</b>			
<b>CV (%)</b>	<b>13.7</b>	<b>13.0</b>	<b>8.0</b>	<b>9.3</b>	<b>8.8</b>	<b>13.6</b>			

**Table 7.2 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha)**

Entries	South Zone						All India		
	Coimbatore	Hyderabad	Mandya	Average	Rank	Superiority%	Average	Rank	Superiority%
JPM-18-7	82.2	68.1	71.2	73.8	2	2.9	84.7	2	11.9
BAIF Bajra-7	81.6	57.2	74.4	71.1	4		75.8	4	0.1
16ADV0055	80.2	71.6	60.0	70.6	5		83.4	3	10.2
Dev-1	98.8	80.2	65.9	81.6	1	13.8	90.1	1	19.0
RBB-1 (NC)	52.9	48.7	52.0	51.2	7		66.7	6	
Giant Bajra (NC)	87.5	64.4	56.8	69.6	6		75.7	5	
Moti Bajra (ZC-SZ)	91.0	54.7	69.5	71.7	3				
<b>Mean</b>	<b>82.0</b>	<b>63.6</b>	<b>64.3</b>	<b>69.9</b>			<b>79.4</b>		
<b>CD at 5(%)</b>	<b>7.2</b>	<b>9.2</b>	<b>7.0</b>						
<b>CV (%)</b>	<b>5.9</b>	<b>8.1</b>	<b>10.4</b>						

**Table 7.3 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha/day)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Pusa	Ayodhya	Ranchi	Bhubaneswar
JPM-18-7	8.12	11.27	9.01	6.17	6.20	8.63	4.74	4.22
BAIF Bajra-7	5.38	7.78	6.44	5.14	5.64	5.94	4.37	6.50
16ADV0055	8.66	9.05	6.17	6.32	5.62	5.51	3.13	5.65
Dev-1	9.37	9.12	6.56	4.42	6.74	7.18	4.36	6.13
RBB-1 (NC)	6.55	10.41	9.04	4.50	8.06	6.97	5.10	4.64
Giant Bajra (NC)	6.67	8.52	6.04	3.66	6.34	5.14	4.60	5.67
AFB-3 (ZC-NWZ)	7.04	11.16	9.58	5.68				
APFB-9-1 (ZC-NEZ)					6.86	7.60	3.20	4.99
<b>Mean</b>	<b>7.40</b>	<b>9.62</b>	<b>7.55</b>	<b>5.13</b>	<b>6.49</b>	<b>6.71</b>	<b>4.22</b>	<b>5.40</b>

**Table 7.3 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Green Forage Yield (q/ha/day)**

Entries	Anand	Jhansi	Rahuri	Urulikanchan	Raipur	Coimbatore	Hyderabad	Mandya	Average	Rank
JPM-18-7	14.28	4.32	6.44	6.40	4.77	8.49	6.25	7.07	7.27	1
BAIF Bajra-7	12.42	4.12	7.49	5.57	3.96	8.35	5.28	7.15	6.35	7
16ADV0055	16.58	4.94	6.11	5.72	5.27	7.58	5.85	6.19	6.77	3
Dev-1	17.22	4.76	5.82	5.56	6.55	8.83	6.32	5.79	7.17	2
RBB-1 (NC)	9.85	4.38	6.72	3.82	3.06	5.27	6.95	5.22	6.28	4
Giant Bajra (NC)	11.87	4.84	6.25	5.67	4.08	8.44	6.14	6.06	6.25	5
BAIF Bajra 1 (ZC-CZ)	13.10	4.24	6.05	5.90	6.14					
Moti Bajra (ZC-SZ)						8.39	5.03	6.68		
<b>Mean</b>	<b>13.62</b>	<b>4.51</b>	<b>6.41</b>	<b>5.52</b>	<b>4.83</b>	<b>7.91</b>	<b>5.97</b>	<b>6.31</b>	<b>6.68</b>	

**Table 7.4 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha/day)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Pusa	Ayodhya	Ranchi	Bhubaneswar
JPM-18-7	1.16	1.23	2.17	1.25	1.40	1.90	1.05	1.04
BAIF Bajra-7	0.74	0.66	1.48	0.95	1.32	1.24	0.87	1.64
16ADV0055	1.19	1.04	1.47	1.47	1.29	1.13	0.68	1.41
Dev-1	1.30	0.84	1.48	1.04	1.51	1.54	0.93	1.52
RBB-1 (NC)	0.92	1.16	2.17	0.99	1.88	1.67	1.11	1.15
Giant Bajra (NC)	0.98	0.82	1.51	0.69	1.40	1.25	0.99	1.40
AFB-3 (ZC-NWZ)	0.98	1.07	1.74	1.15				
APFB-9-1 (ZC-NEZ)					1.68	1.78	0.67	1.21
<b>Mean</b>	<b>1.04</b>	<b>0.97</b>	<b>1.72</b>	<b>1.08</b>	<b>1.50</b>	<b>1.50</b>	<b>0.90</b>	<b>1.34</b>

**Table 7.4 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Dry Matter Yield (q/ha/day)**

Entries	Anand	Rahuri	Urulikanchan	Raipur	Hyderabad	Coimbatore	Mandya	Average	Rank
JPM-18-7	2.31	1.14	1.54	1.03	1.32	1.55	1.71	1.45	1
BAIF Bajra-7	2.23	1.26	0.95	0.87	1.09	1.54	1.77	1.24	4
16ADV0055	2.16	0.94	1.10	1.34	1.24	1.38	1.43	1.28	3
Dev-1	3.29	1.07	1.22	1.56	1.38	1.73	1.34	1.45	1
RBB-1 (NC)	2.12	1.52	0.74	0.62	1.47	1.06	1.08	1.31	2
Giant Bajra (NC)	1.72	1.03	1.07	1.00	1.27	1.56	1.37	1.20	5
BAIF Bajra 1 (ZC-CZ)	1.67	0.94	1.08	1.41					
Moti Bajra (ZC-SZ)					1.03	1.68	1.57		
<b>Mean</b>	<b>2.21</b>	<b>1.13</b>	<b>1.10</b>	<b>1.12</b>	<b>1.26</b>	<b>1.50</b>	<b>1.47</b>	<b>1.32</b>	

**Table 7.5 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Crude Protein Yield (q/ha)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Ayodhya	Ranchi	Average	Rank
JPM-18-7	5.7	5.7	12.2	7.9	1	5.0	7.9	6.5	6.5	2
BAIF Bajra-7	3.7	3.9	10.1	5.9	6	7.2	5.5	6.0	6.2	4
16ADV0055	6.9	7.3	8.7	7.7	2	6.8	5.3	4.5	5.5	7
Dev-1	7.7	5.4	7.9	7.0	4	7.5	5.9	6.3	6.6	1
RBB-1 (NC)	5.3	5.2	13.3	7.9	1	5.5	6.3	6.0	5.9	6
Giant Bajra (NC)	5.1	4.4	10.9	6.8	5	7.0	7.1	5.0	6.3	3
AFB-3 (ZC-NWZ)	5.1	4.9	12.2	7.4	3					
APFB-9-1 (ZC-NEZ)						6.1	7.7	4.4	6.0	5
<b>Mean</b>	<b>5.6</b>	<b>5.3</b>	<b>10.8</b>	<b>7.2</b>		<b>6.4</b>	<b>6.5</b>	<b>5.5</b>	<b>6.2</b>	

**Table 7.5 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Crude Protein Yield (q/ha)**

Entries	Central Zone							South Zone					All India	
	Rai-pur	Ana-nd	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Rank	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Rank	Aver-age	Rank
JPM-18-7	5.0	11.8	7.0	5.1	12.2	8.2	4	8.6	5.3	5.3	6.4	2	7.4	2
BAIF Bajra-7	5.9	12.2	6.5	6.7	6.0	7.5	5	10.4	4.9	3.9	6.4	2	6.6	4
16ADV0055	7.2	12.4	8.6	4.7	10.3	8.6	2	8.7	3.2	4.5	5.5	5	7.1	3
Dev-1	10.7	16.6	7.8	6.5	11.5	10.6	1	11.3	4.0	5.6	7.0	1	8.2	1
RBB-1 (NC)	1.9	7.7	6.0	7.0	6.0	5.7	7	5.1	2.7	3.1	3.6	6	5.8	5
Giant Bajra (NC)	4.9	8.7	7.3	4.7	8.8	6.9	6	8.8	4.5	5.2	6.2	4	6.6	4
BAIF Bajra 1 (ZC-CZ)	8.7	12.4	8.2	4.7	8.0	8.4	3							
Moti Bajra (ZC-SZ)								10.7	4.6	3.8	6.3	3		
<b>Mean</b>	<b>6.3</b>	<b>11.7</b>	<b>7.3</b>	<b>5.6</b>	<b>9.0</b>	<b>8.0</b>		<b>9.1</b>	<b>4.2</b>	<b>4.5</b>	<b>5.9</b>		<b>6.9</b>	

**Table 7.6 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Crude Protein (%)**

Entries	North West Zone					North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Ayodhya	Ranchi	Average	Rank
JPM-18-7	6.5	8.9	8.8	8.1	6	7.4	8.0	8.6	8.0	2
BAIF Bajra-7	6.7	9.2	9.6	8.5	5	7.3	7.6	9.1	8.0	2
16ADV0055	7.7	11.3	7.7	8.9	3	7.4	8.2	8.3	8.0	2
Dev-1	7.9	10.8	7.2	8.6	4	8.0	7.7	8.1	7.9	3
RBB-1 (NC)	7.6	9.8	10.2	9.2	2	7.4	7.9	8.6	8.0	2
Giant Bajra (NC)	6.9	9.0	9.8	8.6	4	8.1	7.5	7.6	7.7	4
AFB-3 (ZC-NWZ)	6.9	9.8	11.7	9.5	1					
APFB-9-1 (ZC-NEZ)						7.7	7.8	8.8	8.1	1
<b>Mean</b>	<b>7.2</b>	<b>9.8</b>	<b>9.3</b>	<b>8.8</b>		<b>7.6</b>	<b>7.8</b>	<b>8.4</b>	<b>8.0</b>	

**Table 7.6 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Crude Protein (%)**

Entries	Central Zone							South Zone					All India	
	Rai-pur	Ana-and	Jabal-pur	Rah-uri	Urulikan-chan	Aver-age	Rank	Coimb-atore	Man-dya	Hydera-bad	Aver-age	Rank	Aver-age	Rank
JPM-18-7	7.0	9.0	6.7	8.1	10.4	8.3	5	10.5	7.4	7.7	8.5	2	8.2	5
BAIF Bajra-7	9.8	9.4	6.7	9.8	8.3	8.8	2	12.7	6.6	6.9	8.7	1	8.6	2
16ADV0055	6.8	10.5	7.1	8.3	10.9	8.7	3	10.9	5.3	6.3	7.5	5	8.3	4
Dev-1	9.9	9.6	7.1	9.8	11.0	9.5	1	11.4	6.1	7.0	8.2	4	8.7	1
RBB-1 (NC)	6.7	8.6	6.6	8.6	10.7	8.2	6	9.6	5.3	6.4	7.1	6	8.1	6
Giant Bajra (NC)	7.2	9.4	7.0	7.8	10.8	8.4	4	10.1	7.9	8.0	8.7	1	8.4	3
BAIF Bajra 1 (ZC-CZ)	8.9	11.2	7.1	8.1	8.6	8.8	2							
Moti Bajra (ZC-SZ)								11.8	6.6	6.9	8.4	3		
<b>Mean</b>	<b>8.0</b>	<b>9.7</b>	<b>6.9</b>	<b>8.6</b>	<b>10.1</b>	<b>8.7</b>		<b>11.0</b>	<b>6.4</b>	<b>7.0</b>	<b>8.2</b>		<b>8.4</b>	

**Table 7.7 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Plant Height (cm)**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Ayodhya	Pusa	Bhubaneswar	Ranchi
JPM-18-7	265.0	239.7	193.4	202.5	258.4	248.3	202.3	260.1
BAIF Bajra-7	275.0	218.0	202.3	220.9	189.2	230.0	214.3	187.4
16ADV0055	275.0	182.0	219.2	259.3	224.0	261.6	212.0	222.6
Dev-1	280.0	207.3	201.2	218.3	270.4	270.0	218.5	219.0
RBB-1 (NC)	285.0	238.0	201.7	179.8	195.2	240.0	195.4	192.0
Giant Bajra (NC)	270.0	204.0	208.4	202.3	268.6	260.0	208.8	172.7
AFB-3 (ZC-NWZ)	280.0	237.7	185.3	178.0				
APFB-9-1 (ZC-NEZ)					246.0	231.6	204.2	199.4
<b>Mean</b>	<b>275.7</b>	<b>218.1</b>	<b>201.6</b>	<b>208.7</b>	<b>236.0</b>	<b>248.8</b>	<b>207.9</b>	<b>207.6</b>

**Table 7.7 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Plant Height (cm)**

Entries	Ana-nd	Jabal-pur	Jha-nsi	Rah-uri	Urulikan-chan	Rai-pur	Coimb-atore	Hydera-bad	Man-dya	Rai-chur	Aver-age	Ra-nk
JPM-18-7	221.7	255.0	295.5	154.0	245.4	276.1	246.5	201.2	144.6	153.5	225.7	2
BAIF Bajra-7	225.2	253.0	296.8	160.8	245.9	277.9	258.0	179.7	144.8	153.5	218.5	5
16ADV0055	218.7	272.0	283.0	157.7	226.8	315.5	236.5	179.2	142.3	169.7	225.4	3
Dev-1	220.0	271.0	289.0	155.9	263.3	278.7	277.5	211.0	154.8	162.4	231.6	1
RBB-1 (NC)	233.5	197.0	255.5	153.7	199.8	184.4	230.0	177.5	131.3	140.1	201.7	6
Giant Bajra (NC)	231.9	261.0	269.3	149.7	233.4	275.3	255.4	173.4	146.5	171.9	220.1	4
BAIF Bajra 1 (ZC-CZ)	220.1	278.5	270.0	155.6	231.8	268.3						
Moti Bajra (ZC-SZ)							243.4	198.4	125.1	157.0		
<b>Mean</b>	<b>224.4</b>	<b>255.4</b>	<b>279.9</b>	<b>155.3</b>	<b>235.2</b>	<b>268.0</b>	<b>249.6</b>	<b>188.6</b>	<b>141.3</b>	<b>158.3</b>	<b>220.5</b>	



**Table 7.8 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Leaf Stem Ratio**

Entries	Ludhiana	Hisar	Bikaner	Avikanagar	Ayodhya	Pusa	Bhubaneswar	Ranchi
JPM-18-7	0.89	0.38	0.62	0.61	0.58	0.49	0.63	0.53
BAIF Bajra-7	0.83	0.44	0.64	0.66	0.65	0.49	0.85	0.62
16ADV0055	0.75	0.38	0.47	0.51	0.68	0.46	0.79	0.61
Dev-1	0.85	0.44	0.62	0.64	0.62	0.57	0.82	0.72
RBB-1 (NC)	0.72	0.38	0.75	0.72	0.56	0.41	0.65	0.56
Giant Bajra (NC)	0.79	0.42	0.50	0.69	0.61	0.59	0.74	0.76
AFB-3 (ZC-NWZ)	0.85	0.46	0.62	0.81				
APFB-9-1 (ZC-NEZ)					0.52	0.48	0.69	0.60
<b>Mean</b>	<b>0.81</b>	<b>0.41</b>	<b>0.60</b>	<b>0.66</b>	<b>0.60</b>	<b>0.50</b>	<b>0.74</b>	<b>0.63</b>

**Table 7.8 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Leaf Stem Ratio**

Entries	Ana-nd	Jabal-pur	Rah-uri	Urulikan-chan	Rai-pur	Jha-nsi	Coimb-atore	Hydera-bad	Man-dya	Aver-age	Ra-nk
JPM-18-7	1.06	0.62	0.56	0.60	0.25	0.37	0.24	0.16	0.17	0.52	2
BAIF Bajra-7	0.88	0.61	0.55	0.44	0.24	0.27	0.23	0.18	0.18	0.52	2
16ADV0055	0.78	0.78	0.64	0.49	0.23	0.33	0.25	0.20	0.17	0.50	3
Dev-1	0.83	0.71	0.55	0.69	0.29	0.32	0.24	0.18	0.18	0.55	1
RBB-1 (NC)	0.81	0.59	0.39	0.49	0.26	0.32	0.20	0.20	0.19	0.48	4
Giant Bajra (NC)	0.77	0.66	0.60	0.47	0.24	0.36	0.21	0.27	0.18	0.52	2
BAIF Bajra 1 (ZC-CZ)	0.85	0.71	0.66	0.47	0.29	0.32					
Moti Bajra (ZC-SZ)							0.24	0.20	0.19		
<b>Mean</b>	<b>0.85</b>	<b>0.67</b>	<b>0.56</b>	<b>0.52</b>	<b>0.26</b>	<b>0.33</b>	<b>0.23</b>	<b>0.20</b>	<b>0.18</b>	<b>0.51</b>	

**Table 7.9 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)					NDF (%)					IVDMD (%)					
	Rah- uri	Ludh- iana	Ran- chi	Aver- age	Ra- nk	Rah- uri	Ludh- iana	Ran- chi	Aver- age	Ra- nk	Rah- uri	Ludh- iana	His- ar	Ran- chi	Aver- age	Ra- nk
JPM-18-7	45.7	47.2	47.3	46.7	6	61.3	62.4	63.5	62.4	3	53.5	48.7	44.4	51.6	49.6	5
BAIF Bajra-7	44.2	46.5	46.1	45.6	5	60.4	66.3	62.2	63.0	4	54.7	49.5	41.9	52.5	49.6	5
16ADV0055	42.2	43.9	44.1	43.4	2	59.3	60.3	61.3	60.3	1	56.2	51.4	46.3	54.1	52.0	2
Dev-1	40.6	45.2	43.2	43.0	1	58.4	62.1	60.8	60.4	2	57.4	52.4	52.7	54.8	54.3	1
RBB-1 (NC)	45.1	43.2	46.8	45.0	4	68.2	62.3	69.2	66.6	6	54.0	53.2	48.0	52.0	51.8	3
Giant Bajra (NC)	43.1	44.3	44.9	44.1	3	62.7	64.1	64.2	63.7	5	55.5	50.9	45.0	53.5	51.2	4
AFB-3 (ZC-NWZ)		45.3					67.4					50.1	45.5			
APFB-9-1 (ZC-NEZ)			44.6					63.2						53.7		
BAIF Bajra 1 (ZC-CZ)	43.1					61.2					55.5					
<b>Mean</b>	<b>43.4</b>	<b>45.1</b>	<b>45.3</b>	<b>44.6</b>		<b>61.6</b>	<b>63.6</b>	<b>63.5</b>	<b>62.7</b>		<b>55.2</b>	<b>50.9</b>	<b>46.2</b>	<b>53.2</b>	<b>51.4</b>	

**Table 8.1 AVTPM-2 (Seed): Second Advanced Varietal Trial in Forage Pearl millet (Seed): Seed Yield (q/ha)**

Entries	North West Zone				North East Zone				Central Zone				
	Ludh-iana	Bika-ner	Aver-age	Ra-nk	**Ayod-hya	Pu-sa	Ra-nk	Superi-ority (%)	Rai-pur	Jabal-pur	Aver-age	Ra-nk	Superi-ority%
JPM-18-7	24.4	10.0	17.2	3	6.9	10.4	3	5.1	11.5	39.8	25.7	1	3.0
BAIF Bajra-7	16.1	5.0	10.6	7	2.6	8.7	6		10.2	34.5	22.3	4	
Dev-1	28.1	11.0	19.5	2	5.5	11.6	2	17.2	12.2	25.8	19.0	6	
16ADV0055	20.0	6.6	13.3	6	4.5	12.4	1	25.3	13.9	34.0	24.0	3	
RBB-1 (NC)	19.7	11.7	15.7	4	2.1	9.7	5		12.5	32.1	22.3	4	
Giant Bajra (NC)	21.1	7.8	14.4	5	2.9	9.9	4		13.6	36.3	24.9	2	
AFB-3 (ZC-NWZ)	26.0	20.4	23.2	1									
APFB-9-1 (ZC-NEZ)					3.2	8.5	7						
BAIF Bajra 1(ZC-CZ)									12.2	31.2	21.7	5	
<b>Mean</b>	<b>22.2</b>	<b>10.4</b>	<b>16.3</b>			<b>10.2</b>			<b>12.3</b>	<b>33.4</b>	<b>22.8</b>		
<b>CD at 5(%)</b>	<b>3.7</b>	<b>2.2</b>				<b>1.4</b>			<b>2.1</b>	<b>0.3</b>			
<b>CV (%)</b>	<b>8.1</b>	<b>14.2</b>				<b>12.5</b>			<b>11.4</b>	<b>18.7</b>			

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 8.1 AVTPM-2 (Seed): Second Advanced Varietal Trial in Forage Pearl millet (Seed): Seed Yield (q/ha)**

Entries	South Zone						All India		
	Coimbatore	Hyderabad	Mandya	Average	Rank	Superiority%	Average	Rank	Superiority%
JPM-18-7	18.7	13.1	10.0	13.9	2	23.1	17.3	1	13.2
BAIF Bajra-7	14.2	8.1	10.8	11.0	6		13.5	6	
Dev-1	20.8	12.2	9.8	14.3	1	26.1	16.4	2	7.8
16ADV0055	16.5	11.4	10.1	12.6	3	11.6	15.6	3	2.4
RBB-1 (NC)	12.1	7.5	9.2	9.6	7		14.3	5	
Giant Bajra (NC)	15.4	8.9	9.0	11.1	5		15.2	4	
Moti Bajra (ZC-SZ)	15.2	9.4	9.4	11.3	4				
<b>Mean</b>	<b>16.1</b>	<b>10.1</b>	<b>9.7</b>	<b>12.0</b>			<b>15.4</b>		
<b>CD at 5(%)</b>	<b>0.9</b>	<b>3.6</b>	<b>0.9</b>						
<b>CV (%)</b>	<b>3.6</b>	<b>20.0</b>	<b>9.3</b>						

## 9. IVTC: INITIAL VARIETAL TRIAL IN FORAGE COWPEA

(Reference Tables: 9.1 to 9.9)

In Forage Cowpea, eight entries along with two national checks *i.e.* Bundel Lobia-1 and UPC-5286; and respective zonal checks were evaluated in Initial Varietal Trial conducted at 26 locations situated in all five zones, 3 in hill, 4 in north-west, 6 in central and 6 in south zone while 7 in north-east zone.

Entry UPC-21-1 was superior by a margin of 6.0 % for GFY and 6.7% for DMY over the best check in NEZ. For dry matter yield in central zone, MFC-18-8, MFC-18-10 and PFC-40 were superior over the best check a margins of 11.5%, 14.0% and 7.9% respectively in CZ. In all other zones and all India level, entries were either marginally superior or inferior to best check in the respective zones.

For green and dry fodder production potential (q/ha/day), entry UPC-21-1 ranked first followed by entry MFC-18-8.

For plant height, national check Bundel Lobia-1 was best. For leaf stem ratio, entry HFC-17-7 ranked first (0.87).

For CPY (q/ha), zonal Check UPC-622 ranked first in HZ, entry UPC21-1 in NWZ, and NEZ, zonal check UPC9202 in CZ, MFC 18-10 in SZ. AT all India level, national check UPC 5286 was top ranked.

For crude protein content, entry HFC-17-7 in HZ, zonal check Bundel lobia-2 in NWZ, entry MFC 18-8 in NEZ, zonal check UPC9202 in CZ, entry TSFC-20-06 in SZ ranked first. At all India level, entry MFC-18-8 was best performer (16.2%) followed by entry PFC-40 and national check UPC-5286 (15.5%). For other quality parameters, check Bundel Lobia-1 was best performer for ADF and NDF as well as for IVDMD.

## 10. AVTC-1: FIRST ADVANCED VARIETAL TRIAL IN FORAGE COWPEA

(Reference Tables: 10.1 to 10.9)

In Forage Cowpea, two entries along with two national checks namely Bundel Lobia-1 and UPC-5286 and respective zonal checks *viz.*, MFC-08-14 for south zone and UPC-628 for NEZ were evaluated in First Advance Varietal Trial at 6 locations in south zone and 7 locations in NEZ.

Zonal check UPC-628 showed superiority for green forage yield (q/ha) whereas national check UPC-5286 showed superiority for dry matter yield (q/ha) in NEZ. National check UPC-5286 showed superiority for green and dry matter yield (q/ha) in SZ. Combining both zones, National check UPC-5286 showed superiority for green and dry matter yield (q/ha).

For green and fodder production potential (q/ha/day), National check UPC-5286 showed superiority.

For plant height, National check UPC-5286 ranked first, whereas for leafiness entry HFC 17-9 was top performer.

For crude protein yield (q/ha), entry HFC-17-9 in SZ, and national check UPC-5286 in NEZ ranked first. For crude protein content, entry HFC-17-9 ranked first in SZ (20.7%) while national check UPC 5286 ranked first in NEZ. Combining both zones, entry HFC 17-9 ranked first (17.1%) as compared to best check UPC 5286 (16.7%). For ADF, NDF and IVDMD, national check Bundel Lobia-1 was best performer.

**Table 9.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	Hill Zone						North West Zone					
	Palam-pur	Sri-nagar	Rajo-uri	Aver-age	Ra-nk	Superi- ority%	Ludh- iana	Pant-nagar	Bika- ner	**Jal- ore	Aver- age	Ra-nk
PFC 36	229.6	131.6	183.3	181.5	9	2.1	285.2	352.5	178.9	191.7	272.2	11
TNFC 1910	239.2	132.4	193.7	188.4	6		253.4	264.0	331.0	166.7	282.8	9
MFC-18-8	274.0	154.7	214.4	214.4	1		248.1	246.8	356.8	217.1	283.9	8
UPC 21-1	291.1	133.3	160.6	195.0	4		332.8	394.6	320.2	209.3	349.2	2
HFC 17-7	202.2	143.5	148.3	164.7	10		338.1	345.3	340.7	218.5	341.4	4
MFC-18-10	237.0	129.1	118.2	161.4	11		248.1	321.2	315.0	193.1	294.8	7
PFC 40	271.8	148.8	157.5	192.7	5		221.7	298.4	388.2	181.9	302.8	5
TSFC-20-06	251.8	152.7	143.2	182.6	8		269.3	250.3	386.7	160.7	302.1	6
Bundel Lobia-1(NC)	262.9	155.5	139.4	185.9	7		364.5	244.1	422.8	150.5	343.8	3
UPC-5286 (NC)	273.3	140.5	176.5	196.8	3		353.9	408.7	316.7	94.9	359.8	1
UPC-622 (ZC-HZ)	325.9	145.5	158.2	209.9	2							
Bundel Lobia-2 (ZC-NWZ)							248.2	292.5	288.1	163.4	276.3	10
<b>Mean</b>	<b>259.9</b>	<b>142.5</b>	<b>163.0</b>	<b>188.5</b>			<b>287.6</b>	<b>310.8</b>	<b>331.4</b>	<b>177.1</b>	<b>309.9</b>	
<b>CD at 5%</b>	<b>NS</b>	<b>14.3</b>	<b>1.1</b>				<b>22.4</b>	<b>36.2</b>	<b>69.5</b>	<b>67.5</b>		
<b>CV%</b>	<b>15.4</b>	<b>5.88</b>	<b>11.4</b>				<b>6.91</b>	<b>11.6</b>	<b>12.2</b>			

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 9.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	North East Zone									
	Ayod-hya	Bhuban-eswar	Jor-hat	Ran-chi	Imp-hal	Pu-sa	**Kal-yani	Aver-age	Ra-nk	Superi- ority%
PFC 36	347.1	291.6	363.1	221.5	315.8	288.0	166.6	304.5	4	6.0
TNFC 1910	220.5	254.1	258.1	288.2	247.9	276.0	163.8	257.5	10	
MFC-18-8	196.0	334.3	292.4	286.1	269.4	213.0	175.0	265.2	9	
UPC 21-1	379.8	380.2	347.6	302.1	299.7	300.0	172.2	334.9	1	
HFC 17-7	298.1	364.5	304.9	341.0	255.5	290.0	169.4	309.0	3	
MFC-18-10	294.0	314.5	286.5	254.2	242.1	273.0	161.1	277.4	7	
PFC 40	196.0	281.2	309.3	304.9	284.2	296.0	179.1	278.6	6	
TSFC-20-06	199.9	242.7	306.4	236.8	185.2	293.0	150.0	244.0	11	
Bundel Lobia-1(NC)	224.4	309.3	279.5	329.9	210.3	256.0	161.1	268.2	8	
UPC-5286 (NC)	404.3	283.3	281.5	309.7	330.0	286.0	162.5	315.8	2	
TNFC 0926 (ZC-NEZ)	228.7	302.0	349.6	252.8	399.1	284.0	161.1	302.7	5	
<b>Mean</b>	<b>271.7</b>	<b>305.3</b>	<b>307.2</b>	<b>284.3</b>	<b>276.3</b>	<b>277.7</b>	<b>165.6</b>	<b>287.1</b>	<b>4</b>	
<b>CD at 5%</b>	<b>60.3</b>	<b>40.2</b>	<b>5.6</b>	<b>36.7</b>	<b>21.2</b>	<b>21.3</b>	<b>9.8</b>			
<b>CV%</b>	<b>12.9</b>	<b>7.7</b>	<b>5.7</b>	<b>7.6</b>	<b>4.5</b>	<b>9.8</b>	<b>18.2</b>			

**Table 9.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	Central Zone								Rank	Superiority%
	Anand	Jhansi	Rahuri	Urulikanchan	Raipur	Meerut	Average			
PFC 36	363.4	145.6	345.1	332.4	169.0	411.4	294.5	8	0.8	
TNFC 1910	338.9	111.1	400.6	305.6	206.0	376.0	289.7	9		
MFC-18-8	365.7	293.5	391.2	337.1	250.0	350.5	331.3	1		
UPC 21-1	356.9	163.0	392.4	264.8	289.4	419.9	314.4	4		
HFC 17-7	334.7	83.8	276.9	301.0	217.6	418.0	272.0	11		
MFC-18-10	352.8	402.3	289.6	236.1	256.9	355.6	315.6	3		
PFC 40	317.6	363.0	346.1	294.5	125.0	339.2	297.6	7		
TSFC-20-06	289.4	372.0	337.2	225.9	148.2	353.0	287.6	10		
Bundel Lobia-1(NC)	344.4	300.9	353.0	272.2	159.7	358.8	298.2	6		
UPC-5286 (NC)	373.1	100.0	311.5	339.8	331.0	428.5	314.0	5		
UPC-9202 (ZC-CZ)	383.3	118.3	365.3	287.1	312.5	506.2	328.8	2		
Mean	347.3	223.0	346.3	290.6	224.1	392.5	304.0			
CD at 5%	NS	18.7	49.8	52.5	27.7					
CV%	10.4	2.1	8.5	10.5	7.2					

**Table 9.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	South Zone								All India		
	Coimbatore	Mandya	Hyderabad	Vellayani	Raichur	Dharwad	Average	Rank	Average	Rank	Superiority%
PFC 36	296.3	237.7	231.3	199.0	253.3	344.9	260.4	10	271.6	8	0.5
TNFC 1910	310.2	180.0	180.4	352.0	243.1	326.4	265.3	6	262.0	9	
MFC-18-8	287.0	265.2	189.7	273.0	254.6	340.3	268.3	3	278.5	3	
UPC 21-1	296.3	252.8	198.9	264.0	254.6	328.7	265.9	5	296.8	1	
HFC 17-7	256.5	198.1	212.8	324.0	268.5	312.5	262.1	8	274.0	5	
MFC-18-10	252.3	271.7	249.8	245.0	238.4	344.9	267.0	4	272.0	7	
PFC 40	306.9	232.6	212.8	287.0	241.7	338.0	269.8	2	273.4	6	
TSFC-20-06	282.4	227.5	222.1	236.0	268.5	331.0	261.2	9	258.8	10	
Bundel Lobia-1(NC)	294.0	238.7	222.1	278.0	239.4	319.4	265.3	6	274.1	4	
UPC-5286 (NC)	298.6	185.7	282.2	320.0	225.5	331.0	273.8	1	295.5	2	
MFC-09-1 (ZC-SZ)	270.8	220.3	212.8	264.0	227.8	377.3	262.2	7			
<b>Mean</b>	<b>286.5</b>	<b>228.2</b>	<b>219.5</b>	<b>276.5</b>	<b>246.9</b>	<b>335.9</b>	<b>265.6</b>		<b>275.7</b>		
<b>CD at 5%</b>	<b>24.5</b>	<b>23.2</b>	<b>NS</b>	<b>9.1</b>	<b>4.1</b>	<b>31.0</b>					
<b>CV%</b>	<b>5.0</b>	<b>11.2</b>	<b>18.4</b>	<b>1.9</b>	<b>9.7</b>	<b>5.4</b>					

**Table 9.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	Hill Zone				North West Zone					
	Palampur	Srinagar	Average	Rank	Ludhiana	Pantnagar	Bikaner	**Jalore	Average	Rank
PFC 36	42.9	20.9	31.9	10	62.7	76.1	33.0	29.3	57.3	10
TNFC 1910	44.3	22.0	33.1	9	53.2	58.6	63.1	25.4	58.3	9
MFC-18-8	51.7	26.9	39.3	2	53.4	54.3	63.3	33.3	57.0	11
UPC 21-1	49.5	21.9	35.7	6	74.9	90.0	60.7	32.3	75.2	2
HFC 17-7	36.6	25.0	30.8	11	71.0	72.5	70.0	33.7	71.2	5
MFC-18-10	45.0	22.5	33.7	8	58.5	72.6	60.9	30.1	64.0	7
PFC 40	49.8	27.2	38.5	3	44.3	60.9	92.0	27.8	65.7	6
TSFC-20-06	48.0	25.4	36.7	5	74.1	51.6	90.7	25.2	72.1	3
Bundel Lobia-1(NC)	49.2	26.9	38.1	4	83.9	51.3	79.6	23.3	71.6	4
UPC-5286 (NC)	45.9	22.8	34.3	7	70.8	87.5	71.4	14.9	76.6	1
UPC-622 (ZC-HZ)	64.6	25.3	44.9	1						
Bundel Lobia-2 (ZC-NWZ)					52.1	61.4	68.9	25.1	60.8	8
<b>Mean</b>	<b>47.9</b>	<b>24.3</b>	<b>36.1</b>		<b>63.5</b>	<b>67.0</b>	<b>68.5</b>	<b>27.3</b>	<b>66.3</b>	
<b>CD at 5%</b>	<b>NS</b>	<b>3.4</b>			<b>4.8</b>	<b>5.6</b>	<b>13.9</b>	<b>10.6</b>		
<b>CV%</b>	<b>16.5</b>	<b>8.13</b>			<b>6.7</b>	<b>8.8</b>	<b>11.8</b>			

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 9.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	North East Zone								Rank	Superiority%
	Ayodhya	Bhubaneswar	Jorhat	Ranchi	Imphal	Pusa	**Kalyani	Average		
PFC 36	79.7	74.6	67.5	26.1	37.1	71.3	17.6	59.4	3	6.7
TNFC 1910	55.0	62.4	48.8	36.0	36.6	64.2	20.8	50.5	10	
MFC-18-8	47.0	86.2	55.5	34.1	32.2	52.6	20.8	51.3	9	
UPC 21-1	92.9	96.9	58.1	35.0	34.3	75.6	19.2	65.5	1	
HFC 17-7	67.0	93.1	51.0	35.2	29.0	72.2	20.1	57.9	4	
MFC-18-10	71.9	80.5	50.7	26.8	27.2	66.6	19.9	54.0	6	
PFC 40	47.9	73.6	60.6	33.7	28.0	73.3	23.1	52.8	7	
TSFC-20-06	50.0	64.2	56.6	24.6	25.8	72.0	16.8	48.9	11	
Bundel Lobia-1(NC)	53.9	82.4	47.8	39.3	24.7	62.0	15.1	51.7	8	
UPC-5286 (NC)	94.8	72.6	53.0	34.9	44.2	68.4	22.0	61.3	2	
TNFC 0926 (ZC-NEZ)	53.7	78.8	60.5	31.3	50.3	69.2	18.7	57.3	5	
<b>Mean</b>	<b>64.9</b>	<b>78.7</b>	<b>55.5</b>	<b>32.5</b>	<b>33.6</b>	<b>67.9</b>	<b>19.5</b>	<b>55.5</b>		
<b>CD at 5%</b>	<b>14.6</b>	<b>10.7</b>	<b>3.6</b>	<b>10.5</b>	<b>6.0</b>	<b>5.3</b>	<b>2.8</b>			
<b>CV%</b>	<b>6.6</b>	<b>8.0</b>	<b>8.7</b>	<b>6.2</b>	<b>10.4</b>	<b>9.0</b>	<b>6.8</b>			

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 9.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	Central Zone						Average	Rank	Superiority%
	Anand	Jhansi	Rahuri	Urulikanchan	Raipur				
PFC 36	44.1	58.2	62.7	56.4	28.8	50.0	9	11.5	
TNFC 1910	54.3	44.4	77.3	51.4	31.1	51.7	8		
MFC-18-8	46.5	117.4	68.9	56.6	46.1	67.1	2		
UPC 21-1	45.2	65.2	68.1	46.2	50.2	55.0	6		
HFC 17-7	43.8	33.5	45.2	46.6	39.4	41.7	11	14.0	
MFC-18-10	46.8	160.9	52.2	40.3	42.7	68.6	1		
PFC 40	49.3	145.2	60.7	47.1	22.2	64.9	3	7.9	
TSFC-20-06	38.7	148.8	56.8	32.6	29.1	61.2	4	1.7	
Bundel Lobia-1(NC)	41.5	120.4	63.1	44.5	31.4	60.2	5		
UPC-5286 (NC)	48.6	40.0	52.4	53.9	52.7	49.5	10		
UPC-9202 (ZC-CZ)	48.8	47.3	64.7	46.3	57.2	52.9	7		
<b>Mean</b>	<b>46.1</b>	<b>89.2</b>	<b>61.1</b>	<b>47.4</b>	<b>39.2</b>	<b>56.6</b>			
<b>CD at 5%</b>	<b>NS</b>	<b>3.3</b>	<b>8.7</b>	<b>2.5</b>	<b>5.4</b>				
<b>CV%</b>	<b>12.1</b>	<b>2.1</b>	<b>8.4</b>	<b>9.0</b>	<b>8.0</b>				



**Table 9.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	South Zone							All India		
	Coimbatore	Mandya	Hyderabad	Vellayani	Dharwad	Average	Rank	Average	Rank	Superiority%
PFC 36	58.6	35.5	48.6	49.8	68.2	52.1	10	52.5	8	
TNFC 1910	64.0	28.7	31.9	86.7	76.1	57.5	2	51.9	10	
MFC-18-8	55.2	46.1	38.0	67.4	71.0	55.5	5	55.7	5	
UPC 21-1	55.8	39.1	41.2	65.9	72.1	54.8	6	59.0	1	2.9
HFC 17-7	48.2	30.3	39.6	81.1	65.8	53.0	8	52.2	9	
MFC-18-10	48.2	53.4	50.5	61.3	73.6	57.4	3	57.8	2	0.8
PFC 40	59.4	34.4	41.5	71.8	71.3	55.7	4	56.9	4	
TSFC-20-06	53.6	37.0	40.1	59.0	70.1	52.0	11	54.7	7	
Bundel Lobia-1(NC)	60.2	31.8	37.2	69.6	65.8	52.9	9	55.5	6	
UPC-5286 (NC)	59.4	28.3	52.5	79.9	69.5	57.9	1	57.3	3	
MFC-09-1 (ZC-SZ)	51.4	30.3	40.7	65.1	79.5	53.4	7			
<b>Mean</b>	<b>55.8</b>	<b>35.9</b>	<b>42.0</b>	<b>68.9</b>	<b>71.2</b>	<b>54.7</b>		<b>55.3</b>		
<b>CD at 5%</b>	<b>4.6</b>	<b>3.1</b>	<b>NS</b>	<b>6.5</b>	<b>7.1</b>					
<b>CV%</b>	<b>4.8</b>	<b>9.7</b>	<b>19.8</b>	<b>5.5</b>	<b>5.8</b>					

**Table 9.3 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Entries	Palampur	Srinagar	Ludhiana	Pantnagar	Bikaner	Ayodhya	Kalyani	Bhubaneswar	Jorhat	Ranchi	Pusa
PFC 36	3.17	1.34	3.96	3.92	2.23	5.88	2.31	4.70	5.59	3.91	3.86
TNFC 1910	3.64	1.68	3.52	3.47	4.14	3.50	2.28	3.93	4.16	5.92	3.77
MFC-18-8	4.32	1.15	3.45	3.12	4.46	3.16	2.43	5.09	4.57	6.09	3.18
UPC 21-1	4.53	1.11	4.62	4.29	4.00	6.54	2.39	6.03	5.99	6.21	3.76
HFC 17-7	2.78	1.15	4.7	3.97	4.26	4.73	2.35	5.52	4.92	5.44	3.81
MFC-18-10	3.67	1.00	3.45	3.91	3.94	5.25	2.24	4.89	4.86	3.89	3.72
PFC 40	4.24	1.22	3.08	3.68	4.85	3.26	2.49	4.49	4.91	6.06	3.76
TSFC-20-06	3.78	1.20	3.74	3.21	4.83	3.44	2.08	3.85	5.34	5.19	3.78
Bundel Lobia-1(NC)	3.75	1.19	5.06	3.17	5.28	3.67	2.24	4.96	4.66	5.00	3.41
UPC-5286 (NC)	4.13	1.20	4.92	4.64	3.96	6.52	2.26	4.15	4.35	4.58	3.84
UPC-622 (ZC-HZ)	5.56	1.16									
Bundel Lobia-2 (ZC-NWZ)			3.45	3.15	3.60	3.57					
TNFC 0926 (ZC-NEZ)							2.24	4.77	5.22	5.74	3.93
<b>Mean</b>	<b>3.96</b>	<b>1.22</b>	<b>4.00</b>	<b>3.68</b>	<b>4.14</b>	<b>4.50</b>	<b>2.30</b>	<b>4.76</b>	<b>4.96</b>	<b>5.27</b>	<b>3.71</b>

**Table 9.3 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Entries	Ana-nd	Jha-nsi	Rah-uri	Urulikan- chan	Rai-pur	Coimb- atore	Man-dya	Hydera- bad	Vella- yani	Dhar- wad	Aver- age	Ra- nk
PFC 36	5.19	1.95	6.24	5.19	2.45	5.93	4.15	4.33	4.40	5.75	4.12	9
TNFC 1910	6.16	1.50	10.27	5.27	3.68	6.08	3.65	3.43	7.80	5.44	4.44	4
MFC-18-8	6.42	3.95	9.86	5.62	4.72	5.32	4.98	3.74	6.10	5.67	4.64	2
UPC 21-1	6.05	2.19	7.31	4.34	4.45	5.81	4.74	3.78	5.80	5.48	4.73	1
HFC 17-7	5.07	1.04	5.06	4.70	2.98	5.03	3.79	4.20	7.20	5.21	4.19	8
MFC-18-10	6.19	5.01	6.79	3.69	4.76	4.59	5.30	4.89	5.40	5.75	4.44	4
PFC 40	5.67	4.90	8.51	4.91	2.36	6.02	4.73	3.97	6.40	5.63	4.53	3
TSFC-20-06	5.36	4.61	7.90	3.83	3.02	5.04	4.91	4.34	5.20	5.52	4.29	7
Bundel Lobia-1(NC)	6.26	3.73	8.08	4.54	1.84	5.25	4.60	4.58	6.20	5.32	4.42	6
UPC-5286 (NC)	5.18	1.35	5.13	5.23	4.53	5.43	3.64	5.40	7.10	5.52	4.43	5
UPC-9202 (ZC-CZ)	5.48	1.50	6.76	4.48	4.96							
MFC-09-1 (ZC-SZ)						5.42	3.85	4.06	5.80	6.29		
<b>Mean</b>	<b>5.73</b>	<b>2.88</b>	<b>7.45</b>	<b>4.71</b>	<b>3.61</b>	<b>5.45</b>	<b>4.39</b>	<b>4.25</b>	<b>6.13</b>	<b>5.60</b>	<b>4.42</b>	

**Table 9.4 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Palampur	Srinagar	Ludhiana	Pantnagar	Bikaner	Ayodhya	Kalyani	Bhubaneswar	Jorhat	Ranchi	Pusa
PFC 36	0.59	0.27	0.87	0.85	0.41	1.27	0.24	1.20	1.04	0.46	0.96
TNFC 1910	0.67	0.29	0.74	0.77	0.79	0.87	0.29	0.97	0.79	0.74	0.88
MFC-18-8	0.82	0.29	0.74	0.69	0.79	0.75	0.29	1.31	0.87	0.73	0.79
UPC 21-1	0.77	0.24	1.04	0.98	0.76	1.47	0.27	1.54	1.00	0.72	0.95
HFC 17-7	0.50	0.23	0.99	0.83	0.88	1.06	0.28	1.41	0.82	0.56	0.95
MFC-18-10	0.70	0.27	0.81	0.89	0.76	1.14	0.28	1.25	0.86	0.41	0.91
PFC 40	0.78	0.34	0.62	0.75	1.15	0.76	0.32	1.17	0.97	0.67	0.93
TSFC-20-06	0.72	0.28	1.03	0.66	1.13	0.79	0.23	1.02	0.98	0.54	0.93
Bundel Lobia-1(NC)	0.70	0.28	1.17	0.67	1.00	0.86	0.21	1.32	0.80	0.60	0.83
UPC-5286 (NC)	0.69	0.28	0.98	0.99	0.89	1.50	0.31	1.06	0.82	0.52	0.92
UPC-622 (ZC-HZ)	1.10	0.30									
Bundel Lobia-2 (ZC-NWZ)			0.72	0.66	0.86						
TNFC 0926 (ZC-NEZ)						0.85	0.26	1.24	0.90	0.71	0.96
<b>Mean</b>	<b>0.73</b>	<b>0.28</b>	<b>0.88</b>	<b>0.79</b>	<b>0.86</b>	<b>1.03</b>	<b>0.27</b>	<b>1.23</b>	<b>0.90</b>	<b>0.60</b>	<b>0.91</b>

**Table 9.4 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Ana-nd	Jha-nsi	Rah-uri	Urulikan- chan	Rai-pur	Coimb- atore	Man-dya	Hydera- bad	Vella- yani	Dhar- wad	Aver- age	Ra- nk
PFC 36	0.63	0.78	1.13	0.88	0.42	1.17	0.62	0.91	1.10	1.14	0.81	5
TNFC 1910	0.99	0.60	1.98	0.89	0.55	1.26	0.58	0.61	1.96	1.27	0.88	3
MFC-18-8	0.82	1.58	1.74	0.94	0.87	1.02	0.86	0.75	1.50	1.18	0.92	2
UPC 21-1	0.77	0.88	1.27	0.76	0.77	1.09	0.73	0.78	1.50	1.20	0.93	1
HFC 17-7	0.66	0.42	0.83	0.73	0.54	0.94	0.58	0.78	1.80	1.10	0.80	6
MFC-18-10	0.82	2.00	1.22	0.63	0.79	0.88	1.04	0.99	1.40	1.23	0.92	2
PFC 40	0.88	1.96	1.49	0.78	0.42	1.17	0.70	0.77	1.60	1.19	0.92	2
TSFC-20-06	0.72	1.84	1.33	0.55	0.59	0.96	0.80	0.78	1.30	1.17	0.87	4
Bundel Lobia-1(NC)	0.76	1.49	1.45	0.74	0.36	1.07	0.61	0.77	1.60	1.10	0.88	3
UPC-5286 (NC)	0.67	0.54	0.86	0.83	0.72	1.08	0.56	1.01	1.80	1.16	0.87	4
UPC-9202 (ZC-CZ)	0.70	0.60	1.20	0.72	0.91							
MFC-09-1 (ZC-SZ)						1.03	0.53	0.77	1.40	1.33		
<b>Mean</b>	<b>0.77</b>	<b>1.15</b>	<b>1.32</b>	<b>0.77</b>	<b>0.63</b>	<b>1.06</b>	<b>0.69</b>	<b>0.81</b>	<b>1.54</b>	<b>1.19</b>	<b>0.88</b>	

**Table 9.5 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	Hill Zone		North West Zone				
	Palampur	Rank	Ludhiana	Bikaner	Pantnagar	Average	Rank
PFC 36	8.3	9	8.6	4.8	13.3	8.9	11
TNFC 1910	8.1	10	7.9	9.4	10.8	9.3	10
MFC-18-8	10.3	2	8.5	10.1	10.5	9.7	8
UPC 21-1	9.7	3	11.0	7.9	15.7	11.5	1
HFC 17-7	7.5	11	9.0	10.0	13.3	10.8	4
MFC-18-10	8.9	6	8.5	8.6	13.3	10.1	7
PFC 40	9.4	4	6.0	11.9	10.7	9.5	9
TSFC-20-06	9.2	5	11.5	13.0	9.5	11.3	3
Bundel Lobia-1(NC)	8.8	7	11.4	11.3	9.0	10.5	5
UPC-5286 (NC)	8.5	8	9.2	10.4	14.5	11.4	2
UPC-622 (ZC-HZ)	12.4	1					
Bundel Lobia-2 (ZC-NWZ)			9.2	10.6	11.3	10.3	6
<b>Mean</b>	<b>9.2</b>		<b>9.2</b>	<b>9.8</b>	<b>12.0</b>	<b>10.3</b>	

**Table 9.5 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	North East Zone								Central Zone					
	Kal-yani	Bhuban-eswar	Jor-hat	Imp-hal	Ayod-hya	Ran-chi	Aver-age	Ra-nk	Ana-nd	Rah-uri	Urulikan-chaan	Rai-pur	Aver-age	Ra-nk
PFC 36	2.2	10.4	8.6	5.2	13.5	5.2	7.5	3	5.7	9.0	12.2	3.5	7.6	6
TNFC 1910	2.7	9.4	6.3	5.3	9.1	5.5	6.4	9	6.8	11.7	9.3	4.1	8.0	4
MFC-18-8	3.5	11.9	7.5	5.6	7.7	5.1	6.9	6	5.7	8.2	13.8	6.0	8.4	3
UPC 21-1	2.9	13.6	7.4	5.3	15.5	5.4	8.3	1	5.4	10.0	9.4	6.3	7.8	5
HFC 17-7	2.5	13.0	6.7	4.3	11.2	5.7	7.2	4	5.6	8.9	9.0	4.7	7.0	8
MFC-18-10	2.3	11.2	6.5	4.1	12.2	4.3	6.8	7	4.9	10.1	7.0	6.0	7.0	8
PFC 40	3.9	10.0	8.0	4.2	8.1	5.1	6.5	8	6.5	9.6	10.4	2.8	7.3	7
TSFC-20-06	1.9	8.7	7.4	3.9	8.7	3.5	5.7	11	5.7	8.4	5.4	3.3	5.7	10
Bundel Lobia-1(NC)	2.1	11.0	5.9	3.7	9.1	5.5	6.2	10	4.6	9.1	7.8	4.0	6.4	9
UPC-5286 (NC)	3.3	10.1	7.3	6.3	16.3	4.9	8.0	2	5.5	7.9	12.4	8.4	8.5	2
TNFC 0926 (ZC-NEZ)	2.6	10.8	7.7	7.2	8.9	4.7	7.0	5						
UPC-9202 (ZC-CZ)									7.4	12.6	9.7	7.6	9.3	1
<b>Mean</b>	<b>2.7</b>	<b>10.9</b>	<b>7.2</b>	<b>5.0</b>	<b>10.9</b>	<b>5.0</b>	<b>7.0</b>		<b>5.8</b>	<b>9.6</b>	<b>9.7</b>	<b>5.1</b>	<b>7.5</b>	

**Table 9.5 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	South Zone					All India	
	Coimbatore	Mandya	Hyderabad	Average	Rank	Average	Rank
PFC 36	9.3	4.2	7.2	6.9	5	7.7	5
TNFC 1910	9.5	4.6	4.5	6.2	8	7.4	7
MFC-18-8	7.9	8.9	5.0	7.3	3	8.0	3
UPC 21-1	6.1	4.8	4.7	5.2	9	8.3	2
HFC 17-7	8.2	4.2	6.4	6.3	7	7.7	5
MFC-18-10	8.2	8.4	8.6	8.4	1	7.8	4
PFC 40	10.2	4.1	6.9	7.1	4	7.5	6
TSFC-20-06	10.1	5.5	7.1	7.5	2	7.2	9
Bundel Lobia-1(NC)	10.0	5.1	6.1	7.1	4	7.3	8
UPC-5286 (NC)	8.1	5.5	7.2	6.9	5	8.6	1
MFC-09-1 (ZC-SZ)	8.3	5.7	6.3	6.8	6		
<b>Mean</b>	<b>8.7</b>	<b>5.5</b>	<b>6.4</b>	<b>6.9</b>		<b>7.7</b>	

**Table 9.6 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	Hill Zone		North West Zone				
	Palampur	Rank	Ludhiana	Bikaner	Pantnagar	Average	Rank
PFC 36	19.3	4	13.7	14.6	17.5	15.3	5
TNFC 1910	18.4	7	14.8	14.9	18.4	16.0	3
MFC-18-8	19.8	2	15.9	16.0	19.3	17.1	1
UPC 21-1	19.5	3	14.7	13.0	17.5	15.1	6
HFC 17-7	20.4	1	12.7	14.3	18.4	15.1	6
MFC-18-10	19.8	2	14.5	14.1	18.4	15.7	4
PFC 40	19.0	5	13.6	12.9	17.5	14.7	7
TSFC-20-06	19.3	4	15.5	14.3	18.5	16.1	2
Bundel Lobia-1(NC)	17.8	8	13.6	14.1	17.5	15.1	6
UPC-5286 (NC)	18.7	6	13.0	14.6	16.6	14.7	7
UPC-622 (ZC-HZ)	19.3	4					
Bundel Lobia-2 (ZC-NWZ)			17.6	15.4	18.4	17.1	1
<b>Mean</b>	<b>19.2</b>		<b>14.5</b>	<b>14.4</b>	<b>18.0</b>	<b>15.6</b>	

**Table 9.6 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	North East Zone								Central Zone					
	Kal-yani	Bhuban-eswar	Jor-hat	Imp-hal	Ayod-hya	Ran-chi	Aver-age	Ran-k	Ana-nd	Rah-uri	Urulikan-chan	Rai-pur	Aver-age	Ran-k
PFC 36	12.3	14.0	12.8	14.1	16.9	19.9	15.0	3	12.9	14.4	21.6	12.1	15.2	4
TNFC 1910	13.1	15.1	13.1	14.4	16.6	15.4	14.6	6	12.5	15.1	18.2	13.1	14.7	5
MFC-18-8	16.8	13.9	13.7	17.2	16.4	15.1	15.5	1	12.2	15.6	24.3	13.0	16.3	2
UPC 21-1	15.2	14.0	12.9	15.4	16.7	15.4	14.9	4	12.0	15.9	20.4	12.5	15.2	4
HFC 17-7	12.6	14.0	13.3	14.8	16.8	16.1	14.6	6	12.8	16.9	19.4	12.0	15.2	4
MFC-18-10	11.6	14.0	12.9	15.1	17.0	16.1	14.4	7	10.5	16.6	17.5	14.0	14.7	5
PFC 40	16.7	13.6	13.3	15.1	16.9	15.1	15.1	2	13.2	15.9	22.0	12.5	15.9	3
TSFC-20-06	11.1	13.5	13.2	15.0	17.4	14.4	14.1	9	14.9	14.9	16.6	11.2	14.4	6
Bundel Lobia-1(NC)	13.6	13.4	12.4	14.8	16.8	13.9	14.2	8	11.0	14.4	17.6	12.7	13.9	7
UPC-5286 (NC)	14.8	13.9	13.9	14.2	17.2	14.1	14.7	5	11.3	15.1	22.9	15.9	16.3	2
TNFC 0926 (ZC-NEZ)	14.1	13.7	12.9	14.2	16.5	14.9	14.4	7						
UPC-9202 (ZC-CZ)									15.1	19.4	21.0	13.3	17.2	1
<b>Mean</b>	<b>13.8</b>	<b>13.9</b>	<b>13.1</b>	<b>15.0</b>	<b>16.8</b>	<b>15.5</b>	<b>14.7</b>		<b>12.6</b>	<b>15.8</b>	<b>20.1</b>	<b>12.9</b>	<b>15.4</b>	

**Table 9.6 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	South Zone					All India	
	Coimbatore	Mandya	Hyderabad	Average	Rank	Average	Rank
PFC 36	15.8	11.8	14.7	14.1	10	15.2	5
TNFC 1910	14.9	16.2	14.0	15.0	9	15.2	5
MFC-18-8	14.4	19.3	13.1	15.6	6	16.2	1
UPC 21-1	10.9	12.3	11.4	11.5	11	14.7	7
HFC 17-7	17.1	14.0	16.3	15.8	5	15.4	3
MFC-18-10	17.1	15.8	17.1	16.7	3	15.4	3
PFC 40	17.1	11.8	16.8	15.2	8	15.5	2
TSFC-20-06	18.8	14.9	17.5	17.1	1	15.3	4
Bundel Lobia-1(NC)	16.6	16.2	16.3	16.4	4	14.9	6
UPC-5286 (NC)	13.6	19.3	13.7	15.5	7	15.5	2
MFC-09-1 (ZC-SZ)	16.2	18.8	15.6	16.9	2		
<b>Mean</b>	<b>15.7</b>	<b>15.5</b>	<b>15.1</b>	<b>15.4</b>		<b>15.3</b>	

**Table 9.7 IVTC: Initial Varietal Trial in Forage Cowpea: Plant Height (cm)**

Entries	Palam-pur	Sri-nagar	Ludh-iana	Pant-nagar	Bika-ner	Ayod-hya	Kal-yani	Bhuban-eswar	Jor-hat	Ran-chi	Imp-hal	Pu-sa
PFC 36	155.0	154.0	54.0	215.8	117.0	144.8	101.2	190.2	101.1	134.7	147.2	200.0
TNFC 1910	178.7	107.0	179.5	232.3	103.0	160.2	87.1	165.1	101.8	153.7	180.1	205.0
MFC-18-8	122.7	118.3	150.0	208.2	118.0	139.4	89.8	214.6	103.8	129.9	145.2	188.3
UPC 21-1	110.3	106.6	112.5	195.8	148.0	140.8	91.5	229.7	97.3	162.0	185.4	221.6
HFC 17-7	150.7	112.3	119.0	196.4	129.0	159.3	90.4	221.8	107.1	171.2	174.0	208.3
MFC-18-10	167.0	108.3	124.0	182.7	167.0	151.8	93.9	209.1	105.8	154.3	147.2	190.0
PFC 40	136.7	111.3	92.5	232.1	141.0	123.8	84.4	173.3	101.1	162.1	168.8	185.0
TSFC-20-06	132.0	109.6	110.5	240.5	157.0	130.8	96.7	157.3	102.1	134.3	137.6	220.0
Bundel Lobia-1(NC)	120.3	112.6	182.5	321.6	157.0	132.9	100.1	198.6	105.3	170.7	139.2	181.6
UPC-5286 (NC)	138.0	109.6	246.5	255.3	108.0	109.4	93.1	181.5	103.5	135.1	187.4	168.3
UPC-622 (ZC-HZ)	198.3	116.6										
Bundel Lobia-2 (ZC-NWZ)			155.5	228.6	148.0							
TNFC 0926 (ZC-NEZ)						156.4	95.0	194.3	110.0	169.7	188.6	200.0
<b>Mean</b>	<b>146.3</b>	<b>115.1</b>	<b>138.8</b>	<b>228.1</b>	<b>135.7</b>	<b>140.9</b>	<b>93.0</b>	<b>194.1</b>	<b>103.5</b>	<b>152.5</b>	<b>163.7</b>	<b>197.1</b>

**Table 9.7 IVTC: Initial Varietal Trial in Forage Cowpea: Plant Height (cm)**

Entries	Ana-nd	Jha-nsi	Rah-uri	Urulikan-chan	Rai-pur	Coimb-atore	Man-dya	Hydera-bad	Vella-yani	Rai-chur	Aver-age	Ran-k
PFC 36	124.0	172.1	111.6	117.1	204.3	106.5	58.0	144.0	92.0	150.1	136.1	10
TNFC 1910	131.7	302.7	115.0	158.2	216.3	123.5	71.8	204.0	166.0	156.7	159.1	2
MFC-18-8	123.5	223.6	96.0	136.6	212.4	106.5	73.2	257.0	103.0	146.6	145.8	7
UPC 21-1	118.0	240.2	90.4	117.0	187.4	120.5	72.2	221.0	86.0	154.5	145.9	6
HFC 17-7	123.5	249.7	84.5	126.1	200.0	110.5	72.3	182.0	109.0	148.5	147.5	3
MFC-18-10	129.7	205.2	90.6	122.4	203.5	98.5	78.9	245.0	97.0	150.1	146.5	5
PFC 40	127.6	278.2	105.6	109.9	188.2	120.0	56.1	175.0	93.0	147.2	141.5	8
TSFC-20-06	130.7	195.9	93.0	123.1	172.9	97.5	53.4	242.0	75.0	150.7	139.2	9
Bundel Lobia-1(NC)	125.5	260.0	114.6	122.6	231.9	97.5	56.9	304.0	152.0	142.4	160.4	1
UPC-5286 (NC)	124.7	202.9	96.7	134.4	202.4	118.5	77.1	189.0	89.0	157.0	146.7	4
UPC-9202 (ZC-CZ)	123.5	183.3	73.1	119.0	204.4							
MFC-09-1 (ZC-SZ)						118.5	65.9	277.0	97.0	140.9		
<b>Mean</b>	<b>125.7</b>	<b>228.5</b>	<b>97.4</b>	<b>126.0</b>	<b>202.1</b>	<b>110.7</b>	<b>66.9</b>	<b>221.8</b>	<b>105.4</b>	<b>149.5</b>	<b>146.9</b>	

**Table 9.8 IVTC: Initial Varietal Trial in Forage Cowpea: Leaf Stem Ratio**

Entries	Palam-pur	Ludh-iana	Pant-nagar	Bika-ner	Ayod-hya	Kal-yani	Bhuban-eswar	Jor-hat	Ran-chi	Imp-hal	Pu-sa
PFC 36	0.58	0.56	1.00	1.33	0.68	0.82	0.95	0.80	0.96	0.74	0.60
TNFC 1910	0.63	0.39	0.73	1.02	0.65	0.79	0.89	0.64	0.95	0.50	0.58
MFC-18-8	0.66	0.41	1.18	0.89	0.69	0.96	1.17	0.76	0.89	0.50	0.47
UPC 21-1	0.50	0.42	1.20	1.19	0.61	0.76	1.29	0.85	0.86	0.69	0.65
HFC 17-7	0.55	0.37	1.53	0.80	0.58	0.85	1.24	0.83	0.93	0.95	0.60
MFC-18-10	0.60	0.34	1.02	0.85	0.62	0.79	1.08	0.69	0.94	0.83	0.57
PFC 40	0.59	1.13	1.01	0.90	0.61	0.73	0.90	0.70	0.92	0.73	0.63
TSFC-20-06	0.49	0.60	0.76	0.62	0.60	0.81	0.87	0.83	0.83	0.43	0.61
Bundel Lobia-1(NC)	0.58	0.80	1.08	0.92	0.57	0.67	1.02	0.58	0.94	0.87	0.53
UPC-5286 (NC)	0.57	0.85	1.20	0.64	0.56	0.83	0.91	0.80	0.93	0.85	0.60
UPC-622 (ZC-HZ)	0.44										
Bundel Lobia-2 (ZC-NWZ)		1.30	0.81	1.03							
TNFC 0926 (ZC-NEZ)					0.52	0.93	0.98	0.59	0.91	0.73	0.58
<b>Mean</b>	<b>0.56</b>	<b>0.65</b>	<b>1.05</b>	<b>0.93</b>	<b>0.61</b>	<b>0.81</b>	<b>1.03</b>	<b>0.73</b>	<b>0.91</b>	<b>0.71</b>	<b>0.58</b>

**Table 9.8 IVTC: Initial Varietal Trial in Forage Cowpea: Leaf Stem Ratio**

Entries	Jhansi	Rahuri	Urulikanchan	Raipur	Coimbatore	Mandya	Hyderabad	Vellayani	Average	Rank
PFC 36	1.09	0.80	0.87	0.42	0.34	0.72	0.98	1.40	0.82	2
TNFC 1910	0.85	0.66	1.21	0.34	0.35	0.56	0.54	1.20	0.71	6
MFC-18-8	1.12	0.74	0.73	0.34	0.32	0.83	0.65	1.40	0.77	4
UPC 21-1	0.82	0.92	1.04	0.45	0.34	0.52	0.89	1.30	0.80	3
HFC 17-7	1.25	0.90	1.32	0.46	0.35	0.77	0.85	1.40	0.87	1
MFC-18-10	0.68	0.92	1.25	0.38	0.38	0.79	0.83	1.10	0.77	4
PFC 40	0.79	0.75	0.91	0.39	0.30	0.69	0.75	1.30	0.77	4
TSFC-20-06	0.62	0.83	1.20	0.34	0.32	0.58	0.64	1.30	0.70	7
Bundel Lobia-1(NC)	0.65	0.80	1.01	0.29	0.33	0.54	0.51	1.20	0.73	5
UPC-5286 (NC)	0.63	0.87	0.98	0.45	0.35	0.61	0.84	1.20	0.77	4
UPC-9202 (ZC-CZ)	1.44	0.96	1.16	0.45						
MFC-09-1 (ZC-SZ)					0.35	0.68	0.77	1.30		
<b>Mean</b>	<b>0.90</b>	<b>0.83</b>	<b>1.06</b>	<b>0.39</b>	<b>0.34</b>	<b>0.66</b>	<b>0.75</b>	<b>1.28</b>	<b>0.77</b>	



**Table 9.9 IVTC: Initial Varietal Trial in Forage Cowpea: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ludhiana	Rank	Ludhiana	Rank	Ludhiana	Rank
PFC 36	44.5	9	67.4	5	55.4	6
TNFC 1910	43.2	6	68.5	7	56.7	4
MFC-18-8	40.3	3	67.2	4	58.7	3
UPC 21-1	44.2	8	66.5	3	56.0	5
HFC 17-7	43.2	6	68.7	8	50.2	11
MFC-18-10	42.1	5	66.4	2	54.2	7
PFC 40	43.5	7	67.4	5	51.4	10
TSFC-20-06	40.2	2	63.5	1	59.7	2
Bundel Lobia-1(NC)	41.2	4	68.1	6	52.3	9
UPC-5286 (NC)	44.5	9	67.2	4	52.4	8
Bundel Lobia-2 (ZC-NWZ)	39.2	1	63.5	1	60.2	1
<b>Mean</b>	<b>42.4</b>		<b>66.8</b>		<b>55.2</b>	

**Table 10.1: AVTC-1: First Advanced Varietal Trial in Cowpea: Green Forage Yield (q/ha)**

Entries	North East Zone								
	Ayodhya	Bhubaaneswar	Ranchi	Jorhat	Kalyani	Imphal	Pusa	Average	Rank
HFC17-9	312.4	345.9	191.7	325.9	187.5	305.2	240.0	272.7	4
MFC-16-8	349.1	298.5	171.4	133.8	180.0	226.7	279.0	234.1	5
UPC-5286 (NC)	332.2	367.3	210.7	282.6	178.3	370.4	265.0	286.7	2
Bundel Lobia-1 (NC)	320.0	313.1	163.0	305.5	191.6	392.5	290.0	282.2	3
UPC-628 (ZC-NEZ)	304.7	378.3	229.2	287.0	199.1	370.0	268.0	290.9	1
Mean	323.7	340.6	193.2	267.0	187.3	333.0	268.4	273.3	
CD at 5%	32.8	22.8	16.3	2.9	10.4	32.0	14.2		
CV%	12.6	4.3	5.5	4.7	7.3	5.4	9.6		

**Table 10.1: AVTC-1: First Advanced Varietal Trial in Cowpea: Green Forage Yield (q/ha)**

Entries	South Zone								All India	
	Coimbatore	Vellayani	Mandya	Hyderabad	Raichur	Dharwad	Average	Rank	Average	Rank
HFC17-9	287.5	200.0	235.2	211.0	245.9	285.4	244.2	2	259.5	2
MFC-16-8	229.2	173.0	150.0	258.2	244.8	259.4	219.1	5	227.2	4
UPC-5286 (NC)	264.6	194.0	248.0	236.0	238.1	310.4	248.5	1	269.0	1
Bundel Lobia-1 (NC)	253.1	165.0	182.8	233.2	238.5	304.2	229.5	4	257.9	3
MFC-8-14 (ZC-SZ)	268.7	225.0	210.4	194.4	245.9	291.7	239.4	3		
<b>Mean</b>	<b>260.6</b>	<b>191.4</b>	<b>205.3</b>	<b>226.6</b>	<b>242.6</b>	<b>290.2</b>	<b>236.1</b>		<b>253.4</b>	
<b>CD at 5%</b>	<b>23.3</b>	<b>6.7</b>	<b>20.5</b>	<b>41.6</b>	<b>1.9</b>	<b>19.6</b>				
<b>CV%</b>	<b>5.8</b>	<b>2.3</b>	<b>13.0</b>	<b>11.8</b>	<b>5.1</b>	<b>4.4</b>				

**Table 10.2: AVTC-1: First Advanced Varietal Trial in Cowpea: Dry Matter Yield (q/ha)**

Entries	North East Zone							Average	Rank
	Ayodhya	Bhubaneswar	Ranchi	Jorhat	Imphal	Pusa	**Kalyani		
HFC17-9	91.1	84.1	42.1	52.9	39.7	57.0	19.8	61.2	3
MFC-16-8	110.9	73.9	36.0	23.6	32.2	67.4	11.8	57.3	4
UPC-5286 (NC)	104.8	92.1	43.7	48.2	47.8	64.2	17.8	66.8	1
Bundel Lobia-1 (NC)	90.8	76.2	34.4	51.5	44.6	69.8	18.3	61.2	3
UPC-628 (ZC-NEZ)	85.6	93.2	48.7	47.2	56.1	66.3	19.1	66.2	2
<b>Mean</b>	<b>96.6</b>	<b>83.9</b>	<b>41.0</b>	<b>44.7</b>	<b>44.1</b>	<b>64.9</b>	<b>17.4</b>	<b>62.5</b>	
<b>CD at 5%</b>	<b>20.3</b>	<b>5.8</b>	<b>NS</b>	<b>3.2</b>	<b>9.3</b>	<b>3.3</b>	<b>0.8</b>		
<b>CV%</b>	<b>7.8</b>	<b>4.5</b>	<b>4.6</b>	<b>11.9</b>	<b>11.8</b>	<b>7.4</b>	<b>5.2</b>		

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 10.2: AVTC-1: First Advanced Varietal Trial in Cowpea: Dry Matter Yield (q/ha)**

Entries	South Zone							All India	
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Average	Rank
HFC17-9	58.7	50.0	40.5	44.4	60.1	50.7	2	56.4	2
MFC-16-8	44.9	43.0	24.7	56.1	56.0	44.9	5	51.7	4
UPC-5286 (NC)	51.4	49.0	45.2	47.4	62.4	51.1	1	59.7	1
Bundel Lobia-1 (NC)	51.7	41.0	30.2	46.7	62.3	46.4	4	54.5	3
MFC-8-14 (ZC-SZ)	49.0	56.0	33.5	40.7	66.5	49.1	3		
<b>Mean</b>	<b>51.1</b>	<b>47.8</b>	<b>34.8</b>	<b>47.1</b>	<b>61.4</b>	<b>48.5</b>		<b>55.6</b>	
<b>CD at 5%</b>	<b>4.5</b>	<b>3.9</b>	<b>2.6</b>	<b>NS</b>	<b>5.5</b>				
<b>CV%</b>	<b>5.7</b>	<b>5.3</b>	<b>9.5</b>	<b>14.3</b>	<b>5.9</b>				

**Table 10.3: AVTC-1: First Advanced Varietal Trial in Cowpea: Green Forage Yield (q/ha/day)**

Entries	Ayod- hya	Bhuban- eswar	Ran- chi	Jor- hat	Kal- yani	Pu- sa	Coimb- atore	Vella- yani	Man- dya	Hydera- bad	Dhar- wad	Aver- age	Ra- nk
HFC17-9	4.88	5.41	3.12	5.01	2.64	2.74	5.04	4.40	4.49	3.95	4.76	4.22	2
MFC-16-8	5.37	4.64	3.50	2.04	2.54	3.27	4.58	3.80	2.76	4.25	4.32	3.73	4
UPC-5286 (NC)	5.35	5.54	3.66	4.04	2.51	3.12	4.72	4.30	4.49	4.79	5.17	4.34	1
Bundel Lobia-1 (NC)	4.77	4.77	2.91	4.93	2.70	3.39	4.87	3.70	3.31	3.97	5.07	4.03	3
UPC-628 (ZC-NEZ)	4.41	5.59	3.82	4.28	2.80	3.08							
MFC-8-14 (ZC-SZ)							5.07	4.90	3.92	4.12	4.86		
<b>Mean</b>	<b>4.96</b>	<b>5.19</b>	<b>3.40</b>	<b>4.06</b>	<b>2.64</b>	<b>3.12</b>	<b>4.86</b>	<b>4.22</b>	<b>3.79</b>	<b>4.22</b>	<b>4.84</b>	<b>4.08</b>	

**Table 10.4: AVTC-1: First Advanced Varietal Trial in Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Bhuban- eswar	Ran- chi	Jor- hat	Kal- yani	Pu- sa	Coimb- atore	Vella- yani	Man- dya	Hydera- bad	Dhar- wad	Aver- age	Ra- nk
HFC17-9	1.32	0.68	0.81	0.28	0.65	1.03	1.10	0.77	0.83	1.00	0.85	2
MFC-16-8	1.15	0.73	0.36	0.17	0.79	0.90	0.95	0.45	0.92	0.93	0.74	4
UPC-5286 (NC)	1.39	0.76	0.69	0.25	0.76	0.92	1.10	0.82	0.96	1.04	0.87	1
Bundel Lobia-1 (NC)	1.16	0.61	0.83	0.26	0.82	1.00	0.90	0.55	0.79	1.04	0.80	3
UPC-628 (ZC-NEZ)	1.38	0.81	0.70	0.27	0.76							
MFC-8-14 (ZC-SZ)						0.93	1.20	0.62	0.86	1.11		
<b>Mean</b>	<b>1.28</b>	<b>0.72</b>	<b>0.68</b>	<b>0.25</b>	<b>0.76</b>	<b>0.95</b>	<b>1.05</b>	<b>0.64</b>	<b>0.87</b>	<b>1.02</b>	<b>0.81</b>	

**Table 10.5: AVTC-1: First Advanced Varietal Trial in Cowpea: Crude Protein Yield (q/ha)**

Entries	North East Zone								South Zone						All India	
	Ayodhya	Bhubaneswar	Ranchi	Jorhat	Kalyani	Imphal	Average	Rank	Coimbatore	Mandya	Hyderabad	Vellayani	Average	Rank	Average	Rank
HFC17-9	12.7	12.4	6.5	6.9	2.8	5.5	7.8	3	11.8	8.0	9.1	11.4	10.1	1	8.7	1
MFC-16-8	14.3	10.9	5.7	3.2	1.6	4.6	6.7	5	7.8	4.4	10.2	8.5	7.7	4	7.1	3
UPC-5286 (NC)	14.3	13.1	7.0	6.5	2.9	7.3	8.5	1	9.5	9.1	8.9	8.6	9.0	2	8.7	1
Bundel Lobia-1 (NC)	12.1	11.7	5.3	7.0	2.3	6.7	7.5	4	8.2	5.6	8.0	5.9	6.9	5	7.3	2
UPC-628 (ZC-NEZ)	11.8	13.4	7.0	6.5	2.5	7.9	8.2	2								
MFC-8-14 (ZC-SZ)									9.5	6.3	8.2	10.8	8.7	3		
<b>Mean</b>	<b>13.0</b>	<b>12.3</b>	<b>6.3</b>	<b>6.0</b>	<b>2.4</b>	<b>6.4</b>	<b>7.7</b>		<b>9.3</b>	<b>6.7</b>	<b>8.9</b>	<b>9.0</b>	<b>8.5</b>		<b>8.0</b>	

**Table 10.6: AVTC-1: First Advanced Varietal Trial in Cowpea: Crude Protein (%)**

Entries	North East Zone								South Zone						All India	
	Ayodhya	Bhubaneswar	Ranchi	Jorhat	Kalyani	Imphal	Average	Rank	Coimbatore	Mandya	Hyderabad	Vellayani	Average	Rank	Average	Rank
HFC17-9	16.9	14.7	15.4	13.2	14.3	13.9	14.7	3	20.1	20.1	19.8	22.7	20.7	1	17.1	1
MFC-16-8	16.8	14.7	15.9	13.9	13.4	14.3	14.8	2	17.5	17.3	18.4	19.7	18.2	4	16.2	3
UPC-5286 (NC)	17.2	14.2	15.9	13.6	16.1	15.3	15.4	1	18.4	20.0	19.0	17.5	18.7	3	16.7	2
Bundel Lobia-1 (NC)	16.4	15.4	15.4	13.9	12.6	15.1	14.8	2	15.8	19.3	16.4	14.4	16.5	5	15.5	4
UPC-628 (ZC-NEZ)	16.5	14.4	14.4	13.5	13.3	14.1	14.4	4								
MFC-8-14 (ZC-SZ)									19.3	19.1	19.6	19.3	19.3	2		
<b>Mean</b>	<b>16.8</b>	<b>14.7</b>	<b>15.4</b>	<b>13.6</b>	<b>13.9</b>	<b>14.5</b>	<b>14.8</b>		<b>18.2</b>	<b>19.1</b>	<b>18.6</b>	<b>18.7</b>	<b>18.7</b>		<b>16.4</b>	

**Table 10.7: AVTC-1: First Advanced Varietal Trial in Cowpea: Plant Height (cm)**

Entries	Ayod-hya	Bhuban-eswar	Ran-chi	Jor-hat	Kal-yani	Imp-hal	Pu-sa	Coimb-atore	Vella-yani	Man-dya	Hydera-bad	Rai-chur	Aver-age	Ra-nk
HFC17-9	119.4	218.1	129.1	104.4	94.2	178.5	138.7	127.5	24.0	84.8	82.2	133.7	119.5	4
MFC-16-8	127.8	195.7	141.6	98.1	107.3	147.7	156.3	117.5	21.0	65.0	118.4	154.7	120.9	3
UPC-5286 (NC)	103.7	224.7	123.2	99.4	100.1	224.3	142.5	115.5	23.0	87.3	104.2	151.1	124.9	1
Bundel Lobia-1 (NC)	114.6	204.6	121.4	106.2	104.2	185.9	161.2	125.0	20.0	64.6	102.3	145.1	121.3	2
UPC-628 (ZC-NEZ)	129.8	231.5	129.1	105.5	104.3	219.2	144.8							
MFC-8-14 (ZC-SZ)								132.5	27.0	79.9	92.7	144.8		
<b>Mean</b>	<b>119.1</b>	<b>214.9</b>	<b>128.9</b>	<b>102.7</b>	<b>102.0</b>	<b>191.1</b>	<b>148.7</b>	<b>123.6</b>	<b>23.0</b>	<b>76.3</b>	<b>100.0</b>	<b>145.8</b>	<b>121.7</b>	

**Table 10.8: AVTC-1: First Advanced Varietal Trial in Cowpea: Leaf Stem Ratio**

Entries	Ayod-hya	Bhuban-eswar	Ran-chi	Jor-hat	Kal-yani	Imp-hal	Pu-sa	Coimb-atore	Vella-yani	Man-dya	Hydera-bad	Aver-age	Ra-nk
HFC17-9	0.55	1.17	0.91	0.81	0.86	0.52	0.47	0.62	1.30	0.68	0.95	0.80	1
MFC-16-8	0.57	0.94	0.72	0.75	0.77	0.47	0.57	0.45	1.10	0.59	0.39	0.67	4
UPC-5286 (NC)	0.60	1.31	0.88	0.81	0.84	0.46	0.53	0.55	1.20	0.71	0.82	0.79	2
Bundel Lobia-1 (NC)	0.63	1.08	0.91	0.76	0.89	0.70	0.45	0.57	1.10	0.63	0.84	0.78	3
UPC-628 (ZC-NEZ)	0.62	1.24	0.75	0.69	0.76	0.43	0.51						
MFC-8-14 (ZC-SZ)								0.53	1.40	0.70	0.76		
<b>Mean</b>	<b>0.59</b>	<b>1.15</b>	<b>0.83</b>	<b>0.76</b>	<b>0.82</b>	<b>0.52</b>	<b>0.51</b>	<b>0.54</b>	<b>1.22</b>	<b>0.66</b>	<b>0.75</b>	<b>0.76</b>	

**Table 10.9: AVTC-1: First Advanced Varietal Trial in Cowpea: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ranchi	Rank	Ranchi	Rank	Ranchi	Rank
HFC17-9	35.3	4	56.9	2	62.3	4
MFC-16-8	34.3	2	57.3	3	63.2	3
UPC-5286 (NC)	34.4	3	58.2	4	63.5	2
Bundel Lobia-1 (NC)	32.0	1	55.3	1	65.4	1
UPC-628 (ZC-NEZ)	40.7	5	61.2	5	58.6	5
<b>Mean</b>	<b>35.3</b>		<b>57.8</b>		<b>62.6</b>	

## 11. IVTRB: INITIAL VARIETAL TRIAL IN FORAGE RICE BEAN

(Reference Tables: 11.1 to 11.8)

In Forage Rice Bean, four entries along with two national checks *i.e.* Bidhan-3 and Bidhan-2 were evaluated in Initial Varietal Trial conducted at 10 locations across the country.

For green and dry forage yield (q/ha), entry JRBJ 12-9 ranked first showing superiority of 12.3 % for GFY and 12.4% for DMY as compared to best check. It was followed by entry JOR-21-1 showing superiority of 2.9 % for GFY and 3.0 % for DMY as compared to best check

For green fodder per day productivity (q/ha/day), entry JOR-21-1 and JRBJ-12-9 (3.54q/ha/day) ranked first. For dry fodder per day productivity (q/ha/day), entry JRBJ-12-9 (0.74q/ha/day) ranked first.

For plant height, entry BRB1-L13P5 ranked first (159.3 cm) followed by entry JRBJ-12-9 (154.8 cm) as compared to best check (151.0 cm). For leafiness, entries JRBJ-12-9 ranked first with value 0.92 followed closely by national check Bidhan-2 with a value of 0.89.

For crude protein yield, entry JRBJ-12-9 ranked first (9.9 q/ha) followed by entry BRB1-L13P5 (8.7q/ha), JOR-21-1 (8.6 q/ha) as compared to best check Bidhan -2 (8.4 q/ha). For crude protein %, entry BRB1-L13P5 was best (16.2%), followed by entry JRBJ-12-9 (15.9%), JOR-21-1 (15.6%) as compared to best check Bidhan -2 (14.9%).

**Table 11.1 IVT (Rice bean): Initial Varietal Trial in Rice bean: Green Forage Yield (q/ha)**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Jor-hat	Pu-sa	Vella-yani	Jabal-pur	Rai-pur	Imp-hal	Kar-jat	Aver-age	Ra-nk	Super-iority%
BRB1-L13P5	327.4	389.6	297.9	380.3	230.0	177.0	302.0	222.2	201.0	225.3	275.3	5	
JOR-21-1	246.5	319.3	392.7	278.9	245.7	278.0	421.8	232.6	236.3	214.6	286.6	2	2.9
JRBJ-12-9	215.4	385.9	337.5	367.5	235.4	233.0	453.1	269.1	377.4	253.8	312.8	1	12.3
JOR-21-2	205.7	345.3	271.8	261.8	220.1	212.0	244.8	184.0	224.6	186.7	235.7	6	
Bidhan-2 (NC)	254.2	414.6	277.0	306.9	210.2	274.0	296.8	263.9	259.9	227.0	278.5	3	
Bidhan-3 (NC)	200.8	392.2	314.5	322.0	215.5	243.0	432.2	270.1	217.5	158.6	276.6	4	
<b>Mean</b>	<b>241.7</b>	<b>374.5</b>	<b>315.2</b>	<b>319.6</b>	<b>226.2</b>	<b>236.2</b>	<b>358.5</b>	<b>240.3</b>	<b>252.8</b>	<b>211.0</b>	<b>277.6</b>		
<b>CD at 5%</b>	<b>19.3</b>	<b>29.0</b>	<b>28.0</b>	<b>3.2</b>	<b>11.5</b>	<b>6.4</b>	<b>1.3</b>	<b>19.7</b>	<b>17.9</b>	<b>27.5</b>			
<b>CV%</b>	<b>9.3</b>	<b>5.2</b>	<b>5.9</b>	<b>4.8</b>	<b>8.4</b>	<b>1.8</b>	<b>14.6</b>	<b>5.4</b>	<b>4.1</b>	<b>8.5</b>			

**Table 11.2 IVT (Rice bean): Initial Varietal Trial in Rice bean: Dry Matter Yield (q/ha)**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Jor-hat	Pu-sa	Vella-yani	Jabal-pur	Rai-pur	Imp-hal	Kar-jat	Aver-age	Ra-nk	Super-iority%
BRB1-L13P5	48.5	45.1	75.6	72.8	48.4	44.0	58.5	46.0	31.4	46.1	51.6	5	
JOR-21-1	29.9	40.2	97.6	52.3	58.3	69.0	87.7	46.6	36.0	47.4	56.5	2	3.0
JRBJ-12-9	27.0	40.3	83.8	73.0	55.1	58.0	87.1	62.4	64.3	65.5	61.7	1	12.4
JOR-21-2	24.6	40.0	68.3	49.8	50.2	53.0	48.1	41.5	43.6	63.5	48.3	6	
Bidhan-2 (NC)	31.0	46.0	71.4	59.6	45.2	69.0	60.4	60.4	45.8	48.9	53.8	4	
Bidhan-3 (NC)	25.5	49.2	80.7	64.1	49.4	61.0	84.7	58.9	37.3	37.6	54.8	3	
<b>Mean</b>	<b>31.1</b>	<b>43.5</b>	<b>79.6</b>	<b>61.9</b>	<b>51.1</b>	<b>59.0</b>	<b>71.1</b>	<b>52.6</b>	<b>43.1</b>	<b>51.5</b>	<b>54.4</b>		
<b>CD at 5%</b>	<b>2.6</b>	<b>9.9</b>	<b>7.3</b>	<b>3.7</b>	<b>4.6</b>	<b>4.5</b>	<b>0.3</b>	<b>6.1</b>	<b>7.0</b>	<b>7.0</b>			
<b>CV%</b>	<b>6.8</b>	<b>6.5</b>	<b>6.1</b>	<b>12.7</b>	<b>8.4</b>	<b>5.1</b>	<b>14.8</b>	<b>7.7</b>	<b>9.3</b>	<b>9.5</b>			



**Table 11.3 IVT (Rice bean): Initial Varietal Trial in Rice bean: Green Forage Yield (q/ha/day)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Raipur	Karjat	Average	Rank
BRB1-L13P5	4.20	4.17	3.35	4.70	2.83	3.90	1.78	2.85	3.47	3
JOR-21-1	3.16	3.34	4.27	3.44	3.06	6.20	2.15	2.68	3.54	1
JRBJ-12-9	2.76	3.95	3.59	4.54	2.87	5.10	2.22	3.33	3.54	1
JOR-21-2	2.64	4.15	3.24	3.23	2.70	4.70	1.88	2.49	3.13	5
Bidhan-2 (NC)	3.26	4.19	3.18	3.79	2.71	6.00	1.91	2.94	3.50	2
Bidhan-3 (NC)	2.57	4.33	3.50	3.98	2.58	5.40	1.93	1.96	3.28	4
<b>Mean</b>	<b>3.10</b>	<b>4.02</b>	<b>3.52</b>	<b>3.95</b>	<b>2.79</b>	<b>5.22</b>	<b>1.98</b>	<b>2.71</b>	<b>3.41</b>	

**Table 11.4 IVT (Rice bean): Initial Varietal Trial in Rice bean: Dry Matter Yield (q/ha/day)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Raipur	Karjat	Average	Rank
BRB1-L13P5	0.62	0.48	0.85	0.90	0.60	0.98	0.37	0.58	0.67	4
JOR-21-1	0.38	0.42	1.06	0.65	0.73	1.50	0.43	0.59	0.72	2
JRBJ-12-9	0.35	0.41	0.89	0.90	0.67	1.30	0.52	0.86	0.74	1
JOR-21-2	0.32	0.48	0.81	0.61	0.62	1.20	0.42	0.85	0.66	5
Bidhan-2 (NC)	0.40	0.46	0.82	0.74	0.58	1.50	0.44	0.63	0.70	3
Bidhan-3 (NC)	0.33	0.54	0.90	0.79	0.59	1.30	0.42	0.46	0.67	4
<b>Mean</b>	<b>0.40</b>	<b>0.47</b>	<b>0.89</b>	<b>0.76</b>	<b>0.63</b>	<b>1.30</b>	<b>0.43</b>	<b>0.66</b>	<b>0.69</b>	

**Table 11.5 IVT (Rice bean): Initial Varietal Trial in Rice bean: Crude Protein Yield (q/ha)**

Entries	Kalyani	Bhubaneswar	Jorhat	Jabalpur	Raipur	Imphal	Ranchi	Average	Rank
BRB1-L13P5	9.2	11.0	11.6	8.8	7.4	4.1	9.0	8.7	2
JOR-21-1	4.8	14.5	8.2	13.8	6.0	4.8	8.1	8.6	3
JRBJ-12-9	3.2	12.5	12.4	13.1	10.2	9.4	8.7	9.9	1
JOR-21-2	3.4	10.1	6.4	7.1	7.0	5.7	7.0	6.7	6
Bidhan-2 (NC)	5.1	10.2	8.2	9.1	7.3	6.0	9.1	7.9	5
Bidhan-3 (NC)	3.2	11.6	8.9	12.8	7.7	5.2	9.8	8.4	4
<b>Mean</b>	<b>4.8</b>	<b>11.7</b>	<b>9.3</b>	<b>10.8</b>	<b>7.6</b>	<b>5.9</b>	<b>8.6</b>	<b>8.4</b>	

**Table 11.6 IVT (Rice bean): Initial Varietal Trial in Rice bean: Crude Protein (%)**

Entries	Kalyani	Bhubaneswar	Jorhat	Jabalpur	Raipur	Imphal	Ranchi	Average	Rank
BRB1-L13P5	18.9	14.6	16.0	15.0	16.1	13.1	19.9	16.2	1
JOR-21-1	16.1	14.9	15.9	15.7	12.9	13.2	20.2	15.6	3
JRBJ-12-9	11.8	14.9	17.1	15.0	16.3	14.6	21.7	15.9	2
JOR-21-2	13.6	14.7	12.3	14.8	16.9	13.1	17.6	14.7	5
Bidhan-2 (NC)	16.4	14.4	13.8	15.1	12.2	13.1	19.7	14.9	4
Bidhan-3 (NC)	12.6	14.4	14.0	15.1	13.0	13.9	19.9	14.7	5
<b>Mean</b>	<b>14.9</b>	<b>14.6</b>	<b>14.8</b>	<b>15.1</b>	<b>14.6</b>	<b>13.5</b>	<b>19.8</b>	<b>15.3</b>	

**Table 11.7 IVT (Rice bean): Initial Varietal Trial in Rice bean: Plant Height (cm)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Jabalpur	Raipur	Imphal	Karjat	Average	Rank
BRB1-L13P5	140.5	135.3	165.1	175.3	133.7	74.0	173.9	174.4	142.0	279.2	159.3	1
JOR-21-1	105.0	145.3	184.6	120.7	141.2	108.0	176.1	150.6	138.1	238.8	150.8	4
JRBJ-12-9	109.0	124.0	179.5	164.6	135.0	94.0	183.8	189.3	133.8	234.9	154.8	2
JOR-21-2	99.7	142.8	154.3	118.0	132.2	80.0	129.0	144.9	136.8	167.6	130.5	6
Bidhan-2 (NC)	101.8	143.5	162.2	131.4	127.5	107.0	165.6	176.2	145.3	249.7	151.0	3
Bidhan-3 (NC)	107.2	133.9	175.4	158.2	130.0	95.0	166.1	182.2	144.6	170.7	146.3	5
<b>Mean</b>	<b>110.5</b>	<b>137.5</b>	<b>170.2</b>	<b>144.7</b>	<b>133.3</b>	<b>93.0</b>	<b>165.7</b>	<b>169.6</b>	<b>140.1</b>	<b>223.5</b>	<b>148.8</b>	

**Table 11.8 IVT (Rice bean): Initial Varietal Trial in Rice bean: Leaf Stem Ratio**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Jor-hat	Pu-sa	Vella-yani	Imp-hal	Jabal-pur	**Rai-pur	**Kar-jat	Aver-age	Ra-nk
BRB1-L13P5	0.77	1.68	1.09	0.76	0.46	1.20	0.42	0.71	0.27	0.45	0.89	2
JOR-21-1	0.64	1.76	1.31	0.70	0.52	0.85	0.26	0.80	0.35	0.31	0.86	4
JRBJ-12-9	0.91	1.52	1.24	0.80	0.48	1.30	0.27	0.87	0.27	0.30	0.92	1
JOR-21-2	0.76	1.97	0.98	0.74	0.42	1.10	0.25	0.68	0.38	0.27	0.86	4
Bidhan-2 (NC)	0.81	1.94	1.04	0.74	0.41	1.00	0.45	0.70	0.32	0.34	0.89	2
Bidhan-3 (NC)	0.69	1.75	1.17	0.82	0.38	1.10	0.30	0.80	0.36	0.28	0.88	3
<b>Mean</b>	<b>0.76</b>	<b>1.77</b>	<b>1.14</b>	<b>0.76</b>	<b>0.45</b>	<b>1.09</b>	<b>0.33</b>	<b>0.76</b>	<b>0.33</b>	<b>0.33</b>	<b>0.88</b>	

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

## **12. AVT-2 Dinanath Grass: ADVANCED VARIETAL TRIAL -2 IN FORAGE DINANATH GRASS**

**(Reference table: 12.1- 12.9)**

Advanced Varietal Trial -2 in Forage Dinanath Grass comprising of four entries with one national check *viz.*, Bundel Dinanath-2 was conducted at 8 locations across the country.

