#### PREFACE

The Annual Report (2014-15), Part I–*Kharif* 2014 embodies the research trial results in the areas of forage crop improvement, crop production and crop protection with the view to develop and test the technologies for better quality/quantity of forage production in different agro climatic situations. This report is the out come of sincere efforts made by all contributing scientists and staff at the Coordinating Unit and AICRP-FCU Centres. The trials and activities were successfully conducted as per the technical programme fixed for Kharif 2014. 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. Weather data has also been recorded from all testing Centres and the same is provided in the report for linking to crop growth *etc*. The breeder seed produced as per the DAC indent is also compiled and reported.

Results have been presented in the form of chapters. The compiled results of forage crop improvement trials has been presented in Chapter - 1, which includes multi-location test performance of newly developed genetic material of annual and perennial forage species. The findings on forage management studies are presented in Chapter - 2 which includes: optimization of fertilizer levels for forage crop in different cropping system, forage production potential, location specific research on weed management and agronomical trial for AVT-2 entries of pearl millet and hybrid maize. Chapter-3 deals with different aspects of plant protection in important forage species *viz.*, maize, pearl millet, cowpea, and rice bean as well as generation of technologies for pest management in the selected crops. Other chapters include details of breeder seed production, in house breeding activities, weather details and other activities *etc*.

The contribution and sincere efforts made by each and every member of the team and their associates at the Centres deserve appreciation in achieving the objectives of this project. Their valuable contribution for over all outputs of AICRP on Forage Crops and Utilization is gratefully acknowledged.

My colleagues at Project Coordinating unit, Dr. A. K. Mall, Sr. Scientist (Plant Breeding); Dr. R. K. Agrawal, Principal Scientist (Agronomy); Dr. S. R. Kantwa, Sr. Scientist (Agronomy); Dr. P. Saxena, Principal Scientist (Pathology) and Dr. Ritu Mawar, Sr. Scientist (Pathology) and technical officers, Shri O. N. Arya and Shri H. K. Agarwal as well as Shri Premchand, PS provided support in distribution of seed/planting material for the trials; analysis and tabulation of data of trials conducted at all the locations. Their contributions are thankfully acknowledged. The efforts of Smt. Priyanka Dixit, Shri Prem Chand and Shri Dayal in computer-based work to final report preparation are sincerely acknowledged.

The administrative support and cooperation received from Dr. P. K. Ghosh, Director, IGFRI during the period is thankfully acknowledged. I also record my sincere thanks to colleagues at IGFRI 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. S. Ayyappan, Secretary DARE & DG, ICAR; Dr. S. K. Datta, Ex-DDG (CS); Dr. J. S. Sandhu, DDG (CS); Dr. I. S. Solanki, ADG (FFC); Dr. J. S. Chauhan, ADG (seed). Support received in various forms from Sri Sujit Mitra, Director (CS), Dr Dinesh Kumar, Principal Scientist (FFC), ICAR are also gratefully acknowledged. Each and every one in the team at AICRP on Forage Crops and Utilization gratefully acknowledges their support.

A. K. Roy Project Coordinator

## **EXECUTIVE SUMMARY**

The present report describes results of the coordinated trials conducted on Crop Improvement, Crop Production and Crop Protection as well as the Breeder Seed Production of the different forage crops during *Kharif*-2014 at different locations/centres in the country placed in five zones *viz.*, Hill zone, North-West zone, North-East zone, Central zone and South zone. Weather data are also reported to correlate the growth and yield of forage crops with weather parameters at different sites during crop period.

## A. FORAGE CROP IMPROVEMENT

In *Kharif*-2014, sixteen breeding trials of four annual and five perennial forage species including test entries with their respective national and zonal checks were conducted at different locations in five zones.

## (a) ANNUAL FORAGES

#### MAIZE

**In IVT**, seven entries and two national checks were evaluated at 19 locations. Results revealed that for GFY (q/ha), entries MFM-6 (7.4%) and BAIF Maize-4 (1.9%) in Hill Zone, entries PAC-746 (13.0%) and MPC-1(6.9%) in North West Zone, entries AFM-4 (10.9%), MFM-4 (10.1%) and MPC-1 (7.6%) in North East Zone, entry PAC-746 (0.8%) in Central zone and entry MPC-1(3.6%) in South Zone proved their superiority however, at national level none of the entries was found superior than the national check.

**In AVT-1**, five entries and two national checks were evaluated at 16 locations. Results revealed that for GFY and DMY (q/ha), none of the entry was found superior than check in any zones as well as at national level. In green forage production potential, entries PFM-7 and AFM-2 and for dry matter production potential (q/ha/day) national check J-1006 was adjudged good performer.

**In AVT-2** (hybrid maize), four entries along with two national checks were evaluated at seven locations. For GFY (q/ha), entry PMH-1 was superior in Hill Zone by 3.8 per cent and DHM-117 in North East Zone by 0.28 per cent than best national check. None of the entry was found superior than the national check at national level.

**In AVT-2 seed** (hybrid maize), four entries along with two national checks were tested at five locations. All the test entries *viz.*, IHTFM (70.9%), PMH-1 (60.6%), PMH-3 (56.8%) and DHM-117 (53.1%) were better than the national check.

## PEARL MILLET

**In IVT**, eight entries along with three national checks were tested at 16 centres. For the character GFY (q/ha), entry APFB-09-10 (1.7%) in North East Zone, entry PAC-982 (0.1%) in Central zone were better than best check. At national level and in other zones, none of entry performed better than the best check.

**In AVTPM-1**, four entries promoted from IVT were evaluated against three national checks at 16 centres. For GFY (q/ha), entry DFMH-30 in North West Zone (2.0%) and South Zone (7.4%), entry NDFB-939 (2.2%) in North East Zone registered superiority. While at all India level, none of the entries performed better than the check.

**In AVTPM-2**, three entries along with three national checks were evaluated at four locations of the country. Results revealed that national check RBC-2 excelled in performance for GFY and DMY (q/ha).

**In AVT-2 seed**, trial for seed yield (q/ha) with three entries along with three national checks conducted at two locations revealed that entries APFB-09-1 (22.9%) and NDFB-936 (15.9%) were found superior over national checks. In North East Zone, seed yield of APFB-09-1 was 6.0 q/ha which was followed by test entry NDFB-936 (5.66 q/ha) and AVKB-19 (4.88 q/ha).

#### COWPEA

**In IVT**, four entries along with two national checks and three zonal checks for respective zones were evaluated at 24 locations. Results revealed that for the character GFY (q/ha), entry MFC-09-13 in Hill Zone (50.6%) and North West Zone (0.3%) exhibited superiority over best national/zonal check. At national level MFC-09-13 (0.7%) was better than check.

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**In AVT-1**, three entries along with national checks and two zonal checks for respective zones at 12 locations were tested. For the character GFY (q/ha), entry TNFC-0926 (7.5%) in North East Zone and entries TNFC-0926 and MFC-09-9 (2.2%) in South Zone and at national level exhibited their superiority for this character.

### **RICE BEAN**

**In IVT**, five entries along with three national checks were tested at 10 locations. For GFY as well as DMY (q/ha), none of the entries excelled in performance with respect to national check Bidhan-2. For fodder production potential (q/ha/day) also, national checks established superiority both for green forage and dry matter production potential. For quality and growth parameters check was best for CPY (q/ha), CP (%), and leaf stem ratio.

#### (b) PERENNIAL FORAGES

### **BAJRA X NAPIER HYBRID**

A varietal evaluation trial comprising eleven entries was established during *Kharif*-2013. The results revealed that for GFY (q/ha), entry VTBN-2013-3 in North West Zone, VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-2 in South Zone and VTBN-2013-4 at all India level and for DMY (q/ha), entry VTBN-2013-4 in North West Zone, VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-4 at all India level established their superiority. For other quality parameters, entry VTBN-2013-6 for ADF (%), VTBN-2013-3 for NDF (%), VTBN-2013-4 for IVDMD (%) and VTBN-2013-8 for DDM (q/ha) were adjudged best performer.

#### DICHANTHIUM ANNULATUM

Varietal evaluation trial comprising eight entries was established initially in *Kharif*-2013 at fifteen locations of the country. The trial was finally established at eight locations of the country. Results obtained from different centres clearly revealed that for GFY (q/ha), entry VTD-7 in North West Zone, VTD-4 in Central Zone, entry VTD-5 in South Zone established their superiority with respect to other entries. At national level, entry VTD-4 was adjudged best performer. For quality parameters, entry VTD-4 for ADF (%) and VTD-7 for NDF and IVDMD (%) were ranked first.

#### **CENCHRUS CILIARIS**

In *Cenchrus ciliaris*, trial comprising nine entries was established in *Kharif*-2013. Results obtained from seven testing locations revealed that for GFY as well as DMY (q/ha), test entry VTCC-8 maintained its superiority in North West and Central Zones while, VTCC-4 in South Zone ranked first.

#### CLITORIA TERNATEA

In *Kharif*-2013, a varietal trial in *Clitoria ternatea* comprising seven entries was established in North West and Central Zone. Data received from eight testing locations revealed that for GFY (q/ha), entry VTCT-7 was superior in both the zones and at national level also while, for DMY, entry VTCT-4 in North west zone and again VTCT-7 in Central Zone as well as at all India level were best performers.

## **B. FORAGE CROP PRODUCTION**

The programme on forage crop production was conducted at 21 locations. In total 22 experiments were conducted, out of which 11 in network (9 coordinated and two AVT based) and 11 in location specific mode with the aim to generate region specific forage production technologies for different growing condition.

Research aspect consisted of: production and quality of BN hybrid under different growing environment and N levels; dual purpose pearl millet under different cutting management practices and nitrogen levels; effect of nutrient management on productivity of perennial grasses under lowland condition; effect of stubble management and INM on forage productivity in rice-oat cropping system; study on year round green fodder production under irrigated condition; evaluation of fodder crops under different rice fallow system; effect of straw mulch on the water requirement, weeds and productivity of BN hybrid; evaluation of different varieties of grass pea as forage crop under different sowing methods in rice based system; study of intercropping system of pigeonpea with different annual fodder crops; effect of N levels on productivity of perennial grasses with and without tree shade; effect of time of sowing and seed rate on performance of fodder maize under rainfed condition;

performance of fodder ricebean as influenced by date of sowing and spacing; enhancing the production potential of various forage crops in coconut gardens through nutrient management; performance of BN hybrid grass as influenced by micronutrient under irrigated conditions; residual effect of P applied to wheat on the succeeding summer fodders in sorghum-wheat-summer fodders cropping system; weed management in multicut sorghum and BN hybrid; studies on intensive fodder cropping systems for yield maximization; study of intensive annual fodder based cropping system; impact of Mg and B on nutrient uptake, quality and yield of bajra napier hybrid and testing of new forage maize and pearl millet genotypes under different management for varietal development.

The summary of *kharif* 2014 results is presented briefly hereunder:

# **PS-11-AST-1: Effect of growing environment and nitrogen levels on production and quality of BN hybrid** (Locations: Palampur, Ludhiana, Anand, Rahuri and Hyderabad)

On mean basis, growing of BN hybrid under unshaded environment recorded higher GFY (801.4 q/ha), DMY (156.5q/ha) and CPY (13.1 q/ha) over shaded environment (652.9, 124.6 and 11.2 q/ha, respectively). The magnitude of increase for GFY, DMY and CPY was 22.7, 25.6 and 10.0%. DMY, CPY and crude protein content of BN hybrid increased consistently with increasing levels of nitrogen up to 125% of recommended N. The magnitude of increase for GFY on location mean basis was 65.8, 29.5, 16.3 and 6.6 % over control, 50, 75 and 100 % of recommended N, respectively. Growing of BN hybrid under unshaded environment fetched higher net return and B:C ratio at Palampur and Ludhiana. Net monetary return and B: C ratio increased consistently with increasing levels of nitrogen up to 125% of RDF (%) was recorded under unshaded environment over shaded environment, whereas, higher values of NDF (%) was recorded under unshaded environment over shaded environment. Growing of BN hybrid under unshaded condition (1466 ppm).

# K-12-AST-1: Performance of dual purpose pearl millet as influenced by different cutting management practices and nitrogen levels

(Locations: Anand, Urulikanchan, Bikaner, Mandya, Hyderabad and Dharwad)

On location mean basis, planting of BAIF Bajra-1 recorded highest GFY (263.4 g/ha), grain yield (8.7 g/ha), and stover yield (121.4 g/ha) and lowest with AVKB-19. On mean basis, cutting of pearl millet at 50 days after sowing and 2<sup>nd</sup> cut at 40 days after first cut and leave for grain recorded higher GFY (379.4g/ha), DMY (70.4 g/ha) and CPY (6.75 g/ha) compared to no cutting and cutting at 50 DAS & left for grain. With respect to nitrogen levels, on mean basis, application of 150% recommended dose of nitrogen recorded higher GFY (268.9 g/ha), DMY (50.8 g/ha) and CPY (5.04 g/ha mean except Urulikanchan) over 100% RDN. The magnitude of increase for GFY, DMY and CPY was 12.0, 21.0, and 26.0 percent more over 100% RDN. On mean basis, BAIF Bajra-1 recorded highest grain yield (8.7 g/ha) and stover yield. BAIF Bajra-1 recorded significantly highest stover yield across the centres over AVKB-19 and GFB-1. On mean basis, no cutting recorded highest grain yield (12.2 g/ha) followed by first cut at 50 DAS and left for grain (7.8 g/ha) and lowest being with cutting at 50 DAS & 2<sup>nd</sup> cut at 40 DAS and left for grain (3.1 g/ha). With respect to nitrogen levels on mean as well as location basis (except Urulikanchan), application of 150% RDN recorded highest grain (8.2 g/ha) and stover yields (104.6 g/ha) over 100% RDN. BAIF Bajra-1 fetched highest net monetary (Rs.34827 ha-1 and benefit cost ratio (2.29) on mean basis. With respect to cutting management practices, on mean basis cutting of dual purpose pearl millet varieties at 50 DAS and left for grain fetched highest net monetary return (Rs. 33215 ha-1) and benefit cost ratio (2.25). On mean basis as well as location wise, application of 150% of recommended dose of nitrogen realized highest net monetary return (Rs. 32674 ha<sup>-1</sup>) and benefit cost ratio (2.17).

# PS-12-AST-1: Effect of nutrient management on productivity of perennial grasses under low land condition

## (Locations: Bhubaneswar, Jorhat, Jabalpur, and Kalyani)

At **Jorhat**, planting of local dol (*Hymanchne emplexicalis*) with 50% NPK (inorganic fertilizer) + 5 t FYM/ha produced significantly highest GFY (989.7 q/ha) and DMY (210.1 q/ha). At **Bhubaneswar**, planting of para grass supplemented with 50 % NPK (inorganic fertilizer) + 5 t FYM/ha recorded highest GFY and DMY. At **Kalyani**, planting of para grass supplemented with 100 % NPK through inorganic fertilizers produced highest GFY (505 q/ha) of lowland grasses. At **Jabalpur**, growing of para grass supplemented with 100 % NPK through inorganic fertilizers produced highest GFY (505 q/ha) of lowland grasses. At **Jabalpur**, growing of para grass supplemented with 100 % NPK through inorganic fertilizers recorded highest GFY (459.8q/ha) and DMY (60.2 q/ha).

# PS-11-AST-2: Effect of levels of nitrogen on productivity of perennial grasses with and without tree shade

#### (Location: Jorhat)

The planting of perennial grasses yielded 32% higher GFY and 25% higher DMY under open condition as compared to shaded condition. Congosignal grass produced significantly higher GFY than Setaria. With increasing levels of nitrogen, GFY increased significantly under both the conditions. The highest CPY was recorded in the treatment receiving 25% > RDNF which was significantly superior over RDNF, 25% < RDNF.

# K-12-AST-2: Effect of time of sowing and seed rate on performance of fodder maize (*Zea mays*) under rainfed condition

#### (Location: Imphal)

The green fodder yield of crop sown on 26<sup>th</sup> May has 28.49% and 44.67% superiority over crop sown on 4<sup>th</sup> June and 14<sup>th</sup> June, respectively. While, seed rate of 80 kg/ha has 4.53% and 3.96% more superiority over seed rate of 40 kg/ha and 60 kg/ha, respectively in terms of green fodder yield. Maize sown on 26<sup>th</sup> May with a seed rate of 60 kg/ha produced significantly highest GFY (536.3 q/ha) and net return (Rs. 64280/ha) compared to rest of the combinations.

# K-12-AST-3: Performance of fodder rice bean as influenced by dates of sowing and spacing (Location: Imphal)

The GFY of rice bean crop sown on 26<sup>th</sup> May has 169.45% and 39.61% superiority over crop sown on 14<sup>th</sup> June and 4<sup>th</sup> June, respectively. While, spacing of 25 cm row to row has 8.29% and 3.51% superiority over spacing of 45 cm and 35 cm in terms of GFY. The sowing of rice bean on 26<sup>th</sup> May with a row to row spacing of 35 cm produced maximum yield (321.9q/ha) and net monetary return (Rs. 32902/ha) over rest of the combinations.

# PS-12-AST-3: Enhancing the production potential of various forage crops in coconut gardens through nutrient management

## (Location: Mandya)

Planting of BN hybrid grass recorded significantly highest GFY (645.9q/ha), DMY (132.9q/ha) and net monetary returns (Rs.30463 /ha) over guinea & signal grass. The application of 150% RDF to different crop(s) recorded highest GFY (589.6q/ha), DMY (131.6q/ha), CPY (10.2q/ha), net monetary returns (Rs.28405/ha) & benefit cost ratio (2.81). Planting of BN hybrid grass supplemented with 150% nutrient level produced significantly highest GFY (721.8q/ha) and DMY (149.3q/ha) over rest of the combinations. The maximum light interception in the bottom and middle of the canopy was observed in BN hybrid with application of 150% RDNF (46.95%, and 37.90% respectively).

## CS-13-AST-4: Residual effect of P applied to wheat on the succeeding summer fodders in sorghumwheat-summer fodders cropping system

#### (Location: Ludhiana)

Among the summer fodders, bajra gave maximum GFY (458.1 q/ha) followed by cowpea (378.0 q/ha) and maize (332.8 q/ha). Maize and bajra fodder yield increased significantly up to 25% of the recommended phosphorus dose. The maximum green fodder yield (190.4 q/ha) of sorghum was obtained in sorghum-wheat-cowpea cropping system which was significantly higher as compared to sorghum-wheat-maize (172.2 q/ha) and sorghum-wheat-bajra (151.4 q/ha) cropping system. With respect to system productivity, sorghum-wheat-cowpea cropping system recorded significantly highest system maize fodder equivalent yield (1471.7q/ha/yr). Application of P to summer fodders did not influence remarkably system maize fodder equivalent yield.

#### K-13-AST-1: Weed management in multicut sorghum

#### (Location: Ludhiana)

The density of total weeds in weedy check was 194.7 weeds/m<sup>2</sup> which was significantly higher than density of total weeds in herbicide treatments and hand weeding. Among herbicide treatments, the highest weed control efficiency was noticed in propaquizalofop 0.0625 and 0.075 kg a.i./ha (93.9 and 93.8 % WCE, respectively) closely followed by atrazine + pendimethalin combinations (92.9 % WCE). Herbicides vallore, pinoxaden, propaquizalofop and oxyfluorfen at all levels controlled weeds effectively but were toxic to the crop resulting in poor fodder yield of multicut sorghum. The highest GFY (945 q/ha) and DMY (194.4 q/ha) was obtained with hand weeding which was at par with atrazine + pendimethalin combinations.

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## PS-13-AST-1: Effect of herbicides on the weed control in Bajra Napier hybrid

(Location: Ludhiana)

The density of total weeds in weedy check was 663 weeds/m<sup>2</sup> which was significantly higher than the density of total weeds in herbicides treatments, intercropping and hand weeding. Among the herbicide treatments, all the combinations of atrazine + pendimethalin effectively controlled weeds. The highest GFY (2102.3q/ha) was obtained with application of atrazine 0.75 + pendimethalin 0.75 kg *a.i.* /ha combination in BN hybrid, whereas highest DMY (361.8 q/ha) was recorded in the plots receiving treatment of herbicide atrazine 0.50 + pendimethalin 0.75 kg *a.i.*/ha. Among herbicide, B:C ratio was higher in atrazine and pendimethalin combinations than atrazine and pendimethalin alone. The highest net monetary return (Rs. 77943/ha) and B: C ratio (1.62) was obtained with atrazine 0.750 kg + pendimethalin 0.750 kg *a.i.*/ha treatment.

# K-14-AST-1 (NT): Effect of nitrogen levels on promising entries of pearl millet (AVTPM-2)

(Locations: Bhubaneswar, Kalyani and Ranchi)

The results indicated that none of the entries under evaluation could surpass the national check Giant bajra at all the locations and also on mean basis. On mean basis, Giant bajra produced 197.1 q/ha, 40.6 q/ha and 2.98 q/ha green fodder, dry matter and crude protein yields, respectively. 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 forage yield increased by 127.4, 63.7 and 29.4 per cent over 0, 30 and 60 kg N/ha and respective increase with respect to dry matter yield was 127.9, 64.6 and 28.1 per cent.

## K-14-AST-2: Effect of nitrogen levels on promising entries of maize (AVTHM-2)

(Locations: Palampur, Hisar, Ludhiana, Bhubaneswar and Ranchi)

On over all mean basis, PHM-1 resulted in the production of 323.0 and 67.2 q/ha GFY and DMY, respectively and was closely followed by J-1006 (NC) producing 297.5 and 65.0 q/ha GFY and DMY. The best entry was DHM-117 producing 293.1q/ha green forage and 64.4 q/ha dry matter. The crude protein yield of 5.89 q/ha was highest in DHM-117 but was comparable with PHM-1 (5.88q/ha) and J-1006 (NC) (5.66q/ha). With the application of 120 kg N/ha, GFY increased by 78.3, 30.7 and 10.3 per cent over 0, 40 and 80 kg N/ha and respective increase in DMY was 86.3, 34.4 and 10.9 per cent.

# C. FORAGE CROP PROTECTION

Forage crop protection trials were conducted during *kharif* 2014 on three major aspects *viz.*, occurrence of insect-pest, diseases and nematodes, evaluation of improved breeding materials for their reaction to insect-pests and diseases and management of pests. In all 06 trials were conducted at different locations *viz.*, Bhubaneswar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri centres. The major emphasis was given on occurrence of diseases and insect-pests in different *Kharif* crops under different agro-climatic conditions and eco-friendly management of insect-pests and diseases.

**Pest occurrence:** Monitoring of diseases and insect pest in Sorghum, Pearl Millet, Maize and Cowpea revealed that at Jhansi zonate leaf spot (*Gleocercospora sorghi*), anthracnose (*Colletotrichum graminicola*), gray leaf spot (*Cercospora sorghi*), sooty stripe (*Ramulispora sorghi*) and leaf blight (*Helminthosporium turcicum*) were predominating diseases in *var*. MP Chari. Percent disease incidence ranged from 20-50%. Their spread and development was favoured by mean temperature around 30°C and humidity 80%. At Ludhiana, zonate and grey leaf spot appeared on sorghum *var*. SL-44. These diseases progressed rapidly under RH 70-85% and between temperature ranges of 31.3-37.6°C during October. At Palampur leaf blight incidences by *Helminthosporium turcicum* was initiated in the mid of July (3%) and progressed (20%) up to last week of August. At Bhubaneswar, leaf spot and leaf blight incidences occurred. Among the insect pest, shoot fly (*Atherigona aproximata*), leaf defoliators and aphid (*Rhopalosiphum maidis*) were recorded at Bhubaneswar and Jhansi.