For forage yield (q/ha), Check Bundel Dinanath-2 performed best for both green and dry matter yield. All other entries were below par over the check.

For green and dry forage production potential (q/ha/day), Check Bundel Dinanath-2 performed best for both green and dry matter yield. All other entries were below par over the check.

In growth parameters, check Bundel Dinanath-2 was best for plant height and leafiness.

In quality parameters, for crude protein yield (q/ha), check Bundel Dinanath-2 ranked first followed by JHD 19-4. For CP content, entry BAU-DN-103-18-2 ranked first with value of 8.3 % followed by BAU-DN-110-18-2 (8.1%) as compared to 7.1 % in check Bundel Dinanath-2. For other quality parameters, entry BAU-DN-109-8 ranked first for ADF, NDF and IVDMD.

## **13. AVT-2 Dinanath Grass (seed): ADVANCED VARIETAL TRIAL -2 IN FORAGE DINANATH GRASS (seed)**

**(Reference table: 13.1)**

Advanced Varietal Trial -2 (seed) in Forage Dinanath Grass comprising of four entries with one national check *viz.*, Bundel Dinanath-2 was conducted at 5 locations across the country.

Entry JHD-19-4 showed superiority over the best check by a margin of 7.7% for seed yield. All other entries were below par over the best check.

**Table 12.1 AVT-2: Advanced Varietal Trial in Dinanath Grass: Green Forage Yield (q/ha)**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Pu-sa	Jabal-pur	Man-dya	**Jor-hat	**Jha-nsi	Aver-age	Ra-nk
JHD-19-4	377.5	260.9	211.5	280.0	315.0	292.7	82.1	145.6	289.6	2
BAU-DN-103-18-2	155.0	310.4	194.3	254.1	217.5	225.4	113.0	42.7	226.1	5
BAU-DN-109-8	244.1	291.9	267.3	277.2	222.5	286.4	69.0	24.3	264.9	3
BAU-DN-110-18-2	197.5	347.7	252.2	242.1	192.5	278.6	127.9	18.2	251.8	4
Bundel Dinanath-2 (NC)	348.3	334.1	282.4	268.8	365.0	302.2	82.4	36.8	316.8	1
<b>Mean</b>	<b>264.5</b>	<b>309.0</b>	<b>241.5</b>	<b>264.4</b>	<b>262.5</b>	<b>277.0</b>	<b>94.9</b>	<b>53.5</b>	<b>269.8</b>	
<b>CD at 5%</b>	<b>19.7</b>	<b>15.0</b>	<b>28.7</b>	<b>14.8</b>	<b>1.4</b>	<b>21.6</b>	<b>7.5</b>	<b>9.9</b>		
<b>CV%</b>	<b>6.2</b>	<b>3.2</b>	<b>7.7</b>	<b>7.7</b>	<b>10.8</b>	<b>10.1</b>	<b>12.5</b>	<b>12.1</b>		

Note: \*\* Data is not included in all India average due to low yield of data

**Table 12.2 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Dry Matter Yield (q/ha)**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Pu-sa	Jabal-pur	Man-dya	**Jor-hat	**Jha-nsi	Aver-age	Ra-nk
JHD-19-4	56.6	50.1	51.1	68.4	63.0	62.1	14.3	48.6	58.6	3
BAU-DN-103-18-2	34.4	69.3	47.3	61.0	42.1	47.3	20.5	22.2	50.2	5
BAU-DN-109-8	52.7	62.7	64.9	66.2	42.5	64.9	11.8	12.7	59.0	2
BAU-DN-110-18-2	34.3	70.5	61.0	60.4	39.7	64.5	18.8	8.6	55.1	4
Bundel Dinanath-2 (NC)	78.0	72.2	68.6	58.2	77.0	71.9	12.4	17.3	71.0	1
<b>Mean</b>	<b>51.2</b>	<b>65.0</b>	<b>58.6</b>	<b>62.8</b>	<b>52.9</b>	<b>62.1</b>	<b>15.6</b>	<b>21.9</b>	<b>58.8</b>	
<b>CD at 5%</b>	<b>14.4</b>	<b>3.1</b>	<b>7.3</b>	<b>3.7</b>	<b>0.3</b>	<b>5.7</b>	<b>2.7</b>	<b>6.6</b>		
<b>CV%</b>	<b>7.4</b>	<b>4.4</b>	<b>8.1</b>	<b>8.2</b>	<b>10.5</b>	<b>11.8</b>	<b>18.7</b>	<b>18.4</b>		

**Table 12.3 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Green Forage Yield (q/ha/day)**

Entries	Kalyani	Ranchi	Bhubaneswar	Pusa	Mandya	**Jorhat	**Jhansi	Average	Rank
JHD-19-4	3.67	2.29	3.36	2.23	4.17	1.37	0.92	3.14	2
BAU-DN-103-18-2	1.50	3.05	2.86	2.11	3.25	1.88	0.27	2.55	5
BAU-DN-109-8	2.37	2.53	3.47	2.16	3.91	1.15	0.16	2.89	3
BAU-DN-110-18-2	1.92	3.33	3.45	1.86	3.80	2.13	0.12	2.87	4
Bundel Dinanath-2 (NC)	3.38	3.23	3.44	2.33	4.24	1.37	0.23	3.32	1
<b>Mean</b>	<b>2.57</b>	<b>2.88</b>	<b>3.32</b>	<b>2.14</b>	<b>3.87</b>	<b>1.58</b>	<b>0.34</b>	<b>2.96</b>	

**Table 12.4 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Dry Matter Yield (q/ha/day)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Mandya	Average	Rank
JHD-19-4	0.55	0.44	0.81	0.24	0.54	0.88	0.58	2
BAU-DN-103-18-2	0.33	0.68	0.70	0.34	0.51	0.68	0.54	3
BAU-DN-109-8	0.51	0.54	0.84	0.20	0.52	0.86	0.58	2
BAU-DN-110-18-2	0.33	0.67	0.84	0.31	0.46	0.88	0.58	2
Bundel Dinanath-2 (NC)	0.76	0.70	0.84	0.21	0.50	1.01	0.67	1
<b>Mean</b>	<b>0.50</b>	<b>0.61</b>	<b>0.80</b>	<b>0.26</b>	<b>0.51</b>	<b>0.86</b>	<b>0.59</b>	

**Table 12.5 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Crude Protein Yield (q/ha)**

Entries	Kalyani	Bhubaneswar	Jorhat	Jabalpur	Mandya	Average	Rank
JHD-19-4	6.2	3.9	0.8	4.9	3.3	3.8	2
BAU-DN-103-18-2	4.1	3.6	1.4	3.2	2.8	3.0	4
BAU-DN-109-8	5.0	4.9	0.6	3.2	3.6	3.5	3
BAU-DN-110-18-2	4.2	4.7	1.2	2.8	4.4	3.5	3
Bundel Dinanath-2 (NC)	7.9	5.2	0.6	6.0	4.1	4.8	1
<b>Mean</b>	<b>5.5</b>	<b>4.5</b>	<b>0.9</b>	<b>4.0</b>	<b>3.6</b>	<b>3.7</b>	

**Table 12.6 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Crude Protein (%)**

Entries	Kalyani	Bhubaneswar	Jorhat	Jabalpur	Ranchi	Mandya	Average	Rank
JHD-19-4	10.9	7.7	5.7	7.7	8.3	5.4	7.6	3
BAU-DN-103-18-2	11.9	7.7	6.7	7.6	10.1	6.0	8.3	1
BAU-DN-109-8	9.6	7.6	5.3	7.6	7.1	5.5	7.1	4
BAU-DN-110-18-2	12.4	7.7	6.6	7.2	7.8	6.8	8.1	2
Bundel Dinanath-2 (NC)	10.2	7.6	5.4	7.8	6.0	5.7	7.1	4
<b>Mean</b>	<b>11.0</b>	<b>7.6</b>	<b>5.9</b>	<b>7.6</b>	<b>7.9</b>	<b>5.9</b>	<b>7.6</b>	

**Table 12.7 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Plant Height (cm)**

Entries	Kal-yani	Ran-chi	Bhuban-eswar	Jor-hat	Pu-sa	Jabal-pur	Jha-nsi	Man-dya	Aver-age	Ra-nk
JHD-19-4	175.4	147.5	62.3	34.4	185.0	147.4	117.5	84.5	119.2	2
BAU-DN-103-18-2	189.4	145.8	55.0	48.8	181.2	116.0	103.0	78.7	114.7	4
BAU-DN-109-8	183.5	115.1	80.3	33.8	175.0	122.5	113.4	93.1	114.6	5
BAU-DN-110-18-2	183.6	144.9	75.5	40.7	177.5	107.4	97.8	93.6	115.1	3
Bundel Dinanath-2 (NC)	195.4	153.9	94.5	55.1	188.3	156.6	125.2	97.9	133.4	1
<b>Mean</b>	<b>185.5</b>	<b>141.4</b>	<b>73.5</b>	<b>42.5</b>	<b>181.4</b>	<b>130.0</b>	<b>111.4</b>	<b>89.5</b>	<b>119.4</b>	

**Table 12.8 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): Leaf Stem Ratio**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Jabalpur	Mandya	Average	Rank
JHD-19-4	0.54	0.60	0.77	0.75	0.63	0.89	0.23	0.63	2
BAU-DN-103-18-2	0.63	0.54	0.73	0.67	0.61	0.80	0.18	0.59	3
BAU-DN-109-8	0.47	0.38	0.88	0.66	0.62	0.85	0.22	0.58	4
BAU-DN-110-18-2	0.61	0.48	0.84	0.60	0.58	0.69	0.21	0.57	5
Bundel Dinanath-2 (NC)	0.59	0.49	0.92	0.64	0.60	1.10	0.24	0.65	1
<b>Mean</b>	<b>0.57</b>	<b>0.50</b>	<b>0.83</b>	<b>0.66</b>	<b>0.61</b>	<b>0.87</b>	<b>0.22</b>	<b>0.61</b>	

**Table 12.9 AVT-2: Advanced Varietal Trial in Dinanath Grass (New): ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ranchi	Rank	Ranchi	Rank	Ranchi	Rank
JHD-19-4	52.6	4	73.2	5	47.4	4
BAU-DN-103-18-2	49.6	3	70.1	3	49.8	3
BAU-DN-109-8	43.6	1	68.3	1	54.5	1
BAU-DN-110-18-2	49.6	3	69.3	2	49.8	3
Bundel Dinanath-2 (NC)	47.3	2	71.3	4	51.6	2
<b>Mean</b>	<b>48.5</b>		<b>70.4</b>		<b>50.6</b>	

**Table 13.1 AVT-2: Advanced Varietal Trial in Dinanath Grass (Seed): Seed Yield (q/ha)**

Entries	Ranchi	Pusa	Jabalpur	Jhansi	Mandya	Average	Rank	Superiority%
JHD-19-4	5.5	7.6	12.4	25.4	5.5	11.3	1	7.7
BAU-DN-103-18-2	7.9	6.2	10.0	15.0	3.6	8.5	4	
BAU-DN-109-8	8.6	6.5	9.5	14.1	4.2	8.6	3	
BAU-DN-110-18-2	8.9	4.8	7.3	12.4	3.7	7.4	5	
Bundel Dinanath-2 (NC)	9.6	5.8	12.3	18.5	6.2	10.5	2	
<b>Mean</b>	<b>8.1</b>	<b>6.2</b>	<b>10.3</b>	<b>17.1</b>	<b>4.6</b>	<b>9.3</b>		
<b>CD at 5%</b>	<b>0.7</b>	<b>0.6</b>	<b>0.1</b>	<b>3.8</b>	<b>0.4</b>			
<b>CV%</b>	<b>5.8</b>	<b>11.2</b>	<b>13.9</b>	<b>11.7</b>	<b>10.7</b>			



**14. VT *Cenchrus ciliaris*-2019 (New): VARIETAL TRIAL IN *Cenchrus ciliaris* (PERENNIAL) – 3<sup>rd</sup> year**

**(Reference Tables: 14.1 to 14.9)**

The trial was established in 2019 with 6 entries along with 3 checks (CAZRI-75, IGFR1 3108, and IGFR1-67-365) in three zones.

As 3 years have been completed, the entries are now decoded. The performance in third year is as follows.

National check IGFR1-67-365 performed best for green fodder yield in all zones and also at all India level. For dry matter yield, entry IG-96-414 was superior over the best check by a margin of 14.1% in NWZ, similarly in SZ, entry RCCB-05 was superior by a margin of 8.4% over the best check. In CZ and at all India level, the national check IG -67-365 was best.

For crude protein yield, check IGFR1-67-365 was best whereas for crude protein content, entry RCCB-06 was best (7.9%) followed by RCC-2016-8 (7.6%) and national check IGFR1-67-365 (7.4%). For ADF, national check CAZRI-75 was best whereas entry RCCB-06 performed best for NDF and IVDMD followed by national check CAZRI-75.

For plant height national check IGFR1-67-365 ranked first whereas for leafiness, national check CAZRI 75 was best.

**15. VT *Cenchrus setigerus* -2019 (New): VARIETAL TRIAL IN *Cenchrus setigerus* (PERENNIAL) – 3<sup>rd</sup> year**

**(Reference Tables: 15.1 to 15.8)**

The trial was established in 2019 with four entries and three national checks (CAZRI 76, TNCS-265 and IG-96-706) at 12 locations across the country. As 3 years have been completed, the entries are now decoded. The performance in third year is as follows.

For green fodder yield (q/ha) and dry matter yield (q/ha), national checks performed best in all zones and at national level. National check TNCS-265 in NWZ, IG-96-706 in south zone and CAZRI-76 in CZ and at all India level were top ranked.

For production potential, national check CAZRI-76 ranked first. For plant height national check CAZRI-76 ranked first (74.1cm) followed by entry IG-97-447 (73.5 cm). For leafiness, national check IG-96-706 was top ranked (1.05) followed by national check CAZRI-76 (1.03).

For crude protein content (CP %), entry RCSB-08 ranked first (7.4%) followed by entry IG-97-447 (7.2%) and entry RCSB-09 (7.0%) and national check CAZRI -76 (6.9%). For crude protein yield (q/ha), national check TNCS-265 ranked first (5.9q).

**Table 14.1 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Green Forage Yield (q/ha)**

Entries	North West Zone						Central Zone							
	Ludh-iana	Bika-ner	Avika-nagar	**Jodh-pur	Aver-age	Ra-nk	Ana-and	Rah-uri	Urulikan-chan	Jha-nsi	Jabal-pur	**Rai-pur	Aver-age	Ra-nk
RCCB-06	318.6	179.5	53.5	23.2	183.9	8	262.5	296.6	601.2	325.0	214.3		339.9	8
RCC-2016-8	481.7	243.9	91.5	11.9	272.4	4	348.1	483.9	556.5	311.7	217.7	282.5	383.6	4
IG-67-1263	315.4	239.8	84.4	19.3	213.2	7	242.2	306.8	400.8	928.3	220.0		419.6	2
CAZRI-327	285.4	176.8	80.8	15.6	181.0	9	186.4	326.8	737.9	411.7	223.3	147.1	377.2	6
RCCB-05	340.1	219.9	104.7	20.7	221.6	6	163.1	299.9	667.5	378.3	221.4		346.0	7
IG-96-414	415.6	276.7	162.1	17.5	284.8	2	151.7	231.4	489.4	325.0	249.7	161.4	289.4	9
IGFRI-67-365 (NC)	488.9	250.7	121.9	11.7	287.2	1	323.1	508.5	830.8	255.7	209.0	326.1	425.4	1
CAZRI 75 (NC)	455.7	235.6	140.3	7.6	277.2	3	328.9	402.0	716.4	375.0	188.3	209.6	402.1	3
IGFRI 3108 (NC)	375	239.6	131.6	8.0	248.7	5	303.3	408.1	585.8	415.0	198.3	245.6	382.1	5
<b>Mean</b>	<b>386.3</b>	<b>229.2</b>	<b>107.9</b>	<b>15.1</b>	<b>241.1</b>		<b>256.6</b>	<b>362.7</b>	<b>620.7</b>	<b>414.0</b>	<b>215.8</b>	<b>228.7</b>	<b>373.9</b>	
<b>CD at 5%</b>	<b>28.4</b>	<b>52.3</b>	<b>2.7</b>	<b>6.2</b>			<b>70.4</b>	<b>59.8</b>	<b>104.0</b>	<b>2.1</b>	<b>2.4</b>	<b>27.1</b>		
<b>CV%</b>	<b>12.8</b>	<b>13.1</b>	<b>12.0</b>	<b>23.7</b>			<b>15.8</b>	<b>9.4</b>	<b>9.6</b>	<b>2.7</b>	<b>13.7</b>	<b>10.3</b>		

Note: \*\* Data is not included in zonal and all India average due to low yield of data

**Table 14.1 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Green Forage Yield (q/ha)**

Entries	South Zone				All India	
	Coimbatore	Mandya	Average	Rank	Average	Rank
RCCB-06	326.4	232.6	279.5	9	281.0	9
RCC-2016-8	450.0	408.4	429.2	3	359.3	2
IG-67-1263	354.7	372.9	363.8	4	346.5	4
CAZRI-327	315.3	410.8	363.0	5	315.5	7
RCCB-05	437.5	422.7	430.1	2	325.5	6
IG-96-414	352.8		352.8	7	294.9	8
IGFRI-67-365 (NC)	472.2	391.4	431.8	1	385.2	1
CAZRI 75 (NC)	438.9	235.5	337.2	8	351.7	3
IGFRI 3108 (NC)	311.1	410.4	360.7	6	337.8	5
<b>Mean</b>	<b>384.3</b>	<b>360.6</b>	<b>372.0</b>		<b>333.1</b>	
<b>CD at 5%</b>	<b>29.5</b>	<b>26.5</b>				
<b>CV%</b>	<b>4.5</b>	<b>11.2</b>				

**Table 14.2 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Dry Matter Yield (q/ha)**

Entries	North West Zone							Central Zone							
	Ludh-iana	Bika-ner	Avika-nagar	**Jodh-pur	Aver-age	Ra-nk	Superi-osity (%)	Ana-nd	Rah-uri	Urulikan-chan	Jha-nsi	**Jabal-pur	**Rai-pur	Aver-age	Ra-nk
RCCB-06	49.1	63.0	13.7	5.8	41.9	9	14.1	83.5	87.7	132.0	81.3	39.4		96.1	7
RCC-2016-8	75.6	75.5	28.9	3.9	60.0	3		115.0	155.8	139.6	77.9	39.3	77.0	122.1	3
IG-67-1263	48.6	75.4	24.0	6.4	49.3	7		72.5	96.3	79.8	232.1	39.6		120.2	4
CAZRI-327	44.0	58.0	25.0	4.9	42.3	8		58.4	107.5	147.7	102.9	40.2	34.6	104.1	6
RCCB-05	52.4	71.5	27.2	5.9	50.4	6		48.9	88.4	131.9	94.6	40.2		90.9	8
IG-96-414	64.0	99.1	45.7	5.1	69.6	1		47.2	75.9	124.7	81.3	46.4	39.0	82.3	9
IGFRI-67-365 (NC)	75.3	74.5	33.2	3.1	61.0	2		101.2	163.0	196.9	63.9	38.6	95.0	131.2	1
CAZRI 75 (NC)	70.2	63.8	37.0	2.2	57.0	5		97.0	136.0	163.8	93.8	33.2	68.0	122.6	2
IGFRI 3108 (NC)	57.8	78.8	38.1	2.6	58.2	4		90.7	133.5	137.7	103.8	34.8	78.3	116.4	5
Mean	59.7	73.3	30.3	4.4	54.4			79.4	116.0	139.4	103.5	39.1	65.3	109.6	
CD at 5%	9.2	16.8	0.7	2.3			22.8	19.3	23.5	5.3	0.4	10.8			
CV%	10.4	13.2	11.7	30.6			16.6	9.5	9.7	2.7	13.8	14.3			

Note: \*\* Data is not included in zonal and all India average due to low yield of data

**Table 14.2 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Dry Matter Yield (q/ha)**

Entries	South Zone					All India	
	Coimbatore	Mandya	Average	Rank	Superiority (%)	Average	Rank
RCCB-06	69.1	54.4	61.7	8		70.4	9
RCC-2016-8	100.0	76.5	88.2	3		93.9	2
IG-67-1263	79.5	92.7	86.1	4		89.0	5
CAZRI-327	68.5	51.9	60.2	9		73.8	8
RCCB-05	95.9	104.7	100.3	1	8.4	79.5	6
IG-96-414	73.9		73.9	6		76.5	7
IGFRI-67-365 (NC)	104.0	81.0	92.5	2		99.2	1
CAZRI 75 (NC)	92.5	54.0	73.2	7		89.8	3
IGFRI 3108 (NC)	68.5	93.1	80.8	5		89.1	4
<b>Mean</b>	<b>83.5</b>	<b>76.0</b>	<b>79.7</b>			<b>84.6</b>	
<b>CD at 5%</b>	<b>6.2</b>	<b>4.2</b>					
<b>CV%</b>	<b>4.3</b>	<b>8.5</b>					

**Table 14.3 VT *Cenchrus ciliaris*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Green Forage Yield (q/ha/day)**

Entries	Ludhiana	Bikaner	Avikanagar	Anand	Jhansi	Coimbatore	**Raipur	Average	Rank
RCCB-06	1.77	2.00	1.14	0.69	3.10	0.91		1.60	9
RCC-2016-8	2.68	2.71	1.48	0.91	3.01	1.25	2.19	2.01	5
IG-67-1263	1.75	2.66	1.78	0.63	8.85	0.99		2.78	1
CAZRI-327	1.59	1.96	1.65	0.49	3.94	0.88	1.14	1.75	8
RCCB-05	1.89	2.44	2.36	0.43	3.57	1.22		1.98	7
IG-96-414	2.31	3.07	3.21	0.40	3.06	0.98	1.25	2.17	3
IGFRI-67-365 (NC)	2.72	2.79	1.94	0.84	2.31	1.31	2.53	1.99	6
CAZRI 75 (NC)	2.53	2.62	2.69	0.86	3.36	1.22	1.62	2.21	2
IGFRI 3108 (NC)	2.08	2.66	2.53	0.79	4.04	0.86	1.9	2.16	4
<b>Mean</b>	<b>2.15</b>	<b>2.55</b>	<b>2.09</b>	<b>0.67</b>	<b>3.92</b>	<b>1.07</b>	<b>1.77</b>	<b>2.07</b>	

**Table 14.4 VT *Cenchrus ciliaris*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Dry Matter Yield (g/ha/day)**

Entries	Ludhiana	Bikaner	Avikanagar	Anand	Jhansi	Coimbatore	**Raipur	Average	Rank
RCCB-06	0.27	0.70	0.29	0.22	0.78	0.19		0.41	9
RCC-2016-8	0.42	0.84	0.47	0.30	0.75	0.28	0.60	0.51	5
IG-67-1263	0.27	0.84	0.51	0.19	2.21	0.22		0.71	1
CAZRI-327	0.24	0.64	0.51	0.15	0.99	0.19	0.27	0.45	8
RCCB-05	0.29	0.80	0.61	0.13	0.89	0.27		0.50	6
IG-96-414	0.36	1.10	0.90	0.12	0.77	0.21	0.30	0.58	2
IGFRI-67-365 (NC)	0.42	0.83	0.53	0.26	0.58	0.29	0.74	0.49	7
CAZRI 75 (NC)	0.39	0.71	0.71	0.25	0.84	0.26	0.53	0.53	4
IGFRI 3108 (NC)	0.32	0.88	0.73	0.24	1.01	0.19	0.61	0.56	3
<b>Mean</b>	<b>0.33</b>	<b>0.82</b>	<b>0.58</b>	<b>0.21</b>	<b>0.98</b>	<b>0.23</b>	<b>0.51</b>	<b>0.53</b>	

**Table 14.5 VT *Cenchrus ciliaris*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Crude Protein Yield (q/ha)**

Entries	Ludhiana	Bikaner	Anand	Rahuri	Urulikanchan	Jabalpur	Coimbatore	Avikanagar	**Raipur	Average	Rank
RCCB-06	3.1	6.7	5.9	6.8	11.6	2.8	5.1	1.0		5.4	6
RCC-2016-8	4.7	6.7	8.4	13.3	10.5	2.8	6.6	2.1	4.0	6.9	2
IG-67-1263	3.2	5.0	4.7	7.7	6.9	2.8	5.6	1.4		4.7	9
CAZRI-327	2.9	4.1	4.1	8.9	12.0	3.1	3.6	1.6	2.4	5.0	8
RCCB-05	3.3	7.2	3.0	7.4	11.3	3.2	5.1	1.5		5.2	7
IG-96-414	4.0	7.4	3.1	6.3	10.9	3.6	7.1	2.4	3.4	5.6	5
IGFRI-67-365 (NC)	4.7	7.8	7.1	12.7	13.2	2.8	7.3	2.6	6.8	7.3	1
CAZRI 75 (NC)	3.7	7.3	5.9	9.9	12.2	2.3	5.6	2.9	4.1	6.2	3
IGFRI 3108 (NC)	3.2	8.1	6.1	9.4	10.0	2.4	4.8	2.3	6.5	5.8	4
<b>Mean</b>	<b>3.6</b>	<b>6.7</b>	<b>5.4</b>	<b>9.2</b>	<b>11.0</b>	<b>2.9</b>	<b>5.6</b>	<b>2.0</b>	<b>4.5</b>	<b>5.8</b>	

**Table 14.6 VT *Cenchrus ciliaris*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Crude Protein (%)**

Entries	Ludhiana	Bikaner	Anand	Rahuri	Urulikanchan	Jabalpur	Coimbatore	Avikanagar	**Raipur	Average	Rank
RCCB-06	6.3	10.6	7.0	7.8	8.8	7.2	7.9	7.3		7.9	1
RCC-2016-8	6.2	8.9	7.3	8.6	7.5	7.2	7.6	7.3	5.2	7.6	2
IG-67-1263	6.5	6.6	6.8	8.0	8.6	7.0	6.7	5.8		7.0	6
CAZRI-327	6.7	7.0	7.3	8.3	8.1	7.7	6.3	6.4	6.8	7.2	5
RCCB-05	6.3	10.1	6.3	8.3	8.6	7.8	5.5	5.5		7.3	4
IG-96-414	6.2	7.5	6.9	8.3	8.7	7.7	5.1	5.3	8.7	7.0	6
IGFRI-67-365 (NC)	6.2	10.5	7.0	7.8	6.7	7.1	6.1	7.7	7.1	7.4	3
CAZRI 75 (NC)	5.3	11.5	5.9	7.3	7.4	7.0	6.0	7.9	6.1	7.3	4
IGFRI 3108 (NC)	5.5	10.2	6.6	7.1	7.3	6.9	5.8	5.9	8.2	6.9	7
<b>Mean</b>	<b>6.1</b>	<b>9.2</b>	<b>6.8</b>	<b>7.9</b>	<b>8.0</b>	<b>7.3</b>	<b>6.3</b>	<b>6.6</b>	<b>7.0</b>	<b>7.3</b>	

**Table 14.7 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Plant Height (cm)**

Entries	Ludh-iana	Bika-ner	Jodh-pur	Avika-nagar	Ana-nd	Rah-uri	Urulikan-cha	Jha-nsi	Jabal-pur	Coimb-atore	Man-dya	**Rai-pur	Aver-age	Ra-nk
RCCB-06	80.1	72.4	62.6	78.3	84.4	91.7	49.8	87.5	63.6	115.3	89.5		79.6	8
RCC-2016-8	94.2	90.0	68.5	88.3	102.2	108.8	51.9	97.1	60.2	122.0	77.1	118.3	87.3	4
IG-67-1263	73.4	87.4	67.6	81.3	86.9	102.1	62.9	106.1	55.8	107.0	68.1		81.7	7
CAZRI-327	75.6	75.8	61.2	80.7	81.8	87.8	52.1	92.5	62.6	107.3	91.3	123.6	79.0	9
RCCB-05	85.2	88.4	59.0	83.3	86.2	99.0	71.9	120.4	70.3	110.0	92.3		87.8	3
IG-96-414	84.3	92.8	69.6	86.0	85.0	100.2	65.3	99.4	72.6	124.6		99.0	88.0	2
IGFRI-67-365 (NC)	82.4	89.0	72.1	91.0	100.6	577.1	44.6	86.8	55.0	125.6	74.1	128.9	127.1	1
CAZRI 75 (NC)	94.1	88.2	69.9	93.3	88.1	107.2	59.0	103.8	53.5	114.0	77.3	118.6	86.2	5
IGFRI 3108 (NC)	82.4	76.3	76.1	87.0	89.3	111.2	59.5	98.7	53.5	100.6	81.3	120.3	83.3	6
<b>Mean</b>	<b>83.5</b>	<b>84.5</b>	<b>67.4</b>	<b>85.5</b>	<b>89.4</b>	<b>153.9</b>	<b>57.4</b>	<b>99.1</b>	<b>60.8</b>	<b>114.0</b>	<b>81.4</b>	<b>118.1</b>	<b>88.9</b>	

**Table 14.8 VT Cenchrus ciliaris-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): Leaf Stem Ratio**

Entries	Ludh-iana	Avika-nagar	Ana-nd	Rah-uri	Urulikan-cha	Jabal-pur	Coimb-atore	Man-dya	**Rai-pur	Aver-age	Ra-nk
RCCB-06	0.81	1.11	2.85	0.69	0.56	0.78	0.34	0.65		0.97	3
RCC-2016-8	1.28	1.47	1.00	1.25	0.53	0.73	0.36	0.60	0.44	0.90	6
IG-67-1263	1.68	1.41	0.64	0.94	0.69	0.66	0.34	0.52		0.86	7
CAZRI-327	1.58	1.52	0.43	0.98	0.64	0.75	0.33	0.62	0.7	0.86	7
RCCB-05	1.31	1.21	1.70	1.02	0.68	0.81	0.36	0.69		0.97	3
IG-96-414	1.66	1.13	1.44	0.96	0.73	0.81	0.37		0.57	1.01	2
IGFRI-67-365 (NC)	1.61	1.18	1.13	1.18	0.57	0.66	0.34	0.67	0.43	0.92	5
CAZRI 75 (NC)	1.46	1.13	2.13	1.50	0.76	0.59	0.36	0.68	0.57	1.08	1
IGFRI 3108 (NC)	1.21	1.16	1.70	1.26	0.57	0.65	0.39	0.67	0.54	0.95	4
<b>Mean</b>	<b>1.40</b>	<b>1.26</b>	<b>1.45</b>	<b>1.09</b>	<b>0.64</b>	<b>0.72</b>	<b>0.35</b>	<b>0.64</b>	<b>0.54</b>	<b>0.95</b>	

**Table 14.9 VT *Cenchrus ciliaris*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Ciliaris* (Perennial): ADF (%), NDF (%) & IVDMD %)**

Entries	ADF (%)				NDF (%)				IVDMD (%)	
	Ludh-iana	Avika-nagar	Aver-age	Ra-nk	Ludh-iana	Avika-nagar	Aver-age	Ra-nk	Ludh-iana	Ra-nk
RCCB-06	48.9	42.8	45.9	4	65.6	75.9	70.8	1	45.3	1
RCC-2016-8	50.1	43.0	46.6	8	69.3	75.9	72.6	3	40.3	8
IG-67-1263	49.3	43.6	46.5	7	70.4	77.1	73.7	5	42.8	3
CAZRI-327	49.3	43.0	46.2	6	72.9	76.9	74.9	7	40.5	6
RCCB-05	50.8	42.7	46.7	9	70.6	75.4	73.0	4	40.0	9
IG-96-414	46.4	43.4	44.9	2	72.0	83.2	77.6	9	41.0	4
IGFRI-67-365 (NC)	49.7	42.3	46.0	5	69.5	83.4	76.5	8	40.9	5
CAZRI 75 (NC)	46.9	42.4	44.7	1	68.6	74.9	71.7	2	40.4	7
IGFRI 3108 (NC)	47.2	43.7	45.4	3	70.9	77.9	74.4	6	43.3	2
<b>Mean</b>	<b>48.7</b>	<b>43.0</b>	<b>45.9</b>		<b>70.0</b>	<b>77.9</b>	<b>73.9</b>		<b>41.6</b>	

**Table 15.1 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Green Forage Yield (q/ha)**

Entries	North West Zone					Central Zone							
	Avika-nagar	Bika-ner	**Jodh-pur	Aver-age	Ra-nk	Ana-nd	Rah-uri	Urulikan-chan	Jha-nsi	Jabal-pur	**Rai-pur	Aver-age	Ra-nk
IG-97-433	103.4	176.4	21.7	139.9	6	167.2	322.8	516.3	338.3	176.6		304.3	6
RCSB-09	109.6	172.4	20.8	141.0	5	134.4	273.8	488.8	337.7	189.3		284.8	7
IG-97-447	99.3	224.3	20.6	161.8	4	182.2	355.5	461.8	285.0	256.0		308.1	5
RCSB-08	92.1	163.8	13.2	127.9	7	121.4	283.3	496.3	545.0	238.6		336.9	4
IG-96-706 (NC)	114.1	289.2	10.6	201.6	3	249.4	414.0	563.5	378.3	204.3	158.3	361.9	3
TNCS-265 (NC)	121.9	337.1	14.6	229.5	1	228.9	424.7	585.7	405.0	174.3	252.8	363.7	2
CAZRI-76 (NC)	93.2	319.6	19.8	206.4	2	177.2	350.0	557.4	751.7	234.5	243.1	414.1	1
<b>Mean</b>	<b>104.8</b>	<b>240.4</b>	<b>17.3</b>	<b>172.6</b>		<b>180.1</b>	<b>346.3</b>	<b>524.2</b>	<b>434.4</b>	<b>210.5</b>	<b>218.1</b>	<b>339.1</b>	
<b>CD at 5%</b>	<b>2.8</b>	<b>59.2</b>	<b>6.9</b>			<b>41.6</b>	<b>55.6</b>	<b>49.0</b>	<b>2.1</b>	<b>5.7</b>	<b>23.7</b>		
<b>CV%</b>	<b>12.5</b>	<b>13.7</b>	<b>22.5</b>			<b>13.0</b>	<b>9.0</b>	<b>5.2</b>	<b>2.7</b>	<b>22.0</b>	<b>14.3</b>		

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 15.1 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Green Forage Yield (q/ha)**

Entries	South Zone				All India	
	Coimbatore	Mandya	Average	Rank	Average	Rank
IG-97-433	340.8	202.1	271.5	5	260.4	7
RCSB-09	395.8	362.0	378.9	3	273.7	5
IG-97-447	298.6	216.4	257.5	7	264.3	6
RCSB-08	396.7	131.8	264.2	6	274.3	4
IG-96-706 (NC)	485.5	331.9	408.7	1	336.7	2
TNCS-265 (NC)	428.6	220.4	324.5	4	325.2	3
CAZRI-76 (NC)	457.2	302.7	380.0	2	360.4	1
<b>Mean</b>	<b>400.5</b>	<b>252.5</b>	<b>326.5</b>		<b>299.3</b>	
<b>CD at 5%</b>	<b>48.3</b>	<b>14.6</b>				
<b>CV%</b>	<b>6.8</b>	<b>10.1</b>				



**Table 15.2 VT Cenchrus setigerus-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Dry Matter Yield (q/ha)**

Entries	North West Zone					Central Zone							
	Avika-nagar	Bika-ner	**Jodh-pur	Aver-age	Ra-nk	Ana-nd	Rah-uri	Urulikan- chan	Jha-nsi	Jabal-pur	**Rai-pur	Aver-age	Ra-nk
IG-97-433	35.0	52.2	6.4	43.6	5	48.4	88.5	106.4	84.6	31.4		71.8	6
RCSB-09	39.6	43.8	5.8	41.7	6	40.1	84.1	83.4	84.4	33.0		65.0	7
IG-97-447	26.0	63.3	5.8	44.7	4	56.7	100.9	101.1	71.3	45.7		75.1	5
RCSB-08	25.7	42.3	4.3	34.0	7	34.6	84.2	89.3	136.3	42.5		77.4	4
IG-96-706 (NC)	35.1	78.7	3.2	56.9	3	73.2	122.0	96.4	94.6	36.3	42.6	84.5	3
TNCS-265 (NC)	39.3	115.0	3.5	77.1	1	70.2	127.4	123.0	101.3	31.6	63.5	90.7	2
CAZRI-76 (NC)	31.3	100.3	5.5	65.8	2	56.4	101.6	107.8	187.9	42.3	64.0	99.2	1
<b>Mean</b>	<b>33.1</b>	<b>70.8</b>	<b>4.9</b>	<b>52.0</b>		<b>54.2</b>	<b>101.2</b>	<b>101.1</b>	<b>108.6</b>	<b>37.5</b>	<b>56.7</b>	<b>80.5</b>	
<b>CD at 5%</b>	<b>0.9</b>	<b>17.6</b>	<b>1.7</b>			<b>11.4</b>	<b>16.3</b>	<b>9.8</b>	<b>5.3</b>	<b>3.9</b>	<b>7.3</b>		
<b>CV%</b>	<b>12.8</b>	<b>13.8</b>	<b>19.7</b>			<b>11.9</b>	<b>9.0</b>	<b>5.4</b>	<b>2.7</b>	<b>20.0</b>	<b>16.8</b>		

**Note: \*\* Data is not included in zonal and all India average due to low yield of data**

**Table 15.2 VT Cenchrus setigerus-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Dry Matter Yield (q/ha)**

Entries	South Zone				All India	
	Coimbatore	Mandya	Average	Rank	Average	Rank
IG-97-433	74.9	45.9	60.4	5	63.0	7
RCSB-09	86.4	95.2	90.8	2	65.6	4
IG-97-447	63.4	52.9	58.1	6	64.6	5
RCSB-08	82.3	32.6	57.4	7	63.3	6
IG-96-706 (NC)	108.1	83.9	96.0	1	80.9	3
TNCS-265 (NC)	89.7	50.3	70.0	4	83.1	2
CAZRI-76 (NC)	96.7	69.2	82.9	3	88.2	1
<b>Mean</b>	<b>85.9</b>	<b>61.4</b>	<b>73.7</b>		<b>72.7</b>	
<b>CD at 5%</b>	<b>10.7</b>	<b>3.5</b>				
<b>CV%</b>	<b>7.0</b>	<b>9.9</b>				

**Table 15.3 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Green Forage Yield (q/ha/day)**

Entries	Avikanagar	Bikaner	Anand	Jhansi	Coimbatore	**Raipur	Average	Rank
IG-97-433	3.00	1.96	0.44	3.39	0.95		1.95	6
RCSB-09	2.00	1.92	0.35	3.40	1.10		1.75	7
IG-97-447	4.00	2.49	0.48	3.00	0.83		2.16	4
RCSB-08	6.00	1.82	0.32	5.61	1.10		2.97	2
IG-96-706 (NC)	5.00	3.21	0.66	4.21	1.35	1.38	2.88	3
TNCS-265 (NC)	1.00	3.75	0.60	4.10	1.19	2.2	2.13	5
CAZRI-76 (NC)	7.00	3.55	0.47	7.82	1.27	2.11	4.02	1
<b>Mean</b>	<b>4.00</b>	<b>2.67</b>	<b>0.47</b>	<b>4.50</b>	<b>1.11</b>	<b>1.90</b>	<b>2.55</b>	

**Table 15.4 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Avikanagar	Bikaner	Anand	Jhansi	Coimbatore	**Raipur	Average	Rank
IG-97-433	0.83	0.58	0.13	0.85	0.21		0.52	5
RCSB-09	0.89	0.49	0.11	0.85	0.24		0.52	5
IG-97-447	0.59	0.70	0.15	0.75	0.18		0.47	6
RCSB-08	0.54	0.47	0.09	1.40	0.23		0.55	4
IG-96-706 (NC)	0.68	0.87	0.19	1.05	0.30	0.37	0.62	3
TNCS-265 (NC)	0.80	1.28	0.18	1.02	0.25	0.55	0.71	2
CAZRI-76 (NC)	0.61	1.12	0.15	1.96	0.27	0.56	0.82	1
<b>Mean</b>	<b>0.71</b>	<b>0.79</b>	<b>0.14</b>	<b>1.13</b>	<b>0.24</b>	<b>0.49</b>	<b>0.60</b>	

**Table 15.5 VT *Cenchrus Setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Setigerus* (Perennial): Crude Protein Yield (q/ha)**

Entries	Bikaner	Anand	Rahuri	Urulikanchan	Jabalpur	Avikanagar	Coimbatore	**Raipur	Average	Rank
IG-97-433	3.2	2.9	7.6	9.4	2.1	1.8	6.2		4.7	3
RCSB-09	3.4	2.5	6.1	7.6	2.3	2.0	6.0		4.3	5
IG-97-447	6.5	3.3	7.1	7.4	3.2	1.5	3.4		4.6	4
RCSB-08	3.0	2.3	7.2	7.3	3.0	1.6	7.6		4.6	4
IG-96-706 (NC)	5.3	4.4	8.9	7.8	2.4	1.6	8.0	3.3	5.5	2
TNCS-265 (NC)	7.2	4.4	9.6	10.3	2.1	2.2	5.5	5.4	5.9	1
CAZRI-76 (NC)	8.6	3.2	6.9	8.8	3.1	1.5	6.4	4.8	5.5	2
<b>Mean</b>	<b>5.3</b>	<b>3.3</b>	<b>7.6</b>	<b>8.4</b>	<b>2.6</b>	<b>1.8</b>	<b>6.1</b>	<b>4.5</b>	<b>5.0</b>	

**Table 15.6 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Crude Protein (%)**

Entries	Bikaner	Anand	Rahuri	Urulikanchan	Jabalpur	Coimbatore	Avikanagar	**Raipur	Average	Rank
IG-97-433	6.2	5.9	8.6	8.8	6.5	8.3	5.2		6.9	4
RCSB-09	7.8	6.1	7.3	9.1	6.9	7.0	5.0		7.0	3
IG-97-447	10.3	5.8	7.1	7.3	7.0	5.3	5.9		7.2	2
RCSB-08	7.2	6.7	8.6	8.2	7.1	9.2	6.4		7.4	1
IG-96-706 (NC)	6.7	5.9	7.3	8.1	6.5	7.4	4.5	7.7	6.5	6
TNCS-265 (NC)	6.2	6.2	7.6	8.4	6.7	6.1	5.7	8.5	6.8	5
CAZRI-76 (NC)	8.6	5.7	6.8	8.2	7.3	6.6	4.8	7.6	6.9	4
<b>Mean</b>	<b>7.6</b>	<b>6.0</b>	<b>7.6</b>	<b>8.3</b>	<b>6.9</b>	<b>7.1</b>	<b>5.3</b>	<b>7.9</b>	<b>6.9</b>	

**Table 15.7 VT *Cenchrus setigerus*-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Plant Height (cm)**

Entries	Avika-nagar	Bika-ner	Jodh-pur	Ana-nd	Rah-uri	Urulikan-chan	Jha-nsi	Jabal-pur	Coimb-atore	Man-dya	**Rai-pur	Aver-age	Ra-nk
IG-97-433	82.7	56.0	61.3	77.8	103.6	48.8	90.9	52.7	89.8	33.6		69.7	4
RCSB-09	84.3	68.8	45.0	65.9	82.8	51.0	96.3	52.8	86.6	37.7		67.1	6
IG-97-447	82.3	85.0	57.7	77.3	96.3	52.9	83.7	66.8	95.0	37.6		73.5	2
RCSB-08	68.1	40.5	38.4	57.8	68.7	59.8	101.6	65.0	96.5	38.8		63.5	7
IG-96-706 (NC)	79.3	52.0	65.4	72.6	100.2	63.9	90.6	54.7	110.5	35.1	85.6	72.4	3
TNCS-265 (NC)	86.0	80.0	57.0	72.3	91.4	42.9	92.3	51.8	94.0	28.3	90.7	69.6	5
CAZRI-76 (NC)	79.0	64.3	59.2	72.7	106.2	59.6	101.3	62.2	98.5	37.8	88.8	74.1	1
<b>Mean</b>	<b>80.3</b>	<b>63.8</b>	<b>54.8</b>	<b>70.9</b>	<b>92.7</b>	<b>54.1</b>	<b>93.8</b>	<b>58.0</b>	<b>95.8</b>	<b>35.5</b>	<b>88.4</b>	<b>70.0</b>	

**Table 15.8 VT Cenchrus setigerus-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus setigerus* (Perennial): Leaf Stem Ratio**

Entries	Avikanagar	Anand	Rahuri	Urulikanchan	Jabalpur	Coimbatore	Mandya	**Raipur	Average	Rank
IG-97-433	1.39	1.32	0.91	0.55	0.68	0.35	0.39		0.80	6
RCSB-09	1.62	1.65	1.48	0.56	0.69	0.33	0.43		0.97	3
IG-97-447	1.43	2.10	0.86	0.65	0.89	0.34	0.29		0.94	5
RCSB-08	1.47	2.40	0.59	0.74	0.84	0.35	0.38		0.97	3
IG-96-706 (NC)	1.49	2.68	1.12	0.67	0.71	0.37	0.35	0.70	1.05	1
TNCS-265 (NC)	1.00	2.63	1.12	0.59	0.67	0.36	0.37	0.65	0.96	4
CAZRI-76 (NC)	1.59	2.73	0.75	0.60	0.79	0.38	0.36	0.74	1.03	2
<b>Mean</b>	<b>1.43</b>	<b>2.22</b>	<b>0.98</b>	<b>0.62</b>	<b>0.75</b>	<b>0.35</b>	<b>0.37</b>	<b>0.70</b>	<b>0.96</b>	

**Table 15.9 VT Cenchrus Setigerus-2019 (3<sup>rd</sup> Year): Varietal Trial in *Cenchrus Setigerus* (Perennial): ADF (%) & NDF (%)**

Entries	ADF (%)		NDF (%)	
	Avikanagar	Rank	Avikanagar	Rank
IG-97-433	39.8	2	76.3	3
RCSB-09	39.4	1	78.6	6
IG-97-447	41.2	4	76.5	4
RCSB-08	40.9	3	76.0	2
IG-96-706 (NC)	42.9	6	77.2	5
TNCS-265 (NC)	41.8	5	75.0	1
CAZRI-76 (NC)	45.4	7	79.1	7
<b>Mean</b>	<b>41.6</b>		<b>77.0</b>	

**16. VTBN-2019 (New): VARIETAL TRIAL IN BAJRA NAPIER HYBRID (PERENNIAL) – 3<sup>rd</sup> year**

**(Reference Table: 16.1 to 16.9)**

The trial was established in 2019 with fourteen entries and two national checks (CO-BN-5, BNH-10) at 19 locations across the country. It included 2 locations in hill, 3 in NW, 3 in NE, 5 in central 4 in south zone.

The entries are in coded form and will be decoded after completion of trial.

**17. VT in Stylosanthes**

The trial failed as most of the entries failed to germinate at many locations.

**Table 16.1 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Green Forage Yield (q/ha)**

Entries	Hill Zone				North West Zone			
	Palampur	Almora	Average	Rank	Ludhiana	Bikaner	Average	Rank
VTBN-2019-1		69.1	69.1	13	1188.3	1430.0	553.9	6
VTBN-2019-2		102.3	102.3	12	945.6		290.5	15
VTBN-2019-3	471.3		471.3	2	975.3		480.0	11
VTBN-2019-4	484.7	118.6	301.6	8	945.6	1292.4	525.2	9
VTBN-2019-5		123.7	123.7	11	1102.6	1112.6	494.7	10
VTBN-2019-6	457.4	56.0	256.7	9	1087.4	1328.3	532.4	8
VTBN-2019-7	557.8	150.0	353.9	6	975.6	1247.6	548.5	7
VTBN-2019-8					675.8		675.8	2
VTBN-2019-9		185.3	185.3	10	1020.4	1827.1	645.6	3
VTBN-2019-10					625.3		625.3	5
VTBN-2019-11	598.6		598.6	1	650.4		462.2	12
VTBN-2019-12		67.3	67.3	14	1245.6		348.5	14
VTBN-2019-13	594.4	55.1	324.8	7	945.7	1364.1	548.5	7
VTBN-2019-14	668.9	175.1	422.0	5	1320.6	1779.9	728.6	1
VTBN-2019-15	698.1	162.8	430.5	4	745.6		408.2	13
VTBN-2019-16	778.2	126.2	452.2	3	1095.4	1332.7	631.3	4
<b>Mean</b>	<b>589.9</b>	<b>115.9</b>	<b>297.1</b>		<b>971.6</b>	<b>1412.7</b>	<b>531.2</b>	
<b>CD at 5%</b>	<b>74.7</b>	<b>31.0</b>			<b>122.4</b>	<b>303.8</b>		
<b>CV%</b>	<b>7.3</b>	<b>25.0</b>			<b>12.6</b>	<b>12.3</b>		

**Table 16.1 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Green Forage Yield (q/ha)**

Entries	North East Zone					Central Zone						
	Bhubaneswar	Ranchi	Jorhat	Average	Rank	Anand	Rahuri	Urulikanchan	Raipur	Jabalpur	Average	Rank
VTBN-2019-1	3608.7	379.5	205.7	1398.0	3	742.7	1358.9	2422.9	910.0	613.2	1209.5	5
VTBN-2019-2	1972.3	418.5	238.2	876.3	15	509.4	1528.0	1948.2	733.3	754.1	1094.6	14
VTBN-2019-3	1987.4	495.8	220.7	901.3	13	622.2	1634.8	2138.9	990.0	590.3	1195.2	8
VTBN-2019-4	3148.5	395.4	236.8	1260.2	6	1299.4	981.0	1998.2	611.7	768.0	1131.7	12
VTBN-2019-5	2071.1	404.6	208.3	894.7	14	1389.9	1293.8	1784.9	805.0	721.5	1199.0	7
VTBN-2019-6	2430.7	339.5	239.1	1003.1	11	865.2	1295.3	1986.5	763.3	827.7	1147.6	11
VTBN-2019-7	1793.3	431.7	134.5	786.5	16	1317.2	1005.5	1780.9	648.3	859.6	1122.3	13
VTBN-2019-8	3045.0	519.0	221.2	1261.7	5	793.6	1179.8	1928.5	596.7	629.9	1025.7	15
VTBN-2019-9	2895.4	339.9	239.3	1158.2	7	933.6	1433.3	1821.7	811.7	820.8	1164.2	10
VTBN-2019-10	2471.0	367.3	208.9	1015.7	10	2110.7	1611.1	2584.6	696.7	736.1	1547.8	2
VTBN-2019-11	3469.1	485.1	237.9	1397.4	4	339.7		1818.0	653.3	772.2	895.8	16
VTBN-2019-12	2258.0	453.3	132.7	948.0	12	1073.8	1480.5	2235.9	640.0	732.6	1232.6	4
VTBN-2019-13	2663.0	345.3	222.4	1076.9	9	1084.7	1491.1	1960.5	675.0	737.9	1189.9	9
VTBN-2019-14	2806.1	367.8	237.3	1137.1	8	658.6	1572.6	2256.2	868.3	677.1	1206.6	6
VTBN-2019-15	3785.7		241.1	2013.4	2	745.0	1359.3	2656.9	1140.0	726.3	1325.5	3
VTBN-2019-16	3492.2			3492.2	<b>1.0</b>	1105.5	2041.9	2727.2		668.5	1635.8	<b>1.0</b>
<b>Mean</b>	<b>2743.6</b>	<b>410.2</b>	<b>214.9</b>	<b>1288.8</b>		<b>974.5</b>	<b>1417.8</b>	<b>2128.1</b>	<b>769.6</b>	<b>727.2</b>	<b>1207.7</b>	
<b>CD at 5%</b>	<b>184.2</b>	<b>29.4</b>	5.5			<b>284.5</b>	<b>222.8</b>	<b>285.2</b>	<b>159.0</b>	<b>10.9</b>		
<b>CV%</b>	<b>4.0</b>	<b>4.3</b>	<b>4.0</b>			<b>17.5</b>	<b>9.4</b>	<b>8.0</b>	<b>12.4</b>	<b>15.4</b>		

**Table 16.1 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Green Forage Yield (q/ha)**

Entries	South Zone						All India	
	Coimbatore	Mandya	Hyderabad	Vellayani	Average	Rank	Average	Rank
VTBN-2019-1	1304.1	724.7	674.7	1403.0	1026.6	14	1135.7	6
VTBN-2019-2	1538.8	721.8	558.1	1571.0	1097.4	12	967.1	15
VTBN-2019-3	2309.4	938.3	769.1	1976.0	1498.2	2	1151.4	4
VTBN-2019-4	2102.7	667.9	613.6	1227.0	1152.8	9	1055.7	13
VTBN-2019-5	1536.9	939.5	816.3	1581.0	1218.4	6	1059.4	12
VTBN-2019-6	1601.3	852.1	572.0	1548.0	1143.4	11	1015.6	14
VTBN-2019-7	1861.0	668.5	349.9	1186.0	1016.4	15	935.5	16
VTBN-2019-8	1727.7	990.6	827.4	1555.0	1275.2	4	1130.0	7
VTBN-2019-9	1386.1	886.8	538.7	1178.0	997.4	16	1087.9	9
VTBN-2019-10	1415.2	832.4	752.5	1339.0	1084.8	13	1211.6	3
VTBN-2019-11	2022.1	877.4		1764.0	1554.5	1	1140.7	5
VTBN-2019-12	1601.3	895.4	780.2	1383.0	1165.0	8	1070.0	10
VTBN-2019-13	2088.8	774.0	685.8	1352.0	1225.1	5	1065.0	11
VTBN-2019-14	1473.6	729.1	666.4	1709.0	1144.5	10	1122.9	8
VTBN-2019-15	1697.4	923.9	494.2	1755.0	1217.6	67	1223.7	2
VTBN-2019-16	2551.3	976.7	755.3	1667.0	1487.6	3	1486.0	1
<b>Mean</b>	<b>1763.6</b>	<b>837.4</b>	<b>656.9</b>	<b>1512.1</b>	<b>1206.6</b>		<b>1116.1</b>	
<b>CD at 5%</b>	<b>102.6</b>	<b>129.6</b>	<b>142.7</b>	<b>23.3</b>				
<b>CV%</b>	<b>3.5</b>	<b>11.7</b>	<b>12.9</b>	<b>0.9</b>				



**Table 16.2 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Dry Mater Yield (g/ha)**

Entries	Hill Zone				North West Zone			
	Palampur	Almora	Average	Rank	Ludhiana	Bikaner	Average	Rank
VTBN-2019-1		14.1	14.1	14	205.6	253.8	229.7	6
VTBN-2019-2		24.9	24.9	12	160.8		160.8	11
VTBN-2019-3	92.5	0.0	46.3	9	159.0		159.0	12
VTBN-2019-4	93.7	25.8	59.7	6	158.9	227.6	193.3	10
VTBN-2019-5		31.7	31.7	11	183.0	213.6	198.3	9
VTBN-2019-6	83.5	15.0	49.3	8	194.6	244.4	219.5	7
VTBN-2019-7	106.3	35.5	70.9	4	176.6	311.9	244.3	3
VTBN-2019-8		0.0			117.6		117.6	14
VTBN-2019-9		43.8	43.8	10	178.6	449.2	313.9	2
VTBN-2019-10		0.0			106.3		106.3	16
VTBN-2019-11	113.2	0.0	56.6	7	111.2		111.2	15
VTBN-2019-12		15.2	15.2	13	203.0		203.0	8
VTBN-2019-13	112.1	13.0	62.6	5	156.0	304.2	230.1	5
VTBN-2019-14	137.2	43.4	90.3	2	224.5	436.1	330.3	1
VTBN-2019-15	132.3	45.1	88.7	3	129.7		129.7	13
VTBN-2019-16	148.2	34.0	91.1	1	191.7	277.3	234.5	4
<b>Mean</b>	<b>113.2</b>	<b>21.3</b>	<b>53.2</b>		<b>166.1</b>	<b>302.0</b>	<b>198.8</b>	
<b>CD at 5%</b>	<b>18.6</b>	<b>5.4</b>			<b>51.6</b>	<b>62.7</b>		
<b>CV%</b>	<b>9.4</b>	<b>17.9</b>			<b>13.4</b>	<b>11.9</b>		

**Table 16.2 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Dry Mater Yield (q/ha)**

Entries	North East Zone					Central Zone						
	Bhubaneswar	Ranchi	Jorhat	Average	Rank	Anand	Rahuri	Urulikanchan	Raipur	Jabalpur	Average	Rank
VTBN-2019-1	851.8	127.5	50.0	343.1	4	147.9	391.5	691.3	291.6	115.3	327.5	4
VTBN-2019-2	466.7	143.6	56.9	222.4	13	115.4	400.7	593.2	222.6	146.3	295.6	11
VTBN-2019-3	468.0	149.2	53.0	223.4	14	108.9	468.5	552.3	277.3	110.3	303.4	7
VTBN-2019-4	754.0	126.4	58.7	313.0	6	265.6	291.8	513.9	177.9	149.4	279.7	14
VTBN-2019-5	494.0	109.5	47.9	217.1	15	268.5	362.5	483.5	241.9	138.0	298.9	9
VTBN-2019-6	586.6	106.9	60.2	251.2	12	164.2	378.4	574.9	235.8	162.3	303.1	8
VTBN-2019-7	419.9	152.1	33.0	201.7	16	298.9	296.6	502.0	201.1	169.0	293.5	12
VTBN-2019-8	732.3	155.0	55.9	314.4	5	157.3	307.3	330.3	147.7	118.6	212.2	15
VTBN-2019-9	704.9	109.4	55.4	289.9	8	195.9	393.7	498.2	234.9	160.1	296.6	10
VTBN-2019-10	600.9	133.7	49.3	261.3	10	383.1	443.9	603.0	222.3	142.1	358.9	2
VTBN-2019-11	836.4	180.0	54.5	357.0	3	72.0		388.0	173.5	150.6	196.0	16
VTBN-2019-12	569.3	169.2	31.8	256.8	11	210.0	398.7	726.9	192.8	141.0	333.9	3
VTBN-2019-13	628.7	107.1	53.7	263.2	9	243.5	386.2	589.9	165.9	142.8	305.7	6
VTBN-2019-14	706.2	133.9	58.6	299.6	7	141.7	393.8	493.4	281.6	129.5	288.0	13
VTBN-2019-15	896.9		52.9	474.9	1	172.5	354.8	550.8	341.2	139.8	311.8	5
VTBN-2019-16	852.5		56.6	454.5	2	214.8	556.6	619.9		126.7	379.5	1
<b>Mean</b>	<b>660.6</b>	<b>136.0</b>	<b>51.8</b>	<b>296.5</b>		<b>197.5</b>	<b>388.3</b>	<b>544.5</b>	<b>227.2</b>	<b>140.1</b>	<b>299.0</b>	
<b>CD at 5%</b>	<b>48.3</b>	<b>22.7</b>	<b>3.7</b>			<b>58.7</b>	<b>62.6</b>	<b>74.5</b>	<b>46.2</b>	<b>6.2</b>		
<b>CV%</b>	<b>4.4</b>	<b>4.0</b>	<b>6.7</b>			<b>17.8</b>	<b>9.6</b>	<b>8.2</b>	<b>12.2</b>	<b>15.4</b>		

**Table 16.2 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Dry Mater Yield (q/ha)**

Entries	South Zone						All India	
	Coimbatore	Mandya	Hyderabad	Vellayani	Average	Rank	Average	Rank
VTBN-2019-1	252.5	153.3	176.1	188.0	192.5	14	260.7	3
VTBN-2019-2	298.6	143.2	141.9	215.0	199.7	13	223.6	15
VTBN-2019-3	451.5	206.3	199.9	269.0	281.7	2	237.7	9
VTBN-2019-4	410.0	111.9	162.0	156.0	210.0	11	230.2	11
VTBN-2019-5	298.5	215.7	246.1	208.0	242.1	5	236.2	10
VTBN-2019-6	312.2	189.6	160.8	193.0	213.9	10	228.9	12
VTBN-2019-7	355.7	142.3	91.0	154.0	185.7	16	215.4	16
VTBN-2019-8	338.9	236.9	234.7	208.0	254.6	4	224.3	14
VTBN-2019-9	272.3	195.5	148.1	143.0	189.7	15	252.2	6
VTBN-2019-10	278.4	182.3	192.5	162.0	203.8	12	250.0	7
VTBN-2019-11	401.2	189.5		248.0	279.6	3	224.5	13
VTBN-2019-12	310.5	202.7	218.1	183.0	228.6	7	255.2	4
VTBN-2019-13	404.0	162.6	208.7	184.0	239.8	6	241.4	8
VTBN-2019-14	278.5	162.3	191.4	224.0	214.1	9	252.3	5
VTBN-2019-15	319.5	212.9	149.7	220.0	225.5	8	265.6	2
VTBN-2019-16	506.7	224.8	186.6	224.0	285.5	1	301.4	1
<b>Mean</b>	<b>343.1</b>	<b>183.2</b>	<b>180.5</b>	<b>198.7</b>	<b>227.9</b>		<b>243.7</b>	
<b>CD at 5%</b>	<b>20.4</b>	<b>28.2</b>	<b>38.0</b>	<b>11.1</b>				
<b>CV%</b>	<b>3.6</b>	<b>11.7</b>	<b>12.5</b>	<b>3.4</b>				

**Table 16.3 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Green Forage Yield (q/ha/day)**

Entries	Ludhiana	Anand	Raipur	Bikaner	Hyderabad	Vellayani	Coimbatore	Average	Rank
VTBN-2019-1	6.25	2.19	5.91	5.22	3.75	17.00	3.63	6.28	9
VTBN-2019-2	4.98	1.50	4.76		3.10	19.00	4.29	6.27	10
VTBN-2019-3	5.13	1.84	6.43		4.27	24.00	6.43	8.02	1
VTBN-2019-4	4.98	3.83	3.97	4.72	3.41	14.00	5.86	5.82	14
VTBN-2019-5	5.8	4.10	5.23	4.06	4.54	18.00	4.28	6.57	6
VTBN-2019-6	5.72	2.55	4.96	4.85	3.18	17.00	4.46	6.10	12
VTBN-2019-7	5.13	3.89	4.21	4.55	1.94	14.00	5.18	5.56	16
VTBN-2019-8	3.56	2.34	3.87		4.60	19.00	4.81	6.36	8
VTBN-2019-9	5.37	2.75	5.27	6.67	2.99	13.00	3.86	5.70	15
VTBN-2019-10	3.29	6.23	4.52		4.18	14.00	3.94	6.03	13
VTBN-2019-11	3.42	1.00	4.24			22.00	5.63	7.26	3
VTBN-2019-12	6.56	3.17	4.16		4.33	16.00	4.46	6.45	7
VTBN-2019-13	4.98	3.20	4.38	4.98	3.81	16.00	5.82	6.17	11
VTBN-2019-14	6.95	1.94	5.64	6.50	3.70	20.00	4.10	6.98	4
VTBN-2019-15	3.92	2.20	7.40		2.75	20.00	4.73	6.83	5
VTBN-2019-16	5.77	3.26		4.86	4.20	20.00	7.11	7.53	2
<b>Mean</b>	<b>5.11</b>	<b>2.87</b>	<b>5.00</b>	<b>5.16</b>	<b>3.65</b>	<b>17.69</b>	<b>4.91</b>	<b>6.50</b>	

**Table 16.4 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Ludhiana	Anand	Raipur	Bikaner	Hyderabad	Vellayani	Coimbatore	Average	Rank
VTBN-2019-1	1.08	0.44	1.89	0.93	0.98	4.10	0.70	1.45	9
VTBN-2019-2	0.85	0.34	1.45		0.79	4.70	0.83	1.49	7
VTBN-2019-3	0.84	0.32	1.80		1.17	6.00	1.26	1.90	1
VTBN-2019-4	0.84	0.78	1.16	0.83	0.90	3.50	1.14	1.31	13
VTBN-2019-5	0.96	0.79	1.57	0.78	1.37	4.60	0.83	1.56	5
VTBN-2019-6	1.02	0.49	1.53	0.89	0.89	4.30	0.87	1.43	11
VTBN-2019-7	0.93	0.88	1.31	1.14	0.51	3.40	0.99	1.31	13
VTBN-2019-8	0.62	0.46	0.96		1.30	4.60	0.94	1.48	8
VTBN-2019-9	0.94	0.58	1.53	1.64	0.86	3.20	0.76	1.36	12
VTBN-2019-10	0.56	1.13	1.44		1.07	3.60	0.78	1.43	11
VTBN-2019-11	0.59	0.21	1.13			5.50	1.12	1.71	2
VTBN-2019-12	1.07	0.62	1.25		1.21	4.00	0.86	1.50	6
VTBN-2019-13	0.82	0.72	1.08	1.11	1.16	4.10	1.13	1.44	10
VTBN-2019-14	1.18	0.42	1.83	1.59	1.06	4.90	0.78	1.68	3
VTBN-2019-15	0.68	0.51	2.22		0.83	4.90	0.89	1.67	4
VTBN-2019-16	1.01	0.63		1.01	1.04	5.00	1.41	1.68	3
<b>Mean</b>	<b>0.87</b>	<b>0.58</b>	<b>1.48</b>	<b>1.10</b>	<b>1.01</b>	<b>4.40</b>	<b>0.96</b>	<b>1.52</b>	

**Table 16.5 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Crude Protein Yield (q/ha)**

Entries	Palam-pur	Ludh-iana	Bika-ner	Bhuban-eswar	Jor-hat	Ran-chi	Ana-nd	Rah-uri	Urulikan-cha	Rai-pur	Jabal-pur	Man-dya	Hydera-bad	Coimb-atore	Aver-age	Ra-nk
VTBN-2019-1		12.7	29.5	68.1	4.0	11.2	16.6	29.0	50.3	23.2	8.5	12.0	14.5	22.1	23.2	4
VTBN-2019-2		10.1		42.8	4.0	7.2	13.9	28.9	40.9	19.9	11.4	9.4	10.3	30.0	19.1	13
VTBN-2019-3	7.2	10.0		42.8	3.8		13.3	37.5	40.2	16.4	8.0	14.5	12.4	41.5	20.6	8
VTBN-2019-4	8.5	10.6	23.7	66.5	3.6	10.5	30.8	20.5	35.9	15.3	12.0	7.8	11.6	41.2	21.3	7
VTBN-2019-5		11.0	20.1	38.6	3.1	8.5	31.0	27.2	33.4	21.9	10.2	14.3	18.5	28.7	20.5	9
VTBN-2019-6	6.3	13.6	31.3	45.2	4.0	8.9	19.5	29.5	36.6	18.1	13.2	13.4	10.5	27.3	19.8	12
VTBN-2019-7	8.4	11.1	42.6	36.0	2.5	7.6	36.1	26.1	35.5	19.2	13.7	8.7	6.1	32.7	20.4	10
VTBN-2019-8		7.3		62.2	3.1	12.9	18.1	22.8	25.9	11.2	8.7	18.7	18.7	32.6	20.2	11
VTBN-2019-9		11.6	43.3	60.1	4.0	6.3	23.4	27.6	38.7	21.2	13.0	14.4	9.8	25.0	23.0	5
VTBN-2019-10		6.8		50.3	3.5	12.4	44.7	34.7	37.1	18.7	11.0	13.8	14.1	31.7	23.2	4
VTBN-2019-11	8.9	6.7		71.5	4.1		8.4		26.1	13.7	12.1	10.8		43.9	20.6	8
VTBN-2019-12		12.6		49.2	3.1	14.0	25.6	31.1	60.0	11.6	10.7	17.9	18.3	34.0	24.0	2
VTBN-2019-13	10.5	9.8	33.5	54.8	3.4	10.5	31.1	29.4	41.4	11.7	11.1	14.2	16.5	40.6	22.8	6
VTBN-2019-14	11.6	13.5	58.4	56.6	2.9	9.5	18.3	30.0	32.3	26.8	9.5	15.0	16.9	29.2	23.6	3
VTBN-2019-15	11.6	8.4		80.4	4.0		19.6	27.4	34.7	27.0	10.4	18.7	12.8	28.0	23.6	3
VTBN-2019-16	12.1	13.4	38.4	72.7	4.0		25.9	46.8	47.2		9.3	18.8	14.5	55.4	29.9	1
<b>Mean</b>	<b>9.4</b>	<b>10.6</b>	<b>35.7</b>	<b>56.1</b>	<b>3.6</b>	<b>10.0</b>	<b>23.5</b>	<b>29.9</b>	<b>38.5</b>	<b>18.4</b>	<b>10.8</b>	<b>13.9</b>	<b>13.7</b>	<b>34.0</b>	<b>22.2</b>	

**Table 16.6 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Crude Protein (%)**

Entries	Palam- pur	Ludh- iana	Bika- ner	Bhuban- eswar	Jor- hat	Ran- chi	Ana- nd	Rah- uri	Urulikan- chan	Rai- pur	Jabal- pur	Man- dya	Hydera- bad	Coimb- atore	Aver- age	Ra- nk
VTBN-2019-1		6.2	11.6	8.0	6.6	8.8	11.3	7.4	7.3	8.0	7.3	7.8	7.7	8.8	8.2	5
VTBN-2019-2		6.3		9.2	6.3	5.0	12.0	7.2	6.9	9.0	7.8	6.6	7.6	10.1	7.8	8
VTBN-2019-3	7.9	6.3		9.1	6.5		12.2	8.0	7.3	6.0	7.2	7.0	6.3	9.2	7.8	8
VTBN-2019-4	9.0	6.7	10.4	8.8	6.3	8.3	11.5	7.0	7.0	8.7	8.0	7.0	7.1	10.1	8.3	4
VTBN-2019-5		6.0	9.4	7.8	6.4	7.8	11.5	7.5	6.9	9.0	7.4	6.5	7.3	9.6	7.9	7
VTBN-2019-6	7.6	7.0	12.8	7.7	6.5	8.3	11.8	7.8	6.4	7.7	8.1	7.0	6.7	8.8	8.1	6
VTBN-2019-7	7.9	6.3	13.7	8.6	5.3	5.0	12.0	8.8	7.1	9.7	8.1	6.1	6.6	9.2	8.2	5
VTBN-2019-8		6.2		8.5	4.8	8.3	11.5	7.4	7.8	7.7	7.4	7.9	8.0	9.6	7.9	7
VTBN-2019-9		6.5	9.6	8.5	7.6	5.8	12.0	7.0	7.8	9.0	8.1	7.4	7.1	9.2	8.1	6
VTBN-2019-10		6.4		8.4	7.2	9.3	11.7	7.8	6.2	8.3	7.8	7.5	7.7	11.4	8.3	4
VTBN-2019-11	7.9	6.0		8.5	7.3		11.6		6.7	8.0	8.0	5.7		10.9	8.1	6
VTBN-2019-12		6.2		8.6	6.5	8.3	12.2	7.8	8.3	6.0	7.6	8.8	8.5	10.9	8.3	4
VTBN-2019-13	9.3	6.3	11.0	8.7	6.3	9.8	12.8	7.6	7.0	7.0	7.8	8.7	8.2	10.1	8.6	3
VTBN-2019-14	8.5	6.0	13.4	8.0	6.2	7.1	12.9	7.6	6.5	9.5	7.4	9.2	9.0	10.5	8.7	2
VTBN-2019-15	8.8	6.5		9.0	7.2	7.8	11.3	7.7	6.3	8.0	7.4	8.8	8.5	8.8	8.1	6
VTBN-2019-16	8.2	7.0	13.8	8.5	7.5	8.1	12.0	8.4	7.6		7.3	8.3	8.2	10.9	8.9	1
<b>Mean</b>	<b>8.3</b>	<b>6.4</b>	<b>11.8</b>	<b>8.5</b>	<b>6.5</b>	<b>7.7</b>	<b>11.9</b>	<b>7.7</b>	<b>7.1</b>	<b>8.1</b>	<b>7.7</b>	<b>7.5</b>	<b>7.6</b>	<b>9.9</b>	<b>8.2</b>	

**Table 16.7 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Plant Height (cm)**

Entries	Palam-pur	Ludh-iana	Bika-ner	Ran-chi	Jor-hat	Ana-and	Rah-uri	Urulikan-ghan	Rai-pur	Jabal-pur	Coimb-atore	Man-dya	Vella-yani	Aver-age	Ra-nk
VTBN-2019-1		163.4	122.2	131.3	164.3	141.1	164.8	175.5	186.0	58.6	175.5	84.0	197.0	147.0	14
VTBN-2019-2		144.3		130.0	184.3	145.3	171.4	178.1	168.4	71.2	185.0	91.4	193.0	151.1	9
VTBN-2019-3	142.3	148.2		123.9	177.5	137.1	146.9	157.9	212.3	55.6	195.5	96.4	211.0	150.4	10
VTBN-2019-4	115.3	141.6	116.6	138.3	196.4	154.9	122.8	162.6	177.5	72.8	190.6	101.0	186.0	144.3	15
VTBN-2019-5		151.3	149.4	180.9	180.4	163.8	158.4	152.1	199.6	65.7	175.0	100.9	223.0	158.4	3
VTBN-2019-6	136.3	155.4	185.8	170.5	191.3	174.4	170.1	172.6	170.4	78.8	180.0	97.0	224.0	162.0	1
VTBN-2019-7	120.3	152.3	217.6	173.1	205.6	162.9	140.2	168.8	144.8	86.1	176.0	102.9	211.0	158.6	2
VTBN-2019-8		122.3		172.1	142.2	156.1	149.5	132.0	191.1	64.3	195.0	120.2	205.0	150.0	11
VTBN-2019-9		144.2	227.6	130.1	172.1	166.8	149.8	171.3	160.7	76.3	188.0	83.6	189.0	155.0	5
VTBN-2019-10		128.6		122.8	176.4	180.7	177.2	161.7	196.3	68.7	162.0	94.8	206.0	152.3	8
VTBN-2019-11	127.7	132.2		149.3	175.9	133.2		137.2	169.1	73.8	180.0	64.6	217.0	141.8	16
VTBN-2019-12		154.2		103.2	225.3	151.1	155.6	184.6	196.2	68.3	172.0	95.5	212.0	156.2	4
VTBN-2019-13	133.7	140.1	128.4	128.1	154.5	166.9	168.5	169.7	173.4	69.7	192.5	85.8	226.0	149.0	13
VTBN-2019-14	137.0	162.3	148.0	203.1	202.1	140.3	169.7	167.0	171.8	65.0	190.5	51.9	195.0	154.1	6
VTBN-2019-15	146.7	131.2			196.4	143.9	173.3	100.8	186.0	67.4	185.5	102.0	216.0	149.9	12
VTBN-2019-16	151.7	145.4	123.6		176.8	155.4	187.1	166.8		64.7	200.5	109.0	208.0	153.5	7
<b>Mean</b>	<b>134.6</b>	<b>144.8</b>	<b>157.7</b>	<b>146.9</b>	<b>182.6</b>	<b>154.6</b>	<b>160.3</b>	<b>159.9</b>	<b>180.2</b>	<b>69.2</b>	<b>184.0</b>	<b>92.6</b>	<b>207.4</b>	<b>152.1</b>	



**Table 16.8 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Leaf Stem Ratio**

Entries	Palam-pur	Ludh-iana	Bika-ner	Ran-chi	Jor-hat	Ana-and	Rah-uri	Urulikan-chan	Rai-pur	Jabal-pur	Coimb-atore	Man-dya	Vella-yani	Aver-age	Ra-nk
VTBN-2019-1		0.72	1.29	0.85	0.86	1.52	0.64	0.82	0.50	0.67	0.41	0.65	0.85	0.81	2
VTBN-2019-2		0.63		0.88	0.88	1.28	0.67	0.56	0.46	0.75	0.36	0.60	0.78	0.71	10
VTBN-2019-3	0.69	0.57		0.77	0.90	1.20	0.60	0.77	0.35	0.65	0.42	0.74	0.53	0.68	11
VTBN-2019-4	0.71	0.52	0.97	0.59	0.96	1.60	0.53	0.82	0.47	0.79	0.40	0.77	0.78	0.76	6
VTBN-2019-5		0.57	1.19	0.78	0.90	1.20	0.82	0.82	0.57	0.71	0.38	0.68	0.67	0.77	5
VTBN-2019-6	0.77	0.69	0.95	0.55	0.94	1.22	0.55	0.59	0.52	0.85	0.36	0.67	0.74	0.72	9
VTBN-2019-7	0.63	0.72	1.45	0.66	0.80	1.19	0.75	0.71	0.53	0.85	0.43	0.64	0.71	0.77	5
VTBN-2019-8		0.85		0.78	0.90	1.19	0.63	0.81	0.54	0.68	0.42	0.78	1.34	0.81	2
VTBN-2019-9		0.63	1.28	0.70	0.88	1.23	0.67	0.71	0.44	0.82	0.39	0.58	1.08	0.78	4
VTBN-2019-10		0.72		0.73	0.89	1.25	0.61	0.81	0.40	0.73	0.40	0.68	0.82	0.73	8
VTBN-2019-11	0.80	0.77		0.66	0.89	1.66		0.76	0.45	0.80	0.41	0.64	0.82	0.79	3
VTBN-2019-12		0.63		0.67	0.88	1.03	0.55	0.81	0.46	0.72	0.36	0.64	0.61	0.67	12
VTBN-2019-13	0.78	0.67	0.93	0.62	0.85	1.37	0.57	0.81	0.38	0.75	0.41	0.60	0.95	0.75	7
VTBN-2019-14	0.73	0.57	0.99	0.79	0.91	1.40	0.55	0.67	0.40	0.70	0.39	0.53	1.11	0.75	7
VTBN-2019-15	0.63	0.75			0.95	1.68	0.59	0.82	0.46	0.71	0.35	0.64	0.62	0.75	7
VTBN-2019-16	0.60	0.67	1.72		0.83	1.73	0.50	0.74		0.69	0.36	0.76	0.44	0.82	1
<b>Mean</b>	<b>0.70</b>	<b>0.67</b>	<b>1.20</b>	<b>0.72</b>	<b>0.89</b>	<b>1.36</b>	<b>0.62</b>	<b>0.75</b>	<b>0.46</b>	<b>0.74</b>	<b>0.39</b>	<b>0.66</b>	<b>0.80</b>	<b>0.76</b>	

**Table 16.9 VTBN-2019 (3<sup>rd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)				NDF (%)				IVDMD (%)	
	Ludhiana	Palampur	Average	Rank	Ludhiana	Palampur	Average	Rank	Ludhiana	Rank
VTBN-2019-1	50.0		50.0	6	70.4		70.4	6	41.2	10
VTBN-2019-2	50.1		50.1	7	72.8		72.8	12	46.4	3
VTBN-2019-3	46.8	57.4	52.1	10	70.2	68.6	69.4	4	40.6	12
VTBN-2019-4	46.8	54.6	50.7	8	70.7	69.4	70.1	5	40.8	11
VTBN-2019-5	47.8		47.8	3	66.7		66.7	1	45.5	4
VTBN-2019-6	48.0	56.6	52.3	11	73.6	70.6	72.1	11	44.8	5
VTBN-2019-7	46.2	59.4	52.8	12	69.0	68	68.5	2	47.0	2
VTBN-2019-8	43.5		43.5	1	73.6		73.6	13	43.0	7
VTBN-2019-9	48.5		48.5	5	71.7		71.7	9	42.6	8
VTBN-2019-10	46.7		46.7	2	71.4		71.4	8	47.2	1
VTBN-2019-11	49.2	57.8	53.5	14	69.8	71.4	70.6	7	43.8	6
VTBN-2019-12	48.2		48.2	4	71.8		71.8	10	40.3	13
VTBN-2019-13	47.6	58.2	52.9	13	71.3	72.0	71.7	9	40.4	12
VTBN-2019-14	48.9	58.6	53.8	16	73.4	67.8	70.6	7	41.6	9
VTBN-2019-15	48.0	59.4	53.7	15	67.5	69.4	68.5	2	40.8	11
VTBN-2019-16	44.8	57.4	51.1	9	69.8	68.8	69.3	3	40.2	14
<b>Mean</b>	<b>47.6</b>	<b>57.7</b>	<b>50.5</b>		<b>70.9</b>	<b>69.6</b>	<b>70.6</b>		<b>42.9</b>	

## FORAGE CROP PRODUCTION

The programme on forage crop production was conducted at 42 locations during Kharif season. In total 10 experiments were conducted, out of which 4 in coordinated, 3 AVT trials and 3 in location specific mode with the aim to generate region as well as location specific forage production technologies for different growing condition.

Research aspect consisted of bio-fortification of annual cereal fodder crops, response of fodder crops to micronutrient management, effect of PGRs and micronutrients on sorghum, feedstuffs for air evacuating method of silage production in polybags, Precision nitrogen management for in forages and nitrogen and cutting management on performance of forage pearl millet varieties. Besides above, advance varietal trials to evaluate the response of promising entries of pearl millet, maize and Dinanath grass to nutrient supplementation was also conducted and reported. From the trials, relevant database generated is presented hereunder;

### A. Coordinated Trials

#### K-20-AST-1a: Response of fodder crops to micronutrient management

[(Table Reference: K-20-AST-1a (a) to (k))]

**Locations (5):** Rahuri, Bikaner, Imphal, Ranchi and BUAT Banda

#### Preamble

Low productivity of livestock is mainly due to the poor feed and fodder availability. There is acute deficiency of micronutrients in different soils of various regions, which causes not only low yields but also poor quality of the fodder. Production potential of fodder crops can be enhanced with micronutrient management. Adequate supply of micronutrients is essential for higher yield and quality of fodder crops. Hence, the study on agronomic bio fortification of fodder through micronutrient supplementation was proposed.

A trial was initiated during Kharif 2020 at five locations i.e., Rahuri, Bikaner, Imphal, Ranchi and BUAT Banda, to study the effect of PGRs and micronutrients on growth, yield and quality of Maize. In Rahuri and Banda the trial was conducted on maize, whereas, at Bikaner, Imphal, Ranchi BxN hybrids was tested. The treatments included; **T<sub>1</sub>**: Absolute control (no fertilizer application), **T<sub>2</sub>**: RDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) (based on soil test), **T<sub>3</sub>**: GRDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup> + FYM 5 t ha<sup>-1</sup>), **T<sub>4</sub>**: GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>, **T<sub>5</sub>**: GRDF + two foliar sprays of government notified multi-micronutrient grade II @ 1% at 30 and 45 DAS and **T<sub>6</sub>**: GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS. The maize crop was sown at 30 cm x 10 cm spacing in 4.0 m x 5.0 m plots. The BN Hybrid was sown at 75 cm x 50 cm spacing in plots. The experiment was laid out in Randomized Block Design with three replications.

## Maize

The results indicated that as regards to yields, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly yield (376.4 & 87.1 q ha<sup>-1</sup>, respectively) which was 46.5 and 32.6 % higher over T<sub>2</sub>; RDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>), in terms of green and dry matter respectively. Treatment T<sub>6</sub> DAS recorded significantly higher crude protein yield (12.14 q ha<sup>-1</sup>).

The results indicated that as regards to yields, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly yield (376.4 & 87.1 q ha<sup>-1</sup>, respectively) which was 46.5 and 32.6 % higher over T<sub>2</sub>; RDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>), in terms of green and dry matter respectively. Treatment T<sub>6</sub> DAS recorded significantly higher crude protein yield (12.14 q ha<sup>-1</sup>). In terms of quality, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly higher L:S ratio, lower ADF and NDF and higher IVDMD (66.4%). Treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded higher Net monetary returns (Rs. 105531 ha<sup>-1</sup>) and B: C ratio (2.44). The application of micronutrient through multi-micronutrient grade I and foliar sprays of grade II brought significant variation in micronutrient content of plants. The treatment GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> and T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded higher content of Zn (185.1), Fe (31.5) and Mn (412.4) in plant. The data on pH, EC and organic carbon content in soil was non-significant.

In terms of quality, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly higher L:S ratio, lower ADF and NDF and higher IVDMD (66.4%). Treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded higher Net monetary returns (Rs. 105531 ha<sup>-1</sup>) and B: C ratio (2.44). The application of micronutrient through multi-micronutrient grade I and foliar sprays of grade II brought significant variation in micronutrient content of plants. The treatment GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> and T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded higher content of Zn (185.1), Fe (31.5) and Mn (412.4) in plant. The data on pH, EC and organic carbon content in soil was non-significant.

## BxN Hybrid

The results indicated that as regards to yields, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly yield (690.0 & 149.5 q ha<sup>-1</sup>, respectively) which was 7.6 and 32.6 % higher over T<sub>2</sub>; RDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>), in terms of green and dry matter respectively. Treatment T<sub>6</sub> DAS recorded significantly higher crude protein yield (17.83 q ha<sup>-1</sup>). In terms of quality, treatment T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup>+ two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded significantly higher L:S ratio, lower ADF (45.33%) and NDF (53.22%) and higher IVDMD (62.3%). Treatment T<sub>2</sub>; RDF (100:50:50 N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O kg ha<sup>-1</sup>) recorded higher Net monetary returns (Rs. 140388 ha<sup>-1</sup>) and B: C ratio (4.52). The application of micronutrient through multi-micronutrient grade I and foliar sprays of grade II brought significant variation in micronutrient content of plants. The treatment GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> and T<sub>6</sub>- GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha<sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS recorded higher content of Fe (139.5), Mn (61.1) and Co (9.1) in plant. The data on pH, EC and organic carbon content in soil was non-significant.

**Table K-20-AST-1a (a): Effect of micronutrient application on biomass yield of fodder crops (q/ha)**

Treatment	GFY							DMY							GFY /day	DMY /day
	Maize		Mean	BN Hybrid				Maize			BN Hybrid				BN Hybrid	
	Rah- uri	Ban- da		Ran- chi	Imp- hal	Bika- ner	Mean	Rah- uri	Ban- da	Mean	Imp- hal	Bika- ner	Ran- chi	Mean	Ran- chi	Ran- chi
T <sub>1</sub>	283.6	110.4	197.0	436.7	427.5	120.0	328.1	67.3	11.8	39.6	90.8	20.9	83.0	64.9	1.2	0.23
T <sub>2</sub>	368.3	145.3	256.8	1048.7	736.5	139.0	641.4	89.6	18.6	54.1	118.1	22.3	199.3	113.2	2.87	0.55
T <sub>3</sub>	403.9	153.7	278.8	1087.0	776.3	156.0	673.1	98.6	20.4	59.5	153.9	28.5	230.8	137.7	2.98	0.63
T <sub>4</sub>	484.3	168.3	326.3	1102.3	783.8	156.1	680.7	121.1	26.5	73.8	127.9	28.9	242.5	133.1	3.02	0.66
T <sub>5</sub>	447.4	196.1	321.8	1125.7	772.3	178.1	692.0	111.7	33.3	72.5	124.3	31.5	247.8	134.5	3.08	0.68
T <sub>6</sub>	527.7	225.0	376.4	1145.3	741.8	183.0	690.0	135.2	39.0	87.1	162.0	34.5	251.9	149.5	3.14	0.69
SE(m) ±	15.0	0.9		24.7	7.4	7.4		5.3	0.2		10.1	2.0	5.2		0.05	0.01
C.D. (P=0.05)	45.1	2.9		76.5	22.3	23.3		16.0	0.6		30.4	6.3	16.5		0.16	0.05
CV%	9.0	9.4		8.3	1.8			10.2	14.0		13.5	20.9	6.2		3.28	4.24

**Table K-20-AST-1a (b): Effect of micronutrient application on growth and quality parameters of fodder crops**

Treatment	CPY (q/ha)				CP (%)				Plant Height (cm)				
	Maize		BN Hybrid		Maize		BN Hybrid		Maize		BN Hybrid		
	Rah- uri	Ran- chi	Imp- hal	Mean	Rah- uri	Ran- chi	Imp- hal	Mean	Ban- da	Rah- uri	Ran- chi	Imp- hal	Bika- ner
T <sub>1</sub>	4.82	5.23	8.78	7.01	7.18	6.31	9.68	8.00	208.4	189.8	57.0	234.4	138.7
T <sub>2</sub>	7.04	13.15	11.03	12.09	7.85	6.60	9.33	7.97	262.3	219.0	82.3	246.3	163.0
T <sub>3</sub>	8.18	16.43	14.12	15.28	8.31	7.12	9.18	8.15	270.0	223.3	85.7	195.9	159.4
T <sub>4</sub>	10.86	18.60	11.77	15.19	8.98	7.67	9.20	8.44	265.0	267.8	86.7	211.4	161.3
T <sub>5</sub>	9.34	16.40	11.62	14.01	8.38	6.62	9.38	8.00	267.4	233.8	88.3	239.1	156.4
T <sub>6</sub>	12.14	20.97	14.68	17.83	8.99	8.32	9.08	8.70	278.1	275.5	90.3	219.8	167.2
SE(m) ±	0.43	0.33	0.90		0.16	0.07	0.25		11.5	6.5	2.9	11.5	9.6
C.D. (P=0.05)	1.30	1.05	2.72		0.48	0.22	0.75		36.7	19.6	9.1	34.8	NS
CV%	9.87	3.78	13.00		3.81	1.71	4.64		7.7	5.5	6.9	8.9	

**Table K-20-AST-1a (c): Effect of micronutrient application on growth offodder crops**

Treatment	Leaf Stem Ratio					Number of leaves/plant at harvest			
	Maize	BN Hybrid				BN Hybrid			
	Rah- uri	Ran- chi	Imp- hal	Bika- ner	Mean	Ran- chi	Imp- hal	Bika- ner	Mean
T <sub>1</sub>	0.49	0.26	0.60	0.62	0.49	8.00	17.25	13.59	12.95
T <sub>2</sub>	0.51	0.28	0.80	0.66	0.58	12.67	16.42	13.59	14.23
T <sub>3</sub>	0.52	0.27	0.80	0.69	0.59	14.00	13.33	11.47	12.93
T <sub>4</sub>	0.60	0.27	1.18	0.66	0.70	16.67	16.67	15.54	16.29
T <sub>5</sub>	0.57	0.26	0.80	0.65	0.57	15.67	17.08	13.08	15.28
T <sub>6</sub>	0.62	0.26	0.73	0.86	0.62	16.00	22.83	14.95	17.93
SE(m) ±	0.01	0.01	0.10	0.08		0.87	3.00	0.89	
C.D. (P=0.05)	0.04	NS	0.31	0.24		2.77	NS	2.79	
CV%	4.83	8.19	21.85			10.88	30.13		

**Table K-20-AST-1a (d): Effect of micronutrient application on quality parameters of fodder crops**

Treatment	Maize				BN Hybrid			
	DM (%)	ADF (%)	NDF (%)	IVDMD (%)	DM (%)	ADF (%)	NDF (%)	IVDMD (%)
	Rahuri				Bikaner	Ranchi		
T <sub>1</sub>	23.74	32.43	58.53	60.8	17.38	54.24	72.52	46.08
T <sub>2</sub>	24.41	31.93	57.6	62.58	16.07	53.86	71.5	46.43
T <sub>3</sub>	24.47	31.08	57	63.8	18.27	53.21	70.26	47.13
T <sub>4</sub>	25.0	29.6	51.83	65.52	18.53	46.24	64.19	52.34
T <sub>5</sub>	24.97	30.9	53.9	64.14	17.65	47.21	65.19	51.71
T <sub>6</sub>	25.55	29.38	50.9	66.41	18.9	45.33	62.26	53.22
SE(m) ±	0.59	0.36	0.95	0.64	0.77	0.59	0.56	0.23
C.D. (P=0.05)	NS	1.08	2.86	1.92	2.43	1.9	1.78	0.73
CV%	4.82	2.33	3.46	2		2.06	1.42	0.8

**Table K-20-AST-1a (e): Effect of micronutrient application on economics of fodder crops**

Treatment	Gross Monetary Return				Net Monetary Return			
	Maize	BN Hybrid			Maize	BN Hybrid		
	Rahuri	Ranchi	Imphal	Mean	Rahuri	Ranchi	Imphal	Mean
T <sub>1</sub>	56714	65500	106875	86187.5	18379	42500	80947	61724
T <sub>2</sub>	73658	157300	184125	170712.5	29478	129300	151475	140388
T <sub>3</sub>	80787	163050	194063	178556.5	28607	132050	148913	140482
T <sub>4</sub>	96868	165350	195938	180644.0	43188	132850	158288	145569
T <sub>5</sub>	89483	168850	193063	180956.5	35883	133850	158413	146132
T <sub>6</sub>	105531	171800	185438	178619.0	50431	133800	145788	139794
SE(m) ±	4041.0	2759.0	1845.0		4041.0	2759.0	1845.0	
C.D. (P=0.05)	12182.0	8806.0	5562.0		12182.0	8806.0	5562.0	
CV%	9.6	3.0	2.0		23.6	4.1	2.0	

**Table K-20-AST-1a (f): Effect of micronutrient application on economics of fodder crops**

Treatment	B: C Ratio						
	Rahuri	Banda	Mean	Ranchi	Imphal	Bikaner	Mean
T <sub>1</sub>	1.48	3.60	2.54	2.85	4.12	2.25	3.07
T <sub>2</sub>	1.67	3.10	2.39	5.62	5.64	2.29	4.52
T <sub>3</sub>	1.55	2.28	1.92	5.26	4.30	2.16	3.91
T <sub>4</sub>	1.80	2.27	2.04	5.09	5.20	2.50	4.26
T <sub>5</sub>	1.67	2.76	2.22	4.82	5.57	2.78	4.39
T <sub>6</sub>	1.92	2.96	2.44	4.52	4.68	2.79	4.00
SE(m) ±	0.08	0.23		0.09	0.05	0.12	
C.D. (P=0.05)	0.23	0.73		0.30	0.16	0.37	
CV%	9.53	14.06		3.53	1.92		



**Table K-20-AST-1a (g): Effect of micronutrient application on nutrient availability in soil at Rahuri**

Treatment	Soil Analysis						Micro nutrients in soil after the harvest (ppm)				
	pH	EC	OC (%)	Available N	Available P	Available K	Treatments	Zn	Fe	Mn	Cu
T <sub>1</sub>	8.54	0.31	0.51	132.1	14.40	353.0	T <sub>1</sub>	0.57	3.52	12.19	1.16
T <sub>2</sub>	8.53	0.31	0.52	161.1	17.20	378.5	T <sub>2</sub>	0.73	8.32	19.90	1.34
T <sub>3</sub>	8.48	0.32	0.51	159.5	16.90	375.3	T <sub>3</sub>	0.31	6.09	25.95	1.24
T <sub>4</sub>	8.48	0.33	0.52	147.3	16.58	365.5	T <sub>4</sub>	0.27	6.26	13.42	1.27
T <sub>5</sub>	8.52	0.32	0.53	153.2	16.87	370.3	T <sub>5</sub>	0.25	5.10	10.39	1.18
T <sub>6</sub>	8.47	0.33	0.54	139.1	15.65	360.8	T <sub>6</sub>	0.35	6.85	11.72	1.26
SE(m) ±	0.02	0.01	0.01	4.05	0.39	4.11					
C.D. (P=0.05)	NS	NS	NS	12.22	1.18	12.38	Initial	0.54	3.97	13.14	1.29
CV%	0.57	8.07	4.06	5.45	4.82	2.24					

**Table-20-AST-1a (h): Effect of micronutrient on nutrient in soil after harvest in BxN hybrid at Imphal**

Treatment	Soil properties		Available nutrient (kg/ha)			Zn (mg/kg)	Fe (mg/kg)	Mn (mg/kg)	Co (mg/kg)
	OC (%)	pH	N	P	K				
T1	1.03	5.12	273.12	12.80	265.20	0.492	57.75	5.730	0.744
T2	1.06	5.18	281.33	14.30	258.70	0.356	53.04	5.364	0.594
T3	1.18	5.10	289.21	14.80	253.80	0.312	39.78	3.602	0.480
T4	1.09	5.21	292.18	15.90	269.30	0.302	55.28	4.764	0.666
T5	1.04	5.14	283.09	13.90	253.50	0.290	26.78	1.704	0.428
T6	1.07	5.13	272.03	14.30	260.80	2.612	54.14	6.514	1.396
Initial	1.28	5.20	290.70	16.50	285.30				

**Table-20-AST-1a (i): Effect of micronutrient on plant micro nutrient parameters after harvest at Imphal**

Treatment	Zn (mg/kg)	Fe (mg/kg)	Mn (mg/kg)	Co (mg/kg)
T1	46.000	111.625	33.625	4.900
T2	36.000	84.250	27.625	4.850
T3	57.250	133.875	29.125	3.825
T4	82.625	107.875	43.875	3.975
T5	42.750	119.125	39.375	7.075
T6	61.250	139.500	61.125	9.075

**Table-20-AST-1a (j): Effect of micronutrient on plant micro nutrient content at Banda**

Treatment	Zn (ppm)	Fe (ppm)	Mn (ppm)	Co (ppm)
T1	56.92	367.61	27.37	5.51
T2	55.71	626.21	28.46	5.73
T3	52.63	523.58	27.54	4.27
T4	83.19	614.83	32.96	5.24
T5	61.61	439.08	22.87	4.61
T6	85.17	412.41	31.55	6.27
SE(m) $\pm$	1.92	35.36	1.07	0.45
C.D. (P=0.05)	6.15	112.86	3.43	N/A
CV%	5.07	12.31	6.54	14.88

**Table-20-AST-1a (k): Effect of micronutrients on micronutrient content in crop and soil at Bikaner**

Treatments	Micronutrient content in crop ( ppm)				Micronutrient content in soil ( ppm)			
	Zn	Fe	Mn	Co	Zn	Fe	Mn	Co
Absolute control	19.26	199.23	30.65	2.10	3.20	4.35	4.45	0.07
RDF (100:50:50 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup> )	23.36	189.08	28.93	2.00	3.15	4.07	4.81	0.07
GRDF (100:50:50 N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O kg ha <sup>-1</sup> + FYM 5 t ha <sup>-1</sup> )	28.92	174.30	34.78	2.05	2.77	3.88	4.37	0.06
GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha <sup>-1</sup>	23.19	195.08	35.28	2.28	2.82	3.69	4.13	0.07
GRDF + two foliar sprays of government notified multi-micronutrient grade II @ 1% at 30 and 45 DAS.	31.06	198.22	43.40	2.55	2.45	4.09	4.04	0.07
GRDF + soil application of government notified multi-micronutrient grade I @ 25 kg ha <sup>-1</sup> + two foliar sprays of grade II @ 1% at 30 and 45 DAS.	20.60	174.35	35.98	2.23	2.41	3.67	3.87	0.07
SE(m) ±	1.22	4.69	1.26	0.16	0.13	0.27	0.14	0.01
C.D. (P=0.05)	3.85	14.77	3.97	NS	0.40	NS	0.45	NS
Micronutrient content in soil ( ppm) before sowing					<b>4.07</b>	<b>4.08</b>	<b>6.08</b>	<b>0.06</b>

## **K-20-AST-1 (b): Yield enhancement and bio-fortification of *kharif* forages with PGRs and micronutrients**

[(Table Reference: K-20-AST-1b (a) to (f)]

**Locations (4):** Palampur, Srinagar, Mandya and Ayodhya

### **Preamble**

### **Preamble**

About 43% and 18% of Indian soils have been reported to be deficient in Zn and B status, respectively. Zinc is known to improve the metabolism of the plant and yield; whereas boron improves the productivity by triggering source and sink relationship. Boron deficiency affects vegetative and reproductive growth of plants, resulting in inhibition of cell expansion and death of meristem. Plant growth regulators and micronutrients in minute quantities play an important role in enhancing growth and development of plants. PGRs like salicylic acid and triacontanol are easily available in the market and are in use with other crops. Therefore, it is proposed to assess the effect PGRs and micronutrients (Zinc and boron) on productivity of forages.

A trial was initiated during *Kharif* 2020 at four locations to study the effect of PGRs and micronutrients on growth, yield and quality of sorghum for three years. The objective of the study was to assess the effect of PGRs and micronutrients on herbage yield and quality, soil properties and economics. The treatments included; T<sub>1</sub>: Triacontanol 10 ppm at 30 DAS (foliar spray), T<sub>2</sub>: Salicylic acid 100 ppm at 30 DAS (foliar spray), T<sub>3</sub>: 5 kg Zn/ha soil application, T<sub>4</sub>: 2 kg B/ha soil application, T<sub>5</sub>: 5 kg Zn + 2 kg B/ha soil application, T<sub>6</sub>: 5 kg Zn/ha soil application + Triacontanol 10 ppm at 30 DAS foliar spray, T<sub>7</sub>: 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray, T<sub>8</sub>: 2 kg B/ha soil application + Triacontanol 10 ppm at 30 DAS foliar spray, T<sub>9</sub>: 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray, T<sub>10</sub>: 5 kg Zn + 2 kg B/ha soil application + Triacontanol 10 ppm at 30 DAS foliar spray, T<sub>11</sub>: 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray and T<sub>12</sub>: Water spray at the time of PGR application. Zn and B were applied at the time of sowing in the soil. The forage sorghum was grown at Palampur, Srinagar, and Ayodhya, whereas, maize was the test crop at Mandya. The crop was raised with recommended package of practices. In treatments, where zinc was not a treatment, an amount of sulphur through gypsum equivalent to sulphate supplied with 5 kg ZnSO<sub>4</sub> was applied to compensate. Zn and B were applied at the time of sowing. The crop was sown in 30 cm apart lines. The trial was laid out in Randomized Block Design with three replications.

## Results

The data revealed that, on location mean basis soil application of 5 kg Zn + 2 kg B/ha + triacontanol (10 ppm) as foliar spray at 30 DAS (T<sub>10</sub>) significantly recorded higher green fodder (464.1 q/ha), dry matter (122.7 q/ha) and crude protein yield (9.8 q/ha). The same treatment recorded higher plant height (208.4cm).

The results revealed that on centre mean basis, at Palampur soil application of 5 kg Zn + 2 kg B/ha + triacontanol (10 ppm) as foliar spray at 30 DAS (T<sub>10</sub>) significantly recorded higher green fodder, dry matter and crude protein yield (320.9 q, 79.1 q and 7.1 q respectively). The same treatment recorded higher plant height (155.0cm) and leaf stem ratio (0.60).

At Srinagar centre, soil application of 5 kg Zn + 2 kg B/ha + triacontanol (10 ppm) as foliar spray at 30 DAS (T<sub>10</sub>) significantly recorded higher green fodder, dry matter and crude protein yield (472.3 q, 118.8 q and 10.5 q respectively). The same treatment recorded higher plant height (210.6cm) and leaf stem ratio (0.70).

At Ayodhya centre also, soil application of 5 kg Zn + 2 kg B/ha + triacontanol (10 ppm) as foliar spray at 30 DAS (T<sub>10</sub>) significantly recorded higher green fodder, dry matter and crude protein yield (560.5 q, 160.1 q and 12.9 q respectively). The same treatment recorded higher plant height (206.2cm) and leaf stem ratio (0.70).

At Mandy centre, soil application of 5 kg Zn + 2 kg B/ha + salicylic acid (100 ppm) as foliar spray at 30 DAS (T<sub>11</sub>) significantly recorded higher green fodder, dry matter and crude protein yield (514.5 q, 137.8 q and 10.9 q respectively) in fodder maize. The same treatment recorded higher plant height (278.4cm) and leaf stem ratio (0.40).

**Table K-20-AST-1b (a): Effect of PGRs and micronutrients on green fodder yield of sorghum**

Treatments	Green fodder yield (q/ha)				
	Palampur	Srinagar	Ayodhya	Mean	Mandya
	Forage sorghum				Maize
T <sub>1</sub> : Tricontanol 10 ppm at 30 DAS	250.0	380.4	522.6	384.3	378.3
T <sub>2</sub> : Salicylic acid 100 ppm at 30 DAS (foliar spray)	261.7	387.1	498.1	382.3	402.7
T <sub>3</sub> : 5 kg Zn/ha soil application	243.1	366.2	518.1	375.8	431.5
T <sub>4</sub> : 2 kg B/ha soil application	246.8	370.4	412.1	343.1	437.9
T <sub>5</sub> : 5 kg Zn + 2 kg B/ha soil application	259.2	386.6	531.4	392.4	481.0
T <sub>6</sub> : 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	265.4	440.0	540.6	415.3	445.7
T <sub>7</sub> : 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	289.9	444.2	522.0	418.7	457.7
T <sub>8</sub> : 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	290.1	446.6	510.1	415.6	469.5
T <sub>9</sub> : 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	300.3	448.3	501.4	416.7	472.4
T <sub>10</sub> : 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	320.9	472.3	560.5	451.2	502.9
T <sub>11</sub> : 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	306.1	466.1	540.1	437.4	514.5
T <sub>12</sub> : Water spray at the time of PGR application	209.9	331.2	457.1	332.7	345.3
SE(m) ±	12.93	6.17	20.19		23.94
C.D. (P=0.05)	38.16	18.53	60.20		70.66

**Table K-20-AST-1b (b): Effect of PGRs and micronutrients on dry matter yield and of sorghum**

Treatments	Dry Matter yield (q/ha)				
	Palampur	Srinagar	Ayodhya	Mean	Mandya
	<b>Forage Sorghum</b>				<b>Maize</b>
T <sub>1</sub> : Tricontanol 10 ppm at 30 DAS	60.66	93.22	146.10	99.99	83.6
T <sub>2</sub> : Salicylic acid 100 ppm at 30 DAS (foliar spray)	63.54	95.8	138.49	99.28	100.2
T <sub>3</sub> : 5 kg Zn/ha soil application	57.58	89.21	144.71	97.17	106.2
T <sub>4</sub> : 2 kg B/ha soil application	60.02	92.11	137.26	96.46	102.3
T <sub>5</sub> : 5 kg Zn + 2 kg B/ha soil application	63.22	95.1	151.62	103.31	106.7
T <sub>6</sub> : 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	67.13	113.52	145.84	108.83	98.1
T <sub>7</sub> : 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	71.88	111.66	141.63	108.39	107
T <sub>8</sub> : 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	69.99	108.42	14.46	64.29	114.5
T <sub>9</sub> : 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	74.02	113.63	138.12	108.59	109.1
T <sub>10</sub> : 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	79.08	118.8	160.12	119.33	132.6
T <sub>11</sub> : 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	76.16	118.37	148.15	114.23	137.8
T <sub>12</sub> : Water spray at the time of PGR application	51.99	83.45	120.28	85.24	87.1
SE(m) ±	3.19	1.54	5.93		6.23
C.D. (P=0.05)	9.41	4.67	16.14		18.38

**Table K-20-AST-1b (c): Effect of PGRs and micronutrients on crude protein yield (q/ha) of sorghum**

Treatments	Crude Protein Yield (q/ha)				
	Palampur	Srinagar	Ayodhya	Mean	Mandya
	Forage sorghum				Maize
T <sub>1</sub> : Tricentanol 10 ppm at 30 DAS	5.39	7.74	10.55	7.89	7.4
T <sub>2</sub> : Salicylic acid 100 ppm at 30 DAS (foliar spray)	5.72	7.76	9.61	7.70	7.3
T <sub>3</sub> : 5 kg Zn/ha soil application	5.30	7.43	10.35	7.69	7.7
T <sub>4</sub> : 2 kg B/ha soil application	5.29	7.42	9.61	7.44	7.5
T <sub>5</sub> : 5 kg Zn + 2 kg B/ha soil application	5.52	7.73	10.99	8.08	7.9
T <sub>6</sub> : 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	6.06	9.39	10.67	8.71	8.0
T <sub>7</sub> : 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	6.32	9.25	10.19	8.59	8.6
T <sub>8</sub> : 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	6.44	9.27	10.04	8.58	8.6
T <sub>9</sub> : 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	6.70	9.37	9.14	8.40	8.0
T <sub>10</sub> : 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	7.11	10.50	12.88	10.16	9.8
T <sub>11</sub> : 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	7.01	10.28	10.88	9.39	9.8
T <sub>12</sub> : Water spray at the time of PGR application	4.43	7.05	8.42		6.6
SE(m) ±	0.31	0.34	0.55		0.4
C.D. (P=0.05)	0.92	1.02	1.76		1.1



**Table K-20-AST-1b (d): Effect of PGRs and micronutrients on crude protein content of sorghum**

Treatments	Crude Protein (%)					ADF (%)	NDF (%)
	Palampur	Srinagar	Ayodhya	Mean	Mandya	Ayodhya	Ayodhya
	Forage sorghum				Maize	Forage sorghum	
T <sub>1</sub> : Tricontanol 10 ppm at 30 DAS	8.87	8.85	7.22	8.31	7.0	40.06	62.3
T <sub>2</sub> : Salicylic acid 100 ppm at 30 DAS (foliar spray)	9.00	8.75	6.95	8.23	6.3	37.4	60.45
T <sub>3</sub> : 5 kg Zn/ha soil application	9.20	9.04	7.15	8.46	7.4	39.26	61.96
T <sub>4</sub> : 2 kg B/ha soil application	8.80	8.40	7.00	8.07	7.4	37.5	60.60
T <sub>5</sub> : 5 kg Zn + 2 kg B/ha soil application	8.73	8.48	7.25	8.15	7.0	40.9	62.90
T <sub>6</sub> : 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	9.00	8.84	7.32	8.39	6.1	41.28	63.50
T <sub>7</sub> : 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	8.80	8.75	7.20	8.25	7.9	40.0	62.20
T <sub>8</sub> : 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	9.20	9.09	7.15	8.48	7.4	40.2	61.86
T <sub>9</sub> : 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	9.07	8.52	6.98	8.19	6.1	38.6	60.9
T <sub>10</sub> : 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	9.00	9.13	7.55	8.56	6.6	41.56	64.3
T <sub>11</sub> : 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	9.20	9.03	7.35	8.53	7.9	41.5	63.5
T <sub>12</sub> : Water spray at the time of PGR application	8.53	8.31	7.00	7.95	7.4	36.9	60.2
SE(m) ±	0.16	NS	0.00		0.3	1.59	1.63
C.D. (P=0.05)	NS	NS	NS		1.0	NS	NS

**Table K-20-AST-1b (e): Effect of PGRs and micronutrients on growth parameters of sorghum**

Treatments	Plant Height (cm) at harvest			
	Palampur	Srinagar	Ayodhya	Mandya
	Forage sorghum			Maize
T <sub>1</sub> : Tricentanol 10 ppm at 30 DAS	131.6	170.87	192.77	231.5
T <sub>2</sub> : Salicylic acid 100 ppm at 30 DAS (foliar spray)	133.3	173.91	187.40	236.0
T <sub>3</sub> : 5 kg Zn/ha soil application	128.2	161.55	189.10	244.9
T <sub>4</sub> : 2 kg B/ha soil application	129.4	152.30	180.13	239.2
T <sub>5</sub> : 5 kg Zn + 2 kg B/ha soil application	130.1	168.77	191.63	251.2
T <sub>6</sub> : 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	135.1	175.64	161.67	247.4
T <sub>7</sub> : 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	134.6	172.19	190.13	259.1
T <sub>8</sub> : 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	138.6	178.33	189.12	241.0
T <sub>9</sub> : 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	138.6	174.10	189.00	256.1
T <sub>10</sub> : 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	155.0	210.61	206.17	262.0
T <sub>11</sub> : 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	145.0	203.77	198.40	278.4
T <sub>12</sub> : Water spray at the time of PGR application	125.5	152.80	166.46	217.9
SE(m) ±	3.34	11.75	9.10	12.9
C.D. (P=0.05)	9.85	11.16	25.10	37.7

**Table K-20-AST-1b (f): Effect of PGRs and micronutrients on quality of sorghum**

Treatments	Leaf Stem Ratio			
	Palampur	Srinagar	Ayodhya	Mandya
	Forage sorghum			Maize
1: Tricontanol 10 ppm at 30 DAS	0.41	0.62	0.69	0.32
T2: Salicylic acid 100 ppm at 30 DAS (foliar spray)	0.45	0.66	0.67	0.27
T3: 5 kg Zn/ha soil application	0.47	0.66	0.7	0.34
T4: 2 kg B/ha soil application	0.49	0.69	0.69	0.3
T5: 5 kg Zn + 2 kg B/ha soil application	0.5	0.7	0.72	0.32
T6: 5 kg Zn/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	0.55	0.72	0.71	0.32
T7: 5 kg Zn/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	0.5	0.72	0.67	0.31
T8: 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	0.55	0.73	0.66	0.32
T9: 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	0.53	0.72	0.67	0.32
T10: 5 kg Zn + 2 kg B/ha soil application + triacontanol 10 ppm at 30 DAS foliar spray	0.58	0.74	0.7	0.33
T11: 5 kg Zn + 2 kg B/ha soil application + salicylic acid 100 ppm at 30 DAS foliar spray	0.6	0.74	0.73	0.36
T12: Water spray at the time of PGR application	0.63	0.77	0.68	0.33
SE(m) $\pm$	0.02	NS	0.03	0.02
C.D. (P=0.05)	0.05	NS	NS	0.05

**K-21-AST-7: Effect of nitrogen and cutting management on performance of forage pearl millet varieties**

[Table Reference: K-21-AST-7 (a) to (h)]

**Locations:**Hyderabad, Raipur, Pusa, Ludhiana, Jabalpur and Varanasi

An experiment was started during *Kharif 2020* at Hyderabad, Raipur, Pusa, Ludhiana, Jabalpur and Varanasi centre in coordinated mode to study the effect of nitrogen and cutting management on yield and economics of new pearl millet varieties for prolonged quality fodder availability period. All possible combinations of four pearl millet varieties (TSFB 15-4, TSFB 15-8, MotiBajra and BAIF Bajra-1) with two nitrogen levels (80 and 120 kg/ ha) and two cutting management two cuts and three cuts at different intervals to harvest maximum quality fodder yield was conducted in split plot design with three replication. For two cutting system, first cut was taken at 60 days after sowing and second cut at 50% flowering. In three cutting management system, first cut was done at 50 days after sowing, second at 35 after first cut and third cut was taken at 50% flowering. Experiment was conducted to evaluate two cut and three cut for maximizing green fodder yield and prolonging green fodder availability.

Among varieties, BAIF Bajra-1 produced maximum green fodder yield at Raipur and Pusa. Whereas, at Ludhiana, Jabalpur and Varanasi variety Moti Bajra produced maximum green fodder yield. At Hyderabad center, variety TSFB 15-8 produced maximum green fodder. On locational mean basis, Moti Bajra produced maximum green and dry fodder yield (636.9 and 158.1 q/ ha). Application of 120 kg/ha nitrogen produced maximum green and dry fodder yield. Three cut at different interval produced maximum green fodder and dry fodder yield (612.4 and 139.6 q/ ha) on locational mean basis. Results of economics shows that maximum gross return, net return and B:C ratio was achieved with variety Moti Bajra with application of 120 kg/ha nitrogen and three cuts at different intervals *i.e.* first at 50 days after sowing, second at 35 after first cut and last cut at 50% flowering.

**Table: K-21-AST-7 (a): Effect of nitrogen and cutting management on biomass yield(q/ha)of forage Pearl Millet varieties**

Treatments	Total Green fodder yield							Total Dry matter yield						
	Rai-pur	Hydera-bad	Pu-sa	Ludh-iana	Jabal-pur	Vara-nasi	Mean	Rai-pur	Hydera-bad	Pu-sa	Ludh-iana	Jabal-pur	Vara-nasi	Mean
<b>Varieties</b>														
TSFB 15-4	387	704	570	467	594	448.6	<b>528.4</b>	74.9	182.1	112	88.7	155.9	156.9	<b>128.4</b>
TSFB 15-8	563	770	663	594	668	523.6	<b>630.3</b>	109.8	191.7	133.8	112.4	211.7	167.8	<b>154.5</b>
Moti Bajra	568	666	688	646	689	564.2	<b>636.9</b>	115.8	172.2	139.7	120.3	214.9	185.7	<b>158.1</b>
BAIF Bajra-1	628	620	692	501	633	474.6	<b>591.4</b>	129.8	152.8	138.8	92.4	197.7	168.3	<b>146.6</b>
SE(m) ±	<b>15.5</b>	<b>19.4</b>	<b>14.9</b>	<b>9.5</b>	<b>12.4</b>	19.45		<b>3.87</b>	<b>6.8</b>	<b>3.9</b>	<b>1.8</b>	<b>3.56</b>	4.55	
C.D. (P=0.05)	<b>53.6</b>	<b>57.5</b>	<b>51.6</b>	<b>32.7</b>	<b>39.6</b>	<b>67.4</b>		<b>13.37</b>	<b>19.8</b>	<b>13.5</b>	<b>6.4</b>	<b>9.85</b>	<b>15.76</b>	
<b>Nitrogen levels</b>														
80 kg/ha	511	664	604	515	633	449.4	<b>562.7</b>	102	166.7	113.3	90.8	195	144.5	<b>135.4</b>
120 kg/ha	561	716	702	589	661	556.0	<b>630.8</b>	113.1	182.7	148.9	116.1	205.4	169.8	<b>156.0</b>
SE(m) ±	<b>4.9</b>	<b>14</b>	<b>10.5</b>	<b>8</b>	<b>9.4</b>	14.16		<b>1.51</b>	<b>4.8</b>	<b>2.2</b>	<b>1.5</b>	<b>2.36</b>	4.76	
C.D. (P=0.05)	<b>14.2</b>	<b>40.7</b>	<b>30.6</b>	<b>23.2</b>	<b>24.5</b>	<b>46.21</b>		<b>4.43</b>	<b>14</b>	<b>6.3</b>	<b>4.5</b>	<b>6.44</b>	<b>15.53</b>	
<b>Cutting management</b>														
Two cuts	522	615	643	574	613	497.1	<b>577.4</b>	101.6	161.2	132.3	110.1	135.6	155.36	<b>132.7</b>
Three cuts	550	765	663	530	658	508.3	<b>612.4</b>	113.6	188.2	129.9	96.8	150	158.97	<b>139.6</b>
SE(m) ±	<b>4.9</b>	<b>14</b>	<b>10.5</b>	<b>8</b>	<b>9.4</b>	11.07		<b>1.51</b>	<b>4.8</b>	<b>2.2</b>	<b>1.5</b>	<b>3.22</b>	2.79	
C.D. (P=0.05)	<b>14.2</b>	<b>40.7</b>	<b>NS</b>	<b>23.2</b>	<b>27.5</b>	<b>33.18</b>		<b>4.43</b>	<b>14</b>	<b>NS</b>	<b>4.5</b>	<b>9.52</b>	<b>8.37</b>	
<b>Interaction</b>														
<b>AXBXC</b>	NS	NS	NS	--	--	NS		NS	NS	NS	--	--	NS	

**Table K-21-AST-7 (b): Effect of nitrogen and cutting management on economics of forage Pearl Millet varieties**

Treatments	Cost of cultivation (Rs./ha)				Gross return (Rs./ha)					Net return (Rs./ha)					B:C ratio				
	Rai-pur	Pu-sa	Vara-nasi	Mean	Rai-pur	Pusa	Jabal-pur	Vara-nasi	Mean	Rai-pur	Pusa	Jabal-pur	Varan-asi	Mean	Rai-pur	Pusa	Jabal-pur	Vara-nasi	Mean
<b>Varieties</b>																			
TSFB 15-4	23585	33371	21150	<b>26035</b>	48420	85433	59363	53832	<b>61762</b>	24835	52062	37127	32682	<b>36677</b>	2.10	2.60	2.70	1.55	<b>2.24</b>
TSFB 15-8	23585	33371	21150	<b>26035</b>	70365	99399	66775	62832	<b>74843</b>	46780	66028	43810	41682	<b>49575</b>	3.00	3.00	2.90	1.97	<b>2.72</b>
Moti Bajra	23585	33371	21150	<b>26035</b>	70988	103242	68853	67704	<b>77697</b>	47403	69871	46617	46554	<b>52611</b>	3.00	3.10	3.10	2.20	<b>2.85</b>
BAIF Bajra-1	23585	33371	21150	<b>26035</b>	78553	103777	63263	56952	<b>75636</b>	54968	70406	41027	35802	<b>50551</b>	3.30	3.10	2.90	1.69	<b>2.75</b>
SE(m) ±	-	-	-	-	<b>1945</b>	<b>2239</b>	-	-	-	<b>1945</b>	<b>2239</b>	-	-	-	<b>0.08</b>	<b>0.07</b>	-	-	-
C.D. (P=0.05)	-	-	-	-	<b>6714</b>	<b>7747</b>	-	-	-	<b>6714</b>	<b>7747</b>	-	-	-	<b>0.28</b>	<b>0.25</b>	-	-	-
<b>Nitrogen levels</b>																			
80 kg/ha	23279	33131	20945	<b>25785</b>	63923	90592	63263	53930	<b>67927</b>	52449	57461	40701.5	32985	<b>45899</b>	2.70	2.80	2.80	1.57	<b>2.47</b>
120 kg/ha	23893	33611	21355	<b>26286</b>	70240	105333	66083	66726	<b>77096</b>	57486	71722	42829.5	45371	<b>54352</b>	2.90	3.20	2.80	2.12	<b>2.76</b>
SE(m) ±	-	-	-	-	<b>610</b>	<b>1570</b>	-	-	-	<b>610</b>	<b>1570</b>	-	-	-	<b>0.02</b>	<b>0.05</b>	-	-	-
C.D. (P=0.05)	-	-	-	-	<b>1781</b>	<b>4583</b>	-	-	-	<b>1781</b>	<b>4583</b>	-	-	-	<b>0.07</b>	<b>0.14</b>	-	-	-
<b>Cutting management</b>																			
Two cuts	22920	29682	20900	<b>24501</b>	65336	96477	61252	59654	<b>70680</b>	42416	66795	38731	39154	<b>46774</b>	2.90	3.30	2.70	1.87	<b>2.69</b>
Three cuts	24250	37060	21400	<b>27570</b>	68827	99448	65834	61002	<b>73778</b>	44577	62388	42708	39202	<b>47219</b>	2.80	2.70	2.90	1.83	<b>2.56</b>
SE(m) ±	-	-	-	-	<b>610</b>	<b>1570</b>	-	-	-	<b>610</b>	<b>1570</b>	-	-	-	<b>0.02</b>	<b>0.05</b>	-	-	-
C.D. (P=0.05)	-	-	-	-	<b>1781</b>	<b>NS</b>	-	-	-	<b>1781</b>	<b>NS</b>	-	-	-	<b>NS</b>	<b>0.14</b>	-	-	-

**Table K-21-AST-7 (c): Effect of nitrogen and cutting management on nutrient uptake of forage Pearl Millet varieties**

Treatments	Total N Uptake (kg/ha)					Total P Uptake (kg/ha)				Total K Uptake (kg/ha)			
	Raipur	Hyderabad	Pusa	Jabalpur	Mean	Raipur	Pusa	Jabalpur	Mean	Raipur	Pusa	Jabalpur	Mean
<b>Varieties</b>													
TSFB 15-4	109.0	221.1	132.3	191.7	<b>163.5</b>	27.0	41.1	46.8	<b>38.3</b>	55.2	82.9	95.1	<b>77.7</b>
TSFB 15-8	177.5	218.8	166.3	260.4	<b>205.8</b>	42.8	52.2	63.5	<b>52.8</b>	90.6	110.7	129.1	<b>110.1</b>
Moti Bajra	176.7	183.1	176.3	264.4	<b>200.1</b>	49.2	59.5	64.5	<b>57.7</b>	95.9	117.3	131.1	<b>114.8</b>
BAIF Bajra-1	197.0	156.6	174.9	243.2	<b>192.9</b>	61.3	65.8	59.3	<b>62.1</b>	113.4	121.5	120.6	<b>118.5</b>
SE(m) ±	<b>8.1</b>	<b>8.4</b>	5.1	<b>0.9</b>		<b>2.0</b>	1.8	<b>1.0</b>		<b>4.5</b>	4.5	<b>0.9</b>	
C.D. (P=0.05)	<b>28.0</b>	<b>24.3</b>	17.8	<b>2.3</b>		<b>7.0</b>	6.1	<b>2.3</b>		<b>15.4</b>	15.4	<b>2.9</b>	
<b>Nitrogen levels</b>													
80 kg/ha	158.5	178.8	137.0	239.9	<b>178.6</b>	40.7	44.6	58.5	<b>47.9</b>	81.6	90.2	119.0	<b>96.9</b>
120 kg/ha	171.6	211.0	187.9	252.6	<b>205.8</b>	49.5	64.7	61.6	<b>58.6</b>	95.9	126.0	125.3	<b>115.7</b>
SE(m) ±	<b>3.0</b>	<b>5.9</b>	2.9	<b>0.2</b>		<b>0.8</b>	1.1	<b>0.4</b>		<b>1.8</b>	2.2	<b>0.9</b>	
C.D. (P=0.05)	<b>8.9</b>	<b>17.2</b>	8.6	<b>0.7</b>		<b>2.3</b>	3.1	<b>1.1</b>		<b>5.3</b>	6.5	<b>2.2</b>	
<b>Cutting management</b>													
Two cuts	154.9	187.1	166.6	166.7	<b>168.8</b>	43.0	55.8	40.7	<b>46.5</b>	84.8	110.1	82.7	<b>92.5</b>
Three cuts	175.2	202.7	158.4	184.5	<b>180.2</b>	47.2	53.5	45.0	<b>48.6</b>	92.7	106.1	91.5	<b>96.8</b>
SE(m) ±	<b>3.0</b>	<b>5.9</b>	2.9	<b>0.2</b>		<b>0.8</b>	1.1	<b>0.4</b>		<b>1.8</b>	2.2	<b>0.6</b>	
C.D. (P=0.05)	<b>8.9</b>	<b>NS</b>	NS	<b>0.7</b>		<b>2.3</b>	NS	<b>1.1</b>		<b>5.3</b>	NS	<b>1.2</b>	

**Table K-21-AST-7 (c): Cut wise green, dry and productivity of forage pearl millet varieties as affected at Raipur**

Treatments	Green fodder yield (q/ha)			Dry matter yield (q/ha)			Per Day productivity q/ha/day GFY	Per Day productivity q/ha/day DFY
	First Cut	Second Cut	Third Cut	First Cut	Second Cut	Third Cut		
Varieties								
TSFB 15-4	159.25	203.83	49.33	31.72	38.29	9.55	3.38	0.65
TSFB 15-8	259.83	259.33	86.66	50.93	50.70	16.39	4.93	0.95
Moti Bajra	313.33	215.15	78.66	65.02	42.78	15.55	4.95	0.99
BAIF Bajra-1	287.33	298.00	85.33	59.47	61.99	16.90	5.48	1.13
SE(m) ±	10.16	7.05	4.29	1.88	1.91		0.13	0.03
C.D. (P=0.05)	3.08	24.35	15.16	6.52	6.61		0.46	0.11
Nitrogen levels								
80 kg/ha	238.33	237.29	71.33	55.89	46.72	13.72	4.47	0.97
120 kg/ha	271.54	250.87	78.66	63.04	50.15	30.95	4.91	0.90
SE(m) ±	3.71	3.23	2.32	1.10	1.02		0.04	0.01
C.D. (P=0.05)	10.84	9.43	NS	3.21	3.00		0.11	0.04
Cutting management								
Two cuts	292.37	230.15	--	57.39	44.20	--	4.97	0.97
Three cuts	217.50	258.00	74.8	46.19	52.68	14.60	4.40	0.90
SE(m) ±	3.71	3.23	--	1.10	1.02	--	0.04	0.01
C.D. (P=0.05)	10.84	9.43	--	3.12	3.00	--	0.11	0.04
Interaction								
AXBXC	NS	NS	--	NS	NS	--	NS	NS



**Table K-21-AST-7 (d): Cut wise GFY and DFY of forage pearl millet varieties at Hyderabad**

Treatment	Green Fodder Yield (q ha <sup>-1</sup> )			Dry Matter Yield(q ha <sup>-1</sup> )		
	First Cut	Second Cut	Third Cut	First Cut	Second Cut	Third Cut
V <sub>1</sub> : TSFB15-4	454.7	306.9	62.8	96.9	69.8	15.4
V <sub>2</sub> : TSFB15-8	409.1	327.1	85.5	96.3	75.1	20.2
V <sub>3</sub> : Moti Bajra	365.4	291.9	64.7	86.8	67.3	18.0
V <sub>4</sub> : BAIFBajra-1	358.3	248.3	62.1	82.3	54.6	15.7
SE(m) ±	<b>12.1</b>	<b>13.4</b>	<b>5.5</b>	<b>4.2</b>	<b>3.4</b>	<b>1.5</b>
C.D. (P=0.05)	<b>35.0</b>	<b>38.9</b>	<b>16.0</b>	<b>NS</b>	<b>9.8</b>	<b>NS</b>
N <sub>1</sub> : 80 Kg ha <sup>-1</sup>	380.9	272.7	71.9	86.5	62.2	17.9
N <sub>2</sub> : 120 Kg ha <sup>-1</sup>	412.7	314.3	65.6	94.7	71.2	16.7
SE(m) ±	<b>8.6</b>	<b>9.5</b>	<b>3.9</b>	<b>2.9</b>	<b>2.4</b>	<b>1.9</b>
C.D. (P=0.05)	<b>24.7</b>	<b>27.5</b>	<b>NS</b>	<b>NS</b>	<b>6.9</b>	<b>NS</b>
C <sub>1</sub> : Two Cuts	408.9	294.7	0	94.1	67.1	0
C <sub>2</sub> : Three Cuts	384.7	292.4	137.0	87.1	66.3	34.7
SE(m) ±	<b>8.5</b>	<b>9.5</b>	<b>3.9</b>	<b>2.9</b>	<b>2.4</b>	<b>1.0</b>
C.D. (P=0.05)	<b>NS</b>	<b>NS</b>	<b>11.3</b>	<b>NS</b>	<b>NS</b>	<b>3.0</b>
<b>Interactions</b>						
V × N × C: SE(m) ±	<b>24.7</b>	<b>26.9</b>	<b>11.1</b>	<b>8.4</b>	<b>6.8</b>	<b>3.0</b>
C.D. (P=0.05)	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>

**Table K-21-AST-7 (e): Cut wise GFY and DFY of forage pearl millet varieties at Pusa**

Varieties	Green Fodder Yield (q ha <sup>-1</sup> )			Dry Matter Yield(q ha <sup>-1</sup> )		
	First cut	Second cut	Third cut*	First cut	Second cut	Third cut*
TSFB 15-4	285.7	211.2	145.2	57.7	40.7	27.2
TSFB 15-8	359.0	217.9	171.6	73.8	43.5	33.0
MotiBajra	368.8	219.6	199.8	75.2	44.6	39.7
BAIF Bajra-1	373.3	223.1	191.0	75.5	44.5	37.7
SE(m) ±	<b>9.8</b>	<b>7.3</b>	-	<b>3.0</b>	<b>1.2</b>	-
C.D. (P=0.05)	<b>33.8</b>	<b>NS</b>	-	<b>10.4</b>	<b>NS</b>	-
<b>Nitrogen levels</b>						
80 kg/ha	325.7	202.2	152.1	61.4	37.9	28.1
120 kg/ha	367.7	233.7	201.7	79.7	48.8	40.7
SE(m) ±	<b>9.4</b>	<b>5.9</b>	-	<b>1.9</b>	<b>1.2</b>	-
C.D. (P=0.05)	<b>27.4</b>	<b>17.2</b>	-	<b>5.6</b>	<b>3.4</b>	-
<b>Cutting management</b>						
Two cuts	381.4	261.7	176.9	79.3	53.0	-
Three cuts	312.0	174.1	-	61.8	33.7	34.4
SE(m) ±	<b>9.4</b>	<b>5.9</b>	-	<b>1.9</b>	<b>1.2</b>	-
C.D. (P=0.05)	<b>27.4</b>	<b>17.2</b>	-	<b>5.6</b>	<b>3.4</b>	-

**TableK-21-AST-7(f): Cut wise GFY and DFY of forage pearl millet varieties as affected at Ludhiana**

Treatments	Green fodder yield (q ha <sup>-1</sup> )			Dry Matter Yield(q ha <sup>-1</sup> )		
	First Cut	Second Cut	Third Cut	First Cut	Second Cut	Third Cut
<b>Varieties</b>						
TSFB 15-4	268.7	170.6	27.8	53.8	31.4	3.51
TSFB 15-8	346.6	212.5	34.8	69.1	39.1	4.18
MotiBajra	388.8	220.7	36.9	75.9	40.6	3.82
BAIF Bajra-1	303.3	166.7	30.6	58.4	30.9	3.15
SE(m) ±	<b>9.9</b>	<b>7.8</b>	<b>0.6</b>	<b>1.9</b>	<b>1.4</b>	<b>0.06</b>
C.D. (P=0.05)	<b>34.1</b>	<b>26.9</b>	<b>2.1</b>	<b>6.7</b>	<b>4.9</b>	<b>0.20</b>
<b>Nitrogen management</b>						
80 kg/ha	306.3	177.3	31.1	57.3	30.5	3.04
120 kg/ha	347.4	207.9	33.9	71.3	40.5	4.29
SE(m) ±	<b>6.4</b>	<b>3.9</b>	<b>0.6</b>	<b>1.3</b>	<b>0.7</b>	<b>0.06</b>
C.D. (P=0.05)	<b>18.6</b>	<b>11.4</b>	<b>1.6</b>	<b>3.7</b>	<b>2.1</b>	<b>0.17</b>
<b>Cutting management</b>						
Two cuts	343.6	230.4	0.0	67.4	42.7	0.00
Three cuts	310.0	154.9	65.0	61.2	28.3	7.33
SE(m) ±	<b>6.4</b>	<b>3.9</b>	<b>0.6</b>	<b>1.3</b>	<b>0.7</b>	<b>0.06</b>
C.D. (P=0.05)	<b>18.6</b>	<b>11.4</b>	<b>1.6</b>	<b>3.7</b>	<b>2.1</b>	<b>0.17</b>

**TableK-21-AST-7 (g):Cut wise growth parameters of forage pearl millet varieties as affected by nitrogen and cutting management at Raipur**

Treatments	Plant height (cm)			No of tillers m row length			L:S Ratio		
	First Cut	Second Cut	Third Cut	First Cut	Second Cut	Third Cut	First Cut	Second Cut	Third Cut
<b>Varieties</b>									
TSFB 15-4	165.89	250.91	132.4	20.33	28.33	22.78	0.71	0.34	0.19
TSFB 15-8	200.95	209.66	95.2	31.83	41.66	30.78	0.57	0.27	0.35
Moti Bajra	224.35	186.66	106.1	26.75	35.91	31.44	0.52	0.26	0.20
BAIF Bajra-1	187.04	227.08	111.7	28.66	34.25	30.11	0.62	0.31	0.36
SE(m) ±	<b>4.08</b>	<b>7.19</b>	--	<b>2.15</b>	<b>1.60</b>	--	<b>0.05</b>	<b>0.01</b>	--
C.D. (P=0.05)	<b>14.12</b>	<b>24.84</b>	--	<b>7.43</b>	<b>5.53</b>	--	<b>NS</b>	<b>0.04</b>	--
<b>Nitrogen levels</b>									
80 kg/ha	193.30	216.33	104.2	27.75	34.45	28.5	0.61	0.30	0.29
120 kg/ha	195.81	220.83	118.5	26.04	35.62	29.1	0.62	0.29	0.26
SE(m) ±	<b>2.78</b>	<b>4.85</b>		<b>1.46</b>	<b>1.20</b>	--	<b>0.02</b>	<b>0.01</b>	--
C.D. (P=0.05)	<b>NS</b>	<b>NS</b>		<b>NS</b>	<b>NS</b>	--	<b>NS</b>	<b>NS</b>	--
<b>Cutting management</b>									
Two cuts	213.19	214.33	--	<b>24.33</b>	<b>35.08</b>	--	0.52	0.27	--
Three cuts	175.92	239.83	111.4	29.45	35.00	28.77	0.70	0.32	0.28
SE(m) ±	<b>2.78</b>	<b>4.85</b>	--	<b>1.46</b>	<b>1.20</b>	--	<b>0.02</b>	<b>0.01</b>	--
C.D. (P=0.05)	<b>8.11</b>	<b>14.15</b>	--	<b>4.28</b>	<b>NS</b>	--	<b>0.07</b>	<b>0.03</b>	--
<b>Interaction</b>									
<b>AXBXC</b>	<b>NS</b>	<b>NS</b>	--	<b>NS</b>	<b>NS</b>	--	<b>NS</b>	<b>NS</b>	--

**Table K-21-AST-7 (h): Cut wise growth parameters of forage pearl millet varieties as affected by nitrogen and cutting management at Pusa**

Varieties	Plant height (cm)			Tillers/m			L:S ratio		
	First cut	Second cut	Third cut	First cut	Second cut	Third cut	First cut	Second cut	Third cut
TSFB 15-4	141.1	122.6	111.9	19.08	34.20	32.04	0.36	0.42	0.39
TSFB 15-8	148.6	127.7	117.6	25.75	39.30	37.45	0.32	0.36	0.37
MotiBajra	153.1	130.3	119.8	22.08	37.76	42.00	0.31	0.37	0.35
BAIF Bajra-1	154.9	132.9	118.4	23.88	37.63	41.80	0.34	0.40	0.39
SE(m) $\pm$	2.7	3.0	-	0.71	1.00	-	0.01	0.00	-
C.D. (P=0.05)	9.2	NS	-	2.47	NS	-	0.03	0.02	-
<b>Nitrogen levels</b>									
80 kg/ha	143.2	123.4	112.6	21.08	34.64	36.37	0.30	0.36	0.34
120 kg/ha	155.6	133.4	121.2	24.31	39.80	40.28	0.37	0.41	0.41
SE(m) $\pm$	2.1	2.5	-	0.41	0.47	-	0.01	0.01	-
C.D. (P=0.05)	6.1	7.2	-	1.21	1.36	-	0.03	0.02	-
<b>Cutting management</b>									
Two cuts	164.0	145.0	-	24.75	39.01	-	0.36	0.37	
Three cuts	134.9	111.8	116.9	20.65	35.43	38.32	0.31	0.40	0.38
SE(m) $\pm$	2.1	2.5	-	0.41	0.47	-	0.01	0.01	-
C.D. (P=0.05)	6.1	7.2	-	1.21	1.36	-	0.03	0.02	-

## B. Location Specific Trials

### K-20-AST-3: Optimizing the feedstuffs for air evacuating method of silage production in polybags

[(Table Reference: K-20-AST-3(a) to (b))]

#### Location (1): Coimbatore

A Field experiment was initiated during June 2020 at Tamil Nadu Agricultural University, Coimbatore to identify suitable fodder crops and additives for polybag method of silage production. The treatments consists of four fodder crops (T<sub>1</sub> - BN hybrid grass (CO BN- 5), T<sub>2</sub> - Fodder maize (African Tall), T<sub>3</sub> - Perennial fodder sorghum (CO-31), T<sub>4</sub> - Guinea grass (CO GG-3) and four method and additives (F<sub>1</sub> - Air evacuation method without additives, F<sub>2</sub> - Air evacuation method with additives (molasses 1%), F<sub>3</sub> - Manual compaction method without additives, F<sub>4</sub> - Manual compaction method with additives (molasses 1%). In air evacuation method, removal of air in poly bags was achieved using vacuum machines. Additives were applied on fresh weight basis. Experiment was laid out in Factorial Randomized Block Design with three replications. Polybags with a capacity of 20kg were used. The observations on fresh silage yield, dry matter content, and temperature, moisture content (before and after storage) were recorded. The laboratory analysis for estimating quality parameters viz., pH, crude protein content, crude fibre content, Ash, acetic acid, lactic acid, butyric acid, digestible dry matter after ensiling were done and data documented. Analyses were done immediately after opening the bag by collecting samples from different layers of bag.

Fodder crops indicated marked impact on dry matter content, moisture content, PH, crude protein content, crude fibre content, ash content, lactic acid content and acetic acid content. Among the different fodder crops, silage produced with fodder maize recorded significantly higher moisture content (before ensiling) of 69.7 percent, moisture content (after ensiling) of 62.4 percent, acetic acid content of 2.2 percent, lactic acid content of 8.2 percent, dry matter digestibility of 61.4 percent and palatability of 98.1 percent with PH of 4.2.

Significantly higher crude protein content of 11.3 percent and ash content of 10.8 percent were registered in Bajra Napier hybrid grass silage. It also recorded the palatability of 97.8 percent which was on par with fodder maize silage. silage of fodder sorghum registered significantly higher dry matter content of 29.9 percent and higher PH of 5.1 with significantly lesser moisture content (before and after silage), crude fibre content (24.5 percent), acetic acid content (1.4 percent), lactic acid content (5.6 percent), dry matter digestibility (52.6 percent) and palatability (93.5 percent).

Method of silage production and additives had no significant effect on fresh silage yield, dry matter content, crude fibre content, ash content, butyric acid content, dry matter digestibility and palatability of silage in polybags. However, it exerted a considerable variation in silage temperature, moisture content (before and after silage), crude protein content, lactic acid content, acetic acid content and dry matter digestibility. Among the methods and additive management, air evacuation method of silage production with application of molasses 1% recorded significantly higher moisture content after silage (61.7 percent), crude protein content (9.5 percent), acidic acid content (2.0 percent) and lactic acid content with lesser PH of 4.3. It was found to be on par with manual compaction method with additives.

Different fodder crops, method of silage production with and without additives, also had a significant interaction effect on acetic acid and lactic acid contents of silage. Higher acetic acid content of 2.5 percent and lactic acid content of 9.0 per cent were recorded in poly bag silage of fodder maize produced by air evacuation method with additives (T2F2) and it was on par with silage of fodder maize produced by manual compaction method with additives (T2F4). However, significantly lower acetic acid content of 1.2 percent and lactic acid content of 4.4 per cent were recorded in silage of fodder sorghum produced through manual compaction method without additives (T3F3).

**Table K-20-AST-3 (a): Effect of different fodder crops, method and additives on fresh yield, dry matter and moisture content of polybags silage**

Treatments	Fresh silage yield (Kg)	Dry matter content (%)	Temperature °C	Moisture percent (Before)	Moisture percent (After)	pH
<b>Factor 1:Fodder crops (4)</b>						
T <sub>1</sub> - BN hybrid grass (CO BN- 5)	19.7	25.9	34.2	67.6	61.4	4.4
T <sub>2</sub> - Fodder maize (African Tall)	19.6	23.5	35.1	69.7	62.4	4.2
T <sub>3</sub> - Perennial fodder sorghum (CO-31)	19.4	29.9	33.3	62.1	57.1	5.1
T <sub>4</sub> - Guinea grass (CO GG-3)	19.6	28.1	34.6	64.9	58.9	4.7
SE(m) ±	0.06	0.24	0.30	0.53	0.54	0.04
C.D. (P=0.05)	NS	0.71	0.88	1.52	1.56	0.12
<b>Factor 2:Method and additives (4)</b>						
F <sub>1</sub> - Air evacuation method without additives	19.6	27.1	33.8	65.3	59.1	4.9
F <sub>2</sub> – Air evacuation method with additives (molasses 1%)	19.5	26.6	35.4	66.9	61.7	4.3
F <sub>3</sub> – Manual compaction method without additives	19.7	27.0	32.9	64.8	58.9	4.8
F <sub>4</sub> – Manual compaction method with additives (molasses 1%)	19.6	27.2	35.0	67.2	60.6	4.4
SE(m) ±	0.06	0.24	0.30	0.53	0.54	0.04
C.D. (P=0.05)	NS	NS	0.59	1.52	1.56	0.12
<b>Factor 1 x Factor 2</b>						
SE(m) ±	0.12	0.49	0.61	1.05	1.08	0.08
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
CV (%)	1.1	3.2	3.0	2.8	3.2	3.1



**Table K-20-AST-3 (b): Effect of different fodder crops, method and additives on quality of polybags silage (over three years)**

Treatments	CP (%)	Crude fibre (%)	Ash (%)	Acetic acid (%)	Lactic acid (%)	Butyric acid (%)	DDM (%)	Palatability (%)
<b>Factor 1:Fodder crops (4)</b>								
T <sub>1</sub> – BN hybrid grass (CO BN- 5)	11.3	28.9	10.8	1.9	7.1	0.0	57.9	97.8
T <sub>2</sub> – Fodder maize (African Tall)	9.4	25.1	6.1	2.2	8.2	0.0	61.4	98.1
T <sub>3</sub> – Perennial fodder sorghum (CO-31)	8.5	24.5	9.4	1.4	5.6	0.0	52.6	93.5
T <sub>4</sub> – Guinea grass (CO GG-3)	7.2	30.9	9.7	1.8	6.7	0.0	55.4	96.9
SE(m) ±	0.11	0.43	0.08	0.02	0.07		0.67	0.59
C.D. (P=0.05)	0.22	0.87	0.24	0.06	0.21	NS	1.95	1.70
<b>Factor 2:Method and additives (4)</b>								
F <sub>1</sub> – Air evacuation method without additives	9.1	26.8	9.1	1.7	6.4	0.0	56.8	96.1
F <sub>2</sub> – Air evacuation method with additives (molasses 1%)	9.5	27.6	8.9	2.0	7.5	0.0	57.1	97.5
F <sub>3</sub> – Manual compaction method without additives	8.9	27.5	9.0	1.5	5.7	0.0	55.9	95.8
F <sub>4</sub> – Manual compaction method with additives (molasses 1%)	9.1	27.5	8.9	2.1	7.8	0.0	57.4	96.8
SE(m) ±	0.11	0.43	0.08	0.02	0.07		0.67	0.59
C.D. (P=0.05)	0.22	NS	NS	0.06	0.21	NS	NS	NS
<b>Factor 1 x Factor 2</b>								
SE(m) ±	0.21	0.87	0.17	0.04	0.14		1.35	1.18
C.D. (P=0.05)	NS	NS	NS	0.12	0.42	NS	NS	NS
CV (%)	2.9	3.8	3.2	4.0	3.7		4.1	2.1

## **K-20-AST-6: Precision nitrogen management for enhancing fodder yield and nitrogen use efficiency in forages**

[(Table Reference: K-20-AST-6 (a))]

**Location (1):** Srinagar

### **Preamble**

Fodder grasses are highly responsive to nitrogen application in terms of growth, quality and yield. Fertilizer nitrogen is a common input used by farmers in different agro-climatic conditions in India with varied use efficiency (30-50%). Nitrogen exhibits high synergistic effect in combination with water and other inputs. Application of inadequate dose of nitrogen results in yield reduction and application in excess leads to increased cost of cultivation and environmental pollution. Hence, the present study on precision management of nitrogen for efficient management and increasing NUE is proposed.

A field experiment was started during *Kharif* 2020 (establishment year) at Srinagar Centre on precision nitrogen management for enhancing fodder yield and nitrogen use efficiency in forage maize variety SFM-1 (KDFM-1). The crop was planted at spacing of 30 x10 cm. The treatments consisted of **T<sub>1</sub>** (No N), **T<sub>2</sub>** 50 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40, **T<sub>3</sub>** 50 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50, **T<sub>4</sub>** 50 kg N/ha (40% N basal) + remaining based on LCC 4, **T<sub>5</sub>** 50 kg N/ha (40% N basal) + remaining based on LCC 5, **T<sub>6</sub>** 100 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40, **T<sub>7</sub>** 100 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50, **T<sub>8</sub>** 100 kg N/ha (40% N basal) + remaining based on LCC 4, **T<sub>9</sub>** 100 kg N/ha (40% N basal) + remaining based on LCC 5, **T<sub>10</sub>** 150 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40, **T<sub>11</sub>** 150 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50, **T<sub>12</sub>** 150 kg N/ha (40% N basal) + remaining based on LCC 4, **T<sub>13</sub>** 150 kg N/ha (40% N basal) + remaining based on LCC 5, **T<sub>14</sub>** as per recommended package of practices (50% N as basal, remaining 50% at 30 days after sowing). The treatments were replicated thrice in a randomized block design. The results recorded during the year indicated that production of fodder maize was better for the treatment **T<sub>14</sub>** (150 kg N/ha (40% N basal) + remaining based on LCC 5. It recorded 479.12 q green and 137.45 q dry matter yield per hectare. However, it was on par with treatment **T<sub>10</sub>**, **T<sub>11</sub>**, **T<sub>12</sub>** and **T<sub>13</sub>** in terms of green fodder and treatment **T<sub>12</sub>** and **T<sub>13</sub>** in terms of dry matter productivity. Treatment **T<sub>14</sub>** (150 kg N/ha (40% N basal) + remaining based on LCC 5 also recorded nitrogen uptake and CP yield over other treatments. The growth parameters namely; plant height; number of leaves per plant and quality were also improved with this treatment as compared to other treatments.

**Table K-20-AST-6 (a): Effect of precision nitrogen management Yield and Nitrogen uptake**

Treatments		Plant height (cm)	No. of leaves / plant	Green fodder yield (q/ha)	Dry fodder yield (q/ha)	N Content (%)	N uptake (Kg/ha)	C P yield (kg/ha)
T <sub>1</sub>	No N Control	221.50	9.92	423.91	85.65	0.40	34.26	214.12
T <sub>2</sub>	50 kg N/ha (40% basal) + remaining based on LCC 4	224.28	10.24	429.68	91.28	0.43	39.25	245.31
T <sub>3</sub>	50 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 40	233.10	10.72	443.67	98.32	0.46	45.22	282.62
T <sub>4</sub>	50 kg N/ha (40% basal) + remaining based on LCC 5	234.37	10.97	446.10	102.14	0.52	53.11	331.93
T <sub>5</sub>	50 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 50	238.14	11.32	449.37	107.31	0.60	64.38	402.37
T <sub>6</sub>	100 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 40	239.45	11.73	452.65	110.24	0.67	73.86	461.62
T <sub>7</sub>	100 kg N/ha (40% basal) + remaining based on LCC 4	240.10	12.16	457.50	113.02	0.69	77.98	487.37
T <sub>8</sub>	100 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 50	245.34	12.58	460.10	115.37	0.70	80.75	504.68
T <sub>9</sub>	100 kg N/ha (40% basal) + remaining based on LCC 4	246.50	13.01	464.35	120.12	0.75	90.09	563.06
T <sub>10</sub>	As per recommended package of practices (50 % N as basal, remaining 50 % at 30 days after sowing)	248.60	13.39	470.11	123.14	0.77	94.81	592.56
T <sub>11</sub>	150 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 40	252.18	13.49	472.58	126.09	0.84	105.91	661.93
T <sub>12</sub>	150 kg N/ha (40% basal) + remaining based on LCC 4	255.33	13.59	473.25	131.11	0.98	128.48	803.00
T <sub>13</sub>	150 kg N/ha (40% basal) + remaining based on SPAD meter critical value of 50	258.68	14.27	475.60	133.02	1.04	138.34	861.62
T <sub>14</sub>	150 kg N/ha (40% basal) + remaining based on LCC 5	267.11	16.54	479.12	137.45	1.08	148.44	927.75
SE(m) ±		<b>3.02</b>	<b>0.32</b>	<b>3.62</b>	<b>2.25</b>	<b>N.S</b>	<b>2.70</b>	<b>9.47</b>
C.D. (P=0.05)		<b>9.03</b>	<b>0.98</b>	<b>10.86</b>	<b>6.75</b>	<b>N.S</b>	<b>8.11</b>	<b>28.41</b>

## **K-20-AST-5: Evaluation of promising fodder grass varieties under shade conditions**

**[(Table Reference: K-20-AST-5 (a) to (b))]**

### **Location (1): Vellayani**

An experiment was laid out at Vellayani centre to assess the influence of different shade levels on the growth, quality and yield of promising fodder varieties. The experiment was laid out in split plot design with three replications. Treatments comprised of three shade levels (0%, 25% and 50% shade) and 5 fodder varieties (BN hybrid varieties Suguna, Susthira, CO-3, CO-5 and Guinea grass var. Sulabha) making 15 treatment combinations. 25 % and 50 % shades were established using shade nets. The BN hybrid was planted in 60 cm apart lines with plant to plant spacing of 60 cm. the lot size was 3X3 m<sup>2</sup>.

Perusal of first year data revealed that different shade levels had significant effect on the yield of different fodder grasses. Highest value for plant height was recorded under 50% shade (1.72 m) by BN hybrid variety Suguna (1.78 m) and guinea grass variety Sulabha (1.72 m). The treatment combination of BN hybrid variety Suguna under 50 % shade level (2.13 m). Eventhough the interaction effect was non-significant, among the shade levels highest L: S ratio was recorded under open (1.53) and highest leaf area was recorded under both 25% and 50% shade levels. Among the varieties, highest tiller number was recorded by guinea grass var. Sulabha (31.7), highest LSR by BN hybrid varieties CO-3 and CO-5 and highest leaf area in BN hybrid variety Susthira.

Highest GFY (2418.7 q/ha) and DFY (604.7 q/ha) were recorded by S<sub>3</sub>V<sub>4</sub>(CO-5 under open condition). Under 25 % and 50 % shade levels, highest GFY and DFY were recorded by guinea grass var. Sulabha.

Highest chlorophyll content was recorded by all BN hybrid varieties under 50 % shade than the other two shade levels. The interaction effect was nonsignificant on quality characters like protein, fibre and oxalate contents. Among the shade levels, highest protein content was recorded under 50 % shade level. Among varieties, BN hybrid var. Suguna recorded highest protein content and GG var. Sulabha recorded lowest fibre content.

**K-20-AST-5 (a): Growth characters of different fodder grass varieties under varying shade levels**

Treatment	Plant Height (m)	No. of tillers	L: S Ratio	Leaf Area (cm <sup>2</sup> )
<b>Shade Levels</b>				
S <sub>1</sub> (25%)	1.56 ab	19.80 b	1.40	358.8 a
S <sub>2</sub> (50%)	1.72 a	19.07 b	1.32	355.5 a
S <sub>3</sub> (Open)	1.44 b	24.27 a	1.53	307.1 b
SE(m) ±	0.0413	1.04	0.04	5.76
C.D. (P=0.05)	0.162	4.1001	NS	22.6315
<b>Varieties</b>				
V <sub>1</sub> (Suguna)	1.79 a	16.33 c	1.21	362.1 b
V <sub>2</sub> (Susthira)	1.59 b	15.44 c	1.22	485.6 a
V <sub>3</sub> (CO 3)	1.41 c	20.89 b	1.65	288.4 c
V <sub>4</sub> (CO 5)	1.37 c	20.78 b	1.51	292.2c
V <sub>5</sub> (Sulabha)	1.72 ab	31.78 a	1.49	273.9 c
SE(m) ±	0.056	0.94	0.10	12.80
C.D. (P=0.05)	0.16	2.73	0.29	37.36
<b>Interaction Effect</b>				
S <sub>1</sub> V <sub>1</sub>	1.58	15.00	1.43	380.7
S <sub>1</sub> V <sub>2</sub>	1.49	14.33	1.23	485.0
S <sub>1</sub> V <sub>3</sub>	1.62	20.67	1.42	324.7
S <sub>1</sub> V <sub>4</sub>	1.43	19.00	1.47	316.7
S <sub>1</sub> V <sub>5</sub>	1.70	30.00	1.43	287.0
S <sub>2</sub> V <sub>1</sub>	2.13	16.33	1.21	380.7
S <sub>2</sub> V <sub>2</sub>	1.71	14.00	1.18	531.0
S <sub>2</sub> V <sub>3</sub>	1.43	16.67	1.35	292.0
S <sub>2</sub> V <sub>4</sub>	1.47	19.00	1.43	281.3
S <sub>2</sub> V <sub>5</sub>	1.86	29.33	1.43	292.3
S <sub>3</sub> V <sub>1</sub>	1.65	17.67	0.99	325.0
S <sub>3</sub> V <sub>2</sub>	1.65	18.00	1.24	440.7
S <sub>3</sub> V <sub>3</sub>	1.18	25.33	2.17	248.7
S <sub>3</sub> V <sub>4</sub>	1.20	24.33	1.63	278.7
S <sub>3</sub> V <sub>5</sub>	1.60	36.00	1.600	242.333
SE(m) ±	0.0966	1.6205	0.1742	22.1713
C.D. (P=0.05)	0.282	NS	NS	NS

**K-20-AST-5 (b) Yield and quality different fodder grass varieties under shade conditions**

Treatment	Yields (q/ha)		*Chlorophyll content (mg g <sup>-1</sup> )	CP content (%)	Fibre content (%)	Oxalate content (%)
	Green fodder	Dry matter				
<b>Shade Levels</b>						
S <sub>1</sub> (25%)	1865.9 b	466.7 b	2.6 b	11.0 b	27.29	2.51
S <sub>2</sub> (50%)	1674.1 c	418.7 c	3.2 a	11.7 a	26.34	2.59
S <sub>3</sub> (Open)	2088.2 a	522.1 a	2.4 c	10.1 c	28.73	2.33
SE(m) ±	8.5169	7.9948	0.0143	0.0553	0.7935	0.0908
C.D. (P=0.05)	33.4414	31.395	0.0563	0.2163	NS	NS
<b>Varieties</b>						
V <sub>1</sub> (Suguna)	1844.3 c	461.3bc	2.99 ab	11.33 b	28.32	2.49
V <sub>2</sub> (Susthira)	1796.3 d	449.1 c	2.89 b	10.32 c	27.86	2.46
V <sub>3</sub> (CO 3)	1808.8 cd	452.4 c	3.14 a	9.87 e	28.83	2.38
V <sub>4</sub> (CO 5)	1921.000 b	480.333 ab	3.122 a	10.790 c	28.406	2.556
V <sub>5</sub> (GG-Sulabha)	2009.8 a	502.7 a	1.51 c	12.35 a	23.84	2.49
SE(m) ±	13.248	8.7105	0.0566	0.1222	0.5044	0.0691
C.D. (P=0.05)	38.6683	25.4241	0.1625	0.3567	1.4721	NS
<b>Interaction Effect</b>						
S <sub>1</sub> V <sub>1</sub>	1907.3	477.3	2.83	11.43	28.63	2.53
S <sub>1</sub> V <sub>2</sub>	1840.7	460.3	2.75	10.25	27.68	2.46
S <sub>1</sub> V <sub>3</sub>	1781.7	446.0	2.99	9.64	28.43	2.53
S <sub>1</sub> V <sub>4</sub>	1744.3	436.0	2.94	11.09	28.33	2.52
S <sub>1</sub> V <sub>5</sub>	2055.3	514.0	1.52	12.63	23.36	2.53
S <sub>2</sub> V <sub>1</sub>	1474.0	368.7	3.60	12.32	27.44	2.56
S <sub>2</sub> V <sub>2</sub>	1500.0	375.0	3.45	11.00	26.42	2.63
S <sub>2</sub> V <sub>3</sub>	1589.0	397.3	3.54	10.73	27.53	2.55
S <sub>2</sub> V <sub>4</sub>	1600.0	400.3	3.78	11.24	27.70	2.65
S <sub>2</sub> V <sub>5</sub>	2207.3	552.0	1.61	13.30	22.58	2.54
S <sub>3</sub> V <sub>1</sub>	2151.7	538.0	2.56	10.25	28.89	2.40
S <sub>3</sub> V <sub>2</sub>	2048.3	512.0	2.49	9.72	29.48	2.30
S <sub>3</sub> V <sub>3</sub>	2055.7	514.0	2.87	9.23	30.52	2.07
S <sub>3</sub> V <sub>4</sub>	2418.7	604.7	2.65	10.14	29.18	2.50
S <sub>3</sub> V <sub>5</sub>	1766.7	442.000	1.39	11.13	25.57	2.40
SE(m) ±	22.9463	15.087	0.0981	0.2117	0.8736	0.1196
C.D. (P=0.05)	66.9754	44.0357	0.2862	NS	NS	NS

\*Fresh leaf weight basis

## R- 19-AST-5: Standardization of Magnesium nutrition in Bajra Napier Hybrid

[(Table Reference: R-19-AST-5 (a))]

**Location:** Vellayani

Bajra Napier hybrid is a tufted perennial humid tropical grass and is popular among dairy farmers of Kerala due to its robust growth, higher productivity, quality, palatability and persistence. Lack of magnesium (Mg) is common in Kerala due to acid soils, heavy fertilization with major nutrients, and leaching under heavy rainfall. Nearly 70 per cent of Kerala soils are deficient in magnesium (GOK, 2018). From an AICRP perennial trial conducted in the centre in past, it was recommended that magnesium application @ 80 kg ha<sup>-1</sup> resulted in highest tiller number, total green fodder yield and dry fodder yield compared to control treatments.

A field experiment was laid out at Vellayani to assess the impact of varying doses and frequency of application of magnesium on the growth, yield and quality attributes of BN hybrid. The experiment was laid out in RBD with 3 replications. Treatments comprised of three MgSO<sub>4</sub> levels- 80, 100 and 120 kg/ha and three frequency of application 2, 3 and 4 splits/year. The crop was raised as per the POP recommendations except treatments. As basal application 25 t/ha FYM was applied followed by 200:50:50 kg/ha NPK in seven splits each applied after cut uniformly in all treatments. The soil in the experimental site was identified as sandy clay loam in texture, moderately acidic in reaction, medium in organic carbon, available nitrogen and available potassium, high in available phosphorus and deficient in available calcium and magnesium status.

Perusal of first year data revealed that among treatment combinations, significantly superior values of green fodder (1891.3 q/ha) and dry matter yields (473.0 q/ha) were recorded with the treatment combination application of 100 kg MgSO<sub>4</sub>/ha once in 6 months. Highest number of tillers (27.07) and LSR (1.99) were also recorded in the same treatment combination. Significantly higher Mg content in plant was recorded in T9 (120 kg MgSO<sub>4</sub>/ha once in 3 months).

**R-19-AST-5 (a): Standardization of Magnesium nutrition in Bajra Napier Hybrid**

Treatment	Plant Height (cm)	No of Tillers/m	Leaf Stem Ratio	Biomass yield (q/ha)		Mg content in plant (%)
				GFY	DFY	
T1-80 kg MgSO <sub>4</sub> /ha once in 6 months	195.3 ab	21.65 e	1.72 bcde	1685.0 c	421.3 bcd	0.350
T2-80 kg MgSO <sub>4</sub> /ha once in 4 months	182.3 b	22.23 e	1.69 cde	1612.3 d	403.2 cde	0.380
T3-80 kg MgSO <sub>4</sub> /ha once in 3 months	185.0 b	21.84 e	1.62 ef	1518.0 e	379.6 e	0.410
T4-100 kg MgSO <sub>4</sub> /ha once in 6 months	200.0 ab	27.07 a	1.99 a	1891.3 a	473.0 a	0.467
T5-100 kg MgSO <sub>4</sub> /ha once in 4 months	215.7 a	25.40 b	1.81 bc	1706.7 c	426.8 bcd	0.480
T6-100 kg MgSO <sub>4</sub> /ha once in 3 months	200.0 ab	23.80 cd	1.83 b	1752.3 b	438.4 abc	0.497
T7-120 kg MgSO <sub>4</sub> /ha once in 6 months	187.0 b	22.83 de	1.65 de	1577.0 d	394.4 de	0.443
T8-120 kg MgSO <sub>4</sub> /ha once in 4 months	212.0 a	24.95 bc	1.75 bcd	1765.7 b	441.5 ab	0.520
T9-120 kg MgSO <sub>4</sub> /ha once in 3 months	213.3 a	22.78 de	1.52 f	1594.0 d	398.8 de	0.550
T10-control	179.7 b	20.07 f	1.65 de	1507.0 e	376.8 e	0.330
SE(m) ±	8.316	0.454	0.041	14.95	12.622	0.007
C.D. (P=0.05)	24.7	1.348	0.121	44.419	37.503	0.022

## C. AVT-2 Trials

### K-21-AST-1: Second Advanced Varietal Trial in Forage Pearl Millet (AVTPM-2-1) [(Table Reference: K-21-AST-1 (a) to (u)]

**Locations:** NWZ-Ludhiana, Bikaner Pantnagar  
NEZ- Pusa, Ranchi  
CZ- Urulikanchan, Raipur, Anand  
SZ-Hyderabad, Mandya

An experiment was conducted during *Kharif* 2021 to find out the response of four promising entries and three checks of pearl millet to graded doses of nitrogen. The study was undertaken at ten locations in four zones i.e, North West, North East, Central and South Zone with four entries (JPM-18-7, BAIF Bajra- 7, Dev-1 and 16ADV0055), one national check, Giant Bajra and four zonal checks (BAIF Bajra 1 (CZ), AFB-3 (NWZ), APFB-9-1 (NEZ), and Moti Bajra (SZ) and Rajasthan check (RBB-1). All the entries were tested under three level of nitrogen application i.e. 30, 60 and 90 kg/ha. The treatments were replicated thrice in Randomized Block Design. The gross plot size was 4 m x 3 m accommodating 4 m long 10 rows at 30 cm. The seed rate used was 12.0 kg/ha.

The results indicated that, in North West Zone, entry Dev-1 recorded significantly higher green fodder yield over rest of the entries and checks. The entry JPM-18-7 and 6ADV0055 also produced significantly higher yields than all the checks. As regards to DFY, and CP yields similar trend was noted as that of green fodder yields. Best performing entry Dev-1 exhibited 28.7 and 14.9 % higher GFY and DFY over the best check - AFB-3 (NWZ). The entry 6ADV0055 and JPM-18-7 also demonstrated its superiority in growth attributes.

In North East Zone also entry Dev-1 recorded higher GFY and DFY, which was significantly superior over other entries as well as checks. This was closely followed by Zonal check- APFB-9-1. The other entries also out yielded all the checks except Zonal check. Similar trend was noted in CP yields. In central zone, entry 16ADV0055 proved higher yielder followed Dev-1. Both the entries out yielded national as well as zonal checks in terms of GFY, DMY and CP yield. In south zone JPM-18-7 produced maximum green, dry as well as crude protein yields. It was significantly superior over all the checks. On national mean basis across the zones, all the entries i.e. JPM-18-7, BAIF Bajra- 7, Dev-1, 16ADV0055 proved higher yield than the check giant Bajra (NC). Among the entries Dev-1, produced maximum biomass yields (535.2 q GFY, 108.5q DMY and 8.92 q/ha CPY). This was followed by 16ADV0055.

The growth parameters, herbage yield and crude protein yield increased consistently with increasing level of nitrogen up to 90 Kg N/ha. With the application of 90 kg N/ha, the green and dry matter yield increased by 20.0 and 23.8 per cent over 30 kg N/ha and 6.5&8.5 per cent over 60 kg N/ha. The response equation was worked out to  $y = -0.012x^2 + 2.8267x + 344.1$  ( $R^2 = 0.9999$ ). The Calculated  $Y_{\text{maxima}}$  is 117.8 kg N/ha, whereas,  $Y_{\text{optima}}$  is 111.3 kg/ha (input cost Rs 16.0/ Kg, output cost Rs 1.10/ kg)



**K-21-AST-1 (a): Effect of nitrogen levels on green forage yield of promising entries of forage Pearl millet**

Varieties	Green Forage Yield (q/ha)														
	NWZ				NEZ			CZ				SZ			Overall Mean
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pusa	Ran-chi	Mean	Urulik anchan	Rai-pur	Ana-nd	Mean	Hyder-abad	Man-dya	Mean	
JPM-18-7	533.3	720.2	500.2	584.6	496.1	388.9	442.5	352.8	482.7	617.0	484.2	332.3	290.4	311.4	471.4
BAIF Bajra- 7	475.0	529.4	291.3	431.9	447.1	413.4	430.3	330.6	403.1	565.0	432.9	260.1	298.7	279.4	401.4
Dev-1	596.8	711.9	641.5	650.1	598.2	496.4	547.3	519.7	603.0	607.0	576.6	286.9	290.4	288.7	535.2
16ADV0055	554.9	702.3	577.3	611.5	488.9	451.5	488.9	554.6	624.8	628.0	602.5	275.8	253.9	264.9	517.8
Giant Bajra (NC)	450.2	674.7	345.4	490.1	390.0	367.4	378.7	445.6	374.4	510.0	443.3	202.7	236.2	219.5	399.7
RBB-1 (NC)	314.7	511.1	314.0	379.9	379.1	370.3	374.7	285.9	276.7	432.0	331.5	203.6	300.0	251.8	338.7
AFB-3 (NWZ)	416.3	603.3	497.4	505.7											
APFB-9-1 (NEZ)					510.6	478.7	494.6								
BAIF Bajra 1 (CZ)								521.8	530.8	596.0	549.5				
Moti Bajra (SZ)												283.2	251.4	267.3	
SE(m) $\pm$	15.1	34.71	11.24		14.2	2.39		12.92	18.69	13.36		6.5	9.83		
C.D. (P=0.05)	43.0	99.22	31.96		40.4	6.83		40.26	53.63	38.19		18.7	28.21		
<b>N Levels (kg/ha)</b>															
30	460.9	581.3	431.2	491.1	460.6	462.4	461.5	390.8	418.1	506.0	438.3	245.1	224.5	234.8	418.1
60	515.6	655.1	482.7	551.2	514.1	508.6	511.4	431.7	479.2	580.0	497.0	257.4	280.0	268.7	470.5
90	546.4	672.0	502.8	573.7	543.8	550.0	546.9	467.9	515.1	608.0	530.3	288.0	318.8	303.4	501.3
SE(m) $\pm$	11.4	22.72	8.50		10.8	1.95		11.03	12.24	26.24		4.3	6.44		
C.D. (P=0.05)	32.5	64.95	24.16		30.5	5.60		32.12	35.11	75.01		12.3	18.46		
<b>Interaction</b>															
SE(m) $\pm$	30.1		22.482		28.5	4.80			32.38			11.3	17.03		
C.D. (P=0.05)	NS		NS		NS	13.70		NS	NS			32.5	48.85		

**K-21-AST-1 (b): Effect of nitrogen levels on and Dry matter yield (q/ha) of promising entries of forage Pearl millet**

Varieties	Dry matter yield														
	NWZ				NEZ			CZ				SZ			Overall Mean
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pu-sa	Ran-chi	Mean	Urulik ancha n	Rai-pur	Ana-and	Mean	Hyder-abad	Man-dya	Mean	
JPM-18-7	57.40	163.53	104.42	108.5	111.40	96.05	103.7	51.50	105.00	99.92	85.5	66.40	69.60	68.00	92.52
BAIF Bajra- 7	54.06	109.36	52.93	72.1	89.80	102.10	96.0	52.29	82.90	93.93	76.4	51.40	68.90	60.15	75.77
Dev-1	69.66	153.68	145.12	122.8	128.80	122.54	125.7	81.22	132.30	120.53	111.4	58.00	72.80	65.40	108.47
16ADV0055	69.12	149.92	116.14	111.7	98.10	99.45	98.8	84.37	134.80	102.72	107.3	57.50	60.80	59.15	97.05
Giant Bajra (NC)	51.67	134.40	66.13	84.1	81.10	90.72	85.9	68.24	86.70	90.79	81.9	40.70	52.50	46.60	76.30
RBB-1 (NC)	34.76	124.40	69.43	76.2	77.60	91.44	84.5	62.24	55.10	67.86	61.7	41.20	71.40	56.30	69.54
AFB-3 (NWZ)	42.76	145.28	106.55	98.2											
APFB-9-1 (NEZ)					105.50	118.19	111.8								
BAIF Bajra 1 (CZ)								77.88	119.80	104.03	100.6				
Moti Bajra (SZ)												57.60	59.20	58.40	
SE(m) ±	1.7	10.37	2.45		3.0	1.33		2.02	5.68	2.52		1.8	2.63		
C.D. (P=0.05)	4.9	29.63	6.97		8.6	3.79		6.30	16.30	7.20		5.2	7.55		
CV (%)	11.2							3.21							
<b>N Levels (kg/ha)</b>															
30	53.73	137.39	90.73	94.0	93.2	114.2	103.70	62.84	86	79.5	76.1	48.8	47.4	48.10	81.38
60	58.16	142.04	99.98	100.1	112.4	125.6	119.00	71.62	104.1	97.17	91.0	52.2	65.1	58.65	92.84
90	61.79	140.81	102.63	101.7	123.5	135.78	129.64	70.29	117.1	114.67	100.7	58.7	82.2	70.45	100.75
SE(m) ±	1.3	6.79	1.85		2.3	1.10		2.61	3.72	4.95		1.2	1.72		
C.D. (P=0.05)	3.7	NS	5.27		6.5	3.10		5.37	10.67	14.15		3.4	4.94		
CV (%)															
<b>Interaction</b>															
SE(m) ±	3.4		4.906		6.1	2.66		-	9.84			3.2	4.56		
C.D. (P=0.05)	9.8		N/A		NS	7.60		NS	NS	Sign.		NS	NS		
CV (%)								6.82		7.78		10.3			

**K-21-AST-1 (c): Effect of nitrogen levels on crude protein yield (q/ha) of promising entries of forage Pearl millet**

Entries	Crude protein yield												Overall Mean
	NWZ				NEZ			CZ				SZ	
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pusa	Ran-chi	Mean	Urulika-nchan	Rai-pur	Ana-nd	Mean	Hydera-bad	
JPM-18-7	3.54	12.89	10.20	8.88	9.59	9.34	9.47	4.82	9.75	7.78	7.45	5.88	8.06
BAIF Bajra- 7	3.67	9.08	3.99	5.58	7.59	11.12	9.36	5.21	7.59	7.58	6.79	3.99	6.09
Dev-1	3.97	10.57	14.92	9.82	11.06	11.66	11.36	8.63	8.49	8.81	8.64	4.88	8.92
16ADV0055	4.02	9.92	11.78	8.57	8.48	9.87	9.18	8.61	9.29	9.22	9.04	4.61	8.24
Giant Bajra (NC)	2.89	10.59	5.56	6.35	6.77	10.32	8.55	6.63	7.69	7.89	7.40	3.11	6.39
RBB-1 (NC)	2.24	8.25	6.02	5.50	6.29	7.49	6.89	6.15	3.69	6.15	5.33	3.40	5.27
AFB-3 (NWZ)	2.71	10.25	10.04	7.67									
APFB-9-1 (NEZ)					9.04	11.62	10.33						
BAIF Bajra 1 (CZ)								5.73	7.33	8.65	7.24		
Moti Bajra (SZ)												4.99	
SE(m) $\pm$	0.10	0.81	0.24		0.27	0.14		0.21	0.42	0.28		0.17	
C.D. (P=0.05)	0.30	2.32	0.69		0.76	0.41		0.65	1.20	0.80		0.49	
CV (%)	10.90							1.07					
30	3.20	9.54	8.45	7.06	7.80	10.99	9.40	6.12	6.00	5.90	6.06	3.94	6.44
60	3.49	11.21	9.52	8.07	9.67	12.49	11.08	6.35	7.82	7.86	7.34	4.35	7.53
90	4.10	9.91	10.22	8.08	10.87	13.90	12.39	7.15	9.25	10.28	8.89	4.95	8.34
SE(m) $\pm$	0.08	0.53	0.18		0.20	0.12		0.19	0.27	0.55		0.11	
C.D. (P=0.05)	0.22	1.52	0.52		0.58	0.34		0.55	0.08	1.57		0.33	
<b>Interaction</b>													
SE(m) $\pm$	0.21		0.482		0.54	0.28		-	0.72			0.301	
C.D. (P=0.05)	0.59		1.371		NS	NS		1.47	NS	NS		NS	
CV (%)								2.25		6.48		11.8	

**K-21-AST-1 (d): Effect of nitrogen levels on growth parameters of promising entries of forage Pearl millet**

Varieties	Green Fodder Yield (q/ha/day)									
	NWZ				NEZ			CZ		
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pusa	Ran-chi	Mean	Urulikan-cha	Rai-pur	Mean
JPM-18-7	5.61	12.86	6.58	8.35	7.89	5.56	6.73	5.19	8.18	6.69
BAIF Bajra- 7	5.00	9.45	3.83	6.09	8.1	5.91	7.01	3.39	6.11	4.75
Dev-1	6.28	12.71	8.44	9.14	9.5	7.09	8.30	7.42	8.49	7.96
16ADV0055	5.84	12.54	8.13	8.84	7.56	5.78	6.67	7.81	12.25	10.03
Giant Bajra (NC)	4.74	12.05	4.87	7.22	6.5	5.25	5.88	6.55	6.93	6.74
RBB-1 (NC)	4.77	9.13	4.55	6.15	7.15	5.29	6.22	3.86	5.53	4.7
AFB-3 (NWZ)	6.31	10.77	7.21	8.1						
APFB-9-1 (NEZ)					8.58	6.84	7.71			
BAIF Bajra 1 (CZ)										
Moti Bajra (SZ)								7.45	7.27	7.36
SE(m) ±	0.2	0.62	0.16		0.25	0.03			0.32	
C.D. (P=0.05)	0.5	1.77	0.44		0.71	0.09			0.93	
<b>N Levels (kg/ha)</b>										
30	5.32	10.38	5.94	7.21	7.76	6.61	7.19	5.58	6.95	6.27
60	5.92	11.7	6.65	8.09	8.57	7.27	7.92	6.17	7.97	7.07
90	6.29	12	6.92	8.4	8.92	7.86	8.39	6.11	8.55	7.33
SE(m) ±	0.1	0.41	0.12		0.19	0.03			0.21	
C.D. (P=0.05)	0.4	1.16	0.33		0.53	0.08			0.61	
<b>Interaction</b>										
SE(m) ±	0.3		0.31		0.5	0.07			0.56	
C.D. (P=0.05)	NS		N/A		NS	0.20			NS	

**K-21-AST-1 (e): Effect of nitrogen levels on growth parameters of promising entries of forage Pearl millet**

Varieties	Dry Matter Yield (q/ha/day)						
	Ludhiana	Bikaner	Pantnagar	Pusa	Ranchi	Urulikanchan	Mean
JPM-18-7	0.60	2.92	1.38	1.77	1.37	0.76	1.47
BAIF Bajra- 7	0.57	1.95	0.70	1.63	1.46	0.75	1.18
Dev-1	0.73	2.74	1.91	2.04	1.75	1.16	1.72
16ADV0055	0.73	2.68	1.63	1.52	1.43	1.19	1.53
Giant Bajra (NC)	0.54	2.40	0.93	1.35	1.30	1.00	1.25
RBB-1 (NC)	0.53	2.22	1.01	1.46	1.31	0.84	1.23
AFB-3 (NWZ)	0.65	2.59	1.54				
APFB-9-1 (NEZ)				1.77	1.69		
BAIF Bajra 1 (CZ)						1.11	1.56
Moti Bajra (SZ)							
SE(m) ±	0.02	0.19	0.03	0.05	0.02		
C.D. (P=0.05)	0.06	0.53	0.10	0.15	0.05		
<b>N Levels (kg/ha)</b>							
30	0.61	2.45	1.25	1.57	1.63	0.90	1.40
60	0.67	2.54	1.38	1.87	1.79	1.02	1.55
90	0.71	2.51	1.41	2.02	1.94	1.00	1.60
SE(m) ±	0.01	0.12	0.03	0.04	0.02		
C.D. (P=0.05)	0.04	NS	0.07	0.11	0.04		
<b>Interaction</b>							
SE(m) ±	0.04		0.067	0.11	0.04		
C.D. (P=0.05)	NS		N/A	NS	0.11		

**K-21-AST-1 (f): Effect of nitrogen levels on crude protein content of promising entries of forage Pearl millet**

Varieties	Crude Protein (%)												
	NWZ				NEZ			CZ				SZ	Overall Mean
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pu-sa	Ran-chi	Mean	Urulik anchana	Rai-pur	Ana-nd	Mean	Hyder abad	
JPM-18-7	6.1	7.97	9.75	7.94	8.56	9.67	9.12	9.26	9.28	7.68	8.48	8.83	8.57
BAIF Bajra- 7	6.6	8.39	7.51	7.50	8.46	10.75	9.61	9.88	9.09	7.97	8.53	7.72	8.49
Dev-1	5.7	6.97	10.25	7.64	8.54	9.38	8.96	10.61	6.41	7.25	6.83	8.42	8.17
16ADV0055	5.8	6.61	10.10	7.50	8.57	9.93	9.25	10.13	6.87	8.91	7.89	8.01	8.33
Giant Bajra (NC)	5.6	7.85	8.38	7.28	8.29	11.29	9.79	9.80	8.72	8.54	8.63	7.67	8.46
RBB-1 (NC)	6.4	6.66	8.64	7.23	8.04	8.14	8.09	9.97	6.68	8.99	7.84	8.18	7.97
AFB-3 (NWZ)	6.4	7.07	9.41	7.63									
APFB-9-1 (NEZ)					8.48	9.80	9.14						
BAIF Bajra 1 (CZ)								7.39	6.10	8.23	7.17		
Moti Bajra (SZ)												8.70	
SE(m) $\pm$		0.28	0.08		0.13	0.04			0.06	0.23		0.12	
C.D. (P=0.05)		0.79	0.23		0.36	0.12			0.18	0.64		0.36	
CV (%)													
<b>N Levels (kg/ha)</b>													
30	6.0	6.96	9.05	7.34	8.36	9.66	9.01	9.80	7.16	7.46	7.31	8.00	8.05
60	6.0	8.02	9.23	7.75	8.60	9.96	9.28	8.81	7.65	8.15	7.90	8.30	8.30
90	6.6	7.10	9.61	7.77	8.77	10.22	9.50	10.12	7.96	9.07	8.52	8.35	8.64
SE(m) $\pm$		0.18	0.06		0.10	0.03			0.04	0.44		0.08	
C.D. (P=0.05)		0.52	0.17		0.27	0.11			0.12	1.27		0.23	
<b>Interaction</b>													
SE(m) $\pm$			0.162		0.25	0.08			0.11			0.22	
C.D. (P=0.05)			0.460		NS	NS			0.32	NS		0.63	
CV (%)										8.22		4.63	