In Cowpea, root rot caused by *Rhizoctonia solani, R. bataticola and Sclerotium rolfsii* was recorded between 10-30% at Jhansi centre. At Bhubaneswar, mosaic appeared in third week of August and continued to increase up to 3.2 rating in 1-5 scale. At Palampur, wilt and root rot were severe (12-45%) during the month of July. Leaf spot and leaf blight (*Ascochyta and phyllosticta* sp) appeared in the first week of July and increased continuously (up to 35%) in the last week of August. *Phytophthora* blight appeared in the second week of July and increased up to third week of July (10-25%). Anthracnose (*Colletotrichum lindemuthianum*) was observed in last week of July (10%) and increased up to first week of August (25%) and mosaic diseases appeared late in the season and remained stationary till the end of August. At Rahuri, yellow mosaic virus was moderate throughout the crop period.

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In Maize, leaf blight incidence started from first week of August and progressed up to second week of September (2.6) on 1-5 scale at Bhubaneswar. At Ludhiana, severity of maydis leaf blight was noticed in the last week of July on *var.* J 1006 and progressed rapidly up to mid September. At Palampur, leaf blight (*Helminthosporium maydis* and *Helminthosporium tercecium*) appeared in the third week of July and severity continued to increase (25%) up to last week of August. Banded leaf and sheath blight (*Rhizoctonia sp*) were also observed in mild form. At Jhansi, incidences of maydis leaf blight were recorded during the crop season. In Pearl Millet, leaf spot was severe (30-35%) at Jhansi and (57%) at Ludhiana. Infestation of insect pest was predominating at Bhubaneswar and Hyderabad.

**Evaluation of breeding materials**: All the cowpea entries were found tolerant to pest and diseases at different locations except Palampur for foliar diseases. All the entries were found free from infestations of aphids at Rahuri. However, at Hyderabad (14.26-27.0%) flea beetle infestation was observed. In Pearl Millet, all the IVT and AVT1 entries were found resistant to pest and diseases across the centers. However, at Ludhiana Giant Bajra and AFB-8 showed moderately susceptible reactions against leaf spot. In IVT maize, all the entries were found susceptible to moderately resistant for maydis leaf spot at Ludhiana. At Rahuri all the entries showed resistant reaction to maize stem borer. All the entries were found resistant to moderately resistant for sheath blight at Jhansi and Palampur except MPC-1. In AVT trials, all the entries were found moderately resistant for sheath blight at Palampur, Bhubaneswar and Jhansi except AFM-3 at Palampur. However, at Ludhiana all the entries were found moderately susceptible for maydis leaf blight except AFM-2.

In hybrid trials, all the entries were found resistant to moderately resistant at Palampur and moderately resistant to Bhubaneswar for maize leaf blight and at Jhansi all the entries were found resistant for leaf blight. In AHTM trial for seed, all the entries were found resistant to moderately resistant at Palampur, Jhansi, Ludhiana and Bhubaneswar except DHM-117 at Palampur. In IVT all entries were found resistant to root rot, leaf blight and leaf spot at Jhansi. At Bhubaneswar, moderately resistant entries were JOR-14-2, BFRB-18 and JRBJ-06-5.

## **Diseases and Pest Management:**

- In trial on Management of foliar diseases of forage sorghum, lowest disease incidence as well as highest forage yield were recorded in seed treatment with carbendazim (2 g/kg) seed + Two foliar sprays of propiconazole (0.1%) and seed treatment with *T. viride* (5g/kg) seed + Two foliar sprays of propiconazole (0.1%) at Bhubaneswar, Ludhiana, Palampur and Jhansi.
- In trial on Integrated management of root rot and foliar diseases of forage cowpea early sowing recorded minimum root rot incidence and highest yield followed by normal and late sown at Jhansi, Ludhiana and Palampur centres, However, at Bhubneshwar late sowing showed minimum root rot incidence. All the treatments in three sowing dates were found effective against the root rot and foliar disease. Among different treatments, T2 [(Seed treatment with *Trichoderma viride + Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval)] and T3 [(Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP(50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval)] was found to be the best treatments as it reduced the disease to maximum extent and in turn provided maximum GFY at all the centres.
- In trial on Biological management of defoliators on cowpea, all the bio-pesticides were quite effective for the management of defoliators as compared to control plot at Jhansi and Ludhiana. However at Rahuri, infestation of defoliators was not observed throughout the crop period hence the spray treatments were not given to the crop.

## **D. BREEDER SEED PRODUCTION**

In *Kharif*-2014, total indent for breeder seed production was 141.68 q for 12 varieties in four forage crops and was allocated to seven SAUs/ICAR/NGO institutes. The maximum indent was for Maize followed by Cowpea, Guar and minimum was for Pearl millet. In Maize (152.8 q) and Pearl millet (0.55 q), the overall breeder seed production was higher than allocated quantity whereas in Cowpea (1.95 q) and Guar (0.80 q), the production was less than the allocated quantity. The overall breeder seed production was 156.1 q against the allocation of 141.68 q, which was 14.42 q surplus than the quantity allocated.

AICRP on Forage Crops & Utilization

VI

# ALL INDIA CCOORDINATED RESEARCH PROJECT ON FORAGE CROPS ZONE, COORDINATED CENTERS AND TESTING LOCATIONS

Zone		Coordir	nated Centers		Testing Locations					
	S. N.	Location	Establishment Year	State	S. N.	Location	State			
I. Hill States = 3	1.	Palampur, CSKHPKV	1970	Himachal Pradesh	1.	Almora, VPKAS*	Uttarakhand			
Locations = 3	2.	Srinagar, SKUAT	2010	Jammu & Kashmir						
II. North West	3.	Ludhiana, PAU	1989	Punjab	2.	Meerut, SVBPUA&T	Uttar Pradesh			
States = 5	4.	Hisar, CCS HAU	1970	Haryana	3.	Avikanagar, IGFRI-RRS*	Rajasthan			
Locations = 13	5.	Pantnagar, GBPUAT	1995	Uttarakhand	4.	Jodhpur, CAZRI-RRS*	Rajasthan			
	6.	Bikaner, SKRAU	1995	Rajasthan	5.	Jalore, RAU-RRS	Rajasthan			
					6.	Udaipur MPUAT	Rajasthan			
					7.	Pali-Marwar CAZRI-RRS*	Rajasthan			
					8.	Jaisalmer, CAZRI-RRS*	Rajasthan			
					9.	Fatehpur Shekhawati, SKRAU	Rajasthan			
					10.	Bawal, HAU	Haryana			
III. North East States = 8	7.	Faizabad, NDUAT	1982	Uttar Pradesh	11.	Umiam (Barapani), ICAR Res. Complex for NEH Region*	Meghalaya			
Locations = 9	8.	Ranchi, BAU	1970	Jharkhand	12.	Visva Bharti, Shantinikaten CU	West Bengal			
	9.	Kalyani, BCKV	1972	West Bengal						
	10.	Bhubaneswar,OUAT	1987	Orissa						
	11.	Jorhat, AAU	1970	Assam						
	12.	Imphal, CAU	2010	Manipur						
	13.	Pusa, RAU	2015 (Approved)	Bihar						

Zone		Coord	inated Centers		Testing Locations				
	S. N.	Location	Establishment Year	State	S. N.	Location	State		
IV. Central	14.	Anand, AAU	1970	Gujarat	13.	Kanpur, CSAU&T	Uttar Pradesh		
States = 6 Locations = 10	15.	Jabalpur, JNKVV	1970	Madhya Pradesh	14.	Jhansi, IGFRI*	Uttar Pradesh		
	16.	Rahuri, MPKV	1971	Maharashtra	15.	Dhari & Jamnagar, GAU	Gujarat		
	17.	Urulikanchan, BAIF	1982	Maharashtra	16.	Akola, PDKVV	Maharashtra		
	18.	Raipur, IGKV	2010	Chhattisgarh	17.	Dapoli & Palghar, KKV	Maharashtra		
V. South	19.	Mandya, UAS (B)	1986	Karnataka	18.	Dharwad, IGFRI-RRS*	Karnataka		
States =6 Locations = 7	20.	Coimbatore, TNAU	1976	Tamil Nadu	19.	Pondicherry, PJLNCA & RI, Karaikal	Pondicherry		
					20.	ANGRAU, Hyderabad	Andhra Pradesh		
	21.	Vellayani, KAU	1971	Kerala					
	22.	Hyderabad, PJTSAU	1970	Telangana					

Summary: Zone = 5, States = 24, Coordinating Centres = 22, Testing Locations = 20

\*ICAR Institute

## AICRP ON FORAGE CROPS Coding of varieties for Kharif-2014

S.N.	Contributor	Designation	Code							
IVTM: Initial Vari	etal Trial in Forage Maize (NEV	V)								
1	BAIF, Urulikanchan	BAIF Maize-4	IVTM-8							
2	Mandya, UAS	MFM-4	IVTM-5							
3	Mandya, UAS	MFM-6	IVTM-3							
4	IGFRI, Jhansi	JHM-14-1	IVTM-1							
5	AAU, Anand	AFM-4	IVTM-9							
6	Advanta Pvt. Ltd.	PAC-746	IVTM-4							
7	MPUAT, Udaipur	MPC-1	IVTM-2							
8	NC	African Tall	IVTM-6							
9	NC	J-1006	IVTM-7							
AVTM-1: First Ad	vanced Varietal Trial in Forage	e Maize								
1	AAU, Anand	AFM-1	AVTM-2							
2	AAU, Anand	AFM-2	AVTM-7							
3	AAU, Anand	AFM-3	AVTM-3							
4	CSKHPKV, Palampur	PFM-7	AVTM-5							
5	IGFRI, Jhansi	JHM-13-1	AVTM-6							
6	NC	African Tall	AVTM-4							
7	NC	J-1006	AVTM-1							
3. AVTHM-2: Seco	nd Advanced Varietal Trial in I	orage Hybrid Maize	I							
1	PAU, Ludhiana	PMH-1	AVT2HM-4							
2	PAU, Ludhiana	PMH-3	AVT2HM-3							
3	ANGRAU, Hyderabad	DHM-117	AVT2HM-6							
4	Advanta Pvt. Ltd.	IHTFM (PAC-745)	AVT2HM-1							
5	NC	African Tall	AVT2HM-5							
6	NC	J-1006	AVT2HM-2							
4. AVTHM-2 (Seed): Second Advanced Varietal Trial in Forage Hybrid Maize										
1	PAU, Ludhiana	PMH-1	AVT2HMS-1							
2	PAU, Ludhiana	PMH-3	AVT2HMS-6							
3	ANGRAU, Hyderabad	DHM-11/	AVI2HMS-5							
4	Advanta Pvt. Ltd	IHIFM (PAC-745)								
5	NC	African Tall	AV12HMS-4							
0 5 IVTDM: Initial V	INC Variatel Trial in Eanson Dearl m	J-1000	AVI2HM5-2							
<b>5. IV I PIVI: IIIIUAI V</b>	AAU Apond									
2	AAU, Allallu Advanta Dyt. I.td	PAC 082	IVITIM 8							
3	ANGRALI Hyderabad	APEB_00_10	IVTPM_1							
<u> </u>	CCS HALL Hisar	HFC-081	IVTPM-7							
5	SKRAU Bikaner	RBB-5	IVTPM-5							
6	NC	Raj Baira Chari-2	IVTPM-6							
7	NC	Giant Baira	IVTPM-3							
8	NC	AVKB-19	IVTPM-2							
6. AVTPM-1: First	Advanced Varietal Trial in For	age Pearl Millet	· · · ·							
1	NDUA&T, Faizabad	NDFB-939	AVT1PM-5							
2	AAU, Anand	AFB-9	AVT1PM-6							
3	deVgen	DFMH-30	AVT1PM-4							
4	SKRAU, Bikaner	RBB-4	AVT1PM-7							
5	NC	Raj Bajra Chari-2	AVT1PM-3							
6	NC	Giant Bajra	AVT1PM-1							
7	NC	AVKB-19	AVT1PM-2							
7. AVTPM-2: Second	nd Advanced Varietal Trial in P	earl millet								
1	AAU, Anand	AFB-8	AVT2PM-5							
2	ANGRAU, Hyderabad	APFB-09-1	AVT2PM-6							
3	NDUA&T, Faizabad	NDFB-936	AVT2PM-1							
4	NC	Raj Bajra Chari-2	AVT2PM-4							
5	NC	Giant Bajra	AVT2PM-2							
6	NC	AVKB-19	AVT2PM-3							

8. AVTPM-2 (Seed): Second Advanced Varietal Trial in Pearl Millet										
1	AAU, Anand	AFB-8	AVT2PMS-6							
2	ANGRAU, Hyderabad	APFB-09-1	AVT2PMS-1							
3	NDUA&T, Faizabad	NDFB-936	AVT2PMS-4							
4	NC	Raj Bajra Chari-2	AVT2PMS-3							
5	NC	Giant Bajra	AVT2PMS-2							
6	NC	AVKB-19	AVT2PMS-5							
9. IVTC: Initial Varietal Trial in Forage Cowpea										
1	IGFRI, Jhansi	IGFRI-06-01	IVTC-5							
2	UAS, Mandya	MFC-09-13	IVTC-7							
3	ANGRAU, Hyderabad	APFC-10-11	IVTC-4							
4	CCS HAU, Hisar	HFC-11-2	IVTC-9							
5	NC	Bundel Lobia-1	IVTC-8							
6	NC	UPC-5286	IVTC-1							
7	ZC (NWZ)	Bundel Lobia-2	IVTC-3							
8	ZC (NEZ/HZ)	UPC-622	IVTC-2							
9	ZC (CZ/SZ)	UPC-9202	IVTC-6							
10. AVTC-1: First	10. AVTC-1: First Advanced Varietal Trial in Cowpea									
1	UAS, Mandya	MFC-09-9	AVTC-2							
2	TNAU, Coimbatore	TNFC-0926	AVTC-1							
3	GBPUAT, Pantnagar	UPC-1301	AVTC-7							
4	NC	Bundel Lobia-1	AVTC-5							
5	NC	UPC-5286	AVTC-6							
6	ZC (NEZ/HZ)	UPC-622	AVTC-4							
7	ZC (SZ)	UPC-9202	AVTC-3							
11. IVT Rice bean	: Initial Varietal Trial in Rice Be	ean								
1	JNKVV, Jabalpur	JRBJ-06-4	IVTRB-6							
2	JNKVV, Jabalpur	JRBJ-06-5	IVTRB-7							
3	AAU, Jorhat	JOR-14-1	IVTRB-1							
4	AAU, Jorhat	JOR-14-2	IVTRB-3							
5	OUA&T, Bhubaneswar	BFRB-18	IVTRB-4							
6	NC	Bidhan-1	IVTRB-8							
7	NC	Bidhan-2	IVTRB-2							
8	NC	RBL-6	IVTRB-5							

## DECODES OF ENTRIES OF AVT AGRONOMICAL TRIAL KHARIF-2014 K-14-AST-1: Effect of nitrogen levels on forage yield of promising entries of pearl millet (AVTPM-2)

S. N.	Name of Entry	Code									
1	AFB-8	AVTPM-2-C									
2	APFB-09-1	AVTPM-2-D									
3	NDFB-936	AVTPM-2-A									
4	Raj Bajra Chari (NC)	AVTPM-2-E									
5	Giant Bajra (NC)	AVTPM-2-B									
6	AVKB-19 (NC)	AVTPM-2-F									

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S. N.	Name of Entry	Code
1	PMH-1	AVTHM-2-B
2	PMH-3	AVTHM-2-C
3	DHM-117	AVTHM-2-E
4	IHTFM (PAC-745)	AVTHM-2-A
5	African Tall (NC)	AVTHM-2-D
6	J-1006 (NC)	AVTHM-2-F

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

#### (Reference Tables: 1.1 to 1.9)

An initial varietal trial in forage maize comprising of seven entries and two national checks *viz.*, African Tall and J-1006 was conducted at 19 locations in five zones of the country. For green forage yield (q/ha), entries MFM-6 (7.4%) and BAIF Maize-4 (1.9%) in Hill Zone, entries PAC-746 (13.0%) and MPC-1 (6.9%) in North West Zone, entries AFM-4 (10.9%), MFM-4 (10.1%) and MPC-1 (7.6%) in North East Zone, entry PAC-746 (0.8%) in Central zone and entry MPC-1 (3.6%) in South Zone were superior over national check however at national level none of the entries was found superior than the national check. For the character dry matter yield (q/ha), entries MFM-4 (6.1%) and MFM-6 (0.3%) in Hill Zone, entry AFM-4 (3.0%) in North West Zone, entries AFM-4 (8.1%) and MFM-4 (1.6%) in North East Zone, entry PAC-746 in Central Zone (4.1%) and at national level (2.0%) were superior. Similarly in green forage and dry matter production potential (q/ha/day), entries PAC-746 and MPC-1 were adjudged good performer.

For crude protein yield (q/ha) and crude protein content (%) entry MFM-6 was superior. For the character plant height, national check African Tall (217.7 cm) was adjudged best performer. For the character leafiness (L/S ratio), entry JHM-14-1 (0.56) along with national check J-1006 (0.56) were superior. For other quality parameters, national check African Tall for ADF (34.3%) and MFM-6 for NDF (69.0%) ranked first whereas for IVDMD (%) test entry JHM-14-1 (68.4%) was best performer.

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

#### (Reference Tables: 2.1 to 2.9)

An advanced varietal trial in forage maize comprising five entries and two national checks *viz.*, African Tall and J-1006 was conducted at 16 locations distributed in four zones of the country. For green forage yield and dry matter yield (q/ha), none of the entries was found superior than checks in any zones as well as at national level. In green forage production potential (q/ha/day), entries PFM-7 and AFM-2 and for dry matter production potential (q/ha/day) national check J-1006 were adjudged best performers.

For crude protein yield (q/ha), national check African Tall maintained superiority while for crude protein content (%) entry AFM-3 was ranked first. For the character leafiness (L/S ratio), national check J-1006 (0.64) was best. For the character plant height, entry JHM-13-1 (202.1 cm) was adjudged best performer. For other quality parameters, African Tall for ADF and IVDMD (%) while AFM-3 for NDF (%) ranked first.

			Hill Zone	L. L.				Nortl	n West Z	Lone		
Entries	Palam-	Alm-	Aver-	Ra-	Superi-	Ludh-	His-	Udai-	Jal-	Aver-	Ra-	Superi-
	pur	ora	age	nk	ority%	iana	ar	pur	ore	age	nk	ority%
JHM-14-1	556.5	464.5	510.5	9		388.9	88.9	529.7	210.7	304.5	7	
MPC-1	545.8	499.2	522.5	7		394.4	118.5	637.6	274.3	356.2	2	6.9
MFM-6	637.9	523.1	580.5	1	7.4	403.7	114.8	533.4	213.1	316.3	5	
PAC-746	641.2	426.7	534.0	5		383.3	137.0	713.0	273.0	376.6	1	13.0
MFM-4	674.0	398.9	536.5	4		361.1	114.8	470.4	240.2	296.6	8	
BAIF Maize-4	680.5	421.3	550.9	2	1.9	352.3	107.4	531.1	246.0	309.2	6	
AFM-4	537.0	490.7	513.9	8		444.4	118.5	579.7	166.0	327.2	4	
African Tall (NC)	633.3	447.5	540.4	3		166.7	100.0	636.6	259.0	290.6	9	
J-1006 (NC)	581.9	469.9	525.9	6		377.3	192.6	553.7	209.3	333.2	3	
Mean	609.8	460.2	535.0			363.6	121.4	576.1	232.4	323.4		
<b>CD at 5%</b>	NS	61.1				65.1	39.6	141.5	58.7			
CV%	11.9	7.7				8.7	18.7	14.0	14.6			

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

Note- Data could not be collected in Srinagar due to flood

Table 1.1 IVTM: Initial	Varietal Trial in Forage	Maize: Green	Forage Yield (a/ha)
	, arrouar irrar mir i orage	mailler Green	I of age I for a (q/ma)

		N	lorth Eas	t Zone			Central Zone								
Entries	Bhuban-	Ran-	Jor-	Aver-	Ra-	Superi-	Ana-	Rai-	Jabal-	Rah-	Urulikan-	Jha-	Aver-	Ra-	Superi-
	eswar	chi	hat	age	nk	ority%	nd	pur	pur	uri	chan	nsi	age	nk	ority%
JHM-14-1	280.2	416.7	238.7	311.8	8		423.0	370.4	464.5	721.2	604.4	488.9	512.1	6	
MPC-1	313.5	444.4	284.5	347.5	3	7.6	382.0	393.5	410.4	709.8	649.1	583.0	521.3	5	
MFM-6	244.8	435.3	260.6	313.5	6		317.0	412.0	452.0	713.5	681.5	467.3	507.2	7	
PAC-746	286.0	342.5	228.8	285.8	9		414.0	481.5	481.2	685.8	930.6	544.7	589.6	1	0.8
MFM-4	261.4	491.1	314.3	355.6	2	10.1	241.0	467.6	360.4	602.5	621.4	402.5	449.2	9	
<b>BAIF Maize-4</b>	247.9	472.2	217.3	312.5	7		350.0	500.0	412.4	843.6	676.2	513.6	549.3	4	
AFM-4	320.2	463.1	185.5	322.9	4		564.0	532.4	356.2	809.8	715.0	532.1	584.9	2	
African Tall (NC)	256.2	490.8	201.4	316.2	5		349.0	439.8	470.8	738.9	752.6	569.4	553.4	3	
J-1006 (NC)	271.8	555.6	247.2	358.2	1	10.9	323.0	425.9	429.1	408.5	777.1	476.6	473.4	8	
Mean	275.8	456.8	242.0	324.9			373.7	447.0	426.3	692.6	712.0	508.7	526.7		
CD at 5%	20.0	83.6	9.9				55.8	76.6	101.2	100.7	43.3	7.3			
CV%	4.2	10.5	12.3				8.9	10.7	13.6	8.4	13.5	4.2			

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Entries				South Z	one				All India Average	
	Hyderabad	Coimbatore	Mandya	Vellayani	Raichur	Average	Rank	Superiority%	Average	Rank
JHM-14-1	514.3	476.9	193.7	240.7	434.0	371.9	7		405.3	8
MPC-1	620.9	597.2	198.0	245.4	465.0	425.3	1	3.6	438.3	2
MFM-6	611.6	560.2	206.2	240.7	426.0	409.0	3		422.7	6
PAC-746	481.9	509.3	208.2	208.3	374.0	356.3	8		437.5	3
MFM-4	546.7	430.6	129.9	259.3	387.0	350.7	9		388.7	9
BAIF Maize-4	583.8	597.2	168.4	222.2	491.0	407.2	4		432.2	4
AFM-4	560.6	537.0	265.4	250.0	344.0	372.8	6		405.7	7
African Tall (NC)	518.9	537.0	220.7	268.5	441.0	402.5	5		424.4	5
J-1006 (NC)	556.0	541.7	223.1	199.1	439.0	410.4	2		445.7	1
Mean	555.0	531.9	201.5	237.1	422.3	389.6			422.3	
CD at 5%	47.5	86.9	0.1	84.9	60.6					
CV%	4.9	9.5	7.6	16.8	5.8					

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

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

Entries		ŀ	Iill Zone	North West Zone					
	Palampur	Almora	Average	Rank	Superiority%	*Hisar	Ludhiana	Rank	Superiority%
JHM-14-1	108.9	75.4	92.2	6		16.9	90.2	5	
MPC-1	106.6	68.7	87.7	8		23.0	94.7	2	
MFM-6	122.2	83.0	102.6	2	0.3	21.1	94.1	3	
PAC-746	125.1	66.6	95.9	5		30.3	93.2	4	
MFM-4	134.6	82.3	108.5	1	6.1	21.5	82.0	7	
BAIF Maize-4	131.1	64.3	97.7	4		21.8	81.7	8	
AFM-4	103.5	60.9	82.2	9		22.2	106.7	1	3.0
African Tall (NC)	124.1	80.4	102.3	3		22.3	42.0	9	
J-1006 (NC)	114.8	64.6	89.7	7		37.6	87.5	6	
Mean	119.0	71.8	95.4			24.1	85.8		
CD at 5%	NS	12.4				9.2	32.3		
CV%	13.0	10.0				20.1	3.1		