**K-21-AST-1 (i): Effect of nitrogen levels on growth parameters of promising entries of forage Pearl millet**

Varieties	Plant Height (cm)													
	NWZ				NEZ			CZ				SZ		
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pusa	Ranchi	Mean	Urulika-nchan	Rai-pur	Ana-nd	Mean	Hyder-abad	Man-dya	Mean
JPM-18-7	255.7	240.4	287.7	261.3	230.1	138.34	184.2	185.7	307.6	222.7	238.7	158.2	184.6	171.4
BAIF Bajra- 7	232.6	211.3	233.2	225.7	222.1	173.70	197.9	166.7	307.5	214.7	229.6	162.3	188.2	175.3
Dev-1	260.0	237.0	291.9	263.0	247.1	195.38	221.2	203.3	323.9	254.7	260.6	177.8	176.6	177.2
16ADV0055	247.3	196.0	260.3	234.5	234.6	153.0	193.8	192.6	330.2	243.0	255.3	159.3	176.7	168.0
Giant Bajra (NC)	234.4	222.0	279.2	245.2	216.9	134.73	175.8	185.1	287.9	221.2	231.4	156.2	161.0	158.6
RBB-1 (NC)	207.3	225.5	285.0	239.3	213.9	138.34	176.1	171.4	237.7	225.4	211.5	156.4	201.6	179.0
AFB-3 (NWZ)	206.3	239.0	284.0	243.1										
APFB-9-1 (NEZ)					237.0	178.61	207.8							
BAIF Bajra 1 (CZ)								193.2	322.3	238.9	251.5	138.7		
Moti Bajra (SZ)													163.2	
SE(m) ±	5.9	7.33	9.69		4.0	0.46			6.99	3.13		3.4	6.77	
C.D. (P=0.05)	16.9	20.96	27.55		11.3	1.30			20.07	8.95		9.7	19.42	
<b>N Levels (kg/ha)</b>														
30	231.4	219.7	269.0	240.0	225.9	152.97	189.4	181.9	286.2	220.6	229.6	152.1	164.3	158.2
60	243.6	232.9	291.7	256.1	236.4	182.05	209.2	182.5	305.6	230.5	239.5	158.3	178.5	168.4
90	238.4	220.8	306.6	255.2	242.6	203.38	223.0	192.0	315.4	243.5	250.3	164.9	193.7	179.3
SE(m) ±	4.5	4.8	7.33		3	0.37			4.58	6.15		2.2	4.43	
C.D. (P=0.05)	12.8	NS	20.83		8.5	1.07			13.14	17.57		6.4	12.71	
<b>Interaction</b>														
SE(m) ±	11.8		19.38		7.9	0.92			12.11			5.9	11.73	
C.D. (P=0.05)	NS		N/A		NS	2.62			NS	NS		16.8	NS	

**K-21-AST-1 (j): Effect of nitrogen levels on growth parameters of promising entries of forage Pearl millet**

Varieties	L/S Ratio												
	NWZ				NEZ			CZ			SZ		
	Ludh-iana	Bika-ner	Pant-nagar	Mean	Pu-sa	Ran-chi	Mean	Urulikan-cha	Rai-pur	Mean	Hydera-bad	Man-dya	Mean
JPM-18-7	0.47	0.57	0.25	0.43	0.31	0.21	0.26	0.49	0.22	0.36	0.19	0.20	0.20
BAIF Bajra- 7	0.29	0.52	0.30	0.37	0.41	0.20	0.31	0.63	0.22	0.43	0.16	0.24	0.20
Dev-1	0.55	0.46	0.28	0.43	0.36	0.20	0.28	0.53	0.30	0.42	0.19	0.23	0.21
16ADV0055	0.44	0.53	0.29	0.42	0.33	0.20	0.27	0.53	0.33	0.43	0.19	0.20	0.20
Giant Bajra (NC)	0.47	0.48	0.26	0.40	0.30	0.20	0.25	0.53	0.20	0.37	0.20	0.21	0.21
RBB-1 (NC)	0.37	0.40	0.25	0.34	0.22	0.19	0.21	0.52	0.37	0.45	0.18	0.24	0.21
AFB-3 (NWZ)	0.46	0.36	0.28	0.37									
APFB-9-1 (NEZ)					0.26	0.20	0.23						
BAIF Bajra 1 (CZ)								0.61	0.29	0.45			
Moti Bajra (SZ)											0.19	0.20	0.20
SE(m) $\pm$	0.01	0.05	0.01		0.00	0.004			0.01		0.00	0.01	
C.D. (P=0.05)	0.04	0.14	0.03		0.01	NS			0.02		0.01	0.02	
<b>N Levels (kg/ha)</b>													
30	0.39	0.44	0.27	0.37	0.32	0.20	0.26	0.55	0.25	0.40	0.18	0.19	0.19
60	0.49	0.49	0.28	0.42	0.34	0.20	0.27	0.57	0.28	0.43	0.21	0.22	0.22
90	0.58	0.49	0.29	0.45	0.35	0.21	0.28	0.53	0.30	0.42	0.18	0.24	0.21
SE(m) $\pm$	0.01	0.03	0.01		0.00	0.003			0.01		0.00	0.00	
C.D. (P=0.05)	0.03	NS	0.02		0.01	NS			0.02		0.01	0.01	
<b>Interaction</b>													
SE(m) $\pm$	0.03		0.021		0.01	0.007			0.021		0.007	0.01	
C.D. (P=0.05)	0.08		N/A		0.03	NS			NS		0.019	NS	



**K-21-AST-1 (k): Effect of nitrogen levels on growth parameters of promising entries of forage Pearl millet**

Varieties	Plant Population/m <sup>2</sup> at Harvest			Mean
	Ludh-iana	Bika-ner	Ran-chi	
JPM-18-7	38.8	71.22	37	49.01
BAIF Bajra- 7	22.7	78	38	46.23
Dev-1	40.8	83.11	38	53.97
16ADV0055	35.4	75.11	37	55.26
Giant Bajra (NC)	27.5	77.78	38	47.76
RBB-1 (NC)	36.7	71.78	37	48.49
AFB-3 (NWZ)	38.8	72.11		55.46
APFB-9-1 (NEZ)			37	
SE(m) ±	1.2	4.08	0.25	
C.D. (P=0.05)	3.4	11.66	NS	
<b>N Levels (kg/ha)</b>				
30	33.1	77.76	38	49.62
60	35.4	74.1	38	49.17
90	40.6	74.9	37	50.83
SE(m) ±	0.9	2.67	0.2	
C.D. (P=0.05)	2.6	NS	NS	
<b>Interaction</b>				
SE(m) ±	2.4		0.5	
C.D. (P=0.05)	NS		1.44	

**Table K-21-AST-1 (l): Interaction effects of various pearl millet varieties and nitrogen levels on green fodder yield at Anand**

Treatment	GFY (q/ha)							Mean	DMY (q/ha)							Mean
	Giant Bajra (NC)	JPM-18-7	BAIF Bajra- 7	RBB-1(NC)	BAIF Bajra 1 (CZ)	Dev-1	16AD V0055		Giant Bajra (NC)	JPM-18-7	BAIF Bajra- 7	RBB-1	BAIF Bajra 1 (CZ)	Dev-1	16ADV0 055	
<b>30</b>	465	532	433	403	556	571	583	506.1	<b>30</b>	72.22	71.9	67.89	58.65	88.84	106.71	79.5
<b>60</b>	523	625	621	433	600	617	639	579.7	<b>60</b>	93.7	95.29	102.79	68.28	100.34	117.22	97.2
<b>90</b>	543	694	641	461	633	633	662	609.6	<b>90</b>	106.44	132.58	111.09	76.66	122.92	137.66	114.7
	510.3	617.0	565.0	432.3	596.3	607.0	628.0			90.8	99.9	93.9	67.9	104.0	120.5	102.7
SE(m) ±	23.14								SE(m) ±	4.36						
C.D. (P=0.05)	66.15								C.D. (P=0.05)	12.47						
CV %	7.09								CV %	7.78						

**Table K-21-AST-1 (m): Interaction effects of various pearl millet varieties and nitrogen levels on Green forage yield at Mandya**

Varieties	GFY (q/ha)				DMY (q/ha)			
	Nitrogen levels (Kg/ha)				Nitrogen levels (Kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JPM-18-7	211.7	312.0	347.7	<b>290.4</b>	44.2	74.9	89.7	<b>69.6</b>
BAIF Bajra- 7	247.7	304.2	344.4	<b>298.7</b>	50.9	68.5	87.6	<b>68.9</b>
Dev-1	236.1	309.2	326.0	<b>290.4</b>	52.5	76.7	89.4	<b>72.8</b>
16ADV0055	237.5	252.6	271.4	<b>253.9</b>	50.4	59.3	72.7	<b>60.8</b>
Giant Bajra (NC)	151.7	244.6	312.3	<b>236.2</b>	29.7	53.1	74.9	<b>52.5</b>
RBB-1 (NC)	256.7	294.1	349.2	<b>300.0</b>	55.2	69.2	89.9	<b>71.4</b>
Moti Bajra (SZ)	230.1	243.5	280.7	<b>251.4</b>	49.2	56.8	71.4	<b>59.2</b>
<b>Mean</b>	<b>224.5</b>	<b>280.0</b>	<b>318.8</b>	<b>-</b>	<b>47.4</b>	<b>65.1</b>	<b>82.2</b>	<b>-</b>
	<b>Particulars</b>	<b>SE(m) ±</b>	<b>C.D. (P=0.05)</b>		<b>Particulars</b>	<b>SE(m) ±</b>	<b>C.D. (P=0.05)</b>	
	Varieties (A)	9.83	28.21		Varieties (A)	2.63	7.55	
	Nitrogen (B)	6.44	18.46		Nitrogen (B)	1.72	4.94	
	Interaction (A x B)	17.03	48.85		Interaction (A x B)	4.56	NS	

**Table K-21-AST-1 (n): Interaction effects of various pearl millet varieties and nitrogen levels on GFY and DMY (q/ha) at Ludhiana**

Genotypes	GFY (q/ha)				DMY (q/ha)			
	Nitrogen levels (kg/ha)				Nitrogen levels (kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JPM-18-7	507.9	558.7	587.3	1653.9	50.79	61.46	64.60	176.9
BAIF Bajra- 7	482.5	514.3	557.1	1553.9	53.08	61.71	66.86	181.7
Dev-1	573.0	671.4	685.7	1930.1	74.49	73.86	75.43	223.8
16ADV0055	522.2	587.9	619.0	1729.1	67.89	70.55	74.29	212.7
Giant Bajra (NC)	428.6	527.0	558.7	1514.3	55.71	57.97	61.46	175.1
RBB-1 ((NC)	294.6	328.3	365.4	988.3	32.41	39.39	40.19	112.0
AFB-3 (NWZ)	417.5	421.9	451.7	1291.1	41.75	42.19	49.69	133.6
<b>Mean</b>	460.9	515.6	546.4	1522.9	<b>53.73</b>	<b>58.16</b>	<b>61.79</b>	173.7
	<b>Particulars</b>	<b>SE(m) ±</b>	<b>C.D. (P=0.05)</b>		<b>Particulars</b>	<b>SE(m) ±</b>	<b>C.D. (P=0.05)</b>	
	Varieties (A)	15.1	43.0		Varieties (A)	1.7	4.9	
	Nitrogen (B)	11.4	32.5		Nitrogen (B)	3.7	1.3	
	Interaction (A x B)	NS	30.1		Interaction (A x B)	9.8	3.4	

**Table K-21-AST-1 (o): Interaction effects of various pearl millet varieties and nitrogen levels on Green forage Yield (q/ha) and Dry matter yield (q/ha) at Pantnagar**

Genotypes	GFY (q/ha)					DMY(q/ha)			
	Nitrogen levels (kg/ha)					Nitrogen levels (kg/ha)			
	30	60	90	Mean	Genotypes	30	60	90	Mean
JPM-18-7	460.9	544.4	577.6	527.6	JPM-18-7	97.2	113.2	118.3	109.6
BAIF Bajra- 7	280.5	316.6	327.7	308.3	BAIF Bajra- 7	52.0	56.9	58.2	55.7
Dev-1	616.4	676.7	691.4	661.5	Dev-1	142.9	152.5	150.5	148.6
16ADV0055	535.8	606.7	682.2	608.2	16ADV0055	107.9	118.9	135.3	120.7
Giant Bajra (NC)	338.8	361.0	380.4	360.1	Giant Bajra (NC)	64.9	69.0	71.9	68.6
RBB-1 (NC)	304.1	340.4	345.2	329.9	RBB-1 (NC)	67.9	74.6	74.9	72.4
AFB-3 (NWZ)	481.8	533.4	515.1	510.1	AFB-3 (NWZ)	102.3	114.9	109.4	108.8
Mean B	431.2	482.7	502.8	472.2		90.7	100.0	102.6	97.8
					Factors	C.D. (P=0.05)	SE(m) ±		
Factors	C.D. (P=0.05)	SE(m) ±			Factor(A)	7.0	2.5		
Factor(A)	32.0	11.2			Factor(B)	5.3	1.9		
Factor(B)	24.2	8.5			Factor(A X B)	N/A	4.9		
Factor(A X B)	N/A	22.5							

**Table K-21-AST-1 (p): Interaction effects of various pearl millet varieties and nitrogen levels on Green Forage yield (q/ha) at Urulikanchan**

Varieties / Nitrogen levels	Green fodder yield (q/ha)							
	Giant Bajra (NC)	JPM-18-7	BAIF Bajra- 7	RBB-1 (NC)	BAIF Bajra 1 (CZ)	Dev-1	16ADV0055	Mean
30 kg/ha	399.31	315.97	307.87	238.43	466.44	500.58	506.95	390.79
60 kg/ha	451.97	359.38	334.49	291.09	534.15	501.16	549.77	431.72
90 kg/ha	485.54	383.10	349.54	328.13	564.82	557.30	607.07	467.93
Mean	445.61	352.82	330.64	285.88	521.80	519.68	554.60	
	Varieties (V)	Nitrogen levels (N)	VxN					
SE(m) ±	12.92	11.03	-					
C.D. (P=0.05)	40.26	32.12	NS					
CV	8.16	16.25	-					

**Table K-21-AST-1 (q): Interaction effects of various pearl millet varieties and nitrogen levels on Dry matter Yield(q/ha) at Urulikanchan**

Varieties / Nitrogen levels	Dry matter yield (q/ha)							
	Giant Bajra (NC)	JPM-18-7	BAIF Bajra- 7	RBB-1 (NC)	BAIF Bajra 1 (CZ)	Dev-1	16ADV0055	Mean
30 kg/ha	62.37	44.52	57.88	52.31	75.56	72.98	74.22	62.84
60 kg/ha	71.37	54.52	46.73	63.28	85.09	84.75	95.61	71.62
90 kg/ha	70.99	55.47	52.26	71.14	72.97	85.94	83.29	70.29
Mean	68.24	51.50	52.29	62.24	77.88	81.22	84.37	
	Varieties (V)	Nitrogen levels (N)	VxN					
SE(m) ±	2.02	2.61	-					
C.D. (P=0.05)	6.30	5.37	NS					
CV	3.21	6.82	-					

**Table K-21-AST-1 (r): Interaction effects of various pearl millet varieties and nitrogen levels on green fodder yield at Raipur**

Treatment	GFY (q/ha)							
	Giant Bajra (NC)	JPM-18-7	BAIF Bajra-7	RBB-1 (NC)	BAIF Bajra 1 (CZ)	Dev-1	16ADV0055	Mean
30 kg/ha	297.1	451.2	302.7	255.5	449.8	599.8	570.6	<b>418.1</b>
60 kg/ha	398.5	499.8	404.0	272.1	545.6	591.4	642.8	<b>479.2</b>
90 kg/ha	427.6	497.0	502.6	302.7	597.0	617.8	660.8	<b>515.1</b>
<b>Mean</b>	<b>374.4</b>	<b>482.7</b>	<b>403.1</b>	<b>276.8</b>	<b>530.8</b>	<b>603.0</b>	<b>624.7</b>	
SE(m) $\pm$								
C.D. (P=0.05)								
CV %								

**Table K-21-AST-1 (s) Interaction effects of various pearl millet varieties and nitrogen levels on dry matter yield at Raipur**

Treatment	DMY (q/ha)							
	Giant Bajra (NC)	JPM-18-7	BAIF Bajra-7	RBB-1 (NC)	BAIF Bajra 1 (CZ)	Dev-1	16ADV0055	Mean
30 kg/ha	61.2	90.7	56.6	49.3	101.0	123.3	119.5	<b>85.9</b>
60 kg/ha	89.0	110.7	76.8	54.6	127.0	132.4	137.8	<b>104.0</b>
90 kg/ha	109.8	113.7	115.2	61.3	131.4	141.2	146.9	<b>117.1</b>
<b>Mean</b>	<b>86.7</b>	<b>105.0</b>	<b>82.9</b>	<b>55.1</b>	<b>119.8</b>	<b>132.3</b>	<b>134.7</b>	
SE(m) $\pm$								
C.D. (P=0.05)								
CV %								

**Table K-21-AST-1 (t): Interaction effect of GFY (q/ha) and DMY (q/ha) of pearl millet entries and Nitrogen levels(AVTPM-2) at Hyderabad**

Treatments	Green Forage Yield(q/ha)				Dry matter yield (q/ha)			
	Nitrogen levels (kg/ha)				Nitrogen levels (kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JPM-18-7	316.5	305.4	374.8	332.3	59.0	61.8	78.3	66.4
BAIF Bajra- 7	222.1	272.1	286.0	260.1	45.6	50.5	58.1	51.4
Dev-1	266.6	272.1	322.1	286.9	55.4	55.9	62.6	58.0
16ADV0055	266.6	277.7	283.2	275.8	53.1	60.2	59.2	57.5
Giant Bajra (NC)	186.0	197.2	224.9	202.7	36.4	40.3	45.5	40.7
RBB-1 (NC)	172.2	194.4	244.4	203.6	35.7	39.2	48.8	41.2
Moti Bajra (SZ)	286.0	283.2	280.4	283.2	56.4	57.8	58.8	57.6
<b>InteractionVXN</b>								
SE(m) ±	11.3				3.2			
C.D. (P=0.05)	32.5				NS			
CV(%)	7.4				10.3			

**Table K-21-AST-1 (u) Interaction effect of CP % and CPY (q/ha) of pearl millet entries and Nitrogen levels(AVTPM-2) at Hyderabad**

Treatments	Crude Protein (%)				Crude protein yield (q/ha)			
	Nitrogen levels (kg/ha)				Nitrogen levels (kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JPM-18-7	8.46	9.00	9.03	8.83	4.99	5.57	7.08	5.88
BAIF Bajra- 7	7.56	7.13	8.46	7.72	3.45	3.60	4.91	3.99
Dev-1	8.20	8.53	8.53	8.42	4.54	4.76	5.33	4.88
16ADV0055	7.73	8.06	8.23	8.01	4.12	4.84	4.87	4.61
Giant Bajra (NC)	7.43	8.46	7.13	7.67	2.70	3.40	3.25	3.11
RBB-1 (NC)	7.73	8.20	8.63	8.18	2.77	3.23	4.21	3.40
Moti Bajra (SZ)	8.90	8.73	8.46	8.70	4.99	5.02	4.97	4.99
<b>InteractionVXN</b>								
SE(m) ±	0.22				0.301			
C.D. (P=0.05)	0.63				NS			
CV(%)	4.63				11.80			

## **K-21-AST-2: Effect of nitrogen levels on forage yield of promising entries of forage maize**

[(Table Reference: K-21-AST-2(a) to (j)]

**Locations (5):** NWZ-Ludhiana, Hisar Pantnagar  
CZ- Anand, Raipur

A field trial AVTM-2 was conducted to find out the response of one promising entry and two checks of maize to graded doses of nitrogen. The study was undertaken at three locations in North West Zone and two locations in Central Zone with one entry (PFM- 12), two national check-African Tall and J-1006 and one zonal check, IIMR hybrid COHM-8. All the entries were tested under four level of nitrogen application i.e. 40, 80, 120 and 160 kg/ha. The treatments were replicated thrice in Randomized Block Design. The gross plot size was 4 m x 3 m accommodating 4 m long 10 rows at 30 cm. The seed rate used was 50.0 kg/ha.

In NW zone entry PFM-12 did not perform well. It produced 386.89 GFY/ha. It recorded 4% & 10.1 % GFY lower GFY than checks COHM-8 and J-1106, respectively. In terms of DFY corresponding decrease was 2.1& 7.6%. In central zone the entry provided yield 661.7q GFY/ha and out yielded checks COHM and J-1106. However, it was on par with African tall (611.4) q/ha. In terms of DFY out yielded all the checks (115.20 q/ha) indicating 9.9% superiority over best checks- J-1006. On overall mean basis of all the locations in two zone, the entry PFM-12 provided superiority (98.39 q/ha) to checks COHM-8 and African tall But it remained on par with J-1006 (97.35 q/ha) in terms of dry matter. As regards to green fodder all the entries were on par with each other. The entry PFM-12 exhibited highest CP content of 6.65% in comparison 6.48 recorded in COHM-8. In terms of CP yield PFM-12 proved the best. The plant height, plant population and LS Ratio of PFM-12 were comparable to national checks. The growth parameters, herbage yield and crude protein yield increased consistently with increasing level of nitrogen up to 160 Kg N/ha. With the application of 160 kg N/ha, the green and dry matter yield increased by 25.2 and 28.6 per cent over 40 kg N/ha and 7.9&7.7 per cent over 120 kg N/ha. The response equation was worked out to  $y = -0.0061x^2 + 2.2055x + 251.85$  ( $R^2 = 0.9999$ ). The Calculated  $Y_{\text{maxima}}$  is 180.8 kg N/ha, whereas,  $Y_{\text{optima}}$  is 168.9 kg/ha (input cost Rs 16.0/ Kg, output cost Rs 1.10/ kg)



**K-21-AST-2 (a): Effect of nitrogen levels on GFY (q/ha) of promising entries of forage Maize**

Entries	Green Forage Yield (q/ha)							
	NWZ				CZ			Overall Mean
	Ludhiana	Hisar	Pantnagar	Mean	Anand	Raipur	Mean	
PFM-12	347.6	389.38	423.44	386.8	779.0	444.3	611.7	476.7
J-1006 (NC)	424.0	405.97	465.11	431.7	803.0	351.6	577.3	489.9
African Tall (NC)	327.7	367.78	437.58	377.7	835.0	387.7	611.4	471.2
COHM-8 (NC)	369.5	358.33	479.23	402.4	775.0	407.8	591.4	478.0
SE(m) $\pm$	10.2	5.94	6.70		15.21	6.78		
C.D. (P=0.05)	29.4	17.24	19.45		43.94	19.69		
<b>N Levels (kg/ha)</b>								
40	277.9	304.93	409.00	330.6	679.0	453.3	566.2	424.8
80	356.9	372.78	436.69	388.8	761.0	406.4	583.7	466.8
120	407.9	416.88	464.84	429.9	814.0	359.9	587.0	492.7
160	426.1	426.88	494.82	449.3	939.0	371.7	655.4	531.7
SE(m) $\pm$	10.2	5.94	6.70		15.21	6.78		
C.D. (P=0.05)	29.4	17.24	19.45		43.94	19.69		
<b>Interaction</b>								
SE(m) $\pm$	20.4	11.88	13.400			13.57		
C.D. (P=0.05)	NS	NS	N/A		NS	NS		

**K-21-AST-2 (b): Effect of nitrogen levels on DMY (q/ha) of promising entries of forage Maize**

Entries	Dry matter yield (q/ha)							
	NWZ				CZ			Overall Mean
	Ludhiana	Hisar	Pantnagar	Mean	Anand	Raipur	Mean	
PFM-12	73.10	104.80	83.64	87.18	135.00	95.40	115.20	98.39
J-1006 (NC)	83.80	108.18	85.28	92.42	136.00	73.50	104.75	97.35
African Tall (NC)	50.10	93.82	76.92	73.61	109.00	83.90	96.45	82.75
COHM-8 (NC)	62.70	95.58	109.26	89.18	104.00	86.30	95.15	91.57
SE(m) ±	1.90	1.98	1.45		2.99	2.98		
C.D. (P=0.05)	5.40	5.73	4.21		8.64	8.53		
<b>N Levels (kg/ha)</b>								
40	44.80	83.31	77.73	68.61	100.00	97.30	98.65	80.63
80	64.30	98.42	84.86	82.53	112.00	86.70	99.35	89.26
120	76.90	109.10	92.18	92.73	127.00	76.10	101.55	96.26
160	83.70	111.55	100.33	98.53	144.00	78.90	111.45	103.70
SE(m) ±	1.90	1.98	1.45		2.99	2.94		
C.D. (P=0.05)	5.40	5.73	4.21		8.64	8.53		
<b>Interaction</b>								
SE(m) ±	3.80	3.95	2.90			5.88		
C.D. (P=0.05)	10.90	NS	N/A		NS	NS		

**K-21-AST-2 (c): Effect of nitrogen levels on GFY and DMY (q/ha/day) of promising entries of forage Maize**

Entries	Green Forage Yield (q/ha/day)					Dry matter Yield (q/ha/day)		
	Ludhiana	Pantnagar	Raipur	Ludhiana	Mean	Pantnagar	Raipur	Mean
PFM-12	4.97	6.72	8.28	1.04	5.25	1.33	1.78	1.56
J-1006 (NC)	6.06	7.38	6.54	1.20	5.30	1.35	1.37	1.36
African Tall (NC)	4.68	6.95	7.24	0.72	4.90	1.22	1.56	1.39
COHM-8 (NC)	5.28	7.61	7.61	0.90	5.35	1.73	1.61	1.67
SE(m) $\pm$	0.15	0.11	0.13	0.03		0.02	0.05	
C.D. (P=0.05)	0.42	0.31	0.37	0.08		0.07	0.16	
<b>N Levels (kg/ha)</b>								
40	3.97	6.49	8.09	0.64	4.80	1.23	1.74	1.49
80	5.10	6.93	6.77	0.92	4.93	1.35	1.45	1.40
120	5.83	7.38	7.66	1.10	5.49	1.46	1.62	1.54
160	6.09	7.85	7.15	1.20	5.57	1.59	1.52	1.56
SE(m) $\pm$	0.15	0.11	0.13	0.03		0.02	0.05	
C.D. (P=0.05)	0.42	0.31	0.37	0.08		0.07	0.16	
<b>Interaction</b>								
SE(m) $\pm$	0.29	0.212	0.25	0.05		0.046	0.10	
C.D. (P=0.05)	NS	N/A	NS	0.16		N/A	NS	

**K-21-AST-2 (d): Effect of nitrogen levels on quality of promising entries of forage Maize**

Entries	Crude protein yield (q/ha)								Crude Protein (%)						
	NWZ				CZ			Overall Mean	NWZ				CZ		Mean
	Ludh-iana	His-ar	Pant-nagar	Mean	Ana-nd	Rai-pur	Mean		Ludh-iana	His-ar	Pant-nagar	Mean	Ana-nd	Rai-pur	
PFM-12	4.84	10.72	6.80	7.45	6.51	8.14	7.33	7.40	6.50	10.22	5.70	7.47	4.81	8.49	6.65
J-1006 (NC)	5.07	11.23	6.81	7.70	6.96	5.47	6.22	7.11	6.00	10.26	5.83	7.36	5.06	7.42	6.24
African Tall (NC)	3.13	9.92	7.93	6.99	5.17	6.4	5.79	6.51	6.20	10.48	6.11	7.60	4.75	7.62	6.19
COHM-8 (NC)	4.16	9.52	8.18	7.29	5.01	7.07	6.04	6.79	6.60	9.77	8.97	8.45	4.80	8.16	6.48
SE(m) ±	0.12	0.24	0.03		0.17	0.27				0.09	0.11		0.05	0.11	
C.D. (P=0.05)	0.35	0.70	0.08		0.48	0.79				0.27	0.33		0.14	0.32	
<b>N Levels (kg/ha)</b>															
40	2.66	7.50	7.11	5.76	4.78	7.95	6.37	6.00	5.90	8.89	5.55	6.78	4.77	8.14	6.46
80	3.91	9.78	7.31	7.00	5.37	7.32	6.35	6.74	6.10	9.99	6.23	7.44	4.78	8.34	6.56
120	4.87	11.84	7.52	8.08	6.11	5.8	5.96	7.23	6.40	10.85	6.96	8.07	4.80	7.60	6.20
160	5.77	12.27	7.78	8.61	7.38	6.01	6.70	7.84	6.90	10.99	7.87	8.59	5.08	7.60	6.34
SE(m) ±	0.12	0.24	0.03		0.17	0.27				0.09	0.11		0.05	0.11	
C.D. (P=0.05)	0.35	0.70	0.08		0.48	0.79				0.27	0.33		0.14	0.32	
<b>Interaction</b>															
SE(m) ±	0.25	0.48	0.226			0.54				0.19	0.058			0.22	
C.D. (P=0.05)	0.71	NS	N/A		Sign.	NS				NS	N/A		Sign.	NS	

**K-21-AST-2 (e): Effect of nitrogen levels on growth parameters of promising entries of forage Maize**

Entries	Plant Height (CM) at Harvest					Leaf Stem Ratio					
	Ludh-iana	His-ar	Pant-nagar	Rai-pur	Mean	Ludh-iana	His-ar	Pant-nagar	Ana-nd	Rai-pur	Mean
PFM-12	194.4	224.1	270.1	276.9	241.4	0.59	0.38	0.43	0.86	0.42	0.54
J-1006 (NC)	200.5	228.6	275.4	248.1	238.1	0.73	0.38	0.46	0.92	0.30	0.56
African Tall (NC)	189.2	213.1	271.1	261.7	233.8	0.59	0.35	0.42	0.92	0.36	0.53
COHM-8 (NC)	191.3	208.2	274.9	271.1	236.4	0.50	0.36	0.48	1.16	0.38	0.58
SE(m) ±	2.4	2.53	2.66	1.49		0.02	0.01	0.01	0.02	0.12	
C.D. (P=0.05)	6.9	7.34	NS	4.33		0.06	0.02	0.03	0.06	0.05	
<b>N Levels (kg/ha)</b>											
40	163.2	192.3	256.7	270.0	220.6	0.49	0.32	0.40	0.98	0.44	0.53
80	196.1	217.1	272.4	268.5	238.5	0.58	0.36	0.44	0.94	0.33	0.53
120	200.4	230.2	279.0	259.1	242.2	0.65	0.39	0.46	0.97	0.35	0.56
160	215.8	234.4	283.4	260.3	248.5	0.69	0.39	0.49	0.97	0.34	0.58
SE(m) ±	2.4	2.53	2.66	1.49		0.02	0.01	0.01	0.02	0.12	
C.D. (P=0.05)	6.9	7.34	7.71	4.33		0.06	0.02	0.03	NS	0.05	
<b>Interaction</b>											
SE(m) ±	4.8	5.06	5.313	2.98		0.04	0.01	0.02		0.37	
C.D. (P=0.05)	NS	NS	N/A	NS		NS	NS	0.07	NS	NS	

**K-21-AST-2 (f): Effect of nitrogen levels on growth parameters promising entries of forage Maize**

Entries	Plant Population/m <sup>2</sup> at 15 DAS						Plant Population/m <sup>2</sup> at Harvest			
	NWZ			CZ			His-ar	Pant-nagar	Rai-pur	Mean
	Ludh-iana	Pant-nagar	Mean	Ana-nd	Rai-pur	Mean				
PFM-12	23.6	2.54	13.07	6.55	18.08	12.32	9.72	2.15	17.67	9.85
J-1006 (NC)	27.8	2.64	15.22	7.23	18.21	12.72	10.00	2.24	17.79	10.01
African Tall (NC)	23.4	2.48	12.94	5.42	18.13	11.78	9.00	1.91	17.71	9.54
COHM-8 (NC)	25.6	2.49	14.05	5.17	17.88	11.53	9.67	2.02	17.46	9.72
SE(m) ±	0.6	0.03		0.28	0.61		0.25	0.03	0.46	
C.D. (P=0.05)	1.8	0.09		0.82	1.79		NS	0.08	1.32	
<b>N Levels (kg/ha)</b>										
40	22.8	2.54	12.67	6.43	20.96	13.70	9.56	2.09	20.25	10.63
80	24.5	2.57	13.54	5.95	16.92	11.44	9.47	2.09	16.71	9.42
120	25	2.54	13.77	6.08	16.33	11.21	9.80	2.08	16.13	9.34
160	28.1	2.5	15.30	5.9	18.08	11.99	9.56	2.06	17.54	9.72
SE(m) ±	0.6	0.33		0.28	0.61		0.25	0.03	0.46	
C.D. (P=0.05)	1.8	NS		NS	1.79		NS	NS	1.32	
<b>Interaction</b>										
SE(m) ±	1.3	0.07			1.23		0.50	0.06	0.91	
C.D. (P=0.05)	NS	N/A		NS	NS		NS	0.17	NS	

**K-21-AST-2 (g): Effect of nitrogen levels on No. of Leaves at Harvest of promising entries of forage Maize**

Entries	No. of Leaves at Harvest		
	Anand	Raipur	Mean
PFM-12	13.40	12.10	12.75
J-1006 (NC)	13.32	11.30	12.31
African Tall (NC)	14.00	11.40	12.70
COHM-8 (NC)	14.47	11.90	13.19
SE(m) $\pm$	0.19	0.16	
C.D. (P=0.05)	0.53	NS	
<b>N Levels (kg/ha)</b>			
40	13.58	11.70	12.64
80	13.92	11.60	12.76
120	13.55	11.80	12.68
160	14.13	11.60	12.87
SE(m) $\pm$	0.19	0.16	
C.D. (P=0.05)	NS	0.47	

**K-21-AST-2 (h): Interaction Effect of nitrogen levels on GFY (q/ha) of promising entries of forage Maize at Pantnagar**

Entries	Nitrogen levels (kg/ha)				
	40 kg/ha	80 kg/ha	120 kg/ha	160 kg/ha	Mean A
PFM-12	403.267	411.600	437.367	441.533	<b>423.442</b>
J-1006 (NC)	408.233	448.787	484.267	519.133	<b>465.105</b>
African Tall (NC)	398.800	426.533	447.067	477.900	<b>437.575</b>
COHM-8 (NC)	425.700	459.833	490.667	540.700	<b>479.225</b>
<b>Mean B</b>	<b>409.000</b>	<b>436.688</b>	<b>464.842</b>	<b>494.817</b>	
<b>Factors</b>	C.D. (P=0.05)	SE(m) ±			
Factor(A)	19.445	6.700			
Factor(B)	19.445	6.700			
Factor(A X B)	N/A	13.400			

**K-21-AST-2 (i): Interaction Effect of nitrogen levels on DMY (q/ha) of promising entries of forage Maize at Pantnagar**

Entries	Nitrogen levels (kg/ha)				
	40 kg/ha	80 kg/ha	120 kg/ha	160 kg/ha	Mean A
PFM-12	78.130	80.963	87.507	87.973	<b>83.643</b>
J-1006 (NC)	72.807	80.447	89.383	98.470	<b>85.277</b>
African Tall (NC)	66.073	73.223	78.943	89.427	<b>76.917</b>
COHM-8 (NC)	93.903	104.817	112.883	125.450	<b>109.263</b>
<b>Mean B</b>	<b>77.728</b>	<b>84.863</b>	<b>92.179</b>	<b>100.330</b>	
<b>Factors</b>	C.D. (P=0.05)	SE(m) ±			
Factor(A)	4.211	1.451			
Factor(B)	4.211	1.451			
Factor(A X B)	N/A	2.902			



**K-21-AST-2 (j): Interaction Effect of nitrogen levels on CPY (q/ha) of promising entries of forage Maize at Anand**

Entries	Nitrogen levels (kg/ha)			
	40 kg/ha	80 kg/ha	120 kg/ha	160 kg/ha
PFM-12	9.65	6.24	5.67	7.98
J-1006 (NC)	4.93	4.11	4.34	5.76
African Tall (NC)	5.94	5.10	4.58	5.85
COHM-8 (NC)	7.32	5.23	5.43	6.48
SE(m) $\pm$	0.33			
C.D. (P=0.05)	0.96			
CV%	9.71			

### **K-21-AST-3: Effect of nitrogen levels of forage yield of promising of Dinanath grass**

[(Table Reference: K-21-AST-3 (a) to (e)]

**Locations (3):** Ranchi, Mandya and Imphal

A field trial AVTD-2 was conducted to find out the response of four promising entries- JHD-19-4, BAU-DN-110-18-2, BAU-DN-109-8, BAU-DN-103-18-2 and one national check (Bundel Dinanath-2) of Dinanath grass to three graded doses of nitrogen (30, 60 and 90 kg N/ha). The nitrogen was supplemented as half N as basal and remaining half N after 30 DAS. Basal application of 60:40 kg/ha P and K was made. The study was undertaken at three locations i.e., Ranchi, Mandya and Imphal in the country. The treatments were replicated thrice in Randomized Block Design. The gross plot size was 4 m x 3 m accommodating 4 m long 10 rows at 30 cm. The seed rate used was 4.0 kg/ha.

The results indicated that, on locational mean basis the national check produced maximum green and dry forage yields of 262.4 and 52.56q/ha, respectively. It was closely followed by entries BAU-DN-103-18-2 (249.5 and 49.78 q/ha) and JHD-19-4(248.7 and 52.81 q/ha). At Mandya centre JHD-19-4demonstrated significant superiority over reaming entries as well a check.BAU-DN-103-18-2 exhibited highest CP contest of 9.85 as well asCPyield (4.71q/ha) on locational mean basis.

The growth parameters, herbage yield and crude protein content and yield increased consistently with increasing level of nitrogen up to 90 Kg N/ha. With the application of 90 kg N/ha, the green and dry matter yield increased by 36.4 and 57.0 per cent over 30 kg N/ha and 10.7 and 17.9 per cent over 60 kg N/ha respectively. The response equation was worked out to  $y = -0.0112x^2 + 2.5583x + 133.9$  ( $R^2 = 0.997$ ). The Calculated  $Y_{\text{maxima}}$  is 114.3 kg N/ha, whereas,  $Y_{\text{optima}}$  is 107.7 kg/ha (input cost Rs 16.0/ Kg, output cost Rs 1.10/ kg)

**K-21-AST-3 (a): Effect of nitrogen levels on biomass yield of promising entries of Dinanath grass**

Varieties	Green Forage Yield (q/ha)				Dry Matter Yield (q/ha)				GFY (q/ha/day)	DMY (q/ha/day)
	Ranchi	Mandya	Imphal	Mean	Ranchi	Mandya	Imphal	Mean	Ranchi	Ranchi
JHD-19-4	347.3	305.1	93.6	248.7	61.30	73.23	23.90	52.81	5.34	0.94
BAU-DN-110-18-2	340.8	217.9	88.9	215.9	60.22	49.94	18.80	42.99	5.24	0.93
BAU-DN-109-8	365.1	224.4	88.3	225.9	64.55	54.24	20.50	46.43	5.62	0.99
BAU-DN-103-18-2	416.1	254.1	78.3	249.5	73.40	58.44	17.50	49.78	6.40	1.13
Bundel Dinanath-2 (NC)	436.7	257.6	92.8	262.4	76.96	60.62	20.10	52.56	6.72	1.18
SE(m) ±	6.15	8.03	1.36		1.1	2.38	0.89		0.09	0.02
C.D. (P=0.05)	17.9	23.39	3.95		3.21	6.94	2.59		0.27	0.04
<b>N Levels (kg/ha)</b>										
30	336.5	200.1	65.1	200.6	59.32	39.57	14.10	37.66	5.18	0.91
60	378.6	258.9	104.2	247.2	66.90	60.43	23.10	50.14	5.83	1.03
90	428.5	296.7	95.8	273.7	75.64	78.45	23.30	59.13	6.59	1.16
SE(m) ±	4.76	6.22			0.86	1.85			0.07	0.01
C.D. (P=0.05)	13.8	18.13			2.49	5.38			0.21	0.03
<b>Interaction</b>										
SE(m) ±	10.65	13.91			1.91	4.13			0.16	0.03
C.D. (P=0.05)	NS	NS			NS	NS			NS	NS

**K-21-AST-3 (b): Effect of nitrogen levels on Crude protein content, Yield and growth parameters of promising entries of Dinanath grass**

Varieties	Crude Protein Yield (q/ha/day)			Crude Protein (%)			Dry matter (%)	Plant population/ m <sup>2</sup> at 15 DAS	Plant population/m <sup>2</sup> at Harvest
	Ranchi	Imphal	Mean	Ranchi	Imphal	Mean	Mandya	Ranchi	Ranchi
JHD-19-4	4.37	2.20	3.29	7.11	9.40	8.26	24.16	93	349
BAU-DN-110-18-2	4.89	1.70	3.30	8.11	9.10	8.61	22.60	88	354
BAU-DN-109-8	4.10	1.90	3.00	6.32	9.20	7.76	23.82	91	414
BAU-DN-103-18-2	7.81	1.60	4.71	10.60	9.10	9.85	22.42	93	460
Bundel Dinanath-2 (NC)	4.90	1.90	3.40	6.32	9.20	7.76	23.21	88	494
SE(m) ±	0.08	0.09		0.06	0.11		0.41	0.85	6.19
C.D. (P=0.05)	0.25	0.26		0.17	0.31		1.91	2.47	18.02
CV (%)		8.37			2.02				
<b>N Levels (kg/ha)</b>									
30	4.37	1.30	2.84	7.34	9.20	8.27	19.85	91	369
60	5.16	2.10	3.63	7.69	9.20	8.45	23.37	92	410
90	6.11	2.10	4.11	8.05	9.20	8.63	26.51	88	463
SE(m) ±	0.07			0.04			0.32	1.42	4.79
C.D. (P=0.05)	0.96			0.13			0.92	NS	13.96
<b>Interaction</b>									
SE(m) ±	0.15			0.02			0.71	1.47	10.72
C.D. (P=0.05)	NS			NS			NS	NS	31.24

**K-21-AST-3 (c): Effect of nitrogen levels on Plant height and Leaf Stem Ratio of promising entries of Dinanath grass**

Varieties	Plant height (cm)				Leaf stem ratio			
	Ranchi	Mandya	Imphal	Mean	Ranchi	Mandya	Imphal	Mean
JHD-19-4	127.5	96.0	193.0	138.8	0.48	0.27	0.24	0.33
BAU-DN-110-18-2	128.2	75.4	172.3	125.3	0.43	0.19	0.30	0.31
BAU-DN-109-8	122.4	79.7	183.4	128.5	0.44	0.21	0.23	0.29
BAU-DN-103-18-2	130.2	87.0	175.1	130.8	0.40	0.22	0.22	0.28
Bundel Dinanath-2 (NC)	139.8	84.1	187.1	137.0	0.41	0.22	0.24	0.29
SE(m) ±	1.77	2.23	3.15		0.01	0.01	0.01	
C.D. (P=0.05)	5.15	6.49	9.13		0.02	0.02	0.04	
<b>N Levels (kg/ha)</b>								
30	119.1	68.6	181.5	123.0	0.43	0.20	0.26	0.30
60	129.7	87.0	177.5	131.4	0.42	0.22	0.25	0.30
90	140.1	97.8	187.7	141.8	0.45	0.24	0.23	0.31
SE(m) ±	1.37	1.73			0.01	0.01		
C.D. (P=0.05)	3.99	5.03			NS	0.01		
<b>Interaction</b>								
SE(m) ±	3.06	3.86			0.02	0.011		
C.D. (P=0.05)	8.91	NS			0.05	NS		

**Table K-20-AST-2 (d): Interaction effect of nitrogen levels on Green forage and Dry matter yield of promising entries of Dinanath Grass at Mandya**

Varieties	Green forage yield (q/ha)				Dry matter yield (q/ha)			
	Nitrogen levels (Kg/ha)				Nitrogen levels (Kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JHD-19-4	236.07	316.70	363.47	<b>305.11</b>	43.87	72.67	96.83	<b>73.23</b>
BAU-DN-110-18-2	172.43	222.70	258.70	<b>217.94</b>	33.53	52.30	64.00	<b>49.94</b>
BAU-DN-109-8	180.40	233.10	259.80	<b>224.43</b>	38.03	54.57	70.13	<b>54.24</b>
BAU-DN-103-18-2	196.77	261.27	304.28	<b>254.10</b>	38.80	62.37	83.27	<b>58.44</b>
Bundel Dinanath-2 (NC)	214.80	260.50	297.43	<b>257.58</b>	43.60	60.23	78.03	<b>60.62</b>
<b>Mean</b>	<b>200.09</b>	<b>258.85</b>	<b>296.73</b>	-	<b>39.57</b>	<b>60.43</b>	<b>78.45</b>	-
	<b>Particulars</b>	SE(m) ±	C.D. (P=0.05)		<b>Particulars</b>	SE(m) ±	C.D. (P=0.05)	
	Varieties (A)	<b>8.03</b>	<b>23.39</b>		Varieties (A)	<b>2.38</b>	<b>6.94</b>	
	Nitrogen (B)	<b>6.22</b>	<b>18.13</b>		Nitrogen (B)	<b>1.85</b>	<b>5.38</b>	
	Interaction (A x B)	<b>13.91</b>	<b>NS</b>		Interaction (A x B)	<b>4.13</b>	<b>NS</b>	

**Table K-20-AST-2 (e): Interaction effect of nitrogen levels on Green forage and Dry matter yield of promising entries of Dinanath Grass at Imphal**

Varieties	Green forage yield (q/ha)				Dry matter yield (q/ha)			
	Nitrogen levels (Kg/ha)				Nitrogen levels (Kg/ha)			
	30	60	90	Mean	30	60	90	Mean
JHD-19-4	68.0	112.5	100.2	<b>93.6</b>	16.0	25.7	29.9	<b>23.9</b>
BAU-DN-110-18-2	59.3	105.3	102.3	<b>88.9</b>	12.3	18.4	25.8	<b>18.8</b>
BAU-DN-109-8	70.3	97.9	96.5	<b>88.3</b>	14.0	24.2	23.2	<b>20.5</b>
BAU-DN-103-18-2	59.8	98.0	77.1	<b>78.3</b>	12.2	22.5	17.8	<b>17.5</b>
Bundel Dinanath-2 (NC)	68.0	107.3	103.1	<b>92.8</b>	16.1	24.6	19.6	<b>20.1</b>
<b>Mean</b>	<b>65.1</b>	<b>104.2</b>	<b>95.8</b>		<b>14.1</b>	<b>23.1</b>	<b>23.3</b>	-
SE(m) ±	1.36				SE(m) ±	0.89		
C.D. (P=0.05)	3.95				C.D. (P=0.05)	2.59		
CV (%)	2.67				CV (%)	7.68		

# FORAGE CROP PROTECTION KHARIF 2021

## PPT 1: Monitoring of diseases and insect pests in kharif forage crops

### Part-1: Monitoring of diseases and insect-pests in kharif forage crops at the main station

**Objective:** To record the occurrence and abundance of major diseases and insect-pests in sorghum, maize, bajra, cowpea and Bajra X Napier hybrid

**Locations:** Ludhiana, Rahuri, Palampur, Jhansi, Bhubaneswar, Coimbatore

**Plot size:** 4x4 m<sup>2</sup> per crop

**Replication:** 4 per crop

**Observations:** Disease/insect-pest progression on kharif forages starting from date of appearance till crop maturity at weekly interval on 10 randomly selected plants per replication per crop using standard rating scale and calculation of disease severity/incidence/insect damage.

### Results

**Location - Ludhiana**

**PEARL MILLET**

#### Leaf Blast:

Leaf blast of pearl millet started appearing in the end of July. Disease progressed at alarming rate during the crop season till end of September with maximum disease severity of 57.3% (Table Ludhiana PPT 1a).

#### Downy mildew:

The incidence of downy mildew was observed from 2<sup>nd</sup> week of August to end of September. The maximum incidence of downy mildew was 27.3% (Table Ludhiana PPT 1a).

### SORGHUM

#### Grey leaf spot:

Grey leaf spot appeared in the last week of July. The maximum disease severity was 46.3% (Table Ludhiana PPT 1a).

**Zonate leaf spot:** The occurrence of zonate leaf spot on sorghum was very less i.e. 21.0% and it appeared late in the season.

#### Anthracnose:

Anthracnose was observed in the 2<sup>nd</sup> week of July. Maximum disease severity of anthracnose was 43.6% (Table Ludhiana PPT 1a).

### MAIZE

**Leaf blight:** Disease appeared in the 2<sup>nd</sup> week of July and progressed slowly upto end of September with severity of 44.0%. Thereafter, as the crop reached physiological maturity, disease progressed at a steady pace (Table Ludhiana PPT 1a).



**Table Ludhiana PPT-1a: Percent severity of diseases associated with pearl millet, maize and sorghum**

Crop/ variety	Name of disease	Percent Disease Incidence / Severity in different SMWs (Standard Meteorological Week)										
		29	30	31	32	33	34	35	36	37	38	39
Sorghum/ SL 44	Anthrachnose ( <i>Colletotrichum sublineolum</i> )	0.0	5.5*	11.7	18.5	22.5	27.9	35.3	37.6	40.5	42.3	43.6
	Grey leaf spot ( <i>Cercospora sorghii</i> )	5.1*	11.5	14.8	17.3	21.3	26.5	30.5	35.3	42.5	44.7	46.3
Maize/ J 1006	Leaf blight ( <i>Bipolaris maydis</i> )	5.4*	7.7	12.3	18.7	24.3	28.0	32.5	37.7	41.2	43.4	44.0
Bajra/ FBC 16	Leaf Blast ( <i>Pyricularia grisea</i> )	5.7*	9.7	16.5	25.6	31.5	38.4	42.5	48.3	51.4	55.7	57.3
	Downy mildew ( <i>Sclerospora graminicola</i> )				2.5*	5.0	9.7	12.4	16.9	21.5	25.3	27.3

\* Week of appearance

**Incidence of different insect pest in *Kharif* forages at Ludhiana:**

The population of sorghum shoot fly started appearing in the month of June (25<sup>th</sup> SMW). The attack of this pest starts after one week of sowing and was reported to be in range of 10-46% deadhearts in sorghum across different meteorological weeks. The stem borer population also started appearing in the month of June and peak population was observed in the month of July in both maize and sorghum with slightly higher pest incidence on maize. The sporadic attack of rice grasshopper in pearl millet, Bajra Napier hybrid was recorded in the second fortnight of July. The spotted pod borer, *Maruca vitrata* in cowpea was observed. It was observed in the month of September (Table Ludhiana PPT 1b).

**Table Ludhiana PPT-1b: Incidence of different insect-pest in *Kharif* forages**

Name of Insect	Crop	Observation (Standard Meteorological week)									
		25	26	27	28	29	30	31	32	33	34
Shoot fly (% dead hearts)	Sorghum	20	20	22	28	38	46	38	22	20	10
Maize borer (% deadhearts)	Sorghum	4	4	6	8	5	5		5	4	3
Maize borer (% dead hearts)	Maize	8	9	10	12	9	7	7	6	4	3
SMW		29	30	31	32	33	34	35	36	37	38
Grasshopper (adults/10 plants)	Pearl millet	0.2	0.4	0.8	1.2	1.5	1.7	2.0	1.8	1	0.2
Grasshopper (adults/5 plants)	Bajra Napier	0.5	0.8	2.5	3.2	3.5	4.0	3.8	2.7	1.8	0.8
SMW		32	33	34	35	36	37	38	39	40	41
Defoliators (Hairy caterpillars/ plant)	Cowpea	-	0.1	0.3	0.6	1.0	1.0	0.8	0.6	0.2	0.1
Cowpea aphid (adults per twig)	Cowpea	2	5	10	12	10	4	2	-	-	-
Spotted pod borer ( <i>Maruca</i> (larvae/ 5 pods)	Cowpea	-	-	-	-	-	-	-	3	3.5	3.2

### Location- Palampur

At Palampur, wilt-root rot complex (75%) and leaf spot & blight (37%) were the major diseases of cowpea, whereas, pod borer and aphids were also observed with mild intensity (10% and 5% respectively). In maize, leaf blight (20%), Banded leaf and sheath blight (5%) were the major diseases along with stem borer (3% incidence). Sorghum was severely infected with zonate leaf spot having 60% disease severity. Leaf blast (30%) in Bajra was observed as major disease (Table Palampur PPT-1a).

**Table Palampur PPT-1a: Seasonal occurrence of the insect pests and diseases on kharif forage crops**

Crop	Diseases and insect pest	Severity /incidence(%) recorded in different SMWs (Standard Meteorological Week)						
		33	34	35	36	37	38	39
Cowpea	Wilt/root rot ( <i>Fusarium oxysporum</i> , <i>Phytophthora vignae</i> )	60	75	75	-	-	-	-
	Anthraxnose ( <i>Colletotrichum lindemuthianum</i> ) and other minor leaf diseases ( <i>Septoria vignae</i> , <i>Cercospora</i> etc. )	10	20	25	30	30	33	37
	Pod borer/Defoliators	-	5	5	8	10	10	10
	Aphids ( <i>Aphis craccivora</i> )	-	2	3	5	5	5	5
Maize	Leaf Blight ( <i>Exserohilum turcicum</i> )	10	10	12	15	15	20	20
	Banded leaf & sheath blight ( <i>Rhizoctonia solani</i> f. sp. <i>sasakii</i> )	1	1	2	2	4	5	5
	Maize stem borer ( <i>Chilo partellus</i> )	-	-	1	1	1	2	3
Sorghum	Zonate leaf spot ( <i>Gloeocercospora sorghi</i> )	30	30	40	45	45	50	60
Bajra	Blast ( <i>Pyricularia grisea</i> )	10	10	15	18	20	25	30

### Location: Rahuri

The per cent dead hearts of shoofly ranged between 1.90 to 31.90%. The aphid (0.30 to 3.30 score) and rust severity of 25.33 to 35.22% were noticed.

In maize, fall army worm damage (29.89 to 74.89%); maydis leaf blight (11.11 to 45.31% severity) and *Curvularia* leaf spot (7.09 to 36.20%) were recorded.

In case of pearl millet the percent dead hearts of stemfly were in the range of 4.80 to 31.40% and downy mildew ranged from 10.60 to 41.40%.

In cowpea, low to moderate level of infestation of aphids per plant (ranged-2.39 to 7.61 score) was noticed. Similarly, defoliators were also observed at low to moderate level (range-1.0 to 2.2/m<sup>2</sup>) while the population of blister beetles was in the range of 1.1 to 2.1/ m<sup>2</sup>. The incidence of yellow mosaic virus (range 2.20 to 23.64%) and leaf spot (range 9.09 to 23.64%) was of low to moderate level. In Grasses very low incidence of insect pests were observed (Table Rahuri PPT 1a).

**Location: Bhubaneswar**

At Bhubaneswar, Wilt-root rot complex (24%), leaf spot (34%) and yellow mosaic virus (28%) were the major diseases of cowpea, whereas leaf defoliators and aphids were also observed with intensity of 34% and 20% respectively. In Maize, leaf bight (24%), Banded leaf and sheath blight (16%) were the major diseases along with fall army worm incidence of with 44%. Bajra was infected with blast having 20% severity and foliage feeder damage of 12% respectively. In Rice bean, incidence of leaf defoliators (18%), leaf spot (18%), root rot (28%) and yellow mosaic virus YMV (14%) were the major diseases recorded.

**Location: Coimbatore****Sorghum**

**Anthracnose:** Anthracnose was observed during September first and second week with maximum disease severity of 25.33 and 22.50% respectively. The disease incidence then reduced upto 2.33% during third week of October.

**Shoot bug (*Peregrinus maidis*):** It was observed during first and second week of August. The number of nymphs and adults per plant observed were 2.44 and 2.33 respectively during the above said period.

**Maize**

**Fall armyworm (*Spodoptera frugiperda*):** The percent damage was ranged from 20.22 to 30.42% and the maximum damage (30.42%) was observed during third week of July.

**Pearlmillet**

No severe pests and disease was observed in pearlmillet.

**Cowpea**

**Aphids (*Aphis craccivora*):** The population of aphids was observed during August. The first two weeks of August recorded 7.33 and 10.66 aphids per plant respectively.

**Yellow Mosaic Virus:** There was no significance occurrence of YMV during the study period.

**Defoliator:** There was no significance occurrence of defoliator record and flea beetle damage was observed during initial stage of the crop.

**Perennial grasses:**

Among the perennial grasses viz., *Cenchrus* sp, guinea grass and Bajra napier, leaf folder was recorded in *Cenchrus* sp. (0.33-0.4 per plant) and spittle bug was recorded in bajra napier hybrid.

**Location: Jhansi**

Defoliators (upto 44.5 % damage) were major insect-pests of cowpea. No incidence of disease in cowpea was observed. In Maize, fall armyworm damage of 51.3% was noticed. Bajra was severely infected with leaf blast with severity as high as 59.8%. Sorghum was severely infected with zonate leaf spot having 62.7% disease severity (Table Jhansi PPT 1).

**Table Rahuri PPT-1a: Seasonal occurrence of the insect pests and diseases on kharif forage crops**

SMW	Sorghum			Maize			Bajra	Cowpea				
	Shoot fly ( <i>Atherigona soccata</i> ); Incidence (%)	Aphids ( <i>Melanaphis sacchari</i> ) (Score)	Rust ( <i>Puccinia purpurea</i> )	<i>S. frugiperda</i> (% damage)	<i>Curcularia</i> leaf spot ( <i>Curvularia lunata</i> ) (% severity)	Maydis leaf blight ( <i>Bipolaris maydis</i> ) (% severity)	Shoot fly ( <i>Atherigona approximata</i> ) damage (%)	Aphids ( <i>Aphis craccivora</i> ) / plant	Blister beetles/ m <sup>2</sup>	Defoliator / m <sup>2</sup>	YMV (% severity)	<i>Cercospora</i> leaf spot ( <i>Cercospora canescens</i> ) (% severity)
27	13.40	0.00	0.00	39.76	0.00	8.89	21.60	5.83	0.0	1.0	0.00	0.00
28	21.60	0.40	0.00	36.56	0.00	10.00	26.20	3.74	0.0	1.0	0.00	0.00
29	24.20	0.60	0.00	29.89	0.00	11.11	29.00	3.51	0.0	1.1	0.00	0.00
30	31.90	0.80	0.00	50.44	0.00	12.22	31.40	6.31	0.0	1.2	0.00	0.00
31	19.60	1.40	0.00	57.78	0.00	13.33	21.30	7.31	0.0	1.5	2.20	9.09
32	7.09	2.30	0.00	56.89	7.09	14.44	12.50	7.43	0.0	1.6	11.09	10.42
33	1.90	3.30	0.00	49.33	7.98	15.56	4.80	7.61	0.0	2.0	13.42	11.87
34	0.00	2.80	25.33	40.22	9.89	17.33	0.00	3.34	0.0	1.0	14.76	13.87
35	0.00	0.90	29.44	34.47	10.67	20.59	0.00	2.39	0.0	1.2	16.78	16.11
36	0.00	0.60	30.33	40.33	18.33	23.78	0.00	3.01	0.0	1.4	20.11	16.00
37	0.00	0.30	32.89	48.89	21.98	25.78	0.00	2.60	1.1	2.0	20.00	16.89
38	0.00	0.00	34.67	54.80	29.63	39.78	0.00	3.37	1.2	2.2	22.20	17.53
39	0.00	0.00	35.22	74.89	36.20	45.31	0.00	3.13	2.0	2.0	23.09	17.98

**Table Bhubaneswar PPT-1(a): Seasonal occurrence of the insect pests and diseases on kharif forage crops**

Crop	Diseases and insect pest	Severity/incidence (%) recorded in different SMWs (Standard Meteorological Week)								
		33	34	35	36	37	38	39	40	41
Cowpea	Wilt/root rot ( <i>Fusarium oxysporum</i> , <i>Phytophthora vignae</i> )	-	04	12	18	24	-	-	-	-
	Leaf spot ( <i>Septoria vignae</i> , <i>Cercospora</i> etc.)	-	2	6	10	16	24	34	-	-
	Yellow mosaic virus	-	-	-	-	2	4	10	14	28
	Aphids ( <i>Aphis craccivora</i> )	-	-	-	-	2	4	8	14	20
	Leaf defoliators	-	-	2	6	10	12	24	28	34
Maize	Blight ( <i>Bipolaris maydis</i> )	-	-	2	4	6	10	16	22	24
	Banded leaf & sheath blight ( <i>Rhizoctonia solani</i> f. sp. <i>sasakii</i> )	-	-	-	2	4	6	8	12	16
	Maize fall armyworm ( <i>S. frugiperda</i> )	-	5	8	14	18	24	30	36	44
Rice bean	Leaf defoliators	-	-	2	4	6	14	18	-	-
	Leaf spot ( <i>Cercospora</i> sp.)	-	-	2	4	10	12	16	18	-
	Root rot ( <i>Rhizoctonia solani</i> )	2	5	8	10	16	20	28	-	-
	Yellow mosaic virus	-	-	-	-	2	4	6	8	14
Bajra	leaf blast ( <i>Pyricularia grisea</i> )	-	-	-	2	4	8	12	16	20

**Table Coimbatore PPT-1(a): Seasonal occurrence of the insect pests and diseases on kharif forage crops**

SMW	Sorghum		Maize	Bajra	Cowpea			Perennial Grasses	
	Anthracnose	Shoot bug ( <i>Peregrinus maidis</i> ) (No. of nymphs and adults/plant)	<i>S. frugiperda</i> (% damage)	Shoot fly ( <i>Atherigona approximata</i> ) damage (%)	Aphids ( <i>Aphis craccivora</i> ) (No. of aphids/plant)	YMV (% severity)	Defoliator No. of larvae / plant	<i>Cenchrus sp.</i>	Bajra Napier hybrid
								Leaf folder No. of larvae/plant	Spittle bug No. of nymphs and adults/plant
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	30.42	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	25.33	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	26.33	0.00	0.00	0.00	0.00	0.33	0.00
32	0.00	2.44	25.22	0.00	7.33	0.00	0.00	0.40	2.33
33	0.00	2.33	20.22	0.00	10.66	0.00	0.00	0.33	2.66
34	0.00	0.00	25.33	0.00	0.00	0.00	0.00	0.00	3.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33
36	25.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	22.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	15.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	5.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Table Jhansi PPT 1: Seasonal occurrence of the insect pests and diseases on kharif forage crops**

Crop	Diseases and insect pest	Severity/incidence/damage (%) of diseases and insect-pests recorded in different SMWs (Standard Meteorological Week)								
		31	32	33	34	35	36	37	38	39
<b>Cowpea</b>	Defoliators	0	3.5	10	18.3	25.0	32.8	35.5	41.3	44.5
<b>Maize</b>	Fall armyworm ( <i>S. frugiperda</i> )	0	2.5	11.3	21.2	27.5	35.8	42.8	47.2	51.3
<b>Pearl millet</b>	Blast ( <i>Pyricularia grisea</i> )	0	0	0	4.4	13.3	24.5	46.7	52.5	59.8
<b>Sorghum</b>	Zonate leaf spot ( <i>Gloeocercospora sorghi</i> )	0	5.3	19.3	23.0	32.2	37.0	48.9	53.8	62.7

## PPT 1: Monitoring of diseases and insect pests in kharif forage crops

### Part-2: Survey of diseases and insect-pests in kharif forage crops

**Locations:** Bhubaneswar, Coimbatore, Palampur, Rahuri and Ludhiana

#### Methodology

Disease/insect-pest incidence to be recorded on kharif forages during the peak season on 15 locations/farmer's field surrounding the center. Data must be recorded either as presence or absence of disease/insect-pest in a particular crop. If it is absent mark it as "0" and if it is present, then note the percent severity/incidence/insect-pest damage along with name of crop, disease/insect-pest, date of observation and name of location.

#### Results

##### Ludhiana

In Ludhiana, survey was conducted in adjoining areas of Ludhiana and nearby four districts of Punjab like Roopnagar, Ferozepur and Moga. Major fodder crops observed in farmers' fields were sorghum, maize and pearl millet during the survey. In sorghum, severity of foliar diseases anthracnose, zonate leaf spot and grey leaf spot was recorded in the range of 0.0 – 40.0, 0.0 – 12.5 and 0.0 – 46.0% respectively. Shoot fly dead hearts were observed in the range of 8.0 – 50.0% whereas, fall army worm incidence was also recorded (0.2 – 2.0%) in some places. In case of fodder maize, leaf blight severity was 0.0 – 25.5% and fall army worm incidence was ranged between 2.0 – 25.0%. In pearl millet, leaf blast was 0.0 – 32.0% and fall army worm infestation was 0.2 – 1.5% (Table Ludhiana PPT 1c).

##### Palampur

In District Kangra at different locations major diseases of maize were blights (10-30%) and BLSB (1-10%). In Pearl millet, leaf blast severity was observed 5- 30 per cent. In Sorghum, the major disease was zonate leaf spot (10-35%) and in cowpea root rot incidence was observed between 15-40% (Table Palampur PPT 1b).

##### Rahuri

During *Kharif* 2021, survey was carried out at 15 different villages adjacent to Rahuri and Sangamner and the incidence/infestation of insect-pests and diseases were noted on different *Kharif* crops. In sorghum crop per cent dead hearts of shoofly ranged from 6.0 to 12.7% and leaf blight (0.6 to 2.8 score) were recorded. In maize, incidence of fall army worm, *S. frugiperda* were observed at low to moderate level (Range 1.2 to 5.0 score), while leaf spot were noticed in the range of 1.4 to 3.0 score at late stage. In pearl millet, per cent dead hearts of stem fly was found in the range of 1.0 to 4.2%. In case of cowpea, aphids infestation were observed low to moderate level (ranged-0.2 to 5.4 score). Similarly, defoliators were observed at low level (range-1.0 to 2.0 per m<sup>2</sup>). The incidence of yellow mosaic virus were in the range of 1.0 to 1.8 score. In Bajra Napier hybrid very negligence of insect pest were noticed (Table Rahuri PPT 1b).



### **Bhubaneswar**

During *Kharif* 2021, 15 villages under 3 districts of Odisha (Khordha, Puri and Cuttack) were surveyed to study the incidence /severity of disease pest in forage crops . In maize, maydis leaf blight, fall army worm & BLSB were recorded with severity of 26.0, 36.2 and 20.5% respectively. Severity of pearl millet blast was recorded in the range of 8.4-23.4%. In cowpea, as high as 18.2% root rot, 22% mosaic incidence were recorded where as in ricebean the highest root rot and mosaic incidence recorded were 16.8 & 14.4% respectively (Table Bhubaneswar PPT 1b).

### **Coimbatore**

Roving Survey was carried out for the occurrence of insect pests in fodder crops at fifteen farmers field of Coimbatore and Tirupur districts. Shoot bug occurrence was noticed in bara napier hybrid during August first, second and third week with the mean population of 2.33, 2.66 and 3.00/plant respectively (Table Coimbatore PPT 1b).

**Table Ludhiana PPT 1c: Survey of diseases and insect-pests in kharif forage crops in Punjab**

District	Date of survey	Name of location	Sorghum					Maize		Pearl millet	
			Anthravnose severity (%)	Zonate leaf spot (%)	Grey leaf spot severity (%)	Sorghum shoot fly % dead hearts	Fall armyworm % infestation	Maydis leaf blight (%)	Fall armyworm % infestation	Leaf blast (%)	Fall armyworm % infestation
Ludhiana	26.08.21	Kohara	40.0	0	42.5	20	0.2	11.0	5	21.0	0.2
		Macchiwara	31.2	0	35.5	10	0.2	12.5	10	15.5	0.2
		Panjeta	15.5	0	25.0	15	0.5	5.0	20	25.0	1.5
		Iraq	10.0	0	8.4	10	0.5	10.0	10	5.5	0.2
		Garibet	5.0	0	5.5	20	0.5	4.7	4.0	12.3	1.0
		Mullanpur	14.2	10.5	15.5	20	1.0	5.5	20	5.5	0.5
		Mandiani	24.3	0	34.5	25	1.0	14.9	25	15.0	3.0
		Talwandi khurd	33.5	0	42.2	30	0.5	20.3	8	25.0	0
		Talwandi kalan	0	12.5	0	20	0.75	19.0	12	32.0	0.5
		Kokri	0	5.0	0	35	1.0	21.5	5	21.0	0
		Jagraon	25.7	0	33.5	50	1	5.5	5	22.0	0.2
Moga	26.08.21	Bijsar	0	0	0	20	1.5	5.0	5	23.5	0.2
		Kokri kalan	14.7	0	17.7	25	1.0	0	8	18.4	0
		Kot Ise Khan	12.6	0	28.2	25	0.5	0	5	18.3	0
		Jalalabad	0	0	0	10	1.0	0	2.5	21.0	0
		Jallekhan	0	6.3	0	20	2.0	0	2	32.0	0
		Zira	0	0	0	8	1.5	0	22	15.0	1.0
Ferozepur	26.08.21	Jhatra	9.5	0	9.5	30	5	0	25	21.0	1.2
		Balkhandi	8.5	0	16.0	15	3	0	20	18.0	0.5
		Jagram	18.3	5.5	28.5	25	0	0	4	10.0	0
		Phabian	23.0	0	32.6	15	0.2	0	5	11.3	0
		Mjapurhass	9.0	0	26.0	20	0	0	0	21.5	0

Roopnagar	29.09.21	Machhiwarakham	5.0	0	9.0	25	0	5.5	20	10.0	0.5
		Chaklohat	0	0	0	30	0	9.5	0	0	0
		Behrampur	0	7.4	0	40	5	11.3	30	0	0
		Bazidpur	27.3	0	25.0	60	5	15.3	35	0	1.5
		Bela	36.5	0	46.0	40	0	18.0	30	0	1
		Morinda	22.0	0	27.0	30	0.5	20.1	25	0	1.0
		Khamano	14.0	0	15.6	20	0	25.5	35	0	1
		Sangatpur	8.5	6.5	15.5	25	0.5	0	25	18.0	1.0
		Kotlasamaspur	5.0	4.5	18.0	25	0.5	0	15	20.5	0.5
		Ghulal	5.0	0	9.0	20	0.5	0	20	16.5	0.5

**Table Palampur 1b: Survey of diseases of fodder crops in Kangra district of Himachal Pradesh**

Place	Maize		Sorghum	Bajra	Cowpea
	Leaf Blights ( <i>Bipolaris maydis</i> & <i>Exserohilum turcicum</i> )	BLSB ( <i>Rhizoctonia solani</i> )	Zonate leaf spot ( <i>Gloeocercospora sorghi</i> )	Leaf blast ( <i>Pyricularia grisea</i> )	Root rot ( <i>Sclerotium rolfsii</i> , <i>Fusarium</i> etc.)
Rajpur	18-22	4-5	30-35	5-10	30-40
Nagri	15-25	7-10	25-30	10-15	25-30
Bindraban	25-30	5-7	NA	NA	NA
Malan	25-30	5-7	30-35	NA	NA
Nagrota	20-25	3-4	NA	NA	20-25
Drang	15-20	6-8	NA	NA	NA
Kandwari	15-20	2-3	15-25	10-15	NA
Chauntra	30-35	-	NA	NA	NA
Dhanotu	20-25	-	10-15	25-30	15-20
Chowki	10-15	-	NA	NA	NA
Bandla	10-15	1-2	15-20	5-10	25-30
Bhawarna	25-30	7-10	15-20	10-15	15-20
Thural	15-20	8-10	15-20	NA	NA

NS: Not surveyed

NA: Crop not available

**Table Rahuri 1b: Survey of diseases of fodder crops in Maharashtra**

Date	Location/ Villages	Crops								
		Jowar		Maize		Bajra	Cowpea			H. Napier
		Shoot fly % dead hearts	Maydis leaf blight (score)	FAW <i>S. frugiperda</i> (score)	Leaf spot (score)	Shoot fly % dead hearts	Aphids / plant (score)	Defoliators/ m <sup>2</sup>	YMV (score)	No .of Sucking insects
01/07/2020	Bherdapur	8.2	0.0	2.4	0.0	1.0	0.0	0.0	0.0	0.0
28/07/2020	Pimpalgaon Nip.	0.00	0.0	2.8	0.0	2.0	0.2	1.0	0.0	0.0
03/08/2020	Wambori	12.7	0.0	3.6	0.0	2.2	1.0	0.0	0.0	0.0
09/08/2020	Matapur	0.0	0.0	2.4	0.0	0.0	2.0	0.0	0.0	0.0
17/08/2020	Digras	11.4	0.0	4.0	0.0	3.2	2.6	2.0	0.0	0.0
25/08/2020	Sukewadi	10.0	0.0	2.0	0.0	2.0	1.2	1.0	0.0	0.0
27/08/2020	Sade	6.0	0.6	2.6	0.0	2.3	1.6	1.0	1.0	0.0
01/09/2020	Khadambe	0.0	1.0	3.8	0.0	2.0	1.0	2.0	1.0	0.0
05/09/2020	Rahuri Khurd	0.0	2.0	4.8	2.2	4.2	3.2	1.4	1.4	0.0
18/09/2020	Kolhar	0.0	2.4	2.4	2.0	0.0	5.4	0.0	1.8	0.0
25/09/2020	Dadh Brk	0.0	1.0	5.0	1.4	0.0	2.8	0.0	1.0	0.0
02/10/2020	Jorve	0.0	1.0	2.0	0.6	0.0	1.0	0.0	0.0	0.0
17/10/2020	Rajapur	0.0	1.0	1.2	2.8	0.0	0.0	0.0	0.0	0.0
14/10/2020	Kokangaon	0.0	2.1	2.2	3.0	0.0	0.0	0.0	0.0	0.0
03/10/2020	Kolhar	0.0	2.8	2.0	2.0	0.0	0.0	0.0	0.0	0.0

**Table:-Bhubaneswar PPT-1 (b): Survey of disease and insect pest in kharif forage crops in Odisha**

District	Date of survey	Name of location	Maize			Pearl millet	Cow pea		Ricebean	
			Maydis leaf blight (% severity)	Fall armyworm (% infestation)	BLSB (% incidence)	Blast (% severity)	Root rot (%)	YMV (%)	Root rot (%)	YMV (%)
Khordha	20.08.21	Bajapur	16.0	32.4	16.4	18.2	4.2	4.2	4.5	6.4
		Haripur	12.5	14.8	0	16.5	4.5	6.5	3.6	4.4
		Kuradhamal	0	22.6	20.5	20.0	8.7	4.8	4.6	10.2
		Kaipadar	8.5	18.2	12.5	23.4	12.0	8.5	6.2	5.2
		palatotapada	0	15.4	0	12.2	6.1	4.6	4.2	8.0
Puri	27.8.21	Alagaam	5.5	10.5	18.4	15.7	7.5	10.2	6.0	8.2
		Kadua	14.5	36.0	11.6	12.5	3.4	4.4	8.2	5.5
		Sukal	0	18.6	0	16.4	10.4	15.2	0	0
		Dugal	0	24.5	0	18.6	12.3	8.2	0	0
		Bala pur	10.0	22.8	13.5	20.8	4.0	6.4	4.2	10.2
Cuttack	5.9.21	Adashpur	26.0	35.4	23.8	16.3	18.2	8.2	8.0	10.2
		Kasarada	20.8	15.6	15.4	12.5	12.5	22.0	12.2	14.4
		Bilasuni	14.5	22.4	0	10.0	5.4	10.4	16.8	6.8
		Pokharigaon	12.6	36.2	18.4	8.4	6.6	18.6	6.5	8.1
		Alana	22.2	32.4	12.2	18.5	12.0	4.3	10.2	12.2

**Table Coimbatore PPT-1b: Survey of insect pests and diseases on Kharif forage crops in Tamil Nadu**

SMW	Location, Crop and Pest														
	M	M	M	M	M	M	M	CM	CM	CM	CM	CM	Ayyansalai	Vedapatti	Madathukulam
	CN Co 5	SN	Guinea grass	Veli masal	SN	Guinea grass	CN Co 5	SN	SN	CN Co 5	SN	CN Co 5	Fodder sorghum	SN	CN Co 5
	Spittle bug	Spittle bug	-	-	Spittle bug	-	Spittle bug	Spittle bug	Spittle bug	Spittle bug	Spittle bug	Spittle bug	-	Spittle bug	Spittle bug
28	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
29	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
30	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
31	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
32	2.33	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
33	0.00	0.00	-	-	2.66	-	0.00	-	-	0.00	-	-	-	0.00	-
34	0.00	0.00	-	-	0.00	-	0.00	-	-	3.00	-	-	-	0.00	-
35	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	3.33	-
36	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
37	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
38	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
39	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
40	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
41	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
42	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-
43	0.00	0.00	-	-	0.00	-	0.00	-	-	0.00	-	-	-	0.00	-

**M** – Mathampalayam

**CM** –Chinnamathampalayam

**SN**: Super Napier

**Spittle bug**: No. of nymphs and adults/plant

## **PPT-2: Evaluation of Kharif forage crops breeding materials for prevalent diseases and insect pests under natural conditions**

**Objective:** Screening of various contributed entries along with national and zonal checks for their reaction to diseases and insect pests under natural conditions using standard disease/insect-pest rating scales.

**Locations:** Ludhiana, Rahuri, Palampur, Coimbatore, Bhubaneswar, Jhansi

**Crops:** Pearl millet, Maize, Cowpea, Rice bean, and perennial grasses

### **Results:**

**IVTPM – Initial varietal trial in Pearl Millet:** (Table: Disease –pest resistance in IVT Pearl Millet trial)

**At Rahuri,** all the entries were resistant to moderately resistant against blast disease.

**At Ludhiana,** All entries were found susceptible to leaf blast. Downy mildew incidence was negligible in all the entries. All the entries showed low incidence of grasshopper per ten plants and its range was recorded to be 0.66- 1.33, the differences were non-significant. Very low level of pyrilla population was observed, with non-significant differences.

**At Bhubaneswar,** all the entries were resistant to moderately resistant against blast and defoliators except AFB-54 and RBB-1 which showed susceptible reaction to blast and moderately susceptible to leaf defoliator.

**At Jhansi,** all the entries were resistant to moderately resistant against blast.

**AVTPM –1 (Advance varietal trial-1 in Pearl Millet):** (Table: Disease –pest resistance in AVT-1 Pearl Millet trial)

**At Rahuri,** all the entries were resistant to moderately resistant against blast disease.

**At Ludhiana,** All entries showed susceptible disease reaction to leaf blast. No incidence of downy mildew was observed. All the entries showed very low incidence of grasshopper per ten plants and its range was 1.00- 1.66, the differences were non-significant. Incidence of cotton grey weevil ranged from 0.66 to 1.00 per 10 plants, the differences were non-significant.

**At Bhubaneswar,** all the entries were resistant to moderately resistant against blast and defoliators.

**At Jhansi,** all the entries were resistant to moderately resistant against leaf blast.

**AVTPM –2 (Advance varietal trial-2 in Pearl Millet):** (Table: Disease –pest resistance in AVT-2 Pearl Millet trial)

**At Rahuri,** all the entries were resistant to moderately resistant against blast disease.

**At Ludhiana,** All entries showed susceptible disease reaction to leaf blast. No incidence of downy mildew was observed. All the entries showed very low incidence of grasshopper per ten plants and its range was 1.00- 1.66, the differences were non-significant. Incidence of cotton grey weevil ranged from 0.66 to 1.00 per 10 plants, the differences were non-significant.

**At Bhubaneswar,** all the entries were resistant to moderately resistant against blast and defoliators.

**At Jhansi,** all the entries were resistant to moderately resistant against blast.



**Table: Disease –pest tolerance in IVT Pearl Millet trial**

Entries	Ludhiana				Bhubaneswar				Jhansi		Rahuri	
	Leaf blast score	Disease reaction	Grasshopper (incidence/10 plants)	<i>Pyrilla</i> (incidence/plant)	Leaf blast score	Disease Reaction	Leaf defoliators (No./10 plants)	Reaction	Leaf blast score	Disease Reaction	Leaf blast score	Reaction
JPM-18-71	6	S	1.00	1.00	3	R	2.8	R	2.3	R	0.00	R
AFB-3 (ZC-NWZ)	6	S	0.66	1.33								
BAIF Bajra 1 (ZC-CZ)									3.0	R	0.00	R
APFB-9-1 (ZC-NEZ)					4	MR	3.6	MR				
FBL-7	6	S	1.33	1.33	4	MR	3.4	MR	2.3	R	0.00	R
FBL -6	5	S	1.00	1.00	2	R	2.1	R	2.0	R	0.00	R
AFB-45	6	S	1.00	1.00	5	MR	3.8	MR	1.0	HR	4.06	MR
NDFB-942	6	S	1.33	1.33	5	MR	3.8	MR	2.3	R	4.41	MR
AFB-54	6	S	1.00	1.00	6	S	4.2	MS	3.0	R	2.77	R
Giant Bajra (NC)	6	S	1.00	0.66	2	R	2.2	R	3.7	MR	0.00	R
RBB-1 (NC)	6	S	0.66	1.00	6	S	4.8	MS	3.3	MR	2.37	R
ADV175020	6	S	1.00	1.00	2	R	2.4	R	2.0	R	0.00	R
Hybrid - FSB2021 - 1	6	S	0.66	0.66	3	R	2.6	R	2.7	R	0.00	R

**Table: Disease –pest tolerance in AVT-1 Pearl Millet trial**

Entries	Ludhiana				Bhubaneswar				Jhansi		Rahuri	
	Leaf blast score	Disease reaction	Grasshoppers (incidence/10 plants)	<i>Pyrilla</i> (incidence/plant)	Leaf blast score	Disease Reaction	Leaf defoliators (No./10 plants)	Reaction	Leaf blast score	Disease Reaction	Leaf blast score	Reaction
FBL 4	6	S	1.66	1.00	3	R	2.8	R	3.0	R	4.15	MR
RBB-1 (NC)	7	S	1.00	0.66	4	MR	2.8	R	2.7	R	4.26	MR
AFB-3 (ZC-NWZ)	6	S	1.66	1.00								
BAIF Bajra 1 (ZC-CZ)									2.3	R	3.89	MR
APFB-9-1 (ZC-NEZ)					5	MR	3.8	MR				

TSFB-1610	6	S	1.00	0.66	2	R	2.2	R	2.3	R	0.00	R
16ADV0111	6	S	1.33	1.00	5	MR	3.6	MR	2.7	R	4.17	MR
JPM 18-37	6	S	1.33	0.66	3	R	2.8	R	3.3	MR	3.89	MR
Giant Bajra (NC)	7	S	1.00	1.00	2	R	2.4	R	3.3	MR	1.99	R
PHBF-5	6	S	1.66	0.66	2	R	2.6	R	3.3	MR	2.09	R

**Table: Disease –pest tolerance in AVT-2 Pearl Millet trial**

Entries	Ludhiana				Bhubaneswar				Jhansi		Rahuri	
	Leaf blast score	Disease reaction	Grasshoppers (incidence/10 plants)	<i>Pyrilla</i> (incidence/plant)	Leaf blast score	Disease Reaction	Leaf defoliators (No./10 plants)	Reaction	Leaf blast score	Disease Reaction	Leaf blast score	Reaction
AFB-3 (ZC-NWZ)	6	S	1.33	0.66								
BAIF Bajra 1 (ZC-CZ)									2.8	R	4.07	MR
APFB-9-1 (ZC-NEZ)					3	R	2.8	R				
JPM-18-7	6	S	1.00	0.66	4	MR	3.6	MR	3.0	R	3.97	MR
BAIF Bajra-7	6	S	1.33	0.66	2	R	2.2	R	2.8	R	4.56	MR
RBB-1 (NC)	6	S	1.33	0.66	4	MR	2.8	R	2.0	R	4.44	R
16ADV0055	6	S	1.66	1.00	2	R	2.4	R	2.8	R	3.87	MR
Dev-1	6	S	1.66	1.00	2	R	2.4	R	3.3	MR	4.13	MR
Giant Bajra (NC)	6	S	1.33	0.66	3	R	2.6	R	2.5	R	1.67	R

#### **IVTC – Initial varietal trial in cowpea (Table: Disease –pest tolerance in IVT in Cowpea trial)**

**At Rahuri**, entries HFC 17-7, MFC-18-10 and PFC 40 were resistant to aphids, whereas PFC 36, UPC-5286 and TSFC-20-06 were moderately resistant. The entries TNFC 1910, MFC-18-8 and PFC 40 were found resistant to yellow mosaic virus.

**At Palampur**, entries PFC 40 and TSFC-20-06 were found moderately resistant to root rot and wilt complex. All other entries were found susceptible.

**At Ludhiana**, all the entries were found resistant to cowpea mosaic virus except HFC 17-7, PFC 40 and TSFC-20-06 which were moderately susceptible. The attack of defoliators was recorded to be in range of 1.66- 2.33 larvae per 10 plants, the differences were non- significant.

**At Bhubaneswar**, all the entries were resistant to moderate resistance against root rot. All entries were resistant to moderately resistant against yellow mosaic virus and aphids except TNFC 1910, TSFC-20-06 which were moderately susceptible.

**At Coimbatore**, all the entries were resistant to moderately resistant to aphids and yellow mosaic virus infestation.

#### **AVTC-1: First Advanced Varietal Trial in Cowpea (Table: Disease –pest tolerance in AVT-1 in Cowpea trial)**

**At Bhubaneswar**, all the entries were found resistant to moderately resistant to aphid, root rot and mosaic except MFC-16-8 which was found moderately susceptible to yellow mosaic virus.

**At Coimbatore**, all the entries were resistant to aphids and yellow mosaic virus infestation.

**Table: Disease –pest tolerance in IVT Cowpea trial**

Entries	Ludhiana			Palampur		Bhubaneswar					
	% mosaic incidence	Disease reaction	Defoliators/ 10 plants	Root rot/wilt/collar rot complex		Root rot %	Disease reaction	Mosaic incidence (%)	Disease reaction	Cowpea aphid (No.)	Reaction
				Incidence (%)	Disease Reaction						
Bundel Lobia-2 (ZC-NWZ)	0.0	HR	2.33								
UPC-622 (ZC-HZ)				14	MR						
TNFC 0926 (ZC-NEZ)						3.5	R	4.8	R	8.2	MR
PFC 36	2.0	R	2.66	60	S	3.6	R	3.2	R	10.5	MR
TNFC 1910	5.5	R	1.66	25	MS	3.8	MR	20.4	MS	22.2	MS
MFC-18-8	6.5	R	2.00	30	MS	2.2	R	0.0	HR	2.4	R
UPC 21-1	15.0	MR	1.66	60	S	2.0	R	0.0	HR	2.0	R
HFC 17-7	27.3	MS	2.00	25	MS	2.2	R	0.0	HR	2.4	R
MFC-18-10	11.0	MR	2.33	30	MS	2.4	R	0.0	HR	2.8	R
Bundel Lobia-1 (NC)	10.5	MR	1.66	20	MR	2.4	R	0.0	HR	3.8	R
UPC-5286 (NC)	0.0	HR	2.00	40	MS	3.6	MR	15.4	MR	12.6	MR
PFC 40	27.0	MS	2.33	20	MR	3.8	MR	12.2	MR	14.8	MR
TSFC-20-06	28.5	MS	2.00	12	MR	4.0	MR	22.2	MS	24.6	MS

**Table: Disease –pest tolerance in IVT Cowpea trial cont...**

Entries	Rahuri				Coimbatore			
	Av. No. of aphids/plant	Reaction	YMV incidence	Disease reaction	Av. No. of aphids/plant	Reaction	YMV incidence	Disease reaction
UPC-9202 (ZC-CZ)	74.00	S	59.40	HS				
MFC-09-1 (ZC-SZ)					1.30	R	2.00	MR
PFC 36	29.90	MR	49.40	S	1.50	R	2.00	MR
TNFC 1910	71.70	S	0.00	HR	0.00	HR	1.0	R
MFC-18-8	36.40	MS	0.00	HR	0.00	HR	1.0	R
UPC 21-1	38.40	MS	6.00	R	0.00	HR	1.0	R
HFC 17-7	5.50	R	45.80	S	1.30	R	1.5	R
MFC-18-10	6.70	R	28.60	MS	0.00	HR	1.0	R
Bundel Lobia-1 (NC)	49.50	MS	25.40	MS	0.00	HR	1.0	R
UPC-5286 (NC)	16.70	MR	22.20	MS	1.60	R	1.5	R
PFC 40	8.60	R	0.00	HR	1.50	R	1.0	R
TSFC-20-06	19.20	MR	42.20	S	1.50	R	1.0	R

**Table: Disease –pest tolerance in AVT-1 Cowpea trial**

Bhubaneswar							Coimbatore			
Entries	Root rot (%)	Disease reaction	Mosaic (% infection)	Disease reaction	Cowpea aphid		Av. No. of aphids/plant	Reaction	YMV incidence	Disease reaction
					No./top leaf with 10 cm petiole	Reaction				
HFC17-9	3.2	R	2.4	R	4.2	R	0.60	R	1.0	R
UPC-5286 (NC)	2.6	R	4.2	R	4.8	R	0.30	R	1.0	R
MFC-8-14 (ZC-SZ)							1.00	R	1.0	R
UPC 628 (ZC-NEZ)	2.4	R	-	HR	2.4	R				
Bundel Lobia-1 (NC)	4.5	R	14.5	MR	6.8	MR	1.70	R	1.0	R
MFC-16-8	12.2	MR	24.4	MS	9.2	MR	1.20	R	1.0	R

#### **IVTM – Initial varietal trial in Maize (Table: Disease –pest tolerance in IVT Maize trial)**

**At Rahuri**, All the entries were found resistant to moderately resistant to fall armyworm except IIMFC 1, ADC-2 and PJHM-1 which were moderately susceptible. All the entries were resistant to moderately resistant to *Maydis* leaf blight.

**At Palampur**, all the entries were resistant to moderately resistant against *Turcicum* leaf blight.

**At Ludhiana**, all entries showed resistant to moderately resistant disease reaction to *Maydis* leaf blight. All the entries exhibited very low incidence of *Chilo partellus* and fall armyworm without any significant variation amongst different test entries.

**At Bhubaneswar**, all the expressed resistant to moderately resistant reaction to leaf blight except Hybrid - FSM2021-1, IIMFC 2, CMH-12-686 showed moderate susceptibility to leaf blight. Hybrid - FSM2021-1, CMH-12-686 IVTM-6 and 12 expressed moderate susceptibility to BLSB in maize. Rest of the entries were resistant to moderately resistant to BLSB.

**At Jhansi**, the entries ADFM-3, IIMFC 1, IIMFC 2, ADFM-2, MFM-18-27, CMH-12-686, HPFM-11, MFM-18-2 were found resistant to *Spodoptera frugiperda*. Rest were moderately susceptible.

**At Coimbatore**, all the entries were found resistant to *Spodoptera frugiperda*.

#### **AVTM –1 (Advance varietal trial-1 in Maize) (Table: Disease –pest tolerance in AVT Maize trial)**

**At Rahuri**, All the entries were found resistant to moderately resistant to fall armyworm. All the entries were resistant to moderately resistant to *Maydis* leaf blight.

**At Ludhiana**, all entries showed moderately resistant disease reaction to leaf blight of maize. All the entries exhibited very low incidence of *Chilo partellus* and fall armyworm without any significant variation amongst different test entries.

**At Palampur**, all the entries were resistant to moderately resistant against *Turcicum* leaf blight.

**At Bhubaneswar**, all the entries were resistant to moderately resistant against *Turcicum* leaf blight and banded leaf and sheath blight.

**At Jhansi**, the entries PMC-13, PMC-11, COHM-8 were found resistant and rest were moderately susceptible to *Spodoptera frugiperda*.

**At Coimbatore**, all the entries were found resistant to *Spodoptera frugiperda*.

**AVTM –2 (Advance varietal trial-2 in Maize) (Table: Disease –pest tolerance in AVT Maize trial)**

**At Rahuri,** All the entries were found resistant to moderately resistant to fall armyworm and *Maydis* leaf blight.

**At Ludhiana,** all entries showed moderately resistant disease reaction to leaf blight of maize. All the entries exhibited very low incidence of *Chilo partellus* and fall armyworm without any significant variation amongst different test entries.

**At Jhansi,** all the tested entries were found resistant to *Spodoptera frugiperda*.

**Table: Disease –pest tolerance in IVT Maize trial**

Entries	Rahuri				Palampur		Jhansi	Reaction
	Fall army worm Leaf Damage (%)	Reaction	Leaf blight severity (%)	Leaf blight Reaction	Leaf blight severity (%)	Disease Reaction	Fall army worm Leaf Damage (%)	
ADFM-3	24.70	R	22.44	MR	15	R	30.0	R
AH-1645	36.56	MR	12.22	R	12	R	46.7	MS
IIMFC 1	57.28	MS	24.33	MR	25	MR	36.7	R
ADC-2	55.08	MS	12.00	R	12	R	60.0	MS
African Tall (NC)	54.58	MS	21.49	MR	14	R	33.3	R
Hybrid - FSM2021-1	34.68	MR	11.82	R	12	R	53.3	MS
PJHM-1	61.84	MS	11.33	R	10	R	43.3	MS
J-1006 (NC)	48.08	MR	12.33	R	10	R	46.7	MS
IIMFC 2	36.32	MR	11.56	R	15	R	36.7	R
ADFM-2	30.68	R	11.62	R	25	MR	30.0	R
MFM-18-27	34.60	R	11.71	R	11	R	33.8	R
CMH-12-686	32.61	R	11.78	R	18	R	26.7	R
HPFM-11	37.43	MR	11.56	R	20	MR	36.7	R
MFM-18-2	33.39	R	11.44	R	18	R	30.0	R
DFH -4	34.70	R	11.22	R	15	R	50.0	MS
KDFM -7	34.42	R	11.56	R	12	R	46.5	MS
COHM-8 (NC)	32.98	R	21.33	MR	14	R	43.1	MS



Table: Disease –pest tolerance in IVT Maize trial cont..

Entries	Ludhiana				Bhubaneswar				Coimbatore	
	Leaf blight severity (%)	Disease reaction	<i>Chilo partellus</i> % infestation	Fall armyworm (% plant infestation)	Leaf blight severity (%)	Disease Reaction	Banded Leaf and Sheath Blight Severity (%)	Disease Reaction	Fall army worm Leaf Damage (%)	Reaction
ADFM-3	15.5	R	1.00	1.00	33	MR	17	R	40.00	R
AH-1645	10.8	R	1.50	1.00	27	MR	15	R	20.00	R
IIMFC 1	35.5	MR	1.00	2.00	12	R	11	R	20.00	R
ADC-2	27.5	MR	1.00	0.33	36	MR	24	MR	20.00	R
African Tall (NC)	35.8	MR	1.50	2.00	11	R	11	R	20.00	R
Hybrid - FSM2021-1	26.0	MR	1.50	2.00	58	MS	44	MS	20.00	R
PJHM-1	12.5	R	1.50	2.00	14	R	13	R	20.00	R
J-1006 (NC)	24.5	MR	1.00	0.33	12	R	12	R	40.00	R
IIMFC 2	37.2	MR	0.75	1.66	51	MS	25	MR	40.00	R
ADFM-2	25.7	MR	1.50	1.66	35	MR	18	R	40.00	R
MFM-18-27	28.3	MR	2.00	2.66	16	R	13	R	20.00	R
CMH-12-686	11.9	R	1.50	1.66	55	MS	41	MS	20.00	R
HPFM-11	31.5	MR	1.50	3.00	38	MR	23	MR	30.00	R
MFM-18-2	25.0	MR	1.50	2.00	19	R	14	R	30.00	R
DFH -4	13.3	R	1.00	0.33	30	MR	15	R	5.00	R
KDFM -7	25.7	MR	1.00	0.33	22	MR	14	R	20.00	R
COHM-8 (NC)	15.7	R	1.00	2.00	26	MR	14	R	40.00	R

**Table: Disease –pest tolerance in AVT-1 Maize trial**

Entries	Rahuri				Ludhiana				Palampur	
	Fall army worm Leaf Damage (%)	Reaction	<i>Maydis</i> leaf blight severity (%)	Reaction	<i>Maydis</i> leaf blight severity (%)	Reaction	<i>Chilo partellus</i> % infestation	Fall armyworm (% plant infestation)	<i>Turcicum</i> leaf blight severity (%)	Reaction
African Tall (NC)	26.60	R	18.71	R	25.0	MR	1.50	2.00	25	MR
KDFM-6	31.60	MR	16.13	R	30.0	MR	1.00	1.00	12	R
J-1006 (NC)	33.40	MR	21.00	MR	25.8	MR	1.00	2.00	8	R
PFM-13	30.20	R	22.67	MR	38.7	MR	2.00	4.00	14	R
HQPM 28	26.20	R	15.58	R	28.0	MR	1.00	2.50	12	R
DFH-2	22.70	R	12.44	R	24.5	MR	1.00	1.00	9	R
PMC-13	40.10	MR	24.00	MR	37.3	MR	0.75	1.00	14	R
PMC-11	26.70	R	20.11	MR	39.7	MR	2.50	2.00	21	MR
COHM-8 (NC)	25.60	R	12.56	R	28.3	MR	1.50	2.50	10	R

**Table: Disease –pest tolerance in AVT-1 Maize trial cont..**

Entries	Bhubaneswar				Coimbatore		Jhansi	Reaction
	<i>Turcicum</i> leaf blight severity (%)	Disease Reaction	Banded Leaf and Sheath Blight Severity (%)	Disease Reaction	Fall army worm Leaf Damage (%)	Reaction	Fall army worm Leaf Damage (%)	
African Tall (NC)	26	MR	20	R	40.00	R	46.5	MS
KDFM-6	44	MR	30	R	10.00	R	43.8	MS
J-1006 (NC)	11	R	11	R	40.00	R	42.5	MS
PFM-13	12	R	13	R	40.00	R	50.0	MS
HQPM 28	30	MR	22	R	10.00	R	46.7	MS
DFH-2	25	MR	15	R	20.00	R	43.3	MS
PMC-13	35	MR	24	R	20.00	R	40.0	R
PMC-11	23	MR	14	R	40.00	R	33.3	R
COHM-8 (NC)	42	MR	28	R	40.00	R	40.0	R

**Table: Disease –pest tolerance in Combined AVT-2 Maize trial**

Entry	Rahuri				Ludhiana				Jhansi	
	Fall army worm Leaf Damage (%)	Reaction	<i>Maydis</i> leaf blight severity (%)	Reaction	<i>Maydis</i> leaf blight severity (%)	Reaction	<i>Chilo partellus</i> % infestation	Fall armyworm (% plant infestation)	Fall army worm Leaf Damage (%)	Reaction
J-1006 (NC)	31.90	MR	25.60	R	31.5	MR	1.50	2.00	48.0	MS
African Tall (NC)	29.10	R	15.33	R	35.3	MR	2.00	3.00	32.0	R
COHM-8 (NC)	28.20	R	13.09	R	21.5	MR	1.25	2.00	40.0	R
PFM-12	27.50	R	23.83	R	25.5	MR	1.50	4.00	30.	R

**IVTRB – Initial varietal trial in Rice bean (Table: Disease –pest tolerance in IVT Rice bean trial)**

**At Bhubaneswar**, all the entries showed resistance to moderate resistance reaction against root rot, yellow mosaic and defoliators except JOR-21-2 which was moderately susceptible to yellow mosaic and root rot.

**Table: Disease –pest tolerance in IVT Rice bean trial**

Bhubaneswar						
Entries	Root rot %	Disease reaction	Mosaic severity %	Disease reaction	Defoliators damage (%)	Reaction
Bidhan-2 (NC)	11.6	MR	12.8	MR	22	MR
BRB1-L13P5	4.8	R	8.8	R	10	R
JOR-21-1	2.8	R	4.2	R	6	R
JRBJ-12-9	4.2	R	6.4	R	6	R
JOR-21-2	12.8	MR	22.3	MS	26	MR
Bidhan-3 (NC)	5.4	R	5.6	R	8	R

**AVT-2-DG: AVT-2-DG: Second Advanced Varietal Trial in Dinanath Grass**

**At Bhubaneswar**, all the entries were resistant to moderately resistant to leaf spot and defoliators except BAU-DN-103-18-2 which was found moderately susceptible to both leaf spot and defoliators.

Entries	Leaf spot severity	Reaction	Leaf defoliators	
			No./ 10 plants	Reaction
JHD-19-4	42.2	MR	3.8	MR
BAU-DN-103-18-2	60.5	MS	4.0	MS
BAU-DN-109-8	12.4	R	2.2	R
Bundel Dinanath-2 (NC)	14.0	R	2.0	R
BAU-DN-110-18-2	44.6	MR	3.8	MR

**VT Bajra X Napier Hybrid – 2019 (New): At Rahuri and Ludhiana**, No disease/ insect-pest was observed.

**VTCC- *Cenchrus ciliaris* (Table: Disease –pest tolerance in VTCC-2019 trial)**

**At Ludhiana**, no disease and insect-pests were observed.

**At Rahuri**, entries CAZRI 75, IGFRI 3108, RCCB-05 were resistant while entries RCCB-06 and IG-96-414 were moderately resistant to leaf blight. Sucking pests and defoliators were not observed throughout crop period.

**Table: Disease –pest tolerance in VTCC-2019 trial**

Entries	Rahuri	
	Mean leaf blight severity	Reaction
RCCB-06	14.03	MR
RCC-2016-8	0	NS
IG-67-1263	0	NS
CAZRI-327	0	NS
IGFRI-67-365 (NC)	0	NS
CAZRI 75 (NC)	4.97	R
IGFRI 3108 (NC)	4.87	R
RCCB-05	5.38	R
IG-96-414	14.31	MR

**\*NS= entry not survived**

**VTCS- *Cenchrus setigerus* (Table: Disease –pest tolerance in VTCS-2019 trial)**

**At Rahuri**, IG-96-706 (NC) was resistant to leaf blight. Sucking pests and defoliators were not observed throughout crop period. Rest of the entries does not survived.

**Table: Disease –pest tolerance in VTCS-2019 trial**

Entries	Rahuri	
	Mean leaf blight severity	Reaction
IG-97-433	0.00	NS
RCSB-09	0.00	NS
IG-96-706 (NC)	7.61	R
IG-97-447	0.00	NS
TNCS-265 (NC)	0.00	NS
RCSB-08	0.00	NS
CAZRI-76 (NC)	0.00	NS

**\*NS= entry not survived**

## PPT-25: Validation of best treatments of trial entitled “Non chemical management of *Helminthosporium* leaf blight in fodder maize”

**Location:** Ludhiana

**Design:** Paired plot design

**Replication:** 7

**Plot size:** 10x10 m<sup>2</sup>

### Treatments

T1: Two foliar spray of *Murraya koenigii* @ 3.0% at 10 days interval

T2: Two foliar spray of chitosan @ 0.05% at 10 days interval

T3: Control

**Note:** First spray should be given at the onset of disease symptoms.

### Observations:

- *Helminthosporium* leaf blight severity.
- Green Fodder Yield (q/ha).
- Economics.

### Results:

Plant extracts and bioagents were tested for the management of leaf blight of fodder maize (Table PPT 25). Leaf blight severity was observed very less in plots treated with two foliar sprays of chitosan @ 0.05% at 10 days interval followed by two foliar sprays of *Murraya koenigii* @ 3.0% at 10 days interval with 19.21 and 22.66 percent respectively with 55.64 and 47.69 percent disease control as compared to check (43.31 % severity). Green fodder yield was maximum in two foliar sprays of chitosan @ 0.05% at 10 days (602.86 q/ha) as compared to check (472.86 q/ha). Higher Benefit cost ratio of 3.69 was obtained in two foliar sprays of chitosan @ 0.05% at 10 days interval than other treatments.

**Table PPT-25: Management of *Helminthosporium* leaf blight in fodder maize**

Treatments		Leaf blight severity (%)	Disease control (%)	Green Fodder Yield (q/ha)	Increase in Yield (%)	B:C ratio
T <sub>1</sub>	Two foliar sprays of <i>Murraya koenigii</i> @ 3.0% at 10 days interval	22.66	47.69	566.43	19.79	3.41
T <sub>2</sub>	Two foliar sprays of chitosan @ 0.05% at 10 days interval	19.21	55.64	602.86	27.49	3.69
T <sub>3</sub>	Control	43.31		472.86		2.69
CD (P=0.05)		2.208		7.655		
SE±(m)		0.709		2.457		
CV		6.603		1.188		

## PPT-26: Management of leaf blast in forage pearl millet

**Locations:** Ludhiana, Jhansi, Bhubaneswar and Palampur

**Design:** RBD

**Replication:** 3

**Plot size:** 3x2 m<sup>2</sup>

**Variety:** Giant Bajra

### Treatments

**T1:** Seed treatment with carbendazim @ 2.0 g/kg seed

**T2:** Seed treatment with tebuconazole + trifloxystrobin @ 1 g/kg seed

**T3:** Seed treatment with chitosan @ 0.05%

**T4:** Seed treatment with neem seed extract @ 5%

**T5:** Seed treatment with tricyclazole @ 0.6 g/kg seed

**T6:** T1+ foliar spray of carbendazim @ 0.5 g/L

**T7:** T2+ foliar spray of tebuconazole + trifloxystrobin @ 0.4g/L

**T8:** T3+ foliar spray of chitosan @ 0.05%

**T9:** T4+ foliar spray of neem seed extract @ 5%

**T10:** T5+ foliar spray of tricyclazole @ 0.3 g/L

**T11:** Control

### Observations:

- Leaf blast severity in each treatment at 7 days interval starting from disease onset.
- AUDPC (A-value) and rate of infection (r) in different treatments
- Green Fodder yield (q/ha) in different treatments.

Note: In treatments T6 to T10, one foliar spray was given just at disease initiation and second spray at 15 days after first one.

### Results:

**At Ludhiana,** leaf blast severity was observed very less in T<sub>7</sub> [Seed treatment with tebuconazole + trifloxystrobin @ 1 g/kg seed + foliar spray of tebuconazole + trifloxystrobin @ 0.4g/L] followed by T<sub>10</sub> [Seed treatment with tricyclazole @ 0.6 g/kg seed + foliar spray of tricyclazole @ 0.3 g/L] with 29.0 and 30.3% respectively as compared to check (52.0%). Likewise, AUDPC values of both the treatments were found lowest that is 760.7 and 798.0 respectively. Green fodder yield was also maximum in both the treatments that is 881.67 and 801.67 q/ha respectively as compared to check 560.0 q/ha.

**At Palampur,** T10 (seed treatment with tricyclazole @ 0.6 g/kg seed and two sprays of same fungicide @ 0.3g/l) was found most effective (terminal disease severity of 10.0%). The values of r/day and AUDPC were observed minimum i.e. 0.04 and 203.00 respectively in T10. Green fodder yield was maximum in T10 is 358.33 q/ha. In control, the disease severity was observed 48.7% with maximum r (0.12) per day and A-value (734.33) and minimum GFY (316.67 q/ha).

**At Bhubaneswar,** among all the treatments, T10 (seed treatment with tricyclazole @ 0.6 g/kg seed and two sprays of tricyclazole @ 0.3 g/l) and T7 (seed treatment with tebuconazole + trifloxystrobin @ 1 g/kg seed followed by two sprays of tebuconazole + trifloxystrobin @ 0.4g/l) with disease severity of 13.4 % and 15.8% were at par with each other. The A-value and r-value were observed minimum i.e. 181.25 and 0.043 respectively, in T10. Green fodder yield was maximum in T10 i.e. 345.3 q/ha. In control the disease severity was observed 48.5% with maximum A-value (858.55) and minimum GFY (248.6 q/ha).

**At Jhansi,** leaf blast severity (28.9%) was observed very less in T7 (Seed treatment with tebuconazole + trifloxystrobin @ 1 g/kg seed + foliar spray of tebuconazole + trifloxystrobin @ 0.4 g/L) as compared to control (55.6%) and other treatments. The A-value was observed minimum in T7 (611.72). r-value was lowest in T7 (0.03). Green fodder yield was also maximum in T7 (794.44 q/ha) as compared to check (627.78 q/ha).



**Table PPT-26: Management of leaf blast in forage pearl millet**

Treatments	Ludhiana				Palampur				Bhubaneswar				Jhansi			
	Terminal mean leaf blast severity (%)	A-value	r-value	GFY (q/ha)	Terminal mean blast severity (%)	A-value	r-value	GFY (q/ha)	Terminal mean blast severity (%)	A-value	r-value	GFY (q/ha)	Terminal mean leaf blast severity (%)	A-value	r-value	GFY (q/ha)
<b>T1</b>	40.0 <sup>c</sup>	989.3 <sup>b</sup>	0.046 <sup>a</sup>	571.67 <sup>h</sup>	33.7 <sup>e</sup>	484.17 <sup>d</sup>	0.11 <sup>c</sup>	329.33 <sup>c</sup>	30.8 <sup>c</sup>	527.1 <sup>e</sup>	0.054 <sup>abc</sup>	296.9 <sup>d</sup>	41.5 <sup>b</sup>	770.0 <sup>cd</sup>	0.06 <sup>a</sup>	705.56 <sup>bc</sup>
<b>T2</b>	37.3 <sup>cd</sup>	875.0 <sup>cd</sup>	0.052 <sup>a</sup>	683.33 <sup>e</sup>	33.0 <sup>e</sup>	466.67 <sup>d</sup>	0.12 <sup>c</sup>	329.67 <sup>c</sup>	31.3 <sup>c</sup>	595.7 <sup>g</sup>	0.049 <sup>abc</sup>	287.7 <sup>c</sup>	43.0 <sup>b</sup>	832.22 <sup>b</sup>	0.06 <sup>ab</sup>	722.22 <sup>bc</sup>
<b>T3</b>	37.3 <sup>cd</sup>	871.5 <sup>cd</sup>	0.064 <sup>a</sup>	630.00 <sup>f</sup>	38.3 <sup>f</sup>	579.83 <sup>f</sup>	0.10 <sup>c</sup>	324.00 <sup>c</sup>	29.6 <sup>c</sup>	586.9 <sup>g</sup>	0.046 <sup>ab</sup>	281.6 <sup>b</sup>	40.7 <sup>b</sup>	808.89 <sup>cd</sup>	0.05 <sup>abc</sup>	700.00 <sup>bc</sup>
<b>T4</b>	44.0 <sup>b</sup>	987.0 <sup>b</sup>	0.047 <sup>a</sup>	601.67 <sup>g</sup>	41.3 <sup>f</sup>	647.50 <sup>g</sup>	0.10 <sup>c</sup>	323.33 <sup>c</sup>	36.6 <sup>d</sup>	652.05 <sup>h</sup>	0.058 <sup>bc</sup>	305.9 <sup>e</sup>	38.5 <sup>b</sup>	749.31 <sup>cd</sup>	0.05 <sup>abc</sup>	677.78 <sup>cd</sup>
<b>T5</b>	39.7 <sup>c</sup>	918.2 <sup>c</sup>	0.052 <sup>a</sup>	590.00 <sup>g</sup>	34.0 <sup>e</sup>	520.33 <sup>e</sup>	0.09 <sup>bc</sup>	330.00 <sup>c</sup>	34.4 <sup>c</sup>	521.50 <sup>e</sup>	0.056 <sup>bc</sup>	313.2 <sup>f</sup>	42.2 <sup>b</sup>	824.44 <sup>b</sup>	0.05 <sup>abc</sup>	716.67 <sup>bc</sup>
<b>T6</b>	43.7 <sup>b</sup>	1017.3 <sup>b</sup>	0.045 <sup>a</sup>	588.33 <sup>g</sup>	18.7 <sup>c</sup>	339.50 <sup>b</sup>	0.07 <sup>b</sup>	349.00 <sup>b</sup>	25.7 <sup>b</sup>	394.80 <sup>c</sup>	0.060 <sup>c</sup>	320.8 <sup>g</sup>	37.8 <sup>b</sup>	744.07 <sup>cd</sup>	0.03 <sup>bc</sup>	738.89 <sup>b</sup>
<b>T7</b>	29.0 <sup>e</sup>	760.7 <sup>f</sup>	0.061 <sup>a</sup>	881.67 <sup>a</sup>	13.7 <sup>b</sup>	325.50 <sup>b</sup>	0.05 <sup>ab</sup>	351.67 <sup>ab</sup>	15.8 <sup>a</sup>	276.50 <sup>b</sup>	0.051 <sup>abc</sup>	338.4 <sup>h</sup>	28.9 <sup>a</sup>	611.72 <sup>e</sup>	0.03 <sup>c</sup>	794.44 <sup>a</sup>
<b>T8</b>	35.0 <sup>d</sup>	837.7 <sup>de</sup>	0.048 <sup>a</sup>	761.67 <sup>c</sup>	15.3 <sup>bc</sup>	397.83 <sup>c</sup>	0.08 <sup>bc</sup>	342.67 <sup>b</sup>	26.7 <sup>b</sup>	457.80 <sup>d</sup>	0.054 <sup>abc</sup>	305.5 <sup>e</sup>	37.8 <sup>b</sup>	746.72 <sup>cd</sup>	0.04 <sup>abc</sup>	716.67 <sup>bc</sup>
<b>T9</b>	35.7 <sup>d</sup>	897.2 <sup>c</sup>	0.051 <sup>a</sup>	708.33 <sup>d</sup>	29.3 <sup>d</sup>	456.17 <sup>d</sup>	0.05 <sup>ab</sup>	325.33 <sup>c</sup>	30.6 <sup>c</sup>	545.65 <sup>f</sup>	0.057 <sup>bc</sup>	298.9 <sup>d</sup>	37.0 <sup>b</sup>	736.40 <sup>cd</sup>	0.04 <sup>abc</sup>	727.78 <sup>bc</sup>
<b>T10</b>	30.3 <sup>e</sup>	798.0 <sup>ef</sup>	0.062 <sup>a</sup>	801.67 <sup>b</sup>	10.0 <sup>a</sup>	203.00 <sup>a</sup>	0.04 <sup>a</sup>	358.33 <sup>a</sup>	13.4 <sup>a</sup>	181.25 <sup>a</sup>	0.043 <sup>a</sup>	345.3 <sup>i</sup>	37.8 <sup>b</sup>	712.70 <sup>de</sup>	0.05 <sup>abc</sup>	744.44 <sup>ab</sup>
<b>T11</b>	52.0 <sup>a</sup>	1192.3 <sup>a</sup>	0.055 <sup>a</sup>	560.00 <sup>h</sup>	48.7 <sup>g</sup>	744.33 <sup>h</sup>	0.12 <sup>c</sup>	316.67 <sup>d</sup>	48.5 <sup>e</sup>	858.55 <sup>i</sup>	0.060 <sup>c</sup>	248.6 <sup>a</sup>	55.6 <sup>c</sup>	995.56 <sup>a</sup>	0.06 <sup>ab</sup>	627.78 <sup>d</sup>
<b>CD @5%</b>	2.953	47.058	0.009	13.485	2.38	38.27	0.02	7.36	2.45	16.04	0.01	5.60	7.77	102.46	0.02	54.73
<b>CV%</b>	4.466	2.975	10.104	1.172	4.84	4.75	12.24	1.28	3.33	1.85	12.4	1.08	11.39	7.75	30.96	4.49

## PPT-27: Management of invasive insect-pest fall army worm, *Spodoptera frugiperda* L. on Forage Maize

**Locations:** Rahuri, Ludhiana, Bhubaneswar and Jhansi

**Design:** RBD

**Plot size:** 4x3 m<sup>2</sup>

**Replication:** 3

**Variety:** African Tall

### Treatments:

**T1:** Foliar spray of Emamectin benzoate 5 WG @ 0.5g/L

**T2:** Foliar spray of Chlorpyrifos 20 EC @ 2 mL /L

**T3:** Foliar spray of *Metarhizium anisopliae* @ 5g /L

**T4:** Foliar spray of *Metarhizium anisopliae* @ 7.5g /L

**T5:** Foliar spray of *Beauveria bassiana* @ 5g /L

**T6:** Foliar spray of *Beauveria bassiana* @ 7.5g /L

**T7:** Foliar spray of *Nomuraea rileyi* @ 5g /L

**T8:** Foliar spray of *Nomuraea rileyi* @ 7.5g /L

**T9:** Foliar spray of Azadirachtin 10000 ppm @ 2mL /L

**T10:** Control

### Observations:

- Percent plant damage before spray and 3, 7, 10 days after spray
- Green Fodder yield (q/ha) in different treatments

### Results:

**At Rahuri,** Emamectin benzoate was the most effective treatment in reducing the infestation of fall army in maize (4.54%) followed by *Nomuraea rileyi* @ 7.5g /L (12.79%) compared to control (64.46%) after 10 days of treatment. Emamectin benzoate recorded the highest green fodder yield (468.1 q/ha) among all treatments.

**At Jhansi,** Emamectin benzoate was the most effective treatment in reducing the infestation of fall army in maize (33.1%) compared to control (86.5%) after 10 days of treatment. All the entomopathogens, *Beauveria bassiana*, *Nomuraea rileyi* and *Metarhizium anisopliae* were at par with each other in managing fall armyworm. Emamectin benzoate recorded the highest green fodder yield (91.67 q/ha) among all treatments.

**At Ludhiana,** emamectin benzoate was most effective in reducing insect infestation (10.00%). Emamectin benzoate recorded the highest green fodder yield (288.3 q/ ha).

**At Bhubaneswar,** emamectin benzoate was most effective in reducing insect infestation (3.5%). Emamectin benzoate recorded the highest green fodder yield (310.2 q/ ha).

**Table PPT-27: Management of invasive insect-pest fall army worm, *Spodoptera frugiperda* L. on Forage Maize**

Treatments	Rahuri					Jhansi				
	% plant infestation				GFY (q/ha)	% plant infestation				GFY (q/ha)
	Precount	3 DAS	7 DAS	10 DAS		Precount	3 DAS	7 DAS	10 DAS	
T1	52.52 <sup>a</sup>	11.66 <sup>a</sup>	7.41 <sup>a</sup>	4.54 <sup>a</sup>	468.1 <sup>a</sup>	49.3	39.8	37.8 <sup>c</sup>	33.1 <sup>c</sup>	91.67 <sup>a</sup>
T2	57.39 <sup>a</sup>	28.50 <sup>b</sup>	22.99 <sup>b</sup>	23.75 <sup>df</sup>	350.5 <sup>b</sup>	48.8	45.8	48.1 <sup>bc</sup>	51.3 <sup>b</sup>	71.67 <sup>b</sup>
T3	55.74 <sup>a</sup>	40.18 <sup>g</sup>	30.60 <sup>f</sup>	22.59 <sup>de</sup>	321.1 <sup>f</sup>	46.7	49.6	53.6 <sup>bc</sup>	56.9 <sup>b</sup>	61.11 <sup>bcd</sup>
T4	55.68 <sup>a</sup>	38.18 <sup>cd</sup>	27.50 <sup>be</sup>	19.73 <sup>d</sup>	334.2 <sup>de</sup>	48.1	48.8	53.1 <sup>bc</sup>	56.8 <sup>b</sup>	59.72 <sup>cd</sup>
T5	58.37 <sup>a</sup>	44.28 <sup>gh</sup>	37.68 <sup>fh</sup>	29.61 <sup>h</sup>	294.2 <sup>g</sup>	46.6	50.0	55.6 <sup>bc</sup>	58.0 <sup>b</sup>	61.11 <sup>bcd</sup>
T6	58.40 <sup>a</sup>	41.41 <sup>cf</sup>	33.86 <sup>fg</sup>	25.58 <sup>dg</sup>	310.5 <sup>f</sup>	46.0	51.2	54.0 <sup>bc</sup>	59.9 <sup>b</sup>	66.67 <sup>bc</sup>
T7	55.24 <sup>a</sup>	39.18 <sup>ce</sup>	24.35 <sup>bd</sup>	17.50 <sup>bc</sup>	337.9 <sup>d</sup>	47.7	52.2	57.6 <sup>b</sup>	60.2 <sup>b</sup>	63.89 <sup>bc</sup>
T8	54.51 <sup>a</sup>	35.04 <sup>c</sup>	21.64 <sup>bc</sup>	12.79 <sup>b</sup>	346.6 <sup>bc</sup>	46.3	50.8	55.8 <sup>bc</sup>	60.8 <sup>b</sup>	66.11 <sup>bc</sup>
T9	56.19 <sup>a</sup>	41.17 <sup>cf</sup>	38.12 <sup>i</sup>	41.60 <sup>i</sup>	284.7 <sup>h</sup>	47.4	51.9	54.2 <sup>bc</sup>	57.6 <sup>b</sup>	67.50 <sup>bc</sup>
T10	56.70 <sup>a</sup>	59.89 <sup>i</sup>	61.72 <sup>j</sup>	64.46 <sup>j</sup>	268.4 <sup>i</sup>	48.1	73.1	79.3 <sup>a</sup>	86.5 <sup>a</sup>	52.78 <sup>d</sup>
CD @5%	NS	4.15	4.33	4.03	6.48	NS	NS	18.06	16.31	10.71
CV%	2.74	7.14	7.84	8.04	7.14			19.16	16.35	9.43

**Table PPT-27 cont.: Management of invasive insect-pest fall army worm, *Spodoptera frugiperda* L. on Forage Maize**

Treatments	Ludhiana					Bhubaneswar				
	% plant infestation				GFY (q/ha)	% plant infestation				GFY (q/ha)
	Precount	3 DAS	7 DAS	10 DAS		Precount	3 DAS	7 DAS	10 DAS	
T1	63.33	38.000 <sup>a</sup>	28.00 <sup>a</sup>	10.00 <sup>a</sup>	288.3 <sup>a</sup>	20.4	10.2 <sup>a</sup>	6.3	3.5 <sup>a</sup>	310.2 <sup>h</sup>
T2	63.33	44.00 <sup>ab</sup>	35.33 <sup>bc</sup>	18.00 <sup>b</sup>	246.6 <sup>d</sup>	20.8	12.6 <sup>b</sup>	9.5	6.8 <sup>ab</sup>	298.5 <sup>g</sup>
T3	62.66	49.33 <sup>bcd</sup>	39.33 <sup>de</sup>	25.33 <sup>de</sup>	238.0 <sup>e</sup>	21.9	17.4 <sup>c</sup>	14.6	10.7 <sup>b</sup>	272.8 <sup>e</sup>
T4	62.00	46.00 <sup>bc</sup>	34.66 <sup>b</sup>	20.66 <sup>bcd</sup>	256.3 <sup>c</sup>	21.5	12.8 <sup>b</sup>	10.2	8.3 <sup>ab</sup>	256.2 <sup>bc</sup>
T5	60.66	53.33 <sup>de</sup>	38.00 <sup>bcd</sup>	24.66 <sup>3cde</sup>	220.6 <sup>f</sup>	22.5	10.2 <sup>a</sup>	8.7	7.6 <sup>ab</sup>	265.6 <sup>de</sup>
T6	60.66	47.33 <sup>cd</sup>	36.00 <sup>bcd</sup>	20.00 <sup>bc</sup>	264.6 <sup>b</sup>	21.3	11.8 <sup>ab</sup>	10.3	8.4 <sup>ab</sup>	280.5 <sup>f</sup>
T7	60.00	52.00 <sup>cd</sup>	38.66 <sup>cde</sup>	24.00 <sup>cde</sup>	226.0 <sup>f</sup>	22.5	15.5 <sup>c</sup>	12.0	9.8 <sup>b</sup>	254.3 <sup>b</sup>
T8	62.66	46.66 <sup>bcd</sup>	37.33 <sup>bcd</sup>	22.66 <sup>bcd</sup>	270.0 <sup>b</sup>	22.6	13.4 <sup>b</sup>	11.2	9.1 <sup>b</sup>	262.8 <sup>cd</sup>
T9	60.66	48.66 <sup>bcd</sup>	40.00 <sup>e</sup>	28.66 <sup>e</sup>	245.0 <sup>d</sup>	22.4	17.2 <sup>c</sup>	14.4	10.5 <sup>b</sup>	285.4 <sup>f</sup>
T10	60.00	59.33 <sup>e</sup>	52.66 <sup>f</sup>	43.33 <sup>f</sup>	202.3 <sup>g</sup>	20.2	25.6 <sup>d</sup>	32.6	43.4 <sup>c</sup>	220.5 <sup>a</sup>
CD @5%	NS	6.85	3.96	4.75	6.17	NS	2.04	3.76	4.61	7.50
CV%	7.28	8.18	6.03	11.57	1.45	-	8.10	16.89	22.78	1.62

## PPT-28: Assessment of crop losses due to diseases and insect-pests in forage Cowpea

**Locations:** Ludhiana, Palampur, Rahuri, Bhubaneswar and Jhansi

**Design:** Paired plot design

**Replication:** 7

**Plot size:** 5 x 5 m<sup>2</sup>

**Variety:** Bundel Lobia-1

**Treatments:** 2      T1: Protected      T2: Unprotected

**Measures to be imposed under protected conditions as per need:**

- **For management of root rot and foliar diseases (anthracnose and leaf blight) of forage cowpea:**
  - Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP (50 g/kg seed) followed by two foliar sprays of 0.1 per cent propiconazole at 15 day interval.
- **For management of defoliators in forage cowpea:**
  - Foliar application of *B. bassiana* @ 5g/L (1x10<sup>7</sup> cfu/ml)
- **For management of sucking pests and yellow mosaic virus incidence:**
  - Two sprays of imidacloprid 17.8 SL @ 0.3 ml/lit at 15 days interval followed by two sprays of *Verticillium lecani* @ 5 g/L at 10 days interval.
  - Effort must be made for need based application of disease/pest management practices in protected plots.
  - Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP (50 g/kg seed) is must. Application of management practices in standing crop should be done right at the start of disease/pests attack initiation in protected plots.

### Observations

- Severity/incidence of different diseases (Root-rot, Anthracnose, Yellow mosaic virus, leaf blight) and insect-pests (defoliators and aphids) as per standard disease/pests specific rating scale in both protected and unprotected plots starting from date of appearance till crop maturity at weekly interval.
- Green fodder yield in protected as well as unprotected plots.

### Results:

**At Palampur**, in protected treatment, 72.37, 62.5, 75.0 and 64.6% control of root rot, foliar diseases, yellow mosaic virus and defoliators respectively was recorded with 73.02% increase over unprotected treatment. Hence, 73.02% losses occurred due to diseases and insect-pests in green fodder yield at Palampur (Table PPT-28a).

**At Bhubaneswar**, the incidence of root rot and anthracnose recorded was 4.04% and 12.89% in protected treatment compared to 17.21% and 38.83% respectively in unprotected treatment. The numbers of leaf defoliators per 10 plants were 1.68 in protected treatment compared to unprotected treatment (5.82). The number of aphids were 3.84 in protected plot (88.49% reduction in aphid infestation) when compared to the unprotected crop. The green fodder yield was 325.43 q/ha which showed an increase of 32.98% compared to unprotected plots (Table PPT-28b). Hence, around 32.98% losses occurred due to diseases and insect-pests at Bhubaneswar (Table PPT-28b).

**At Rahuri**, the population of cowpea aphid (*Aphis craccivora*) noticed was 7.72 aphids per stem (81.38% protection over control) in protected and 41.46 aphids in unprotected. The population of defoliators noticed was 0.89 per plant in protected (78.02% protection over control) and 14.30 per plant in unprotected plots. The severity of yellow mosaic virus noticed on cowpea was 17.70 in protected (45.61% protection over control) and 32.54 in unprotected plots. The green fodder yield was 326.86 q/ha which showed an increase of 32.14% compared to unprotected plots. Hence, 32.14% losses occurred due to diseases and insect-pests at Rahuri (Table PPT-28c).

**At Jhansi**, in protected treatment 30.99% control of defoliators was recorded with 22.94% increase in green fodder yield (153.1 q/ha) over unprotected treatment (124.6 q/ha). Hence, 22.94% losses occurred due to insect-pests at Jhansi (Table PPT-28d).

**At Ludhiana**, in protected treatment, 45.38% control of YMV and 26.24% control of defoliators was recorded as compared to unprotected treatment along with 19.25% increase in green fodder yield. Hence, 19.25% losses occurred due to diseases and insect-pests at Ludhiana (Table PPT-28e).

**Table PPT-28a: Assessment of crop losses due to diseases and insect-pests in forage Cowpea**

Treatments	Palampur									
	Root rot		Foliar diseases		YMV		Defoliators		Green Fodder yield	
	Incidence (%)	Control (%)	Severity (%)	Control (%)	Incidence (%)	Control (%)	Incidence (%)	Control (%)	(q/ha)	% loss
T1	15.00 (22.75)	72.37	12.86 (20.91)	62.50	1.14 (1.43)	75.00	5.86 (13.96)	64.66	168.57	73.02
T2	54.29 (47.45)	-	34.29 (35.79)	-	4.57 (2.36)	-	16.57 (23.98)	-	97.43	-
<i>t-cal</i>	7.7E-6		1.1E-08		1.6E-08		4.2E-08		6.6E-6	
<i>P-value</i>	0.001		0.001		0.001		0.001		0.001	

**Table PPT-28b: Assessment of crop losses due to diseases and insect-pests in forage Cowpea cont..**

Bhubaneswar											
Treatments	Root rot / Collar rot incidence (%)		Anthracnose severity (%)		Leaf defoliators (no./10 plants)		Control (%)	Aphids (no./top leaf)		Green Fodder yield	
	Incidence (%)	Control (%)	Incidence (%)	Control (%)	Number	% Damage		Number	Control (%)	(q/ha)	% loss
T1	4.04	76.53	12.89	66.80	1.68	6.7	71.13	3.84	88.49	325.43	32.98
T2	17.21	-	38.83*	-	5.82	23.3	-	33.36*	-	244.71*	-
<i>t Cal</i>	2.35		8.95		1.31			10.33		11.89	
<i>P-value</i>	0.001		0.004		0.006			0.003		0.002	

**Table PPT-28c: Assessment of crop losses due to diseases and insect-pests in forage Cowpea cont..**

Treatments	Rahuri										
	Aphids		Defoliators			YMV		Leaf blight		Green Fodder yield (q/ha)	% loss
	Mean no./stem	Control (%)	Mean no./ plant	% damage	Control (%)	% severity	Control (%)	% severity	Control (%)		
<b>T1</b>	7.72	81.38	0.89	6.12	78.02	17.70	45.61	18.00	96.17	326.86	32.14
<b>T2</b>	41.46		4.05	14.30		32.54		32.94		228.87	
<i>t-cal</i>	7.29		4.78	2.76		4.99		1.72		3.28	-
<i>P-value</i>	0.002		0.001	0.001		0.003		0.002		0.0001	

**Table PPT-28d: Assessment of crop losses due to diseases and insect-pests in forage Cowpea cont..**

Treatments	Jhansi			
	Defoliators damage (%)		Green Fodder yield	
	Damage (%)	Control (%)	(q/ha)	% loss
<b>T1</b>	31.50	30.99	153.1	22.94
<b>T2</b>	45.64	-	124.6	-
<i>t-cal</i>	14.52		8.70	-
<i>P-value</i>	<0.0001		<0.0001	

**Table PPT-28e: Assessment of crop losses due to diseases and insect-pests in forage Cowpea cont.**

Treatments	Ludhiana							
	YMV		Defoliators				GFY (q/ha)	
	Incidence (%)	Disease Control (%)	5 DAS	7 DAS	Defoliators (% damage)	Control (%)	(q/ha)	% loss
<b>T1</b>	9.09 (17.47)	45.38	3.2 <sup>a</sup>	2.60 <sup>a</sup>	20.80	26.24	574.4	19.25
<b>T2</b>	17.42 (24.64)		6.2 <sup>b</sup>	6.00 <sup>b</sup>	28.20		481.7	
<i>t-cal</i>	1.10		1.56	1.30			3.50	
<i>P-value</i>	0.0001		0.001	0.001			0.0001	

## PPT- 29: Eco friendly management of Zonate leaf spot of Sorghum

Location: Palampur

Treatments: 9

Replications: 3

Design: RBD

Plot size: 3x2 m<sup>2</sup>

### Treatments:

T1: Three foliar spray of *Trichoderma viride* @ 0.5%

T2: Three foliar spray of *Psuedomonas flourescens* @ 0.5%

T3: Three foliar spray of Jeevamrit @ 10%

T4: Three foliar spray of Tamarlassi @ 10%

T5: Three foliar spray of extract of eupatorium ark @ 10%

T6: Three foliar spray of Azadirachtin 3000 ppm @ 0.3%

T7: Three foliar spray of Panchgavya @ 10%

T8: Three foliar spray of propiconazole @ 0.1% (Chemical control)

T9: Control

**\*Sprays given at 7 days interval starting from disease appearance.**

### Observations:

- Disease severity (%) at 7 days interval starting from disease onset.
- AUDPC and rate of infection in different treatments
- Green Fodder Yield (q/ha)

### Results:

The experiment was conducted with 9 treatments having 3 replications in RBD at Palampur for the management of zonate leaf spot (*Gloeocercospora sorghi*) of Sorghum using non chemical methods. Among all the treatments, three foliar spray of propiconazole @ 0.1% (Chemical check) was found most effective which gave 65.04% disease control with 18.48% increase in the green fodder yield over control. Among the non-chemical methods, three foliar sprays of extract of eupatorium ark @ 10% giving 49.19% disease control with 12.35% increase in the yield over control was found best followed by three foliar spray of Tamarlassi @ 10% with 47.15% disease control with 7.81 % increase in the yield over control. Three foliar sprays of Panchgavya @ 10% was also found effective with 43.09% disease control and 15.63% increase in the yield. The higher yield in Panchgavya may be due to its nutritional effect on the host. The values of *r*/day and AUDPC were observed minimum i.e. 0.07 and 462.0 respectively, in chemical check. Among non- chemical treatments, minimum *r* and AUDPC were observed in treatment having three foliar spray of extract of eupatorium ark @ 10% i.e. 0.09 and 565.83, respectively. This was followed by three foliar spray of Tamarlassi @ 10% having *r*=0.09 and AUDPC=572.83, respectively. In control the disease severity was 82.0% with maximum *r* (0.11) per day, AUDPC (800.33) and minimum GFY (315.7 q/ha).



**Table PPT-29: Eco friendly management of zonate leaf spot of Sorghum**

Treatment	Zonate leaf spot of Sorghum						Green fodder yield	
	Zonate leaf spot		r (per week)		AUDPC		(q/ha)	Increase over check (%)
	Terminal mean severity (%)	Control (%)	r	Relative infection rate (%)	AUDPC	Relative AUDPC (%)		
<b>T1</b>	55.67 (48.24) <sup>c</sup>	32.11	0.09 <sup>b</sup>	87.50	673.17 <sup>cd</sup>	84.11	331.7 <sup>cd</sup>	5.07
<b>T2</b>	58.33 (49.78) <sup>c</sup>	28.86	0.09 <sup>b</sup>	87.50	689.50 <sup>d</sup>	86.15	325.3 <sup>d</sup>	3.06
<b>T3</b>	50.00 (44.98) <sup>bc</sup>	39.02	0.09 <sup>b</sup>	87.50	648.67 <sup>cd</sup>	81.05	349.3 <sup>c</sup>	10.67
<b>T4</b>	43.33 (41.12) <sup>b</sup>	47.15	0.09 <sup>b</sup>	87.50	572.83 <sup>bc</sup>	71.57	340.3 <sup>d</sup>	7.81
<b>T5</b>	41.67 (40.10) <sup>b</sup>	49.19	0.09 <sup>b</sup>	84.38	565.83 <sup>b</sup>	70.70	354.7 <sup>c</sup>	12.35
<b>T6</b>	48.33 (44.03) <sup>bc</sup>	41.06	0.10 <sup>b</sup>	93.75	628.83 <sup>c</sup>	78.57	359.3 <sup>bc</sup>	13.83
<b>T7</b>	46.67 (43.07) <sup>bc</sup>	43.09	0.10 <sup>b</sup>	93.75	609.00 <sup>b</sup>	76.09	365.0 <sup>b</sup>	15.63
<b>T8</b>	28.67 (32.36) <sup>a</sup>	65.04	0.07 <sup>a</sup>	62.50	462.00 <sup>a</sup>	57.73	374.0 <sup>a</sup>	18.48
<b>T9</b>	82.00 (64.90) <sup>d</sup>	-	0.11 <sup>c</sup>	100.00	800.33 <sup>e</sup>	100.00	315.7 <sup>e</sup>	-
<b>CD (5%)</b>	5.47		0.01		60.34		6.69	
<b>CV</b>	6.90		0.02		5.69		1.11	

## PPT-30: Management of root rot and wilt in cowpea

Location: Bhubaneswar

Treatments: 8

Replications: 3

Design: RBD

Plot size: 3x2 m<sup>2</sup>

### Treatments:

- T1:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with *Trichoderma viride* @ 5g/kg seed
- T2:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with *Pseudomonas fluorescens* @ 5g/kg seed
- T3:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with *Bacillus subtilis* @ 5g/kg seed
- T4:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with *Aspergillus niger* @ 5g/kg seed
- T5:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with chitosan @ 0.05%
- T6:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with neem seed extract @ 5%
- T7:** Soil application of *T. viride* @ 4 kg/ha enriched in FYM @ 250 kg/ha as basal + seed treatment with tebuconazole 2DS @ 1g/kg seed
- T8:** Control

### Observations:

- Germination percentage
- Root rot and wilt incidence at weekly interval starting from disease onset
- AUDPC and rate of infection in different treatments
- Green fodder yield (q/ha)

### Results:

Among various treatments for management of root rot and wilt in forage cowpea, the chemical seed treatment with tebuconazole 2DS @ 1g/kg seed along with basal soil application of *T. viride* @ 4kg/ha enriched in FYM @ 250 kg/ha was the best treatment with 93.5% germination which reduced the disease by 58.1% and increased the yield by 17.6% compared to control. Among nonchemical treatments, seed treatment with *T. viride* along with basal application of the same bio agent was found superior recording 87.2% germination followed by *P. fluorescens* (84.5%). The *T. viride* treatment reduced the disease by 48.1 % and increased the yield by 14.0% when compared to control.

**PPT 30: Management of root rot-wilt complex in cowpea**

Treatments	Germination (%)	Terminal root rot/wilt complex severity	Disease reduction	AUDPC	Rate of infection	GFY (q/ha)	Increase in yield
<b>T1</b>	87.2 <sup>d</sup>	25.1 <sup>b</sup>	48.1	517.65 <sup>b</sup>	0.045 <sup>bc</sup>	340.4 <sup>d</sup>	14.0
<b>T2</b>	84.5 <sup>d</sup>	29.4 <sup>c</sup>	39.3	609.35 <sup>c</sup>	0.045 <sup>bc</sup>	342.8 <sup>d</sup>	14.8
<b>T3</b>	76.8 <sup>b</sup>	34.8 <sup>d</sup>	28.1	719.25 <sup>e</sup>	0.046 <sup>c</sup>	331.5 <sup>c</sup>	11.0
<b>T4</b>	76.6 <sup>b</sup>	29.2 <sup>c</sup>	39.7	647.50 <sup>d</sup>	0.030 <sup>a</sup>	324.1 <sup>b</sup>	9.5
<b>T5</b>	80.4 <sup>c</sup>	33.6 <sup>d</sup>	30.6	617.05 <sup>c</sup>	0.053 <sup>cd</sup>	335.3 <sup>c</sup>	12.3
<b>T6</b>	78.2 <sup>bc</sup>	24.2 <sup>b</sup>	50.0	523.25 <sup>b</sup>	0.033 <sup>ab</sup>	330.6 <sup>c</sup>	10.7
<b>T7</b>	93.5 <sup>e</sup>	20.3 <sup>a</sup>	58.1	408.80 <sup>a</sup>	0.041 <sup>abc</sup>	351.2 <sup>e</sup>	17.6
<b>T8</b>	73.2 <sup>a</sup>	48.4 <sup>e</sup>	-	952.7 <sup>f</sup>	0.060 <sup>d</sup>	298.6 <sup>a</sup>	-
<b>CD (5%)</b>	3.17	2.98		11.38	0.01	5.01	-
<b>CV (%)</b>	2.23	5.40		1.04	14.85	0.86	-

**PPT-31: Estimation of yield losses due to insect-pests in fodder sorghum**

**Location:** Rahuri, Coimbatore

**Treatments:** 8

**Replications:** 3

**Design:** RBD

**Plot size:** 4x4 m<sup>2</sup>

**Treatments:**

**T1:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 7, 15, 25, 40, 75, 90 days after emergence (DAE)

**T2:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 7, 15, 25 and 75 DAE

**T3:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 7, 15, 40 and 90 DAE

**T4:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 7, 15, 25 and 40 DAE

**T5:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 7, 15, 75 and 90 DAE

**T6:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed + spray at 25, 40, 75 and 90 DAE

**T7:** Seed treatment with Thaimethoxam 30 FS @ 2g/kg of seed

**T8:** Control

**Treatment information:**

- Spray at 7 and 15 DAE of Azadirachtin 3000 ppm @ 2ml/ lit of water for management of shootfly
- Spray at 25 and 40 DAE of Emamectin benzoate 5 WG @ 0.5g /lit of water for management of fall armyworm
- Spray at 75 and 90 DAE of imidacloprid 17.8 SL @ 0.3ml/lit of water for management of aphids

**Observations:**

- Number of larva and adults of shootfly on five randomly selected leaves per plant (5 plants will be randomly selected/plot) and % damage (in terms of deadhearts) by shootfly at 5 days interval starting from pest emergence till pest presence.
- Number of larva and adults of armyworm on five randomly selected leaves per plant (5 plants will be randomly selected/plot) and % damage by armyworm at 5 days interval starting from pest emergence till pest presence.
- Number of nymphs and adults on five randomly selected plants and % damage by aphids at 5 days interval starting from pest emergence till pest presence.
- Green fodder yield (q/ha) in different treatments.
- Percent Yield loss in different treatments.

**Results:****Rahuri****Shootfly**

At 30 DAE, significantly least numbers of shootfly larvae were recorded in T5 (0.53) followed by T3 (0.57), T4 (0.64), T1 (0.74) and T2 (0.78) which were at par with each other. At 30 DAE, significantly least numbers of shootfly adults were recorded in T3 (0.41) followed by T5 (0.45) and T1 (0.47) which were at par with each other (Table PPT-Rahuri 31a). At 15 DAE, significantly least numbers of dead hearts were recorded in T3 (5.67) followed by T5 (5.74), T2 (6.77) and T1 (7.59) which were at par with each other. Similar trend were observed at 20, 25 and 30 DAE (Table Rahuri PPT-31b).

**Fall Army Worm**

Before application of sprays on 25 DAE, all the treatments were found non significant. At 30 DAE significantly least numbers of percent infestation were recorded in T4 (5.57) which was at par with T1 (6.23), T2 (6.01) and T6 (6.80) as compared with remaining treatments T5 (21.65), T3 (22.65) and T7 (22.44), T8 (22.91). Similar trend were observed at 35 and 40 DAE. However at 45 DAE percent infestation was recorded significantly lowest in T4 (0.57) and was at par with T6 (0.78), T1 (0.90), T6 (6.80) and next best treatment was T2 (4.67) as compared with remaining treatments (Table Rahuri PPT-31b).

**Aphid**

Differences in aphid infestation on sorghum before application of sprays at 75 DAE was non-significant. However, after spray at 100 DAE significantly lowest numbers of aphids were observed in T5 (13.78) followed by T1 (14.78) and T6 (15.58) (Table Rahuri PPT-31b).

**Green forage yield:** The results presented in table 20 indicated that the significantly highest green forage yield (468.72 q/ha) was observed in T1 followed by T5 (444.25 q/ha) (Table Rahuri PPT-31b).

**Yield loss:** Percent yield loss in sorghum were estimated to be 43.10% (T8). Yield losses due to shootfly alone were estimated to be around 25.62% (T6). Yield losses due to fall armyworm were estimated to be around 5.22% (T5). Yield losses due to aphids were estimated to be around 20.97 % (T4) (Table Rahuri PPT-31b).

## Coimbatore

**Shoot fly:** The initial population of shoot fly ranged from 0.43 to 0.52 larvae/plant and the per cent damage was from 11.5 to 13.53%. The population of shoot fly and percent damage was reduced at 15 DAE in all the treatments except T7 (Seed treatment with thiamethoxam 30 FS @ 2g/kg of seed) and untreated check. The best treatment was T1 which recorded mean population of shoot fly 0.44 /plant, 0.31/plant and 0.43/plant at 7, 15 and 25 DAE respectively. The percent damage recorded in T1 was 11.50, 6.79 and 6.28 on 7, 15 and 25 DAE respectively. It was followed by T2, T3 and T4 (Table Coimbatore PPT-31a).

**Fall Armyworm:** The percent damage of fall armyworm was lowest in T1 and T6 in which the damage was 6.79% at 45 DAE (Table Coimbatore PPT-31b).

**Yield:** The highest yield was recorded in T1 (104.76 q/ha) followed by T4 (101.00 q/ha) (Table Coimbatore PPT-31b).

**Yield loss:** Percent yield loss in sorghum was estimated to be 32.23% (T8). Yield losses due to shootfly alone were estimated to be around 15.68% (T6). Yield losses due to fall armyworm were estimated to be around 6.14% (T5) (Table Coimbatore PPT-31b).

**Table Rahuri PPT-31a: Estimation of yield losses due to insect-pests in fodder sorghum at Rahuri**

Treatments	Mean shootfly larvae/5 plants				Mean shootfly adults/5 plants			
	15 DAE	20 DAE	25 DAE	30 DAE	15 DAE	20 DAE	25 DAE	30 DAE
<b>T1</b>	1.16 <sup>c</sup> (1.29)	0.92 <sup>cd</sup> (1.19)	0.81 <sup>ab</sup> (1.14)	0.74 <sup>ab</sup> (1.11)	0.70 <sup>ab</sup> (1.10)	0.55 <sup>ab</sup> (1.03)	0.52 <sup>ab</sup> (1.01)	0.47 <sup>ab</sup> (0.99)
<b>T2</b>	1.29 <sup>cd</sup> (1.34)	0.89 <sup>c</sup> (1.18)	0.83 <sup>ab</sup> (1.15)	0.78 <sup>ab</sup> (1.13)	1.15 <sup>cd</sup> (1.28)	0.79 <sup>ab</sup> (1.14)	0.73 <sup>c</sup> (1.11)	0.64 <sup>ab</sup> (1.07)
<b>T3</b>	0.98 <sup>ab</sup> (1.22)	0.73 <sup>ab</sup> (1.11)	0.57 <sup>a</sup> (1.04)	0.57 <sup>ab</sup> (1.03)	0.68 <sup>a</sup> (1.09)	0.52 <sup>a</sup> (1.01)	0.44 <sup>a</sup> (0.97)	0.41 <sup>a</sup> (0.95)
<b>T4</b>	1.06 <sup>ab</sup> (1.25)	0.74 <sup>ab</sup> (1.12)	0.60 <sup>ab</sup> (1.05)	0.64 <sup>ab</sup> (1.07)	0.93 <sup>c</sup> (1.20)	0.65 <sup>ab</sup> (1.07)	0.53 <sup>ab</sup> (1.02)	0.59 <sup>ab</sup> (1.04)
<b>T5</b>	0.87 <sup>a</sup> (1.17)	0.66 <sup>a</sup> (1.08)	0.66 <sup>ab</sup> (1.08)	0.53 <sup>a</sup> (1.02)	0.71 <sup>ab</sup> (1.10)	0.53 <sup>ab</sup> (1.02)	0.51 <sup>ab</sup> (1.01)	0.46 <sup>ab</sup> (0.98)
<b>T6</b>	2.22 <sup>e</sup> (1.65)	1.81 <sup>e</sup> (1.52)	1.67 <sup>c</sup> (1.47)	1.85 <sup>cd</sup> (1.53)	1.52 <sup>ef</sup> (1.42)	1.25 <sup>cd</sup> (1.32)	1.15 <sup>ef</sup> (1.28)	1.25 <sup>cd</sup> (1.32)
<b>T7</b>	2.39 <sup>ef</sup> (1.70)	1.90 <sup>ef</sup> (1.55)	1.71 <sup>cd</sup> (1.49)	1.77 <sup>c</sup> (1.51)	1.44 <sup>e</sup> (1.39)	1.22 <sup>c</sup> (1.31)	1.04 <sup>e</sup> (1.24)	1.08 <sup>c</sup> (1.26)
<b>T8</b>	2.67 <sup>g</sup> (1.78)	2.87 <sup>g</sup> (1.83)	3.05 <sup>e</sup> (1.88)	3.04 <sup>e</sup> (1.88)	1.82 <sup>g</sup> (1.52)	1.97 <sup>e</sup> (1.57)	2.12 <sup>g</sup> (1.62)	2.09 <sup>e</sup> (1.61)
<b>CD @5%</b>	0.06	0.08	0.15	0.14	0.08	0.16	0.12	0.18
<b>CV%</b>	6.50	7.65	6.62	6.39	7.73	7.58	5.90	8.77

**Table Rahuri PPT-31b: Estimation of yield losses due to insect-pests in fodder sorghum at Rahuri**

Treatments	% dead hearts of shootfly				% plant infestation by fall armyworm					Aphid population				GFY (q/ha)	Yield Loss (%)
	15 DAE	20 DAE	25 DAE	30 DAE	25 DAE	30 DAE	35 DAE	40 DAE	45 DAE	75 DAE	80 DAE	85 DAE	90 DAE		
<b>T1</b>	10.35 <sup>a</sup> (18.76)	8.32 <sup>a</sup> (16.77)	8.89 <sup>ab</sup> (17.35)	7.59 <sup>ab</sup> (15.99)	16.52 <sup>a</sup> (23.98)	6.23 <sup>ab</sup> (14.46)	2.57 <sup>ab</sup> (9.22)	1.57 <sup>ab</sup> (7.19)	0.90 <sup>ab</sup> (5.44)	58.56 <sup>a</sup> (7.69)	20.37 <sup>ab</sup> (4.57)	17.14 <sup>ab</sup> (4.20)	14.78 <sup>ab</sup> (3.91)	468.72 <sup>a</sup>	-
<b>T2</b>	13.09 <sup>ab</sup> (21.21)	10.31 <sup>ab</sup> (18.73)	9.10 <sup>ab</sup> (17.56)	6.77 <sup>ab</sup> (15.08)	15.06 <sup>a</sup> (22.83)	6.01 <sup>ab</sup> (14.19)	2.34 <sup>ab</sup> (8.80)	2.01 <sup>ab</sup> (8.14)	4.67 <sup>c</sup> (12.48)	52.80 <sup>a</sup> (7.30)	18.81 <sup>ab</sup> (4.39)	15.38 <sup>ab</sup> (3.98)	18.02 <sup>ab</sup> (4.30)	393.68 <sup>cd</sup>	16.01
<b>T3</b>	13.04 <sup>ab</sup> (21.17)	11.75 <sup>c</sup> (20.05)	7.67 <sup>a</sup> (16.08)	5.67 <sup>a</sup> (13.78)	20.74 <sup>a</sup> (27.09)	22.6 <sup>cd</sup> (28.42)	23.98 <sup>c</sup> (29.32)	24.65 <sup>c</sup> (29.77)	9.98 <sup>d</sup> (18.42)	53.12 <sup>a</sup> (7.32)	62.09 <sup>cd</sup> (7.91)	63.91 <sup>cd</sup> (8.03)	21.23 <sup>ab</sup> (4.66)	402.81 <sup>c</sup>	14.06
<b>T4</b>	12.18 <sup>ab</sup> (20.43)	9.60 <sup>ab</sup> (18.05)	8.02 <sup>ab</sup> (16.45)	6.02 <sup>ab</sup> (14.20)	18.34 <sup>a</sup> (25.36)	5.57 <sup>a</sup> (13.65)	2.23 <sup>a</sup> (8.59)	1.23 <sup>a</sup> (6.38)	0.57 <sup>a</sup> (4.32)	51.21 <sup>a</sup> (7.19)	64.23 <sup>cd</sup> (8.05)	67.14 <sup>cd</sup> (8.22)	68.73 <sup>cd</sup> (8.32)	370.45 <sup>cd</sup>	20.97
<b>T5</b>	12.14 <sup>ab</sup> (20.39)	8.54 <sup>ab</sup> (16.99)	7.74 <sup>ab</sup> (16.15)	5.74 <sup>ab</sup> (13.86)	16.70 <sup>a</sup> (24.12)	21.65 <sup>c</sup> (27.73)	24.32 <sup>cd</sup> (29.55)	25.32 <sup>cd</sup> (30.21)	27.32 <sup>c</sup> (31.51)	53.29 <sup>a</sup> (7.33)	16.71 <sup>ab</sup> (4.15)	16.46 <sup>ab</sup> (4.12)	13.78 <sup>a</sup> (3.78)	444.25 <sup>ab</sup>	5.22
<b>T6</b>	24.93 <sup>c</sup> (29.96)	21.61 <sup>d</sup> (27.70)	18.99 <sup>c</sup> (25.84)	20.66 <sup>c</sup> (27.03)	17.07 <sup>a</sup> (24.40)	6.80 <sup>ab</sup> (15.12)	2.47 <sup>ab</sup> (9.04)	1.80 <sup>ab</sup> (7.71)	0.78 <sup>ab</sup> (5.08)	48.90 <sup>a</sup> (7.03)	15.30 <sup>a</sup> (3.97)	14.60 <sup>a</sup> (3.89)	15.58 <sup>ab</sup> (4.01)	348.64 <sup>cd</sup>	25.62
<b>T7</b>	25.38 <sup>cd</sup> (30.25)	22.3 <sup>de</sup> (28.22)	19.01 <sup>cd</sup> (25.85)	21.18 <sup>cd</sup> (27.40)	16.76 <sup>a</sup> (24.17)	22.44 <sup>cd</sup> (28.28)	24.44 <sup>cd</sup> (29.63)	26.11 <sup>cd</sup> (30.73)	27.44 <sup>cd</sup> (31.59)	53.27 <sup>a</sup> (7.33)	56.26 <sup>c</sup> (7.53)	60.18 <sup>cd</sup> (7.79)	66.48 <sup>c</sup> (8.18)	285.52 <sup>e</sup>	39.09
<b>T8</b>	30.03 <sup>cd</sup> (33.23)	32.56 <sup>f</sup> (34.79)	33.83 <sup>e</sup> (35.56)	35.16 <sup>e</sup> (36.37)	16.51 <sup>a</sup> (23.98)	22.91 <sup>cd</sup> (28.60)	25.24 <sup>cd</sup> (30.16)	26.91 <sup>cd</sup> (31.25)	28.58 <sup>cd</sup> (32.31)	49.96 <sup>a</sup> (7.10)	58.29 <sup>cd</sup> (7.67)	58.04 <sup>c</sup> (7.65)	68.32 <sup>cd</sup> (8.30)	267.35 <sup>ef</sup>	43.10
<b>CD @5%</b>	3.74	2.56	2.17	2.71	NS	4.92	4.55	4.73	5.48	NS	1.43	1.45	1.10	34.37	
<b>CV%</b>	8.79	6.49	5.84	7.61	8.28	13.25	12.85	14.49	17.99	9.89	13.69	13.92	11.11	8.27	

**Table Coimbatore PPT-31a: Estimation of yield losses due to insect-pests in fodder sorghum at Coimbatore**

Treatments	Mean shootfly larvae/5 plants			% dead hearts of shootfly		
	7 DAE	15 DAE	25 DAE	7 DAE	15 DAE	25 DAE
<b>T1</b>	0.44 <sup>a</sup> (0.66)	0.31 <sup>a</sup> (0.56)	0.43 <sup>a</sup> (0.66)	11.50 <sup>a</sup> (19.86)	6.79 <sup>a</sup> (17.73)	6.28 <sup>a</sup> (15.11)
<b>T2</b>	0.43 <sup>a</sup> (0.66)	0.44 <sup>ab</sup> (0.66)	0.43 <sup>a</sup> (0.66)	11.54 <sup>a</sup> (19.86)	9.27 <sup>b</sup> (14.52)	6.28 <sup>a</sup> (15.11)
<b>T3</b>	0.44 <sup>a</sup> (0.66)	0.32 <sup>a</sup> (0.56)	0.43 <sup>a</sup> (0.66)	11.50 <sup>a</sup> (19.86)	9.27 <sup>b</sup> (3.04)	9.25 <sup>b</sup> (17.73)
<b>T4</b>	0.51 <sup>b</sup> (0.72)	0.34 <sup>bc</sup> (0.58)	0.52 <sup>b</sup> (0.72)	13.43 <sup>b</sup> (21.50)	9.27 <sup>b</sup> (17.73)	9.27 <sup>b</sup> (17.73)
<b>T5</b>	0.52 <sup>b</sup> (0.72)	0.33 <sup>ab</sup> (0.57)	0.52 <sup>b</sup> (0.72)	13.43 <sup>b</sup> (21.50)	11.53 <sup>c</sup> (19.86))	9.25 <sup>b</sup> (17.73)
<b>T6</b>	0.44 <sup>a</sup> (0.66)	0.51 <sup>c</sup> (0.71)	0.44 <sup>a</sup> (0.66)	11.54 <sup>a</sup> (19.86)	13.43 <sup>d</sup> (21.50)	16.43 <sup>d</sup> (23.91)
<b>T7</b>	0.43 <sup>a</sup> (0.66)	0.63 <sup>d</sup> (0.79)	0.44 <sup>a</sup> (0.66)	13.44 <sup>b</sup> (21.50)	16.43 <sup>e</sup> (23.91)	14.88 <sup>c</sup> (22.69)
<b>T8</b>	0.43 <sup>a</sup> (0.66)	0.62 <sup>d</sup> (0.79)	0.44 <sup>a</sup> (0.66)	11.54 <sup>a</sup> (19.86)	17.85 <sup>f</sup> (25.00)	17.85 <sup>e</sup> (25.00)
<b>CD @5%</b>	0.015	0.104	0.015	0.018	0.085	0.096
<b>CV%</b>	0.037	0.134	0.039	0.082	0.411	0.473



**Table Coimbatore PPT-31b: Estimation of yield losses due to insect-pests in fodder sorghum at Coimbatore**

Treatments	% plant infestation by fall armyworm							GFY (q/ha)	Yield loss(%)
	15 DAE	20 DAE	25 DAE	30 DAE	35 DAE	40DAE	45 DAE		
<b>T1</b>	13.43 <sup>b</sup> (21.50)	11.53 <sup>b</sup> (19.86)	16.43 <sup>a</sup> (23.91)	11.54 <sup>a</sup> (19.86)	11.54 <sup>a</sup> (11.54)	22.46 <sup>c</sup> (28.29)	6.79 <sup>a</sup> (15.11)	104.76 <sup>a</sup>	-
<b>T2</b>	13.44 <sup>b</sup> (21.50)	11.54 <sup>b</sup> (19.86)	16.44 <sup>a</sup> (23.91)	16.43 <sup>c</sup> (23.91)	17.85 <sup>c</sup> (25.00)	21.47 <sup>b</sup> (27.61)	16.43 <sup>c</sup> (23.91)	98.43 <sup>c</sup>	6.04
<b>T3</b>	13.43 <sup>b</sup> (21.50)	16.43 <sup>d</sup> (23.91)	17.85 <sup>b</sup> (25.00)	19.00 <sup>d</sup> (25.84)	20.27 <sup>d</sup> (26.76)	20.27 <sup>a</sup> (26.76)	9.10 <sup>b</sup> (17.55)	99.78 <sup>bc</sup>	4.75
<b>T4</b>	11.53 <sup>a</sup> (19.86)	9.27 <sup>a</sup> (17.73)	16.43 <sup>a</sup> (23.91)	11.54 <sup>a</sup> (19.86)	24.65 <sup>f</sup> (29.77)	21.47 <sup>b</sup> (27.61)	21.39 <sup>d</sup> (27.55)	101.00 <sup>b</sup>	3.59
<b>T5</b>	11.53 <sup>a</sup> (19.86)	14.88 <sup>e</sup> (22.69)	17.85 <sup>b</sup> (25.00)	19.00 <sup>d</sup> (25.84)	23.58 <sup>e</sup> (29.05)	21.39 <sup>b</sup> (27.55)	23.58 <sup>e</sup> (29.05)	98.33 <sup>c</sup>	6.14
<b>T6</b>	17.85 <sup>d</sup> (25.00)	17.85 <sup>e</sup> (25.00)	23.57 <sup>e</sup> (29.05)	14.77 <sup>b</sup> (22.60)	14.77 <sup>b</sup> (22.60)	24.65 <sup>d</sup> (29.77)	6.79 <sup>a</sup> (15.11)	88.33 <sup>d</sup>	15.68
<b>T7</b>	16.43 <sup>c</sup> (23.91)	21.47 <sup>f</sup> (27.61)	20.26 <sup>c</sup> (26.76)	18.90 <sup>e</sup> (25.77)	23.58 <sup>e</sup> (29.05)	24.65 <sup>d</sup> (29.77)	23.58 <sup>e</sup> (29.05)	73.67 <sup>e</sup>	29.68
<b>T8</b>	19.00 <sup>e</sup> (25.84)	20.26 <sup>g</sup> (26.76)	19.00 <sup>d</sup> (25.84)	21.38 <sup>d</sup> (27.55)	24.65 <sup>f</sup> (29.77)	24.64 <sup>d</sup> (29.77)	27.55 <sup>f</sup> (31.66)	71.00 <sup>f</sup>	32.23
<b>CD @5%</b>	0.036	0.059	0.122	0.106	0.155	0.107	0.241	2.073	
<b>CV%</b>	0.140	0.219	0.376	0.364	0.441	0.270	0.976	1.314	

## PPT-32: Estimation of yield losses due to foliar diseases (anthracnose, gray leaf spot and zonate leaf spot) in fodder sorghum

**Location:** Ludhiana, Palampur, Jhansi

**Treatments:** 8

**Replications:** 3

**Design:** RBD

**Plot size:** 4x4 m<sup>2</sup>

### Treatments:

**T1:** Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 and 35 days after emergence (DAE)

**T2:** Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 DAE

**T3:** Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 35 DAE

**T4:** Foliar spray of propiconazole @ 1ml/l at 20 and 35 DAE

**T5:** Foliar spray of propiconazole @ 1ml/l at 20 DAE

**T6:** Foliar spray of propiconazole @ 1ml/l at 35 DAE

**T7:** Seed treatment with carbendazim (2g/kg)

**T8:** Control

### Treatment information:

- Seed treatment with carbendazim (2g/kg) for managing seed borne inoculum.
- Foliar spray at 20 and 35 DAE of propiconazole @ 1ml/l for the management of foliar diseases (anthracnose, gray leaf spot and zonate leaf spot) for managing air borne inoculum.

### Observations:

- Disease severity (%) of respective disease on 10 randomly selected plants per replication per treatment at 5 days interval starting from 10 days after emergence till crop harvesting.
- AUDPC and rate of infection in different treatments.
- Fodder quality attributes viz., Crude protein (%), ADF (%), NDF (%) in different treatments at the time of harvesting.
- Green fodder yield (q/ha) in different treatments.
- Percent quantitative and qualitative yield loss in different treatments.

### Results

#### Palampur

The experiment was conducted to assess the crop losses due to foliar diseases in forage sorghum. During the season, there was heavy infection of zonate leaf spot disease. Among all the treatments, the two foliar sprays of propiconazole @ 1ml/l at 20 and 35 DAE was found most effective which gave 46.5% disease control with 22.14% increase in the green fodder yield over check. This was followed by seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 and 35 DAE with 45.4% disease control with 23.47% increase in the yield over check. The values of *r*/day and AUDPC were also observed as 0.04 and 534.33 respectively in treatment having two foliar sprays of propiconazole @ 1ml/l at 20 and 35 DAE. This was followed by seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 and 35 DAE having *r* 0.04 and AUDPC 537.50, respectively. In control, the disease severity was 61.7% with maximum *r* (0.12) per day and AUDPC (842.33) and minimum GFY (326.67q/ha).

The crude protein increased from 3.43 to 17.1% in treatments as compared to control being maximum in T1, T2 and T4. ADF increase only in T4, T5 and T7 by small margin (0.6 to 1.1%) and in rest of the treatments decrease in ADF(%) was seen. NDF(%) decreased (-1.34 to -4.01%) in different treatments as compared to control. Maximum green fodder yield loss recorded due to the disease was 19% in control compared to best treatment (T1) during the season (Table Palampur PPT-32a).

### **Ludhiana**

The experiment was conducted to assess the crop losses due to foliar diseases in forage sorghum. Disease severity was observed very less in T1 [Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 and 35 days after emergence (DAE)] followed by T3 [Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 35 DAE] and T4 [Foliar spray of propiconazole @ 1ml/l at 20 and 35 DAE] with 28.67, 32.33 and 36.00% in case of grey leaf spot and 29.00, 37.00 and 39.67 respectively in case of anthracnose as compared to control (48.00 and 45.67%). Likewise, AUDPC values were also found lowest (958.33 and 741.67) in T1 as compared to check (1345.0 and 1052.50). The crude protein increased from 2.5 to 15.2% in some treatments (T1, T3, T7) as compared to control being maximum in T7. In rest of the treatments, decrease in CP (%) was seen. ADF increase only in T6 by 8.4% and in rest of the treatments decrease in ADF (%) was seen as compared to control. NDF (%) decreased (-1.3 to -8.1%) in different treatments as compared to control. Green fodder yield was maximum in T1 (485.0 q/ha) respectively as compared to check 341.67 q/ha. Maximum green fodder yield loss recorded due to the diseases (gray leaf spot and anthracnose) was 30% in control compared to best treatment (T1) during the season (Table Ludhiana PPT-32b).

### **Jhansi**

The experiment was conducted to assess the crop losses due to foliar diseases in forage sorghum. During the season, heavy infection of zontate leaf spot was observed. Terminal disease severity was observed very less in T1 [Seed treatment with carbendazim (2g/kg) + foliar spray of propiconazole @ 1ml/l at 20 and 35 days after emergence (DAE)] followed by T4 [Foliar spray of propiconazole @ 1ml/l at 20 and 35 DAE] with 36.3 and 39.4% percent as compared to control (66.3%). Likewise, AUDPC values were also found lowest ( 974.1 and 1038.7) in T1 and T4 as compared to check (1292.1). The crude protein increased from 0.2 to 9.1% in all the treatments (except T7 in which CP% decreased) as compared to control being maximum in T1 and T5. ADF% decreased in all the treatments when compared to control. NDF (%) increased only in T1 (6.5%) and in T3 (0.1%)very slight was seen in NDF%. In rest of the treatments, NDF% decreased (-0.8 to -6.4%) as compared to control. Green fodder yield was maximum in T1 (453.1 q/ha) as compared to control 379.6 q/ha. Maximum green fodder yield loss recorded due to the zonate leaf spot was 16.2% in control compared to best treatment (T1) during the season (Table Jhansi PPT-32c).

**Table Palampur PPT-32a: Estimation of yield losses due to foliar diseases (anthracnose, gray leaf spot and zonate leaf spot) in fodder sorghum at Palampur**

Treatment	Zonate leaf spot of Sorghum					Quality Characters						GFY	
	Zonate leaf spot	r (per day)		AUDPC		Crude protein		ADF		NDF			
	Severity (%)	Rate (r)	Relative infection rate (%)	AUDPC	Relative AUDPC (%)	Crude protein (%)	% increase	ADF (%)	% increase	NDF (%)	% increase	(q/h)	Yield loss (%)
T1	33.67 (35.45) <sup>a</sup>	0.05 <sup>a</sup>	39.76	537.50 <sup>a</sup>	45.08	10.21 <sup>a</sup>	17.1	67.40	-3.0	58.20	-2.7	403.33 <sup>a</sup>	-
T2	36.00 (36.85) <sup>ab</sup>	0.09 <sup>b</sup>	72.49	543.33 <sup>ab</sup>	45.57	10.21 <sup>a</sup>	17.1	68.20	-1.8	57.40	-4.2	381.00 <sup>b</sup>	5.5
T3	39.33 (38.82) <sup>bc</sup>	0.06 <sup>a</sup>	44.92	564.67 <sup>b</sup>	47.36	9.62 <sup>ab</sup>	12.1	67.80	-2.4	58.60	-2.0	375.67 <sup>b</sup>	6.9
T4	33.00 (35.04) <sup>a</sup>	0.04 <sup>a</sup>	30.61	534.33 <sup>a</sup>	44.81	10.21 <sup>a</sup>	17.1	69.80	0.6	57.80	-3.5	399.00 <sup>a</sup>	1.1
T5	37.00 (37.45) <sup>b</sup>	0.09 <sup>b</sup>	72.49	592.67 <sup>c</sup>	49.71	9.33 <sup>bc</sup>	9.3	70.20	1.1	59.00	-1.4	385.33 <sup>b</sup>	4.5
T6	40.67 (39.60) <sup>c</sup>	0.12 <sup>c</sup>	94.23	672.00 <sup>d</sup>	56.36	9.04 <sup>bcd</sup>	6.4	68.40	-1.5	57.40	-4.2	377.33 <sup>b</sup>	6.4
T7	43.00 (40.96) <sup>c</sup>	0.11 <sup>b</sup>	82.35	616.00 <sup>c</sup>	51.66	8.75 <sup>cd</sup>	3.3	70.00	0.9	58.60	-2.0	331.33 <sup>c</sup>	17.9
T8	81.67 (64.67) <sup>d</sup>	0.13 <sup>c</sup>	100.00	1192.33 <sup>e</sup>	100.00	8.46 <sup>d</sup>	-	69.40	-	59.80	-	326.67 <sup>c</sup>	19.0
CD (5%)	1.88	0.02		29.44		0.77						13.86	
CV	2.59	15.06		2.75		4.57						2.11	

\*Figures in parentheses are arc sine transformed values

**Table Ludhiana PPT 32 (b): Estimation of yield losses due to grey leaf spot in fodder sorghum at Ludhiana**

Treatments	Terminal mean gray leaf spot severity (%)	AUDPC	Rate of infection	Terminal mean anthracnose severity (%)	AUDPC	Rate of infection	Quality parameters						GFY (q/ha)	Yield loss (%)
							CP (%)	% increase	ADF (%)	% increase	NDF (%)	% increase		
T <sub>1</sub>	28.67 <sup>g</sup>	958.3 <sup>e</sup>	0.056 <sup>a</sup>	29.00 <sup>e</sup>	741.67 <sup>f</sup>	0.082 <sup>a</sup>	8.0	2.5	36.8	-6.8	60.2	-6.6	485.0 <sup>a</sup>	-
T <sub>2</sub>	44.00 <sup>c</sup>	1250.8 <sup>b</sup>	0.078 <sup>a</sup>	42.00 <sup>bc</sup>	933.33 <sup>c</sup>	0.086 <sup>a</sup>	7.5	-4.0	37.4	-5.1	61.3	-4.7	406.6 <sup>d</sup>	16
T <sub>3</sub>	32.33 <sup>f</sup>	1049.1 <sup>d</sup>	0.083 <sup>a</sup>	37.00 <sup>d</sup>	825.00 <sup>e</sup>	0.085 <sup>a</sup>	8.7	10.3	35.3	-11.3	59.4	-8.1	462.2 <sup>b</sup>	5
T <sub>4</sub>	36.00 <sup>e</sup>	1122.5 <sup>c</sup>	0.064 <sup>a</sup>	39.67 <sup>c</sup>	875.83 <sup>d</sup>	0.085 <sup>a</sup>	7.3	-6.8	36.7	-7.1	63.4	-1.3	459.4 <sup>b</sup>	5
T <sub>5</sub>	44.67 <sup>bc</sup>	1270.0 <sup>b</sup>	0.086 <sup>a</sup>	43.00 <sup>b</sup>	979.17 <sup>b</sup>	0.086 <sup>a</sup>	7.8	0.0	38.4	-2.3	62.2	-3.2	379.2 <sup>e</sup>	22
T <sub>6</sub>	38.67 <sup>d</sup>	1154.1 <sup>c</sup>	0.065 <sup>a</sup>	40.33 <sup>c</sup>	919.17 <sup>c</sup>	0.065 <sup>a</sup>	7.6	-2.6	42.9	8.4	62.5	-2.7	429.2 <sup>c</sup>	11
T <sub>7</sub>	46.33 <sup>ab</sup>	1320.0 <sup>a</sup>	0.066 <sup>a</sup>	43.33 <sup>b</sup>	1007.5 <sup>b</sup>	0.086 <sup>a</sup>	9.2	15.2	36.3	-8.3	60.3	-6.5	355.0 <sup>f</sup>	27
T <sub>8</sub>	48.00 <sup>a</sup>	1345.0 <sup>a</sup>	0.072 <sup>a</sup>	45.67 <sup>a</sup>	1052.5 <sup>a</sup>	0.066 <sup>a</sup>	7.8	-	39.3	-	64.2	-	341.6 <sup>f</sup>	30
<b>CD (5%)</b>	2.127	37.293	NS	2.287	38.785	NS							15.51	
<b>CV</b>	3.019	1.782	21.547	3.233	2.393	17.843							2.115	

**Table Jhansi PPT 32 (c): Estimation of yield losses due to foliar diseases (anthracnose, gray leaf spot and zonate leaf spot) in fodder sorghum at Jhansi**

Treatment	Zonate leaf spot of Sorghum			Quality Characters						GFY	
	Terminal mean zonate leaf spot Severity (%)	AUDPC	Rate (r)	Crude protein		ADF		NDF			
				Crude protein (%)	% increase	ADF (%)	% increase	NDF (%)	% increase	(q/h)	Yield loss (%)
T1	36.3 <sup>e</sup>	974.1 <sup>d</sup>	0.026 <sup>d</sup>	11.85	9.1	37.94	-20.4	71.62	6.5	453.1 <sup>a</sup>	-
T2	43.3 <sup>cd</sup>	1083.7 <sup>bc</sup>	0.030 <sup>cd</sup>	11.75	8.3	39.91	-14.4	65.99	-1.5	429.8 <sup>ab</sup>	5.14
T3	46.2 <sup>bc</sup>	1111.5 <sup>b</sup>	0.029 <sup>cd</sup>	10.79	0.2	42.21	-8.2	67.00	0.1	414.6 <sup>bc</sup>	8.50
T4	39.4 <sup>de</sup>	1038.7 <sup>c</sup>	0.028 <sup>cd</sup>	11.04	2.4	41.61	-9.8	65.87	-1.7	432.3 <sup>ab</sup>	4.59
T5	46.7 <sup>bc</sup>	1087.6 <sup>bc</sup>	0.035 <sup>bc</sup>	11.85	9.1	42.09	-8.5	66.95	0.0	402.1 <sup>cd</sup>	11.26
T6	45.8 <sup>c</sup>	1123.6 <sup>b</sup>	0.031 <sup>cd</sup>	11.42	5.7	42.67	-7.0	66.43	-0.8	398.5 <sup>cd</sup>	12.04
T7	51.4 <sup>b</sup>	1145.0 <sup>b</sup>	0.040 <sup>b</sup>	10.33	-4.3	45.36	-0.7	62.92	-6.4	382.1 <sup>d</sup>	15.67
T8	66.3 <sup>a</sup>	1292.1 <sup>a</sup>	0.058 <sup>a</sup>	10.77	-	45.67	-	66.96	-	379.6 <sup>d</sup>	16.23
CD (5%)	5.42	62.27	0.009							24.10	
CV	6.59	3.21	14.39							3.34	



## **Breeder Seed Production in Forage Crops (*Kharif-2021*)**

### **[Indent Year Kharif 2022]**

**(Table reference: Tables BSP 1, 2)**

In *Kharif-2021*, the indent for breeder seed production (Indent year *Kharif-2022*) was received from DAC, Govt. of India for 20 varieties of 6 forage crops viz., fodder maize, fodder pearl millet, fodder cowpea, fodder Gaur, Hedge Lucerne and Sewan Grass. The total indent for breeder seed production was 78.10q.

The indent was allotted to Twelve SAUS/ICAR/NGO institutes. Among the quantity allotted for different forage crops, maximum was for forage maize (60.20q) followed by cowpea (15.90 q), pearl millet (1.55 q), fodder Guar (0.25 q), Hedge Lucerne (0.10q) and Sewan Grass (0.10q).

The final Breeder Seed Production report (BSP-IV) received from different seed producing centres revealed that the overall breeder seed production was higher or equal to indent in all the crops except fodder Guar.

Variety wise scenario indicates that in Forage Maize, 04 varieties were indented and report from 08 centers indicate that production was surplus or equal in all four varieties African Tall, Pratap Makka Chari-6, TSFM-15-5 and J-1006. Thus in maize, the production was more or equal to indented quantity in all 4 varieties. Total production was 81.48 q as against the indent of 60.20 q making a surplus of 21.28 q (35.34%).

In Forage pearl millet, indent was received for 6 varieties which were allocated to 5 centers. Production was surplus in GAFB-4, Raj Bajra-1, BAIF Bajra-1, FBC-16, PCB-165 whereas it met the target in HC-20. Thus in pearl millet, production was equal or more in all 6 varieties as compared to indented quantity. Total production was 7.65q as against the indent of 1.55 q thereby making a surplus of 6.10 q (393.55%).

In Forage cowpea, indent was received for 7 varieties which were allocated to 7 centers. Production was surplus in EC-4216, MFC-09-1, CL-367, UPC 628, UPC 8705, whereas it met the target in TNFC-0926. The production was deficit in Bundel Lobia-2, where the crop was reported to be damaged due to heavy rain. Seed was also produced for another notified variety MFC-08-14. Thus in cowpea the production was more or equal in 6 varieties whereas it was deficit in only one variety as compared to indented quantity. UAS Bengaluru reported production of 2.00 q seed of cowpea variety MFC-08-14 which was not indented. Total production was 22.75q as against the indent of 15.90q, thereby making a surplus of 6.85 q (43.08%).

In case of Sewan grass, indent of 0.10q was received for one variety RLS-11-50. Production by SKRAU, Bikaner was 11.00 q thereby making a surplus of 10.90q (10900%). In case of fodder guar, indent of 0.25q was received of one variety Bundel Guar-3. Production was nil as crop was reported to be damaged due to heavy rain. In case of hedge Lucerne, indent of 0.10 q was received for one variety TDN 1308 which was produced by TNAU, Coimbatore. ICAR-IGFRI Jhansi also reported production 0.20q seed of Guinea grass variety PGG 518 which was not indented.

Thus variety wise scenario indicates that production was equal or more in 18 varieties and deficit in 2 varieties as compared to indented quantity.

The overall breeder seed production in forage crops was 123.18q as against the indent of 78.10q indicating that surplus production was 123.08q or 45.08q (57.72%) higher than the indented quantity.



**Table BSP 1: Centre wise Breeder Seed Production (q) during Kharif-2021**

**[Indent Kharif 2022]**

S N	Producing centre/ State	Variety	Crop	DAC indent	Actual Allocation	Actual Production	Production Surplus / Deficit (-)
Maharashtra							
1.	BAIF, Uralikanchan	AFRICAN TALL COMPOSITE	Fodder Maize	38.50	10.00	12.00	2.00
		EC-4216	Fodder Cowpea	7.20	3.20	3.60	0.40
		BAIF Bajra-1	Fodder Pearl millet	0.65	0.65	5.00	4.35
2.	MPKV, Rahuri	AFRICAN TALL COMPOSITE	Fodder Maize	38.50	22.00	29.00	7.00
		EC-4216	Fodder Cowpea	7.20	2.00	4.50	2.50
Punjab							
3.	PAU, Ludhiana	J-1006	Fodder Maize	13.95	13.95	15.00	1.05
		FBC 16	Fodder Pearl millet	0.34	0.34	0.40	0.06
		PCB 165	Fodder Pearl millet	0.02	0.02	0.05	0.03
		CL-367	Fodder cowpea	0.20	0.20	0.30	0.10
		PGG 518	Guinea Grass	0.0	0.0	0.20	0.20
Rajasthan							
4.	MPUAT, Udaipur	PratapMakka Chari-6	Fodder Maize	5.50	5.50	7.50	2.00
5.	SKRAU, Bikaner	Raj Bajra-1 (RRB)	Fodder Pearl Millet	0.30	0.30	1.00	0.70
		RLSB 11-50	Sewan Grass	0.10	0.10	11.00	10.90
Uttar Pradesh							
6.	ICAR-IGFRI, Jhansi	AFRICAN TALL COMPOSITE	Fodder Maize	38.50	6.50	***	***
		EC-4216	Fodder cowpea	7.20	2.00	3.50	1.50
		Bundel Lobia - 2	Fodder cowpea	3.00	3.00	0.75	(-) 2.25#
		Bundel Guar -3 (IGFRI 1019-1)	Fodder Guar	0.25	0.25	0.00	(-)0.25#
Telengana							
7.	PJTSAU, Hyderabad	TSFM 15-5	Fodder Maize	2.25	2.25	2.25	-
Karnataka							
8.	UAS (B) ZARS Mandya	MFC -09-1	Fodder cowpea	2.00	2.00	3.60	1.60
		MFC-08-14	Fodder cowpea	0.0	0.0	2.00	2.00
		African Tall	Fodder Maize	0.00	0.00	9.00	9.00
Haryana							
9.	CCS HAU, Hisar	HC-20 (HMP 9102)	Fodder Pearl millet	0.20	0.20	0.20	
Uttarakhand							
10.	GBPUAT, Pantnagar	UPC 628	Fodder cowpea	0.50	0.50	1.00	0.50
		UPC 8705	Fodder cowpea	0.50	0.50	1.00	0.50
Tamil Nadu							
11.	TNAU, Coimbatore	TNFC 926	Fodder cowpea	2.50	2.50	2.50	-
		TDN 1308	Hedge Lucerne	0.10	0.10	0.10	-
Gujarat							
12.	AAU, Anand	Gujarat Anand Forage Bajra 4 (GAFB 4)	Fodder Pearl Millet	0.04	0.04	1.00	0.96
13.	CSK HPKV, Palampur	African Tall	Fodder Maize	0.0	0.0	6.73	6.73
Grand Total				78.10	78.10	123.18	45.08

\*\*\*= Grown in Rabi 2021-22, data will be available by May 2022

# = Crop loss due to heavy rain.

**Table BSP 2: Variety-wise Breeder Seed Production (q) during Kharif-2021**

**[Indent Kharif 2022]**

Crop	S N	Variety	Produced by	Year of Notification	DAC indent	Allocat ion As per BSP-1	Actual Producti on (q)	Production Surplus (+) / Deficit (-)
Forage Maize	1	TSFM 15-5	PJTSAU, Hyderabad	2019	2.25	2.25	2.25	-
	2	PratapMakka Chari-6	MPUAT, Udaipur	2009	5.50	5.50	7.50	2.00
	3	J-1006	PAU, Ludhiana	1992	13.95	13.95	15.00	1.05
	4	AFRICAN TALL COMPOSITE	MPKV, Rahuri	1983	38.50	22.00	29.00	7.00
			IGFRI Jhansi			6.50	***	
			BAIF, Uralikanchan			10.00	12.00	2.00
			CSKHPKV, Palampur				0.00	0.00
			UAS Bangalore		0.00	0.00	9.00	9.00
	Total				60.20	60.20	81.48	(+) 21.28
Forage Pearl Millet	5	Gujarat Anand Forage Bajra 4 (GAFB 4)	AAU, Anand	2019	0.04	0.04	1.00	0.96
	6	Raj Bajra-1 (RRB)	SKRAU, Bikaner	2018	0.30	0.30	1.00	0.70
	7	FBC 16	PAU, Ludhiana	2016	0.34	0.34	0.40	0.06
	8	BAIF Bajra-1	BAIF, Uralikanchan	2010	0.65	0.65	5.00	4.35
	9	PCB 165	PAU, Ludhiana		0.02	0.02	0.05	0.03
	10	HC-20 (HMP 9102)	CCS HAU, Hisar		0.20	0.20	0.20	-
	Total				1.55	1.55	7.65	(+) 6.10
Forage Cowpea	11	MFC -09-1	UAS (B) ZARS Mandya	2016	2.00	2.00	3.60	1.60
	12	CL-367	PAU, Ludhiana	2006	0.20	0.20	0.30	0.10
	13	EC-4216	ICAR-IGFRI, Jhansi	1978	7.20	2.00	3.50	1.50
			BAIF, Uralikanchan			3.20	3.60	0.40
			MPKV, Rahuri			2.00	4.50	2.50
	14	Bundel Lobia-2	ICAR-IGFRI, Jhansi		3.00	3.00	0.75	(-) 2.25*
	15	TNFC 926	TNAU, Coimbatore	2017	2.50	2.50	2.50	-
	16	UPC 628	GBPUAT, Pantnagar	2010	0.50	0.50	1.00	0.50
	17	UPC 8705	GBPUAT, Pantnagar	1996	0.50	0.50	1.00	0.50
	18	MFC-08-14	UAS ZARS, Mandya		0.00	0.00	2.00	2.00
Total				15.90	15.90	22.75	(+) 6.85	
Sewan Grass	19	RLSB 11-50	SKRAU, Bikaner	2016	0.10	0.10	11.00	10.90
	Total				0.10	0.10	11.00	(+) 10.90
Hedge Lucerne	20	TDN 1308	TNAU, Coimbatore	2019	0.10	0.10	0.10	-
	Total				0.10	0.10	0.10	-
Fodder Guar	21	Bundel Guar -3 (IGFRI 1019-1)	ICAR-IGFRI, Jhansi	1999	0.25	0.25	0.00*	(-) 0.25
	Total				0.25	0.25	0.00*	(-) 0.25
Guinea Grass	22	PGG-518	PAU, Ludhiana		0.00	0.00	0.20	0.20
	Total				0.00	0.00	0.20	0.20
Grand total					78.10	78.10	123.18	(+) 45.08

\* Crop loss due to heavy rain

**National (DAC) indent for forage crops Breeder Seed Production (BSP-1)****Year of indent: Kharif-2023****Year of Production: Kharif-2022****Crop: Fodder Cowpea**

SN	Variety	Year of Release	Center	DAC indent (q)	Allocation (q)	Indenter (q)
1	Vijaya (APFC-10-1)	2016	PJTSAU, Hyderabad	0.80	0.80	NDDDB (0.80)
2	Bundel lobia - 4 (IL-1177)	2015	ICAR-IGFRI, Jhansi	0.60	0.60	NDDDB (0.60)
3	Bundel Lobia-2	1994	ICAR-IGFRI, Jhansi	2.50	2.50	DADH (2.50)
4	UPC-8705	1996	GBPUAT, Pantnagar	1.00	1.00	NDDDB (1.00)
5	EC-4216	1978	BAIF, Uralikanchan	6.10	3.00	DADF (5.00) NSC (0.10), UP (1.00)
			MPKV, Rahuri		3.10	
6	CL-367	2006	PAU, Ludhiana	0.20	0.20	PB (0.20)
			<b>Total</b>	<b>11.20</b>	<b>11.20</b>	

**Crop: Fodder Maize**

SN	Variety	Year of Release	Center	DAC indent (q)	Allocation (q)	Indenter (q)
1	CG Makka Chari-1	2021	IGKV, Raipur	2.00	2.00	KVSS (2.00)
2	J-1007	2021	PAU, Ludhiana	9.00	9.00	KVSS (2.00), NDDDB (1.00), PB (6.00)
3	TSFM 15-5	2019	PJTSAU, Hyderabad	2.60	2.60	NDDDB (1.30), KVSS (1.00), NSAI (0.30)
4	PratapMakka Chari-6	2009	MPUAT, Udaipur	2.00	2.00	NDDDB (1.00), KVSS (1.00)
5	J-1006 + Fodder Maize J 1006	1992	PAU, Ludhiana	15.80	15.80	DADH (2.00), NDDDB (3.50), NSC (1.00), PB (6.30), KVSS (1.00), NSAI (2.00)
6	AFRICAN TALL COMPOSITE	1983	MPKV, Rahuri	18.36	12.36	DADH (6.00), NDDDB (1.30), NSC (10.00), KK (0.06), KVSS (1.00)
			IGFRI Jhansi		6.00	
			<b>Total</b>	<b>49.76</b>	<b>49.76</b>	

**Crop: Rye Grass**

S N	Variety	Year of Release	Center	DAC indent (q)	Allocation (q)	Indenter (q)
1	PBRG-2	2020	PAU, Ludhiana	1.00	1.00	KVSS (1.00)
2	Palam Rye Grass	2020	CSK HPKV, Palampur	1.00	1.00	KVSS (1.00)

**Crop: Fodder Rice Bean (RED BEAN)**

SN	Variety	Year of Release	Center	DAC indent (q)	Allocation (q)	Indenter (q)
1	Bidhan Rice Bean-2 (KRB-4)	2005	BCKV, Kalyani	0.50	0.50	DADF (0.50)

**Crop: Fodder Pearl Millet**

SN	Variety	Year of Release	Center	DAC indent (q)	Allocation (q)	Indenter (q)
1	TSFB 15-8	2020	PJ TSAU, Hyderabad	0.70	0.70	KVSS (0.50), NSAI (0.20)
2	TSFB 15-4	2019		1.20	1.20	KVSS (1.00), NSAI (0.20)
3	Moti Bajra (APFB-09-1)	2016		0.20	0.20	NSAI (0.20)
4	TSFB 17-8	2021		0.50	0.50	KVSS (0.50)
5	TSFB 18-1	2021		0.50	0.50	KVSS (0.50)
6	GAFB 4	2019	AAU, Anand	1.60	1.60	NDDB (1.60)
7	BAIF Bajra-1	2010	BAIF, Uralikanchan	1.37	1.37	DADH (0.70), NDDB (0.50), NSAI (0.12), NSC (0.05)
8	FBC 16	2007	PAU, Ludhiana	0.44	0.44	NDDB (0.20), NSC (0.10), PB (0.04), NSAI (0.10)
9	HC-20 (HMP 9102)	2002	CCS HAU, Hisar	1.40	1.40	NDDB (1.40)
10	IGPM 5-2				-	NSAI (0.03)
11	Raj Bajra-1 (RRB)	2018	SKRAU, Bikaner	0.15	0.15	RAJ (0.15)
			<b>Total</b>	<b>8.06</b>	8.06	

## Specials Trials

### K-21-AST-5: Screening of high biomass maize lines for silage potential

[(Table Reference: K-21-AST-5(a) to (j))]

**Locations (6):** PAU, Ludhiana, NDDDB, Anand, PJTSAU, Hyderabad, IGKV, Raipur, South campus Mirzapur BHU, and BCKV, Kalyani

The growth of dairy sector primarily depends upon the availability of nutritious fodder. Maize is one of the most nutritious non-legume green fodders. It is quick growing, yields high biomass, highly palatable and free from any anti-nutritional components. It contains sufficient quantities of protein and minerals and possesses high digestibility as compared to other non-legume fodders. It contains high concentrations of soluble sugars in the green stage, which makes it most fit for preservation as silage.