\* Not included in zonal and all India average due to  $CV \ge 20$ 

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		N	North Ea	st Zone						(	Central Zon	e			
Entries	Bhuban-	Ran-	Jor-	Aver-	Ra-	Superi-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Jha-	Aver-	Ra-	Superi-
	eswar	chi	hat	age	nk	ority%	nd	pur	pur	uri	nchan	nsi	age	nk	ority%
JHM-14-1	56.5	98.9	47.4	67.6	6		73.1	112.8	114.1	115.8	101.9	91.5	101.5	8	
MPC-1	62.7	103.3	49.6	71.9	4		90.6	119.8	98.7	121.9	110.3	107.8	108.2	5	
MFM-6	52.4	86.7	48.6	62.6	8		75.1	124.8	110.8	129.6	118.7	73.6	105.4	7	
PAC-746	59.6	88.9	42.4	63.6	7		86.6	144.6	119.4	118.6	163.3	103.1	122.6	1	4.1
MFM-4	58.9	103.9	62.4	75.1	2	1.6	59.6	140.7	80.8	92.4	101.9	74.4	91.6	9	
BAIF Maize-4	56.9	115.8	38.6	70.4	5		70.8	133.2	116.6	125.0	133.6	102.1	113.6	4	
AFM-4	56.5	133.9	49.3	79.9	1	8.1	81.3	129.0	108.3	131.4	129.5	64.2	107.3	6	
African Tall (NC)	51.2	85.3	39.0	58.5	9		71.3	151.8	100.6	156.8	103.8	122.8	117.8	2	
J-1006 (NC)	67.6	121.7	32.4	73.9	3		98.7	161.7	79.8	151.4	124.7	79.5	116.0	3	
Mean	58.0	104.3	45.5	69.3			78.6	135.4	103.2	127.0	120.9	91.0	109.3		
CD at 5%	4.4	21.7	5.4				11.4	22.3	26.9	18.5	7.3	7.0			
CV%	4.3	11.9	15.4				8.7	10.3	15.1	8.4	6.5	4.0			

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

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

			South	Zone				All India Av	erage
Entries	Hydera-	Coimb-	Man-	*Vella-	Aver-	Ra-	Aver-	Ra-	Super-
	bad	atore	dya	yani	age	nk	age	nk	iority%
JHM-14-1	76.9	59.6	41.5	33.7	59.3	6	84.3	7	
MPC-1	97.1	79.7	29.9	42.0	68.9	1	89.4	4	
MFM-6	87.5	75.5	32.0	45.0	65.0	2	87.6	6	
PAC-746	72.3	74.1	40.6	47.4	62.3	4	93.2	1	2.0
MFM-4	89.8	57.3	24.9	46.6	57.3	8	83.1	8	
BAIF Maize-4	56.7	78.0	39.9	27.0	58.2	7	89.6	3	
AFM-4	70.4	73.1	42.4	43.7	62.0	5	89.4	4	
African Tall (NC)	76.3	90.9	21.7	44.1	63.0	3	87.9	5	
J-1006 (NC)	81.1	65.0	40.8	45.8	62.3	4	91.4	2	
Mean	78.7	72.6	34.9	41.7	62.0		88.4		
CD at 5%	11.8	13.1	6.8	22.7					
CV%	8.7	10.4	11.4	31.5					

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Entries	Ludh-	His-	Palam-	Bhuba-	Ran-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Man-	Vella-	Aver-	Ra-
Entries	iana	ar	pur	neswar	chi	hat	nd	pur	pur	uri	nchan	bad	atore	dya	yani	age	nk
JHM-14-1	5.40	1.17	8.00	4.50	7.71	3.79	7.98	5.88	7.14	12.65	10.42	9.10	10.60	3.60	2.67	6.71	4
MPC-1	5.50	1.56	7.90	5.08	7.40	4.52	6.70	6.25	6.41	12.45	12.48	10.10	12.71	3.65	2.72	7.03	2
MFM-6	5.60	1.51	9.20	3.81	7.02	4.09	5.03	6.54	7.06	13.99	11.17	10.00	12.45	3.66	2.67	6.92	3
PAC-746	5.30	1.80	9.20	4.61	6.11	3.81	8.12	7.64	7.18	11.82	14.32	9.50	10.61	3.68	2.31	7.07	1
MFM-4	5.00	1.51	9.80	4.33	8.61	4.99	4.23	7.42	5.37	11.16	10.71	9.40	7.83	2.26	2.88	6.37	7
BAIF Maize-4	4.90	1.41	9.80	3.94	8.31	3.15	6.12	6.98	7.13	12.52	12.76	8.40	7.67	3.97	2.98	6.67	5
AFM-4	6.20	1.56	7.90	4.10	9.57	3.92	5.67	6.76	6.31	6.81	12.95	9.10	9.03	4.21	2.21	6.42	6
African Tall (NC)	2.30	1.32	8.90	4.00	7.37	3.40	5.56	7.94	6.34	12.23	12.52	7.30	8.29	3.02	2.46	6.20	8
J-1006 (NC)	5.20	2.53	8.10	5.25	7.59	2.94	6.87	8.45	5.47	13.96	14.02	8.90	8.66	4.74	2.77	7.03	2
Mean	5.04	1.60	8.76	4.40	7.74	3.85	6.25	7.10	6.49	11.96	12.37	9.09	9.76	3.64	2.63	6.71	

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

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

Entries	Ludh-	His-	Bhuban-	Ran-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Aver-	Ra-
Entries	iana	ar	eswar	chi	hat	nd	pur	pur	uri	nchan	bad	atore	age	nk
JHM-14-1	1.30	0.22	0.91	1.83	0.75	1.38	1.79	1.75	2.03	1.76	1.40	1.32	1.37	4
MPC-1	1.30	0.30	1.02	1.72	0.79	1.59	1.90	1.54	2.14	2.12	1.60	1.70	1.48	2
MFM-6	1.30	0.28	0.82	1.39	0.76	1.19	1.98	1.73	2.54	1.95	1.40	1.68	1.42	5
PAC-746	1.30	0.40	0.96	1.58	0.71	1.70	2.30	1.86	2.05	2.51	1.40	1.54	1.53	1
MFM-4	1.10	0.28	0.98	1.82	0.99	1.05	2.23	1.20	1.71	1.76	1.50	1.04	1.30	7
BAIF Maize-4	1.10	0.29	0.88	1.96	0.60	1.24	2.11	1.76	2.12	2.27	0.90	1.11	1.36	6
AFM-4	1.50	0.29	0.85	2.30	0.78	1.43	2.05	1.59	2.19	2.16	1.10	1.22	1.46	3
African Tall (NC)	0.60	0.29	0.83	1.33	0.61	1.13	2.41	1.50	2.27	1.92	1.00	1.26	1.26	8
J-1006 (NC)	1.20	0.50	1.11	1.99	0.51	1.86	2.57	1.22	2.61	2.45	1.30	1.05	1.53	1
Mean	1.19	0.32	0.93	1.77	0.72	1.40	2.15	1.57	2.18	2.10	1.29	1.33	1.41	

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Entries	Palam-	Ludh-	His-	Bhuban-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Man-	Aver-	Ra-
Entries	pur	iana	ar	eswar	hat	nd	pur	pur	uri	nchan	bad	atore	dya	age	nk
JHM-14-1	9.8	5.2	1.8	4.5	4.3	3.9	9.4	9.4	10.1	9.7	6.4	4.9	3.9	6.4	6
MPC-1	9.7	6.9	2.1	5.0	4.7	4.6	10.6	8.1	12.6	9.5	9.3	7.7	2.3	7.2	3
MFM-6	11.8	8.0	2.0	4.2	4.2	3.9	12.0	9.2	11.3	10.1	11.5	9.9	2.7	7.7	1
PAC-746	11.3	4.7	3.4	4.7	4.0	4.2	13.6	9.8	7.2	14.4	6.7	6.8	3.0	7.2	3
MFM-4	11.0	6.0	2.1	4.7	5.8	3.1	14.3	6.5	5.4	9.5	8.3	5.3	2.9	6.5	5
BAIF Maize-4	11.5	7.1	2.2	4.6	3.7	3.5	13.2	9.6	10.8	11.1	5.7	7.9	3.0	7.2	3
AFM-4	8.8	5.3	2.4	4.4	4.6	4.4	12.7	8.5	7.4	10.8	6.7	7.1	4.2	6.7	4
African Tall (NC)	11.9	3.6	2.0	4.2	3.4	3.5	16.1	8.1	10.9	8.8	8.6	10.3	3.1	7.3	2
J-1006 (NC)	11.7	6.4	4.0	5.4	3.1	5.0	17.3	6.5	7.9	10.8	7.5	6.0	2.8	7.3	2
Mean	10.8	5.9	2.4	4.6	4.2	4.0	13.2	8.4	9.3	10.5	7.9	7.3	3.1	7.1	

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

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

Entring	Palam-	Ludh-	His-	Bhuban-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Man-	Aver-	Ra-
Entries	pur	iana	ar	eswar	hat	nd	pur	pur	uri	nchan	bad	atore	dya	age	nk
JHM-14-1	9.1	5.8	10.5	8.0	9.0	5.3	8.4	8.3	8.7	9.5	8.3	8.3	7.9	8.2	6
MPC-1	9.1	7.3	9.2	7.9	9.6	5.1	8.9	8.2	10.3	8.6	9.6	9.6	6.1	8.4	5
MFM-6	9.6	8.5	9.6	8.0	8.6	5.2	9.6	8.3	8.7	8.5	13.1	13.1	7.0	9.1	1
PAC-746	9.1	5.0	11.2	7.9	9.5	4.9	9.4	8.4	6.1	8.8	9.2	9.2	7.2	8.1	7
MFM-4	8.2	7.3	9.9	8.0	9.5	5.2	10.2	8.0	5.8	9.3	9.2	9.2	7.0	8.2	6
BAIF Maize-4	9.1	8.7	9.9	8.1	9.7	5.0	9.9	8.3	8.7	8.3	10.1	10.1	8.3	8.8	2
AFM-4	9.1	5.0	10.7	7.8	9.4	5.4	9.8	8.3	5.6	8.3	9.6	9.6	8.3	8.2	6
African Tall (NC)	9.6	8.5	8.8	8.2	8.8	4.9	10.6	8.3	6.9	8.5	11.4	11.4	7.0	8.7	3
J-1006 (NC)	10.2	7.3	10.7	8.0	9.8	5.1	10.7	8.1	5.2	8.7	9.2	9.2	9.9	8.6	4
Mean	9.2	7.0	10.0	8.0	9.3	5.1	9.7	8.2	7.3	8.7	10.0	10.0	7.6	8.5	

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

Entring	Palam-	Ludh-	His-	Udai-	Jal-	Bhuban-	Ran-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Jha-	Hydera-	Coimb-	Man-	Vella-	Rai-	Aver-	Ra-
Entries	pur	iana	ar	pur	ore	eswar	chi	hat	nd	pur	pur	uri	nchan	nsi	bad	atore	dya	yani	chur	age	nk
JHM-14-1	270.0	191.0	132.0	223.4	215.0	183.5	162.0	164.2	207.5	172.6	208.1	205.4	211.8	254.4	219.1	243.2	146.1	230.3	208.0	202.5	6
MPC-1	233.3	197.0	168.9	268.3	262.8	194.3	164.0	209.3	229.0	181.9	186.1	235.0	255.4	267.2	253.8	260.0	167.4	156.0	213.0	215.9	2
MFM-6	300.0	184.7	146.7	252.4	223.9	154.2	171.0	178.1	214.9	192.4	204.8	225.3	201.4	252.8	241.9	246.7	154.3	195.3	200.0	207.4	5
PAC-746	267.3	172.7	143.3	227.6	228.9	187.2	161.0	195.9	187.1	172.9	217.7	223.7	205.0	207.3	209.9	191.3	161.7	184.3	177.0	195.9	9
MFM-4	276.7	173.0	153.2	243.3	227.2	175.1	155.0	183.7	198.2	208.2	178.3	223.3	207.4	231.6	221.5	227.1	158.7	143.7	184.0	198.4	8
BAIF Maize-4	288.0	190.7	154.0	234.7	212.8	167.3	152.0	201.8	214.4	147.3	214.4	218.3	234.6	273.4	232.2	242.1	164.5	194.3	220.0	208.2	4
AFM-4	286.7	176.7	137.3	242.6	177.8	179.2	182.0	189.8	210.7	180.0	195.0	226.0	217.9	225.3	211.8	217.9	164.5	209.0	165.0	199.7	7
African Tall (NC)	300.0	194.3	125.0	248.7	228.3	160.3	169.0	224.5	216.2	218.9	189.8	246.3	225.6	300.7	250.0	261.2	171.2	210.0	197.0	217.7	1
J-1006 (NC)	272.7	175.7	166.4	241.9	216.7	198.4	153.0	195.9	208.9	248.2	180.8	218.3	239.0	241.3	217.6	233.8	147.8	207.3	202.0	208.7	3
Mean	277.2	184.0	147.4	242.5	221.5	177.7	163.2	193.7	209.7	191.4	197.2	224.6	222.0	250.4	228.6	235.9	159.6	192.3	196.2	206.1	

## Table 1.8 IVTM: Initial Varietal Trial in Forage Maize: Leaf Stem Ratio

Entring	Palam-	Ludh-	His-	Jal-	Bhuban-	Ran-	Jor-	Rai-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Man-	Vella-	Aver-	Ra-
Entries	pur	iana	ar	ore	eswar	chi	hat	pur	pur	uri	nchan	bad	atore	dya	yani	age	nk
JHM-14-1	0.38	0.60	0.32	0.26	1.06	0.45	0.98	0.57	0.58	0.38	1.26	0.28	0.29	0.51	0.41	0.56	1
MPC-1	0.41	0.40	0.28	0.27	1.14	0.65	1.04	0.53	0.49	0.33	0.66	0.25	0.41	0.60	0.32	0.52	4
MFM-6	0.46	0.60	0.32	0.47	0.79	0.78	0.91	0.50	0.52	0.32	0.66	0.28	0.34	0.33	0.49	0.52	4
PAC-746	0.38	0.40	0.32	0.35	1.09	0.52	0.78	0.47	0.69	0.43	0.87	0.50	0.24	0.68	0.34	0.54	3
MFM-4	0.44	0.30	0.37	0.25	0.98	0.50	0.66	0.53	0.45	0.36	0.86	0.29	0.25	0.51	0.28	0.47	5
BAIF Maize-4	0.43	0.20	0.26	0.45	0.93	0.55	1.18	0.44	0.65	0.33	0.72	0.27	0.24	0.81	0.34	0.52	4
AFM-4	0.44	0.40	0.37	0.51	1.02	0.68	0.81	0.56	0.50	0.46	1.04	0.33	0.25	0.35	0.31	0.54	3
African Tall (NC)	0.38	0.30	0.32	0.24	0.87	0.78	1.11	0.43	0.52	0.31	1.18	0.34	0.28	0.75	0.41	0.55	2
J-1006 (NC)	0.43	0.40	0.32	0.34	1.19	0.75	1.39	0.41	0.39	0.36	0.75	0.32	0.28	0.67	0.42	0.56	1
Mean	0.42	0.40	0.32	0.35	1.01	0.63	0.98	0.49	0.53	0.36	0.89	0.32	0.29	0.58	0.37	0.53	

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

	ADF (%	)		NDF (	%)		IVDN	AD (%)
Entries	Ludhiana	Rank	Ludhiana	Anand	Average	Rank	Hisar	Rank
JHM-14-1	42.3	8	66.3	80.6	73.5	6	68.4	1
MPC-1	39.4	4	64.2	83.0	73.6	7	67.0	2
MFM-6	37.4	2	57.2	80.8	69.0	1	65.5	4
PAC-746	44.3	9	68.2	83.1	75.6	9	64.0	9
MFM-4	39.9	5	63.8	81.7	72.8	5	65.9	3
BAIF Maize-4	38.3	3	59.4	82.4	70.9	2	64.1	8
AFM-4	41.6	7	63.4	80.9	72.1	4	65.0	5
African Tall (NC)	34.3	1	60.8	82.8	71.8	3	64.4	7
J-1006 (NC)	40.4	6	64.3	83.0	73.7	8	64.8	6
Mean	39.8		63.1	82.0	72.5		65.5	

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		Hill	Zone				Nort	th West Zor	ne		
Entries	Palam-	Alm-	Aver-	Ra-	Ludh-	His-	Udai-	Pant-	Jal-	Aver-	Ra-
	pur	ora	age	nk	iana	ar	pur	nagar	ore	age	nk
AFM-1	580.0	546.3	563.2	5	255.6	241.7	465.1	238.8	270.3	294.3	2
AFM-3	603.6	489.2	546.4	6	270.8	227.8	379.0	237.1	212.7	265.5	3
PFM-7	661.8	662.0	661.9	2	209.7	111.1	340.1	224.6	257.3	228.6	6
JHM-13-1	644.0	586.4	615.2	3	223.6	86.1	361.0	238.5	240.0	229.8	5
AFM-2	591.4	491.5	541.5	7	190.3	108.3	362.4	234.9	235.3	226.2	7
J-1006 (NC)	600.7	578.7	589.7	4	259.7	272.2	452.6	232.7	344.3	312.3	1
African Tall (NC)	717.0	699.8	708.4	1	166.7	122.2	416.5	233.2	266.0	240.9	4
Mean	628.4	579.1	603.7		225.2	167.1	396.7	234.3	260.9	256.8	
CD at 5%	61.9	29.7			25.1	53.1	90.0	52.4	26.1		
CV%	5.5	2.9			4.4	17.7	13.0	6.9	5.6		

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

Note- Data could not be collected due to floods at Srinagar; Trial failed in Faizabad

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

		Nort	h East Z	lone					Cer	ntral Zone				All In	dia Average
Entries	Bhuban-	Ran-	Jor-	Aver-	Ra-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Jha-	Aver-	Ra-	Aver-	Ra-
	eswar	chi	hat	age	nk	nd	pur	pur	uri	nchan	nsi	age	nk	age	nk
AFM-1	298.5	194.5	238.7	243.9	4	244.0	433.3	407.0	707.1	742.0	692.5	537.7	5	409.7	3
AFM-3	317.1	222.2	199.6	246.3	3	264.0	422.2	410.0	632.4	776.1	785.1	548.3	4	403.1	4
PFM-7	283.4	211.8	227.1	240.8	5	267.0	486.1	436.8	703.5	732.9	596.2	537.1	6	400.7	5
JHM-13-1	266.8	166.7	193.5	209.0	7	205.0	450.0	504.9	551.5	817.3	677.7	534.4	7	388.3	7
AFM-2	240.8	211.8	226.8	226.5	6	304.0	472.2	456.3	760.5	803.9	603.6	566.8	3	393.4	6
J-1006 (NC)	304.1	250.0	193.2	249.1	2	226.0	461.1	491.7	722.6	788.8	729.6	570.0	2	431.7	2
African Tall (NC)	329.0	270.8	181.9	260.6	1	255.0	530.6	474.0	851.9	849.9	744.4	617.6	1	444.3	1
Mean	291.4	218.2	208.7	239.4		252.1	465.1	454.4	704.2	787.3	689.9	558.8		410.2	
CD at 5%	24.7	60.4	5.5			28.5	46.0	92.9	77.4	38.6	18.6				
CV%	4.8	15.4	8.1			6.9	6.2	11.1	6.2	9.4	10.5				

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		Hill	Zone			N	orth Wes	t Zone			Nor	th East	Zone	
Entries	Palam-	Alm-	Aver-	Ra-	Ludh-	His-	Pant-	Aver-	Ra-	Bhuban-	Ran-	Jor-	Aver-	Ra-
	pur	ora	age	nk	iana	ar	nagar	age	nk	eswar	chi	hat	age	nk
AFM-1	113.7	53.2	83.5	4	61.3	54.2	63.9	59.8	2	64.1	45.5	42.9	50.8	3
AFM-3	115.0	39.4	77.2	6	63.1	45.1	62.2	56.8	3	66.8	49.9	33.2	50.0	4
PFM-7	129.8	67.8	98.8	3	47.6	23.1	67.8	46.2	5	65.5	52.4	42.0	53.3	2
JHM-13-1	129.6	79.2	104.4	2	56.4	15.9	65.3	45.9	6	60.9	33.5	34.5	43.0	7
AFM-2	115.2	50.6	82.9	5	44.1	23.0	74.4	47.2	4	54.2	54.5	41.0	49.9	5
J-1006 (NC)	115.3	38.9	77.1	7	60.3	49.2	74.4	61.3	1	70.0	68.6	37.6	58.8	1
African Tall (NC)	134.2	80.1	107.2	1	40.5	29.9	62.2	44.2	7	64.2	45.8	34.1	48.1	6
Mean	121.8	58.5	90.1		53.3	34.3	67.2	51.6		63.7	50.0	37.9	50.5	
CD at 5%	14.4	4.0			18.9	19.1	12.5			6.2	15.4	3.5		
CV%	6.7	3.9			6.9	10.3	5.7			5.5	17.2	12.0		

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

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

				Centra	l Zone				All India	Average
Entries	Ana-	Rai-	Jabal-	Rah-	Urulika-	Jha-	Aver-	Ra-	Aver-	Ra-
	nd	pur	pur	uri	nchan	nsi	age	nk	age	nk
AFM-1	60.6	131.7	108.3	125.8	99.0	127.3	108.8	6	82.2	5
AFM-3	60.1	127.8	109.6	122.7	115.2	145.0	113.4	4	82.5	4
PFM-7	59.4	146.2	105.5	131.4	94.3	101.4	106.3	7	81.0	7
JHM-13-1	39.8	136.8	126.5	109.6	138.3	141.2	115.4	3	83.4	3
AFM-2	53.3	143.6	111.9	141.2	113.8	115.4	113.2	5	81.1	6
J-1006 (NC)	60.1	140.0	122.0	135.8	120.5	148.6	121.2	2	88.7	2
African Tall (NC)	52.0	159.3	117.4	165.8	121.1	160.8	129.4	1	90.5	1
Mean	55.0	140.8	114.4	133.2	114.6	134.2	115.4		84.2	
CD at 5%	6.6	14.0	22.9	14.8	10.9	7.8				
CV%	7.3	6.2	11.6	6.2	5.3	4.4				

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Entries	Palam-	Ludh-	His-	Pant-	Bhuban-	Ran-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulika-	Aver-	Ra-
Entries	pur	iana	ar	nagar	eswar	chi	hat	nd	pur	pur	uri	nchan	age	nk
AFM-1	8.80	2.70	3.18	3.51	4.50	3.53	3.85	4.28	6.99	6.16	12.63	14.00	6.18	5
AFM-3	9.20	2.90	3.00	3.49	4.73	3.83	2.98	4.63	6.81	6.51	10.37	14.37	6.07	6
PFM-7	11.00	2.20	1.46	3.35	4.62	4.23	3.39	5.45	7.84	6.93	13.27	14.37	6.51	1
JHM-13-1	10.00	2.40	1.13	3.36	4.30	2.73	3.12	3.15	7.26	7.88	7.99	13.85	5.60	7
AFM-2	9.60	2.00	1.43	3.54	4.01	4.07	3.66	5.74	7.62	6.91	13.83	14.62	6.42	2
J-1006 (NC)	9.10	2.80	3.58	3.32	4.68	4.62	2.80	3.59	7.44	7.44	12.25	13.84	6.29	3
African Tall (NC)	10.00	1.80	1.61	3.33	5.09	4.51	2.64	4.05	8.56	7.52	12.17	13.93	6.27	4
Mean	9.67	2.40	2.20	3.41	4.56	3.93	3.20	4.41	7.50	7.05	11.79	14.14	6.19	