Keeping above points in view a trial was initiated at six locations during Kharif 2021 to evaluate five high biomass yielding lines for agronomic traits as well as evaluation of silage quality. A field and lab trial was conducted at. The objective of the study was to screen high biomass maize lines / released cultivars for silage potential and assess fermentation characteristics and nutritional quality of silage of these maize lines. The five maize lines namely African tall, J-1006, TSFM 15-5 (PJTSAU) J 1007 (state release from PAU), KDFM – 5 (state release from SKUAST- K). Additionally three lines- V<sub>6</sub>: DKC9141, V<sub>7</sub>: DKC9144 and V<sub>8</sub>: Elite 751 and one line - V<sub>9</sub>: MFM-18-27 was evaluated at Raipur and Ludhiana centres. The high biomass germplasm lines were screened at milk, dough and dent stages. Observations on agronomic parameters, Plant Quality parameters as well Silage quality parameters were recorded. The Planting was done in plots in plots of for each variety using standard agronomic practice for forage production. Silage was prepared from maize harvested at three different stages; (milk, dough and dent stages). Accordingly harvesting was done three times from each variety. Harvesting each time was done from different lines of each variety and not as multicut. Silage to be made from harvested material using standard practice. Three to five kg capacity bags were used to make silage. The results indicated that among the varieties remarkable variation in biomass yields was not observed. However J-1006 produced higher yields than rest of the lines. The fodder harvesting at dough stage produced higher green fodder but harvesting at dent stage recorded higher dry matter yields. The dry matter content important parameters for silage making, but this also did not vary significantly among varieties. However, dry matter content was highest at dent stage and varied in range of 30.7 to 31.9%. The crop took 75-84 days to reach milk stage, 84-90 days to reach dough stage and 88 to 98 days to dent stage. The total soluble sugar in maize plant varied in narrow range. Highest TSS was noted during dough stage. The maximum crude protein content in plant was noted at milk stage followed by dough, then dent stage. The ADF and NDF content in plant increased with stage of harvest. KDFM-1 recorded significantly lower ADF & NDF content & higher CP content. The pH, which is primary indicator of silage quantity decreased significantly with advancement in stage of harvest. Among varieties no significant variation was observed in pH content of silage. Crude protein content in silage was higher in silage prepared from maize cut milk stage and reduced as cutting stage progressed. Varietal difference was narrow. The soluble sugar in silage was highest in silage prepared from fodder cut at dough stage than other two stages.

The dry matter content in silage increased with stage of harvest, maximum being at dent stage. The varietal difference was in narrow range. The ADF and NDF content in silage decreased with advancement of cutting stage. The lab analysis indicated no variation on Butyric and Acetic acid content in silage either due to silage or variety reasons. The Lactic acid content did not follow any clear trend. TSFM-15-5 and J-1007 recorded higher lactic acid (5.92 & 5.79%) respectively, at milk stage, whereas, African Tall and J-1006 recorded higher Lactic acid in silage at dough stage (4.48 & 5.64 %) respectively. Total ash content varied in range of 10.94 to 14.73 but did not represent any clear trend either due to variety or harvest stage.

**Table K-21-AST-5(a): Green and Dry Fodder Yield of high biomass lines at milk, dough and dent stages**

Varieties	Green Forage Yield (q/ha)							Dry Matter Yield (q/ha)					
	Milk Stage							Milk Stage					
	NDDB	Rai- pur	Kal- yani	Ludh- iana	Mirza pur	Hydera bad	Mean	NDDB	Rai- pur	Kal- yani	Ludh- iana	Hyder abad	Mean
V <sub>1</sub>	331.5	323	245.4	458.3	280	370	334.7	62.0	69.1	40.7	108.2	90.0	74.0
V <sub>2</sub>	338.3	343	320.6	479.2	270	341	348.7	60.4	72.0	68.3	101.2	84.0	77.2
V <sub>3</sub>	308.3	366.3	241.2	334.2	302.5	376	321.4	62.1	79.1	38.6	76.4	83.0	67.8
V <sub>4</sub>	306.5	316.4	294.8	534.7	235	358	340.9	63.0	65.8	55.1	98.5	81.0	72.7
V <sub>5</sub>	328.3	399.6	305.3	375.2	292.5	362	343.8	63.9	78.3	61.4	67.8	85.0	71.3
V <sub>6</sub>		373.0						62.0	69.1	40.7	108.2	90.0	74.0
V <sub>7</sub>		466.2							97.0				
V <sub>8</sub>		283.1							62.3				
V <sub>9</sub>				444.8		345.0					87.2	77.0	
Dough Stage							Dough Stage						
V <sub>1</sub>	364.4	386.3	268.2	388.9	350.6	426	364.1	95.2	98.9	55.0	122.6	131.0	100.5
V <sub>2</sub>	385.8	349.7	342.5	435.2	335.3	396	374.1	88.4	87.4	78.1	140.5	121.0	103.1
V <sub>3</sub>	343.3	379.6	258.3	221.6	383.8	439	337.6	95.8	102.5	48.8	71.5	137.0	91.1
V <sub>4</sub>	349.3	366.3	315.8	444.2	300.3	418	365.7	95.8	102.6	67.9	119.6	125.0	102.2
V <sub>5</sub>	347	366.3	322.4	324.1	356.8	405	353.6	92.1	84.2	69.6	103.7	116.0	93.1
V <sub>6</sub>		409.6						95.2	98.9	55.0	122.6	131.0	100.5
V <sub>7</sub>		472.9							111.6				
V <sub>8</sub>		389.6							89.6				
V <sub>9</sub>				351.8		409.0					110.2	111.0	
Dent Stage							Dent Stage						
V <sub>1</sub>	222.2	359.6	291.6	333.9		409	323.3	80.9	110.0	92.1	115.3	129.0	105.5
V <sub>2</sub>	244.8	363	370.1	324.1		378	336.0	85.2	100.9	127.7	117.4	119.0	110.0
V <sub>3</sub>	257.5	366.3	284.7	319.4		412	328.0	66.0	110.6	80.3	107.7	132.0	99.3
V <sub>4</sub>	253.9	359.6	348.2	449.1		405	363.2	66.8	104.3	113.5	132.0	127.0	108.7
V <sub>5</sub>	270	363	353.8	212.9		397	319.3	74.3	105.3	117.5	71.9	125.0	98.8
V <sub>6</sub>		399.6						80.9	110.0	92.1	115.3	129.0	105.5
V <sub>7</sub>		416.3							119.0				
V <sub>8</sub>		383.0							101.1				
V <sub>9</sub>				370.4		386.0					123.3	118.0	

V<sub>1</sub>: African Tall; V<sub>2</sub>: J-1006 ; V<sub>3</sub>: TSFM 15-5 ; V<sub>4</sub>: J-1007 ; V<sub>5</sub>: KDFM-1 ; V<sub>6</sub>: DKC9141 ; V<sub>7</sub>: DKC9144 ; V<sub>8</sub>: Elite 751 ; V<sub>9</sub>: MFM-18-27

**Table K-21-AST-5(b): Dry matter content and plant height (cm) of high biomass lines**

Varieties	DM (%)							Plant Height (cm)						
	Milk Stage							Milk Stage						
	NDDB	Rai-pur	Kal-yani	Ludh-iana	Hydera bad	Mean		NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza pur	Hyder abad	Mean
V <sub>1</sub>	19.0	21.4	16.6	21.1	24.2	20.5		293	288	147	195	130	263	219
V <sub>2</sub>	18.4	21.0	21.3	18.4	24.6	20.7		263	360	165	177	123	217	217
V <sub>3</sub>	20.7	21.6	16.0	22.9	22.1	20.7		281	260	142	194	133	278	215
V <sub>4</sub>	20.2	20.8	18.7	23.6	22.5	21.2		247	306	149	189	109	242	207
V <sub>5</sub>	18.5	19.6	20.1	18.1	23.5	20.0		252	273	151	176	123	254	205
V <sub>6</sub>		22.4							304					
V <sub>7</sub>		20.8							285					
V <sub>8</sub>		22.0							328					
V <sub>9</sub>				19.6	22.3						182.5		263.0	
	Dough Stage							Dough Stage						
V <sub>1</sub>	26.3	25.6	20.5	26.9	30.8	26.0		362	176	196	148	234	301	244
V <sub>2</sub>	24.9	25.0	22.8	32.3	30.6	27.1		300	198	177	131	214	232	216
V <sub>3</sub>	26.9	27.0	18.9	32.1	31.2	27.2		331	155	194	148	221	306	233
V <sub>4</sub>	27.2	28.0	21.5	31.5	29.8	27.6		269	181	189	144	208	261	215
V <sub>5</sub>	25.4	23.0	21.6	32.0	28.6	26.1		281	186	176	140	204	285	216
V <sub>6</sub>		22.8						328						
V <sub>7</sub>		23.6						259						
V <sub>8</sub>		23.0						269						
V <sub>9</sub>				31.3	27.1					183.1			302.0	
	Dent Stage							Dent Stage						
V <sub>1</sub>	30.0	30.6	31.6	29.4	31.6	30.6		306	191	197	243		280	243
V <sub>2</sub>	29.3	27.8	34.5	36.2	31.4	31.8		372	208	178	250		225	247
V <sub>3</sub>	29.5	30.2	28.2	33.5	32.0	30.7		252	176	193	228		288	227
V <sub>4</sub>	31.8	29.0	32.6	34.6	31.3	31.9		308	195	189	236		253	236
V <sub>5</sub>	31.6	29.0	33.2	33.8	31.4	31.8		248	199	177	219		267	222
V <sub>6</sub>		26.2						313						
V <sub>7</sub>		28.6						316						
V <sub>8</sub>		26.4						314						
V <sub>9</sub>				33.3	30.5					181.9			283.0	

**Table K-21-AST-5(c): Number of Leaves and Leaf Length of high biomass lines at different stages**

Varieties	No. of Leaves								Leaf Length						
	Milk Stage								Milk Stage						
	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza pur	Hyderabad	Mean		NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza pur	Hyderabad	Mean
V <sub>1</sub>	12.5	10.6	11.5	8.0	13.8	14.3	11.8		105.8	66.6	70.0	72.5	61.5	105.9	80.4
V <sub>2</sub>	13.1	10.4	12.8	9.5	13.8	12.3	12.0		102.4	70.0	86.0	95.0	54.5	90.2	83.0
V <sub>3</sub>	13.3	9.8	10.7	6.0	14.5	15.0	11.6		110.2	68.3	69.0	64.5	69.0	115.6	82.8
V <sub>4</sub>	13.0	9.4	11.6	9.0	11.0	13.7	11.3		101.9	70.0	77.0	97.5	52.3	99.5	83.0
V <sub>5</sub>	12.8	11.0	12.2	8.5	13.3	15.0	12.1		98.0	62.0	82.0	83.5	58.5	112.8	82.8
V <sub>6</sub>		8.8								79.9					
V <sub>7</sub>		9.2								65.7					
V <sub>8</sub>		9.6								73.2					
V <sub>9</sub>				6.0		14.7						73.0		106.8	
Dough Stage								Dough Stage							
V <sub>1</sub>	12.8	8.8	12.4	7.8	11.8	11.0	10.8		108.9	77.9	73.6	69.5	96.4	85.3	
V <sub>2</sub>	12.6	9.6	14.2	9.3	10.5	10.3	11.1		106.7	72.8	96.3	58.5	70.9	81.0	
V <sub>3</sub>	12.5	8.6	11.6	5.8	12.5	11.7	10.5		103.8	70.2	75.2	75.5	98.9	84.7	
V <sub>4</sub>	13.4	9.2	12.7	8.7	9.0	11.3	10.7		109.3	72.0	90.2	56.0	80.4	81.6	
V <sub>5</sub>	12.8	10.0	13.2	8.1	11.5	9.7	10.9		104.7	70.0	93.5	66.0	79.6	82.8	
V <sub>6</sub>		10.0								73.2					
V <sub>7</sub>		9.2								67.6					
V <sub>8</sub>		9.2								69.1					
V <sub>9</sub>				5.9		10.0							91.8		
Dent Stage								Dent Stage							
V <sub>1</sub>	11.2	8.6	12.8	7.4		9.3	9.9		103.0	74.2	75.4			92.8	86.4
V <sub>2</sub>	12.0	9.2	14.5	9.0		8.7	10.7		101.2	71.0	98.6			68.6	84.9
V <sub>3</sub>	11.7	8.4	11.8	5.4		9.3	9.3		97.7	71.0	78.3			89.7	84.2
V <sub>4</sub>	11.7	9.0	12.9	7.6		9.3	10.1		96.3	72.2	91.1			73.5	83.3
V <sub>5</sub>	11.3	9.2	13.5	7.8		9.0	10.2		99.0	69.8	94.3			72.4	83.9
V <sub>6</sub>		7.6								69.2					
V <sub>7</sub>		8.2								63.8					
V <sub>8</sub>		9.0								70.9					
V <sub>9</sub>				5.7		9.3								65.2	



**Table K-21-AST-5(d): Leaf breath and Nitrogen content in Plant and Silage of high biomass lines at different stages**

Varieties	Leaf breath (cm)							Nitrogen content (%) In plant		Nitrogen content in Silage
	Milk Stage							Milk Stage		Milk Stage
	NDDB	Rai- pur	Kal- yani	Ludh- iana	Mirza pur	Hydera bad	Mean	Raipur	Hyderabad	Raipur
V <sub>1</sub>	8.5	7.1	6.7	7.0	6.5	7.3	7.2	1.00	1.12	0.99
V <sub>2</sub>	9.4	6.9	8.6	6.5	6.1	7.8	7.6	1.05	1.33	0.99
V <sub>3</sub>	8.7	7.0	6.0	6.5	6.9	8.0	7.2	1.12	1.28	0.97
V <sub>4</sub>	9.1	6.8	6.8	9.0	5.0	9.8	7.8	1.27	1.19	0.96
V <sub>5</sub>	9.4	6.6	8.0	9.3	5.9	9.9	8.2	1.37	1.19	1.16
V <sub>6</sub>		6.8						1.17		1.01
V <sub>7</sub>		7.1						0.92		0.99
V <sub>8</sub>		6.9						0.93		0.97
V <sub>9</sub>				7.5		9.5			1.12	
Varieties	Dough Stage							Dough Stage		Dough Stage
	NDDB	Rai- pur	Kal- yani	Ludh- iana	Mirza pur	Hydera bad	Mean	Raipur	Hyderabad	Raipur
V <sub>1</sub>	8.6	7.8	7.3		6.6	8.6	7.8	0.90	1.07	0.92
V <sub>2</sub>	9.5	6.7	8.4		6.3	6.6	7.5	0.96	1.21	0.90
V <sub>3</sub>	8.8	6.9	7.1		7.0	7.8	7.5	1.04	1.17	0.99
V <sub>4</sub>	9.6	6.9	7.5		5.1	7.6	7.3	1.16	1.14	0.98
V <sub>5</sub>	9.6	6.8	8.2		6.1	8.2	7.8	1.00	1.12	1.16
V <sub>6</sub>		6.5						0.94		0.99
V <sub>7</sub>		7.2						0.93		0.91
V <sub>8</sub>		6.8						0.92		1.07
V <sub>9</sub>					8.0				1.05	
Varieties	Dent Stage							Dent Stage		Dent Stage
	NDDB	Rai- pur	Kal- yani	Ludh- iana	Mirza pur	Hydera bad	Mean	Raipur	Hyderabad	Raipur
V <sub>1</sub>	8.2	8.3	7.5			6.8	7.7	0.79	0.80	0.77
V <sub>2</sub>	8.5	6.8	8.6			6.3	7.6	0.82	1.05	0.84
V <sub>3</sub>	8.5	6.8	7.2			7.0	7.4	0.80	0.98	0.82
V <sub>4</sub>	8.4	6.4	7.7			7.3	7.5	0.79	0.96	0.73
V <sub>5</sub>	8.6	6.6	8.3			7.6	7.8	0.77	0.84	0.69
V <sub>6</sub>		6.5						0.79		0.77
V <sub>7</sub>		7.0						0.85		0.80
V <sub>8</sub>		6.6						0.89		0.75
V <sub>9</sub>						7.2			0.95	

**Table K-21-AST-5(e): Crude protein and total soluble sugar content in Plant of high biomass lines at different stages**

Varieties	CP (%) in Plant							Total Soluble Sugar content (%) in Plant				
	Milk Stage							Milk Stage				
	NDDB	Rai- pur	Kal- yani	Ludh- iana	Mirza pur	Hydera bad	Mean	NDDB	Rai- pur	Ludh- iana	Hyder abad	Mean
V <sub>1</sub>	10.6	6.3	15.8	8.3	7.26	7.0	9.2	6.63	7.40	6.97	7.80	7.20
V <sub>2</sub>	8.8	6.6	17.1	7.6	7.78	8.3	9.4	6.57	6.90	5.43	7.60	6.63
V <sub>3</sub>	8.7	7.0	14.9	8.6	10.14	8.0	9.6	6.77	7.40	6.91	7.70	7.20
V <sub>4</sub>	9.1	7.9	16.4	8.9	6.80	7.4	9.4	6.63	7.40	7.71	7.00	7.19
V <sub>5</sub>	9.4	8.5	16.5	9.1	9.45	7.4	10.1	6.67	6.70	7.77	6.90	7.01
V <sub>6</sub>		7.3							8.1	7.14		
V <sub>7</sub>		5.7							8.7			
V <sub>8</sub>		5.8							8.6			
V <sub>9</sub>				7.6		7.00					6.80	
Dough Stage							Dough Stage					
V <sub>1</sub>	7.8	5.6	11.3	7.2	7.50	6.7	7.7	6.93	8.30	8.40	7.60	7.81
V <sub>2</sub>	8.1	6.0	14.1	7.2	7.87	7.6	8.5	6.50	7.60	7.43	7.20	7.18
V <sub>3</sub>	8.1	6.5	10.3	6.9	7.15	7.3	7.7	6.90	7.60	8.00	7.90	7.60
V <sub>4</sub>	8.4	7.2	11.9	7.0	6.87	7.2	8.1	6.50	7.90	7.26	7.20	7.22
V <sub>5</sub>	8.0	6.3	12.9	7.0	8.35	7.0	8.3	6.63	8.30	7.54	7.50	7.49
V <sub>6</sub>		5.9							8.3	6.97	7.20	
V <sub>7</sub>		5.8							8.6			
V <sub>8</sub>		5.7							8.4			
V <sub>9</sub>				7.1		6.56						
Dent Stage							Dent Stage					
V <sub>1</sub>	7.1	4.9	10.5	5.8	5.0	6.7		7.57	6.60	7.71	6.90	7.20
V <sub>2</sub>	7.3	5.1	11.2	5.4	6.6	7.1		7.40	6.70	8.57	7.00	7.42
V <sub>3</sub>	7.8	5.0	9.3	5.5	6.1	6.7		7.33	6.70	8.00	6.70	7.18
V <sub>4</sub>	7.7	4.9	10.8	5.9	6.0	7.1		7.50	6.60	10.00	6.80	7.73
V <sub>5</sub>	6.6	4.8	11.1	4.9	5.3	6.5		7.37	6.00	8.86	6.20	7.11
V <sub>6</sub>		5.0							7.5	8.00		
V <sub>7</sub>		5.3							8.4			
V <sub>8</sub>		5.6							8.1			
V <sub>9</sub>				5.5	5.95						6.50	

**Table K-21-AST-5(f): Quality parameters in Plant of high biomass lines at different stages**

Varieties	ADF content (%) in Plant					NDF content (%) in Plant					CP yields (q/ha)	Crude Fat content in plant (%)	
	Milk Stage					Milk Stage					Milk Stage	Milk Stage	
	NDDB	Rai-pur	Ludh-iana	Hydera-bad	Mean	NDDB	Rai-pur	Ludh-iana	Hyder-abad	Mean	Kal-yani	NDDB	Mirza-pur
V <sub>1</sub>	37.3	35.5	42.9	42.4	39.5	65.0	51.6	62.8	64.4	61.0	6.50	1.00	1.08
V <sub>2</sub>	39.0	54.5	37.4	48.7	44.9	67.4	67.0	63.5	62.2	65.0	11.70	1.00	1.09
V <sub>3</sub>	39.1	54.3	36.2	46.2	44.0	69.0	67.0	65.8	60.3	65.5	5.80	1.00	1.78
V <sub>4</sub>	39.8	43.4	37.1	43.7	41.0	69.9	64.2	64.3	64.3	65.7	9.10	1.00	0.83
V <sub>5</sub>	39.0	32.2	39.0	41.2	37.9	65.7	62.5	66.3	62.5	64.3	10.20	1.00	0.82
V <sub>6</sub>		35.00					61.00						
V <sub>7</sub>		38.00					62.00						
V <sub>8</sub>		42.00					64.50						
V <sub>9</sub>			38.6	48.2				65.5	67.2				
	Dough Stage					Dough Stage					Dough Stage		
V <sub>1</sub>	41.7	55.1	35.1	48.9	45.2	69.0	67.2	60.7	68.2	66.3	6.20	1.00	1.54
V <sub>2</sub>	38.6	31.5	32.4	50.1	38.2	68.6	68.0	57.9	64.7	64.8	11.10	1.00	1.84
V <sub>3</sub>	41.1	36.1	36.1	48.9	40.6	68.8	60.1	58.8	61.4	62.3	5.10	1.00	1.39
V <sub>4</sub>	37.8	31.0	34.6	45.6	37.3	67.5	57.2	57.9	68.2	62.7	8.10	1.00	1.35
V <sub>5</sub>	38.5	31.3	35.1	45.2	37.5	67.5	59.0	62.1	64.7	63.3	9.00	1.00	1.69
V <sub>6</sub>		42.00					64.20						
V <sub>7</sub>		38.00					61.20						
V <sub>8</sub>		42.00					60.20						
V <sub>9</sub>			34.1	46.7				60.0	68.4				
	Dent Stage					Dent Stage					Dent Stage		
V <sub>1</sub>	34.5	32.0	39.0	46.5	38.0	61.2	50.2	63.0	70.1	61.1	9.67	1.79	
V <sub>2</sub>	33.0	46.1	39.5	51.2	42.5	59.2	68.8	63.7	67.8	64.9	14.30	1.38	
V <sub>3</sub>	33.0	28.0	36.8	50.4	37.1	59.6	48.0	68.3	64.2	60.0	7.47	2.16	
V <sub>4</sub>	31.1	40.6	37.5	46.8	39.0	58.9	60.2	65.2	68.0	63.1	12.26	1.52	
V <sub>5</sub>	34.3	29.3	40.8	44.8	37.3	59.8	50.5	66.3	62.9	59.9	13.04	1.00	
V <sub>6</sub>		32.00					64.20						
V <sub>7</sub>		41.00					61.50						
V <sub>8</sub>		32.00					58.50						
V <sub>9</sub>			39.7	50.2				66.5	69.9				

**Table K-21-AST-5(g): pH and crude protein, crude fibre and Butyric acid content in silage made from fodder harvested at different stages**

Varieties	pH of silage						CP content (%) in Silage					Crude fibre content (%) in plant	Butyric acid (%)
	Milk Stage						Milk Stage					Milk Stage	Milk Stage
	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza pur	Mean	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mean	Kalyani	NDDB
V <sub>1</sub>	3.83	3.83	3.90	3.80	3.91	3.85	10.02	6.20	11.90	7.00	8.78	16.5	0.10
V <sub>2</sub>	3.53	3.81	3.80	3.70	4.12	3.79	9.25	6.20	12.80	7.60	8.96	19.5	0.10
V <sub>3</sub>	3.33	3.76	4.00	3.70	4.07	3.77	8.50	6.00	14.90	7.90	9.33	16.0	0.10
V <sub>4</sub>	3.43	3.77	3.70	3.50	3.92	3.66	9.31	6.00	14.20	8.10	9.40	17.5	0.10
V <sub>5</sub>	3.37	3.83	3.80	3.70	4.06	3.75	9.37	7.20	10.40	8.10	8.77	18.0	0.10
V <sub>6</sub>		3.76						6.3					
V <sub>7</sub>		3.72						6.2					
V <sub>8</sub>		3.57						6.0					
V <sub>9</sub>				3.6						7.1			
	Dough Stage						Dough Stage						
V <sub>1</sub>	3.57	3.85	3.70	3.50	4.21	3.77	8.23	5.80	9.65	6.10	7.45	38.5	0.10
V <sub>2</sub>	3.47	3.48	3.60	3.50	4.13	3.64	9.01	5.60	8.08	6.50	7.30	42.0	0.10
V <sub>3</sub>	3.50	3.50	3.80	3.70	4.18	3.74	8.26	6.20	7.58	5.90	6.99	37.5	0.10
V <sub>4</sub>	3.53	3.86	3.60	3.50	4.09	3.72	8.41	6.10	8.69	6.40	7.40	39.0	0.10
V <sub>5</sub>	3.60	3.51	3.90	3.50	4.04	3.71	9.11	7.20	8.55	6.40	7.82	41.0	0.10
V <sub>6</sub>		3.73						6.2					
V <sub>7</sub>		3.74						5.7					
V <sub>8</sub>		3.69						6.7					
V <sub>9</sub>				3.6						5.5			
	Dent Stage						Dent Stage						
V <sub>1</sub>	3.53	3.54	3.60	3.70		3.59	7.41	4.80	8.16	5.20	6.39	36.5	0.10
V <sub>2</sub>	3.53	3.53	3.40	3.50		3.49	7.48	5.30	5.31	5.40	5.87	41.0	0.10
V <sub>3</sub>	3.53	3.51	3.70	3.90		3.66	7.57	5.10	6.62	5.20	6.12	32.0	0.10
V <sub>4</sub>	3.53	3.60	3.50	3.50		3.53	7.74	4.60	6.23	5.40	5.99	36.5	0.10
V <sub>5</sub>	3.63	3.65	3.80	4.00		3.77	7.57	4.30	7.03	5.40	6.08	38.0	0.10
V <sub>6</sub>		3.78						4.8					
V <sub>7</sub>		3.51						5.0					
V <sub>8</sub>		3.40						4.7					
V <sub>9</sub>				3.6						4.6			

**Table K-21-AST-5(h): Dry matter, total soluble sugar and IVDMD (%) in Silage**

Varieties	Total Soluble Sugar content (%) in Silage			IVDMD (%) in Silage	Dry Matter content (%) in Silage					
	Milk Stage			Milk Stage	Milk Stage					
	Rai-pur	Ludh-iana	Mean	Ludh-iana	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza-pur	Mean
V <sub>1</sub>	6.50	3.60	5.05	52.20	17.74	20.00	16.20	24.10	27.36	21.08
V <sub>2</sub>	6.20	3.50	4.85	52.00	17.51	19.00	20.80	25.00	33.94	23.25
V <sub>3</sub>	6.50	5.00	5.75	50.10	18.19	19.80	16.00	26.30	31.70	22.40
V <sub>4</sub>	6.50	3.50	5.00	53.60	18.85	20.00	18.40	27.60	32.86	23.54
V <sub>5</sub>	6.30	3.60	4.95	51.80	18.53	19.00	18.80	23.30	28.24	21.57
V <sub>6</sub>	6.2					21.6				
V <sub>7</sub>	6.2					19.6				
V <sub>8</sub>	6.5					21.0				
V <sub>9</sub>		3.5						23.2		
Varieties	Dough Stage			Dough Stage	Dough Stage					
	Dough Stage			Dough Stage	Dough Stage					
	Rai-pur	Ludh-iana	Mean	Ludh-iana	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza-pur	Mean
V <sub>1</sub>	7.20	5.40	6.30	52.60	24.67	24.00	19.80	30.50	27.41	25.28
V <sub>2</sub>	7.00	5.60	6.30	49.40	25.08	24.20	22.10	35.00	38.27	28.93
V <sub>3</sub>	7.50	5.90	6.70	50.40	23.35	25.60	18.20	34.60	35.40	27.43
V <sub>4</sub>	6.00	5.00	5.50	50.60	22.90	26.00	21.00	33.00	34.39	27.46
V <sub>5</sub>	7.00	3.80	5.40	48.10	25.09	22.20	20.80	33.70	35.19	27.40
V <sub>6</sub>	7.2					22.0				
V <sub>7</sub>	7.5					22.0				
V <sub>8</sub>	7.5					21.8				
V <sub>9</sub>		5.4						33.4		
Varieties	Dent Stage			Dent Stage	Dent Stage					
	Dent Stage			Dent Stage	Dent Stage					
	Rai-pur	Ludh-iana	Mean	Ludh-iana	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza-pur	Mean
V <sub>1</sub>	6.00	4.20	5.10	49.70	26.04	29.00	22.80	35.30		28.29
V <sub>2</sub>	6.00	5.20	5.60	48.50	30.26	26.00	24.60	42.10		30.74
V <sub>3</sub>	6.50	5.00	5.75	48.90	26.95	28.00	21.40	36.20		28.14
V <sub>4</sub>	6.80	4.40	5.60	51.60	31.87	27.00	22.30	35.30		29.12
V <sub>5</sub>	5.80	5.40	5.60	46.20	32.00	27.00	21.80	37.60		29.60
V <sub>6</sub>	6.5					24.0				
V <sub>7</sub>	7.5					26.6				
V <sub>8</sub>	7.8					25.6				
V <sub>9</sub>		4.5						34.8		

**Table K-21-AST-5(i): Growth and quality parameters in plant and silage**

Varieties	Crude Fat content (%) in silage	Lactic Acid (%)	Acetic Acid (%)	Total Ash (%) in Silage	Weight of green leaves/plant(g)	Weight of green Stem/plant (g)	Weight of green cobs/plant (g)	ADF content in Silage					
	Milk Stage							Milk Stage					
	NDDB	NDDB	NDDB	NDDB	NDDB	NDDB	NDDB	NDDB	Rai-pur	Kal-yani	Ludh-iana	Mirza pur	Mean
V <sub>1</sub>	1.47	3.70	0.23	12.98	0.18	0.61	0.25	41.2	42.8	36.5	42.9	54.5	43.6
V <sub>2</sub>	1.42	3.99	0.11	10.94	0.18	0.46	0.41	38.6	48.5	37.4	37.4	51.5	42.7
V <sub>3</sub>	1.17	5.92	0.10	10.95	0.76	0.48	0.25	38.3	49.8	35.4	36.2	47.9	41.5
V <sub>4</sub>	1.12	5.79	0.10	15.30	0.19	0.40	0.32	38.6	45.5	37.8	37.1	44.9	40.8
V <sub>5</sub>	1.28	3.95	0.11	13.34	0.18	0.45	0.38	38.2	43.7	36.7	39.0	50.2	41.6
V <sub>6</sub>									37.22				
V <sub>7</sub>									42.92				
V <sub>8</sub>									44.95				
V <sub>9</sub>											38.6		
	Dough Stage							Dough Stage					
V <sub>1</sub>	1.62	4.48	0.10	12.57	0.18	0.66	0.08	41.4	43.5	30.5	35.1	53.8	40.9
V <sub>2</sub>	2.07	5.64	0.10	9.89	0.20	0.47	0.45	33.0	52.3	32.2	32.4	52.4	40.5
V <sub>3</sub>	1.13	3.60	0.10	13.05	0.15	0.55	0.22	43.3	49.1	28.4	36.1	57.2	42.8
V <sub>4</sub>	2.18	2.94	0.11	10.97	0.22	0.40	0.48	35.9	35.1	30.1	34.6	49.7	37.1
V <sub>5</sub>	1.80	4.50	0.10	10.36	0.19	0.48	0.49	36.2	40.3	29.7	35.1	53.2	38.9
V <sub>6</sub>									47.70				
V <sub>7</sub>									41.36				
V <sub>8</sub>									45.30				
V <sub>9</sub>											34.1		
	Dent Stage							Dent Stage					
V <sub>1</sub>	1.18	3.96	0.10	9.66	0.13	0.47	0.08	36.0	46.2	26.2	39.0		36.9
V <sub>2</sub>	1.13	4.32	0.10	14.73	0.12	0.37	0.31	36.6	50.5	28.7	39.5		38.8
V <sub>3</sub>	1.12	2.54	0.10	9.30	0.12	0.33	0.16	35.3	35.2	24.2	36.8		32.9
V <sub>4</sub>	1.50	2.33	0.10	11.81	0.12	0.31	0.22	34.0	33.3	27.6	37.5		33.1
V <sub>5</sub>	1.29	3.28	0.10	10.55	0.12	0.40	0.29	32.6	49.7	26.5	40.8		37.4
V <sub>6</sub>									35.71				
V <sub>7</sub>									46.69				
V <sub>8</sub>									38.84				
V <sub>9</sub>											39.7		

**Table K-21-AST-5(j) Ash content in plant of high biomass lines at different stages**

Varieties	Ash content (%) in plant			
	Milk Stage			
	NDDB	Ludh- iana	Mirza- pur	Mean
V <sub>1</sub>	10.79	5.20	6.40	7.46
V <sub>2</sub>	11.01	5.30	7.44	7.92
V <sub>3</sub>	11.77	5.20	8.34	8.44
V <sub>4</sub>	14.12	6.20	5.93	8.75
V <sub>5</sub>	18.82	5.50	8.08	10.80
V <sub>9</sub>		5.7		
	Dough Stage			
V <sub>1</sub>	11.01	4.70	9.83	8.51
V <sub>2</sub>	11.01	5.60	8.83	8.48
V <sub>3</sub>	12.58	4.40	7.78	8.25
V <sub>4</sub>	10.66	5.20	6.97	7.61
V <sub>5</sub>	9.40	4.80	6.19	6.80
V <sub>9</sub>		4.7		
	Dent Stage			
V <sub>1</sub>	9.73	5.30		7.52
V <sub>2</sub>	11.55	6.50		9.03
V <sub>3</sub>	12.40	5.80		9.10
V <sub>4</sub>	9.17	5.90		7.54
V <sub>5</sub>	10.14	5.10		7.62
V <sub>9</sub>		5.1		

## PPT-33: Germplasm evaluation programme against diseases and insect-pests in forages

**Objective:** To identify potential resistance donors for their further use in forage breeding programme.

### Details of crop, disease/insect-pest and place of screening

Crop	Disease	Place
Maize	Maydis leaf blight	Ludhiana
	Turcicum leaf blight	Palampur, Mandya
	Downy mildew, Rust	Mandya
	Fall armyworm	Coimbatore, Rahuri
Cowpea	Root rot/wilt	Palampur, Bhubaneshwar
	Defoliators, Yellow mosaic virus	Coimbatore, Rahuri
Pearl millet	Blast	#Jaipur, Dhule, Ludhiana

#AICRP-Pearl millet centre Jaipur, Dhule

**Design:** Augmented design

#### Crop: Maize

- Number of entries/lines: 108
- Paired rows for each germplasm in 3 m rows.
- 30 cm row to row and 10 cm plant to plant distance.
- Fertilizers: 80:40 kg/ha (N:P) 40:40 kg/ha (N:P) basal+ 40 N after 30 days

#### Crop: Cowpea

- Number of entries/lines: 68
- Paired rows for each germplasm in 3 m rows.
- 30 cm row to row and 10 cm plant to plant distance.
- Fertilizers: 20:40 kg/ha (N:P) basal

#### Crop: Pearl millet

- Number of entries/lines: 29
- Paired rows for each germplasm in 3 m rows.
- 30 cm row to row and 10 cm plant to plant distance.
- Fertilizers: 40:20 kg/ha (N:P) basal



## Results

### Forage Maize

In maize, a total of 108 germplasm lines were tested against different diseases and insect-pest at various locations. At Rahuri and Coimbatore, germplasm lines were screened for fall armyworm resistance. At Ludhiana, germplasm lines were screened for maydis leaf blight resistance. At Mandya, germplasm lines were screened for turcicum leaf blight and sorghum downy mildew resistance.

**At Rahuri**, 58 germplasm lines were found susceptible, 5 lines were resistant and 27 lines were moderately resistant to Fall armyworm in maize (Table PPT 33a). Resistant lines were SRG 10, SRG 12, BAIF-121, BAIF-122 and African Tall.

**At Coimbatore**, 76 lines were categorized as resistant and 21 lines were moderately susceptible against fall armyworm. The entries which recorded lowest score (1) were MAI-316, MFM-20-350-4, BAIF-119, BAIF-122, BAIF-206, BAIF-211, BAIF-240 and IC-334973 (Table PPT 33a).

**At Ludhiana**, 2 lines were found moderately resistant and rest were susceptible to maydis leaf blight moderately resistant lines were SRG 25 and MFM-18-2 (w) (Table PPT 33a).

**At Mandya**, all the lines were found susceptible to downy mildew disease. Against Turcicum leaf blight, 56 genotypes found resistant. Moderately resistant reaction was shown by 41 genotypes. 9 genotypes showed moderately susceptible reaction and 1 genotype (IC-335194) showed susceptible reaction to TLB (Table PPT 33a).

**Against fall armyworm**, SRG 10, BAIF-121, BAIF-122 and African Tall were found resistant at both the tested locations (Rahuri and Coimbatore) and thus can serve as effective source of resistance against fall armyworm.

**Against Maydis leaf blight and Turcicum leaf blight**, SRG 25 and MFM-18-2 (w) were found moderately resistant (against Maydis leaf blight) and resistant (against Turcicum leaf blight) at Ludhiana and Mandya respectively and thus can serve as effective source of resistance against both these diseases.

**Table PPT 33a: Reaction of different germplasm lines against different diseases and insect-pests**

Entries	Reaction to Fall armyworm damage				Reaction to Maydis leaf blight (MLB), Turcicum leaf blight (TLB) and sorghum downy mildew (SDM)					
	Rahuri		Coimbatore		Ludhiana		Mandya			
	Rating score	Reaction	Rating score	Reaction	MLB severity (%)	Reaction	SDM incidence (%)	Reaction	TLB (disease score)	Reaction
SRG 1	7.25	S	3	R	82.1	S	100	S	3.0	R
SRG 2	7.56	S	5	MS	87.0	S	100	S	4.0	MR
SRG 3	5.06	MR	3	R	81.0	S	100	S	2.5	R
SRG 4	7.4	S	5	MS	71.3	MS	100	S	3.0	R
SRG 5	8.43	S	5	MS	76.2	MS	100	S	2.5	R
SRG 6	8.18	S	5	MS	80.0	MS	86.7	S	2.0	R
SRG 7	8.49	S	5	MS	74.5	MS	100	S	4.0	MR
SRG 8	7.57	S	5	MS	73.5	MS	100	S	2.5	R
SRG 9	7.34	S	4	R	61.0	MS	100	S	3.5	MR
SRG 10	3.46	R	5	R	67.3	MS	100	S	3.5	MR
SRG 11	NG		NG		65.5	MS	100	S	3.0	R
SRG 12	4.08	R	5	MS	71.0	MS	100	S	3.0	R
SRG 13	6.52	MR	3	R	60.0	MS	100	S	4.0	MR
SRG 14	6.35	MR	3	R	64.5	MS	100	S	3.5	MR
SRG 15	5	MR	3	R	61.3	MS	76.9	S	2.0	R
SRG16	7.42	MR	4	R	71.0	MS	100	S	5.0	MR
SRG 17	8.43	S	2	R	67.3	MS	100	S	5.0	MR
SRG 18	8.44	S	3	R	68.8	MS	100	S	4.0	MR

Entries	Reaction to Fall armyworm damage				Reaction to Maydis leaf blight (MLB), Turcicum leaf blight (TLB) and sorghum downy mildew (SDM)					
	Rahuri		Coimbatore		Ludhiana		Mandya			
	Rating score	Reaction	Rating score	Reaction	MLB severity (%)	Reaction	SDM incidence (%)	Reaction	TLB (disease score)	Reaction
SRG 19	8.36	S	2	R	81.6	S	100	S	5.0	MR
SRG 20	6.79	MR	3	R	83.3	S	100	S	5.0	MR
SRG 21	7.56	S	4	R	87.7	S	100	S	5.0	MR
SRG 22	7.44	S	5	R	61.3	MS	100	S	2.5	R
SRG 23	7.36	S	2	R	62.4	MS	92.3	S	5.0	MR
SRG 24	7.42	S	3	R	67.8	MS	100	S	4.0	MR
SRG 25	NG		NG		41.0	MR	100	S	2.0	R
MFM-18-2 (w)	8.13	S	3	R	47.2	MR	100	S	2.0	R
MFM-18-3	7.37	S	5	MS	63.0	MS	100	S	3.5	MR
MFM-18-4	7.61	S	3	R	73.0	MS	100	S	5.0	MR
MFM-18-7	7.71	S	4	R	74.3	MS	100	S	3.0	R
MFM-18-27	8.44	S	2	R	77.0	MS	92.3	S	4.0	MR
MAI-12	6.76	MR	4	R	61.8	MS	100	S	2.0	R
MAI-194	NG		3	R	64.2	MS	100	S	3.0	R
MAI-316	6.58	MR	1	R	71.2	MS	100	S	3.0	R
MFM-20-319-2 (o)	8.35	S	5	MS	69.0	MS	100	S	3.5	MR
MFM-20-322-2	8.23	S	5	MS	65.6	MS	100	S	2.0	R
MFM-20-339	7.34	S	3	R	64.1	MS	93.3	S	4.0	MR
MFM-20-347-2	7.78	S	3	R	61.2	MS	100	S	4.0	MR
MFM-20-350-4	8.25	S	1	R	63.4	MS	100	S	3.0	R
MFM-20-356-1	8.22	S	3	R	67.7	MS	100	S	4.0	MR
MAI-7	NG		3	R	72.3	MS	100	S	2.5	R
MAI-8	5.03	MR	5	MS	75.3	MS	100	S	3.0	R
MAI-10	7.8	S	3	R	76.6	MS	100	S	3.0	R
CML-451	7.56	S	3	R	70.0	MS	100	S	NG	NG
MAI-105	7.67	S	4	R	69.7	MS	60	S	3.0	R
MAI-217	7.56	S	4	R	68.0	MS	100	S	2.0	R
MAI-215	7.8	S	4	R	63.5	MS	84.6	S	3.5	MR
MAI-264	8.45	S	3	R	64.0	MS	100	S	3.0	R
J-1006	8.54	S	4	R	70.0	MS	100	S	3.0	R
JC-1465	7.81	S	4	R	72.3	MS	100	S	3.0	R
JC-1463-1	8.44	S	4	R	76.5	MS	100	S	2.0	R
JC-1455-1	8.56	S	5	MS	67.8	MS	100	S	2.0	R
JC-4	8.38	S	5	MS	66.5	MS	100	S	4.0	MR
PFM-10	8.54	S	2	R	63.2	MS	100	S	5.0	MR
PFM-11	8.57	S	3	R	61.5	MS	100	S	3.0	R
PFM-12	8.55	S	5	MS	60.0	MS	100	S	3.5	MR
PML-81	7.56	S	5	MS	63.5	MS	100	S	4.0	MR
PML-243	8.35	S	4	R	64.2	MS	100	S	3.0	R
PML-368	7.69	S	3	R	65.2	MS	100	S	2.0	R
PML-1230	7.57	S	3	R	67.1	MS	100	S	4.0	MR
CML-269	5.95	MR	3	R	66.8	MS	100	S	2.5	R
JH-16224	7.56	S	3	R	70.0	MS	100	S	2.5	R
JH-17026	7.75	S	3	R	69.3	MS	100	S	3.0	R
2201647	7.8	S	3	R	68.1	MS	100	S	2.5	R
2201666 (2201646)	7.56	S	3	R	66.2	MS	93.3	S	3.0	R
2201371	7.69	S	4	R	65.0	MS	100	S	2.5	R
2201372	7.73	S	4	R	65.7	MS	100	S	3.5	MR

Entries	Reaction to Fall armyworm damage				Reaction to Maydis leaf blight (MLB), Turcicum leaf blight (TLB) and sorghum downy mildew (SDM)					
	Rahuri		Coimbatore		Ludhiana		Mandya			
	Rating score	Reaction	Rating score	Reaction	MLB severity (%)	Reaction	SDM incidence (%)	Reaction	TLB (disease score)	Reaction
2201373	7.71	S	3	R	64.3	MS	100	S	2.5	R
JC-12	5	MR	2	R	62.1	MS	100	S	2.5	R
BAIF-107	5.78	MR	2	R	76.0	MS	100	S	2.5	R
BAIF-119	NG		1	R	77.0	MS	100	S	3.0	R
BAIF-121	3.55	R	3	R	75.8	MS	100	S	7.0	MS
BAIF-122	3.91	R	1	R	74.3	MS	92.9	S	4.0	MR
BAIF-128	6.06	MR	2	R	70.7	MS	100	S	4.0	MR
BAIF-137	NG		2	R	62.3	MS	91.7	S	3.0	R
BAIF-206	7.56	S	1	R	61.2	MS	100	S	1.5	R
BAIF-211	6.29	MR	1	R	71.0	MS	100	S	2.5	R
BAIF-238A	NG		2	R	75.5	MS	100	S	5.5	MS
BAIF-240	7.57	S	1	R	64.0	MS	90	S	2.5	R
BAIF-245	7.73	S	2	R	73.0	MS	100	S	6.0	MS
BAIF-255	5.89	MR	4	R	74.5	MS	100	S	3.0	R
BAIF-256	6.81	MR	3	R	65.4	MS	93.3	S	4.5	MR
BAIF-257	6.28	MR	3	R	67.0	MS	90	S	3.5	MR
BAIF-269	6.43	MR	2	R	77.0	MS	100	S	2.5	R
BAIF-270	6.68	MR	2	R	70.5	MS	100	S	1.5	R
BAIF-281	5.75	MR	NG	-	71.6	MS	100	S	2.5	R
BAIF-283	5.89	MR	5	MS	73.7	MS	100	S	3.5	MR
BAIF-296	5.77	MR	5	MS	61.3	MS	100	S	3.5	MR
BAIF-298	6.71	MR	3	R	67.0	MS	100	S	2.0	R
BAIF-299	NG		3	R	68.1	MS	100	S	2.5	R
BAIF-303	7.7	S	5	MS	78.9	MS	100	S	3.5	MR
BAIF-306	NG		5	MS	73.6	MS	100	S	4.0	MR
BAIF-311	5.77	MR	3	R	69.4	MS	93.3	S	2.5	R
BAIF-312	5.64	MR	3	R	61.2	MS	100	S	6.0	MS
IC-335194	6.79	MR	2	R	66.1	MS	100	S	8.0	S
IC-334973	7.7	S	1	R	76.0	MS	100	S	7.0	MS
IC-335185	8.35	S	2	R	73.2	MS	73.3	S	2.5	R
IC-335789	NG				74.5	MS	100	S	6.0	MS
IC-334969	NG				70.0	MS	100	S	3.0	R
IC-334974	NG				64.0	MS	100	S	6.0	MS
IC-334966	7.7	S	2	R	65.2	MS	100	S	5.0	MR
IC-338984	NG				NG	MS	100	S	3.5	MR
IC-334965	6.01	MR	2	R	74.0	MS	100	S	3.5	MR
TSFM-15-5	5.39	MR	2	R	76.0	MS	100	S	2.0	R
Hyderabad local collection (Mandya)	NG				NG		92.9	S	4.0	MR
IC-334981	NG				NG		100	S	7.0	MS
IC-335188	NG				NG		100	S	6.0	MS
IC-338984	NG				NG		100	S	2.5	R
African Tall (NC)	3.97	R	2	R	70.0	S	100	S	3.5	MR

NG: No germination; R: Resistant; MR: Moderately resistant; MS: Moderately susceptible; S: Susceptible

## Forage Pearl millet

At Ludhiana, 29 lines were evaluated under artificial inoculation conditions against leaf blast and all the lines showed susceptible disease reactions to leaf blast (Table PPT 33c).

**Table PPT 33c: Reaction of germplasm lines to blast**

Germplasm lines	Ludhiana	
	Blast severity (disease score)	Reaction
AFB-23	7	S
AFB-24	7	S
AFB-25	7	S
AFB-26	7	S
AFB-27	7	S
AFB-28	7	S
AFB-29	7	S
AFB-30	7	S
AFB-31	7	S
AFB-32	7	S
AFB-33	7	S
AFB-34	7	S
AFB-35	8	HS
AFB-36	7	S
AFB-37	7	S
AFB-45	7	S
AFB-49	7	S
AFB-51	7	S
AFB-53	7	S
AFB-54	7	S
GAFB-4 (Variety)	7	S
GFB-1 (Variety)	7	S
GFB-3 (Variety)	7	S
RBB-1	7	S
Giant Bajra	7	S
TSFB-1610	7	S
TSFB-15-4	7	S
TSFB-15-8	7	S
Moti Bajra	7	S

S: Susceptible; HS: Highly Susceptible

## Forage Cowpea

In cowpea, a total of 68 germplasm lines were tested against different diseases and insect-pest at various locations. At Rahuri, germplasm lines were screened for yellow mosaic virus and defoliators resistance. At Coimbatore, germplasm lines were screened for yellow mosaic virus resistance. At Bhubaneswar, germplasm lines were screened for root rot resistance.

**At Rahuri**, in forage cowpea 56 lines were immune and 12 germplasm lines were found resistant to cowpea defoliators. Against Yellow Mosaic Virus (YMV), 6 germplasm lines were found moderately susceptible, 16 lines resistant, 40 lines highly resistant and 5 lines were moderately resistant.

**At Coimbatore**, among the 68 lines evaluated against Yellow mosaic virus, 20 lines were found to be Immune, 11 lines were resistant, 21 lines were moderately resistant, 14 lines were moderately susceptible and one line was found to be susceptible.

**At Bhubaneswar**, Out of 68 cowpea germplasm lines tested against root rot, 11 lines expressed immunity to root rot, 37 lines were resistant, 9 lines were moderately resistant, 4 lines were moderately susceptible, 1 line was susceptible and 5 lines were highly susceptible to root rot disease of cowpea.

Among the 68 germplasm lines, MFC-20-3, MFC-20-7, UPC-804, CL-334, N-311, IFC-9304, IFC-8401, CS-98, FD-74, FD-928, FD-1151, FD-1161, FD-1273, FD-1277, CO-5, CO-(FC)-8, TNFC-0926, CO-9, IFC-24094 and BL-1 exhibited resistance against yellow mosaic virus, defoliators, root rot disease and thus can be used as an effective source of resistance against multiple diseases and insect-pest in cowpea.

**Table PPT 33a: Reaction of different cowpea germplasm lines to diseases and insect-pests**

Entries	Reaction of germplasm lines to diseases and insect-pests							
	Rahuri				Coimbatore		Bhubaneswar	
	YMV rating score	Reaction	Defoliators rating score	Reaction	YMV rating score	Reaction	Root rot incidence (%)	Reaction
MFC-08-14	1.3	R	1.0	Immune	2	MR	NG	
MFC-16-8	0	HR	2.1	R	2	MR	40	MS
MFC-09-3	1	R	1.0	Immune	3	MS	15	MR
KBC-2	0	HR	1.0	Immune	2	MR	4	R
KM-5	0	HR	1.0	Immune	3	MS	45	S
MFC-18-2	0	HR	1.0	Immune	3	MS	10	R
MFC-18-4	1.41	R	1.0	Immune	2	MR	3	R
MFC-18-5	2.21	MR	1.0	Immune	2	MR	2	R
MFC-18-8	0	HR	2.2	R	2	MR	13	MR
MFC-18-10	1.61	R	2.0	R	2	MR	16	MR
MFC-20-3	1.32	R	2.0	R	1	R	3	R
MFC-20-5	1.63	R	2.2	R	3	MS	3	R
MFC-20-7	1.23	R	2.0	R	1	R	8	R
MFC-20-8	1.44	R	2.2	R	3	MS	3	R
MFC-20-11	1.13	R	2.0	R	2	MR	7	R
MFC-20-20	1.53	R	2.3	R	2	MR	2	R
MFC-20-22	1.3	R	2.2	R	5	HS	6	R
MFC-20-25	0	HR	2.0	R	1	R	22	MS
MFC-20-26	0	HR	1.0	Immune	5	HS	13	MR
MFC-20-27	1.44	R	2.2	R	4	S	2	R
MFC-20-28	0	HR	1.0	Immune	3	MS	78	HS
MFC-20-29	0	HR	1.0	Immune	2	MR	12	MR

Entries	Reaction of germplasm lines to diseases and insect-pests							
	Rahuri				Coimbatore		Bhubaneswar	
	YMV rating score	Reaction	Defoliators rating score	Reaction	YMV rating score	Reaction	Root rot incidence (%)	Reaction
MFC-20-30	0	HR	1.0	Immune	2	MR	6	R
UPC-287	0	HR	1.0	Immune	3	MS	11	MR
UPC-607	0	HR	1.0	Immune	2	MR	15	MR
UPC-618	0	HR	1.0	Immune	3	MS	2	R
UPC-621	3.12	MS	1.0	Immune	2	MR	8	R
UPC-622	2.05	MR	1.0	Immune	2	MR	0	I
UPC-625	0	HR	1.0	Immune	3	MS	2	R
UPC-628	2.81	MR	1.0	Immune	2	MR	0	I
UPC-4200	3.01	MS	1.0	Immune	2	MR	4	R
UPC-5286	2.07	MR	1.0	Immune	2	MR	3	R
UPC-5287	1.66	R	1.0	Immune	3	MS	0	I
UPC-8705	3.06	MS	1.0	Immune	2	MR	2	R
UPC-9202	2.84	MR	1.0	Immune	2	MR	2	R
UPC-801	0	HR	1.0	Immune	3	MS	2	R
UPC-802	3.72	MS	1.0	Immune	2	MR	0	I
UPC-803	3.56	MS	1.0	Immune	2	MR	4	R
UPC-804	0	HR	1.0	Immune	0	HR	8	R
UPC-805	3.1	MS	1.0	Immune	0	HR	6	R
UPC-951	0	HR	1.0	Immune	0	HR	6	R
CL-334	1.7	R	1.0	Immune	0	HR	0	I
N-311	0	HR	1.0	Immune	1	R	0	I
IFC-9304	0	HR	1.0	Immune	1	R	0	I
IFC-8401	0	HR	1.0	Immune	0	HR	3	R
CS-98	0	HR	1.0	Immune	0	HR	4	R
FD-74	0	HR	1.0	Immune	0	HR	2	R
FD-739	0	HR	1.0	Immune	0	HR	70	HS
FD-801	0	HR	1.0	Immune	0	HR	16	MR
FD-826	0	HR	1.0	Immune	0	HR	75	HS
FD-927	0	HR	1.0	Immune	0	HR	12	MR
FD-928	0	HR	1.0	Immune	0	HR	8	R
FD-1052	0	HR	1.0	Immune	0	HR	35	MS
FD-1151	0	HR	1.0	Immune	0	HR	6	R
FD-1161	0	HR	1.0	Immune	1	R	8	R
FD-1237	0	HR	1.0	Immune	1	R	72	HS
FD-1259	0	HR	1.0	Immune	0	HR	30	MS
FD-1269	0	HR	1.0	Immune	0	HR	75	HS
FD-1273	0	HR	1.0	Immune	0	HR	10	R
FD-1277	1.61	R	1.0	Immune	1	R	6	R
CO-5	0	HR	1.0	Immune	1	R	8	R
CO-(FC)-8	0	HR	1.0	Immune	1	R	0	I
TNFC-0926	0	HR	1.0	Immune	0	HR	0	I
CO-9	0	HR	1.0	Immune	0	HR	0	I
IFC-24094	0	HR	1.0	Immune	0	HR	6	R
BL-1	0	HR	1.0	Immune	1	R	4	R
Vijayar	0	HR	1.0	Immune	3	MS	2	R
TSFC-20-06	1.9	R	1.0	Immune	3	MS	0	I

NG: No germination; I: Immune; HR: Highly Resistant; R: Resistant; MR: Moderately resistant; MS: Moderately susceptible; S: Susceptible; HS: Highly susceptible

## FORAGE TECHNOLOGY DEMONSTRATIONS

To popularize the forage production technologies and make the farmers aware about various new fodder crop varieties, total of 627 FTD's were conducted by AICRP coordinating and co-operating centres during *Kharif* 2021 for the crops viz., BN hybrid, sorghum (including multi cut and perennial), rice bean, fodder maize, pearl millet, setaria and guinea grass. Out of 627 FTD's, 215 were conducted on BN Hybrid, 30 on Rice bean, 125 on Maize, 25 on forage sorghum, 90 on Pearl millet, 30 on Cowpea and 25 on Setaria grass and 25 on hedge Lucerne besides few on other fodder crops and intercropping systems. FTDs were conducted in the new villages to extend the adoption of technologies in large areas. No extra financial support was provided due to paucity of funds. The centres conducted FTDs out of their own resources and in convergence with other programmes.

### FTDs allotted to different centres for conducting during Kharif 2021

Centre	BN hybrid	Rice bean	Maize	Pearl millet	Cowpea	Sorghum	Guinea grass	Setaria	Other	Total
Jorhat	10							5	Congo 5	20
Bhubaneswar	10			5	5					20
Kalyani	10	10	10							30
Ranchi	20	10	10				20			60
Ayodhya	10			10						20
Jabalpur	5	10	15	5						35
Anand	10			10						20
Urulikanchan	20			10	5					35
Bikaner				10			Lasiurus 2 Cluster bean 10			22
Ludhiana	30									30
Hyderabad	25		20	15	5	Per. Sorgh10 Hedge Lucerne 20				95
Mandya	5				5		5	Maize +cowpea 5		20
Palampur	20							20		40
Srinagar			40							40
Imphal	10		10			10				30
Raipur			10			10				20
Vellayani	20				5					25
Pantnagar			10	10						20
Coimbatore	10					5	Hedge Lucerne 5			20
Hisar				15	5			Teosinte 5		25
<b>Total</b>	<b>215</b>	<b>30</b>	<b>125</b>	<b>90</b>	<b>30</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>62</b>	<b>627</b>





# Forage In-House Breeding Activities Kharif-2021

AICRP (FC&U), TNAU, Coimbatore

## Forage Plant Genetic Resources

**Germplasm explorations made:** New germplasm explorations were made at The Nilgris and Erode districts of Tamil Nadu as per details below.

SN	Crop	Number of accessions	Location of Exploration
1.	Napier grass	2	Nilgris district, Tamil Nadu
2.	Desmanthus	12	Erode district, Tamil Nadu
<b>Total</b>		<b>14</b>	

**Germplasm Maintenance:** The details of the germplasm accessions maintained in different forage crops at Coimbatore centre are furnished below.

SN	Crop	Number of accessions
1.	Bajra	206
2.	Napier grass	56
3.	Guinea Grass	96
4.	Cenchrus sp	156
5.	Cowpea	150
<b>Total</b>		<b>664</b>

## Forage Genetic Improvement programme

### I.BxN hybrid

**Development of high water use efficient BN hybrids**

**Hybridization between identified fodder Bajra and Napier grass:** Hybridization was made between seven Napier accessions as male parents and 25 elite pearl millet accessions from ICRISAT as female parents with identified special traits as detailed below.

Bajra accessions with special traits selected as parents						Napier accessions with special traits selected as parents		
SN	Accessions	Special Traits	SN	Accessions	Special Traits	SN	Accessions	Special Traits
1.	GP 15069	High GFY	16.	IP 11354	High L/S ratio	1.	FD 482	High WUE
2.	GP 15072		17.	IP 20273		2.	FD 474	
3.	GP 15073		18.	IP 20338		3.	FD 434	
4.	GP 15074		19.	PT 5091		4.	FD 443	
5.	GP 16271		20.	PT 5365		5.	FD 465	High GFY and profuse tillering
6.	GP 18219		21.	PT 5581		6.	FD 464	
7.	GP 15076	High tillering	22.	PT 5588		7.	FD 432	
8.	GP 15953		23.	PT 5652				
9.	GP 15958		24.	PT 5682				
10.	GP 15988		25.	PT 5701/1				
11.	GP 16016							
12.	TNFB 9901							
13.	TNFB 9902							
14.	GP 16023							
15.	GP 16026							

Of hybridization attempted in these genotypes, seed set was successful in 15 cross combinations. Although attempt was made to cross all the four identified WUE Napier genotypes (FD 482, FD 474, FD 434, FD 443) with pearl millet accessions, hybridization was successful with only one WUE Napier genotype *viz.*, FD 482 because of lack of flowering synchronization of the other Napier genotypes with the pearl millet accessions.

#### Details of successful cross combinations

SN	Crosses	SN	Crosses	SN	Crosses
1.	GP 15074 x FD 482	6.	GP 15073 x FD 482	11.	PT 5091 x FD 482
2.	GP 15074 x FD 465	7.	GP 15073 x FD 464	12.	PT 5091 x FD 432
3.	GP 16016 x FD 482	8.	GP 15958 x FD 482	13.	TNFB 9902 x FD 482
4.	GP 16016 x FD 464	9.	GP 15958 x FD 464	14.	GP15074x432
5.	GP 16016 x FD 465	10.	GP 16023 x FD 482	15.	GP16016x432

**Evaluation of BN hybrids for high WUE under Rain out Shelter:** The above 15 F<sub>1</sub> bajra Napier hybrids along with five checks (CO 3, CO (CN) 4, CO (BN) 5, CO 6 and TNCN 34) were planted in the rain out shelter on 15.09.2021 to study the water use efficiency of bajra Napier hybrids. Two water levels were imposed which were calculated based on the pan evaporation rate which include Irrigation water/ Cumulative Pan Evaporation at 0.8 and 0.6. The respective control which is IW/CPE at 1 is maintained outside the rainout shelter. Irrigation for the control was done once the cumulative pan evaporation (CPE) rate reaches 50 mm. Similarly for the water level at 0.8 irrigation was done when CPE reaches 62.5 mm while for 0.6 water level it is done at 83.3 mm of CPE. First harvest of green fodder yield is under progress.

#### Development of bajra napier hybrid grass for high green fodder yield

**Clonal Nursery Evaluation:** A total of 31 F<sub>1</sub> hybrids along with the check hybrids CO (BN) 5 and CO 6 were planted in RBD with two replications in clonal nursery during October 2020. Among the cultures, the culture TNCN 2020-23 recorded the highest green fodder yield of 397.34 t/ha followed by TNCN 2020-05 recorded 361.64t/ha/yr over seven consecutive cuts.

In another set of clonal nursery evaluation, a total of 29 F<sub>1</sub> Bajra Napier hybrids synthesized during Rabi 2021 were planted along with the check CO (BN) 5 and CO 6 in RBD with two replications on 04.10.2021. The crop has well established.

#### State Multi Location Trial in Bajra Napier hybrid grass

**Performance of the bajra –Napier hybrid clones under MLT (2019-21):** Multi Location Trials (MLTs) have been conducted at five locations of Tamil Nadu during 2019-20 to evaluate the performance of promising clones and checks *viz.*, TNCN 1901, TNCN 1902 and CO (BN) 5. In addition, during 2020-21, MLTs have been organized at eleven locations throughout the state to evaluate the performance Out of the three entries, TNCN 1902 had recorded highest green fodder yield of 38.56 t/ha/cut followed by TNCN 1901 recorded 35.31 t/ha/cut which is 12.43 and 8.94 percent yield increase over the check CO (BN) 5 respectively.

#### Performance of the bajra –Napier hybrid clones under MLT

Entry	Mean Green fodder yield (t/ha/cut)			Percentage over CO(BN) 5
	2019-20	2020-21	Mean	
TNCN 1901	35.16	35.45	35.31	8.94
TNCN 1902	34.31	38.56	36.44	12.43
CO (BN) 5 (c)	31.15	33.66	32.41	-

As per the norms of the perennial trials, the bajra-napier MLTs will be organized for three consecutive years to ascertain the consistency in performance of entries. Therefore, the MLT of these entries are being continuously evaluated during 2021-22 in same/additional locations. The pooled data of three years will be considered for the promotion of entries to the on-farm trials during 2022-23.

## II. Lucerne

**Poly cross breeding programme:** A total of eight parents namely Anand-2, Krishna, RL-88, CO 1, BAL 08-1, Anand-3, CO 4 and Kutchi were sown on 05.03.2021 in heptagon design. Upon completion of crossing, the poly-crossed seeds were collected and processing of seed is under progress.

Under state programme, a total of 93 poly-crossed hybrid progenies along with the check Lucerne varieties viz., CO 3 and CO 4 were sown on 06.01.2021 in the field no. E1 of new area farm and the crop has germinated well.

## III. Fodder Cowpea

**Seed multiplication of superior performing cowpea cultures:** During *Kharif* 2021, two promising fodder cowpea cultures viz., TNFC 1910 and TNFC1905 which were nominated for evaluation under AICRP FC&U – IVT were raised for seed multiplication. The seeds were harvested and processing is under progress.

During *Kharif* 2021, a total of 100 single plants from 20 crosses in F<sub>3</sub> progenies in fodder cowpea and the single plant progenies were selected and harvested.

## IV. Fodder Maize

**Development of high biomass yielding maize hybrids with fodder quality:** Crossing block was raised during Rabi 2020-21 by using 11 lines and 8 testers in maize. The details of inbred lines used as parents for synthesis of single cross maize hybrids are furnished below.

**Special traits of the inbreds utilized in the hybridization**

SN	Inbred	Special Trait	SN	Inbred	Special Trait
1.	UMI 1200	High biomass	11.	N112	Late flowering
2.	UMI 1221		12.	N 10-86	
3.	UMI 1230		13.	N 09-160-2	
4.	UMI 1205		14.	N 66	
5.	UMI 1201		15.	N 123	
6.	UMI 1210		16.	N61	
7.	UMI 1220		17.	52021	Medium duration
8.	UMI 1221		18.	52485	
9.	African tall	Tallness	19.	UMI 112	
10.	TNFM 139-1	Earliness			

A total of 62 F<sub>1</sub> maize single cross hybrids along with the local check CO H (M) 8 were sown during Kharif 2021 in RBD with two replications. The crop was harvested at flowering stage and evaluated for green fodder yield. Among the hybrids evaluated, the F<sub>1</sub> hybrid TNFMH 25 recorded the green fodder yield of 77.10 t/ha is 42% yield increase over the check COH (M) 8. Performance of this cross will be evaluated over season along with the national check COH (M) 8 to exploit it further.

#### Details of cross combinations

SN	Cross combinations	SN	Cross combinations	SN	Cross combinations
1.	UMI 1200 × UMI 1221	22.	UMI 1205 × N 66	43.	UMI 1230 × UMI 1200
2.	UMI 1200 × UMI 1230	23.	UMI 1205 × N 10-86	44.	UMI 1230 × TNFM 139-1
3.	UMI 1200 × N 09-160-2	24.	UMI 1205 × African Tall	45.	UMI 1230 × N -09-160-2
4.	UMI 1200 × N 66	25.	UMI 1210 × UMI 1200	46.	N 123 × UMI 1200
5.	UMI 1200 × African tall	26.	UMI 1210 × UMI 1230	47.	N 123 × UMI 112
6.	UMI 1200 × TNFM 139-1	27.	UMI 1210 × UMI 112	48.	N 123 × UMI 1230
7.	UMI 1200 × N-10-86	28.	UMI 1210 × N 09-160-2	49.	52021 × N -09-160-2
8.	UMI 1200 × N112	29.	UMI 1210 × N 66	50.	52021 × N 66
9.	UMI 1201 × 1200	30.	UMI 1210 × N 10-86	51.	52021 × TNFM 139-1
10.	UMI 1201 × UMI 1200	31.	UMI 1210 × African Tall	52.	52021 × UMI 112
11.	UMI 1201 × UMI 1230	32.	UMI 1210 × TNFM 139-1	53.	52021 × UMI 1200
12.	UMI 1201 × UMI 112	33.	UMI 1220 × UMI 1200	54.	52485 × UMI 1200
13.	UMI 1201 × N 09-160-2	34.	UMI 1220 × UMI 1230	55.	52485 × UMI 1230
14.	UMI 1201 × N 66	35.	UMI 1220 × UMI 112	56.	52485 × UMI 112
15.	UMI 1201 × N 10-86	36.	UMI 1220 × N 66	57.	52485 × N -09-160-2
16.	UMI 1201 × African Tall	37.	UMI 1220 × African Tall	58.	52485 × N66
17.	UMI 1201 × TNFM 139-1	38.	UMI 1220 × TNFM 139-1	59.	52485 × TNFM 139-1
18.	UMI 1205 × UMI 1200	39.	UMI 1221 × UMI 112	60.	N 61 × UMI 1230
19.	UMI 1205 × UMI 1230	40.	UMI 1221 × N 66	61.	N 61 × African Tall
20.	UMI 1205 × UMI 112	41.	UMI 1221 × N 10-86	62.	N 61 × UMI 112
21.	UMI 1205 × N 09-160-2	42.	UMI 1221 × African Tall		

### AICRP (FC&U), BCKV, Kalyani

#### Gamma ray induced mutagenesis in Bidhan Rice Bean 1

To find out any morphological mutants in regards to forage quality (high protein or fibre), photo insensitivity, early flowering, bushy types (without the trailing habit) *etc* or any other agro-economic traits. Variants serving dual purpose character (seed + green forage) could be a good finding which may be of two types- (i) Green forage yielder after proper harvesting of seeds: in that case early flowering mutants will be selected; (ii) Green forage yielder before the harvesting of the seeds, here late flowering may be selected. M1, M2 & M3 generation is over. The selected plants from the M3 generation is be evaluated in the M4 generations for confirmed selection of desired mutants.

**M4 generation:** M4 Mutant- L1P6, L13P5, L1P1, L3P4, L6P1, L4P5, L7P1, L3P2, L4P3 and Control. eg. L4P5- dual purpose (higher GFY + seed yield), L7P1, L6P1, L4P3 and L13P5 are promising lines for higher GFY and CPY.

#### Germplasm maintained

- Rice bean: 250
- Coix: 3
- Forty (40) germplasm lines of ricebean were evaluated against two checks *viz.*, Bidhan ricebean 2 and Bidhan ricebean 3 as Large Scale Trial (LST) on production of fodder rice bean.

## AICRP (FC&U), GBPUAT, PANTNAGAR

**Cowpea germplasm evaluation:** 105 germplasm lines comprising indigenous & exotic lines & improved genetic stocks have been planted in 2.0 m long rows spaced 1.0 m apart for the evaluation and maintenance. In late podding stage, due to heavy rain some of the lines didn't harvest.

**Multiplication/Maintenance of improved Genetics stock/Released Varieties:** Twenty-six improved lines including released varieties were planted in 15-20 rows of 30-meter-long plots each for seed increase to be utilized in the station evaluation and national coordinated trial, demonstration, FTDs at Various locations. Multiplication/increase of 32 plots of 32 improved lines/released varieties were undertaken during the Kharif 2021 season.

SN	Improved lines/varieties	SN	Improved lines/varieties	SN	Improved lines/varieties
1	UPC-2025	12	UPC-631	23	UPC-2004
2	UPC-2024	13	UPC-4200	24	UPC-2001
3	UPC-2023	14	UPC-8705	25	UPC-287
4	UPC-2010	15	UPC-9202	26	UPC-626
5	UPC-2007	16	UPC-622	27	UPC-621
6	UPC-2006	17	UPC-2028	28	UPC-607
7	UPC-2003	18	UPC-2027	29	UPC-625
8	UPC-2002	19	UPC-2026	30	UPC-804
9	Vegetable Selection	20	UPC-2009	31	UPC-628
10	UPC-5287	21	UPC-2008	32	UPC-5286
11	UPC-618	22	UPC-2005		

**Evaluation of progenies:** Total of ninety-six breeding lines including 08 F<sub>1</sub>, 28 F<sub>6</sub>, 39 F<sub>7</sub>, and 21 F<sub>11</sub> progenies were planted in 5 m long double row spaced 75cm apart for the evaluation with respect to different characters as per the breeding objectives. Due to heavy rain in the late podding stage some of the lines didn't harvest.

S. No.	Progenies	Number of lines	S. No.	Progenies	Number of lines
1	F <sub>1</sub>	8	3	F <sub>7</sub>	39
2	F <sub>6</sub>	28	4	F <sub>11</sub>	21

**Fresh cross attempted:** On the basis of visual observation regarding foliage biomass and disease resistance, following crosses have been made in forage cowpea during Kharif 2021

S. No.	Crosses made	S. No.	Crosses made
1	UPC-5286 x UPC-622	3	UPC-8705 x UPC-9202
2	UPC-622 x UPC-9202	4	UPC-622 x UPC- 5286

**Breeder seed production:** In Kharif 2021 the following amount of different varieties of cowpea have been produced against the indicated DAC indent:

SN	Variety	DAC indent (KG) (BSP I)	Actual production(KG) (BSP IV)
1	UPC-625	-	10
2	UPC- 4200	-	30
3	UPC-8705	50	70
4	UPC-628	50	70

**Variety notified = 01:** Forage Oat - UPO-10-2 (Pant Forage Oat 4)

## AICRP (FC&U), PAU, Ludhiana

### New crosses attempted

- **Pearl millet:** A total of 20 new forage hybrids and 3 composites were developed which will be evaluated in summer 2022.
- **Cowpea:** A total of 26 new crosses were synthesized by crossing lines selected on the basis of erectness, virus resistance, late flowering and high GFY.
- **Maize:** Four inbreds viz. VL 176258, VL 162590, PML 187 and PML 120 were selected for high biomass and good fodder quality and F<sub>1</sub>'s among them were generated.
- **Bajra x Napier hybrids:** A new set of crosses is being attempted (about 20) using superior bajra forage lines as female and superior napier grass as male parents.

### Breeding material maintained/handled/generated

#### Pearl millet

- Maintenance and development of male sterile lines: 50
- Inbred lines (B&R) maintained: 250
- Fifty male sterile lines from all the seven different sources of male sterility

#### Male sterile lines being maintained / developed in different sources

Source	No. of MS lines	Source	No. of MS lines
A1	20	A2	3
A3	3	A4	15
A5	4	Gero	2
Vio	2	AG	1

#### Cowpea

- Breeding material consisting of F<sub>1</sub> Crosses (17), F<sub>2</sub> (12), F<sub>3</sub> (9) F<sub>4</sub> (6), F<sub>5</sub> (5) and F<sub>6</sub> (3) was maintained.

### Station trials conducted during Kharif 2021

Trial	Entries	Promising entries
Station trial of Bajra x Napier hybrid	16 + 4 (C)	PBN 408, PBN 407, PBN 414, PBN 402
Station trial-Bajra	4+2 (C)	FBL 7, FBL 6, PCB 166, FBL 12
Cowpea Multilocation Trial- Ludhiana, Ballawal	10+2 (C)	PFC 42, PFC 44
Maize Multi location Trial- Ludhiana, Gurdaspur	10+2 (C)	PFM 12, PFM 18

### Germplasm maintained

Crop	Number of accessions/Populations
Pearl millet- Inbreds	250
Pearl millet- CMS lines	50
Napier grass	30
Cowpea	221
Maize	38
Cluster bean	84
<b>Total</b>	<b>673</b>

**Entries in AICRP (FC) trials and their status**

<b>Trial</b>	<b>entry</b>	<b>Remarks</b>
VTNB-Perennial (2019)	PBN 402, PBN 407, PBN 408	Trial will continue up to <i>Kharif</i> 2022
IVTPM	FBL 6	Trial concluded
AVTPM-1	FBL 4, PHBF 5	Trial concluded
AVTM-1	PFM 13	Trial concluded
AVTM-2	PFM 12	Trial concluded

**Varieties released at Central or State level (in last 6 years): 25**

<b>Crop</b>	<b>Variety</b>	<b>Year of release</b>	<b>State/Central release</b>
<b>Oats</b>	OL 10	2014	State
	OL 1802	2016	CZ
	OL 1804	2016	NEZ
	OL 11	2017	State
	OL 1802-1	2017	NWZ
	OL 1760	2017	SZ
	OL 1769-1	2017	CZ
	OL 12	2018	State
	OL 1861	2019	All India (except HZ)
	OL 1869-1	2019	CZ
	OL 13	2020	State
	OL 14	2020	State
	OL 15	2021	State
	OL 1896	2021	NWZ
	OL 1876-2	2021	NEZ
	OL 1874-1	2021	SZ
<b>Berseem</b>	BL 43	2017	State
	BL 44	2021	State & NWZ
<b>Ryegrass</b>	PBRG 2	2020	NWZ & HZ
<b>Sorghum</b>	PSC 4	2015	State
<b>Pearl millet</b>	PCB 165	2020	State
<b>Maize</b>	J 1007	2020	State
<b>Bajra Napier Hybrid</b>	PBN 346	2016	State
	PBN 342	2017	NWZ, NEZ and SZ
	PBN 351	2019	CZ

**AICRP (FC&U), RPCAU, Pusa****Forage Cowpea improvement programme**

- Extensive crosses were made in forage cowpea.
- F<sub>3</sub>'s of following crosses have been generated
  - C543 × Bundel lobia-1
  - PFC 12 × TSFC-16-1
  - UPC 1701 × HFC-16-1
  - UPC 628 × C 217
- Nearly 250 genotypes of different fodder crops collected and are being maintained.
- Breeder seed production of Forage oat, Hybrid Napier and Guinea grass has been initiated.
- One station trial and one maintenance trial were conducted on forage cowpea in the last *Kharif* season.

## AICRP (FC&U), SKUAST-K, Srinagar

### Germplasm procurement

Crop	No. of Collections	Source
Maize	30	IIMR, Ludhiana, IGKV, Raipur
Cowpea	10	USDA
Sorghum	5	DSR, Hyderabad

### Forage Maize

- The population crosses made during *Kharif*-2020 were advanced by random mating and also evaluated for various forage and quality traits during *kharif*-2021.
- Third cycle of random mating was completed during *kharif* season-2021. In addition to this various forage pools of maize were maintained by bulk/chain sibbing in white background.
- Six entries have been contributed to initial varietal trial (IVT) on forage maize and one entry KDFM-6 has been promoted to AVT-1 during 2021.
- Local land race collection showing promising in forage related traits have been collected and are maintained.
- 60 lines were advanced as a collaborative venture with AICRP-Maize Centre at Hyderabad

## AICRP (FC&U), ANDUAT, AYODHYA

### Germplasm collection, evaluation & maintenance

Crop	Existing accessions	New Collections	Total acc.	Source
Forage Bajra	36	03	39	Barabanki, Lucknow and Ghajipur
Forage cowpea	06	03	09	Barabanki
BN Hybrids	02	10	12	IGFRI, Jhansi
Range grasses/ legumes	02	22	24	IGFRI, Jhansi

### Breeding Programme in Forage Bajra: Ten new crosses were made during Kharif 2020

S.N.	Cross combinations	S.N.	Cross combinations
1	NDFB 911 x AFB-4	6	NDFB 1803 x BAIF Bajra
2	NDFB 911 x AFB-3	7	NDFB 1506x AFB-4
3	NDFB 912 x BAIF Bajra	8	NDFB 939 x AFB-3
4	NDFB 939 x Giant Bajra	9	NDFB 939 x Giant Bajra
5	NDFB 938 x AFB-4	10	NDFB 1803x AFB-3

### Segregating generations:

- F<sub>1</sub> = 10
- F<sub>2</sub> = 07
- F<sub>3</sub> = 05
- Advance lines = 08
- One station trial viz., VT Station on Forage Bajra was conducted. Fourteen genotypes were tested against two checks viz., NDFB-2 and NDFB-3



## AICRP (FC&U), BAIF, Urulikanchan

**Mandated crops:** Maize, Pearl millet, Lucerne, B x N hybrid, *Cenchrus* and *Stylosanthes*

**Breeding:** During this season advancement of breeding material of B x N hybrid and fodder maize was undertaken.

### 1. B x N hybrid

**Evaluation of B x N hybrids:** Seeds of 15 crosses of Bajra and Napier grass were sown during *summer*-2021. Based on the phenotypic characters, 28 promising individual clumps were identified. A station trial was established in randomized block design to evaluate progenies of 28 clumps for green biomass yield and quality parameters along with checks BNH-10 and CO 5. The data was collected for first cutting.

### 2. Maize

**a. Crossing programme:** Four new poly cross were attempted using three parental lines in each cross as under:

1. BAIF 242 x BAIF 102 x PratapMakka
2. BAIF 242 x African Tall x PratapMakka
3. BAIF 245 x African Tall x PratapMakka
4. PratapMakka x BAIF 102 x African Tall

**b. Evaluation of crosses:** F<sub>1</sub> progeny of following sixteen crosses of maize along with check African Tall was grown for evaluation. Bulk seed of ten crosses was obtained for further advancement programme.

SN	White grain colour			SN	Red Grain colour		
1	BAIF- 235	x	BAIF-102	11	BAIF - 141	x	BAIF - 314
2	BAIF- 242	x	BAIF-102	12	BAIF - 265	x	BAIF - 314
3	BAIF- 245	x	BAIF-102	13	BAIF - 249	x	BAIF - 314
4	BAIF- 297	x	BAIF-102	14	BAIF - 112	x	BAIF - 314
5	PratapMakka -6	x	BAIF-102	15	BAIF - 226	x	BAIF - 314
6	BAIF- 235	x	PratapMakka -6	16	BAIF - 320	x	BAIF - 314
7	BAIF- 242	x	PratapMakka -6				
8	BAIF- 245	x	PratapMakka -6				
9	BAIF- 297	x	PratapMakka -6				
10	BAIF- 102	x	PratapMakka -6				

**Advancement of progeny:** F<sub>3</sub> progenies of 72 IPS selected from following twelve crosses of maize were grown for evaluation of different fodder traits. Eighty four IPS were made from above progeny for further advancement.

SN	Cross			No. of IPS	SN	Cross			No. of IPS
1	PratapMakka	x	African Tall	13	9	BAIF-150	x	BAIF-295	04
2	BAIF-235	x	African Tall	11	10	BAIF-218	x	BAIF-295	07
3	BAIF-304	x	African Tall	04	11	BAIF-224	x	BAIF-295	05
4	BAIF-242	x	African Tall	07	12	BAIF-309	x	BAIF-295	04
5	BAIF-313	x	African Tall	04	13	BAIF-150	x	BAIF-295	03
6	BAIF-245	x	African Tall	06	14	BAIF-218	x	BAIF-295	07
7	BAIF-102	x	African Tall	03	15	BAIF-224	x	BAIF-295	05
8	BAIF-303	x	African Tall	04	16	BAIF-309	x	BAIF-295	04

## AICRP (FC&U), CSKHPKV, Palampur

### Germplasm addition

Crop	No. of collections	Source
Black spear grass ( <i>Heteropogon contortus</i> )	6	Distt. Kangra (HP)
Scented grass ( <i>Chrysopogon gryllus</i> )	4	Distt. Kangra (HP)

### Germplasm holding

Crop	No. of collections
Setaria grass ( <i>Setaria anceps</i> )	40
Black spear grass ( <i>Heteropogon contortus</i> )	19
Scented grass ( <i>Chrysopogon gryllus</i> )	17
Maize ( <i>Zea mays</i> )	20

### Promising Germplasm - Setaria grass

Traits	Entries
Leaf-stem ratio	S-9, S-18, S-20 and S-39
Tillers/plant	S-21
Low oxalates	S-6, S-7, S-10, S-13, S-17, S-18, S-20, S-30 and S-33

### Breeding work

#### Setaria grass

- Twelve clonal selections of Setaria grass namely S-1, S-6, S-7, S-10, S-13, S-17, S-18, S-20, S-21, S-24, S-30 and S-33 evaluated for forage attributes revealed that all entries were statistically at par for most of the forage attributes as compared to check S-92.
- Twelve polycross progenies of Setaria grass viz., S-1, S-6, S-10, S-13, S-16, S-18, S-20, S-21, S-25, S-27, S-33 and S-92 are under evaluation.

#### Maize

- Twenty-one entries of fodder maize were evaluated against check African tall for plant height, green forage yield, grain yield and straw yield. All the maize entries were statistically at par with African tall for grain and straw yields. Entries PMG-3, PMG-36, PMG-93-1, PMG-93-2, PMG-41, PMG-9, PMG-52-1, PMG-97 and PMG-52 were found statistically at par with African tall for green forage yield.

### Bajra-Napier hybrid programme

- Evaluation of sixteen entries of NB hybrids against two checks viz. NB-37 and IGFRI-5 for forage attributes indicated that all the NB hybrid entries were statistically at par for green forage yield with best check NB-37.

## AICRP (FC&U), AAU, Jorhat

**Evaluation of Ricebean Germplasm:** Twenty-seven ricebean germplasms collected from Arunachal Pradesh, Mizoram, Manipur and Assam including checks were evaluated for their earliness, productivity, quality and disease and pests' resistance. Ten promising entries were selected on the basis of earliness, productivity, quality and disease and pests' resistance.

Promising Germplasm	Characters
JCR-20-1	Earliness, Drought tolerant, cold tolerant, moderately tolerant to water logged, tolerant to Major diseases and pests
JCR-20-3	GFY, DMY, Plant ht, CP%, Drought tolerant, Cold tolerant
JCR-20-5	GFY, DMY, Plant ht, tolerant to major diseases and pests
JCR-20-6	Earliness, drought tolerant, cold tolerant, moderately tolerant to water logged, tolerant to major diseases and pests
JCR-20-9, JCR-19-7, JCR-19-4, JCR-19-12	GFY, DMY drought tolerant, cold tolerant, moderately tolerant to water logged, tolerance to Major diseases and pests
JCR-19-2, JCR-19-9	GFY, DMY, Plant ht, CP%, Drought tolerant, Cold tolerant

**National hybridization programme on Ricebean:** A national hybridization programme was initiated, where 5 centres viz Jorhat, Kalyani, Bhubaneswar, Jabalpur and Vellayani participated. Each centre contributed two entries. Diallel crossing was made between the ten entries without reciprocal. After 8<sup>th</sup> generation of selection four crossed progenies were selected and seeds of the selected entries were multiplied during *kharif* 2021.

SN	Entry	GFY(q/ha)	DMY(q/ha)	CPY(q/ha)
1	J8(V8 x V3)	325.20	62.30	17.5
2	J2(V2 x V9)	315.50	58.40	17.2
3	J5(V5 x V8)	297.30	56.42	17.5
4	J10(V10 x V4)	295.46	52.30	18.7

**Hybridization programme in Ricebean:** In *kharif* 2017 diallel cross was made (without reciprocal) among 7 selected entries to develop a variety with high biomass. The F4 progenies were evaluated in *kharif* 2021.

Parents	Features
JCR-14-7, JCR-13-5, Shyamalima	GFY, DMY Drought tolerant, Cold tolerant, moderately tolerant to water logging, tolerance to Major diseases and pests
JCR-08-7	Earliness
JCR-08-5, JCR-08-17	CP%
JCR-08-1	Plant height

**Crossing programme in Ricebean:** A new crossing programme is attempted taking 8 selected entries. Diallel crossing was made without reciprocal. Objective is to develop ricebean variety with early, high GFY, DMY and high protein quality

Parents	Features
JCR-20-1, JCR-20-6	Earliness, Drought tolerant, cold tolerant, moderately tolerant to water logged, tolerant to Major diseases and pests
JCR-20-9	GFY, DMY drought tolerant, cold tolerant, moderately tolerant to water logged, tolerance to Major diseases and pests
JCR-18-3, JCR-20-3, JCR-19-9, JCR-19-4, JCR-19-2	GFY, DMY, Plant ht, CP%, Drought tolerant, Cold tolerant

**Evaluation of cowpea germplasm:** Eight cowpea germplasm were evaluated in 2020 and selected entries were evaluated in kharif 2021.

Entry	GFY(q/ha)	DMY(q/ha)	Plant ht(cm)	CP%
JCC-20-1	363.05	67.50	110.00	13.88
JCC-20-3	347.64	60.49	105.80	13.33
JCC-20-4	349.63	60.63	107.13	13.65
JCC-20-6	309.34	58.05	105.27	13.28
UPC-5286	296.52	48.25	112.50	14.00

**Evaluation Local paddy variety for dual purpose:** Eight local paddy varieties (Baodhan) viz. Buruli, Amoni, Baola, Befu, Jeng, Negheru, Rangadhar and Rabgilibao were evaluated both for food and fodder purpose. First cut was given after 33 days of sowing and second cut was given after 30days of first cut. The performance of the rice varieties given below.