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

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

Entries	Ludh-	His-	Pantna-	Ran-	Jor-	Ana-	Rai-	Jabal-	Rah-	Urulikan-	Bhuban-	Aver-	Ra-
Entries	iana	ar	gar	chi	hat	nd	pur	pur	uri	chan	eswar	age	nk
AFM-1	0.70	0.71	0.94	0.82	0.69	1.06	2.12	1.64	2.25	1.87	0.97	1.25	4
AFM-3	0.70	0.59	0.91	0.86	0.50	1.05	2.06	1.73	2.01	2.13	1.00	1.23	5
PFM-7	0.50	0.30	1.01	1.04	0.63	1.21	2.36	1.67	2.48	1.85	1.07	1.28	3
JHM-13-1	0.60	0.21	0.92	0.54	0.56	0.61	2.21	1.97	1.59	2.34	0.98	1.14	6
AFM-2	0.50	0.30	1.12	1.04	0.66	1.01	2.32	1.69	2.57	2.07	0.90	1.29	2
J-1006 (NC)	0.60	0.65	1.06	1.27	0.55	0.95	2.26	1.84	2.30	2.11	1.08	1.33	1
African Tall (NC)	0.40	0.39	0.89	0.76	0.49	0.83	2.57	1.86	2.37	1.99	0.99	1.23	5
Mean	0.57	0.45	0.98	0.90	0.58	0.96	2.27	1.77	2.22	2.05	1.00	1.25	

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

Entries	Palampur	Ludhiana	Hisar	Bhubaneswar	Jorhat	Anand	Jabalpur	Rahuri	Urulikanchan	Average	Rank
AFM-1	11.9	3.1	5.1	6.1	4.3	3.4	7.7	9.3	8.1	6.5	4
AFM-3	11.8	4.3	4.7	5.3	3.3	3.3	7.8	11.2	9.1	6.8	3
PFM-7	11.4	2.3	2.3	5.7	4.1	3.4	8.5	9.5	7.0	6.0	7
JHM-13-1	12.1	3.2	1.5	5.4	3.2	2.2	10.5	8.1	11.2	6.4	5
AFM-2	10.1	3.2	2.3	4.9	3.8	2.9	9.2	10.2	8.9	6.2	6
J-1006 (NC)	11.1	3.3	5.0	5.8	3.9	3.3	10.1	11.2	9.5	7.0	2
African Tall (NC)	13.7	2.6	3.0	4.9	3.9	2.8	9.6	14.3	10.3	7.2	1
Mean	11.7	3.1	3.4	5.4	3.8	3.0	9.1	10.5	9.1	6.6	

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Entries	Palampur	Ludhiana	Hisar	Bhubaneswar	Jorhat	Anand	Jabalpur	Rahuri	Urulikanchan	Average	Rank
AFM-1	10.5	5.0	9.4	9.5	10.1	5.5	8.1	7.4	8.2	8.2	3
AFM-3	10.2	6.8	10.5	8.0	10.0	5.5	8.1	9.1	7.9	8.5	1
PFM-7	8.8	4.9	9.9	8.8	10.7	5.6	8.1	7.2	7.4	7.9	6
JHM-13-1	9.3	5.6	9.6	8.9	9.1	5.5	8.3	7.3	8.1	8.0	5
AFM-2	8.8	7.3	9.9	9.1	9.2	5.5	8.3	7.2	7.8	8.1	4
J-1006 (NC)	9.6	5.4	10.1	8.2	10.6	5.5	8.3	8.2	7.9	8.2	3
African Tall (NC)	10.2	6.3	10.1	7.6	10.5	5.4	8.3	8.7	8.5	8.4	2
Mean	9.6	5.9	9.9	8.6	10.0	5.5	8.2	7.9	8.0	8.2	

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

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

Entries	Palam-	Ludh-	His-	Jal-	Pant-	Udai-	Ran-	Jor-	Ana-	Jabal-	Rah-	Urulika-	Jha-	Bhuban-	Aver-	Ra-
Entries	pur	iana	ar	ore	nagar	pur	chi	hat	nd	pur	uri	nchan	nsi	eswar	age	nk
AFM-1	277.7	175.0	149.2	231.7	170.0	198.0	181.0	109.7	192.5	170.3	221.7	227.3	239.4	169.2	193.8	7
AFM-3	254.3	176.3	153.3	200.0	234.7	172.9	174.0	136.9	183.9	187.2	233.3	238.9	227.2	179.3	196.6	3
PFM-7	267.0	192.3	146.3	218.3	175.0	210.0	174.0	153.6	200.5	203.8	214.3	252.3	230.7	163.2	200.1	2
JHM-13-1	312.0	179.0	147.8	215.0	153.3	188.1	167.0	100.5	179.1	236.4	238.7	279.3	275.3	158.5	202.1	1
AFM-2	258.7	171.7	147.0	195.0	190.0	203.2	188.0	124.1	207.9	213.1	229.3	238.1	224.3	152.4	195.9	5
J-1006 (NC)	222.7	169.0	172.1	195.0	200.0	170.1	178.0	131.8	186.5	232.0	211.6	238.3	245.4	174.7	194.8	6
African Tall (NC)	225.7	156.3	137.3	181.7	173.3	199.9	166.0	116.3	183.8	225.5	251.7	246.9	295.4	185.5	196.1	4
Mean	259.7	174.2	150.4	205.2	185.2	191.7	175.4	124.7	190.6	209.8	228.7	245.9	248.3	169.0	197.1	

Entries	Palam-	Ludh-	His-	Pant-	Bhuba-	Ran-	Jor-	Jabal-	Rah-	Urulika-	Aver-	Ra-
Entries	pur	iana	ar	nagar	neswar	chi	hat	pur	uri	nchan	age	nk
AFM-1	0.44	0.30	0.27	0.39	1.12	0.63	1.13	0.53	0.37	0.83	0.60	3
AFM-3	0.48	0.40	0.39	0.30	1.17	0.63	1.24	0.55	0.34	0.90	0.64	1
PFM-7	0.37	0.30	0.37	0.42	0.98	0.64	0.79	0.48	0.31	0.75	0.54	5
JHM-13-1	0.50	0.60	0.38	0.31	0.93	0.81	0.80	0.66	0.32	0.66	0.60	3
AFM-2	0.49	0.50	0.34	0.28	0.87	0.58	0.84	0.52	0.41	0.67	0.55	4
J-1006 (NC)	0.41	0.70	0.32	0.30	1.09	0.60	1.05	0.63	0.37	0.94	0.64	1
African Tall (NC)	0.37	0.40	0.58	0.45	1.21	0.88	0.86	0.57	0.28	0.71	0.63	2
Mean	0.44	0.46	0.38	0.35	1.05	0.68	0.96	0.56	0.34	0.78	0.60	

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

# Table 2.9 AVTM-1: First Advanced Varietal Trial in Forage Maize: ADF (%), NDF (%), IVDMD (%)

		AD	F (%)				]	NDF (%	)				IVDM	D (%)	
Entries	Palam-	Ludh-	Rah-	Aver-	Ra-	Palam-	Ludh-	Ana-	Rah-	Aver-	Ra-	His-	Rah-	Aver-	Ra-
	pur	iana	uri	age	nk	pur	iana	nd	uri	age	nk	ar	uri	age	nk
AFM-1	48.2	44.5	47.9	46.9	3	68.2	58.0	80.3	70.5	69.3	5	72.1	51.6	61.8	4
AFM-3	51.2	41.4	43.9	45.5	2	69.4	53.8	80.3	66.1	67.4	1	71.8	54.7	63.2	2
PFM-7	51.8	49.6	49.8	50.4	6	71.0	63.4	78.9	70.7	71.0	6	73.8	50.1	62.0	3
JHM-13-1	49.4	48.4	49.1	49.0	5	68.4	60.3	79.9	68.4	69.3	5	73.4	50.6	62.0	3
AFM-2	50.0	42.8	53.1	48.6	4	69.4	52.9	79.1	73.6	68.8	3	73.6	47.5	60.6	5
J-1006 (NC)	49.2	50.5	54.8	51.5	7	68.0	59.3	79.5	69.3	69.0	4	72.2	46.2	59.2	6
African Tall (NC)	50.4	41.2	41.2	44.3	1	70.4	53.4	79.8	71.3	68.7	2	71.4	56.8	64.1	1
Mean	50.0	45.5	48.6	48.0		69.3	57.3	<b>79.7</b>	70.0	69.1		72.6	51.1	61.8	

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

#### (Reference Tables: 3.1 to 3.6)

An advanced varietal trial in forage hybrid maize comprising of four entries namely IHTFM, PMH-3, PMH-1 and DHM-117 along with two national checks i.e. J-1006 and African Tall was conducted at seven locations in Hill Zone, North West Zone and North East Zone of the country. Results of the trial obtained from different centres clearly revealed that for green forage yield (q/ha), entry PMH-1was superior in Hill Zone by 3.8 per cent and DHM-117 in North East Zone was superior by 0.28 per cent than best national check. None of the entry was found superior than the national check at national level.

For dry matter yield (q/ha), entry IHTFM proved superior in Hill Zone by 0.9 per cent, in North West Zone by 0.8 per cent and at national level by 3.8 per cent. While, entry DHM-117 in North East Zone (9.3%) and at national level (5.0%) were exhibited superiority over national check. For fodder production potential (q/ha/day), national check J-1006 ranked first both for green forage and dry matter production potential.

National check J-1006 ranked first for crude protein yield (q/ha) whereas African Tall ranked first for crude protein (%). For the character plant height, check J-1006 (198.9 cm) and for leafiness (L/S ratio) entry DHM-117 (0.69) proved superior. For other quality parameters like ADF (%) and NDF (%), national check African Tall maintained its superiority while for IVDMD (%) entry IHTFM exhibited superiority with respect to national check.

# 4. AVTHM-2 (SEED): SECOND ADVANCED VARIETAL TRIAL IN FORAGE HYBRID MAIZE (SEED)

## (Reference Table: 4.1)

Results for the second advanced varietal trial in forage hybrid maize for seed with four entries namely PMH-1, IHTFM, DHM-117 and PMH-3 along with two national checks i.e. J-1006 and African Tall was conducted at five locations. Results obtained from different location with respect to seed yield (q/ha) clearly revealed that all the test entries *viz.*, IHTFM (70.9%), PMH-1 (60.6%), PMH-3 (56.8%) and DHM-117 (53.1%) established their superiority over national check.

		I	Hill Zone				Nort	h West Z	lone			No	orth East	Zone		All Ir	ndia
Entries	Palam-	Alm-	Aver-	Ra-	Superi-	Ludh-	His-	Udai-	Aver-	Ra-	Jor-	Ran-	Aver-	Ra-	Superi-	Aver-	Ra-
	pur	ora	age	nk	ority%	iana	ar	pur	age	nk	hat	chi	age	nk	ority%	age	nk
IHTFM	600.7	387.2	494.0	3		488.9	152.1	566.2	402.4	3	192.3	208.3	200.3	5		370.8	2
PMH-3	568.7	352.4	460.6	4		369.4	141.7	694.7	401.9	4	221.4	169.3	195.3	6		359.6	5
PMH-1	623.6	454.3	539.0	1	3.8	313.9	197.9	580.9	364.2	6	190.3	210.9	200.6	4		367.4	3
DHM-117	507.3	362.8	435.1	6		450.0	118.8	576.2	381.7	5	197.3	231.8	214.5	1	0.28	349.2	6
J-1006 (NC)	589.2	449.1	519.2	2		466.7	237.5	580.3	428.2	1	210.3	208.3	209.3	3		391.6	1
African Tall (NC)	571.5	331.6	451.6	5		419.4	104.2	710.1	411.2	2	219.4	208.3	213.9	2		366.4	4
Mean	576.8	389.6	483.2			418.1	158.7	618.1	398.3		205.2	206.2	205.7			367.5	
CD at 5%	NS	23.5				86.2	40.9	121.0			5.4	35.2					
CV%	9.8	4.0				9.3	17.0	14.9			10.3	11.3					

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

Note- Data could not be collected due to floods at Srinagar

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

		Η	ill Zone				North W	Vest Zoi	ne		No	rth East	Zone			All Ind	lia
Entries	Palam-	Alm-	Aver-	Ra-	Superi-	*His-	Ludh-	Ra-	Superi-	Jor-	Ran-	Aver-	Ra-	Superi-	Aver-	Ra-	Superi-
	pur	ora	age	nk	ority%	ar	iana	nk	ority%	hat	chi	age	nk	ority%	age	nk	ority%
IHTFM	115.9	88.1	102.0	1	0.9	34.5	98.8	1	0.8	34.7	43.3	39.0	5		76.2	2	3.8
PMH-3	111.3	64.8	88.1	5		28.3	70.2	5		42.8	31.8	37.3	6		64.2	5	
PMH-1	121.3	49.8	85.6	6		41.7	66.9	6		36.7	43.1	39.9	4		63.6	6	
DHM-117	97.7	102.6	100.2	3		26.6	93.2	3		39.6	52.4	46.0	1	9.3	77.1	1	5.0
J-1006 (NC)	113.9	70.8	92.4	4		47.9	98.0	2		41.6	42.6	42.1	2		73.4	3	
African Tall (NC)	107.9	94.3	101.1	2		18.7	81.1	4		43.3	39.0	41.1	3		73.1	4	
Mean	111.3	78.4	94.9			33.0	84.7			39.8	42.0	40.9			71.2		
CD at 5%	NS	4.9				11.0	32.6			2.8	11.7						
CV%	10.8	4.2				20.9	4.5			12.3	18.3						

\* Not included in zonal and all India average due to  $CV \ge 20$ 

 Table 3.3 AVTHM-2: Second Advanced Varietal Trial in Forage Hybrid Maize: Green Forage Yield & Dry Matter Yield (q/ha/day)

			GFY	(q/ha/day)						DMY(q/ha	/day)		
Entries	Palam-	Ludh-	His-	Jor-	Ran-	Aver-	Ra-	Ludh-	His-	Jor-	Ran-	Aver-	Ra-
	pur	iana	ar	hat	chi	age	nk	iana	ar	hat	chi	age	nk
IHTFM	9.00	8.00	2.00	2.87	3.72	5.12	2	1.60	0.45	0.52	0.77	0.83	3
PMH-3	8.40	6.10	1.86	3.21	3.07	4.53	6	1.20	0.37	0.62	0.57	0.69	5
PMH-1	9.30	5.10	2.60	2.84	3.63	4.69	4	1.10	0.55	0.55	0.74	0.73	4
DHM-117	7.30	7.40	1.56	3.13	3.86	4.65	5	1.50	0.35	0.63	0.87	0.84	2
J-1006 (NC)	8.80	7.70	3.13	3.14	4.00	5.35	1	1.60	0.63	0.62	0.81	0.92	1
African Tall (NC)	8.50	6.90	1.37	3.27	3.93	4.79	3	1.30	0.25	0.65	0.73	0.73	4
Mean	8.55	6.87	2.09	3.08	3.70	4.86		1.38	0.43	0.60	0.75	0.79	
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Entring		Crude I	Protein Y	ield (q/ha)					Crude I	Protein (%	<i>(o</i> )	
Entries	Palampur	Ludhiana	Hisar	Jorhat	Average	Rank	Palampur	Ludhiana	Hisar	Jorhat	Average	Rank
IHTFM	11.9	6.2	3.3	3.4	6.2	2	10.3	6.3	9.6	10.1	9.1	3
PMH-3	11.3	3.8	3.0	4.1	5.6	5	10.1	5.4	10.7	9.7	9.0	4
PMH-1	11.4	5.4	4.1	3.5	6.1	3	9.4	8.0	9.9	9.6	9.2	2
DHM-117	10.3	5.7	2.7	3.9	5.6	5	10.5	6.1	10.1	9.9	9.1	3
J-1006 (NC)	11.5	7.2	4.6	4.0	6.8	1	10.1	7.3	9.6	9.7	9.2	2
African Tall (NC)	9.6	7.1	1.9	4.5	5.8	4	9.0	8.7	10.3	10.6	9.6	1
Mean	11.0	5.9	3.3	3.9	6.0		9.9	7.0	10.0	9.9	9.2	

 Table 3.4 AVTHM-2: Second Advanced Varietal Trial in Forage Hybrid Maize: Crude Protein Yield (q/ha) & Crude Protein (%)

Table 3.5 AVTHM-2: Second Advanced Varietal Trial in Forage Hybrid Maize: Plant Height (cm) & Leaf Stem ratio

			]	Plant heig	ht (cm)						Leaf	Stem Ra	ntio		
Entries	Palam-	Ludh-	His-	Udai-	Jor-	Ran-	Aver-	Ra-	Palam-	Ludh-	His-	Jor-	Ran-	Aver-	Ra-
	pur	iana	ar	pur	hat	chi	age	nk	pur	iana	ar	hat	chi	age	nk
IHTFM	252.0	195.0	134.2	287.8	121.1	189.0	196.5	3	0.49	0.50	0.59	0.88	0.53	0.60	5
PMH-3	274.5	151.3	141.0	283.3	133.8	182.0	194.3	4	0.47	0.90	0.52	0.88	0.46	0.65	4
PMH-1	268.3	172.0	139.5	283.3	126.8	190.0	196.6	2	0.45	0.50	0.78	0.90	0.64	0.65	4
DHM-117	267.0	179.0	123.3	257.6	144.2	186.0	192.9	5	0.38	1.00	0.67	0.86	0.53	0.69	1
J-1006 (NC)	254.0	197.3	157.8	272.0	136.1	176.0	198.9	1	0.46	1.10	0.57	0.67	0.58	0.68	2
African Tall (NC)	257.5	177.3	136.2	258.9	123.3	191.0	190.7	6	0.42	0.80	0.64	0.86	0.60	0.66	3
Mean	262.2	178.7	138.7	273.8	130.9	185.7	195.0		0.45	0.80	0.63	0.84	0.56	0.65	

## Table 3.6 AVTHM-2: Second Advanced Varietal Trial in Forage Hybrid Maize: ADF (%), NDF (%) & IVDMD (%)

Entrica		ADF (9	70)			NDF (	(%)		IVDMD	(%)
Entries	Palampur	Ludhiana	Average	Rank	Palampur	Ludhiana	Average	Rank	Hisar	Rank
IHTFM	52.6	42.40	47.5	5	70.6	63.40	67.0	5	74.0	1
PMH-3	53.8	45.90	49.9	6	69.4	66.20	67.8	6	72.2	2
PMH-1	50.6	345.9049.96537.9044.32		2	71.4	55.80	63.6	2	71.4	4
DHM-117	53.2	41.60	47.4	4	70.6	60.30	65.5	3	69.6	5
J-1006 (NC)	51.4	41.90	46.7	3	72.2	61.30	66.8	4	72.2	2
African Tall (NC)	52.2	34.50	43.4	1	69.8	45.60	57.7	1	72.0	3
Mean	52.3	40.7	46.5		70.7	58.8	64.7		71.9	

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Entries	Palampur	Udaipur	Jorhat	*Ranchi	*Hisar	Average	Rank	Superiority%
PMH-1	49.1	26.0	27.4	12.7	4.6	34.2	2	60.6
IHTFM	45.0	35.5	28.8	13.0	2.8	36.4	1	70.9
DHM-117	45.0	23.7	29.1	4.9	2.6	32.6	4	53.1
PMH-3	43.0	28.7	28.4	13.0	2.2	33.4	3	56.8
J-1006 (NC)	25.0	14.0	25.0	7.8	5.0	21.3	5	
African Tall (NC)	14.1	0.0	31.0	4.4	2.3	15.0	6	
Mean	36.9	21.3	28.3	9.3	3.3	28.8		
CD at 5%	6.7	4.1	1.6	7.0	NS			
CV%	11.8	14.7	7.9	26.9	23.5			

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

Note- Data could not be collected due to floods at Srinagar

\* Not included in all India average due to  $\mathrm{CV} \geq 20$ 

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

### (Reference Tables: 5.1 to 5.9)

An initial varietal trial in Pearl millet comprising of eight entries along with three national checks *i.e.* AVKB-19, Giant Bajra and Raj Bajra Chari-2 was conducted at 16 centres located in four zones *viz.*, North-West, North-East, Central and South Zone of the country. Data reported from different centres clearly revealed that for the character green forage yield (q/ha), entry APFB-09-10 (1.7%) in North East Zone, entry PAC-982 (0.1%) in Central zone proved their superiority with respect to national check. At national level and in other zones, none of entry performed better than the checks.

Similarly for the character dry matter yield (q/ha), entry AFB-10 (1.9%) in North East Zone and APFB-09-10 (1.7%) in South Zone exhibited superiority over best check. Coming to the superiority at national level, national check Giant Bajra was adjudged best performer.

In forage production potential (q/ha/day), national check Giant Bajra was adjudged best performer for green and dry matter yield potential. In growth parameter, entry APFB-09-10 (209.3) ranked first followed by national check Giant Bajra (208.9 cm) for plant height and entry PAC-982 (0.50) was superior for leaf stem ratio. In quality parameters, entry PAC-982 (7.7 q/ha) for crude protein yield and HFC-081 (9.2%) for crude protein content was recorded best performer. For other quality parameters, entry HFC-081 for NDF and ADF (%), national check Raj Bajra Chari-2 for IVDMD (%) and Giant Bajra for DDM (q/ha) recorded their superiority.

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

## (Reference Tables: 6.1 to 6.9)

In Pearl millet, four entries namely DFMH-30, NDFB-939, AFB-9 and RBB-4 promoted from IVT were evaluated against three national checks Giant Bajra, AVKB-19 and Raj Bajra Chari-2 at 16 centres located in four zones. For green forage yield (q/ha), entry DFMH-30 in North West Zone (2.0%) and South Zone (7.4%), entry NDFB-939 (2.2%) in North East Zone registered superiority. While at all India level, none of the entries performed better than the checks. For the character dry matter yield (q/ha), entries DFMH-30 (11.6%) and RBB-4 (0.5%) in North West Zone, entry NDFB-939 (1.0%) in North East Zone, entry DFMH-30 in South zone (16.3%) and at national level (3.9%) proved their superiority with respect to national check. Similarly, for forage production potential (q/ha/day), entry DFMH-30 was ranked first with 7.8 and 1.77 q/ha/day for green forage and dry matter production potential (q/ha/day), respectively. National check Giant Bajra ranked first for plant height (211.6 cm) and character leaf stem ratio (0.45).

In quality parameters, entry DFMH-30 proved superior for crude protein yield (8.5 q/ha) and national check Raj Bajra Chari-2 for crude protein content (9.5%). For other quality parameters like ADF (%), IVDMD (%) and DDM (q/ha), entry DFMH-30 performed better than the checks while, for NDF (%) entry AFB-9 ranked first.