Entry	GFY(q/ha)	DMY(q/ha)	CP%	Seed Yield(t/ha)
Burulibao	180.22	40.20	6.3	1.2
AmoniBao	199.70	48.25	6.0	1.5
BaolaBao	189.20	43.65	6.3	1.2
Befubao	225.00	55.00	7.1	1.4
JengBao	197.80	46.20	6.6	1.5
NegheriBao	223.25	52.30	7.8	1.7
Rangadharbao	221.45	51.40	6.8	1.5
Rabgilibao	185.22	42.30	6.7	1.1

## AICRP (FC&U), CAU Imphal

### Germplasm maintained

SN	Crop	No. of accessions
1.	Rice bean	43
2.	Maize	27
3.	Cowpea	32
4.	Oats	62
5.	Lathyrus	4
6.	Berseem	4
7.	Perennial fodder crops	
	Bajra Napier hybrid	4
	Seteria Grass	1
	Signal Grass	1

## AICRP (FC&U), KAU, Vellayani

**Induced mutagenesis for developing dual purpose genotypes in fodder cowpea:** Seeds of forage cowpea (*Vigna unguiculata*) variety Aishwaryawas treated with chemical mutagen EMS with aim to develop a dual purpose cowpea with forage characters as well as good seeding behaviour. The M1 generation is harvested and the segregating M2 population is raised. Seeds from the selected plants in the M2 generation will be harvested separately and used to raise M3 generation.

**Development of core collection of fodder cowpea genotypes:** 139 accessions of forage cowpea (*Vigna unguiculata*) collected from NBPGR, New Delhi were raised in summer 2021 season. Data analysis is being carried out to identify the promising accessions which can be taken forward in future crop improvement programmes. Many of the accessions are showing promising forage characteristics. These are raised in the coming seasons and depending on the genetic distance among the accessions based on  $D^2$  statistics, crosses will be attempted to generate variability.

**Identification of *Stylosanthes* species for yield and quality suited for cultivation in Kerala:** To identify the best *Stylosanthes* species from among *S. scabra*, *S. hamata*, *S. seabrana* and *S. guianensis* suited for the climatic conditions of Kerala, thirteen accessions are collected from different parts of the country and are raised in the field. They will be evaluated for forage yield and quality for the coming years and the best suited species for the climatic condition of Kerala will be identified.

**Construction of population structure in *Stylosanthes* sp. using SSR markers:** Genomic DNA of accessions of *Stylosanthes* genotypes from among *S. scabra*, *S. seabrana*, *S. hamata* and *S. guianensis* will be isolated from the leaf samples and will be screened using SSR markers. Phenotypic data of same genotypes will be utilized for interpretation of molecular data and construction of population structure of the genotypes will be attempted.

**Variability studies in fodder bajra for yield and quality:** Thirty genotypes of Fodder Bajra (*Pennisetum glaucum* (L.) R. Br.) will be raised in Summer 2022 and evaluated for yield and its correlated characteristics along with the nutritional profiling including antioxidant analysis.

**Suitability of a potential underutilized legume *Vignastipulacea* for fodder purpose:** Accessions of *Vignastipulacea* collected from NBPGR, New Delhi is raised in Rabi 2021 and evaluated for fodder and seed yield along with nutritional quality.

## AICRP (FC&U), OUAT, Bhubaneswar

**Rice bean:** Three best performing pure lines identified as suitable for August-September sowing and January-February sowing because of better plant height and foliage growth was sown for seed multiplication during Kharif 2021.

## AICRP (FC&U), IGKV, Raipur

**Maintenance of forage garden:** Total 47 varieties of different fodder crop received from IGRI, Jhansi were grown on 15-07-2021 and maintain in forage garden.

**Collection and Maintenance of germplasm of Dinanath Grass:** Total 18 germplasm was collected during *Kharif*-2020 and 31 germplasm collected on 13.11.2021 from different region of Chhattisgarh, based on different morphological traits *i.e.* plant height, stem thickness, number of tillers/ branches, Days to 50% flowering, flower colour, panicle length and thickness. Out of 49 germplasm 23 having compact panicle and 26 having feathery panicle and 13 having early, 15 having late and 21 is medium duration. Seed of these germplasm were multiplied by sowing on 30.07.2021, for constituting next year evaluation trial with checks.

**Exploration in collaboration with NBPGR:** Different forage grasses (*Pennisetum pedicellatum*, *Heteropogon contortus*, Foxtail millet, *Apluda*, *Dichanthium*, *Chloris gayna*, *leptochloachinensis*, *vignastipulaceae*, *Aristidaadsceiona*, *Vignahainiana*, *Digitarialongifolia*, *Clitoria*etc) were explored at different Village-District (Mujargondi-Gurubalod, Purur-Jagtaradhamtari, Kanharipuri-Kanker, Gotulmunda-GudpelKanker, Telgara and Hatka- CharamaKanker, Shri Guhan-NarharipurKanker, Umrahad-LilwapaharKanker, Dabena-Kanker of Kanker C.G. with NBPGR Scientist team (Dr. Nilamani Dixit, Dr. Puran Chandra and Dr. Ravi) during 19-21 Oct 2021.

**Collection of germplasm of Dinanath Grass:** Total 16 germplasm were collected on 13.11.2021 from different region of Chhattisgarh based on plant height, stem thickness, number of tillers/ branches, Days to 50% flowering, flower colour, panicle length and thickness.

**Table 1: Passport data of collected germplasm of Dinanath grass**

S. N.	GP Name		Village	Block	District	Date of Collection
1	RDC	1	Cherikheri	Dharsiwa	Raipur	02/11/2021
2	RDC	1b	Labhandi	Dharsiwa	Raipur	03/11/2020
3	RDC	1c	Cherikheri	Dharsiwa	Raipur	03/11/2020
4	RDC	2	Cherikheri	Dharsiwa	Raipur	02/11/2021
5	RDC	2b	Cherikheri	Dharsiwa	Raipur	02/11/2020
6	RDC	3	Cherikheri	Dharsiwa	Raipur	02/11/2020
7	RDC	4	Cherikheri	Dharsiwa	Raipur	02/11/2021
8	RDC	4b	Jora	Dharsiwa	Raipur	03/11/2020
9	RDC	5	Jora	Dharsiwa	Raipur	02/11/2021
10	RDC	6	Jora	Dharsiwa	Raipur	13/11/2021
11	RDC	6b	Jora	Dharsiwa	Raipur	13/11/2021
12	RDC	6c	Jora	Dharsiwa	Raipur	13/11/2021
13	RDC	7	Cherikheri	Dharsiwa	Raipur	13/11/2021
14	RDC	8	Cherikheri	Dharsiwa	Raipur	13/11/2021
15	RDC	9	Cherikheri	Dharsiwa	Raipur	13/11/2021
16	RDC	10	Jora	Dharsiwa	Raipur	03/11/2020
17	RDC	10b	Jora	Dharsiwa	Raipur	25/11/2021
18	RDC	11	Jora	Dharsiwa	Raipur	03/11/2020
19	RDC	12	Jora	Dharsiwa	Raipur	03/11/2020
20	RDC	13	Cherikheri	Dharsiwa	Raipur	03/11/2020

21	RDC	14	Jora	Dharsiwa	Raipur	03/11/2020
22	RDC	14b	Jora	Dharsiwa	Raipur	03/11/2020
23	RDC	15	Jora	Dharsiwa	Raipur	03/11/2020
24	RDC	16	Jora	Dharsiwa	Raipur	03/11/2020
25	RDC	16b	Jora	Dharsiwa	Raipur	03/11/2020
26	RDC	17	Jora	Dharsiwa	Raipur	03/11/2020
27	RDC	18	Jora	Dharsiwa	Raipur	03/11/2020
28	RDC	19	Jora	Dharsiwa	Raipur	03/11/2020
29	RDC	20	Cherikheri	Dharsiwa	Raipur	13/11/2021
30	RDC	21	Cherikheri	Dharsiwa	Raipur	13/11/2021
31	RDC	22	Cherikheri	Dharsiwa	Raipur	13/11/2021
32	RDC	23	Cherikheri	Dharsiwa	Raipur	13/11/2021
33	RDC	23b	Cherikheri	Dharsiwa	Raipur	03/11/2020
34	RDC	24	Cherikheri	Dharsiwa	Raipur	13/11/2021
35	RDC	25	Cherikheri	Dharsiwa	Raipur	13/11/2021
36	RDC	26	Cherikheri	Dharsiwa	Raipur	13/11/2021
37	RDC	27	Cherikheri	Dharsiwa	Raipur	13/11/2021
38	RDC	28	Cherikheri	Dharsiwa	Raipur	13/11/2021
39	RDC	29	Cherikheri	Dharsiwa	Raipur	13/11/2021
40	RDC	30	Cherikheri	Dharsiwa	Raipur	13/11/2021
41	RDC	31	Cherikheri	Dharsiwa	Raipur	14/11/2021
42	RDC	32	Cherikheri	Dharsiwa	Raipur	14/11/2021
43	RDC	33	Cherikheri	Dharsiwa	Raipur	14/11/2021
44	RDC	34	Labhandi	Dharsiwa	Raipur	14/11/2021
45	RDC	35	Cherikheri	Dharsiwa	Raipur	25/11/2021
46	RDC	36	Cherikheri	Dharsiwa	Raipur	25/11/2021
47	RDC	37	Purur	Jagtara	Dhamtari	19/10/2021
48	RDC	38	Gujargondi	Gurur	Balod	19/10/2021
49	RDC	39	Lilvopahar	Umrahad	Kanker	21/10/2021

**Maintenance of germplasm of Dinanath Grass:** Total 25 germplasm maintain by sowing on 30.07.2021, which was collected during *Kharif*-2020. Evaluation of these germplasm for different morphological traits *i.e.* plant height, stem thickness, stem colour, number of tillers/branches, Days to 50% flowering, flower colour, panicle length and thickness. Seed of these germplasm were multiplied for constituting next year evaluation trial with checks.

**Seed Multiplication of promising lines of Cowpea:** RCC-48, RCC-65, RCC-46, RCC52 were sown on 28-07-2021 for seed multiplication which will incorporate in IVT. These genotype perform better under Chhattisgarh region.

## AICRP (FC&U), BAU, Ranchi

### Forage Maize

- Generation Advancement: BAU FM-201 and BAU FM-202

### Dinanath Grass

- Thirteen germplasm were maintained.
- Five F<sub>2</sub> population of Dinanath grass is being maintained.
- **Station trial:** Ten entries were tested in Dinanath trial. The entry BAU DN-108 (495.15 q/ha) was found significantly high yielder followed by BAU DN-109 (471.89 q/ha) and JHD 19-2 (459.74 q/ha).

## Bajra Napier hybrid

**Station trial:** Out of eight entries tested in station trial, the entry BAU BN-101 (474.3 q/ha) were found at par with best check Co-3 (456.2 q/ha) and significantly superior with second best check NB-21 (350.3 q/ha).

## AICRP (FC&U), JNKVV, Jabalpur

### Forage Plant Genetic Resources

Crop	existing accession	new collection	total accession	source	area of collection
Soybean	45	5	50	-	NRC Indore & Sehore
Rice bean	37	6	43	NBPGR, New Delhi	

### Rice bean

#### Generation of materials/entries/crosses made during Kharif 2021

##### Crosses made and advanced in Rice bean

- Seven new crosses were made
- Selections were made and advanced as per details below

Cross advanced	4F <sub>1</sub>	4F <sub>2</sub>	5F <sub>3</sub>	2F <sub>4</sub>	4F <sub>5</sub>
Selection made	-	22	09	07	05

- Single plant progenies and promising genotypes were also evaluated for different fodder traits.
- Five new accessions were obtained by NBPGR, New Delhi
- Selections were made for different fodder traits in the mutation derived populations of Bidhan -1 (EMS 0.4% and 0.8% for 1, 2 and 4hrs treatments)

### Soybean

- Single plant selections were made using different fodder traits.
- Five new accessions were obtained by NRC, Indore

## AICRP (FC&U), MPKV, Rahuri

**Evaluation of B x N hybrids:** Eight Bajra x Napier crosses were attempted during *Rabi*-2020. Crossed seed of these crosses was sown during *Kharif*-2021 for isolating heterotic clones for further identification of high yielding B x N hybrids for green forage yield.

**Crossing programme:** Eleven new crosses were attempted involving four elite Bajra forage lines as female and nine Napier grass lines as male parents during *Rabi*-2021 as per details below.

SN	Crossing details	SN	Crossing details
1	Giant Bajra x GBN-1	7	Giant Bajra x GBN-40
2	Giant Bajra x GBN-4	8	BAIF Bajra-1 x GBN-10
3	Giant Bajra x GBN-7	9	TSFB-15-4 x GBN-19
4	Giant Bajra x GBN-10	10	TSFB-15-8 x GBN-19
5	Giant Bajra x GBN-14	11	TSFB-15-8 x GBN-30
6	Giant Bajra x GBN-27		



## AICRP (FC&U), AAU, Anand

### Maintenance of germplasm

SN	Crop	No. of Lines
1.	Sorghum	571
2.	Maize	198
3.	Pearl millet	137
4.	Cowpea	42
5.	Sorghum Sterile line & its maintainers	8
6.	Pearl millet Sterile line & its maintainers	4
7.	Clitoria	24

### New Germplasm collection

SN	Crop	Total numbers	Source
1.	Sorghum	09	Gujarat-Local
2.	Maize	11	Gujarat-Local
3.	Bajra	01	Gujarat-Local

### Forage Pearl millet: *New crosses: 10*

Sr. No.	Details of cross	Objective(s)
1.	GAFB 4 x AFB-45	<ul style="list-style-type: none"> <li>Higher GFY</li> <li>Higher tillering</li> <li>Multicut type</li> </ul>
2.	GAFB 4 x AFB-54	
3.	GAFB 4 x AFB-58	
4.	GAFB 4 x AFB-62	
5.	GAFB 4 x AFB-71	
6.	BAIF Bajra x AFB-45	
7.	BAIF Bajra x AFB-54	
8.	BAIF Bajra x AFB-58	
9.	BAIF Bajra x AFB-62	
10.	BAIF Bajra x AFB-71	

### Segregating materials

Generation	Sown	Selected IPS / Bulk
F <sub>1</sub>	11	11
F <sub>2</sub>	50	150
F <sub>3</sub>	45	45
F <sub>4</sub>	105	81
F <sub>5</sub>	143	100
F <sub>6</sub>	46	25
F <sub>7</sub>	43	15 Bulks
<b>TOTAL</b>	<b>443</b>	<b>412+15(B)</b>

**Forage Maize: New Crosses: 14**

Sr. No.	Details of cross	Objective(s)
1.	IC-130882 X ORIGIN MEXICO-6354	<ul style="list-style-type: none"> <li>To develop tillering type maize</li> <li>To develop tall type maize</li> <li>To develop maize having broad &amp; more leaf length type</li> </ul>
2.	IC-130882 X ORIGIN MEXICO-6357	
3.	IC-130882 X ORIGIN MEXICO-6377	
4.	IC-130882 X GDRFG-1644	
5.	IC-130913 X IC-130976	
6.	IC-130913 X IC-130987	
7.	IC-130913 X IC-131016	
8.	IC-130913 X MEXICAN ACCESSION-4207	
9.	IC-130913 X NP96K-2415	
10.	IC-130913 X ORIGIN MEXICO-6345	
11.	IC-130913 X ORIGIN MEXICO-6354	
12.	IC-130913 X ORIGIN MEXICO-6357	
13.	IC-130913 X ORIGIN MEXICO-6377	
14.	IC-130913 X GDRFG-1644	

**Forage Maize: Segregating materials**

Generation	Sown	Selected IPS / Bulk
F <sub>1</sub>	49	44
F <sub>2</sub>	03	16
F <sub>3</sub>	30	64
F <sub>4</sub>	141	107
F <sub>5</sub>	133	119
F <sub>6</sub>	99	142
F <sub>7</sub>	23	12 Bulks
<b>TOTAL</b>	<b>478</b>	<b>492 12(B)</b>

**Forage Sorghum: Segregating materials**

Generation	Sown	Selection(IPS)/ Bulk
F <sub>1</sub>	02	-
F <sub>2</sub>	18	84
F <sub>3</sub>	29	23
BC <sub>2</sub> F <sub>4</sub>	106	90
F <sub>4</sub>	04	8
F <sub>5</sub>	22	26
F <sub>6</sub>	21	22
F <sub>7</sub>	63	17 Bulks
<b>TOTAL</b>	<b>265</b>	<b>253 + 17 (B)</b>

**Varieties released at State Level (in last 3 years)**

**Forage Bajra: Gujarat Anand Forage Bajra 4 (GAFB 4):** Recommended by 14<sup>th</sup> Combined Joint AGRESCO Meeting of SAUs held during April 3-5, 2018 at Junagadh Agricultural University, Junagadh and accepted for the release for Middle Gujarat. It has single cut nature with light green foliage, tall plant height up to 240 cm, more tillers (average 3.7) and leaves per plant (average 29), thin stem and high leaf stem ratio (0.9), average CP 7.66%, green fodder yield nearly 580q/ha, dry fodder yield nearly 120q/ ha.

## Other Activities Kharif-2021

### AICRP (FC&U), BAU, Ranchi

#### Awards and Recognitions

- **Appreciation Award** received on 11<sup>th</sup> Dec. 2021 during 41<sup>st</sup> Rabi Research Council meeting for active support and contribution in developing crop variety of Maize (Birs Baby Corn-1) on crop improvement aspect.
- **Best Research Award** received on 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovation (3<sup>rd</sup> ICFAI), 24-26 December 2021, Ranchi, Jharkhand.
- **Outstanding Plant Breeder Award** received on 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovation (3<sup>rd</sup> ICFAI), 24-26 December 2021, Ranchi.
- **Co-chairman of the technical session** during 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovation (3<sup>rd</sup> ICFAI), 24-26 December 2021 Ranchi.

#### Abstracts in Seminar/Symposium

Prasad Y, Kumar S, Kumar R, Kumar K, Izhar T, Bhushan S and Kumar S (2021). Genetic diversity studies in forage maize (*Zea mays* L.) for green fodder yield. 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Ranchi, Jharkhand.

Kumari Manisha, Kumar, K; Kumar, AM, Kumar R, Prasad K, Prasad Y, Kumar S and Kumar SB (2021). Correlation and path analysis studies in chickpea (*Cicer arietinum* L). 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Ranchi, Jharkhand.

Kumari Manisha, Kumar, K; Kumar, AM, Kumar R, Prasad K, Prasad Y, Kumar S and Kumar SB (2021). Divergence studies in chickpea (*Cicer arietinum* L). 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Ranchi, Jharkhand.

Kumar S, Kumar SB and Prasad Y (2021). Characterization of upland rice (*Oryza sativa* L) germplasm under rainfed ecology. 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Ranchi, Jharkhand.

Kumar R, Prasad Y, Kumar K, Kumar S and Shanti Bhushan (2021). Production of quality seed through participatory mode. 3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Holiday Home, Ranchi, Jharkhand.

#### Participation in Seminar/Conference

- Participated in the “3<sup>rd</sup> International Conference (Hybrid Mode) on Food, Agriculture and Innovations 'ICFAI-2021' held at Ranchi, Jharkhand during 24<sup>th</sup> to 26<sup>th</sup> Dec. 2021.

**Student Guided:** Minor Advisor M.Sc-1 in PBG; Major Advisor M.Sc-1 in Agronomy

**TSPs conducted:** Total thirty three demonstrations were conducted during Kharif 2021, Out of that 18 fodder demonstrations were conducted at Angara block in Ranchi district, which included BxN hybrid and Maize. Fifteen fodder demonstration of Maize were conducted at Mander Block, Village-Nagra, Masmano and Sursa.

### TSP Training Programme

SN	Date	District	Sub-District	Village/ Panchayat	Activities	No. of beneficiaries
1.	7 - 8 Sept, 2021	Shahebganj	Mandro	Shimra	Farmer's training	60
2.	7 - 8 Sept., 2021	Shahebganj	Mandro	Shimra	Input distribution	50
3.	31 <sup>st</sup> Aug. 2021	Ranchi	Khumariya	Kanke	Planting material of	25
4.	31 <sup>st</sup> Aug. 2021	Ranchi	Ormanjhi	Aara Kerum	BxN, Guinea, Urea, SSP, MOP	25
5.	27 <sup>th</sup> Oct. 2021	Ranchi	Angara	Guridhi	Distribution of Duch hoe & Kisan Dairy & Training Kit	48

## AICRP (FC&U), AAU, Jorhat

### Research Papers

Balmiki S, Neog SB and Barua NS (2021) Genetic variability in Ricebean (*Vigna Umbellata* Thunb.) for important quantitative characteristics *Forage Res.* 47 (2): 172-179.

Das RR, Das G, Talukdar P and Neog SB (2021) Genetic analysis for yield and yield attributing traits in Cowpea (*Vigna unguiculata* L. Walp) *Legume Research* 44: 900-905.

**Research Guidance:** Dr S Bora Neog - M Sc. (Agri): 1

**Course taught:** Dr S Bora Neog: - BSc: 1 MSc: 1

### Extension Leaflet:

- Banpanirsamayatpasukhadyajugan(Assamese)
- Pasurupajyogiudbhid(Assamese)

**FTD conducted:** 30

**TSP activities:** Adopted seven villages in Baksa district, Assam

### Seed/ planting material sold

Sl No	Forage crops	Total quantity (Kg)		
		Total Slips ( No)	Foundation Seed	TFL Seed
1.	Hybrid Napier CO4, CO5	50,000		
2.	Setaria : PSS-1	20,000		
3.	Guinea grass	10,000		
4.	Rice bean: Shyamalima		25Kg	2.0qtls
	<b>Grand Total</b>	<b>80,000</b>	<b>25kg</b>	<b>2.0qtls</b>

## AICRP (FC&U), UAS (B) ZARS Mandya

### Awards and Honours: 04

- Received certificate of appreciation in Development of Forage Production Technology “Agase Intercropping with BN Hybrid or perennial fodder sorghum” during 2021(**National Level**)
- Received certificate of appreciation in Development of Forage Production Technology “Perennial grass based cropping system involving Bajra Napier Hybrid grass with *Sesbania grandiflora*” during 2021(**National Level**)
- Dr. Nagesh Chikkarugi, Senior Technical Assistant, AICRP on Forage crops & Utilization awarded Best Technical Employee of University of Agricultural Sciences, Bangalore on 56<sup>th</sup> foundation day of UAS Bangalore on 1<sup>st</sup> October-2021.
- Best field demonstration award by UAS, Bangalore during Kisan Mela held on 1<sup>st</sup> and 02<sup>nd</sup> of December-2021 V. C. Farm, Mandya Krishimela -2021).

### Publications

#### Full Length Publications: 04

Naveena H, Shekara BG, Manoj KN and Chikkarugi NM. (2021) Effect of different organic sources of nutrients on green fodder yield, nutrient uptake and economics of fodder maize and succeeding fodder cowpea under Maize-cowpea cropping system. *Forage Res.* 47 (1): 130-134.

Manoj KN, Shekara BG, Sridhara S, Jha PK, Prasad PVV (2021) Biomass quantity and quality from different year-round cereal–legume cropping systems as forage or fodder for livestock. *Sustainability* 13: 9414. <https://doi.org/10.3390/su13169414> (**NAAS-8.58**)

Shekara BG, Mahadevu P, Chikkarugi NM and Manasa N.(2021)Performance of fodder pearl millet genotypes to different levels of nitrogen. *Forage Res.* 47 (2): 193-196

Naveena BM, Shekara BG, Vishwanath AP, Kalyana Murthy K N and Chikkarugi NM(2021) Effect of times of sowing and nitrogen levels on growth and seed yield of fodder oats (*Avena sativa* L.), *J. Pharm. Innov*10(12): 2752-2756.

### Kannada Folders: 04

- Paustidayak Dwidala Mevin Belegalu
- Adhik Hasiru Mevigagi navin besaya tantrikategalu
- Vividh Mevu belegala sudharit Utpadana Tatntrikategalu
- Adhik Iluvarigagi Mevin Toke Godi Tali

**TV talk delivered: 01-** Fodder Production Technologies on TV delivered on 26/10/2021

**External examiner/ thesis evaluation of PG Students.**

Mr. Iranna Sangalad - Precision Nitrogen management for enhancing productivity and nitrogen use efficiency in fodder maize (*Zea mays* L.) - UAS, Dharwad

**Important persons visit**

- Vice Chancellor. UAS, GKVK, Bangalore
- Boards Members of UAS, GKVK, Bangalore
- Director of Research, UAS, GKVK, Bangalore
- Managing Director CADA, Govt of Karnataka
- Associate Director of Research, UAS, Bangalore

**Meetings / Workshop/Winter School attended: 08**

SN	Title	Date	Events held at	Scientist Participated
1	Environmental Ethics & Ecological restoration: Issues and Strategies	05/06/2021	MPUAT, Udaipur	Dr. Nagesh Chikkarugi
2	Public Private Partnership for Sustainable Irrigation	07/06/2021	DDG- Agricultural Education-ICAR	Dr. B G Shekara
3	Increasing farmers Income: Way Forward	18/06/2021	UAS, Bangalore	Dr. Nagesh Chikkarugi
4	Business opportunities in exporting of fruits and vegetables- Alumni Association, UAS, Bangalore	20/06/2021	UAS, Bangalore	Dr. B G Shekara
5	National Webinar on Microbial Technologies for sustainable Agriculture and Climate change Mitigation	07/07/2021	MPUAT, Udaipur	Mrs. Manasa N
6	National Group Meet on Forage crops & Utilization-Kharif-2021	20-09-2021	IGFRI, Jhansi (Online Mode)	Dr. B. G. Shekara Dr. P. Mahadevu Dr. Nagesh Chikkarugi
7	Quality control of microbial bio-pesticides	25- 29 Oct, 2021	NIPHM, Hyderabad	Dr. Nagesh Chikkarugi
8	Fodder production technologies under tribal sub plan	12/08/2021	Bhavikere Village, Bovi Colony, Saraguru Taluka, Mysore district	Dr. S. N. Vasudevan Dr. B. G. Shekara Dr. Chandrakal Hanagi Dr. Sunil C. M. Dr. Nagesh Chikkarugi

**Training/DAESI Programme attended as resource person: 15 by Dr B G Shekara**

SN	Title	Date	Place
1	Fodder production technologies in livestock skill training programme	25-08-2021	EEU, Naganahalli
2	Sugarcane and Paddy production technologies	06-08-2021	RSK, Kasaba, Narsipura
3	Rainfed farming and natural resource management	17-09-2021	College of Horticulture, Mysore
4	Fodder production technologies	24-09-2021	KVK, Mandya
5	Fodder production technologies	28-09-2021	KVK, Mandya

6	Fodder production technologies	01-10-2021	Online mode-SAMETI-GKVK
7	Fodder production technologies	01-10-2021	DAESI, ZARS, Mandya
8	Fodder production technologies	12-10-2021	KVK, Mandya
9	Rainfed agriculture and natural resource management	19-10-2021	ZARS, Mandya
10	Rainfed agriculture	22-10-2021	KVK, Mandya
11	Oilseed production technologies	13-11-2021	DESI-College of Agriculture, Mandya
12	Cotton Cultivation	26-11-2021	KVK, V. C Farm, Mandya
13	Cotton Cultivation	30-11-2021	ZARS, V. C Farm, Mandya
14	Fodder & Pulses production technologies	08-12-2021	EEU, Naganahalli
15	Maize Production Technologies	18-12-2021	CoA, Mandya

### Kisan Samparka Kendra visits by scientists

SN	Scientist	RSK	Date of visit	Problems identified and suggestions given
1	Dr. Nagesh Chikkarugi	Chikkayyan Chatra, Mysore District	06-12-2021	Involved in interaction with farmers and given information about recently released varieties of the university, pests and diseases.
2	Dr. B G Shekara	T. Narasipura, Mysore District	20-12-2021	Information given about use of bio fertilizers in different field crops and paddy varieties suitable for summer season and nutrient management in sugarcane crop.
3	Manasa N	Bettada pura, Piriya pattana Taluk, Mysore District	06-12-2021	Ragi varieties and production technologies and Production technologies of different fodder crops

### Teaching activities: Courses handled

- Breeding Cereals, Forages and Sugarcane GPB 511 (2+0)
- Insect Pests of Field Crops & Stored Grains and their Management-AET-311 (1+1)
- Crop production Technology-2 AGR 221 (1+1) oil seeds commercial crops & fiber crops COA, Chamarajanagara (UG Course)
- Principles and Practices of weed Management AGR 503 (1+1) (CoA, Mandya) (PG Course, at CoA, V. C. Farm, Mandya)

### Research Guidance

- M.Sc. (Agri.) in GPB – 1
- M. Sc. (Agri.) in Agronomy- 1
- Ph.D. (Agri.) in Agronomy- 1

### FTDs conducted: 20

### TSP activities

- Critical inputs viz., seeds of Fodder Maize, Multi-cut fodder Sorghum and Hedge lucerne were procured and distributed to tribes.
- Provided sickles and plastic crates for daily usage of agriculture purpose

**Seed/ planting material sold**

S. No.	Crops	Root Slips Sold(In Lakhs)
1.	Napier Bajra Hybrid (Co-3)	0.30
	Napier Bajra Hybrid (BNH-10)	0.60
2	Guinea grass (JHGG-08-1)	0.25
3	Rhodes grass (Selection)	0.05
4	Signal grass(Selection)	0.04

**Quality seed production Kharif 2021**

Sl. No	Crop	Variety	Class of seed	Quantity Produced(q)
1	Forage Cowpea	MFC-09-1	NS	0.15
2	Forage Cowpea	MFC-08-14	NS	0.04
3	Fodder Cowpea	MFC-09-3	NS	0.08

**Externally funded projects: 01**

- Accelerating green fodder production through establishment of model demonstration and multiplication units in southern Karnataka with budget outlay of 25 lakhs. (Dept of animal husbandry and veterinary services, GOK).

**Variety developed**

**Fodder Cowpea variety MFC-09-3-** Dr. P. Mahadevu & Dr. B G Shekara Notified vide Ref No. SO.8(E), dated 24/12/2021

**Other activities**

Served as Chairman of the committee constituted by ADR for disposal of old records (1975-2005) of ZARS, V C Farm, Mandya

**AICRP (FC&U), SKRAU, Bikaner****Breeder seed production during Kharif 2021**

Crop	Variety	Indent (kg)	Production (kg)
Fodder pearl millet	Raj Bajra-1(RBB-1)	70 kg	200 kg
Sewan grass	Jaisalmeri sewan	10 kg	11 kg

**Course taught**

- Dr. R.C. Bairwa - PG course AGRON 522 Principles and practices of weed management
- Dr. A. S. Godara - PG course AGRON 523-Dry land farming and watershed management

**FTDs conducted:** Total 23 fodder demonstrations were conducted during Kharif-2021, including 10 of cluster bean, 11 of fodder bajra and 2 of NB –hybrid.



**Training conducted:** Farmers were given training of green fodder production during kharif season at the time of distribution of demonstrations under AICRP on FCU.

**Other assigned duties**

Dr. A. S. Godara

- Conducted three station trials on cluster bean and cotton
- Worked as Farm In-charge.
- Member of physical verification committee, ARS, Bikaner
- Sell and Purchase committee member of ARS, Bikaner and NSP Bikaner

Dr. R. C. Bairwa

- Conducted station trial on Dhaman and Sewan grass.
- PG Hostel warden

## AICRP (FC&U),TNAU, Coimbatore

### Awards and Honours: 1

- **Best Poster award** was received by Dr. T. Ezhilarasi for poster entitled ‘Agathi (*Sesbaniagrandiflora* L.): Nutritious tree fodder suitable for Tamil Nadu’ during International conference on Future challenges and prospects in plant breeding held on 6<sup>th</sup> – 7<sup>th</sup> October, 2021 at TNAU, Coimbatore.

### Publications

#### Book chapters with ISBN: 3

Ezhilarasi T, Babu C and Ganesan KN. (2021). Nucleus and breeder seed production of perennial fodder sorghum varieties. In: Manual on Nucleus and Breeder seed production in field crops, Centre for Plant Breeding & Genetics, Tamil Nadu Agricultural University, Coimbatore. P. 189-194. (ISBN: 978-81-95444-50-2)

Ezhilarasi T, Ganesan KN and Geetha S. (2021). Nucleus and breeder seed production of lucerne and hedge lucerne. In: Manual on Nucleus and Breeder seed production in field crops, Centre for Plant Breeding & Genetics, Tamil Nadu Agricultural University, Coimbatore. P. 195-202. (ISBN: 978-81-95444-50-2).

Geetha S, Ganesan KN, Kumaresan D and Binodh Asish K. (2021) Breeder seed production programme in Tamil Nadu Agricultural University and its impact on crop productivity. In: Manual on Nucleus and Breeder seed production in field crops, Centre for Plant Breeding & Genetics, Tamil Nadu Agricultural University, Coimbatore. P.1-13. (ISBN: 978-81-95444-50-2).

#### Research articles: 2

Aswini MS, Ganesan KN, Ezhilarasi T and Sivakumar SD. (2021). Combining ability and heterosis studies in fodder pearl millet [*Pennisetum glaucum* (L.) R. Br.]. *Electron. J. Plant Breed.* 12 (3): 1011-1021. (NAAS: 5.14)

Aswini MS, Ganesan KN, Ezhilarasi T and Sivakumar SD. (2022). Genetic studies on association and inter-relationship of green fodder yield and fodder quality traits in hybrids of fodder pearl millet [*Pennisetum glaucum* (L.) r. br.]. *Intern. J. Multidisciplinary Res. and Growth Eval.* 3(1): 01-06.

#### Seminar/Symposia papers: 5

Aswini MS and KN Ganesan. (2021). Genetic variability and association studies for enhanced green fodder yield in fodder pearl millet [*Pennisetum glaucum* (L.) R. Br.]. In: Book of abstracts of the International conference on Future challenges and prospects in plant breeding held during 6-7 October, 2021, TNAU, Coimbatore. p 164. (ISBN: 978-81-954445-2-6)

Ezhilarasi T, Ganesan KN, Sivakumar SD, Leelavathi S and S Geetha. (2021). Agathi (*Sesbaniagrandiflora* L.): Nutritious tree fodder suitable for Tamil Nadu. In: Book of abstracts of the International conference on Future challenges and prospects in plant breeding held during 6-7 October, 2021, TNAU, Coimbatore. p 71. (ISBN: 978-81-954445-2-6)

Ganesan KN, Ezhilarasi T, Shamini K, Sivakumar SD and Geetha S. (2021). Evaluation of pasture legume *Stylosanthes* spp. for green fodder yield and quality. In: Book of abstracts of the International conference on Future challenges and prospects in plant breeding held during 6-7 October, 2021, TNAU, Coimbatore. p 72. (ISBN: 978-81-954445-2-6)

Shamini K, Ezhilarasi T, Ganesan KN, Sivakumar SD and Geetha S. (2021). Assessing the existing genetic variability and association of different traits for enhanced green fodder yield in Guinea grass. In: Book of abstracts of the International conference on Future challenges and prospects in plant breeding held during 6-7 October, 2021, TNAU, Coimbatore. p 76. (ISBN: 978-81-954445-2-6).

Subbulakshmi M, Ganesan KN, Iyanar K, Sivakumar SD and Ravichandran V. (2021). Genetic variability for green fodder yield in pearl millet-napier hybrids. In: Book of abstracts of the International conference on Future challenges and prospects in plant breeding held during 6-7 October, 2021, TNAU, Coimbatore. p 77. (ISBN: 978-81-954445-2-6)

#### **Important persons visited to AICRP FC centre**

- Hon'ble Minister of state for Agriculture and Farmer's Welfare, Thiru. M.R.K. Paneer Selvam and Thiru C. Samayamoorthy IAS., Agricultural Production Commissioner and Secretary to Government of Tamil Nadu inaugurated the Fodder Pellet unit funded by TANII scheme (2019-21) entitled "Pelletization of forage crops for enhancing livestock productivity" Govt. of Tamil Nadu at Department of Forage Crops, TNAU, Coimbatore on 28.07.2021.
- Hon'ble Minister Shri. C. Madhuswamy, Minister for Minor Irrigation, Law, Parliamentary Affairs & Legislation of Karnataka State, Visited forage garden and Fodder Pellet production unit on 23.08.2021.
- Dr. J. Jeyaranjan, Vice Chairman, State planning commission has visited the fodder pellet production unit funded by TANII on 22.12.2021.
- Mr. Sam Joseph, General Manager, and his team from HATSUN Agro Product Ltd., visited Department of Forage Crops, TNAU, Coimbatore on 19.01.2022 to review the progress of HATSUN Chair Assistant Professor Chair Scheme.

#### **Student(s) guided:**

Ph.D. in Plant Breeding and Genetics – 4; M.Sc. (Agri.) in PBG – 2;  
M.Sc. (Agri.) in Agronomy -1  
M.Sc. (Agri.) in Entomology – 1.

**FTDs conducted: 20**

#### **Training conducted for farmers/ NGO/ Govt. officials: 8**

A total of eight trainings entitled "Sustainable fodder production strategies for enhancing livestock productivity" were conducted at KVKs throughout Tamil Nadu for farmers.

S. No.	Date	Place	No. of beneficiaries
1.	28.08.2021	ICAR-KVK, Pappalapatti, Dharmapuri	105
2.	29.08.2021	ICAR-KVK, Sandhiyur, Salem	98
3.	22.10.2021	ICAR-KVK, Vamban, Pudukottai	95
4.	22.10.2021	ICAR-KVK, Sirugamani, Trichy	96
5.	28.10.2021	ICAR-KVK, Ramanathapuram	90
6.	28.10.2021	ICAR-KVK, Aruppukottai	98
7.	28.10.2021	ICAR-KVK, Madurai	100
8.	28.10.2021	ICAR-KVK, Pongalur, Tiruppur	52

**Quantity of seeds/ planting material produced and supplied (2021-22)**

S. No.	Crop/ variety	Class of seeds	Quantity produced	Quantity supplied
<b>I</b>	<b>SEEDS (kg)</b>			
1.	Multicut Fodder sorghumCO (FS) 29	BS	167.00	167.00
		TFL	1.25	1.25
2.	Fodder sorghum CO 31	BS	456.00	456.00
		TFL	1000.00	878.00
3.	Fodder CowpeaTNFC 0926	BS	50.00	50.00
		TFL	1.10	1.10
4.	Fodder Cowpea CO 9	TFL	3.10	3.10
4.	Maize African tall	TFL	13.00	11.10
5.	<i>Desmanthus</i> CO 1	TFL	312.10	312.10
6.	<i>Desmanthus</i> CO 2	BS	2.00	2.00
		TFL	16.00	15.35
7.	Lucerne CO 3	BS	50.00	50.00
		TFL	0.75	0.75
8.	Agathi	TFL	50.00	47.35
<b>Total</b>			<b>2,122.30</b>	<b>1,995.10</b>
<b>II</b>	<b>PLANTING MATERIAL (Nos.)</b>			
1.	BN hybrid CO (BN) 5 stem cuttings		4,00,000	3,86,075
2.	Guinea grass CO (GG) 3 rooted slips		2,500	2,250
3.	<i>Cenchrus</i> CO 1 – Rooted slips (Nos.)		300	290
4.	<i>Cenchrus</i> CO 2 – Rooted slips(Nos.)		50	20
<b>Total</b>			<b>4,02,850</b>	<b>3,88,635</b>

**Interaction with farmers, NGO and Govt. staff:** Interactive meeting on ‘Importance of green fodder and fodder pellet production’ were conducted at Department of Forage Crops with cattle growers of Tamil Nadu. Through these programmes, **1639 numbers** of cattle growers and entrepreneurs were sensitized about the importance of balanced feeding in livestock, location specific improved fodder varieties and its production and preservation technologies.

**Externally funded project: 2**

S. No.	Title of the project	Sponsors	Duration	Outlay (Rs. in lakhs)	PI
1.	HATSUN chair Assistant Professor scheme in PB&G for forage Crop research	HATSUN Agro Product. Ltd. (HAPL)	2018-23	64.74	Dr. K.N.Ganesan Senior Breeder AICRP (FC&U) i/c
2.	Expansion of Activities of Biotech-KISAN Hub in Two Aspirational Districts (Virudhunagar And Ramanathapuram) of Tamil Nadu – Phase II'	DBT	2019-2021	76.00	Dr. S.D. Sivakumar AICRP Agronomist
<b>Total</b>				<b>140.74</b>	

**AICRP (FC&U), BCKV, Kalyani****Research papers in refereed journals**

Atta K, Pal AK and Jana K (2021). Effects of salinity, drought and heavy metal stress during seed germination stage of ricebean [*Vigna umbellata* (Thunb.) Ohwi and Ohashi]. *Plant Physiol. Rep. Springer*(ISSN 2662-253X), 26 (1): 109-115.

Khan R, Biswas S, Kundu CK, Jana K, Ray R and Bandopadhyay P. (2021). Effect of conservation tillage practices on growth attributes of different fodder crops and soil moisture depletion. *International Journal of Chemical Studies* 9 (1): 1846-1852.

**Research Guidance:** M. Sc. (Ag.) in Agronomy – 1; Ph. D. in Agronomy- 3

**Courses taught:** Agronomy of fodder and forage crops and other courses

**FTDs conducted:** 50 units [Forage maize (cv. J 1006) - 10 units, Ricebean (cv. Bidhan ricebean 1 & 2) – 20units and BN hybrid (cv. CO3 and CO4) – 20units.

**TSP activities**

80 tribal farmers of Pingla, Narayangarh block of Paschim Medinipur district, Hirbandh block of Bankura district of West Bengal (Red & laterite zone i.e. western part) were benefitted by different field activities organized under TSP Programme of AICRP on FC & U, BCKV, Kalyani centre. Agricultural, livestock and fodder & forage cum food related interventions were demonstrated for socio-economic condition uplift of tribal farmers/families under adopted villages of TSP programme.

Forage Maize (cv. J 1006), Rice bean (cv. Bidhan Ricebean-1, Bidhan rice bean-2 & Bidhan Rice bean-3), Hybrid maize (cv. Disha), Coix (cv. Bidhan Coix-1), forage Blackgram (cv. Goutam), Mung (Meha), Moringa seeds, vegetable seeds (brinjal, chili, bhindi, onion etc.) planting materials (cuttings) of Bajra-Napier Hybrid (CO 3, CO 4 & CO 5) along with *rhizobium* culture, insecticides (lancergold), fungicides (SAAF), Knap sack sprayer (general & battery operated), micro-nutrient mixture (nutri gold), literature (book on cultivation, leaflets in Bangla on forage crops) and plastic bucket were distributed among selected tribal farmers. Tribal farmers' meet cum demonstrations on improved cultivation practices of fodder & forage crops was conducted successfully.

## **Farmers' Meeting: 2 (Two)**

### **Seed production**

#### **TFL, Nucleus and Breeder Seed production**

- Ricebean (Bidhan Ricebean-1)
- Ricebean (Bidhan Ricebean-2)
- Ricebean (Bidhan Ricebean-3)

#### **Management of BN hybrid**

- BN hybrid (CO-3) : 8500 cuttings
- BN hybrid (CO-4) : 7400 cuttings
- BN hybrid (CO5) : 6500 cuttings
- **Multiplication and management of Guinea grass, stylo and drum stick**
- Seed production of L7P1, L4P5, L6P1, L4P3 and L13P5 (promising mutant lines of Bidhan rice bean 1)

#### **Externally Funded Project: 2 (Private Company)**

##### **Participation in seminar/farmers' meeting etc:**

- Farmers Meet on forage production technology with tribal families/farmers at Ela Batitaki and Rampura villages, Narayangarh block of Paschim Medinipur district.
- Participated as resource person and delivered lecture on "Modern Agronomic Management Technology" at Farmers' Training Programme under AICRP on Forage Crops & Utilization, BCKV, Kalyani at North 24 Parganas, Nadia, Bankura, Purulia respectively through online platform on google meet.

**Awareness development on 'seed production' of forage crops:** Seed production of Forage maize (cv. J 1006/African Tall) and ricebean (cv. Bidhan ricebean-2) by farmers for their own uses as seed for the next year.

#### **Transfer of technology**

- Distribution of Ricebean, Mungbean, Blackgram seeds to farmers for popularizing as legume cover crop for conservation of soil and water, nutrient enrichment and fodder production in drought prone areas of Nadia, South 24 Parganas, Jalpaiguri and Paschim Medinipur districts.
- Conducting on-farm trials/demonstration on forage production along with rice introducing the *Coix aquatica* and the model is acceptable to the farmers as they are getting forage in the low-lying areas of Nadia and South 24 Parganas district of West Bengal.
- Distribution of Ricebean and cowpea seeds to farmers for popularizing as an under canopy legume crop in nutrient enrichment and fodder production in the Mango, Banana, Litchi and Guava Orchards under different districts of West Bengal.
- Trainings to the farmers of different districts through online platform.

- Provided seeds of maize (cv. J1006), ricebean (Bidhan ricebean-1, Bidhan ricebean-2 & Bidhan ricebean-3), cutting of guinea & BN hybrid (cv. CO 3, CO 4 & CO 5) and Coix (cv. Bidhan coix-1) etc. to ICAR- CSSRI, Canning Town, South 24 Parganas and supplied breeder seed of Bidhan ricebean 2 to AICRP on FC & U, RPCAU, Pusa, Bihar, Agro-forestry Division, BAU, Ranchi, Jharkhand and KVK, Assam.
- Distributions of leaflets on forage crops among the farmers for dissemination of forage technology.
- Distribution of planting material (cuttings) of BN hybrid (Variety: CO 3, CO 4 & CO 5) to the resource poor farmers in Bankura, Purulia, Paschim Medinipur, Nadia, North-24 Parganas, Cooch Behar, Burdwan and Hooghly districts etc.

**Popular articles:** 2 (in bengali)

Act as reviewer of research papers of Journal of Crop and Weed, BCKV, Mohanpur, Nadia, West Bengal-741252 and ‘Oryza’, NRRI, Cuttack, Odisha.

## AICRP (FC&U), GBPUA&T, Pantnagar

### TSP-Forage Crops

- 04 Tribal villages – Tota Baria (Bajpur Block), Pachpera-Jhankat, Saroja and Pahseni (Sitarganj Block) were selected under TSP program and nearly 65 families were benefitted by providing free inputs i.e. forage seed and fertilizers for demonstration
- The field demonstrations 65 including on 20 on forage maize and 45 on forage sorghum were conducted during crop in *Kharif* season 2021
- The fertilizers including NPK and urea was also distributed among farming communities.
- Technical know-how and leaflets on forage crops were also distributed.

**FTD conducted** :25 (10 on maize and 15 on sorghum)

**Farmers' Meetings** : 13

**Group discussions** : 12

**Radio Talks** : 07 [Dr MS Pal – 04, Dr B Prasad – 03]

**Participation in National Conference/Workshop:** 07[Dr MS Pal – 02, Dr B Prasad – 05]

**Teaching courses:** 09[Dr MS Pal – 03, Dr B Prasad – 06]

**Research Guidance:**07 students [Dr MS Pal – 03, Dr B Prasad – 04]

### Publications

#### Books: 02

- Pal MS (2021). **Basic Mathematics and Altitude**. NIPA Publishing House, NewDelhi. 592p. (ISBN: 978-93-89907-02-5).
- Prasad Birendra. (2021). **All in one objective in Seed Science and Technology**. Jaya Publishing House (11 April 2021) New Delhi. ASIN: LV25W0928B. pp:340

#### Other publications

SN	Item	Dr M S Pal	Dr B Prasad	Total
1	Research Papers	04	01	05
2	Popular articles	03	01	04
3	Research Report	02	-	02
4	Book Chapter	-	05	05
	Total	09	07	16

#### Other assigned duties

##### Dr MS Pal

- Program Coordinator (AICRP-FCU)
- PG (Family) Hostel Warden

##### Dr B Prasad

- Deputy Coordinator: RAWA (2020-21, 2021-22)
- Coordinator of JRF tutorial classes in Plant Science (2021)
- Deputy Coordinator, certificate course on Seed Production Technology for 3 months.

#### Revenue generated

SN	Crop	Variety	Seed quantity (q)	Rate Breeder seed/q	Total value (in rupees)
1	Oat	UPO-212	110.0	7250	797500.00
2	Cowpea	UPC-625, UPC-4200, UPC-8705 and UPC-628	1.8	12900	23220.00
				<b>Total</b>	<b>820720.00</b>



## AICRP (FC&U), IGKV, Raipur

### Externally Funded Projects

(Rs. in lakh)

SN	Title	PI/Co PI	Funding source	Budget
1.	Demonstration and training on silage production	S. K. Jha, PI	VV fund	0.75
2.	Efficacy of Carfentrazone ethyl 40DF against sedges and broad leafed weed in DSR	S.K.Jha, PI	Sponsored	4.0
3.	bio-efficacy and phytotoxicity of BAS 625 04 H against grassy weed in transplanted rice and its residual effect on succeeding crop	S.K.Jha, PI	PPP (BASF India Limited)	6 .0
4.	Study the effect of improved corn hybrids on the quality of silage”	S.K.Jha, PI	PPP (Bayer Crop Science Ltd)	3.0
5.	Accelerated Genetic gain in Rice (AGGRi Alliance) Marginal Environment (ME)	Sunil Verma, PI	IRRI	15.0
6.	Identification of genetically superior species/varieties Morphological and DNA marker based identification of Bamboo in C.G.	Sunil Verma, Co PI	RNBM	5.0
7.	Global Rice Array: India partnership to strengthen global phenomics networks	Sunil Verma, Co PI	IRRI	8.0
8.	Study the effect of improved corn hybrids on the quality of silage” (from Bayer Crop Science Ltd)	Sunil Verma, Co PI	PPP	3.0
9.	Demonstration, Training and Production of silage to accelerate milk production in Chhattisgarh	Sunil Verma, Co PI	RKVY, Govt of India	50 .0
10.	Mainstreaming rice landraces diversity in varietal development through genome wide association studies: A model for large-scale utilization of gene bank collection of rice	Sunil Verma, Co PI	DBT	96.0
11.	Development of superior haplotype based near isogenic lines (Haplo-NILs) for enhanced genetic gain in rice	Sunil Verma, Co PI	DBT	110.0

### Teaching

	Level	Courses	Subject	Credit
<b>Dr S.K. Jha</b>				
	PG	AGRON -501	Modern Concept in crop production	3(3+0)
<b>Dr.Sunil Verma</b>				
	UG	ABT-5211	Food Safety and Standards	3(2+1)
		ABT-5121	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)
	PG	MBBD-508	Laboratory I: Biochemistry, physiology and analytical Techniques	3 (0+3)
		MBBD-521	Molecular Breeding	3(3+0)
		MBBD-528	Laboratory III: Molecular breeding, genomics & proteomics	3 (0+3)
	PhD	MBB-601	Advances in Plant Molecular Biology	3(3+0)
		MBB-605	Advances in Functional Genomics and Proteomics	2(2+0)

### Research Guidance

Subject	No of student registered
Agronomy (Dr S.K. Jha)	PG: Major advisor- 3, Co-advisor -6 Ph. D.: Major advisor- 2
Plant Breeding (Dr.Sunil Verma)	PG: Major advisor- 6 , Co-advisor -9 Ph. D.: Major advisor- 1 Co-advisor -6

**Linkage with other programmes and institutes:** AICRP(Dryland), CARS, Jagdalpur, Bastar (Chhattisgarh), AICRP(IFS), KVK's of Chhattisgarh

### Research Papers Published

Shesh J, Jha SK, Singh RK and Thakur S (2021) Effect of de-topping and nitrogen doses on economics of maize (*Zea mays* L.) Varieties *International Journal of Chemical Studies* 2021; 9(1): 2423-2425

### Books Chapters

Jha SK, Verma Sunil and Jha Deepti (2021) Tribal welfare programme through AICRP-FC&U, IGKV, Raipur under Tribal Sub Plan in Chhattisgarh" Published in Glimpses of tribal sub plan activities of All India Coordinated Research Project on Forage Crops and Utilization published by AICRP-FC&U ISSN 978-81-948917-3-4

### Extension Articles

Jha SK, Sahu RP and Verma SK (2021). gkbZM<sup>a</sup>ksiksud rduhd ls pkjk mRiknu] [ksrh] ebZ 2021, ICAR, Jhansi, India. pp 4 to 6 ISSN No 0023-1088.

### On line Training: Dr Sunil Verma

SN	Title of Programme	Duration	Organized by
1	Gender responsive plant breeding	12 days (17 <sup>th</sup> to 27 <sup>th</sup> May, 2021)	GREAT Project (Makerere and Cornell University)
2	Smart Breeding technology for Next gen Plant Breeding	04 Days (31 Aug-3 <sup>rd</sup> Sep, 2021)	CGIAR-IRRI-IGKV collaboration
3.	Breeding innovation for crop improvement to enhance genetic gains	21 Days (20 Oct-16 <sup>th</sup> Nov, 2021)	ISARC, Varanasi
4	NagriyNikay election training	1 Day (16 Dec, 2021)	Election Commission
5	NagriyNikay election training	1 Day (22 Dec, 2021)	Election Commission
6	Attained meeting on Improvement of elite Rice varieties for GI	1 Day (06 Aug, 2021)	DRS, IGKV, Raipur

### Extension packages

- Generated *package of practices of fodder crops production under Chhattisgarh Condition* and published for Extension workers in university dairy published by Director Extension Services, IGKV, Raipur
- Published package of practices of fodder crops production in **Krishi Yug Panchang 2021-2022** published by Director Extension Services, IGKV, Raipur
- Demonstrated the fodder *production technology in Agriculture Museum* at IGKV, Raipur published by Director Extension Services, IGKV, Raipur
- Developed *computer based programme* of fodder production technology for demonstration in museum
- Training for SMS, PC of KVK's* on fodder production
- Training for *REO, ADO, DDA of C.G. Government Agriculture department* on fodder production
- Stat policy draft on round the year fodder production submitted to Chhattisgarh government for *Gothan Development*

### **New Seed production Farm**

- New fodder seed production farm initiated at CARS, Bhatapara, KVK Mahasamund and KVK Durg with the help of local administration and RKVY.

### **Important visitor:**

- Visit of Hon'ble V.C. IGKV, Raipur along with Directors, Deans, PC, SMS and scientist in forage demonstration block.

### **FTD's**

- Fodder technology demonstration was conducted in Mahasamund, Bemetara and Raipur district of Chhattisgarh on fodder Maize perennial sorghum , BNH

### **Forage Garden**

- Kharif – Cowpea, Maize, Guar, Rice bean, Pearl millet, Sorghum, BN Hybrid, Dinanath grass, Guinea grass, Dhaman grass, Anjan grass
- Rabi –Berseem, Lucerne, Rye grass, Oat and Lathyrus
- Fodder tree and shrub of Munga, Albizia, Leucena, Desmenthus, Clitoria,

## **AICRP (FC&U), CAU, Imphal**

### **Extension Activities**

- Resource person: 3 ; Interaction programme: 6

**FTDs conducted: 45 in kharif 2021** [Maize (20); Sorghum (20); Bajra Napier hybrid (5)]

### **Research Guidance**

- M. Sc. (Agri.) as Major Guide – one ; M.Sc. as Co guide - Two

### **Courses taught**

- Dryland agriculture, Cropping system, Geoinformative and precision farming and Heritage Agriculture.- Number of topics- 75

**Publications** - Bulletin - 1

**Revenue generated: Sale of BxN slips** - Rs 10,000

### **Inputs supplied**

- Fodder maize seed, Hybrid Napier cutting, oats seed, Sorghum, chemical fertilizers, plant protection chemicals etc were supply to FTDs beneficiaries.
- Fodder seed (seasonal, perennial, perennial cutting etc) are made available at the AICRP on Forage Crops & Utilization, CAU, Imphal Centre.

### **University Assigned Activities**

- Assigned as Co-PI in the Project Sustainable Livelihood Development of Farmers under Farmers FIRST Programme component.
- Assigned as Co-PI in the Project ICAR-IGFRI NEH Component Project.
- Assigned as Co-PI in the Project Identification of Climate resilient food crops, traditional rice varieties of Manipur and their production enhancement through Scientific manipulation having least impact to climate Change.
- Assigned as committee chairman and members in many programme by CAU, Imphal
- Also actively involved in many activities in the CAU Head Quarter and Directorate of Research office of CAU, Imphal

## AICRP (FC&U), PAU, Ludhiana

### Publications:

#### Research papers: (14)

- Amandeep, Kapoor Rahul and Singh Gurpreet (2021) Genetic variability and association study from exotic germplasm accessions in fodder oats (*Avena sativa* L.) *Forage Res.*, 46 (4): 332-336.
- Atri Ashlesha and Cheema Harpreet Kaur. (2021). Field evaluation of sorghum genotypes against diseases and insect-pests. *Forage Research*. Accepted
- Atri Ashlesha, Cheema HK & Singh N (2021) Ecofriendly management of stem rot of berseem caused by *Sclerotinia trifoliorum*. *European Journal of Plant Pathology*. <https://doi.org/10.1007/s10658-021-02273-0> (NAAS rating: 7.58)
- Bhardwaj NR, Atri A, Rani U, Banyal DK and Roy AK. (2021). Weather-based models for predicting risk of zonate leaf spot disease in Sorghum. *Tropical Plant Pathology*, 46: 702-713. <https://doi.org/10.1007/s40858-021-00461-1> (NAAS rating: 7.34)
- Hilli Harshvardan J, Kapoor Rahul, Amandeep (2021) Hybridization and factors influencing seed set in oat. *Indian J Agri. Res.* DOI: 10.18805/IJARE.A-5813.
- Kapoor Rahul (2021) Notification of crop varieties and registration of germplasm, Oat Variety-OL 1896. *Indian J. Genet. Pl. Breed.* 81 (4): 613. (NAAS rating: 6.55)
- Kapoor Rahul (2021) Notification of crop varieties and registration of germplasm, Oat Variety-OL 1876-2. *Indian J. Genet. Pl. Breed.* 81 (4): 611. (NAAS rating: 6.55)
- Kapoor Rahul (2021) Notification of crop varieties and registration of germplasm, Oat Variety-OL 1874 *Indian J. Genet. Pl. Breed.* 81 (4): 612. (NAAS rating: 6.55)
- Kaur AD and Goyal M 2021 Metabolic adjustments in forage oats (*Avena sativa* L.) genotypes under different sowing windows. *Physiology and Molecular Biology of Plants* 27: 2709-2725 {<http://dio.org/10.1007/s12298-21-01118-8>} (NAAS rating- 8.39)
- Kaur AD, Goyal M, Kaur M and Mahal AK 2021 Interactive effect of planting dates and development stages on digestibility, qualitative traits and yield of forage oat (*Avena sativa* L.) genotypes. *Cereal Research Communication* <https://doi.org/10.1007/s42976-021-00217-2> (NAAS rating- 6.85)
- Kaur Gagandeep, Kapoor Rahul, Sharma Priti and Srivastava Puja (2021) Molecular characterization of oats (*Avena sativa* L.) germplasm with microsatellite markers. *Indian J. Genet. Pl. Breed.* 81(1): 144-147 (NAAS rating: 6.41)
- Kaur M, Oberoi HK and Ashlesha (2021). Interactive effects of fertility levels and genotypes on production potential, quality estimation and disease incidence of forage sorghum. *Forage Research* 47(1): 49-53.
- Kaur Maninder, Oberoi HK and Ashlesha (2021) Interactive effects of fertility levels and genotypes on production potential, quality estimation and disease incidence of forage sorghum. *Forage Research* 47(1): 49-53.

Kumari A, Goyal M, Mittal AD and Kumar R (2021). Defensive Capabilities of Contrasting Sorghum Genotypes against *Atherigona soccata* (Rondani) infestation *Protoplasma* <https://doi.org/10.1007/s00709-021-01703-4> (NAAS rating-9.36)

#### Popular/Extension articles

Kapoor Rahul and Kaur Maninder (November 2021). Hari vichbijojavi di vadherejhad den vali navikisam – OL 15. *Vigyanak Pashu Palan* 16(3): 19-20.

Kapoor Rahul, Sohu RS and Goyal Meenakshi 2021. Grow new berseem and oats varieties. *Progressive Farming* 57 (10): 35.

Kaur Maninder and Sohu RS (February 2022). Aaojaniye berseem de beezutpadandiyanbarikian. *Vigyanak Pashu Palan* 16(6): 25.

Singh Devinderpal and Goyal Meenakshi 2021. Hari vitchvadhkataian den valagairfalidarchara- Rai gha. *Vigyanik Pashu Palan*, 16(4): 10-11

Singh Devinderpal, Goyal Meenakshi and Kaur Maninder 2021. Punjab ryegrass-2: A new variety of ryegrass for nutritious fodder. *Progressive Farming*, 57 (10): 18.

Singh Devinderpal, Kaur Maninder and Oberoi Harpreet Kaur (January 2022). Garmiyan vich pashuan layi hare chariyan da suchaja prabandh. *Bahumantvi Kheti* 5(1): 10-13.

Singh Devinderpal, Sohu RS and Kaur Maninder (January 2021). Berseem de beej utpadan sambandhi zaroori nukte. *Bahumantvi Kheti* 4(10): 10.

#### Transfer of technology

**Lectures delivered:** Two lectures delivered to the young farmers on Production technology of *Kharif* and *Rabi* fodders.

**Research Guidance:** M. Sc.: 6; Ph.D.: 2

**FTDs conducted:** 20; Napier Bajra Hybrid (PBN 342) = 20

#### Seed/Planting material sold

Crop	Variety	B/S (q)	F/S (q)	C/S (q)	TL (q)	Total (q)
Cowpea	CL 367	0.20	-	-	1.30	<b>1.50</b>
Guinea Grass	PGG 518	0.20	-	-	3.00	<b>3.20</b>
Maize	J 1006	28.00	45.00	458.00	12.00	<b>543.00</b>
	J 1007	-	-	-	395.00	<b>395.00</b>
Bajra	FBC 16	2.10	6.90	38.00	11.00	<b>58.00</b>

#### External funded Projects: (2)

Project/Scheme	Funding Agency	Budget (in Lacs)	PI/Co-PI
Breeding for development of baby corn hybrids	ICAR-Indian Institute of Maize Research, Ludhiana	109.59	Dr. Meenakshi Goyal (Co-PI)
Development of low lignin mutants of sugarcane through mutagenesis and genome editing approach	CSIR, New Delhi	33.00	Dr Meenakshi Goyal (Co-PI)

## AICRP (FC&U), SKUAST-K, Srinagar

**Forage Technology Demonstration:** Twenty (20) numbers of FTD's were conducted on Fodder Maize through concerned KVKs to promote location specific technologies during Kharif 2021.

### Students Guided:

- M.Sc (Ag) in Agronomy -03 (01-Major Advisor & 02-Co-Advisor)
- M.Sc (Ag) in Seed Science and Technology -01 (Major Advisor)
- Ph.D (Ag) in Plant Breeding -01 (Major Advisor)

### Publications

Bhat RA, Ahmed Faizaan, Rashid Z & Others (2021). Evaluation of fodder Maize cv African Tall and its response to different rates of FYM and biofertilizers under cold arid conditions of Kargil. *International Journal of Plant and Soil Sciences*

Faisul-ur-Rasool, Bhat MI, Dar ZA, Lone BA, Sofi LA, Hakeem SA, Rashid Z, Nasseer S, Bashir S, Nisa S, Majeed. (2021). Legume-Maize intercropping system: An alternative pathway for sustainable agriculture. *International Journal of Plant & Soil Science*. 33(16): 87-92.

Fayaz A, Lone BA, Shilpa, Qayoom S, Dar NA, Dar ZA, Rasool F, Kumar S, Khuroo NS, Singh P and Andrabi N (2020). Calibration validation and evaluation of CERES Maize Model under temperate conditions of Kashmir, using DSSAT 4.7. *Current Journal of Applied Science and Technology*. 39(25): 1-7

Iqbal Badar, Ahmed Mushtaq, Rashid Z. & others (2021). Problems faced by vegetable growers in District Budgam, J&K. *Asian Journal of Agricultural Extension, Economics & Sociology*

Majid Shabeena, Kumar Amit, Nasseer Sabina, Bashir Sabiya, Mughal M. Najeeb, Dar Z A, Amin Asima, Rashid Zahida, Rasool Faisal and Hakeem Shafiq. (2021). Floral Biology of Exotic and Indigenous Almond (*Prunus amygdalus* Batsch.) Genotypes under Temperate Conditions of Kashmir Valley. *International Journal of Current Micro biology and Applied Sciences*. 10. (1):2807-2813 (NAAS rating 5.38)

Nasseer Sabina, Rashid Zahida, Bashir Sabiya, Rasool Faisal, Majeed Shabeena, Seerat-un-Nisa, S Iqbalhahida, Habib Mehfuza, Nagoo Shahina and Dar ZA. (2021). Preliminary evaluation of Maize (*Zea mays* L.) hybrids for grain yield under temperate conditions. *Current Journal of Applied Science and Technology*. 40(24): 46-50.(NAAS rating 4.71)

Nasseer Sabina, Shabeena M, Sabiya B, Zahida R, Seerat N, Dar ZA, Faisal R, Shahida I, Mehfuza H, Shafiq H, Shahina N and Gul Zaffar. (2020). Inheritance studies of aroma in aromatic Rice (*Oryza sativa* L.) of temperate areas of Kashmir valley. *Research and Reviews: A Journal of Biotechnology*. 10 (3): 5-8

Rashid Zahida, Khuroo NS, Ahangar Tanveer Ahmad, Majid Shabeena, Bashir Sabiya, Nasseer Sabina, Faisul-Ur-Rasool, Shafeeq H and Dar ZA. (2021). Precision Nitrogen management for enhancing yield and quality of fodder Maize. *International Journal of Plant & Soil Science*. 33(18): 236-241

Sabiya Bashir, Mohammad Najeeb Mughal, Zahida Rashid, Shabeena Majid, Sabeena Naseer, Zahoor A. Dar, Shafeeq A. Hakeem and Faisal Rasool. (2021). Screening of French Bean (*Phaseolus vulgaris* L.) Genotypes against *Alternaria* Leaf Spot Caused by (*Alternaria alternata*) under dryland conditions of Kashmir. *International Journal of Plant & Soil Science*. 33(23): 25-30

Zahida Rashid, Tanveer Ahmad Ahngar, Sabiya B, Sabina N, Khuroo NS, Shabeena M, Rakshanda A, Bhat Raies A, Faisul-Ur-Rasool, Shafeeq H, Dar ZA and Seerat Jan. (2021). Influence of plant growth regulators and micronutrients on growth, yield and quality of Sorghum under temperate conditions. *International Journal of Experimental Agriculture*. 43 (9):18-23.

### Manuals Published

- Protection of Plant Varieties & farmers Rights Act (An Overview): as contributor
- A Practical manual of precision agriculture: as contributor
- Field manual on profitable maize cultivation: as contributor
- Maize for fodder under temperate ecologies of Kashmir valley: as contributor

## AICRP (FC&U), RPCAU, Pusa

**Resource person:** Dr. Nilanjaya delivered lecture as expert on the topic *Bihar Pradesh ke liye upyukt chara faslein, prajatiyan evum bij keshrot* in an online training programme conducted by IGRI, Jhansi for Gaushalas on 27-28<sup>th</sup> July, 2021.

### Research Guidance

- Dr. Nilanjaya - one M.Sc. student and one Ph.D. student on Forage Oat and Forage cowpea, respectively
- Dr. Gangadhar Nanda, Agronomist has guided one M.Sc. student who worked on Fodder Oat and currently guiding/co-guiding three M. Sc. Students who are doing their Master's research work on Fodder pearl millet and Fodder Oat.

### Teaching

- Dr. Nilanjaya is having course load of nearly 20 credit hours per semester along with additional assignment of Officer-In- Charge (Academic) of Deptt. of Plant Breeding and Genetics as well as PG College of Agriculture (PGCA).
- Dr. Gangadhar Nanda is having course load of nearly 15 credit hours per semester along with additional assignment of Officer-In- Charge Fodder production at APRI, RPCAU, Pusa.

**Golden Jubilee Forage Garden:** Golden Jubilee Forage Garden was maintained at RPCAU centre consisting of 50 annual, perennial and fodder trees.

**Popular article:** One popular article entitled “रबी में हरे चारा फसलों की वैज्ञानिक खेती: आत्मनिर्भर पशुपालक” were published in Adhunik Kisan magazine of RPCAU, Pusa.

## AICRP (FC&U), BAIF, Urulikanchan

Kauthale VK, Patil SD and Takawale PS(2020) Influence of cutting- management practices for green fodder and grain production in dual-purpose forage crops. *Indian Journal of Agronomy* 65 (3): 348-351

Jade SS, Takawale PSand Bahulikar RA (2021). The utility of ISSRs for the identification of interspecific hybrids between pearl millet (*Pennisetum glaucum* [L.] R. Br.) × Napier grass (*Pennisetum purpureum* Schumach) *Plant Genetic Resources: Characterization and Utilization*; 19 (2): 104-111

### Important persons visit to AICRPFC centre

1. Dr. Ashok Kumar, Director, NBPGR, New Delhi
2. Dr. P. K. Pujari, Director, RC&IG, BARC, Mumbai

**Fodder Technology Demonstrations (FTDs):**25 Fodder Technology Demonstrations (FTD) were organised in three crops namely Forage bajra, B x N Hybrid and forage cowpea. Ten each FTDs of BAIF Bajra-1and BAIF Napier Hybrid-11 and five of forage cowpea var. EC 4216 were established at farmers field on 0.20 ha area in four blocks of Pune district. Monitoring of the demonstrations was done time to time and the data on green fodder yield was generated through field visits by Technical staff of the project.

### TSP activities

BAIF centre is actively engaged for the implementation of Tribal Sub Plan activity. The activity was under taken in four villages namely, Ozarde, Pimparipada, Ambapur and Kalamba in Nandurbar district. Initially the village level meetings were organised for the farmers to make aware them about TSP activity and identify the needs of farmers. Based on that the activities were planned which included raising of B x N hybrid (BNH-11) nursery, supply of farm inputs like seed, fertilizer etc.), small equipment and machineries, micro-irrigation unit, Training and capacity building of farmers. In all fifty tribal farmers have participated in the activity.

During the period, forty nurseries of BNH-11 were established at farmer's field. They were provided with planting material, Bioprom and chemical fertilizers through the project support. Field training programme were arranged for 50 farmers on preservation technologies particularly the silage making.

**Training conducted:** Delivered online webinar on “Fodder Resource Development” and around 70 representatives of various organization including BAIF were attended it.

### Seed/ planting material sold

Foundation and Truthful seed production activity of maize African Tall, BAIF Bajra-1 and cowpea var. EC 4216 was undertaken as organizational activity. Technical inputs for quality seed production were given by scientific staff of the project.

During the period 24.31q seeds of different fodder crops and 4.27 lakh planting material of cultivated perennial grasses was sold to the farmers by the organization.



## AICRP (FC&U), CSKHPKV, Palampur

### Awards/ Recognitions

#### Dr. D K Banyal

- Fellow Indian Society of Plant Pathologist 2021
- Member Indian Phytopathological Society Award Preliminary Evaluation Committee 2021

#### Dr. Naveen Kumar and Dr. D K Banyal

- Member Editorial Board Himachal Journal of Agricultural Research

### Research publications

- Arora A, Sood VK, Chaudhary HK, Banyal DK, Kumar S, Rajni D, Kumari R, Khushbu A, Priyanka and Yograj S(2021). Genetic diversity analysis of oat (*Avena sativa* L.) germplasm revealed by agro-morphological and SSR markers. *Range Mgmt. & Agroforestry* 42 (1): 38-48
- Bhardwaj NR, Atri A, Rani U, Banyal DK and Roy AK. (2021). Weather-based models for predicting risk of zonate leaf spot disease in Sorghum. *Trop. Plant Pathol.* <https://doi.org/10.1007/s40858-021-00461-1>(NAAS 7.34)
- Katoch Rajan and Tripathi Ankur (2021) Research advances and prospects of legume lectins. *Journal of Biosciences* 46:104 (1-30).
- Katoch Rajan, Tripathi Ankur, Hallan Vipin and Raj Ritu (2021). Cloning, characterization, expression analysis and agglutination studies of novel gene encoding  $\beta$ -D-galactose, N-acetyl-D-glucosamine and lactose binding lectin from ricebean (*Vigna umbellata*). *Molecular Biotechnology*. <https://doi.org/10.1007/s12033-021-00410-y>.
- Kumar N, Anuragi H, Rana M, Priyadarshini P, Singhal R, Chand S, Indu S, Sood VK, Singh S and Ahmed S. (2021). Elucidating morpho-anatomical, physio-biochemical and molecular mechanism imparting salinity tolerance in oats (*Avena sativa*). *Plant Breeding* 140(5): 835-850
- Kumar Naveen, Banta Nitish, Chahal Arvind, Kantwa SR and Singh Sukhchain.(2021). Production potential of dual purpose winter cereals as influenced by cutting management under mid hill conditions of Himachal Pradesh *Forage Res.* 47 (2):187-192
- Kumari A, Sood VK and Arora A. (2021). Effect of drought stress on physio-biochemical parameters in *Festuca* and *Lolium* genotypes. *Annals of Phytomedicine* 10(2): 494-501
- Mawar R, Mathur M, Rani U, Banyal DK, Awasthi DP and Roy AK. (2021). Effect of biological and chemical treatments on root rot incidence on cowpea and relationship with climatic parameters. *Multilogic in Science.* 12: 55-60
- Priyanka, Sood VK, Rana A and Kumar S. (2021). Genetic divergence among oat (*Avena sativa* L.) genotypes under dual purpose and seed yield related systems. *Biological Forum- An International Journal* 13(4): 1163-1169
- Rana A, Sood VK, Priyanka and Kumar S. (2021). Heterosis in oat (*Avena sativa* L.) for various agro-morphological, yield and quality traits. *Biological Forum- An International Journal* 13(4): 1149-1157

## Symposiums/conferences

- Banyal DK and Mallannavara AB (2021). Oat powdery mildew caused by *Blumeria graminis* and its management. In National Symposium on Strategic Plant Disease Management for Food security organized by INSOPP at CPRI Shimla on 6-7<sup>th</sup> December, 2021.
- Kumar Naveen, Agrawal RK and Sharma Tarun. (2021). Productivity and quality of fodder maize genotypes under different nitrogen management under sub- humid & sub-temperate rainfed conditions. 5<sup>th</sup> International Agronomy Congress, November 23-27, 2021, India: pp: 880-881
- Kumar Naveen, Agarwal RK, Singh Sukhchain and Thakur Deeksha. (2021). Effect of phosphorus levels on performance of promising entries of forage cowpea. 5<sup>th</sup> International Agronomy Congress, November 23-27, 2021, India: pp 861-862
- Priyanka, Sood VK, Kumar S, Rana A and Sanadya SK. (2021). Minimum data set to improve seed and fodder yield in Oat. In: Abstracts: 3rd International Conference on “Global Initiative in Agricultural, Forestry and Applied Sciences for Food Security, Environmental Safety and Sustainable Development (GIAFAS-2021)”. October 17-18, 2021, Dehradun, Uttarakhand, India. P.435
- Priyanka, Sood VK, Rana A, Gupta C, Verma S and Arora A. (2021). Biochemical evaluation of oat genotypes for  $\beta$ - glucan content and powdery mildew resistance. In: Abstracts: International conference on Future Challenges and Prospects in Plant Breeding. October 6-7, 2021, Coimbatore, P.129
- Rana A, Sood VK, Priyanka, Gupta C, and Chaudhary HK. (2021). Assessment of genetic diversity and combining ability estimates in oat (*Avena sativa* L.) for agromorphological, yield and quality traits. In: Abstracts: International conference on Future Challenges and Prospects in Plant Breeding. October 6-7, 2021, Coimbatore, P.198

## Participation in Seminar/ Workshop/ Group meetings

- Dr DK Banyal, attended National Symposium on Strategic Plant Disease Management for Food security organised by INSOPP at CPRI Shimla on 6-7<sup>th</sup> December, 2021. Acted as Co Chairman in Technical session – II and also presentation oral paper on Oat powdery mildew caused by *Blumeria graminis* and its management.
- Drs. Naveen Kumar, V K Sood, D K Banyal and Rajan Katoch attended
  - NGM of AICRP-FCU (*Rabi*) on 20<sup>th</sup> September 2021 through online mode.
  - Agriculture officer’s workshop *Rabi* during 28.12.2021 in the Directorate of Extension education, CSKHPKV, Palampur.

## Courses taught

Course No	Course Title	Cr. Hr.
Agro510	Agrostology and Agroforestry	2+1=3
LPM 121	Livestock Management	1+1=2
GP-509	Biotechnology for Crop Improvement (Shared)	2+1=3
GP-603	Genomics in Crop Improvement (Shared)	2+1=3
GP 591	Master’s Seminar	1+0= 1
GP 691	Doctoral Seminar	1+0= 1
Pl Path 518	Epidemiology and Forecasting of Plant Diseases	2+1=3
Pl Path 605	Principles and Procedures of Certification	1+0= 1
Biochem.121	Plant Biochemistry	1+1=2
Biochem.502	Plant Biochemistry	3+0=3

Students guidance (as major advisor)	:	MSc. = 8 ; Ph.D. = 12		
Forage technology consultations	:	6		
Lectures delivered to farmers and developent officers	:	2		
Forage technologies demonstrations	:	40		
Linkages developed with other programmes and institutes	:	Department of Animal Husbandry, HP Govt. AICRP (IFS); AICRP (Agroforestry)		
—				
Association in <i>Adhoc</i> Projects	:			
Title of the research project		Funding agency	Budget (lakhs)	Associated scientist
Assessment, validation and refinement of disease management technology for vegetable crops” from Japan International Cooperation Agency – JICA for 30 lakhs		JICA	30.0	Dr. D K Banyal (PI)
Mapping of geographical distribution and identification of new invasive <i>spp.</i> of insects-pest and diseases, simulated futuristic crop water foot prints scenarios for Major Crops, in Himachal Pradesh		DST	55.57	Dr. D K Banyal (Co-PI)
Propagation of planting stock of perennial high yielding grass species, fodder trees and their further dissemination on farmers’ fields as well as Gosadans’ in the state		Govt. of HP	5.54 crore	Dr Naveen Kumar (PI)
Revolving funds - Mega seed project (forage seed production) - Production of seed and seedlings of improved grasses and legumes		CSKHPKV	≈ 5-6 /year	Dr. Naveen Kumar & Dr. V K Sood

### AICRP (FC&U), KAU CoA, Vellayani

#### Publications Journal Papers - 5

- Usha CT, Agrawal RK, Anita MR and Mubeena P (2021). Carbon sequestration potential of grass based fodder production systems in humid tropics of Kerala. *Range management and Agroforestry* 42(1):104-109 (NAAS rating-6.37)
- Sruthy LT and Usha CT (2021). Standardization of seed rate and harvesting schedules for fodder crops grown under hydroponics system. *Range management and Agroforestry* 42(1):137-142 (NAAS rating-6.37)
- Mubeena P, Usha CT and Deepa Surendran (2021). Nutritional evaluation of predominant fodder trees and shrubs of Southern Kerala as a quality livestock feed. *Agricultural Science Digest*-p.1-5
- Arya S Nair and Gayathri G (2022). Optimization of doses for Ethyl Methane Sulphonate (EMS) and analysis of M1 generation of fodder cowpea [*Vigna unguiculata* (L.) Walp]. *Pharma Innovation* 11(2):593-598
- Amritha Varanya, Gayathri G, Arya K, Usha C Thomas, Pratheesh P Gopinath and Hulsure Priyanka. (2022). Genetic variability and genetic parameters analysis of 143 fodder cowpea [*Vigna unguiculata* (L.) Walp] germplasm accessions for yield and yield attributing traits. *Pharma Innovation* 11(2):2595-2600

### **Books-1**

‘Fodder crops- a handbook’ in Malayalam for publication from KAU as a part of the Golden Jubilee celebration of KAU,2021

### **Popular articles. malayalam-3**

- Fodder cowpea, page.no.57-58, Karshakan August 2021
- Ksheeravijayathinu kaalitheettavilakal in Malayalam, Pg. 18-20, Karshakan- August 2021
- Azolla as cattle feed –page no-35-36. Kerala Karshakan August 2021

### **Conference papers-5**

Mubeena P and Thomas Usha C (2021).Quality characteristics of major tree fodders in kerala as a ruminant feed. Second international web conference on Smart agriculture for resource conservation and ecological stability.ANRCM, India. Page no.79

Navya MV, Deepthi C and Thomas Usha C.(2021).Influence of varying levels and frequency of application of Magnesium nutrition on yield attributes of Bajra napier hybrid. Second international web conference on Smart agriculture for resource conservation and ecological stability.ANRCM, India. Page no.80

Deepthi C, Navya MV and Thomas Usha C.(2021). Performance of bajra napier hybrid varieties under varying shade levels. Second international web conference on Smart agriculture for resource conservation and ecological stability.ANRCM, India. Page no.49

Varanya Amritha, Gayathri G. Arya K., Thomas Usha C and Gopinath Pratheesh P.(2021). Principal Component Analysis for seedling characters in Fodder Cowpea [*Vigna unguiculata* (L.) Walp]. In: Book of abstracts of the International Conference on Future Challenges & Prospects in Plant Breeding (FCPPB 2021), 6-7 October 2021, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore, p. 74. Abstract No. PP1068

Nair Arya S, Gayathri G, Arya K, Thomas Usha C and Thomas Beena.(2021). Effect of mutagenesis on seed parameters in M2 generation of fodder cowpea [*Vigna unguiculata* (L.)Walp]. In: Book of abstracts of the International Conference on Future Challenges & Prospects in Plant Breeding (FCPPB 2021), 6-7 October 2021, Tamil Nadu Agricultural University, Coimbatore, p. 167. Abstract No. PP4059

### **Farmers Training classes handled as resource person-3 - Dr. Usha C Thomas**

- Fodder crop production- online - organized by TSS, CoA, Vellayani on 4.02.2022
- Fodder crop production- online – organized by Department of Agronomy, CoA, Vellayani on 11.02.2022
- Scientific fodder production offline – As a part of the Technology Week 2021-22 of KVK Wayanad on 27.12.2021 – 60 farmers participated

**Scheduled caste sub plan (SCSP):**Distributed fodder cuttings to each of the 25 beneficiary on 15.02.2022 in the Parakkode block in Kollam district

### Tribal subplan programme(TSP)

District	Activities	ST population benefitted (number)
Wayanad	Training on Fodder cultivation	60
	Distribution of layer hen(420 numbers)	60
	Distribution of Fodder cuttings	15
	Distribution of Kid goats	17
	Distribution of Spades	30
	Distribution of Sprayers	7

**TV live Programme-1** on topic Fodder cultivation on 29.10.2021 at 6.00 pm – Krishidarshan

**Radiotalk- 1**-Role of fodder grasses in soil and water conservation on 5.09.2021 at 6.50 pm

#### Research guidance

- PhD in Agronomy- 2
- M.Sc. (Agri.) in Agronomy-3
- M.Sc. (Agri.) in Plant Breeding and Genetics-4
- M.Sc. –Integrated Biotechnology-1

#### Teaching- Courses

##### Dr. Usha C Thomas

- Agro1101- Introductory Agro-meteorology & Climate change(1+1)-
- Agron 605- Irrigation management(2+1)
- DOF1101- Introductory Agriculture (1+0)

##### Dr. Gayathri G

- Pbgn3205 – Intellectual Property Rights (1+0)
- Pbgn2204 Crop Improvement-2 (1+1)
- Pbgn 1102- Principles of Genetics and Cytogenetics (Old Scheme) (2+1)
- GP520- Genetics (Remedial course for M.Sc.(Ag.Stat.)(2+0)
- GP518- Breeding of Tropical Crops(1+1)
- GP605- Advanced Plant Breeding Systems (2+0)

#### Other externally funded projects

- Revolving Fund scheme on ‘Planting material production in fodder crops’, funded by KAU – PI Usha C Thomas
- Kerala State plan project 2020-21 on ‘Performance Evaluation of Promising Fodder Varieties in Different AEUs in Kerala’– PI Dr. Usha C Thomas
- Kerala State plan project 2020-21 on ‘ Identification of *Stylosanthes* species for yield and quality suited for cultivation in Kerala’ - PI Dr. Gayathri G

#### Additional Duty

- Dr.Usha C Thomas as Assistant Warden, UG Ladies Hostel, College of Agriculture, Vellayani
- Dr.Usha C Thomas as the member of district level monitoring committee of State Horticulture Mission
- Dr. Gayathri G Assisting Academic Officer (UG) in day-to-academic matters of UG students and nodal officer for KSHCEC Higher Education Survey 2018-19

## HRD- Participation in Trainings

- Dr. Gayathri G attended a workshop on Data Analysis and Hands on Training in Statistical Methods conducted by the Department of Agricultural Statistics, CoA, Vellayani from 02/09 to 04/09

## AICRP (FC&U), MPKV, Rahuri

### Publications

#### Research papers

Magar PH, Damame SV and Pathan (2021). Effect of cutting management and nitrogen levels on silage quality and yield of maize. *Forage Res.* 47(3): 320-324.

Bhapkar SP, Surana PP, Shinde VB and Shinde GC (2021) Characterization and variability studies for green forage yield and associated traits in Forage cactus (*Opuntia spp.*) *Forage Res.* (47) 3: 292-298

Gaikwad S.A, Kulkarni SR, Landge SA and Wasu RS (2021) Effectiveness of biopesticides against oat aphid, *Rhopalosiphum padi* L. *International Journal of Chemical Studies* 9(1): 2629-2633

Gaikwad SA, Landge SA, Bhute NK and Pathan YK (2021) Seasonal incidence of aphid (*Rhopalosiphum padi* L.) and its natural enemies on forage oat (*Avena sativa* L.) *The Pharma Innovation Journal* 10(11): 241-245

#### Popular articles

Surana Prasanna, Landge Sandip & Shinde Vijaykumar (2021). “Rabi Hangamatil Chara Pike” ‘Shri Sugi Rabi-2021’ September, Page No.23-25.

Surana Prasanna, Shinde Vijay kumar and Andhale Mangal (2021). “Kharif Hangamatil Chara Pikanche Vyavsthapan” ‘Shri Sugi Kharif-2021’ June, Page No.46-48.

### Visits of important persons to AICRP FC, MPKV, Rahuri centre

- Hon. Bhagat Singh Koshyari, Governor of Maharashtra state and Chancellor, MPKV, Rahuri visited the exhibition stall of Forage and Grasses at ATIC Centre on 28.10.2021
- Dr. S. R. Gadakh, Director of Research, MPKV, Rahuri, Dr. V. L. Amolik, Head, Department of Botany, MPKV, Rahuri Dr. R. S. Wagh, ADR, MPKV, Rahuri and Dr. Vasant Pokharkar, DDR, MPKV, Rahuri visited forage project as on 8.10.2021 and 20.01.2022.
- Dr. C. S. Patil, Head, Department of Entomology, MPKV, Rahuri Visited Forage Project as on 27.01.2022
- Shri. Pramod Lavhale, Registrar, MPKV, Rahuri Visited Forage Project as on 19.01.2022

**Establishment of Forage Garden:** Established Seventy three different varieties of perennial Kharif and Rabi forage crops for Forage Garden at Rahuri Center under the guidance of Project Coordinator, IGFRI, Jhansi

### Research Guidance

- Prof. P.P.Surana :01 M.Sc. (Agri.) student in Plant Breeding
- Dr. S. V. Damame: 01 M. Sc. (Agri.) student in Biochemist
- Dr. S.A. Landge: 01 M. Sc. (Agri.) student in Entomology

### A) Training/Seminar Attended:

- Dr. S. A. Landge attended three weeks online training programme on “**Weather Based Agromet Advisory Services through ICT**” organized by Center for Advanced Agriculture Science and Technology (CAAST) for Climate Smart Agriculture and Water Management (CSAWM), MPKV, Rahuri under NAHEP of ICAR new Delhi during w.e.f. 02.08.2021 to 22.08.2021
- Attended the five day training on Honeybee at CBRTI, Pune during 04/10/2021 to 08/10/2021

### TV/Radio talks

- Radio talk :04
- Lectures to farmers in training programme: 04

### Seed Production Programme-Kharif-2021

SN	Crop (Variety)	Stage of seed	Target Area (ha)	Actual Sown Area (ha)	Target (q)	Quantity Produced (q)
1	Maize (African Tall)	Nucleus	0.10	0.15	1.00	In field
		Breeder	1.00	1.40	10.00	11.55
		Truthful	1.00	1.00	10.00	14.40
2	Cowpea (Shweta)	Nucleus	0.05	0.05	0.04	0.04
		Breeder	0.05	0.05	0.50	0.05
		Truthful	0.15	0.20	1.50	1.00
3	Cowpea (EC-4216)	Breeder	0.80	0.80	2.00	5.00
4	Bajra (Giant Bajra)	Nucleus	0.10	0.10	0.07	0.05
		Breeder	0.30	0.20	0.20	0.07
		Truthful	2.50	0.40	0.40	2.45

### Farmers and Govt. Staff of Agril. Department of Maharashtra State

- No. of Farmers visited to farm during *Kharif* 2021 : 130
- No. of Govt. officers/staff visited *Kharif*-2021 : 15

### Product Testing of Forage Crops during Kharif 2021

SN	Company	Crop	Particulars	No. of sample
1	Crystal Crop Protection, Aurangabad	Sorghum	Fodder quality of sorghum hybrids.	10
2	Bayer Crop Sci. Ltd, Thane	Maize	Field Testing Trial of Fodder Maize hybrid	01
3	UPL Ltd Mumbai	Maize	Efficacy of different insecticides against Fall Army Worm	03
4	UPL Ltd Mumbai	Maize	Field Testing Trial of Fodder Maize hybrid	01
5	Nuziveedu seeds Ltd. Telangana	Maize		01
6	Bayer Crop Sci. Ltd, Thane	Maize		01
7	C.P.Seeds (i) Pvt. Ltd, Bangalore	Maize		02

### AICRP (FC&U), PJTSAU, Hyderabad

#### Research papers

Vijay Kumar P, Balazzii Naaiik RVT, Rajkumar BV, Swetha M, Bhavya manjari M (2021) Front line demonstration on IPM and Non-IPM approaches against the incidence of pod borer complex in pigeon pea in Northern Telangana Zone. *Journal of Entomological research* 45(1):115-118

Manjari MB, Balazzii Naaiik RVT B, Rajkumar BV, Swetha M, Kumar PV, Suresh, M, Mohan M and Veni CP (2021) Performance assessment of work efficiency of easy transplanter for reducing drudgery among farm women while transplanting of tomato seedlings. *Multilogic in Science*. 10(36): 1613-1618.

#### Popular articles

Shashikala T, Shanthi M, Balazzii Naaiik RVT, Shailaja K and Sukruth Kumar T (2021) Paadi rythula palita varum-Hydroponics paddathilo pashugrasa sagu. *Vyavasayam* 7(11):42

Sukruth Kumar T, Balazzii Naaiik RVT and Shashikala T (2021). Vesavilo pashugrasa jonna sagu. *Vyavasayam* 7(2):41

Shanthi M, Shashikala T, Sushila R, Balazzii Naaiik RVT and Sukruth Kumar T (2021) Hydroponic paddathilo pashugrasa uthpathi-Nanyatha *Vyavasayam* 7(2):42

Suresh M, Balazzii Naaiik RVT, Rajkumar BV, Vijay Kumar P, Swetha M, Bhavya Manjari M & Mohan M (2021) Nelanu sajeevamgaa unchandi nela jeeva vaividhyanni rakshinchandi *Rythu bandhu* (11) 03: 14-15.

Srilaxmi B, Balazzii Naaiik RVT, Rajkumar BV, Suresh M, Swetha M, Bhavya Manjari M, Vijay Kumar P & Mohan M (2021) Maamidi Putha dashalo paatinchavalasina jaagrattalu *Rythu bandhu* (11)03: 16-17.

Mohan M, Balazzii Naaiik RVT, Vijay Kumar P, Rajkumar BV, Swetha M, Bhavya Manjari M, & Suresh M (2021) Manchi neeti chepalalo vacche saadhaarana vyadhulu – yajamaanya paddatulu *Rythu bandhu* (11)03:10-11.