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			N	orth West	Zone					North Ea	ast Zone		
Entries	Ludhiana	Hisar	Bikaner	Jalore	Meerut	Average	Rank	Pusa	Bhubaneswar	Ranchi	Average	Rank	Superiority%
APFB-09-10	717.6	375.0	495.5	279.7	666.7	506.9	4	363.0	312.9	509.2	395.0	1	1.7
AFB-10	648.1	361.1	487.5	252.7	695.8	489.0	5	303.0	280.2	500.0	361.1	4	
RBB-5	634.3	379.6	506.8	361.7	731.5	522.8	3	409.0	261.4	435.3	368.6	3	
HFC-081	509.3	171.3	376.8	207.7	751.1	403.2	8	326.0	272.9	453.6	350.8	6	
PAC-982	895.2	490.7	574.5	418.0	598.6	595.4	2	335.0	335.8	370.3	347.0	8	
AVKB-19 (NC)	761.6	314.8	375.1	200.0	550.5	440.4	6	331.0	296.8	435.3	354.4	5	
Giant Bajra (NC)	840.0	606.5	599.8	352.3	808.5	641.4	1	404.0	353.7	407.5	388.4	2	
Raj Bajra Chari-2 (NC)	708.3	236.1	385.9	274.7	531.6	427.3	7	432.0	267.5	351.9	350.5	7	
Mean	714.3	366.9	475.2	293.3	666.8	503.3		362.9	297.6	432.9	364.5		
CD at 5%	81.3	101.5	111.3	78.0	3.6			32.1	44.6	92.2			
CV%	12.4	15.7	13.4	15.3	4.3			9.4	8.6	12.1			

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

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

Entries				Central Z	lone						South Zo	one			All	India
Entries	Ana- nd	Jabal- pur	Rah- uri	Urulika- nchan	Dh- ari	Aver- age	Ra- nk	Superi- ority%	Hydera- bad	Coimb- atore	Man- dya	Rai- chur	Aver- age	Ra- nk	Aver- age	Ra- nk
APFB-09-10	438.0	485.3	465.9	483.6	361.1	446.8	4		537.5	513.9	113.9	291.7	364.2	2	435.9	3
AFB-10	545.0	477.0	388.1	435.8	281.7	425.5	6		537.5	356.5	108.5	255.0	314.4	4	406.7	5
RBB-5	548.0	452.0	393.0	560.7	302.3	451.2	3		426.3	490.7	107.8	232.8	314.4	4	425.5	4
HFC-081	370.0	487.4	373.6	466.1	255.0	390.4	7		449.4	384.3	95.0	185.3	278.5	6	360.9	7
PAC-982	520.0	510.3	621.1	571.8	448.2	534.3	1	0.1	565.3	509.3	89.0	276.3	360.0	3	478.2	2
AVKB-19 (NC)	551.0	491.6	389.5	523.2	272.9	445.6	5		449.4	379.6	116.7	231.7	294.3	5	392.4	6
Giant Bajra (NC)	667.0	352.0	681.1	572.3	397.7	534.0	2		537.5	527.8	213.2	260.8	384.8	1	504.8	1
Raj Bajra Chari-2 (NC)	471.0	314.5	372.9	464.5	267.8	378.1	8		421.6	300.9	100.0	217.4	260.0	7	359.9	8
Mean	513.8	446.3	460.6	509.7	323.3	450.7			490.6	432.9	118.0	243.9	321.3		420.5	
CD at 5%	44.3	96.4	65.0	NS	103.8				33.6	71.7	11.7	40.0				
CV%	5.0	12.2	8.1	14.2	18.3				3.9	9.5	6.7	6.6				

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Entries			North Wes	t Zone				1	North Eas	st Zone		
	Ludhiana	Hisar	Bikaner	Jalore	Average	Rank	Pusa	Bhubaneswar	Ranchi	Average	Rank	Superiority%
APFB-09-10	127.0	75.9	105.0	40.1	87.0	4	82.8	68.3	99.7	83.6	5	
AFB-10	113.4	84.7	94.6	45.3	84.5	5	68.9	65.1	157.2	97.1	1	1.9
RBB-5	101.5	82.2	108.0	72.6	91.1	3	94.2	58.3	114.7	89.1	3	
HFC-081	86.6	37.0	76.7	39.5	59.9	8	74.9	55.6	135.8	88.8	4	
PAC-982	152.0	97.1	123.1	69.3	110.4	2	76.5	72.3	80.0	76.3	8	
AVKB-19 (NC)	131.0	65.6	84.4	32.5	78.4	6	74.9	65.2	105.8	82.0	6	
Giant Bajra (NC)	142.8	148.0	118.0	69.2	119.5	1	90.4	78.0	117.5	95.3	2	
Raj Bajra Chari-2 (NC)	113.3	48.8	90.8	44.4	74.3	7	97.7	62.4	70.8	77.0	7	
Mean	121.0	79.9	100.1	51.6	88.1		82.5	65.6	110.2	86.1		
CD at 5%	52.0	20.0	NS	7.1			11.4	10.0	33.6			
CV%	3.4	14.1	18.5	7.9			7.3	8.8	17.2			

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

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

				<b>Central Zor</b>	ie					South 2	Zone			All	India
Entries	Ana-	Jabal-	Rah-	Urulikan-	*Dha-	Aver-	Ra-	Hydera-	Coimb-	Man-	Aver-	Ra-	Superi-	Aver-	Ra-
	nd	pur	uri	chan	ri	age	nk	bad	atore	dya	age	nk	ority%	age	nk
APFB-09-10	89.3	120.4	89.8	89.5	64.4	97.2	5	105.0	74.3	38.8	72.7	1	1.7	86.1	4
AFB-10	87.2	117.7	69.4	79.9	48.6	88.5	6	111.9	48.0	32.9	64.3	4		84.0	5
RBB-5	98.6	111.0	89.6	104.6	54.0	100.9	4	80.0	72.6	31.2	61.3	5		87.1	3
HFC-081	59.9	121.2	73.2	92.6	48.2	86.7	7	95.9	56.0	25.6	59.2	6		73.6	7
PAC-982	136.7	128.1	113.1	109.2	83.1	121.8	2	109.3	69.0	25.8	68.0	3		97.3	2
AVKB-19 (NC)	112.8	122.9	83.7	100.9	48.1	105.1	3	81.7	53.1	36.0	56.9	7		82.2	6
Giant Bajra (NC)	164.7	82.7	146.2	103.5	83.2	124.3	1	112.5	66.6	35.4	71.5	2		105.4	1
Raj Bajra Chari-2 (NC)	90.5	72.9	75.4	93.8	44.0	83.1	8	85.7	39.8	29.8	51.8	8		72.6	8
Mean	105.0	109.6	92.5	<b>96.7</b>	59.2	101.0		97.8	59.9	31.9	63.2			86.0	
CD at 5%	9.8	24.0	13.6	NS	36.6			14.1	13.5	3.6					
CV%	5.4	12.5	8.4	11.03	36.4			8.2	12.8	9.4					

\* Not included in Zonal and All India average due to  $CV \ge 20$ 

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Entries	Ludhi-	His-	Bika-	Pu-	Bhuban	- Ran-	Ana-	Jabal-	Rah-	Urulika-	Dha-	Hydera-	Coimb	- Man-	Aver-	Ra-
Entries	ana	ar	ner	sa	eswar	chi	nd	pur	uri	nchan	ri	bad	atore	dya	age	nk
APFB-09-10	11.60	4.90	9.18	5.70	4.23	9.42	6.95	6.64	9.14	7.93	6.86	11.20	10.28	3 2.94	7.64	5
AFB-10	10.50	4.80	9.03	4.80	4.18	9.80	11.12	7.01	8.44	8.38	5.75	11.90	7.92	2.66	7.59	6
RBB-5	10.20	5.00	9.39	6.30	3.84	7.77	12.18	6.64	8.36	10.01	6.12	9.90	12.27	1.25	7.80	3
HFC-081	8.20	2.30	6.98	5.20	3.84	8.89	7.40	7.60	8.69	9.32	5.20	10.40	9.61	2.00	6.83	8
PAC-982	14.10	6.50	8.84	5.30	4.66	6.49	9.29	6.99	9.27	9.86	7.44	12.30	8.49	1.85	7.96	2
AVKB-19 (NC)	12.30	4.10	6.95	5.30	4.24	8.37	11.72	6.64	9.06	10.9	5.42	10.60	9.49	2.58	7.69	4
Giant Bajra (NC)	13.50	8.00	9.23	6.30	4.85	7.14	10.59	5.25	10.81	10.6	6.86	10.50	10.56	4.90	8.51	1
Raj Bajra Chari-2 (NC)	11.40	3.10	7.15	6.60	3.99	7.03	9.81	4.49	8.47	9.48	5.53	10.00	7.52	1.80	6.88	7
Mean	11.48	4.84	8.34	5.69	4.23	8.11	9.88	6.41	9.03	9.56	6.15	10.85	9.52	2.50	7.61	
Table 5.4 IVTPM: Init	ial Variet	tal Tri	al in F	orage	Pearl m	illet: Dr	y Matt	er Yield	(q/ha	/day)						
Entries	Ludh-	His-	Bik	a-	Pu- E	Shuban-	Ran-	Ana-	Jabal-	Rah-	Urulika	- Hyde	era- C	Coimb-	Aver-	Ra-
Entries	iana	ar	ne	r	sa	eswar	chi	nd	nur	uri	nchan	ba	d	atore	age	nk

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

Entries	Ludh-	His-	Bika-	Pu-	Bhuban-	Ran-	Ana-	Jabal-	Rah-	Urulika-	Hydera-	Coimb-	Aver-	Ra-
Entries	iana	ar	ner	sa	eswar	chi	nd	pur	uri	nchan	bad	atore	age	nk
APFB-09-10	2.00	1.00	1.94	1.30	0.92	1.84	1.42	1.65	1.76	1.47	2.20	1.49	1.58	6
AFB-10	1.80	1.11	1.75	1.10	0.97	3.08	1.78	1.73	1.51	1.54	2.50	1.07	1.66	5
RBB-5	1.60	1.08	2.00	1.40	0.86	2.04	2.20	1.63	1.91	1.87	1.90	1.81	1.69	3
HFC-081	1.40	0.49	1.42	1.20	0.78	2.66	1.20	1.75	1.70	1.85	2.20	1.40	1.50	7
PAC-982	2.40	1.28	1.89	1.20	1.00	1.40	2.44	1.75	1.69	1.88	2.40	1.15	1.71	2
AVKB-19 (NC)	2.10	0.86	1.56	1.20	0.93	2.03	2.40	1.66	1.95	2.10	1.90	1.33	1.67	4
Giant Bajra (NC)	2.30	1.95	1.82	1.40	1.07	2.06	2.61	1.23	2.32	1.92	2.20	1.33	1.85	1
Raj Bajra Chari-2 (NC)	1.80	0.64	1.68	1.50	0.93	1.41	1.89	1.04	1.71	1.91	2.00	0.99	1.46	8
Mean	1.93	1.05	1.76	1.29	0.93	2.07	1.99	1.56	1.82	1.82	2.16	1.32	1.64	

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

Entries	Ludhiana	Hisar	Bhubaneswar	Anand	Jabalpur	Rahuri	Urulikanchan	Hyderabad	Coimbatore	Mandya	Average	Rank
APFB-09-10	8.6	6.9	5.6	3.5	9.6	6.9	7.6	9.7	9.7	2.6	7.1	3
AFB-10	8.2	6.9	5.0	5.3	9.4	5.3	6.9	10.8	5.4	1.7	6.5	5
RBB-5	4.8	6.6	4.5	5.4	8.7	6.7	9.2	8.8	8.3	3.4	6.7	4
HFC-081	7.5	6.7	4.7	3.1	9.6	6.1	7.7	8.4	8.8	0.9	6.4	6
PAC-982	8.8	6.3	5.5	6.3	10.2	8.7	9.2	10.6	9.7	1.6	7.7	1
AVKB-19 (NC)	7.9	7.0	4.9	4.6	9.8	6.1	8.4	6.1	5.6	2.9	6.3	7
Giant Bajra (NC)	9.6	6.4	5.8	7.9	6.0	9.1	8.4	10.8	6.4	5.1	7.6	2
Raj Bajra Chari-2 (NC)	9.3	7.6	4.9	4.6	5.2	5.2	8.0	6.3	5.2	1.5	5.8	8
Mean	8.1	6.8	5.1	5.1	8.6	6.8	8.2	8.9	7.4	2.5	6.7	

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Entries	Ludhiana	Hisar	Bhubaneswar	Anand	Jabalpur	Rahuri	Urulikanchan	Hyderabad	Coimbatore	Mandya	Average	Rank
APFB-09-10	6.8	10.7	8.3	3.9	8.0	7.7	8.5	9.2	13.1	11.1	8.7	2
AFB-10	7.2	9.9	7.7	6.0	8.0	7.6	8.6	9.6	11.4	11.4	8.7	2
RBB-5	4.7	9.4	7.7	5.5	7.8	7.5	8.8	10.9	11.4	11.4	8.5	3
HFC-081	8.7	9.4	8.5	5.3	8.0	8.3	8.3	8.7	15.8	10.8	9.2	1
PAC-982	5.8	9.2	7.6	4.6	8.1	7.7	8.4	9.6	14.0	12.3	8.7	2
AVKB-19 (NC)	6.0	10.7	7.5	4.1	8.0	7.3	8.3	7.4	10.5	12.3	8.2	4
Giant Bajra (NC)	6.7	10.1	7.4	4.8	7.5	6.2	8.1	9.6	9.6	11.1	8.1	5
Raj Bajra Chari-2 (NC)	8.2	10.3	7.9	5.1	7.2	6.9	8.5	7.4	13.1	12.3	8.7	2
Mean	6.8	10.0	7.8	4.9	7.8	7.4	8.4	9.1	12.4	11.6	8.6	

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

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

Entrica	Ludh-	His-	Bika-	Jal-	Mee-	Bhuban-	Ran-	Ana-	Jabal-	Rah-	Urulika-	Dha-	Hydera-	Coimb-	Man-	Rai-	Aver-	Ra-
Entries	iana	ar	ner	ore	rut	eswar	chi	nd	pur	uri	nchan	ri	bad	atore	dya	chur	age	nk
APFB-09-10	259.5	203.7	217.0	200.0	300.0	228.6	192.0	245.7	171.2	197.0	168.9	188.3	200.2	240.7	150.0	186.0	209.3	1
AFB-10	272.9	182.0	248.0	205.0	255.0	218.8	192.0	238.7	164.4	184.8	188.4	175.0	164.3	214.1	162.0	175.0	202.5	4
RBB-5	294.2	193.6	247.0	221.7	275.0	184.4	186.0	243.7	150.6	185.5	164.1	166.0	179.0	230.4	108.0	182.0	200.7	3
HFC-081	260.0	190.0	231.0	208.3	325.0	209.2	191.0	223.1	175.7	174.1	170.3	175.3	160.9	200.0	110.8	153.0	197.4	5
PAC-982	240.7	188.3	170.0	206.7	250.0	234.5	191.0	216.7	195.2	158.0	156.3	218.3	172.1	222.8	110.5	166.0	193.6	8
AVKB-19 (NC)	272.8	191.4	240.0	181.7	150.0	223.5	190.0	239.5	185.3	160.6	194.3	170.7	168.6	212.2	152.5	170.0	193.9	7
Giant Bajra (NC)	265.3	175.4	220.0	181.7	290.0	238.5	193.0	250.5	143.5	231.9	177.3	213.3	195.9	242.0	153.5	170.0	208.9	2
Raj Bajra Chari-2 (NC)	308.5	174.7	232.0	213.3	225.0	189.2	190.0	256.0	144.8	181.6	184.0	176.7	169.3	214.5	112.5	179.0	196.9	6
Mean	271.7	187.4	225.6	202.3	258.8	215.8	190.6	239.2	166.3	184.2	175.5	185.5	176.3	222.1	132.5	172.6	200.4	

# Table 5.8 IVTPM: Initial Varietal Trial in Forage Pearl millet: Leaf Stem Ratio

Entries	Ludh-	His-	Bika-	Jal-	Bhuban-	Ran-	Jabal-	Rah-	Urulika-	Dha-	Hydera-	Coimb-	Man-	Aver-	Ra-
Entries	iana	ar	ner	ore	eswar	chi	pur	uri	nchan	ri	bad	atore	dya	age	nk
APFB-09-10	0.60	0.50	0.40	0.25	1.05	0.80	0.56	0.17	0.61	0.49	0.21	0.18	0.23	0.47	2
AFB-10	0.50	0.44	0.38	0.32	0.95	0.36	0.48	0.23	0.57	0.46	0.33	0.21	0.26	0.42	6
RBB-5	0.40	0.46	0.38	0.38	0.81	0.36	0.39	0.26	0.65	0.45	0.25	0.24	0.20	0.40	7
HFC-081	0.40	0.43	0.41	0.34	0.91	0.38	0.51	0.21	0.59	0.57	0.28	0.21	0.21	0.42	6
PAC-982	0.60	0.64	0.31	0.33	1.09	0.57	0.74	0.34	0.70	0.55	0.29	0.21	0.19	0.50	1
AVKB-19 (NC)	0.50	0.50	0.25	0.22	1.00	0.58	0.71	0.29	0.51	0.44	0.34	0.19	0.18	0.44	4
Giant Bajra (NC)	0.50	0.57	0.37	0.35	1.12	0.34	0.37	0.23	1.01	0.36	0.24	0.21	0.28	0.46	3
Raj Bajra Chari-2 (NC)	0.50	0.46	0.30	0.47	0.84	0.60	0.34	0.34	0.59	0.44	0.30	0.19	0.21	0.43	5
Mean	0.50	0.50	0.35	0.33	0.97	0.50	0.51	0.26	0.65	0.47	0.28	0.21	0.22	0.44	

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Entrica	ADF (9	6)	NDF (%	<i>(o</i> )	IVDM	D (%)	DDM (q/ha)		
Entries	Ludhiana	Rank	Ludhiana	Rank	Hisar	Rank	Hisar	Rank	
APFB-09-10	45.3	5	63.3	6	64.3	6	48.8	5	
AFB-10	40.3	3	60.6	3	70.4	3	59.6	3	
RBB-5	50.2	8	63.9	7	70.4	3	57.9	4	
HFC-081	38.1	1	58.0	1	71.2	2	26.3	8	
PAC-982	49.3	7	64.2	8	68.8	4	66.8	2	
AVKB-19 (NC)	46.8	6	62.6	5	65.2	5	42.8	6	
Giant Bajra (NC)	43.4	4	62.4	4	63.9	7	94.6	1	
Raj Bajra Chari-2 (NC)	38.5	2	58.6	2	73.6	1	35.9	7	
Mean	44.0		61.7		68.5		54.1		

Table 5.9 IVTPM: Initial Varietal Trial in Forage Pearl millet: ADF (%), NDF (%), IVDMD (%) & DDM (q/ha)

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

			North	-West Z	one				Ν	North-East	st Zone		
Entries	Ludh-	His-	Bika-	Jal-	Aver-	Ra-	Superi-	Pu-	Bhubane-	Ran-	Aver-	Ra-	Superi-
	iana	ar	ner	ore	age	nk	ority%	sa	swar	chi	age	nk	ority%
DFMH-30	750.0	472.2	312.4	474.3	502.2	1	2.0	287.0	275.1	201.4	254.5	7	
NDFB-939	463.9	363.9	320.2	363.0	377.7	5		353.0	349.1	187.5	296.5	1	2.2
AFB-9	419.4	250.0	364.1	322.3	339.0	6		340.0	322.0	177.1	279.7	4	
RBB-4	550.0	305.6	409.4	299.3	391.1	3		326.0	287.6	215.3	276.3	6	
Giant Bajra (NC)	655.6	505.6	404.0	404.7	492.5	2		323.0	338.1	194.5	285.2	3	
AVKB-19 (NC)	529.2	358.3	359.0	284.7	382.8	4		337.0	366.8	166.7	290.1	2	
Raj Bajra Chari-2 (NC)	425.0	219.4	331.5	314.7	322.6	7		342.0	293.8	201.4	279.1	5	
Mean	541.9	353.6	357.2	351.9	401.1			329.7	318.9	192.0	280.2		
CD at 5%	92.3	120.6	50.9	53.0				27.3	32.2	24.3			
CV%	15.7	19.0	8.0	8.5				10.1	5.7	7.0			

				Central Z	one						All I	ndia				
Entries	Ana-	Jabal-	Rah-	Urulika-	Dha-	Aver-	Ra-	Hydera-	Coimb-	Man-	Karai-	Aver-	Ra-	Superi-	Aver-	Ra-
	nd	pur	uri	nchan	ri	age	nk	bad	atore	dya	kkal	age	nk	ority%	age	nk
DFMH-30	686.0	460.1	666.6	715.2	411.7	587.9	2	422.1	497.2	209.5	262.3	347.8	1	7.4	443.9	2
NDFB-939	626.0	413.2	467.1	618.9	316.5	488.3	3	322.1	352.8	152.4	197.8	256.3	6		366.7	5
AFB-9	490.0	470.5	377.2	551.0	262.6	430.2	6	305.4	333.3	205.5	142.7	246.7	7		333.3	7
RBB-4	625.0	365.4	448.5	633.9	293.1	473.2	5	349.9	419.4	166.0	249.4	296.2	3		371.5	3
Giant Bajra (NC)	618.0	503.8	719.3	755.9	395.8	598.6	1	338.8	461.1	210.1	285.0	323.7	2		444.6	1
AVKB-19 (NC)	614.0	439.3	422.3	581.9	312.3	474.0	4	327.6	441.6	174.3	219.1	290.7	4		370.9	4
Raj Bajra Chari-2 (NC)	514.0	516.3	303.6	497.4	275.6	421.4	7	316.5	352.8	205.3	243.1	279.4	5		334.5	6
Mean	596.1	452.7	486.4	622.0	323.9	496.2		340.3	408.3	189.0	228.5	291.5			380.8	
<b>CD</b> at 5%	38.4	93.4	59.0	101.0	53.3			30.2	35.2	27.7	28.0					
CV%	3.6	11.6	6.8	13.0	9.2			5.0	4.8	8.7	7.0					

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

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

			North-V	Vest Zone	e			Ν	orth-Eas	t Zone			
Entries	Ludh-	His-	Bika-	Jal-	Aver-	Ra-	Superi-	Pu-	Bhuban-	Ran-	Aver-	Ra-	Superi-
	iana	ar	ner	ore	age	nk	ority%	sa	eswar	chi	age	nk	ority%
DFMH-30	131.3	90.7	75.5	82.0	94.9	1	11.6	66.4	60.8	49.9	59.0	7	
NDFB-939	74.2	78.4	64.4	75.6	73.1	5		79.7	75.2	54.0	69.6	1	1.0
AFB-9	67.1	50.6	71.2	58.2	61.8	7		76.4	69.9	50.1	65.5	3	
RBB-4	93.5	64.3	120.9	62.8	85.4	2	0.5	73.9	63.5	56.7	64.7	5	
Giant Bajra (NC)	112.8	77.3	75.8	74.0	85.0	3		72.3	72.9	42.2	62.5	6	
AVKB-19 (NC)	84.7	79.2	87.5	58.0	77.3	4		77.1	80.7	38.4	65.4	4	
Raj Bajra Chari-2 (NC)	68.9	47.9	79.0	71.7	66.9	6		77.4	64.7	64.5	68.9	2	
Mean	90.4	69.8	82.0	68.9	77.8			74.7	69.7	50.8	65.1		
CD at 5%	45.4	24.5	22.7	6.3				6.2	8.2	12.5			
CV%	4.4	19.5	15.5	5.1				8.7	6.6	13.7			

			С	entral Z	one						So	outh Zone				1	<u>All Indi</u>	a
Entries	Ana-	Jabal-	Rah-	Urulika	a- Dha	- Aver-	Ra-	Hydera	- Coi	mb- M	lan-	Karai-	Aver-	Ra-	Super-	Aver-	Ra-	Superi-
	nd	pur	uri	nchar	ri	age	nk	bad	ato	ore d	lya	kkal	age	nk	iority%	age	nk	ority%
DFMH-30	160.4	111.2	140.5	136.6	66.	0 122.9	2	94.6	68	8.1 4	6.1	61.0	67.5	1	16.3	90.1	1	3.9
NDFB-939	97.0	96.5	89.7	113.9	55.	90.4	5	60.4	44	.4 3	8.1	37.7	45.2	6		70.9	5	
AFB-9	91.6	114.5	65.0	101.9	44.	0 83.4	7	62.0	47	'.5 4	1.1	24.4	43.8	7		64.7	7	
RBB-4	120.0	84.3	96.3	125.0	56.	96.3	4	74.5	51	.5 3	4.9	45.6	51.6	3		76.5	3	
Giant Bajra (NC)	147.0	124.2	149.9	136.4	71.	0 125.7	1	68.6	65	5.2 4	6.2	51.9	58.0	2		86.7	2	
AVKB-19 (NC)	124.0	103.4	90.4	114.4	52.	) 96.8	3	59.6	48	3.6 3	6.6	46.6	47.8	5		73.8	4	
Raj Bajra Chari-2 (NC)	104.4	128.3	65.6	96.6	51.	0 89.2	6	66.3	43	6.8 4	3.1	43.9	49.3	4		69.8	6	
Mean	120.6	108.9	99.6	117.8	56.4	4 100.7		69.4	52	2.8 4	0.9	44.4	51.9			76.1		
CD at 5%	8.0	22.9	11.0	19.0	9.4			10.9	10	).1 4	1.7	9.0						
CV%	3.8	11.8	6.2	9.0	9.3			8.9	10	).8 1	3.1	11.4						
Table 6.3 AVTPM-1	: First A	dvance	d Vari	etal Tr	ial in l	Forage P	earl mil	llet: Gre	een Fo	rage Y	ield	(q/ha/da	ıy)					
E 4 1	Ludh-	His-	Bik-	Pu-	Bhuba	n- Ran-	Ana-	Jabal-	Rah-	Urulika-	D	ha- Hy	dera-	Coimb	- Man-	Karai-	Aver	- Ra-
Entries	iana	ar	aner	sa	eswar	chi	nd	pur	uri	nchan		ri t	ad	atore	dya	kkal	age	nk
DFMH-30	12.10	6.20	4.81	4.60	4.09	3.79	10.89	6.97	13.07	13.75	8	.35 9	.80	9.56	4.95	4.14	7.80	1
NDFB-939	7.50	4.80	5.93	5.40	5.40	3.82	12.52	6.26	9.16	11.46	6	.55 7	.40	7.84	3.56	3.50	6.74	5
AFB-9	6.80	3.30	6.74	5.30	4.95	3.27	9.80	7.12	7.25	10.40	5.	.43 7	.20	7.41	5.52	2.64	6.21	7
RBB-4	8.90	4.00	7.58	5.10	4.31	4.14	13.02	5.37	9.34	12.43	6	.11 8	.50	10.49	3.58	4.43	7.15	3
Giant Baira (NC)	10.60	6.70	6.21	5.10	4.95	3.29	9.81	7.40	10.90	13.74	6	.90 8	.30	8.38	4.67	4.27	7.41	2
AVKB-19 (NC)	8.50	4.70	6.65	5.20	5.32	2.92	13.95	6.46	9.18	11.19	6	.33 7	.00	10.52	4.62	4.12	7.11	4
Raj Bajra Chari-2 (NC)	6.90	2.90	6.14	5.30	4.45	3.66	11.42	7.59	7.41	9.75	5.	.70 7	.90	8.40	4.53	4.56	6.44	6
Mean	8.76	4.66	6.29	5.14	4.78	3.56	11.63	6.74	9.47	11.82	6	.48 8	.01	8.94	4.49	3.95	6.98	5
Table 6.4 AVTPM-1	: First A	dvance	d Vari	etal Tr	ial in l	Forage P	earl mi	let: Dry	v Matt	er Yiel	d (a	/ha/dav)						
	Ludh-	Н	is-	Bika-	P11-	Bhuban-	Ran-	An-	Iaba	l- Ra	<u>h-</u>	Urulik-	Hv	dera-	Coimh-	Karai-	Aver-	Ra-
Entries	iana	2	ar	ner	sa	eswar	chi	and	pur		ri	anchan	ł	bad	atore	kkal	age	nk
DFMH-30	2.10	1.	19	1.16	1.10	0.90	0.94	4.13	1.68	3 2.7	76	2.63	2	.20	1.31	0.96	1.77	1
NDFB-939	1 20	1	03	1 19	1 20	1 16	1 10	1 94	1 46	5 1'	76	2 11	1	40	0.99	0.67	1 32	6
AFB-9	1.20	0	67	1.12	1.20	1.10	0.92	1.21	1.10	) 1. 8 1'	25	1.92	1	50	1.06	0.07	1.32	7
RBB-4	1.10	0.	85	2.24	1.20	0.95	1.08	2 50	1.75	1.20		2.45	1	80	1.00	0.45	1.23	2
Giant Baira (NC)	1.50	1	02	1 17	1.20	1.07	0.71	2.30	1.27	2.0	7	2.43 2.48	1	70	1.29	0.00	1.54	2
AVKB 10 (NC)	1.00	1.	04	1.17	1.30	1.07	0.71	2.55	1.02	2 2.2	26	2.40	1	30	1.19	0.87	1.55	5
Dai Baira Chari 2 (NC)	1.40	1.	63	1.02	1.20	0.08	1.17	2.02	1.31	1. 2 1.	50	2.20	1	.50	1.10	0.87	1.40	+ 5
Moon	1.10	0. A	03 07	1.40	1.20	1.90	0.0/	2.52	1.00	) 1.0	)4	1.09 7.7/	1	.10	1.04	0.82	1.37 1.46	5
ivicali	1.40	υ.	14	1.43	1.43	1.04	0.74	4.33	1.02	4 1.3	· T	4.44	1		1.13	0.70	1.40	

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

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Entries	Ludhiana	Hisar	Bhubaneswar	Anand	Jabalpur	Rahuri	Urulikanchan	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
DFMH-30	11.0	8.9	4.8	9.0	8.7	11.9	13.5	9.1	7.7	3.6	5.4	8.5	1
NDFB-939	4.5	7.0	5.8	5.9	7.5	6.8	12.3	5.8	5.0	2.1	3.1	6.0	5
AFB-9	5.4	4.8	5.5	5.9	9.2	4.9	10.9	6.0	5.8	1.9	2.9	5.7	6
RBB-4	8.5	6.6	5.1	7.1	6.6	6.1	12.7	5.9	6.0	1.2	5.0	6.4	4
Giant Bajra (NC)	9.0	6.9	5.7	6.4	9.9	13.4	13.4	5.4	7.7	4.7	3.2	7.8	2
AVKB-19 (NC)	5.6	7.1	6.2	7.5	8.0	8.2	12.1	6.3	5.1	2.4	4.7	6.7	3
Raj Bajra Chari-2 (NC)	3.7	4.7	5.2	5.2	10.2	6.1	10.7	5.5	6.1	2.2	6.3	6.0	5
Mean	6.8	6.6	5.5	6.7	8.6	8.2	12.2	6.3	6.2	2.6	4.4	6.7	

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

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

Entries	Ludhiana	Hisar	Bhubaneswar	Anand	Jabalpur	Rahuri	Urulikanchan	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
DFMH-30	8.4	9.9	7.9	5.6	7.9	8.5	9.9	9.6	11.4	11.4	8.8	9.0	4
NDFB-939	6.1	9.0	7.7	6.0	7.8	7.6	10.8	9.6	11.4	12.3	8.3	8.8	5
AFB-9	8.0	9.4	7.8	6.4	8.0	7.6	10.7	9.6	12.3	10.5	11.8	9.3	2
RBB-4	9.1	10.3	8.0	6.0	7.8	6.3	10.2	7.9	11.8	12.3	10.9	9.1	3
Giant Bajra (NC)	8.0	9.0	7.9	4.4	8.0	8.9	9.8	7.9	11.8	13.3	6.1	8.6	6
AVKB-19 (NC)	6.6	9.0	7.7	6.0	7.9	9.1	10.6	10.5	10.5	10.9	10.1	9.0	4
Raj Bajra Chari-2 (NC)	5.4	9.9	8.1	5.0	8.0	9.4	11.1	8.3	14.0	10.9	14.4	9.5	1
Mean	7.4	9.5	7.9	5.6	7.9	8.2	10.4	9.1	11.9	11.7	10.1	9.1	

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

Entries	Ludh-	His-	Bika-	Jal-	Bhuban-	Ran-	Ana-	Jabal-	Rah-	Urulika-	Dha-	Hydera-	Coimb-	Man-	Karai-	Aver-	Ra-
Entries	iana	ar	ner	ore	eswar	chi	nd	pur	uri	nchan	ri	bad	atore	dya	kkal	age	nk
DFMH-30	288.2	145.6	220.0	186.7	189.4	187.0	263.4	174.9	180.2	186.6	181.7	233.0	274.7	98.0	180.2	199.3	3
NDFB-939	239.0	170.8	210.0	226.7	239.0	187.0	239.6	156.0	174.4	218.8	175.0	185.4	223.5	108.5	199.5	196.9	6
AFB-9	234.5	175.7	252.0	208.3	222.1	185.0	238.2	186.3	184.8	217.6	183.7	194.8	222.5	106.0	146.1	197.2	5
RBB-4	290.7	173.6	260.0	185.0	200.5	191.0	246.7	143.0	173.2	203.0	177.3	204.5	234.9	105.0	170.1	197.2	5
Giant Bajra (NC)	309.3	175.2	230.0	155.0	229.9	194.0	276.3	190.7	240.0	181.0	215.0	218.4	260.4	126.2	173.1	211.6	1
AVKB-19 (NC)	266.7	165.3	240.0	210.0	244.6	179.0	250.9	165.2	190.6	177.4	166.3	196.4	213.1	116.0	177.3	197.3	4
Raj Bajra Chari-2 (NC)	282.9	182.4	266.0	178.3	209.2	180.0	244.4	197.1	193.6	234.7	178.7	187.1	247.5	100.0	169.4	203.4	2
Mean	273.0	169.8	239.7	192.9	219.2	186.1	251.4	173.3	191.0	202.7	182.5	202.8	239.5	108.5	173.7	200.4	

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Entries	Ludh-	His-	Bika-	Jal-	Bhuban-	Ran-	Jabal-	Rah-	Urulika-	Dha-	Hydera-	Coimb-	Man-	Karai-	Aver-	Ra-
Entries	iana	ar	ner	ore	eswar	chi	pur	uri	nchan	ri	bad	atore	dya	kkal	age	nk
DFMH-30	0.60	0.60	0.25	0.40	0.89	0.46	0.52	0.22	0.47	0.58	0.25	0.20	0.23	0.23	0.42	3
NDFB-939	0.40	0.51	0.23	0.40	1.05	0.33	0.55	0.20	0.48	0.58	0.24	0.18	0.27	0.18	0.40	4
AFB-9	0.70	0.53	0.30	0.33	0.87	0.32	0.63	0.29	0.49	0.43	0.32	0.22	0.32	0.16	0.42	3
RBB-4	0.50	0.38	0.25	0.25	0.91	0.31	0.36	0.21	0.42	0.76	0.26	0.24	0.21	0.20	0.38	5
Giant Bajra (NC)	0.50	0.54	0.35	0.29	1.11	0.47	0.71	0.24	0.61	0.50	0.23	0.29	0.27	0.21	0.45	1
AVKB-19 (NC)	0.70	0.49	0.29	0.30	1.08	0.36	0.53	0.23	0.43	0.78	0.34	0.27	0.17	0.21	0.44	2
Raj Bajra Chari-2 (NC)	0.50	0.54	0.29	0.25	0.98	0.34	0.88	0.30	0.55	0.49	0.36	0.25	0.24	0.19	0.44	2
Mean	0.56	0.51	0.28	0.32	0.98	0.37	0.60	0.24	0.49	0.59	0.29	0.24	0.24	0.20	0.42	

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

## Table 6.9 AVTPM-1: First Advanced Varietal Trial in Forage Pearl millet: ADF (%), NDF (%), IVDMD (%) & DDM (q/ha)

Entrica		ADF	(%)			NDF (	(%)			IVDMI	D(%)		DDM	(q/ha)
Entries	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank	Hisar	Rahuri	Average	Rank	Hisar	Rank
DFMH-30	36.1	43.7	39.9	1	46.9	66.1	56.5	2	68.6	54.8	61.7	1	62.2	1
NDFB-939	44.3	51.9	48.1	7	58.4	63.7	61.1	4	65.2	48.4	56.8	6	51.1	4
AFB-9	37.3	47.1	42.2	3	51.1	61.3	56.2	1	67.2	52.2	59.7	5	34.0	6
RBB-4	34.7	50.7	42.7	4	47.1	65.9	56.5	2	62.4	49.4	55.9	7	40.1	5
Giant Bajra (NC)	37.0	44.5	40.8	2	51.8	62.3	57.1	3	68.4	54.2	61.3	2	52.9	2
AVKB-19 (NC)	41.6	44.3	43.0	5	62.8	64.5	63.6	6	66.4	54.4	60.4	3	52.6	3
Raj Bajra Chari-2 (NC)	43.7	47.8	45.8	6	59.3	65.5	62.4	5	68.2	51.7	59.9	4	32.7	7
Mean	39.2	47.2	43.2		53.9	64.2	59.1		66.6	52.2	59.4		46.5	

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## 7. AVTPM-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE PEARL MILLET (Reference Tables: 7.1 to 7.4)

In forage pearl millet, three entries namely NDFB-936, AFB-8 and APFB-09-1 along with three national checks *i.e.* Raj Bajra Chari-2 (RBC-2), AVKB-19 and Giant Bajra were evaluated in second advanced varietal trial conducted at four locations. Results reported from different centres clearly revealed that national check RBC-2 excelled in performance for green forage yield and dry matter yield (q/ha).

In fodder production potential (q/ha/day), entry NDFB-936 was superior both for green forage and dry matter production potential with respect to national check RBC-2. In quality parameters, national check RBC-2 for crude protein yield (q/ha) and entry NDFB-936 for crude protein content (%) were adjudged good performers. For growth parameter, national check AVKB-19 (196.2 cm) ranked first whereas for leafiness (L/S ratio), entry AFB-8 (0.80) proved superiority with respect to check.

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

#### (Reference Table: 8.1)

Results of the second advanced varietal trial in forage pearl millet for seed with three entries *i.e.* APFB-09-1, NDFB-936 and AFB-8 along with three national checks *i.e.* Giant Bajra, RBC-2 and AVKB-19 conducted at two locations revealed that for seed yield (q/ha), entries APFB-09-1 (22.9%) and NDFB-936 (15.9%) was found superior over national checks. In North East Zone, seed yield of APFB-09-1 was 6.0 q/ha which was followed by test entry NDFB-936 (5.66 q/ha) and AVKB-19 (4.88 q/ha).

			GFY	(q/ha)					DMY (	(q/ha)		
Entries	Pu-	Bhuba-	Ran-	Kal-	Aver-	Ra-	Pu-	Bhuba-	Ran-	Kal-	Aver-	Ra-
	sa	neswar	chi	yani	age	nk	sa	neswar	chi	yani	age	nk
NDFB-936	365.0	332.9	195.3	94.0	246.8	3	81.8	73.0	66.6	23.2	61.1	3
AFB-8	332.0	297.0	164.1	90.4	220.9	6	76.2	65.4	48.4	22.6	53.1	6
APFB-09-1	340.0	273.0	187.5	104.6	226.3	4	78.2	60.2	59.1	23.1	55.2	5
Giant Bajra (NC)	362.0	248.5	197.9	96.0	226.1	5	83.8	54.7	68.6	23.7	57.7	4
AVKB-19 (NC)	329.0	382.9	200.5	93.8	251.6	2	73.9	84.1	67.9	22.7	62.1	2
RBC-2 (NC)	302.0	353.2	231.8	164.4	262.8	1	68.5	77.6	75.6	42.6	66.1	1
Mean	338.3	314.6	196.2	107.2	239.1		77.1	69.2	64.4	26.3	59.2	
<b>CD</b> at 5(%)	27.3	27.1	29.2	12.2			6.7	6.0	16.5	2.8		
CV (%)	10.3	5.7	9.8	7.5			8.4	5.8	16.8	7.0		

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

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

Entries		GFY (	q/ha)				DN	IY (q/ha)		
	Pusa	Bhubaneswar	Ranchi	Average	Rank	Pusa	Bhubaneswar	Ranchi	Average	Rank
NDFB-936	5.70	5.37	4.43	5.17	1	1.30	1.18	1.51	1.33	1
AFB-8	5.30	4.87	3.41	4.53	5	1.20	1.07	1.00	1.09	4
APFB-09-1	5.40	4.01	3.67	4.36	6	1.20	0.89	1.15	1.08	5
Giant Bajra (NC)	5.70	4.07	4.30	4.69	4	1.30	0.90	1.49	1.23	3
AVKB-19 (NC)	5.20	5.80	4.09	5.03	3	1.20	1.27	1.38	1.28	2
RBC-2 (NC)	4.70	5.52	5.15	5.12	2	1.10	1.21	1.68	1.33	1
Mean	5.33	4.94	4.18	4.82		1.22	1.09	1.37	1.22	

#### Table 7.3 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Crude Protein Yield (q/ha) & Crude Protein (%)

Entries		CPY (q/l	ha)		СР	(%)
Entries	Bhubaneswar	Kalyani	Average	Rank	Bhubaneswar	Rank
NDFB-936	5.8	2.0	3.9	2	8.0	1
AFB-8	5.0	1.8	3.4	4	7.6	3
APFB-09-1	4.7	1.4	3.1	5	7.9	2
Giant Bajra (NC)	4.1	2.1	3.1	5	7.6	3
AVKB-19 (NC)	6.3	1.3	3.8	3	7.5	4
RBC-2 (NC)	5.8	3.8	4.8	1	7.5	4
Mean	5.30	2.07	3.68		7.67	

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Entries		Pla	nt Height(cm)	0			Leaf Sten	n Ratio	
Entries	Bhubaneswar	Ranchi	Kalyani	Average	Rank	Bhubaneswar	Ranchi	Average	Rank
NDFB-936	235.1	156.0	149.8	180.3	3	1.15	0.36	0.76	2
AFB-8	228.3	158.0	145.1	177.1	4	1.17	0.43	0.80	1
APFB-09-1	204.6	163.0	156.3	174.6	5	1.03	0.32	0.68	3
Giant Bajra (NC)	196.4	154.0	140.5	163.6	6	1.09	0.26	0.68	3
AVKB-19 (NC)	256.5	153.0	179.0	196.2	1	0.98	0.29	0.64	4
RBC-2 (NC)	249.7	157.0	171.9	192.9	2	0.89	0.27	0.58	5
Mean	228.4	156.8	157.1	180.8		1.05	0.32	0.69	

Table 7.4 AVTPM-2: Second Advanced Varietal Trial in Forage Pearl millet: Plant Height (cm) & Leaf Stem Ratio

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

Entrica		Nort	h-East Zone		
Entries	Bhubaneswar	Kalyani	Average	Rank	Superiority%
APFB-09-1	8.54	3.45	6.00	1	22.9
NDFB-936	7.82	3.49	5.66	2	15.9
AFB-8	7.19	1.54	4.37	5	
Giant Bajra (NC)	6.77	1.78	4.28	6	
RBC-2 (NC)	7.40	1.46	4.43	4	
AVKB-19 (NC)	6.67	3.09	4.88	3	
Mean	7.40	2.47	4.93		
<b>CD</b> at 5(%)	0.42	0.11			
CV (%)	3.81	3.08			

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

#### (Reference Tables: 9.1 to 9.9)

In forage cowpea, four entries along with two national checks namely Bundel Lobia-1 and UPC-5286 and three zonal checks *viz.*, UPC-622, UPC-9202 and BL-2 for respective zones were evaluated in initial varietal trial at 24 locations across the five zones.

For the character green forage yield (q/ha), entry MFC-09-13 in Hill Zone (50.6%) and North West Zone (0.30%) exhibited superiority over best national/zonal check. At national level MFC-09-13 (0.7%) maintained its superiority. For dry matter yield (q/ha), entry MFC-09-13 in Hill Zone (38.3%), Central Zone (4.1%) and at all India level (1.3%) exhibited its superiority with respect to check.

For fodder production potential (q/ha/day), national check Bundel Lobia-1 for green forage and dry matter yield registered superiority. For evaluation against quality parameter, entries MFC-09-13 for crude protein yield (q/ha) and IGFRI-06-01 for crude protein content (%) were superior. For the character plant height, check variety Bundel Lobia-1 (128.6 cm) and for leafiness (L/S ratio), entries MFC-09-13 and HFC-11-2 (0.77) ranked first. For other quality parameters, entry IGFRI-06-01 for ADF (%) and DDM (q/ha), entry HFC-11-2 for NDF (%) and check variety UPC-5286 for IVDMD (%) registered superiority.

## 10. AVTC-1: FIRST ADVANCED VARIETAL TRIAL IN FORAGE COWPEA (Reference Tables: 10.1 to 10.9)

In forage cowpea, three entries namely TNFC-0926, MFC-09-9 and UPC-1301 along with national checks namely Bundel Lobia-1 (BL-1) and UPC-5286 and two zonal checks *i.e.* UPC-622 and UPC-9202 for respective zones at 12 locations across the three zones of the country were tested. For green forage yield (q/ha), entry TNFC-0926 (7.5%) in North East Zone and entries TNFC-0926 and MFC-09-9 (2.2%) in South Zone and at national level exhibited their superiority.

For dry matter yield (q/ha), entry TNFC-0926 with 3.1 per cent in North East Zone and MFC-09-9 in South Zone with 0.7 per cent proved superiority. Even at national level, entry MFC-09-9 (3.3%) and TNFC-0926 (2.8%) recorded superiority over best national check. For fodder production potential (q/ha/day), entry TNFC-0926 maintained superiority both for green forage and dry matter production potential.

For evaluation against quality parameters, national check UPC-5286 (17.6%) was adjudged good performer for crude protein whereas for crude protein yield, entry MFC-09-9 (6.6 q/ha) ranked first. For the character plant height national check BL-1 (131.0 cm) and for leafiness MFC-09-9 (0.71) were superior. For other quality parameters, entry MFC-09-9 for ADF (%) and national check UPC-5286 for NDF (%) exhibited superiority.