### Details of FTDs distributed during *kharif* 2017-18

S. No	Crop	No. of FTDs
1	APBN-1	21
2	Cowpea	06
3	Maize	20
4	Bajra	05
<b>Total</b>		<b>52</b>

**Tribal Sub Plan:** Organized one (01) field day in NagarKurnool and training given on Maize Fodder production techniques and Perennial fodder production techniques to 200 farmers

**Conferences attended:** All staff members attended following conferences

SN	Date	Title	symposium/ conference
1	12-14 July 2021	National Initiative for Accelerating Fodder technology Adoption	ICAR, IGRI, Jhansi
2	16-19 September 2021	Global conference on innovative approaches for enhancing water productivity in Agriculture including horticulture	ASM Foundation, New Delhi & PJTSAU, Hyderabad
3	25-27 November 2021	Agri Innovations to Combat Food and Nutrition Challenges	Indian Society of Agronomy and PJTSAU

### Meetings attended

Scientist	Meeting	Date	Venue
Dr.RVT.Balazzii Naaiik	ZREAC 2021	26-27 April, 2021	RARS, STZ, Palem
Dr.T.Shashikala	ZREAC 2021	23-24 March, 2021	RARS, NTZ, Adilabad
Dr.T.Sukruth kumar	ZREAC 2021	26-27 March, 2021	RARS, CTZ, Warangal
Dr. T.Shashikala	National seminar on Seed production – Quality	6-7 October, 2021	On lineby TSSDC, Govt of Telangana
All scientists	State Level Annual Workshop meeting	1-2 May, 2021	On line
All scientists	attended <i>kharif</i> NGM	1 June, 2021	online
All scientists	attended <i>rabi</i> NGM	20 September, 2021	On line
Dr.RVT. Balazzii Naaiik & Dr.T.Sukruth Kumar	Pre-ZREAC meeting	3-4 March, 2021	at RARS, Palem
Dr.T.Shashikala	Pre-ZREAC meeting	1-2 March, 2021	at RARS, Palem

### TV Programmes

SN	Scientist	Title of programme	Channel	Telecast date
1	Dr.T.Shashikala	Vesavi pasugrasa pantala sagu	DD Yadagiri, live-in	27.01.21
2	Dr.T.Shashikala	Pasugrasa pantallo kothha rakalu-Sagu suchanalu	DD Yadagiri live in	20.05.21
3	Dr.T.Sukruth kumar	Silage pramukyatha	T Sat live in	27.09.21

### Important persons visiting the centre

- **20.08.2021:** University Head, Department of Agronomy Dr.Venkata Ramana visited our centre for technical inspection.

- **14.01.2021:** Dr.A.K.Roy, Project Coordinator visited our centre for monitoring. Visited FTDs as well as field trials during the stay.
- **02.02.21:** Visit of Associate Director of Research, STZ, Dr. Dhamodhar Raju on technical inspection.

#### **Student Guidance/Teaching**

<b>S.No</b>	<b>Major advisor</b>	<b>Minor advisor</b>	<b>Courses taught</b>
Dr.T.Shashikala	1	-	-
Dr.RVT.Balazzii Naaiik	1	1	-
Dr.T. Sukruth Kumar	1	2	1

#### **Guest lectures**

<b>SN</b>	<b>Scientist</b>	<b>Organizers</b>	<b>Topic of lecture</b>	<b>Venue</b>	<b>Date</b>
1	Dr. T. Shashikala	RFC, Pahadisharif, Hyderabad	Enhancement of fodder production for the farmers	RFC, Pahadisharif, Hyderabad	24.02.2021
2			Enhancement of fodder production		15.03.2021

**25-28.11.2021:** Exhibited a stall on fodder crops on occasion of International Conference held by Indian Society of Agronomy at PJTSAU.

## AICRP (FC&U), OUAT, Bhubaneswar

### Research Publication

Dhal P, Sahu G, Dhal A, Mohanty S and Dash SK (2021). Priming of Vegetable Seeds: A review. *The Pharma Innovation Journal* 11 (2): 519-525

### Presentation in seminar

Dhal P, Dash SK, Mohanty S and Dhal A (2021). Influence of Plant Growth Regulators on Seed Health and Vigour in Okra. Presented in 6<sup>th</sup> International Conference in Hybrid mode on GRISAAS-2021; on December 13-15, 2021 at SKRAU, Bikaner, Rajasthan

### Teaching - Dr. Arabinda Dhal

- Fundamentals of Plant Pathology PPT-121 BSc (Ag) 1<sup>st</sup> Year 2<sup>nd</sup> Semester (Credit Hours: 2+1) Practical only
- Integrated Pest & Disease Management PPT-312 BSc (Ag) 3<sup>rd</sup> Year 5<sup>th</sup> Semester (Credit Hours: 2+1) Theory
- Diseases of Field & Horticultural Crops-I PPT-313 BSc (Ag) 3<sup>rd</sup> Year 5<sup>th</sup> Semester (Credit Hours: 2+1) Theory
- Diseases of Field & Horticultural Crops and their management-II PPT-324 BSc (Ag) 3<sup>rd</sup> Year 6<sup>th</sup> Semester (Credit Hours: 2+1) Theory

**Students Guided:** MSc Ag in Plant Pathology – 1

Management of root rot and wilt disease in forage cowpea and its effect on nodulation by K.M.Bhawani – Chairman: Dr. Arabinda Dhal

### Other Activities of Dr. A.Dhal

- Assistant Warden, Hostel No. 2, OUAT, Bhubaneswar
- Executive Member Literacy Society, College of Agriculture, Bhubaneswar
- Training Programme on “Disease symptoms & effective management in pulses and oilseed crops, organized by SITE, Government of Odisha on 15.11.2021 and 10.01.2022- By Dr. A.Dhal
- Impart Rabi training programme to FTAs of KCC as resource person on 10.11.2021 organized by Dean, Extension Education, OUAT, Bhubaneswar
- Participated in 29<sup>th</sup> Annual Conference of Agricultural Economics Research Association on the topic “Public Policies and Agricultural Transformations in India” on 27-29<sup>th</sup> October 2021 organized by Department of Agricultural Economics, OUAT, Bhubaneswar

### Change in Directory

Orissa University of Agriculture & Technology, Bhubaneswar-751003 (Odisha)			
Dr. Arabinda Dhal	Jr. Pathologist	09937193430	foragebbsr@gmail.com
Dr. S. Sahu	Dean of Research	0674-2397692	deanresearch_03@hotmail.com

## AICRP (FC&U), AAU, Anand

**Region specific Crop Production technologies generated:** Following recommendations for the farmers communities have been made in the SAUs Joint Combined AGRESCO meetings.

- The farmers of middle Gujarat agro-climatic zone, For effective weed management with better seed yields as well as net return in oats for seed purpose can be achieved by one hand weeding at 20 DAS fb IC at 40 DAS or pre emergence application of pendimethalin @ 0.9 kg ha<sup>-1</sup> fb provide effective weed management. (2016-17)
- BN Hybrid + Lucerne based perennial cropping system is recommended which fetched higher net monetary return and BC ratio. (In Central Zone). (2016-17)
- The farmers of middle Gujarat agro-climatic zone growing lucerne (Anand 2) are advised to have last cut of green forage at 3rd or 4th week of February and leave for seed production, followed by foliar spray of 0.02% boron at flower initiation stage and 2nd spray at 10 days after 1st spray along with all recommended practices to get higher yield and net return. (2017-18)
- The farmers of middle Gujarat agro-climatic zone growing guinea grass are advised to grow variety Co (GG) 3 and apply 50 kg N/ha after each cut upto three years to obtain higher green forage, dry matter, crude protein yields and net return. (Basal dose of FYM 10 t/ha, 50 kg N/ha and 40 kg P<sub>2</sub>O<sub>5</sub>/ha should also be applied). (2017-18)
- The farmers of Middle Gujarat agro-climatic zone growing multi cut forage sorghum variety CoFS29 for seed production purpose are advised to apply 40 kg N/ha and 40 kg P<sub>2</sub>O<sub>5</sub>/ha as basal and 120 kg N/ha in three equal splits each at 30 days after sowing, at 50 DAS (i.e., after first cut) and at 30 days after first cut for obtaining higher seed yield and net return. (2018-19)

### Bio-chemical analysis of forage plant samples for quality evaluation during *kharif*-2021

Total 4370 Forage plant samples were analyzed for quality evaluation of different trials of Plant breeding and Agronomy of Main Forage Research Station, Anand as well as Godhra and Bikaner centre center during the *Kharif* -2021 season of year.

Discipline	Total No. of Expts.	No. of samples analysed for				
		DM%	CP%	ADF	NDF	HCN
Plant Breeding	20	888	888	180	602	304
Agronomy	03	150	150	66	150	0
Bikaner Centre	09	0	132	0	0	0
Godhra Centre	01	30	30	0	0	0
PG Trial	02	200	200	200	200	0
<b>TOTAL</b>	<b>35</b>	<b>1268</b>	<b>1400</b>	<b>446</b>	<b>952</b>	<b>304</b>

**Number of Trials Conducted/Allotted (*Kharif*-2021)**– 14 AICRP and 10 state trials were conducted successfully as allocated

**Breeder Seed Production: (As per National & State indents)**

Sr. No.	Crop	Quantity (kg)		
		ICAR	State	Total
1.	Forage Sorghum var. GAFS 11	00	50	50
2.	Forage Sorghum var. GAFS 12	00	60	60
3.	Forage Bajra var. GAFB 4	00	90	90

**Revenue generated - ₹ 57,600 [Receipt (01.04.2020 to 28.02.2021)]**

**Transfer of technology**

**FTD:** The FTD of *Hybrid Napier*; Variety: Co-3 have been arranged on farmer's field for wide publicity among the farmers during *Kharif-2021*.

SN	Name of farmers	SN	Name of farmers
1.	Kiritbhai J. Chavada	6.	Santubhai P. Patel
2.	Manjulaben M Patel	7.	Nenaji Mangaji Thakor
3.	Kanaksinh R. Chavda	8.	Balvantsing D. Rathod
4.	Rajendrasing R. Vaghela	9.	Vishnubhai C. Rathod
5.	Shivabhai L. Patel	10.	Rajendrabhai R. Rathod

**Golden Jubilee Forage Garden:** In forage garden of *Kharif-2021*, there were two types of forage crops like seasonal forage crops (43 varieties) and perennial forage crops (19 varieties). Among these, total 16 varieties of sorghum, 6 varieties of pearl millet, 12 varieties of cowpea, 5 varieties of maize and 4 varieties of rice bean were sown as seasonal forage crops. In perennial crops, 2 varieties of marvel grass, 2 varieties of *Cenchrus* spp, 1 variety of para grass, 3 varieties of Guinea grass and 10 varieties of hybrid napier.

**Research Paper published: Eight**

Rathod PH, Shah PG, Parmar KD and Kalasariya RL (2022). The fate of fluopyram in the soil-water-plant ecosystem: a review. *Reviews of Environmental Contamination and Toxicology*, 260(1):1-19. DOI:10.1007/s44169-021-00001-7.

Farooq TH, Kumar U, Yan Y, Arif MS, Sakoor A, Tayyab M, Rathod PH, Altaf MM and Wu P (2022). Receptiveness of soil bacterial diversity in relation to soil nutrient transformation and canopy growth in Chinese fir monoculture influenced by varying stand density. *Trees-Structure and Function*. DOI: 10.1007/s00468-022-02278-0.

Patel HK, Rathod PH, Gohil DP, Padheriya D and Raiyani AM. (2021). Response of nitrogen levels on growth, yield and quality of single cut oat cultivars. *International Journal of Agriculture Sciences* 13 (4): 10748-10750.

Shiyal Vikram, Patel HK, Rathod PH, Patel PM, Raval CH and Patel AP (2021). Integrated nutrient management on fodder dual purpose oat (*Avena sativa* L.). *Journal of Plant & Soil Science* 33 (16): 80-86.

Patel HK, Rathod PH, Shroff JC and Patel PM (2021). Green fodder yield and quality of fodder maize as influenced by seed priming. *Green Farming*. 12 (1&2): 46-48.

Shroff JC, Patel HK, Patel PM and Rathod PH (2021). Effect of nitrogen levels on yield and quality of Guinea grass under middle Gujarat condition. *Green Farming*, 12 (1&2): 35-38.

Patel HK, Rathod PH and Padheriya DR (2021). Effect of nitrogen levels on forage yield and quality of multi cuts oat cultivars. *Journal of Plant & Soil Science*, 33(21): 9-13.

Sidapara Mayank P, Gohil DP, Patel Oarthik U and Sharma Deepak D (2021). Heterosis studies for yield and yield components in okra [*Abelmoschus esculentus* (L.) Moench]. *Journal of Pharmacognosy and Phytochemistry* 10(1):1268-1275.

#### **Group Meeting/Training/Seminar/Web Conference Attended/Participated: Nine**

- Gohil DP, Patel HK and Rathod PH attended online NGMKharif-2021 held on 1<sup>st</sup> – 2<sup>nd</sup> June, 2021.
- Gohil DP, Patel HK and Rathod PH attended online NGM Rabi-2021-22 held on 20<sup>th</sup> September, 2021.
- Patel HK has participated in national level webinar on “Secondary agriculture for agricultural income enhancement” on 19 April 2021.
- Patel HK has participated in a webinar on *Madhamakhi palan* during 19-20 June 2021.
- Patel HK has participated in online orientation programme on J-Gate and CMIE database during 16-17 July 2021.
- Patel HK has participated in webinar on “*Polyhouse na pakoma Rog-Jivat vyavsthan*” on 23 July 2021.
- Patel HK has participated in online seminar on “Analysis of pesticide residues in food and agricultural commodities” on 27 August 2021.
- Patel HK has participated in online seminar on “Climate resilient agricultural production system through organic management” during 20-21 October 2021.
- Rathod PH has participated in online national workshop on “Intellectual property rights and innovations” organized by IPR cell, AAU and Rajiv Gandhi National Institute of Intellectual Property Management on 27 October 2021.

#### **FTD conducted: Fourteen**

#### **Externally funded project: Two**

- A project entitled “Quality Seed Production in Fodder Crops” under Fodder Development Programme funded by Govt. of Gujarat, Gandhinagar. **B.H. 18457-28**
- Evaluation of performance of chicklet variety fund

**Extension activities:** Delivered Phone in live online programme on “Chomasu Ghaschara Pakoni Kheti” in the Doordarshan Programme, Ahmedabad on Date: 02.06.2021.

- Delivered lectures on “Ghaschara Pakonu Gunvatta Sabhar Beej Utpadan” in the course “Diploma in Agricultural Extension Services for Input Dealers (DAESI)” organized by Institute of Distance Education (IDEA), AAU, Anand on Date: 28.01.2022.

- Delivered lectures on “Ghaschara Pakoms Sanklit Jivat Vyavshthannu Mahatva” to the farmers participated in the training programme organized by Department of Entomology, BACA, AAU, Anand on Date: 20.02.2022.

### P.G. Teaching during 2021-22

Faculty	Course No.	Title of the course	Credit
Dr D. P. Gohil	GP 511	Breeding for cereals, forage and sugarcane	2 + 1
Dr Hiren K. Patel	AGRON 511	Agronomy of forage crops	2 + 1
	AGRON 601	Current trends in Agronomy	3+0
	PGS-506	Disaster management	1 + 0
	ABM-519	Fertilizer technology and management	2 + 0
	e-Course-3	Usefulness of disaster management in agriculture, Distance Education at IDEA, AAU, Anand	1 + 0
Dr Paresh H. Rathod	Soils 510	Remote sensing and GIS techniques for soil and crop studies	2 + 1
	Soils 512	System approaches in soil and crop studies	2 + 1
	Soils 516	Introduction to agrochemicals	2 + 1
	NRMH 1.1 (UG, COH)	Fundamentals of soil science	2 + 1
	NRMH 4.7 (UG, COH)	Soil, water and plant analysis	1 + 1

### P.G. Student allotted to faculty of MFRS, Anand

Major Guide	Student	Degree	Status
Dr D. P. Gohil	Parmar Sumit V.	M. Sc. (Agri.)	Completed
	Borkhatariya Tejas V.	M. Sc. (Agri.)	Continue... (4 <sup>th</sup> Sem.)
	Rathod Parth Kanubhai	M. Sc. (Agri)	Continue... (1 <sup>st</sup> Sem.)
Dr Hiren K. Patel	Patel Harsh K.	M. Sc. (Agri)	Completed
	Nagar Kuldeep	M. Sc. (Agri)	Continue... (1 <sup>st</sup> Sem.)
	Badi Aehamadraza	M. Sc. (Agri)	Continue... (1 <sup>st</sup> Sem.)
	Dudhat Dinesh	M. Sc. (Agri).	Continue... (1 <sup>st</sup> Sem.)
	Nandaniya Bhavna	M. Sc. (Agri).	Continue... (1 <sup>st</sup> Sem.)
	Padheriya Dhaval	Ph. D. (in-service)	Continue... (1 <sup>st</sup> Sem.)
Dr Paresh H. Rathod	Jhala Ila Ranjitsinh	M. Sc. (Agri).	Continue... (1 <sup>st</sup> Sem.)

## WEATHER REPORT FOR KHARIF- 2021

The weather report of 'AICRP Forage Crops and Utilization' coordinating, cooperating and voluntary centers across different zones of the country during *Kharif*-2021 has been presented in this section. The weather parameters from 26<sup>th</sup> Standard Meteorological Week (June 25, 2021) to 44<sup>th</sup> Standard Meteorological Week (November 04, 2021) were taken into consideration, which covers the *Kharif* 2021 season for all the testing locations for trial conduction. The meteorological data recorded at different centers is presented in tables [M1 to M14] and graphically represented in succeeding pages. During the reporting period, weather variations are clearly visible in maximum and minimum temperature, rainfall, rainy days, relative humidity and sunshine hours in different agro-climatic zones, which demonstrated varied impact on establishment, growth, yield and quality of different forage crops, varieties and cropping systems. The weather parameters have also shown close correlation with the incidence and surveillance of insect-pest and diseases of forage crops.

### Temperature

In Hill zone, meteorological data from Srinagar, Palampur and Almora has been compiled. Srinagar center recorded wide variations in temperature particularly in  $T_{\min}$ . On seasonal mean basis, Srinagar remained the coolest, recording mean minimum temperature ( $T_{\min}$ ) of 15.0<sup>0</sup>C followed by Almora (16.8<sup>0</sup>C). Almora recorded highest mean maximum temperature ( $T_{\max}$ - 29.2<sup>0</sup>C). Srinagar witnessed the coolest week with low temperature of 2.7<sup>0</sup>C during 44<sup>th</sup> SMW, however, highest  $T_{\max}$  (32.6<sup>0</sup>C) was also recorded at Almora during 27<sup>th</sup> SMW.

In North-East zone, data has been compiled from Ayodhya, Ranchi, Kalyani, Jorhat, Bhubaneswar and Imphal centres. Imphal recorded lowest  $T_{\min}$  (15.5<sup>0</sup>C) during 44<sup>rd</sup> SMW. On the basis of mean  $T_{\min}$  of the season, Imphal and Ranchi were coolest recording 21.5 and 23.5<sup>0</sup>C whereas, Bhubaneswar and Ayodhya recorded highest mean  $T_{\max}$  (33.1<sup>0</sup>C). Maximum day temperature was also recorded at Jorhat (35.6<sup>0</sup>C) during 37<sup>th</sup> SMW. Least variation for minimum and maximum temperature over the season was observed at Imphal followed by Ayodhya.

In North-West zone, data has been presented from Hisar, Bikaner, Pantnagar, Udaipur and Ludhiana centers. Maximum temperature was noted at Hisar (41.4.8<sup>0</sup>C) during 27<sup>th</sup> SMW. The highest mean  $T_{\max}$  (36.9<sup>0</sup>C) was recorded at Bikaner. The mean  $T_{\min}$  was nearly equal and ranged between 20.5 to 25.5<sup>0</sup>C at all the centres.

In Central zone, data has been reported from Jhansi, Anand, Rahuri, Urulikanchan, Jabalpur, and Raipur. Remarkable variations in  $T_{\max}$  and  $T_{\min}$  was been observed at different centre. Jabalpur recorded the lowest  $T_{\min}$  (11.0<sup>0</sup>C) followed by Jhansi (12.6<sup>0</sup>C) during 44<sup>th</sup> SMW. The highest  $T_{\max}$  was also recorded at Jhansi (40.8<sup>0</sup>C) during 27 SMW. Urulikanchan recorded lower mean  $T_{\min}$  (20.0<sup>0</sup>C) over the season as compared to rest of the locations. Jhansi recorded highest mean  $T_{\max}$  (33.5<sup>0</sup>C) during the season among all centres in the zone. The least difference in minimum and maximum temperature over the season was noted at Urulikanchan.



In South zone, data has been reported from Hyderabad, Mandya, Coimbatore, Vellayani and Dharwad centres. The lowest  $T_{\text{Min}}$  was recorded at Mandya ( $17.5^{\circ}\text{C}$ ) during 29<sup>th</sup> SMW followed by Hyderabad ( $17.9^{\circ}\text{C}$ ) in 43<sup>th</sup> SMW. The highest day temperature was recorded at Hyderabad centre ( $33.4^{\circ}\text{C}$ ) during 27<sup>th</sup> SMW. On the seasonal mean basis, Vellayani and Coimbatore experienced higher mean  $T_{\text{Max}}$  but was comparable to other locations in the zone. The lowest mean  $T_{\text{min}}$  ( $19.1^{\circ}\text{C}$ ) was observed at Mandya followed by Dharwadcentre ( $20.4^{\circ}\text{C}$ ). The minimum variation in mean ( $T_{\text{max.}}$  and  $T_{\text{min.}}$ ) temperature was observed at Vellayani, whereas, maximum variation was recorded at Hyderabad.

## Rainfall

India, being vast country with diverse agro-climate condition witnessed wide variation in total rainfall received during *Kharif* 2021 season, ranging from 33.0 mm at Srinagar to 1920.8 mm at Palampur. Similarly wide variation was recorded in number of rainy days recorded between 2 at Srinagar to 84 at Kalyani. In Hill zone, Palampur received highest rainfall (1920.8 mm) followed by Almora (774.5 mm in 49 rainy days). In North East zone, Bhubaneswar received highest rainfall (1229.3 mm) followed by Imphal (763.9 mm) and lowest being at Kalyani (119.6 mm). The maximum numbers of rainy days were recorded at Kalyani (84 rainy days) and lowest being at Ayodhya (35 rainy days). In North-West zone, Pantnagar received highest rainfall (1003.6 mm) in 30 rainy days followed by Ludhiana (803.6 mm) in 33 rainy days and lowest being at Bikaner (267.2 mm in 20 rainy days). In Central zone, maximum rainfall (859.6 mm) in 46 rainy days was received at Raipur followed by Jhansi (775.8 mm) and lowest being with Urulikanchan (318.0 mm). In South zone, Vellayani received maximum rainfall (1178.5 mm) in 74 rainy days followed by Hyderabad (781.0 mm in 40 rainy days) and lowest total rainfall was at Coimbatore (269.0 mm in 30 rainy days).

## Relative Humidity (RH)

Being the rainy season, in general higher mean RH values were recorded at all the centres. Jorhat recorded highest mean morning RH ( $RH_1$ ) of 93.9% whereas highest mean evening RH ( $RH_2$ ) was observed at Vellayani centre (86.7%). In Hill zone, the mean morning RH was highest at Almora (89.9%). Srinagar recorded minimum morning RH (54.5%) on mean seasonal basis. The maximum difference in morning and evening RH was observed at Almora centre. In North-East zone, relatively higher RH was recorded at all centres. Higher mean RH of 93.9 and 93.7% were noted at Jorhat and Kalyani during morning, respectively. Minimum RH during morning hours was recorded at Imphal (65.9%), whereas, lower evening RH (69.3%) was recorded at Ayodhya. In North-West zone, RH ranged from 91.9 to 72.1 % in morning hours and between 75.3 to 43.7% in afternoon. The lowest mean RH during morning (91.9%) as well as evening hours was recorded at Udaipur (75.3%). Lowest mean RH during evening hours was recorded at Bikaner (43.7%). In Central zone, maximum mean RH in morning hours (88.9%) was recorded at Raipur whereas, lowest RH was noted at Anand (87.8%). As regards to mean RH during evening hours, maximum mean RH in (66.9%) was recorded at Urulikanchan. The maximum variation between minimum and maximum RH was noted at Rauri (86.4 and 59.3%, respectively). In South zone, maximum mean RH in morning hours (93.7%) was recorded at Hyderabad and lowest RH at Coimbatore (83.5%), whereas, in evening hours maximum mean RH was recorded at Dharwad (77.9%) and lowest RH at Coimbatore (59.7%).

## Sunshine hours

Among all the zones, maximum mean sunshine hours were observed at Bikaner (7.7 h/day) and minimum at Imphal (4.3 h/day). In Hill zone, higher average sunshine hours were recorded at Palampur (5.3h/day) and Almora (5.3 h/day). In North-West zone, more sunshine hours were recorded at Bikaner (7.7 h/day) followed by Ludhiana (6.7 h/day). Shortest days were observed at Udaipur (4.9 h/day). In North-East zone, on seasonal mean basis, maximum average sunshine hours were recorded at Ranchi (6.5 h/day) whereas, shortest days were observed at Bhubaneswar and Imphal (4.3 h/day). Other centres recorded minor difference in sunshine duration. In Central zone, on mean basis, the maximum sunshine hours was recorded at Rahuri (5.0 h/day) followed by Anand (4.8 h/day) In South zone, on mean basis, Coimbatore recorded maximum sunshine hours (5.4 h/day), whereas lowest was at Mandya (4.4 h/day).

SMW		SMW		SMW	
<b>26</b>	June 25-July 01,2021	<b>33</b>	Aug. 13-Aug. 19, 2021	<b>40</b>	Oct. 01-Oct. 07, 2021
<b>27</b>	July 02-July 08, 2021	<b>34</b>	Aug. 20-Aug. 26, 2021	<b>41</b>	Oct. 08-Oct. 14, 2021
<b>28</b>	July 09-July 15, 2021	<b>35</b>	Aug. 27-Sep. 02, 2021	<b>42</b>	Oct.15-Oct. 21, 2021
<b>29</b>	July 16-July 22, 2021	<b>36</b>	Sep. 03-Sep. 09, 2021	<b>43</b>	Oct. 22-Oct.28, 2021
<b>30</b>	July 23-July 29, 2021	<b>37</b>	Sep. 10-Sep. 16, 2021	<b>44</b>	Oct. 29-Nov. 04, 2021
<b>31</b>	July 30-Aug. 05, 2021	<b>38</b>	Sep. 17-Sep. 23, 2021		
<b>32</b>	Aug. 06-Aug 12, 2021	<b>39</b>	Sep. 24-Sep. 30,2021		

**Table M1: Meteorological data in Hill zone during crop growth period of Kharif-2021**

Std. Week No.	PALAMPUR						ALMORA						
	Temperature (C)		Humidity (%)		Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2			Max.	Min.	RH1	RH2			
26	30.5	19.4	69	51	6.2	9.6	31.7	20.1	81	59	3	16.5	8.1
27	31.1	19.4	75	53	62.2	8.7	32.6	20.4	86	48	0	0.0	8.1
28	27.8	18.8	93	76	559.0	4.9	29.9	20.0	85	49	4	14.5	5.0
29	26.2	20.2	96	88	281.8	2.1	26.4	19.5	89	83	5	134.0	2.1
30	25.9	20.8	98	91	174.4	1.3	28.9	20.0	90	75	4	25.5	4.3
31	27.5	20.0	94	83	89.2	3.9	30.0	20.2	88	75	5	37.5	5.2
32	27.1	19.3	91	85	85.6	4.1	29.2	19.9	90	66	5	92.5	4.5
33	27.6	18.6	88	81	45.0	6.6	30.1	16.8	91	63	3	33.5	5.3
34	25.5	20.5	93	89	66.4	2.0	29.4	19.4	86	72	1	8.0	5.0
35	26.5	18.3	93	82	80.4	5.0	29.6	18.8	94	70	4	49.5	4.8
36	26.4	19.0	96	85	180.6	3.0	30.1	18.7	92	71	3	12.0	4.4
37	25.5	18.2	93	87	85.2	4.0	30.0	18.2	89	73	3	8.5	4.6
38	26.5	18.9	95	83	86.4	4.6	29.5	17.7	92	76	4	13.5	3.8
39	26.7	17.9	86	85	29.8	4.4	30.1	16.5	91	70	1	2.0	5.3
40	25.9	16.5	89	78	55.0	4.9	30.1	15.4	93	70	1	31.0	5.9
41	26.8	14.9	73	55	15.0	8.4	30.4	12.6	93	58	0	0.0	7.5
42	25.9	13.9	77	63	4.2	7.4	26.1	11.2	96	79	3	296.0	4.2
43	22.1	10.5	74	60	14.4	6.5	26.8	8.9	93	56	0	0.0	5.6
44	22.5	9.3	65	53	0.0	8.5	24.8	5.4	89	61	0	0.0	7.0
<b>Mean/ Total</b>	<b>26.5</b>	<b>17.6</b>	<b>86.2</b>	<b>75.2</b>	<b>1920.8</b>	<b>5.3</b>	<b>29.2</b>	<b>16.8</b>	<b>89.9</b>	<b>67.0</b>	<b>49</b>	<b>774.5</b>	<b>5.3</b>

**Table M2: Meteorological data in Hill zone during crop growth period of Kharif-2021**

Std. Week No.	SRINAGAR				
	Temperature (C)		Humidity (%)		Rainfall (mm)
	Max.	Min.	RH1	RH2	
26	30.7	15.8	68	43	0.0
27	30.5	16.9	69	40	1.3
28	29.9	19.7	78	54	2.3
29	29.0	19.6	80	48	1.7
30	31.1	21.5	78	54	1.0
31	30.0	19.5	82	55	1.1
32	29.9	17.6	83	69	1.3
33	28.7	15.8	81	65	1.7
34	32.1	18.1	81	61	0.0
35	29.0	16.0	71	45	0.3
36	30.8	16.9	73	44	0.0
37	28.0	15.8	82	53	5.2
38	29.5	16.8	75	47	0.3
39	29.5	14.9	79	49	0.8
40	26.9	13.8	78	51	1.8
41	23.2	8.8	81	58	1.7
42	21.4	8.5	91	65	3.0
43	15.1	5.4	88	73	9.5
44	18.2	2.7	87	62	0.0
<b>Mean/ Total</b>	<b>27.6</b>	<b>15.0</b>	<b>79.2</b>	<b>54.5</b>	<b>33.0</b>

**Table M3: Meteorological data in North West zone during crop growth period of Kharif-2021**

Std. Week No.	HISAR							BIKANER						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	40.0	26.8	63	35	1	8.9	8.1	41.1	27.7	57	35	1	16.0	
27	41.4	27.9	65	38	0	0.0	8.0	41.1	27.9	60	37	0	0.0	
28	37.8	28.1	79	61	3	18.5	5.2	41.1	27.5	68	40	2	13.2	
29	35.9	26.9	86	63	1	9.0	4.3	39.0	29.1	68	51	1	20.0	2.5
30	33.7	27.4	92	76	3	56.0	3.5	36.9	27.1	76	52	2	31.4	5.0
31	31.9	26.5	94	79	4	149.9	2.6	37.4	27.2	74	54	2	18.6	4.7
32	35.6	26.6	88	58	0	0.0	7.6	37.7	26.9	70	45	1	34.0	9.1
33	37.1	26.3	80	54	0	0.0	9.6	39.1	27.1	60	36	0	0.0	10.9
34	34.7	26.7	86	69	0	0.5	5.2	38.9	26.5	66	38	0	1.6	8.6
35	35.9	25.9	88	66	1	15.7	6.7	37.7	26.4	65	40	0	0.0	9.7
36	32.7	25.8	95	75	2	100.2	4.3	36.8	25.6	80	52	2	28.8	7.0
37	31.8	25.2	89	72	2	44.3	4.7	34.4	24.7	86	65	3	28.6	6.7
38	32.3	25.2	90	76	1	142.0	6.1	35.1	24.9	85	55	2	27.0	7.8
39	31.9	25.4	91	71	2	126.0	5.7	33.6	23.7	91	62	1	35.4	6.1
40	33.3	25.3	93	66	1	5.5	6.7	36.1	24.4	82	47	1	3.2	9.0
41	34.8	21.6	86	37	0	0.0	8.2	36.9	20.4	62	29	0	0.0	9.3
42	31.3	18.4	86	50	0	0.0	6.3	34.6	17.2	67	29	1	2.6	8.8
43	29.8	15.9	86	44	0	0.0	7.8	30.5	17.0	79	41	1	6.8	8.8
44	30.4	13.5	83	34	0	0.0	7.0	32.4	13.6	72	24	0	0.0	9.3
<b>Mean/ Total</b>	<b>34.3</b>	<b>24.5</b>	<b>85.3</b>	<b>59.2</b>	<b>21</b>	<b>676.5</b>	<b>6.2</b>	<b>36.9</b>	<b>24.5</b>	<b>72.1</b>	<b>43.7</b>	<b>20</b>	<b>267.2</b>	<b>7.7</b>

**Table M4: Meteorological data in North West zone during crop growth period of Kharif-2021**

Std. Week No.	PANTNAGAR							LUDHIANA						
	Temperature (C)		Humidity (%)		No. of Rainy Days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	35.7	27.0	78	56	0	0.0	7.2	36.3	25.3	68	42	9	84.8	8.1
27	36.4	27.3	81	56	0	0.0	7.0	37.5	28.5	65	45	1	27.4	8.1
28	33.7	26.3	82	64	2	33.6	4.2	34.6	27.8	72	57	2	30.8	6.0
29	30.2	25.4	91	80	6	168.6	2.3	32.8	27.3	80	69	4	167.8	5.3
30	32.1	26.6	88	74	2	33.8	4.1	31.8	27.7	85	74	2	45.2	3.5
31	33.4	26.3	86	66	2	19.6	6.4	32.5	27.0	86	72	4	69.0	3.8
32	33.7	26.2	85	66	2	12.2	6.2	34.1	26.8	83	61	0	1.0	7.9
33	33.4	25.8	90	69	4	96.7	4.4	35.2	28.1	77	55	0	0.0	10.1
34	31.4	25.4	91	79	3	60.4	2.3	32.3	27.2	84	70	1	37.6	4.9
35	31.4	25.0	89	75	2	114.6	3.1	34.1	26.1	79	58	0	0.0	7.5
36	33.0	25.7	85	62	0	0.0	9.0	32.2	26.8	84	69	2	16.2	4.3
37	33.5	24.7	84	69	2	27.2	6.7	31.6	25.2	84	68	4	146.8	5.6
38	32.2	24.8	90	63	1	9.4	5.5	29.8	24.6	90	75	0	132.8	3.5
39	33.4	24.2	84	58	0	0.0	7.4	32.8	24.6	89	62	0	0.0	8.2
40	32.9	23.5	91	61	1	7.3	6.2	32.8	24.4	87	56	1	6.6	8.7
41	33.2	20.5	87	50	0	0.0	8.0	33.7	21.6	85	40	0	0.0	9.4
42	30.6	20.6	88	67	3	420.2	5.3	31.8	19.1	87	39	0	0.0	7.0
43	29.7	16.6	89	44	0	0.0	8.5	31.3	19.5	87	43	3	37.6	8.5
44	29.7	14.1	88	37	0	0.0	8.3							
<b>Mean/ Total</b>	<b>32.6</b>	<b>24.0</b>	<b>86.7</b>	<b>62.9</b>	<b>30</b>	<b>1003.6</b>	<b>5.9</b>	<b>33.2</b>	<b>25.4</b>	<b>81.8</b>	<b>58.6</b>	<b>33</b>	<b>803.6</b>	<b>6.7</b>

**Table M5: Meteorological data in North West zone during crop growth period of Kharif-2021**

Std. Week No.	Udaipur					
	Temperature (C)		Humidity (%)		Sunshine hrs	Rainfall (mm)
	Max.	Min.	RH1	RH2		
26	34.6	24.2	91	74	7.6	7.6
27	34.2	25.2	86	72	8.4	0.0
28	34.9	25.1	92	77	6.4	10.8
29	33.5	23.3	92	75	4.4	22.9
30	29.0	22.0	91	86	0.2	43.4
31	27.6	21.8	93	83	0.3	18.6
32	30.8	21.8	92	77	3.7	49.2
33	31.6	21.1	92	73	6.4	3.0
34	30.1	22.0	92	75	3.8	25.8
35	30.7	20.9	95	86	3.3	40.2
36	31.2	21.2	96	85	3.3	27.0
37	28.7	21.1	94	77	1.8	122.4
38	30.5	21.3	95	80	3.1	37.8
39	29.8	21.0	95	83	3.9	17.2
40	31.2	20.4	95	75	5.9	3.3
41	32.9	19.6	92	65	6.5	1.8
42	30.9	15.0	87	69	7.1	6.6
43	29.9	13.8	91	72	8.0	0.0
44	30.4	9.4	85	45	8.7	0.0
<b>Mean/ Total</b>	<b>31.2</b>	<b>20.5</b>	<b>91.9</b>	<b>75.3</b>	<b>4.9</b>	<b>437.6</b>

**Table M6: Meteorological data in Central zone during crop growth period of Kharif-2021**

Std. Week No.	URLIKANCHAN						RAIPUR						
	Temperature (C)		RH1	RH2	Rainfall (mm)	No. of Rainy days	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sun shine (hours)
	Max.	Min.					Max.	Min.	RH1	RH2			
26	29.6	22.8	97	74	14.5	1	33.1	25.5	86	62	2	42.6	3.6
27	31.8	22.9	82	67	8.3	2	33.6	25.1	90	69	4	135.0	3.4
28	29.5	22.9	74	76	3.1	0	32.1	26.0	87	67	1	16.2	4.0
29					30.4	4	34.2	26.5	84	63	3	56.8	6.7
30					11.8	0	30.4	24.8	91	80	5	88.2	1.5
31	26.6	21.9	84	87	7.6	2	28.8	24.8	88	76	2	15.8	1.3
32	29.0	21.7	73	78	1.4	0	33.0	25.6	88	70	3	63.6	3.2
33	27.2	21.4	81	89	5.2	0	32.8	26.0	90	68	3	25.8	3.2
34	29.3	20.8	72	79	4.5	1	32.1	25.6	90	70	3	22.8	3.9
35	28.8	22.5	76	79	12.6	2	32.6	25.5	87	65	2	9.8	5.0
36	29.4	21.1	74	76	54.6	2	32.6	24.9	88	70	4	86.0	6.4
37	28.4	21.6	67	68	11.6	2	31.1	24.5	94	79	7	238.4	2.6
38	29.1	21.1	63	65	6.3	1	30.2	24.3	92	74	2	16.2	1.9
39	29.3	21.6	61	64	9.3	1	31.8	24.7	91	70	3	26.8	5.1
40	33.0	21.3	52	55	100.4	4	32.7	25.1	90	66	0	0.0	6.0
41	31.5	20.6	49	53	36.1	3	32.6	23.0	89	44	0	0.4	6.7
42	31.2	18.5	41	45	0.3	0	32.4	24.3	90	57	2	15.2	7.8
43	30.9	15.1	35	37	0.0	0	31.4	18.1	87	35	0	0.0	9.3
44	32.0	15.7	73	42	0.0	0	30.4	19.1	88	50	0	0.0	7.9
<b>Mean/ Total</b>	<b>29.8</b>	<b>20.8</b>	<b>67.8</b>	<b>66.9</b>	<b>318.0</b>	<b>25.0</b>	<b>32.0</b>	<b>24.4</b>	<b>88.9</b>	<b>65.0</b>	<b>46</b>	<b>859.6</b>	<b>4.7</b>



**Table M7: Meteorological data in Central zone during crop growth period of Kharif-2021**

Std. Week No.	ANAND						RAHURI						
	Temperature (C)		Humidity (%)		Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2			Max.	Min.	RH1	RH2			
26	33.9	26.3	85	61	52.2	6.0	30.3	23.9	86	62	4	87.2	3.4
27	35.8	27.7	82	52	0.0	9.2	34.1	25.1	76	45	0	0.0	8.4
28	35.9	27.4	87	60	8.4	6.3	30.3	23.8	91	68	4	118.6	2.3
29	33.9	27.1	89	71	10.4	3.5	30.1	23.9	85	66	4	43.6	3.0
30	31.0	26.4	90	81	93.0	0.4	30.1	24.6	82	59	0	2.8	3.6
31	30.5	26.3	87	74	5.6	0.3	28.4	23.6	83	67	1	4.8	2.1
32	33.0	26.6	84	60	0.0	3.7	31.3	24.2	80	58	0	1.2	5.5
33	33.5	26.1	87	64	5.6	6.1	25.8	22.7	88	68	4	34.6	2.9
34	31.2	26.0	90	69	1.0	1.7	27.8	22.2	93	68	3	48.8	4.2
35	33.2	25.6	92	75	82.8	4.2	29.3	22.9	88	66	2	81.2	4.7
36	32.7	26.3	91	78	13.4	4.3	29.6	23	92	67	4	117.4	4.3
37	30.3	25.8	94	84	54.5	2.0	29.8	23.9	84	64	1	7.6	4.3
38	29.8	25.7	95	85	89.2	0.6	28.9	23.1	87	69	3	51.6	3.6
39	31.7	25.5	94	72	72.0	3.1	28.6	22.4	92	69	5	58.8	1.7
40	33.6	25.9	92	63	18.0	6.6	31.2	22.7	94	65	4	63.2	7.7
41	35.0	25.8	91	58	0.4	6.6	30.8	22.7	92	59	1	25.4	6.1
42	34.7	21.6	83	38	0.0	8.3	32.3	20.7	85	39	0	0.0	8.3
43	33.1	21.2	83	41	0.0	9.3	32.1	18.5	84	32	0	0.0	9.8
44	33.1	16.7	73	23	0.0	9.7	31.3	18.2	79	36	0	0.0	8.6
<b>Mean/ Total</b>	<b>32.9</b>	<b>25.3</b>	<b>87.8</b>	<b>63.6</b>	<b>506.5</b>	<b>4.8</b>	<b>30.1</b>	<b>22.7</b>	<b>86.4</b>	<b>59.3</b>	<b>40.0</b>	<b>746.8</b>	<b>5.0</b>

**Table M8: Meteorological data in Central zone during crop growth period of Kharif-2021**

Std. Week No.	JABALPUR							JHANSI					
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		Rainfall (mm)	No. of Rainy days
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2		
26	33.6	24.7	86	61	3	38.6	4.7						
27	35.7	26.7	75	50	1	15.0	4.7	40.8	26.8	80	51	0.0	0
28	33.3	25.1	85	58	2	33.2	5.5	38.7	26.8	83	49	8.2	1
29	33.4	25.4	84	70	3	35.4	5.5	35.7	26.4	88	60	70.8	3
30	27.7	23.8	95	85	5	130.4	0.2	34.3	25.8	86	50	29.2	3
31	26.8	23.4	91	84	6	43.7	0.3	29	24.3	92	71	318.2	4
32	28.5	24.2	90	79	2	11.1	0.5	32.2	25.7	89	59	6.0	1
33	32.6	24.7	89	71	3	42.3	4.9	35.6	25.8	81	46	0.0	0
34	30.7	24.7	87	67	0	2.2	2.6	34.1	25.6	83	49	4.8	1
35	31.6	24.5	86	68	0	2.5	5.1	34.1	24.4	88	62	47.4	3
36	31.4	24.1	91	78	4	35.7	4.1	33.6	24.7	83	60	46.2	1
37	30.0	23.8	93	81	4	100.8	2.3	31.8	24.4	93	86	93.8	6
38	30.9	23.6	89	68	2	16.3	4.7	30.8	23.8	88	64	26.0	2
39	31.9	24.1	88	62	1	3.8	5.6	32.7	24.6	81	49	0.0	0
40	32.9	23.7	84	58	0	0	8.2	33.2	22.3	85	52	2.0	0
41	33.3	20	84	48	0	0	8.6	32.7	19.6	86	54	0.0	0
42	31.9	19.9	88	48	2	67	8.1	32.4	19.4	87	64	123.2	2
43	30.7	16	87	41	0	0	8.3	31.6	16.7	80	83	0.0	0
44	28.7	11	84	33	0	0	9	30.5	12.6	82	52	0.0	0
<b>Mean/ Total</b>	<b>31.3</b>	<b>22.8</b>	<b>87.2</b>	<b>63.7</b>	<b>38.0</b>	<b>578.0</b>	<b>4.9</b>	<b>33.5</b>	<b>23.3</b>	<b>85.3</b>	<b>58.9</b>	<b>775.8</b>	<b>27.0</b>

**Table M9: Meteorological data in North East zone during crop growth period of Kharif-2021**

Std. Week No.	JORHAT							RANCHI						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min	RH1	RH2			
26	32.1	24.9	95	81	3	63.2	1.9	34.2	23.0	85	70	1	20.4	6.3
27	31.4	24.9	94	77	4	38.8	2.8	33.6	24.2	86	70	4	159.1	5.9
28	33.3	25.0	95	78	4	48.4	3.2	32.5	23.2	86	70	3	94.4	5.2
29	33.0	25.1	94	74	2	67.0	4.8	34.3	24.1	86	70	3	62.0	7.2
30	35.4	25.8	90	64	1	6.9	7.9	33.8	24.2	85	69	2	74.8	4.4
31	34.0	25.1	95	72	4	35.9	6.1	31.2	23.0	85	69	3	302.0	3.4
32	34.5	25.3	91	71	3	113.4	4.5	33.6	24.3	85	70	4	133.4	8.6
33	32.4	25.2	92	82	2	55.0	1.9	33.5	24.9	85	69	3	60.8	7.1
34	32.2	24.8	95	81	3	20.0	2.4	33.6	24.6	86	69	3	54.8	7.1
35	31.1	24.2	95	81	2	32.4	2.4	31.5	25.2	84	70	2	27.4	5.6
36	33.7	24.3	94	72	2	16.6	6.8	33.0	24.7	85	70	3	68.8	7.2
37	35.6	25.4	91	62	1	3.0	8.6	32.3	24.7	85	69	4	229.4	3.7
38	32.0	23.8	96	73	3	33.4	4.3	32.3	23.6	84	69	4	114.6	6.0
39	34.2	24.2	94	64	1	45.8	7.0	32.7	24.3	87	70	2	33.4	7.6
40	32.7	23.9	93	73	1	3.7	6.4	31.9	23.8	86	69	2	49.6	8.0
41	34.5	24.3	94	66	1	22.6	8.0	32.0	22.5	85	69	0	0.0	8.8
42	33.8	24.1	94	73	2	62.2	5.2	31.7	22.1	87	69	2	36.2	5.0
43	30.2	20.5	96	63	1	16.9	7.0	29.8	19.0	86	69	0	0.0	8.0
44	30.1	18.1	96	58	1	14.8	8.7	29.8	19.6	85	70	0	0.0	7.6
<b>Mean/ Total</b>	<b>33.0</b>	<b>24.2</b>	<b>93.9</b>	<b>71.8</b>	<b>41</b>	<b>700.0</b>	<b>5.3</b>	<b>32.5</b>	<b>23.4</b>	<b>85.4</b>	<b>69.5</b>	<b>45</b>	<b>1521.1</b>	<b>6.5</b>

**Table M10: Meteorological data in North East zone during crop growth period of Kharif-2021**

Std. Week No.	IMPHAL							AYODHYA						
	Temperature (C)		Humidity (%)		Rainfall (mm)	No. of Rainy	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	28.6	22.5	87	73	30.0	2	2.4	34.1	27.5	89	66	2	14.4	4.0
27	30.8	22.8	85	63	21.6	4	4.1	35.5	27.2	96	72	1	38.4	5.7
28	31.0	22.3	84	64	45.8	4	4.3	34.8	27.1	87	62	0	0.0	6.7
29	29.8	22.9	88	70	82.1	3	2.8	34.1	26.8	92	70	4	38.0	3.0
30	29.8	22.6	92	69	76.2	2	2.0	34.4	27.2	89	70	3	37.4	4.2
31	30.2	22.6	86	72	93.1	5	4.5	33.2	26.1	86	66	1	3.0	5.9
32	29.7	23.6	83	69	5.7	2	2.0	32.2	26.2	92	79	4	125.6	3.4
33	27.5	22.4	93	77	66.4	2	1.6	33.8	26.2	90	72	2	18.8	5.4
34	29.1	22.5	89	72	20.7	2	2.1	32.2	25.5	95	81	3	24.6	2.6
35	30.8	22.7	89	67	82.1	5	5.1	32.7	26.1	90	72	1	0.1	5.5
36	30.4	22.0	86	64	46.4	5	5.1	33.7	26.2	94	65	2	42.4	3.9
37	29.0	21.8	88	73	34.3	2	2.0	32.1	25.5	90	68	4	206.0	4.4
38	30.1	21.4	90	65	63.5	5	5.4	31.2	25	94	78	1	41.4	6.1
39	30.6	21.2	86	61	18.3	7	6.6	32.2	25.1	94	75	2	63.0	7.3
40	31.1	21.6	88	62	5.9	7	6.7	32.7	24.5	92	74	3	18.0	8.1
41	30.9	21.1	87	58	4.4	6	6.3	34	24	90	69	0	0.0	9.0
42	27.5	19.0	88	64	62.4	4	4.4	31.8	23.6	94	69	2	24.0	6.9
43	27.6	17.9	92	62	5.0	6	6.2	31.1	18.2	89	47	0	0.0	6.5
44	28.0	15.5	82	47	0.0	9	8.9	32.2	21.9	91	62	0	0.0	6.6
<b>Mean/ Total</b>	<b>29.6</b>	<b>21.5</b>	<b>87.5</b>	<b>65.9</b>	<b>763.9</b>	<b>81.1</b>	<b>4.3</b>	<b>33.1</b>	<b>25.3</b>	<b>91.3</b>	<b>69.3</b>	<b>35.0</b>	<b>695.1</b>	<b>5.5</b>

**Table M11: Meteorological data in North East zone during crop growth period of Kharif-2021**

Std. Week No.	KALYANI							BHUBANESWAR						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sun shine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	33.5	26.9	91	69	1	0.1	5.4	34.4	26.9	92	71	2	22.1	6.0
27	33.0	26.2	94	80	4	2.6	2.1	34.4	26.1	93	75	3	67.7	3.5
28	33.0	26.8	93	82	6	6.7	4.7	33.5	26.4	92	73	5	62.2	6.2
29	33.5	26.5	92	74	7	3.7	5.3	35.0	26.3	93	72	2	80.4	8.3
30	32.0	26.2	96	79	7	11.1	3.4	31.9	26.1	96	81	4	51.0	1.1
31	31.1	26.3	96	83	6	12.4	1.8	32.5	25.7	93	73	1	15.6	3.0
32	32.7	26.0	96	80	7	8.9	3.6	32.9	27.0	93	68	4	54.0	5.9
33	33.7	27.5	93	76	2	0.8	3.3	33.9	26.2	91	77	3	36.8	3.3
34	33.0	26.1	92	77	5	4.8	5.5	33.5	25.4	92	74	5	125.2	6.2
35	32.0	25.7	96	82	6	16.7	3.4	32.9	25.8	94	81	6	130.4	4.6
36	34.1	26.2	92	71	3	2.9	6.0	32.8	25.5	94	78	4	92.7	5.2
37	31.8	25.7	94	75	6	11.4	5.8	32.2	25.4	97	84	4	299.7	2.1
38	30.1	25.2	97	85	6	8.3	2.3	32.4	25.4	96	80	3	69.1	1.7
39	32.7	25.8	92	73	5	2.2	4.6	32.1	25.5	94	80	3	45.2	3.6
40	32.2	25.0	96	74	4	13.0	6.4	34.4	25.4	93	67	1	16.5	7.1
41	34.3	26.0	91	69	0	0.0	7.1	34.6	26.0	93	64	1	15.5	3.5
42	31.4	24.9	96	81	6	13.9	3.4	30.9	25.1	97	73	6	45.2	0.9
43	31.6	23.5	94	64	3	0.3	6.9	33.0	22.2	93	65	0	0.0	7.7
44	31.1	21.2	88	56	0	0.0	7.2	31.1	23.6	86	60	0	0.0	2.0
<b>Mean/ Total</b>	<b>32.4</b>	<b>25.7</b>	<b>93.7</b>	<b>75.3</b>	<b>84</b>	<b>119.6</b>	<b>4.6</b>	<b>33.1</b>	<b>25.6</b>	<b>93.3</b>	<b>73.5</b>	<b>57</b>	<b>1229.3</b>	<b>4.3</b>

**Table M12: Meteorological data in South zone during crop growth period of Kharif-2021**

Std. Week No.	HYDERABAD							VELLAYANI						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	32.1	23.5	93	67	3	13.0	3.3	32.2	26.1	88	80	1	0.8	7.5
27	33.4	24.0	93	61	1	16.0	5.3	32.7	26.2	88	81	3	2.4	8.1
28	29.4	22.8	98	88	4	95.8	2.3	30.7	23.7	93	88	6	121.4	4.6
29	29.6	22.9	99	85	4	152.2	2.7	31.6	25.1	92	84	2	18.0	6.3
30	28.5	22.7	98	80	3	41.8	4.1	30.3	24.0	94	88	6	62.6	4.1
31	30.4	23.1	96	78	0	0.0	5.7	31.4	25.5	89	86	3	2.5	8.8
32	32.2	23.9	95	70	0	2.4	6.6	30.8	23.9	92	87	3	43.2	6.0
33	30.4	22.9	94	76	4	52.8	4.4	30.6	23.3	91	85	1	8.6	5.2
34	29.9	23.1	93	67	0	1.2	5.0	31.1	24.1	91	85	5	53.0	9.0
35	28.9	22.2	96	81	6	54.6	2.1	30.3	22.7	94	90	5	67.5	2.9
36	27.7	22.3	98	82	5	81.8	2.3	30.6	23.3	92	87	3	32.3	6.4
37	29.0	22.8	91	72	1	7.2	4.7	31.0	23.5	91	86	4	83.1	6.4
38	30.5	22.6	93	72	2	30.0	5.9	31.8	24.3	88	81	3	33.8	6.8
39	28.1	22.1	93	79	4	131.4	3.0	31.1	23.3	92	88	3	166.1	4.6
40	31.4	22.4	94	62	1	4.4	7.9	31.4	22.4	93	90	3	118.6	3.2
41	31.4	21.4	91	59	1	87.8	7.6	31.6	22.2	96	91	7	135.0	2.4
42	30.6	21.4	89	62	1	8.6	5.7	30.8	21.9	92	89	6	95.6	1.1
43	30.9	17.9	90	40	0	0.0	8.9	31.0	22.8	92	91	4	70.8	4.2
44	29.5	20.1	85	61	0	0.0	4.8	30.1	22.5	94	90	6	63.2	2.4
<b>Mean/ Total</b>	<b>30.2</b>	<b>22.3</b>	<b>93.7</b>	<b>70.7</b>	<b>40</b>	<b>781.0</b>	<b>4.9</b>	<b>31.1</b>	<b>23.7</b>	<b>91.7</b>	<b>86.7</b>	<b>74</b>	<b>1178.5</b>	<b>5.3</b>

**Table M13: Meteorological data in South Zone during crop growth period of Kharif-2021**

Std. Week No.	COIMBATORE							MANDYA						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2				Max.	Min.	RH1	RH2			
26	32.7	23.0	82	52	0	1.0	8.1	30.7	20.4	89	75	0	0.0	4.1
27	32.9	24.0	85	58	1	7.0	7.7	31.0	19.8	91	72	2	37.0	4.6
28	30.4	23.4	80	64	1	5.5	1.4	30.2	18.9	88	79	2	9.0	2.3
29	29.8	23.2	81	62	2	15.5	5.2	28.1	17.5	90	79	2	18.7	1.3
30	31.0	23.9	77	59	0	2.5	5.5	29.4	17.9	95	76	2	39.6	3.4
31	32.4	23.0	82	51	0	0.0	7.5	29.6	18.4	87	72	0	0.0	5.7
32	32.5	23.4	85	56	0	1.0	6.5	30.0	18.3	88	65	0	2.0	5.0
33	31.2	23.7	85	54	1	11.3	4.5	30.3	20.4	89	57	2	29.4	3.1
34	31.3	22.8	85	63	3	14.2	6.6	30.1	18.3	87	64	2	11.0	4.9
35	31.1	22.9	85	60	3	16.0	3.2	29.3	18.0	86	60	1	7.2	4.8
36	29.9	22.8	82	60	2	9.0	5.7	29.7	19.0	86	62	2	46.5	1.9
37	32.2	23.6	81	54	0	0.0	6.9	30.0	19.3	88	62	0	1.0	5.0
38	33.2	23.3	85	55	1	3.0	6.1	30.3	19.4	89	61	0	0.0	6.6
39	31.4	23.5	83	59	2	17.0	5.7	30.0	20.0	91	62	1	5.4	4.6
40	30.9	23.5	87	62	4	5.0	5.3	30.0	19.7	91	59	3	33.0	5.0
41	30.9	23.3	83	65	1	37.0	4.0	29.4	19.7	89	63	5	77.6	5.4
42	31.0	23.5	86	66	1	11.5	5.3	30.1	20.1	85	61	2	37.4	5.2
43	30.3	22.7	86	64	3	66.5	4.9	30.1	19.7	90	63	4	161.4	5.6
44	28.1	23.0	87	71	5	46.0	2.1	29.4	18.3	89	62	1	11.6	4.3
<b>Mean/ Total</b>	<b>31.2</b>	<b>23.3</b>	<b>83.5</b>	<b>59.7</b>	<b>30</b>	<b>269.0</b>	<b>5.4</b>	<b>29.9</b>	<b>19.1</b>	<b>88.8</b>	<b>66.0</b>	<b>31</b>	<b>527.8</b>	<b>4.4</b>

**Table M14: Meteorological data in South Zone during crop growth period of Kharif-2021**

Std. Week No.	DHARWAD						
	Temperature (C)		Humidity (%)		No. of Rainy days	Rainfall (mm)	Sunshine hrs
	Max.	Min.	RH1	RH2			
26	28.4	20.7	89	71	0	1.8	NA
27	30.1	21.2	88	70	1	7.6	NA
28	26.7	20.5	91	86	4	23.8	NA
29	25.7	20.7	91	89	5	44.0	NA
30	26.1	20.4	91	87	3	104.6	NA
31	27.0	20.7	92	87	3	16.4	NA
32	29.2	20.8	89	83	2	12.3	NA
33	26.8	20.1	90	90	3	14.0	NA
34	29.0	20.2	89	81	1	11.0	NA
35	28.2	20.6	88	79	2	26.6	NA
36	27.5	20.5	91	80	2	11.4	2.9
37	27.1	21.0	92	86	3	16.6	3.9
38	29.1	20.3	89	71	0	0.0	5.2
39	28.0	20.3	88	78	2	19.4	4.1
40	30.9	21.1	87	80	4	39.8	6.3
41	29.2	20.9	91	75	2	25.0	5.1
42	30.6	19.6	83	61	0	0.0	6.7
43	29.8	18.5	77	62	1	33.4	7.0
44	29.4	19.7	83	64	1	3.8	5.2
<b>Mean/ Total</b>	<b>28.4</b>	<b>20.4</b>	<b>88.4</b>	<b>77.9</b>	<b>39</b>	<b>411.5</b>	<b>5.2</b>



**APPENDIX I: FORAGE CROP IMPROVEMENT TRIALS AT A GLANCE: (KHARIF-2021)**
**Cont...**

Kharif-2021		Tr.-1	Tr.-2	Tr.-3	Tr.-3	Tr.-5	Tr.-6	Tr.-7	Tr.-8	Tr.-9	Tr.-10
Zone	Location	IVTM	AVTM-1	AVTM-2	AVTM-2 (seed)	IVTPM	AVTPM-1	AVTPM-2	AVTPM-2 (seed)	IVTC	AVTC-1
1 (HZ)	Palampur	DR	DR							DR	
2	Srinagar	DR	DR							DR	
3	Almora	DR	DR								
4	Rajouri	DR	DR							DR	
5 (NWZ)	Bikaner					DR	DR	DR	DR	DR	
6	Jalore	DR	DR	DR		DR	DR	DR		DR	
7	Hisar	DR	DR	DR	TF	DR	DR	DR	TF	TF	
8	Ludhiana	DR	DR	DR	DR	DR	DR	DR	DR	DR	
9	Pantnagar	DR	DR	DR	DR					DR	
10	Udipur	DR	DR	DR						TF	
11	Avikanagar					DR	DR	DR			
12	Jodhpur										
13 (NEZ)	Jorhat									DR	DR
14	Kalyani									DR	DR
15	Bhubaneswar	DR	DR			DR	DR	DR		DR	DR
16	Ranchi	DR	DR			DR	DR	DR		DR	DR
17	Pusa	DR	DR			DR	DR	DR	DR	DR	DR
18	Ayodhya	DR	DR			DR	DR	DR	DR	DR	DR
19	CAU Imphal	DR	DR							DR	DR
20 (CZ)	Jhansi	DR	DR	DR		DR	DR	DR		DR	
21	Rahuri	DR	DR	DR		DR	DR	DR		DR	
22	Urulikanchan	DR	DR	DR	DR	DR	DR	DR		DR	
23	Anand			DR	DR	DR	DR	DR		DR	
24	Jabalpur	DR	DR	DR	DR	DR	DR	DR	DR		
25	Raipur	DR	DR	DR	DR	DR	DR	DR	DR	DR	
26	Karjat (Dapoli)										
27	Meerut									DR	
28 (SZ)	Hyderabad	DR	DR			DR	DR	DR	DR	DR	DR
29	Mandya	DR	DR			DR	DR	DR	DR	DR	DR
30	Coimbatore	DR	DR			DR	DR	DR	DR	DR	DR
31	Dharwad									DR	DR
32	Vellayani									DR	DR
33	Raichur					DR	DR	DR		DR	DR
34	Karaikkal	DR	DR								
Total Location		23/23	23/23	11/11	6/7	19/19	19/19	19/19	9/10	26/28	13/13

# APPENDIX I: FORAGE CROP IMPROVEMENT TRIALS AT A GLANCE: (KHARIF-2021)

Kharif-2021		Tr.-11	Tr.-12	Tr.-13	Tr.-14	Tr.-15	Tr.-16	Total
Zone	Location	IVT Rice Bean	AVT-2 Dinanath Grass	AVT-2 Dinanath Grass (seed)	VT Cenchrus Ciliaris-2019 3 <sup>rd</sup> Year	VT Cenchrus Setigerus-2019 3 <sup>rd</sup> Year	VT BXN Bajra Napier Hybrid-2019 3 <sup>rd</sup> year	
1 (HZ)	Palampur						DR	4/4
2	Srinagar							3/3
3	Almora						DR	3/3
4	Rajouri							3/3
5 (NWZ)	Bikaner				DR	DR	DR	8/8
6	Jalore							7/7
7	Hisar				TF	TF	TF	6/12
8	Ludhiana				DR		DR	11/11
9	Pantnagar							5/5
10	Udipur							3/4
11	Avikanagar				DR	DR		5/5
12	Jodhpur				DR	DR		2/2
13 (NEZ)	Jorhat	DR	DR				DR	5/5
14	Kalyani	DR	DR					4/4
15	Bhubaneswar	DR	DR				DR	10/10
16	Ranchi	DR	DR	DR			DR	11/11
17	Pusa	DR	DR	DR				11/11
18	Ayodhya							8/8
19	CAU Imphal	DR	DR					6/6
20 (CZ)	Jhansi		DR	DR	DR	DR		11/11
21	Rahuri				DR	DR	DR	10/10
22	Urulikanchan				DR	DR	DR	11/11
23	Anand				DR	DR	DR	9/9
24	Jabalpur	DR	DR	DR	DR	DR	DR	14/14
25	Raipur	DR			DR	DR	DR	13/13
26	Karjat (Dapoli)	DR						1/1
27	Meerut							1/1
28 (SZ)	Hyderabad				DR		DR	10/10
29	Mandya		DR	DR	DR	DR	DR	13/13
30	Coimbatore				DR	DR	DR	11/11
31	Dharwad							2/2
32	Vellayani	DR					DR	4/4
33	Raichur							5/5
34	Karaikkal							2/2
Total Location		10/10	9/9	5/5	13/14	11/12	16/17	232/239

Abbreviations: **DR** = Data reported, **DNR**= Data not reported, **TF** = Trial failed, **Success index (%)** = 97.07(%)

## APPENDIX II: FORAGE CROP PRODUCTION TRIALS AT A GLANCE: (KHARIF-2021)

Location/ Trial	K-20-AST-1a	K-20-AST-1b	K-21-AST-7	K-20-AST-3	K-20-AST-6	K-20-AST-5	R-19-AST-5	K-21-AST-1	K-21-AST-2	K-21-AST-3	K-21-AST-5	Total
<b>HILL ZONE</b>												
Palampur		DR										1/1
Srinagar		DR			DR							2/2
<b>NORTH WEST ZONE</b>												
Hisar									DR			1/1
Ludhiana			DR					DR	DR		DR	4/4
Bikaner	DR							DR				2/2
Pantnagar								DR	DR			2/2
<b>NORTH EAST ZONE</b>												
Ayodhya		DR										1/1
Ranchi	DR							DR		DR		3/3
Imphal	DR									DR		2/2
Pusa			DR					DR				2/2
Kalyani											DR	1/1
Varanasi			DR									1/1
Mirzapur											DR	1/1
<b>CENTRAL ZONE</b>												
Jabalpur			DR									1/1
Rahuri	DR											1/1
Urulikanchan								DR				1/1
Anand								DR	DR			2/2
NDDB Anand											DR	1/1
Raipur			DR					DR	DR		DR	4/4
Banda	DR											1/1
<b>SOUTH ZONE</b>												
Hyderabad			DR					DR			DR	3/3
Mandya		DR						DR		DR		3/3
Coimbatore				DR								1/1
Vellayani						DR	DR					2/2
<b>Total (DR &amp; TC)/ Allotted</b>	<b>5/5</b>	<b>4/4</b>	<b>6/6</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>10/10</b>	<b>5/5</b>	<b>3/3</b>	<b>6/6</b>	<b>43/43</b>

**Abbreviations:** DR = Data reported, **Success index (%) = 100 (%)**

### APPENDIX-III: FORAGE CROP PROTECTION TRIALS AT A GLANCE (KHARIF-2021)

Locations /Trial	PPT-1	PPT-2	PPT-25	PPT-26	PPT-27	PPT-28	PPT-29	PPT-30	PPT-31	PPT-32	Total
OUAT, Bhubaneswar	DR	DR		DR	DR	DR		DR			6/6
IGFRI, Jhansi	DR	DR		DR	DR	DR				DR	6/6
CSKHPKV, Palampur	DR	DR		DR		DR	DR			DR	6/6
MPKV, Rahuri	DR	DR			DR	DR			DR		5/5
PAU, Ludhiana	DR	DR	DR	DR	DR	DR				DR	7/7
TNAU, Coimbatore	DR	DR							DR		3/3
Total	6/6	6/6	1/1	4/4	4/4	5/5	1/1	1/1	2/2	3/3	33/33

DR=Data reported, DNR= Data not reported, Success index (%) = 100 %

## **APPENDIX IV: DIRECTORY OF SCIENTIFIC STAFF: AICRP ON FORAGE CROPS & UTILIZATION CENTERS**

Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b>Anand Agricultural University, Anand Campus, Anand-388 110 (Gujrat)</b>					
Dr. D. P. Gohil	Research Scientist (FC) –Plant Breeding	02692-264179/ 225861	9974175796	02692- 261520/ 261526	forageanand@gmail.com
Dr. H. K. Patel	Scientist (Agronomy)		9898977551		hiren@aau.in
Dr. P. H. Rathod	Scientist ( Biochemistry)		9408856727		rathod23904@aau.in
<b>Assam Agricultural University, Jorhat-785013 (Assam)</b>					
Dr. S. Bora Neog	Principal scientist (PB)	0376-2340044	09435091670		seujiboraneog@yahoo.com
Dr. A. K. Bhattacharya	Director (Research)	0376-2340044	0376-2340044	0376- 2310831	dr_agri@aau.ac.in
<b>BAIF Development Research Foundation, Urulikanchan, Pune-412 202 (Maharashtra)</b>					
Mr. P.S. Takawale	Forage Breeder (PBG) & OIC	9834662093 8668511570	09881369750	020- 26926347	pramodkumar.takawale@baif.org.in
Mr. R. V. Kale	Scientist (Agronomy)	9834662093 8668511570	09096590204		rahul.kale@baif.org.in
Dr. A. B. Pande	Group Vice President (Livestock & Scientific Research)	020-25231661	09325010213		abpande@baif.org.in
<b>Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur-741 252, Distt. Nadia (West Bengal)</b>					
Dr. Kalyan Jana	Officer In Charge & Assistant Professor, Agronomy	033-25828407	09932250618	033- 25828407	foragebckv@gmail.com kjanarrr@gmail.com
Dr. Sutanu Sarkar	Assistant Professor, Plant Breeding	033-25828407	09883084507	033- 25828407	sutanumax@gmail.com
Prof. G. C. Hazra	Director of Research	033-25828407	06295626637	033- 25828407	bckvdr@gmail.com
<b>Birsa Agricultural University, Kanke, Ranchi-834 006 (Jharkhand)</b>					
Dr. Yogendra Prasad	Jr. Scientist (Plant Breeding) & OIC		09431322453		yogendraprasad_bau@rediffmail.com
Dr. Birendra Kumar	Jr. Agronomist		07004203996		kbirendra1973@gmail.com
Dr. S. K. Pal	Director of Research	0651-2450610	09431175736	0651- 2451011	dr_bau@rediffmail.com
<b>C.S.K. Himachal Pradesh Krishi Vishwavidyalaya, Palampur-176 062 (Himachal Pradesh)</b>					
Dr. Naveen Kumar	Principal Scientist (Agronomy) & OIC	01894-230392	09418149173	01894- 230511	nkumarhp@gmail.com
Dr. V. K. Sood	Principal Scientist (PB)	01894-230391	08628040403		vkspbg23@rediffmail.com
Dr. D. K. Banyal	Principal Scientist (PP)	01894-230326	09418111480		dkbanyal@gmail.com
Dr. Rajan Katoch	Scientist Biochemistry	01894-230391	09418121870		rajankatoch@yahoo.com
Dr. S. P. Dixit	Director of Research	01894-230406	09418291095 (M)	01894- 320406	dttech@hillagric.ac.in

Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b>C.C.S. Haryana Agricultural University, Hisar-125 004 (Haryana)</b>					
Satyawan Arya	Assistant Scientist (Plant Breeding)	01662-255270	9416548140 7988073464		foragehau@gmail.com
Dr. Minakshi	Assistant Scientist (GPB), Forage Section	01662-255270	9041126105		jattanmina@gmail.com
Dr. Naveen Kumar	Assistant Scientist (Agronomy)	01662-255270	9416547443		nknaveenroyal@gmail.com
Dr. S. K. Sehrawat	Director of Research	01662-284340	9053093003	01662-255258 (SVC)	drccshau@gmail.com
<b>Central Agricultural University, Post Box No.23, Imphal-795 004 (Manipur)</b>					
Dr. R. Joseph Koirang	Agronomist & OIC	0385-2410427	09612976457		josephkoireng@rediffmail.com/ aicrpforagecauimphal@gmail.com
Dr. S. Basanta Singh	I/C Director of Research	0385-2410415	9612161841	0385-2410415	drcau@yahoo.co.in dorcau@gmail.com
<b>G.B. Pant University of Agriculture &amp; Technology, Pantnagar-263 145 (Uttarakhand)</b>					
Dr. Mahendra Singh Pal Program Coordinator	Professor Agronomy	05944-234448 7579177380	05944233279	05944 233473	drmspal1@gmail.com profmspal@yahoo.com
Dr. Birendra Prasad	Professor Gen & PB	7906194355			prasadsbst@gmail.com
Dr. Mohan Singh	Agronomist	7500241451	-	-	mohansingh10262@gmail.com
Dr. A S Nain	Director Research	05944-233363	7500211418	05944-2347334	desgbpuat@gmail.com
<b>Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chattisgarh)-492001</b>					
Dr. S. K. Jha	Scientist (Agronomy)	07716888879	09926113737		skjha_igau@yahoo.co.in
Dr. Sunil Verma	Scientist (PB)		920022 10272		Sunil.verma244@gmail.com
Dr. Vivek Kumar Tripathi	Directorate of Research Services	91-771-2443035	98261 74530	91-771-2443035 91-771-2442131	drs_igkvr@yahoo.com
<b>Jawahar Lal Nehru Krishi Vishwavidyalaya, Jabalpur-482 004 (Madhya Pradesh)</b>					
Dr. Amit Jha	Scientist (Agronomy)		09425469854		amitagcrewa@rediffmail.com
Dr. S. K. Biliaya	Principal Scientist (PB)		09425165543		
Dr. Dharendra Khare	Director (Research)	0761-2681200 0761-2681074	0761-2681614	0761-2681074	drsjnkvv@gmail.com
<b>Kerala Agricultural University, College of Agriculture, Vellayani-695522 Thiruvananthapuram (Kerala)</b>					
Dr. Usha C. Thomas	Professor (Agronomy) & OIC		9496301170		ushacthomas@gmail.com
Dr. Gayathri.G	Assistant Professor (PB)	0471-2381002	8289897357		gayathri.g@kau.in
Dr. Madhu Subramanian	Director of Research	0487-2438101	7907242525		dr@kau.in
<b>Mahatma Phule Krishi Vidyapeeth, Rahuri-413722 (Maharashtra)</b>					
Dr. G. N. Deore	Forage Breeder & OIC	9423438513	9423438513		gndeore.60@gmail.com
Dr. Sandip Landge	Scientist-1 (Entomology)	08830512132	07588604043	02426-243223	landge_sandip@rediffmail.com
Dr. Shivaji V. Damame	Scientist-1 (Biochemistry)	8275592262	08275592262	02426-243223	shivajidamame@gmail.com
Dr. V. B. Shinde	Grass Breeder & O/c	8275440715	-		Vbshinde70@gmail.com
Dr. S. R. Gadakh	Director of Research	02426-243261	0 9423164967	02426-243223	dormpkv@rediffmail.com
<b>A.N.D. University of Agriculture &amp; Technology, Kumarganj, Ayodhya-224 221 (Uttar Pradesh)</b>					
Dr. Shambhoo Prasad	Dy. Director Research	05270-262051	08818280955 09450766603	-	drnduat@gmail.com
Dr. Piyusha Singh	Forage Breeder		9458362834		Piyusha_singh@yahoo.com
Dr. Rajesh Kumar	Jr. Agronomist		9452520242		rajeshnduat@gmail.com

Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b><u>Odisha University of Agriculture &amp; Technology, Bhubaneswar-751003 (Odisha)</u></b>					
Dr. Arabinda Dhal	Jr. Pathologist		09937193430		foragebbsr@gmail.com
Dr. S. Sahu	Dean of Research	0674-2397692	0674-2397692	-	deanresearch_03@hotmail.com
<b><u>Punjab Agricultural University, Ludhiana-141 004 (Punjab)</u></b>					
Dr. R. S. Sohu	Principal Forage Breeder I/C Forage, Millets & Nutrition Section		09876743898	0161-2401960	inchargeforages@pau.edu
Dr. Maninder Kaur	Agronomist	0161-2401960 Ext. 443	08607754264	0161-2400945 0161-2409891	manindersindhu@pau.edu
Dr. Rahul Kapoor	Senior Forage Breeder	-do-	09815585599	-do-	rahulkapoor@pau.edu
Dr. Ashlesha Singla	Plant Pathologist (Forage)	-do-	09872874383	-do-	ashlesha-atr@pau.edu
Dr. Meenakshi Goyal	Biochemist	-do-	09216176800	-do-	meenakshigoyal@pau.edu
Dr. Harpreet Kaur Cheema	Senior Entomologist	-do-	09872869983	-do-	hkcheema@pau.edu
Dr. A.S. Dhatt	Director Research	0161-2401221	0161-2404433	0161-2407309	drpau@pau.edu
<b><u>Professor Jayashankar Telangana State Agricultural University (PJTSAU) Rajendranagar, Hyderabad-500 030 (Telangana)</u></b>					
Dr. T. Shashikala	Principal Scientist (PB) & Head	040-24001706	09849152482	040-24001706	tshashikala69@gmail.com forage_hyd@yahoo.com
Dr. RVT.Balazzii Naaik	Sr. Scientist ( Agronomy)		9440104717	040-24001706	balazziipjtsau@gmail.com
Dr. T. Sukruth Kumar	Sr. Scientist ( SSAC)		9491402702		Sukruthdr.ag@gmail.com
Dr.Ch. Damodar Raju	Associate Director of Research	080083111779	9951335111	08540-221177	adrpalem@gmail.com
Dr. R. Jagadeeshwar	Director of Research	040-24015078	8179540261	040-24017453	dr.pjtsau@gmail.com
<b><u>Rajendra Prasad Central Agricultural University, Pusa, Samastipur, 848 125 (Bihar)</u></b>					
Dr. Nilanjaya	Scientist (Plant Breeding)		6202843136/ 9801400108	06274-240255	nilanjayapbg@gmail.com
Dr. Gangadhar Nanda	Asstt. Professor (Agronomy)		08938020771		gnanda@rpcau.ac.in
<b><u>S.K. Rajasthan Agricultural University, Bikaner-334 006 (Rajasthan)</u></b>					
Dr. A. S. Godara	Prof. (Plant Breeding)	0151-2111406	9460043084	0151-2250570	godara_as@yahoo.com
Dr. R. C. Bairwa	Assistant Prof. (Agronomy)	0151-2111406	09413969540	0151-2250570	ramesh_ag@hotmail.com
Dr. P.S. Shekhawat	Director Research	0151-2250199 0151-2250576	09414003248	0151-2250576	dor@raubikaner.org
<b><u>S.K. University of Agriculture Science &amp; Technology, Srinagar-190001, Kashmir (J &amp; K)</u></b>					
Dr. Zahida Rashid	Agronomist		09469673198		Zahida1926@gmail.com
Dr. N. Saleem Khuroo	Assoc. Prof. (PB)	09596769713	07889723718	-	Skhuroo0909@gmail.com
<b><u>Tamil Nadu Agricultural University, Coimbatore-641 003 (Tamil Nadu)</u></b>					
Dr. K. N. Ganesan	Professor (PBG) & OIC	0422-6611228	09487019529	-	forage@tnau.ac.in knganesan71@gmail.com
Dr. S. Rani	Assistant Prof. (Agronomy)	0422-6611228	72000 95422	-	malarrani82@gmail.com
Dr. K. Premalatha	Assistant Prof. (Entomology)	0422-6611228	76392 12345	-	kpremalatha2003@yahoo.co.in
Dr. M. Raveendran	Director of Research	0422-6611447, 547	9842181968 8148095400	0422-2436325	drres@tnau.ac.in raveendrantnau@gmail.com

Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b>University of Agricultural Sciences (Bengaluru) Zonal Agril. Res. Station, VC Farm, Mandya-571405 (Karnataka)</b>					
Dr. B. G. Shekara	Principal Scientist (Agronomy) & OIC	08232-277925	09900618898		shekara_gundanaik@rediffmail.com bgshekar66@gmail.com
Dr. P Mahadevu	Principal Scientist (GPB)	08232-277925	09945332633	08232-277966	pmahadevu69@gmail.com
Dr. Venkatesh	Associate Director of Research	08232-277147	09449866917		adrzarsmandya@gmail.com
Dr. Y. G. Shadakshari	Director of Research	080-23330206	09449866903	080-23330206	druasgkvkb@gmail.com
<b>ICAR-Central Arid Zone Research Institute, Jodhpur-342 003 (Rajasthan)</b>					
Dr. O.P. Yadav	Director	0291-2786584	0291-2788484	0291-2788706	director.cazri@icar.gov.in
Dr. M. P. Rajora	Pr. Sci. (PB)	0291-27 86483	09461269336	0291-2788706	mpajora1@gmail.com
Dr. J. P. Singh	Pr. Sci. (Eco Bot)		09929273918		
<b>Nagaland University- School of Agricultural Sciences &amp; Rural Development, Medziphema-797106, Nagaland</b>					
Dr. Tankeswar Gohain	Assistant Professor		09436430276		tankeswar1968@gmail.com
<b>ICAR- National Dairy Research Institute, Karnal-132001 (Haryana)</b>					
Dr. Magan Singh	Senior Scientist		08901122193		magansingh07@gmail.com
<b>ICAR - CAZRI Regional Research Centre CAZRI Jaisalmer, (Rajasthan)</b>					
	Head	02992 252412			
<b>ICAR – Indian Institute of Maize Research, PAU Campus Ludhiana, 141004 (Punjab)</b>					
Dr. Sujoy Rakshit	Director	011-5841805		011-25848195	pdmaize@gmail.com
<b>ICAR -Directorate of Maize Research, Regional Maize Research and Seed Production Centre, Begusarai (Bihar)</b>					
Dr. V. K. Yadav	Sr. Scientist I/c Station	06243-215254			
<b>ICAR- Indian Institute of Seed Science, P. B. No. 11, Village : Kushmaur (P.O. Kaithauli, Mau-275 101 (U.P.)</b>					
Dr. Sanjay Kumar	Director	0547-2530326	9013563919		Director.seed@icar.gov.in
<b>ICAR-Indian Institute of Wheat &amp; Barley Research, P.B. No. 158, Karnal-132 001 (Haryana)</b>					
Dr. G. P. Singh	Project Director	0184-2267490	0184-2267559	0184-2267390	indu.dwr@icar.org.in
Dr. R. P. S. Verma	PS & PI, Barley Network	0184-2267490/ 2265632/2267495	09416468414	0184-2267390	rpsverma.dwr@icar.org.in
<b>ICAR-IARI Regional Research Station, Karnal-132 001 (Haryana)</b>					
Dr. V. K. Pandita	Head	0184-2267169	0184-2267365	0184-2266672	ssatwal.iari@gmail.com
<b>ICAR-Indian Institute of Millets Research, Rajendranagar, Hyderabad-500 030, (A.P.)</b>					
Dr. Vilas Tonapi	Director		040 - 2459 9301	040 - 24599304	millets.icar@nic.in director.millets@icar.gov.in
<b>ICAR- Indian Institute of Farming Systems Research, Modipuram, Meerut-250110</b>					
Dr. A. S. Panwar	Director	0121-2888711		0121-2888546	directoriiifsr@yahoo.com



Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b>ICAR-National Bureau of Plant Genetic Resources, New Delhi-110 012</b>					
Dr. Ashok Kumar	Director	011-25843697	011-25841177	011-25842495	director.nbpgr@icar.gov.in
Dr. Anjali Kak	Principal Scientist	011-25841835		011-25841835	anjali@nbpgr.ernet.in
<b>ICAR Research Complex for NEH Region, Umroi Road (Umiam) Barapani-793 103 (Meghalaya)</b>					
	Director	0364-2570257	0364-2570302	0364-2570288/ 2570501/	director@icarneh.ernet.in
<b>National Dairy Development Board, Anand-388 001 (Gujarat)</b>					
Dr. Digvijay Singh	Sr. Manager (PS-AH)	02692-226246 (O)	02692-226517(R)	09426389619	dsingh@nddb.coop
<b>Agriculture Research Station, Mahim Road, Palghar, District- Palghar (Maharashtra)-401 404</b>					
A. S. Dhane	Jr. Entomologist	02525-241048		07028065626	nandishala@gmail.com ankurdhane@gmail.com
Dr. U. V. Mahadkar	Director Research				dorbskkv@rediffmail.com
<b>Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri-415 712 (Maharashtra)</b>					
Dr. R. B. Ulemale	Jr. Agronomist & OIC Forage	0724-258200/ 2258467	0724-2451631		
<b>Grassland Research Station Junagadh Agricultural University, Dhari (Distt. Amreli), Gujarat</b>					
Dr. Anshuman Dalpatrai Rathod	Assoc. Research Scientist (Agronomy)	02797-221117			
Mr. V. V. Ansodariya	Assistant Research Scientist (Pl.Br.)	02797-221117	09824156656		grsdhari@jau.in
<b>Main Agricultural Research Station, University of Agricultural Sciences, P. B. No. 24, Raichur-548 101 (Karnataka)</b>					
Dr. Ajith Kumar K.	Scientist (Pathology) In-charge Forage Section	08532-220193	9008333006	08532-220193	ajithk.path@gmail.com
<b>Maharana Pratap University of Agriculture &amp; Technology, Udaipur 313 001 (Rajasthan)</b>					
Dr. R. B. Dubey	Assistant Professor (GPB)	0294-2420154 (Office)	9694383617		dubey_rb2006@yahoo.co.in
Dr. Roshan Choudhary	Assistant Professor (Agronomy)	0294-2417334	9571233592	0294-2420447	roshan6109@yahoo.co.in
Dr. P. L. Maliwal	Director Research	0294-2417334	9414162568	0294-24220447	dr@mapuat.ac.in
<b>Pandit Jawahar Lal Nehru College of Agril. &amp; Research Institute, Karaikal – 609 603 (Puduchery)</b>					
Dr. S. Mala	Prof. (Agronomy)	04368-261372 (O)	09487820451		mala_ap@yahoo.co.in
<b>Pearl Millet Research Station Junagadh Agricultural University, Junagadh, Jamnagar-361 006</b>					
Dr. P. R. Padhar	Research Scientist (Pearl Millet)	0288-2711793			
<b>Regional Agricultural Research Station, Karjat, Raigad-410 201 (Maharashtra)</b>					
Dr. P.B. Banawe	Asst. Rice Specialist		9898723119		ricespecialistkarjat@gmail.com bhart_breed@yahoo.co.in,
Dr. P.M. Haldankar	Director of Research		9421809721		dorbskkv@rediffmail.com
<b>Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut-250 110 (U.P.)</b>					
Dr. L. K. Gangwar	Prof. & Head (GPB)	0121-28888505	9411957307	0121-2411505	gangwarlk@gmail.com
<b>S.K. Rajasthan Agriculture University, Agricultural Research Station, Keshwana Jalore -343001</b>					
Dr. Ramdev Sutaliya	Zonal Director Research	02973-265915	09925949101		sutladol@gmail.com

Name	Designation & Discipline	Tel. Office	Tel. Residence	Fax	E-mail
<b>S. K. University of Agril. Sciences &amp; Technology, Regional Research Station, Rajouri B.P.O. Tandwal 185 131 (Jammu)</b>					
Dr. Deepak Kumar	Sr. Scientist (Agril. Extension)		7006959781		rarsrajouri@gmail.com
<b>ICAR- Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora 263 601 (Uttarakhand)</b>					
Dr. J. K. Bisht	Pl. Sci. (Agron.) & OIC Forage Research	05962-230208/ 230060	05962-230130	05962-231539	bishtjk@hotmail.com
<b>ICAR- Indian Grassland and Fodder Research Institute, Jhansi-284 003 (U.P.)</b>					
Dr. Amaresh Chandra	Director	0510-2730666	9450041285		igfri.director@gmail.com director.igfri@icar.gov.in
Dr. Nagaratna Biradar	OIC IGFR- SRRS, Dharwad	0836-2447150	8618546485	0836-2743459	nagaratna123@gmail.com
Dr. Shahid Ahmad	Pri Sci & Head CI Division		945077665		shahidigfri@gmail.com
Dr. Vijay Yadav	Pri Sci & Head ST Division		94124463923		vijayyadav777@gmail.com
Dr. Suhail Ahmed	OIC, IGFR RRS, Srinagar		7006929670		suhail114@gmail.com
Dr. R.P. Nagar	OIC, IGFR RRS, Avikanagar		9214909817		rpnagar44@gmail.com
<b>ICAR- AICRP on Forage Crops and Utilization, Project Coordinating Unit, IGFR, Jhansi 284 003 (U.P.)</b>					
Dr. A. K. Roy	Project Coordinator	0510-2730029	0510-2730639 09415412144	0510-2730833	pcforage@gmail.com
Dr. R. K. Agrawal	Pr. Scientist (Agronomy)	0510-2730029	09415179141	0510-2730029	rajiv68@gmail.com
Dr. N. R. Bhardwaj	Scientist ( Plant Pathology)	0510-2730029	7525060745	8954094647	nitish.rattanbhardwaj@gmail.com
Dr. Subhash Chand	Scientist (GPB)	0510-2730029	09483474935		subashchand5415@gmail.com
<b>ICAR HQ, New Delhi</b>					
Dr. T. R. Sharma	Deputy Director General (CS)	011-25842068 /23382545	011-25842508 0124-246166	011-23097003	ddgcs.icar@nic.in
Dr. R.K. Singh	Asstt. Director General (FFC)	011-2338433		011-23384323	ypsingh.icar@nic.in

<b>Regional Fodder Stations, Department of Animal Husbandry and Dairying, Government of India</b>			
Office	Tel.	Mobile	E-mail
Director I/c Regional Fodder Station, Camp Office, 618/A, Gandhinagar, Jammu 180 004 (J&K)	0191-2457698	09622928606	rfsjammu@gmail.com
Dr. P. Thamodaran Director I/c Regional Fodder Station, Dhamrod, Campus CCBF, Ankaleshwar, Gujarat.	02629-290760	0948614838	rsfpdgujarat@yahoo.in rfsjgujarat@gmail.com
Sh. Banvir. Singh, Director Regional Fodder Station, P.O. Pahari Sharif, Via Keshavgiri, Hyderabad 501510 Telengana	08415201034	08099801610	rsfphyd@redif fmail.com directorrsfphy d@gmail.com director-rfshyd@gov.in
Dr. P. Mahesh Director I/c Regional Fodder Station, Hesserghatta, Bangalore North 560088	08028466279	09845616268 09449926784	directorcfspf @yahoo.in directorcfspf @gmail.com
Sh. A. K. Yadav, Director I/c Regional Fodder Station, P.O. Dairy Farm, Via Red Hills, Chennai-52	04426310884	09445210582	rsfpdchennai @gmail.com
Sh. Brijendra Koli Director I/c Regional Fodder Station, P.O. Netaji Subhash Sanitorium, Distt. Nadia – 741251(WB)	03325898425	09086003194	rsfpd.kalyani @gmail.com
Dr. Prem Pal Singh Director I/c Regional Fodder Station, P.O Textile Mills, Hissar125002	01662259184	09416300997	rfshisardirector@mail.com
Dr. Santosh Menon Director I/c Regional Fodder Station Suratgarh, Rajasthan-335804	01509268047	09413553781	dir.rsfpdstg@g mail.com

Private Companies		
Office	Mobile	E-mail
Dr. Sukhpal Singh, Head- R&D, Foragen Seeds Pvt. Ltd,# 8-2-618/A, Flat 302, Road No-11 Banjara Hills, Hyderabad-500 034	9989211318	sukhpal.singh@foragenseeds.com
Prabhakar Babu. G CEO & Co-Founder Foragen Seeds Pvt. Ltd, Hyderabad	9000002334	www.foragenseeds.com
Khoja Habib Mamad, Alamdar Seeds, Main Market, Nagalpar Moti, Gujarat 370110	997989412	alamdar_seeds@yahoo.co.in
Gopal Bele, Crop Lead Pearl Millet, Hytech Seeds India Pvt. Limited, Hyderabad	9347057302	b.gopal@hytechseed.in
Bhuwan Parihar, Assoc. Breeder (Pearl Millet), J. K. Agri Genetics Ltd	9110570862	bhuwanparihar@jkagri.com
Bramareswara Rao.K, Sr. Breeder, Pearl Millet, M/s. Rasi Seeds (P ) Ltd ., Survey no 444, 442, 443 Station Masaipet, Veldurthymandal, Medak-502334 Telangana	9908499477	bramareswararao.k@rasiseeds.in
Rajan Gupta, Principal Breeder – Corn, Rasi Seeds (P) Ltd. Survey Nos. 60/1, 60/2, 61/1, Kakkehalli, Doddatumkur Post, Doddaballapur Taluk, Bangalore Rural District -561203	9686101150	rajan.gupta@rasiseeds.com
Aditiya Sharma Sr. Breeder Forage Millet, Advanta UPL, Limited, Hyderabad	9849557468	aditya.sharma@advantaseeds.com
Dr. S.M. Rafiq, General Manager R & D, Nuziveedu Seeds Ltd	9581412496	mohdrafiq.s@nuziveeduseeds.com
Mahanand, Kanchan Ganga Seed Company Pvt. Ltd. 6-3-1085/D/202, Dega Towers, Rajbhavan Road,Somajiguda, Hyderabad - 500 082	9140 23311915	kanchanseeds@gmail.com
Dr. Gopal Gharde, Breeding Lead, Crystal Corporation Protection Limited, Sy. No. 271/E, 271/EE, 271/U, Singaipalle village road, Karimanagar, Hyderabad, Telangana-502279	9423394765	gopal.gharde@crystalcrop.com