Entring		Hill Z	lone					North We	est Zone				
Entries	Palampur	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Bikaner	Udaipur	Jalore	Meerut	Average	Rank	Superiority%
APFC-10-11				504.6	259.3	141.7	218.7	281.0	221.3	439.3	295.1	4	
IGFRI-06-01	90.7	5		453.7	311.1	132.9	250.2	273.2	227.3	416.4	295.0	5	
MFC-09-13	170.8	1	50.6	502.3	259.3	228.3	240.8	250.0	206.3	476.5	309.1	1	0.3
HFC-11-2	56.9	6		458.3	229.6	222.1	211.4	186.6	168.0	531.6	286.8	6	
UPC-5286 (NC)	108.3	3		560.2	229.6	210.4	167.9	239.8	126.0	391.8	275.1	7	
Bundel Lobia-1 (NC)	91.7	4		476.9	248.1	217.1	220.9	273.2	253.7	468.2	308.3	2	
UPC-622 ZC (NEZ-HZ)	113.4	2											
Bundel Lobia-2 ZC (NWZ)				516.2	270.4	207.5	192.9	264.4	166.0	483.4	300.1	3	
UPC-9202 ZC (CZ-SZ)													
Mean	105.3			496.0	258.2	194.3	214.7	252.6	195.5	458.2	295.6		
CD at 5%	12.8			22.4	36.2	59.3	33.0	52.6	24.8	2.9			
CV%	6.7			10.1	7.8	9.4	8.6	11.7	7.1	5.0			

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

Note- Data could not be collected due to floods at Srinagar

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

			North	ı East Zoı	ne						Central Zon	ne		
Entrica	Faiza-	Kaly-	Bhuban-	Jor-	Ran-	Aver-	Ra-	Ana-	Jha-	Rah-	Urulika-	Kan-	Aver-	Ra-
Entries	bad	ani	eswar	hat	chi	age	nk	nd	nsi	uri	nchan	pur	age	nk
APFC-10-11	159.3	300.9	269.8	281.7	213.1	245.0	3	494.0	305.6	286.1	349.4	273.2	341.7	5
IGFRI-06-01	212.4	259.3	220.0	262.0	231.4	237.0	4	444.0	324.1	321.5	434.2	319.4	368.6	2
MFC-09-13	208.3	264.8	237.5	233.9	148.1	218.5	6	457.0	388.9	339.5	407.9	240.7	366.8	3
HFC-11-2	200.2	203.7	280.2	186.3	222.2	218.5	6	393.0	268.5	201.4	361.3	212.9	287.4	7
UPC-5286 (NC)	159.3	294.4	316.6	292.7	222.2	257.1	2	556.0	217.6	338.1	492.8	250.0	370.9	1
Bundel Lobia-1 (NC)	192.0	238.0	272.9	202.3	268.6	234.7	5	401.0	324.1	263.8	453.2	347.2	357.9	4
UPC-622 ZC (NEZ-HZ)	151.1	337.0	280.2	278.8	277.8	265.0	1							
Bundel Lobia-2 ZC (NWZ)														
UPC-9202 ZC (CZ-SZ)								486.0	268.5	297.2	355.5	222.2	325.9	6
Mean	183.2	271.2	268.1	248.2	226.2	239.4		461.6	299.6	292.5	407.8	266.5	345.6	
CD at 5%	43.1	27.3	40.4	7.0	65.0			73.1	5.6	49.6	24.1	56.2		
CV%	13.2	5.7	8.5	9.5	16.0			9.5	10.5	9.5	12.7	5.2		

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				So	uth Zone						All Indi	a
Entries	Coimb-	Karai-	Man-	Hydera-	Dhar-	Rai-	*Vella-	Aver-	Ra-	Aver-	Ra-	Superi-
	atore	kkal	dya	bad	wad	chur	yani	age	nk	age	nk	ority%
APFC-10-11	245.4	128.5	232.7	291.9	287.0	160.0	273.2	224.3	5	275.8	3	
IGFRI-06-01	268.5	148.6	233.9	245.6	273.2	178.0	213.0	224.6	4	272.1	4	
MFC-09-13	277.8	206.4	284.7	254.8	273.2	216.0	328.7	252.1	2	282.2	1	0.7
HFC-11-2	208.3	135.0	180.6	213.1	263.9	128.0	259.3	188.2	6	238.5	6	
UPC-5286 (NC)	226.9	144.4	263.8	259.5	250.0	201.0	300.9	224.3	5	271.6	5	
Bundel Lobia-1 (NC)	194.4	266.2	308.9	305.8	291.7	148.0	199.1	252.5	1	280.3	2	
UPC-622 ZC (NEZ-HZ)												
Bundel Lobia-2 ZC (NWZ)												
UPC-9202 ZC (CZ-SZ)	254.6	175.5	228.6	287.3	259.3	155.0	379.6	226.7	3			
Mean	239.4	172.1	247.6	265.4	271.2	169.4	279.1	227.5		270.1		
CD at 5%	54.7	27.1	27.6	49.8	50.0	39.9	107.2					
CV%	12.9	8.9	6.5	10.5	10.4	9.4	21.6					

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

\* Not included in zonal and All India average due to  $CV \ge 20$ 

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

		Hill Zone				North Wes	t Zone		
Entries	Palam-	Ra-	Superi-	Ludh-	His-	Pant-	Bika-	Aver-	Ra-
	pur	nk	ority%	iana	ar	nagar	ner	age	nk
APFC-10-11				85.8	48.2	25.0	31.5	47.6	7
IGFRI-06-01	18.2	4		78.5	55.9	25.8	40.1	50.1	5
MFC-09-13	33.2	1	38.3	86.4	42.2	47.1	33.1	52.2	3
HFC-11-2	11.5	6		80.7	37.9	40.8	33.4	48.2	6
UPC-5286 (NC)	22.3	3		96.4	42.6	41.7	31.9	53.1	2
Bundel Lobia-1 (NC)	17.7	5		82.2	44.7	40.8	37.0	51.2	4
UPC-622 ZC (NEZ-HZ)	24.0	2							
Bundel Lobia-2 ZC (NWZ)				90.3	54.8	38.8	30.8	53.7	1
UPC-9202 ZC (CZ-SZ)									
Mean	21.2			85.8	46.6	37.1	34.0	50.9	
CD at 5%	2.2			24.6	12.1	18.8	7.9		
CV%	5.6			4.1	14.4	15.5	13.0		

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			Nort	h East 2	Zone							Centr	al Zone			
Entries	Faiza-	Kal-	Bhuban-	Jor-	Ran-	Aver-	Ra-	Superi-	Ana-	Jha-	Rah-	Urulik-	Kan-	Aver-	Ra-	Superi-
	bad	yani	eswar	hat	chi	age	nk	ority%	nd	nsi	uri	anchan	pur	age	nk	ority%
APFC-10-11	32.7	61.2	59.9	51.2	33.3	47.6	5		72.6	88.9	37.8	48.3	69.4	63.4	5	
IGFRI-06-01	69.4	52.6	48.8	46.0	41.7	51.7	1	3.2	69.6	92.6	45.0	56.4	81.9	69.1	4	
MFC-09-13	58.8	52.6	51.3	41.4	23.6	45.5	6		82.3	105.6	65.0	53.3	62.5	73.7	1	4.1
HFC-11-2	45.8	40.9	61.0	31.6	34.2	42.7	7		62.8	81.5	26.5	54.0	54.6	55.9	7	
UPC-5286 (NC)	34.3	60.1	69.0	49.8	35.8	49.8	3		82.8	71.3	62.2	72.0	65.8	70.8	2	
Bundel Lobia-1 (NC)	52.3	48.5	60.1	35.2	48.3	48.9	4		73.5	92.6	33.6	64.2	88.9	70.6	3	
UPC-622 ZC (NEZ-HZ)	24.5	69.1	60.9	49.7	46.4	50.1	2									
Bundel Lobia-2 ZC (NWZ)																
UPC-9202 ZC (CZ-SZ)									67.5	81.5	53.1	45.0	56.0	60.6	6	
Mean	45.4	55.0	58.7	43.6	37.6	48.0			73.0	87.7	46.2	56.2	68.5	66.3		
CD at 5%	6.4	6.6	9.2	2.8	11.7				12.1	11.2	8.3	3.8	12.4			
CV%	7.9	6.7	8.7	8.9	17.4				9.7	7.2	10.1	7.7	2.3			

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

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

				South Z	Lone					All India	l
Entring	Coimb-	Karai-	Man-	Hydera-	Dhar-	*Vella-	Aver-	Ra-	Aver-	Ra-	Superi-
Entries	atore	kkal	dya	bad	wad	yani	age	nk	age	nk	ority%
APFC-10-11	35.9	25.0	44.2	32.7	54.1	51.9	38.4	3	49.3	5	
IGFRI-06-01	30.5	25.0	42.1	26.8	58.9	40.5	36.7	5	50.3	4	
MFC-09-13	43.5	37.7	54.1	36.7	55.7	62.4	45.5	2	53.3	1	1.3
HFC-11-2	35.4	23.4	30.7	26.4	55.6	49.3	34.3	6	43.4	6	
UPC-5286 (NC)	30.7	19.1	50.1	30.8	52.8	57.2	36.7	5	51.1	3	
Bundel Lobia-1 (NC)	29.7	60.5	49.4	32.6	59.6	37.8	46.4	1	52.6	2	
UPC-622 ZC (NEZ-HZ)											
Bundel Lobia-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	40.3	23.1	41.2	31.8	52.8	72.1	37.8	4			
Mean	35.1	30.5	44.5	31.1	55.6	53.0	39.4		50.0		
CD at 5%	7.9	7.6	13.0	5.4	8.2	20.4					
CV%	12.6	14.0	15.4	9.7	8.3	21.6					

\* Not included in zonal and All India average due to  $CV \ge 20$ 

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Entrico	Palam-	Ludh-	His-	Pant-	Bika	Faiza	Bhuba-	Jor-	Ran	Ana-	Jha-	Rah-	Urulikan-	Kan	Coimb-	Vella-	Man-	Hyder-	Dhar	Karai-	Aver-	Ran
Entries	pur	iana	ar	nagar	-ner	bad	neswar	hat	chi	nd	nsi	uri	chan	-pur	atore	yani	dya	abad	-wad	kkal	age	k
APFC-10-11		5.40	3.40	1.71	4.05	3.98	3.91	3.86	3.38	8.67	4.37	5.50	5.38	4.48	3.51	4.71	4.80	6.10	4.42	2.44	4.42	2
IGFRI-06-01	1.50	4.90	4.10	1.63	4.63	4.16	3.14	3.59	3.79	7.05	5.34	6.99	7.49	5.60	3.84	3.67	4.74	5.50	4.20	2.59	4.42	2
MFC-09-13	2.50	5.40	3.40	2.40	4.46	4.63	3.34	3.20	2.17	5.19	6.08	4.41	8.00	3.76	3.97	5.67	5.77	4.70	4.20	3.16	4.32	3
HFC-11-2	0.90	4.90	3.00	2.71	3.92	5.00	3.64	2.55	3.17	6.89	4.20	4.11	6.45	3.87	3.21	4.47	3.90	5.20	4.06	2.55	3.93	5
UPC-5286 (NC)	1.90	6.00	3.00	2.21	3.11	2.74	4.46	4.01	3.31	6.70	3.14	5.45	9.13	4.03	3.34	5.19	5.57	5.10	3.85	2.36	4.23	4
Bundel Lobia-1 (NC)	1.60	5.10	3.30	2.65	4.09	5.05	3.50	2.77	4.55	6.37	4.84	5.74	7.43	5.99	2.86	3.43	7.24	6.80	4.49	4.24	4.60	1
UPC-622 ZC (NEZ-HZ)	1.80					2.60	3.84	3.82	4.02													
Bundel Lobia-2 ZC (NWZ)		5.60	3.60	2.18	3.57																	
UPC-9202 ZC (CZ-SZ)										7.71	3.99	3.76	5.15	3.27	3.64	6.55	4.70	5.10	3.99	2.66		
Mean	1.70	5.33	3.40	2.21	3.98	4.02	3.69	3.40	3.48	6.94	4.57	5.14	7.00	4.43	3.48	4.81	5.25	5.50	4.17	2.86	4.32	

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

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

Entrice	Ludh-	His-	Pant-	Bika-	Faiza-	Bhuba-	Jor-	Ran-	Ana-	Jha-	Rah-	Urulika-	Kan-	Coimb-	Hydera-	Dhar-	Karai-	Aver-	Ra-
Entries	iana	ar	nagar	ner	bad	neswar	hat	chi	nd	nsi	uri	nchan	pur	atore	bad	wad	kkal	age	nk
APFC-10-11	0.90	0.63	0.30	0.58	0.81	0.87	0.70	0.52	1.27	1.27	0.73	0.74	1.14	0.51	0.70	0.83	0.51	0.77	5
IGFRI-06-01	0.80	0.73	0.32	0.74	1.36	0.70	0.63	0.68	1.10	1.53	0.98	0.97	1.44	0.44	0.60	0.91	0.38	0.84	2
MFC-09-13	0.90	0.56	0.50	0.61	1.31	0.72	0.57	0.34	0.94	1.65	0.84	1.04	0.98	0.62	0.70	0.86	0.31	0.79	3
HFC-11-2	0.90	0.50	0.50	0.62	1.20	0.79	0.43	0.48	1.10	1.27	0.54	0.96	0.99	0.55	0.60	0.85	0.28	0.74	6
UPC-5286 (NC)	1.00	0.56	0.44	0.59	0.59	0.97	0.68	0.53	1.00	1.03	1.00	1.33	1.05	0.45	0.60	0.81	0.62	0.78	4
Bundel Lobia-1 (NC)	0.90	0.59	0.50	0.68	1.61	0.77	0.48	0.81	1.17	1.38	0.73	1.05	1.53	0.44	0.70	0.92	0.27	0.85	1
UPC-622 ZC (NEZ-HZ)					0.42	0.83	0.68	0.67											
Bundel Lobia-2 ZC (NWZ)	1.00	0.72	0.41	0.57															
UPC-9202 ZC (CZ-SZ)									1.07	1.21	0.67	0.65	0.82	0.58	0.60	0.81	0.24		
Mean	0.91	0.61	0.42	0.63	1.04	0.81	0.60	0.58	1.09	1.33	0.79	0.96	1.14	0.51	0.64	0.86	0.37	0.80	

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

Entrice	Palam-	Ludh-	His-	Faiza-	Bhuban-	Jor-	Ana-	Rah-	Urulika-	Coimba-	Man-	Hydera-	Karai-	Aver-	Ra-
Entries	pur	iana	ar	bad	eswar	hat	nd	uri	nchan	tore	dya	bad	kkal	age	nk
APFC-10-11		1.1	8.1	5.2	9.3	6.8	8.1	5.7	7.3	5.4	5.2	6.3	5.0	6.1	5
IGFRI-06-01	3.1	0.8	10.4	12.4	7.7	5.9	9.0	6.2	8.6	4.9	5.4	4.7	4.8	6.5	4
MFC-09-13	6.7	0.9	7.1	10.6	7.9	5.2	10.9	9.0	8.5	7.1	8.1	4.6	6.3	7.1	1
HFC-11-2	2.1	0.8		7.5	9.7	4.0	8.2	3.6	8.4	6.1	4.6	4.4	4.5	5.3	6
UPC-5286 (NC)	4.0	1.1	7.6	5.7	11.0	6.6	10.4	9.4	10.2	3.6	7.8	5.0	3.7	6.6	3
Bundel Lobia-1 (NC)	3.3	0.8	7.7	8.6	9.2	4.8	8.3	4.5	9.8	5.3	10.8	4.4	12.6	6.9	2
UPC-622 ZC (NEZ-HZ)	4.3			4.2	9.9	6.5									
Bundel Lobia-2 ZC (NWZ)		1.1	9.4												
UPC-9202 ZC (CZ-SZ)							9.8	7.3	6.9	6.9	5.4	5.7	4.0		
Mean	3.9	0.9	8.4	7.7	9.2	5.7	9.2	6.5	8.5	5.6	6.8	5.0	5.9	6.4	

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Entries	Pala	n- Ludh	- His-	Faiza-	Bhuban-	- Jor-	Ana-	Rah-	Urulika	a- Coin	nb- Man	- Hydera	- Karai-	Jha-	Aver-	Ra-
Entries	pu	iana	ar	bad	eswar	hat	nd	uri	nchan	ator	re dya	bad	kkal	nsi	age	nk
APFC-10-11		20.6	16.9	16.6	15.6	13.6	11.1	15.1	15.0	14.	9 10.5	19.3	20.1	13.2	15.6	4
IGFRI-06-01	17.	2 17.3	18.6	17.8	15.8	12.8	13.0	13.8	15.1	16.	2 14.4	17.5	19.3	17.0	16.1	1
MFC-09-13	20.	1 17.3	16.9	18.0	15.4	12.6	13.3	13.8	16.0	16.	2 13.6	12.6	16.6	19.4	15.8	3
HFC-11-2	18.4	4 15.5		17.0	16.0	12.9	13.0	13.7	15.6	17.	1 15.4	16.6	19.3	15.8	15.9	2
UPC-5286 (NC)	18.	1 18.7	17.9	16.5	16.0	13.4	12.6	15.1	14.1	11.	8 14.9	16.2	19.3	12.0	15.5	5
Bundel Lobia-1 (NC)	19.	) 16.6	17.3	16.5	15.3	13.8	11.3	13.4	15.3	17.	9 15.8	13.6	21.0	14.0	15.8	3
UPC-622 ZC (NEZ-HZ)	18.	1		17.0	16.2	13.2										
Bundel Lobia-2 ZC (NWZ)		18.9	17.1													
UPC-9202 ZC (CZ-SZ)							14.6	13.7	15.4	17.	1 11.8	17.9	17.5	19.5		
Mean	18.	5 17.8	17.4	17.1	15.8	13.2	12.7	14.1	15.2	15.	9 13.8	16.2	19.0	15.8	15.8	
Table 9.7 IVTC: Initial	Varieta	l Trial ir	I Forage	Cowpea	a: Plant	Height (	(cm)									
Entries	Pa	lam-	His-	Pant	t-	Bika-	Udai-		Jal-	Faiza-	Kal- I	Bhuban-	Jor	Rai	n-	Ana-
Entrites	1	our	ar	naga	ar	ner	pur		ore	bad	yani	eswar	hat	ch	i	nd
APFC-10-11			115.7	173.	3	78.0	71.6	9	91.7	45.3	102.8	209.2	132.1	100	0.0	148.5
IGFRI-06-01	6	3.3	121.2	161.	7	79.0	82.0	:	81.7	75.3	93.6	191.5	194.6	97.	.0	151.0
MFC-09-13	7	9.0	120.0	193.	3	112.0	77.8	,	70.0	81.7	94.3	198.3	125.5	98.	.0	143.9
HFC-11-2	7	5.7	124.9	121.	3	71.0	84.4	,	76.7	64.0	90.7	228.6	106.4	100	0.0	154.3
UPC-5286 (NC)	7	0.0	102.8	181.	7	91.0	73.1	:	86.7	58.9	103.6	245.6	153.4	98.	.0	156.9
Bundel Lobia-1 (NC)	7	9.7	119.8	163.	3	144.0	73.2	:	83.3	59.0	93.9	217.6	226.7	102	0.0	159.9
UPC-622 ZC (NEZ-HZ)	10	)6.0								47.7	107.3	237.9	188.9	97.	.0	
Bundel Lobia-2 ZC (NWZ)			115.3	179.	0	149.0	69.3	1	0.00							
UPC-9202 ZC (CZ-SZ)																143.4
Mean	7	9.0	117.1	167.	7	103.4	75.9		84.3	61.7	98.0	218.4	161.1	98.	.9	151.1
Table 9.7 IVTC: Initial	Varieta	l Trial ir	Forage	Cowpea	a: Plant	Height (	(cm)									
Entries	Jhansi	Rahuri	Kanpur	Urulikar	nchan I	Ludhiana	Coimbat	ore V	ellayani	Mandya	Hyderaba	d Karaik	kal Raic	hur A	Average	Rank
APFC-10-11	148.1	128.3	187.7	222.	.1	102.9	53.3		110.0	65.2	115.6	69.'	7 50	.8	114.6	5
IGFRI-06-01	202.4	136.7	162.9	230.	.1	104.4	60.0		148.2	59.1	124.6	92.:	5 57	.8	120.5	4
MFC-09-13	142.9	178.4	182.7	194.	.1	92.2	59.7		163.7	95.3	165.2	158.	.3 61	.8	125.6	2
HFC-11-2	140.0	100.8	155.9	197.	.0	112.9	62.3		125.0	51.4	140.6	88.0	0 43	.0	109.3	6
UPC-5286 (NC)	127.3	204.9	167.8	202.	.6	106.7	57.3		145.3	61.4	165.9	98.′	7 60	.4	122.6	3
Bundel Lobia-1 (NC)	189.1	111.9	173.9	213.	.7	88.9	56.7		156.1	85.3	133.5	171.	.2 55	.9	128.6	1
UPC-622 ZC (NEZ-HZ)																
Bundel Lobia-2 ZC (NWZ)						97.8										
UPC-9202 ZC (CZ-SZ)	139.6	187.8	159.1	204.	.4		62.6		154.9	53.6	173.2	185.	.7 50	.4		
Mean	155.6	149.8	170.0	209.	.1	100.8	58.8		143.3	67.3	145.5	123.	.4 54	.3	120.2	

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

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Entries	Palam-	His-	Pant-	Bika-	Faiza-	Kal-	Bhuban-	Jor-	Ran-	Jha-	Rah-	Urulika-	Kan-	Coimb-	Vella-	Man-	Hydera-	Kara-	Aver-	Ra-
Entries	pur	ar	nagar	ner	bad	yani	eswar	hat	chi	nsi	uri	nchan	pur	atore	yani	dya	bad	ikkal	age	nk
APFC-10-11		0.72	0.76	0.71	0.80	0.75	0.89	0.61	0.62	0.66	0.61	0.74	0.78	0.59	0.99	0.60	0.80	0.45	0.71	4
IGFRI-06-01	0.46	0.78	0.76	0.69	0.81	0.84	0.92	0.80	0.51	0.52	0.60	0.70	0.88	0.54	1.66	0.33	0.53	0.47	0.71	4
MFC-09-13	0.58	1.13	0.95	0.72	0.79	0.83	0.85	0.84	0.79	0.64	0.44	0.71	0.76	0.52	1.90	0.51	0.56	0.38	0.77	1
HFC-11-2		1.18	0.90	1.06	0.90	0.79	1.04	0.75	0.72	0.59	0.77	0.76	0.67	0.39	0.89	0.67	0.64	0.37	0.77	1
UPC-5286 (NC)	0.52	0.98	0.85	0.79	0.87	0.66	1.11	0.83	0.81	0.66	0.50	0.90	0.72	0.49	1.05	0.51	0.60	0.44	0.74	2
Bundel Lobia-1 (NC)	0.62	0.86	1.07	0.60	0.87	0.73	0.97	0.69	0.65	0.60	0.55	0.92	0.73	0.55	0.81	0.75	0.59	0.53	0.73	3
UPC-622 ZC (NEZ-HZ)	0.66				0.85	0.79	1.08	0.67	0.64											
Bundel Lobia-2 ZC (NWZ)		0.95	0.96	0.78																
UPC-9202 ZC (CZ-SZ)	0.48									0.70	0.37	1.03	1.15	0.48	0.92	0.68	0.66	0.43		
Mean	0.55	0.94	0.89	0.76	0.84	0.77	0.98	0.74	0.68	0.62	0.55	0.82	0.81	0.51	1.17	0.58	0.63	0.44	0.74	

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

## Table 9.9 IVTC: Initial Varietal Trial in Forage Cowpea: ADF (%), NDF (%), IVDMD (%) & DDM (q/ha)

		ADF (	(%)			NDF	(%)		IVDME	0(%)	DDM(q/	ha)
Entries	Ludhiana	Jhansi	Average	Rank	Ludhiana	Jhansi	Average	Rank	Hisar	Rank	Hisar	Rank
APFC-10-11	34.0	36.4	35.2	4	45.6	49.2	47.4	4	71.2	4	34.3	3
IGFRI-06-01	35.3	34.9	35.1	3	53.5	48.1	50.8	8	72.8	2	40.7	1
MFC-09-13	36.7	34.3	35.5	5	50.4	45.5	48.0	6	71.4	3	30.1	6
HFC-11-2	37.8	33.6	35.7	6	48.3	44.6	46.5	3				
UPC-5286 (NC)	33.9	39.6	36.8	7	46.8	48.6	47.7	5	75.0	1	32.0	4
Bundel Lobia-1 (NC)	37.6	37.6	37.6	8	48.0	50.6	49.3	7	70.8	5	31.7	5
UPC-622 ZC (NEZ-HZ)												
Bundel Lobia-2 ZC (NWZ)	33.7		33.7	1	46.1		46.1	2	68.8	6	37.7	2
UPC-9202 ZC (CZ-SZ)		34.8	34.8	2		45.3	45.3	1				
Mean	35.6	35.9	35.5		48.4	47.4	47.6		71.7		34.4	

	Hi	ll Zone				North Ea	st Zone			
Entries	Palam-	Ra-	Faiza-	Bhuban-	Ran-	Jor-	Kal-	Aver-	Ra-	Super-
	pur	nk	bad	eswar	chi	hat	yani	age	nk	iority
TNFC-0926	221.5	6	137.9	299.6	179.7	235.9	291.9	229.0	1	7.5
MFC-09-9	263.9	3	137.9	256.9	143.2	228.8	265.2	206.4	4	
UPC-1301	259.7	4	107.2	264.7	156.3	204.4	314.6	209.4	3	
Bundel Lobia-1 (NC)	223.6	5	98.0	325.1	138.0	223.1	281.5	213.1	2	
UPC-5286 (NC)	302.8	1	87.3	231.3	117.2	215.9	339.8	198.3	5	
UPC-622 ZC (NEZ-HZ)	298.6	2	79.7	228.2	148.4	220.9	254.0	186.2	6	
UPC-9202 ZC(SZ)										
Mean	261.7		108.0	267.6	147.1	221.5	291.1	207.1		
CD at 5%	47.8		16.9	27.7	29.6	3.8	13.2			
CV%	12.1		10.4	6.9	13.2	6.9	3.0			

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

Note- Data could not be collected due to floods at Srinagar

					0						
			Sou	ith Zone					All Iı	ndia Av	erage
Coimb-	Vella-	Man-	Hydera-	Dhar-	Kara-	Aver-	Ra-	Superi-	Aver-	Ra-	Super-
atore	yani	dya	bad	wad	ikal	age	nk	ority	age	nk	iority
210.4	600.7	148.9	185.3	264.6	173.1	263.8	2	2.2	245.8	1	3.8
141.7	541.7	224.2	133.3	256.3	286.2	263.9	1	2.2	239.9	2	1.2
145.8	559.0	158.7	133.3	222.9	132.3	225.3	6		221.6	5	
137.5	552.1	214.0	162.4	229.2	200.4	249.2	5		232.1	4	
175.0	583.3	202.4	149.9	252.0	185.1	258.0	3		236.8	3	
158.3	590.3	128.4	131.2	222.9	309.4	256.8	4				
161.5	571.2	179.4	149.2	241.3	214.4	252.8			235.2		
25.8	101.7	22.0	22.7	24.4	43.5						
10.6	5.0	8.5	10.1	6.7	13.5						
	Coimb- atore 210.4 141.7 145.8 137.5 175.0 158.3 161.5 25.8 10.6	Coimb- atoreVella- yani210.4600.7141.7541.7145.8559.0137.5552.1175.0583.3158.3590.3161.5571.225.8101.710.65.0	Coimb- atoreVella- yaniMan- dya210.4600.7148.9141.7541.7224.2145.8559.0158.7137.5552.1214.0175.0583.3202.4158.3590.3128.4161.5571.2179.425.8101.722.010.65.08.5	Sou           Coimb- atore         Vella- yani         Man- dya         Hydera- bad           210.4         600.7         148.9         185.3           141.7         541.7         224.2         133.3           145.8         559.0         158.7         133.3           137.5         552.1         214.0         162.4           175.0         583.3         202.4         149.9           158.3         590.3         128.4         131.2           161.5         571.2         179.4         149.2           25.8         101.7         22.0         22.7           10.6         5.0         8.5         10.1	South ZoneCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wad210.4600.7148.9185.3264.6141.7541.7224.2133.3256.3145.8559.0158.7133.3222.9137.5552.1214.0162.4229.2175.0583.3202.4149.9252.0158.3590.3128.4131.2222.9161.5571.2179.4149.2241.325.8101.722.022.724.410.65.08.510.16.7	South ZoneCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikal210.4 $600.7$ 148.9185.3264.6173.1141.7541.7224.2133.3256.3286.2145.8559.0158.7133.3222.9132.3137.5552.1214.0162.4229.2200.4175.0583.3202.4149.9252.0185.1158.3590.3128.4131.2222.9309.4161.5571.2179.4149.2241.3214.425.8101.722.022.724.443.510.65.08.510.16.713.5	South ZoneCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikalAver- age210.4 $600.7$ 148.9185.3264.6173.1263.8141.7541.7224.2133.3256.3286.2263.9145.8559.0158.7133.3222.9132.3225.3137.5552.1214.0162.4229.2200.4249.2175.0583.3202.4149.9252.0185.1258.0158.3590.3128.4131.2222.9309.4256.8161.5571.2179.4149.2241.3214.4252.825.8101.722.022.724.443.510.65.08.510.16.713.5	South ZoneCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikalAver- ageRa- nk210.4 $600.7$ 148.9185.3264.6173.1263.82141.7541.7224.2133.3256.3286.2263.91145.8559.0158.7133.3222.9132.3225.36137.5552.1214.0162.4229.2200.4249.25175.0583.3202.4149.9252.0185.1258.03158.3590.3128.4131.2222.9309.4256.84161.5571.2179.4149.2241.3214.4252.8425.8101.722.022.724.443.510.65.08.510.16.713.5	South ZoneCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikalAver- ageRa- nkSuperi- ority210.4 $600.7$ 148.9185.3264.6173.1263.822.2141.7541.7224.2133.3256.3286.2263.912.2145.8559.0158.7133.3222.9132.3225.36137.5552.1214.0162.4229.2200.4249.25175.0583.3202.4149.9252.0185.1258.03158.3590.3128.4131.2222.9309.4256.84161.5571.2179.4149.2241.3214.4252.8425.8101.722.022.724.443.510.65.08.510.16.713.5	South ZoneAll InCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikalAver- ageRa- nkSuperi- orityAver- age210.4 $600.7$ 148.9185.3264.6173.1263.822.2245.8141.7541.7224.2133.3256.3286.2263.912.2239.9145.8559.0158.7133.3222.9132.3225.36221.6137.5552.1214.0162.4229.2200.4249.25232.1175.0583.3202.4149.9252.0185.1258.03236.8158.3590.3128.4131.2222.9309.4256.84235.225.8101.722.022.724.443.5235.2235.210.65.08.510.16.713.554.554.554.5	South ZoneAll India AvCoimb- atoreVella- yaniMan- dyaHydera- badDhar- wadKara- ikalAver- ageRa- nkSuperi- orityAver- ageRa- nk210.4 $600.7$ 148.9185.3264.6173.1263.822.2245.81141.7541.7224.2133.3256.3286.2263.912.2239.92145.8559.0158.7133.3222.9132.3225.36221.65137.5552.1214.0162.4229.2200.4249.25232.14175.0583.3202.4149.9252.0185.1258.03236.83158.3590.3128.4131.2222.9309.4256.84235.2235.225.8101.722.022.724.443.513.5235.2

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

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Entring	Hill	Zone	<b>_</b>	•		North Ea	st Zone			
Entries	Palampur	Rank	Faizabad	Bhubaneswar	Ranchi	Jorhat	Kalyani	Average	Rank	Superiority
TNFC-0926	44.4	4	40.7	64.5	26.0	42.6	58.3	46.4	1	3.1
MFC-09-9	51.2	3	41.4	55.7	26.9	41.3	53.7	43.8	3	
UPC-1301	52.2	2	24.8	58.8	28.8	35.6	65.1	42.6	4	
Bundel Lobia-1 (NC)	43.0	5	31.9	70.3	24.1	39.5	59.4	45.0	2	
UPC-5286 (NC)	59.2	1	23.0	47.8	18.9	40.0	70.2	39.9	5	
UPC-622 ZC (NEZ-HZ)	59.2	1	26.3	50.0	20.5	39.3	53.3	37.9	6	
UPC-9202 ZC(SZ)										
Mean	51.5		31.3	57.9	24.2	39.7	60.0	42.6		
CD at 5%	9.2		4.8	5.9	6.6	2.0	3.5			
CV%	11.8		9.7	6.8	18.1	8.8	3.9			

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

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

				South Z	Zone					All Ir	ndia Avera	age
Entries	Coimb-	Man-	Hydera-	Dhar-	Kara-	Vella-	Aver-	Ra-	Superi-	Aver-	Ra-	Superi-
	atore	dya	bad	wad	ikal	yani	age	nk	ority	age	nk	ority
TNFC-0926	30.2	25.3	21.3	59.7	36.8	78.1	41.9	4		44.0	2	2.8
MFC-09-9	23.0	44.8	16.4	50.0	56.1	70.4	43.4	1	0.7	44.2	1	3.3
UPC-1301	20.6	28.6	16.0	45.9	28.7	72.7	35.4	6		39.8	5	
Bundel Lobia-1 (NC)	19.9	38.5	20.1	47.5	39.8	71.8	39.6	5		42.2	4	
UPC-5286 (NC)	24.9	40.5	17.9	54.3	41.4	75.8	42.5	3		42.8	3	
UPC-622 ZC (NEZ-HZ)												
UPC-9202 ZC(SZ)	22.5	23.1	15.2	48.6	72.2	76.7	43.1	2				
Mean	23.5	33.5	17.8	51.0	45.8	74.3	41.0			42.6		
CD at 5%	4.6	4.6	3.0	6.3	12.5	13.2						
CV%	13.1	9.5	11.0	8.2	18.2	5.0						

<b>Table 10.3:</b>	<b>AVTC-1: First</b>	Advanced Variet	al Trial in Cowpea	: Green Forage	Yield (g/ha/day)

Entries	Faizabad	Bhubaneswar	Ranchi	Jorhat	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Karaikal	Average	Rank
TNFC-0926	2.75	3.84	2.99	3.37	3.83	9.69	3.25	4.20	4.07	2.73	4.07	1
MFC-09-9	2.42	3.52	2.17	3.27	2.02	8.74	4.82	2.40	3.94	4.19	3.75	3
UPC-1301	2.43	3.84	2.08	2.92	2.08	9.02	3.46	2.40	3.43	2.60	3.43	5
Bundel Lobia-1 (NC)	1.78	4.39	1.94	3.19	2.75	8.91	4.53	3.70	3.53	3.04	3.78	2
UPC-5286 (NC)	1.48	3.56	1.60	3.08	2.33	9.13	4.31	2.80	3.88	2.88	3.51	4
UPC-622 ZC (NEZ-HZ)	1.33	3.36	2.21	3.16								
UPC-9202 ZC(SZ)					2.26	9.52	2.78	2.50	3.43	4.39		
Mean	2.03	3.75	2.17	3.16	2.55	9.17	3.86	3.00	3.71	3.30	3.71	

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

Entries	Faizabad	Bhubaneswar	Ranchi	Jorhat	Coimbatore	Hyderabad	Dharwad	Karaikal	Average	Rank
TNFC-0926	0.81	0.83	0.43	0.61	0.55	0.50	0.92	0.56	0.65	1
MFC-09-9	0.72	0.76	0.40	0.59	0.33	0.30	0.77	0.85	0.59	2
UPC-1301	0.56	0.85	0.38	0.51	0.29	0.30	0.71	0.52	0.52	4
Bundel Lobia-1 (NC)	0.58	0.95	0.33	0.56	0.40	0.50	0.73	0.61	0.58	3
UPC-5286 (NC)	0.39	0.74	0.25	0.57	0.33	0.30	0.84	0.64	0.51	5
UPC-622 ZC (NEZ-HZ)	0.44	0.74	0.30	0.56						
UPC-9202 ZC(SZ)					0.32	0.30	0.75	1.02		
Mean	0.58	0.81	0.35	0.57	0.37	0.37	0.79	0.70	0.57	

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

Entries	Palampur	Faizabad	Bhubaneswar	Jorhat	Kalyani	Coimbatore	Mandya	Hyderabad	Karaikal	Average	Rank
TNFC-0926	8.5	7.4	10.1	5.6	5.5	4.8	4.3	3.4	6.9	6.3	4
MFC-09-9	9.3	7.3	8.4	5.6	6.2	3.0	5.8	2.1	11.8	6.6	1
UPC-1301	9.5	4.4	9.0	4.9	9.4	3.3	4.5	2.6	6.1	6.0	5
Bundel Lobia-1 (NC)	8.4	5.7	10.6	5.5	8.3	3.9	4.9	4.0	5.8	6.3	3
UPC-5286 (NC)	11.5	3.9	7.6	5.2	7.7	5.2	5.4	3.8	8.6	6.5	2
UPC-622 ZC (NEZ-HZ)	11.9	4.4	7.7	5.3	6.4						
UPC-9202 ZC(SZ)						4.6	2.9	3.1	13.5		
Mean	9.9	5.5	8.9	5.3	7.3	4.2	4.6	3.2	8.8	6.3	

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

51.2

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Entries	Palampur	Fai	zabad B	nubanesw	var	Jorhat	Coimbator	e Man	dya	Hyderaba	ad K	araikal	Average	Rank
TNFC-0926	19.0	1	8.2	15.6		13.4	15.8	16	.2	15.8		18.8	16.6	3
MFC-09-9	18.2	1	7.6	15.1		13.8	13.1	12	.8	13.1		21.0	15.6	4
UPC-1301	18.2	1	7.8	15.3		13.9	16.2	15	.3	16.2		21.0	16.7	2
Bundel Lobia-1 (NC)	19.5	1	7.9	15.0		13.9	19.7	12	.5	19.7		14.5	16.6	3
UPC-5286 (NC)	19.5	1	6.8	15.9		13.2	21.0	12	.3	21.0		21.0	17.6	1
UPC-622 ZC (NEZ-HZ)	20.1	1	6.8	15.4		13.7								
UPC-9202 ZC(SZ)							20.6	12	.5	20.6		18.8		
Mean	19.1	1	7.5	15.4		13.6	17.7	13	.6	17.7		19.2	16.6	
Table 10.7: AVTC-1: Firs	t Advanced V	Varietal [	<b>Frial in Cov</b>	vpea: 1	Plant H	leight (	cm)							
	Palam-	Faiza-	Bhuban	· F	Ran-	Jor-	Kal-	Coimb-	Vella-	Man-	Hvdera	a- Kar	a- Aver-	Ra-
Entries	pur	bad	eswar		chi	hat	yani	atore	yani	dya	bad	ika	l age	nk
TNFC-0926	193.3	56.4	229.2	1	02.4	122.2	94.8	64.7	194.2	48.9	161.5	156	.3 129.4	2
MFC-09-9	174.5	55.4	217.4	Ģ	99.6	107.4	99.0	66.7	195.4	58.7	123.3	131	.5 120.8	4
UPC-1301	211.3	74.2	222.3	Ć	96.9	107.5	102.1	58.3	178.5	41.1	126.3	92.	0 119.1	5
Bundel Lobia-1 (NC)	204.5	63.2	234.6	1	00.0	127.7	92.3	54.7	199.5	53.9	176.5	134	.2 131.0	1
UPC-5286 (NC)	182.5	96.0	204.7		96.8	120.6	100.2	64.3	153.7	57.1	169.0	135	.8 125.5	3
UPC-622 ZC (NEZ-HZ)	191.8	57.5	190.1	í	93.6	109.8	95.1	0.110	10011	0/11	10,10	100		U
UPC-9202 ZC(SZ)	1,110	0710	1,011	-		10,10	2011	64.7	178.9	43.4	183.0	163	3	
Maar	102.0	(7.1	2164		no 1	1150	07.2	(2.2	102.2	50.5	156.6	125	5 1050	
	193.0	07.1	$\frac{210.4}{10.4}$		9 <u>8.2</u>	115.8	91.2	02.2	183.3	50.5	150.0	135	.5 125.2	
Table 10.8: AVTC-1: Firs	t Advanced V	Varietal 1	Trial in Cov	vpea: 1	Leaf St	tem Kat	10				-			
Entrica	Palam-	Faiza-	Bhuban-	Ran-	Jor-	Kal	- Coim	o- Vella-	Man	- Ну	/dera-	Kara-	Aver-	Ra-
Entries	pur	bad	eswar	chi	hat	yan	i atore	yani	dya	1	bad	ikal	age	nk
TNFC-0926	0.52	0.90	1.13	0.43	0.59	0.85	5 0.46	0.62	0.73	(	).85	0.40	0.68	3
MFC-09-9	0.52	0.86	1.04	0.38	0.79	0.62	2 0.49	0.89	0.80	(	).87	0.56	0.71	1
UPC-1301	0.54	0.80	1.07	0.45	0.81	0.88	8 0.47	0.59	0.77	(	).87	0.38	0.69	2
Bundel Lobia-1 (NC)	0.51	0.81	1.18	0.37	0.76	0.79	9 0.47	0.73	0.73	(	).74	0.42	0.68	3
UPC-5286 (NC)	0.47	0.89	0.97	0.53	0.66	0.87	7 0.37	0.58	0.65	(	).79	0.41	0.65	4
UPC-622 ZC (NEZ-HZ)	0.61	0.85	0.84	0.50	0.77	0.89	9							
UPC-9202 ZC(SZ)							0.48	0.71	0.75	1	1.04	0.51		
Mean	0.53	0.85	1.04	0.44	0.73	0.82	2 0.46	0.69	0.74	(	).86	0.45	0.68	
Table 10.9: AVTC-1: Firs	t Advanced V	Varietal [	<b>Frial in Co</b>	vpea:	ADF (	%) & N	<b>DF</b> (%)							
Entries		ADF (%)				NDF (%)	)							
	Palampu	ur	Rank	Pa	alampur		Rank							
TNFC-0926	50.0		2		64.2		6							
MFC-09-9	49.2		1		61.8		2							
UPC-1301	51.4		3		62.2		3							
Bundel Lobia-1 (NC)	51.8		4		63.0		4							
UPC-5286 (NC)	52.0		5		61.2		1							
UPC-622 ZC (NEZ-HZ)	52.6		6		63.4		5							

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UPC-9202 ZC(SZ)

Mean

62.6

## 11. IVT RICE BEAN: INITIAL VARIETAL TRIAL IN FORAGE RICE BEAN (Reference Tables: 11.1 to 11.5)

An initial varietal trial in forage rice bean with five entries namely JOR-14-1, JOR-14-2, BFRB-18, JRBJ-06-4 and JRBJ-06-5 along with three national checks *i.e.* Bidhan-1, Bidhan-2 and RBL-6 was conducted at 10 locations across the country. Results obtained from different centres clearly revealed that for green forage as well as dry matter yield (q/ha), none of the entries excelled in performance with respect to national check Bidhan-2. Similar was the case for fodder production potential (q/ha/day) where national checks established their superiority both for green forage and dry matter production potential. Even for quality and growth parameters Bidhan-2 established best performance for crude protein yield (q/ha), crude protein (%), plant height and leaf stem ratio.

## 12. VTBN HYBRID-2013 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN BAJRA X NAPIER HYBRID (PERENNIAL)

#### (Reference Tables: 12.1 to 12.6)

In Bajra x Napier hybrid, a varietal evaluation trial comprising of eleven entries was established during *Kharif*-2013. The results obtained from all the 13 testing locations clearly revealed that for green forage yield (q/ha), entry VTBN-2013-3 in North West Zone, VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-2 in South Zone and VTBN-2013-4 at all India level and for dry matter yield (q/ha), entry VTBN-2013-4 in North West Zone, VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-2 in South Zone and VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-2 in South Zone and VTBN-2013-6 in North East Zone, VTBN-2013-9 in Central Zone, VTBN-2013-2 in South Zone and VTBN-2013-4 at all India level established their superiority. For the character forage production potential (q/ha/day), entry VTBN-2013-1 for green forage and entry VTBN-2013-9 for dry matter production potential exhibited its superiority. For crude protein yield, entry VTBN-2013-5 (11.8 q/ha) and for crude protein content, entry VTBN-2013-2 (8.3%) ranked first. Entry VTBN-2013-3 for plant height and VTBN-2013-1 for leafiness was adjudged best performer. For other quality parameters, entry VTBN-2013-6 for ADF (%), VTBN-2013-3 for NDF (%), VTBN-2013-4 for IVDMD (%) and VTBN-2013-8 for DDM (q/ha) were adjudged best performer.

(This Trial will be continue in coded form)

Entrica	Kaly-	Ran-	Pu-	Jor-	Imp-	Jabal-	Rai-	Pal-	Vella-	Bhuban-	Aver-	Ra-
Entries	ani	chi	sa	hat	hal	pur	pur	ghar(Dapoli)	yani	eswar	age	nk
JOR-14-1	251.9	407.5	320.0	204.5	161.0	287.4	236.1	252.5	106.5	263.1	249.0	6
JOR-14-2	250.5	435.3	371.0	245.8	248.6	339.5	167.8	232.5	97.2	231.2	261.9	3
BFRB-18	308.8	416.7	316.0	211.9	146.4	387.4	189.8	208.8	90.3	267.7	254.4	5
JRBJ-06-4	270.4	453.6	357.0	232.9	155.2	302.0	208.3	278.8	115.7	210.4	258.4	4
JRBJ-06-5	245.8	407.8	330.0	225.9	136.4	227.0	259.3	301.3	88.0	218.7	244.0	8
Bidhan-2 (NC)	260.7	370.3	311.0	303.7	317.9	379.1	196.8	267.5	97.2	314.5	281.9	1
RBL-6 (NC)	248.6	527.8	251.0	243.8	129.1	210.4	266.2	182.5	67.1	338.5	246.5	7
Bidhan-1 (NC)	289.4	435.3	413.0	282.0	145.4	256.2	185.2		115.7	303.1	269.5	2
Mean	265.7	431.8	333.6	243.8	180.0	298.6	213.7	246.3	97.2	268.4	258.2	
CD at 5%	16.1	76.1	33.7	8.4	37.2	64.4	39.3	34.6	32.5	42.3		
CV%	3.5	10.0	10.7	11.0	11.8	12.3	10.4	7.9	19.1	9.0		

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

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

Entrica	Kal-	Ran-	Pu-	Jor-	Imp-	Jabal-	Rai-	Palghar-	Vella-	Bhuban-	Aver-	Ra-
Entries	yani	chi	sa	hat	hal	pur	pur	(Dapoli)	yani	eswar	age	nk
JOR-14-1	54.5	62.2	66.5	38.4	44.6	52.0	72.5	50.5	33.0	55.7	53.0	6
JOR-14-2	54.3	70.0	77.9	45.6	60.9	62.7	51.5	46.5	30.1	49.0	54.9	3
BFRB-18	67.9	70.8	65.4	39.2	35.0	73.1	57.1	41.8	28.0	56.2	53.4	5
JRBJ-06-4	60.4	75.0	74.4	43.7	40.2	55.6	64.3	55.8	35.9	43.9	54.9	3
JRBJ-06-5	52.4	68.3	68.3	42.7	28.5	41.0	79.7	60.3	27.3	46.0	51.4	7
Bidhan-2 (NC)	58.2	57.5	64.7	61.2	92.8	70.6	60.8	53.5	30.1	68.3	61.8	1
RBL-6 (NC)	53.9	98.9	53.2	41.4	41.2	37.7	80.3	36.5	20.8	75.2	53.9	4
Bidhan-1 (NC)	61.7	71.4	84.8	47.6	31.5	46.0	56.8		35.9	63.1	55.4	2
Mean	57.9	71.8	69.4	45.0	46.8	54.8	65.4	49.3	30.1	57.2	54.8	
CD at 5%	3.2	21.4	10.2	3.5	6.5	11.7	12.1	3.5	10.1	8.7		
CV%	3.2	16.9	9.2	10.5	7.9	12.2	10.5	4.0	19.1	8.8		

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					GFY	(q/ha/day)								Ι	DMY (q	/ha/day)			
Entries	Ran-	Pu-	Jor-	Jabal-	Rai-	Palghar-	Vella-	Bhuban-	Aver-	Ra-	Ran-	Pu-	Jor-	Jabal-	Rai-	Palghar-	Bhuban-	Aver-	Ra-
	chi	sa	hat	pur	pur	(Dapoli)	yani	eswar	age	nk	chi	sa	hat	pur	pur	(Dapoli)	eswar	age	nk
JOR-14-1	7.40	3.80	2.74	2.21	2.95	3.71	2.36	2.25	3.43	5	1.13	0.79	0.45	0.40	0.91	0.74	0.48	0.70	5
JOR-14-2	7.13	4.40	2.89	2.61	1.73	3.41	2.16	2.20	3.32	6	1.14	0.92	0.54	0.48	0.53	0.68	0.47	0.68	6
BFRB-18	9.05	3.80	2.49	3.20	1.96	3.07	2.00	2.68	3.53	4	1.53	0.78	0.46	0.60	0.59	0.61	0.56	0.73	3
JRBJ-06-4	7.95	4.20	2.87	2.53	2.15	4.10	2.57	1.99	3.54	3	1.31	0.88	0.51	0.46	0.66	0.82	0.41	0.72	4
JRBJ-06-5	6.79	3.40	2.66	1.92	2.67	4.43	1.95	1.99	3.23	7	1.13	0.81	0.50	0.34	0.82	0.88	0.42	0.70	5
Bidhan-2 (NC)	6.61	3.80	3.57	3.26	2.03	3.91	2.16	3.02	3.54	3	1.02	0.78	0.72	0.60	0.63	0.78	0.66	0.74	2
RBL-6 (NC)	12.27	3.00	2.41	2.50	3.33	2.69	1.49	3.33	3.88	1	2.29	0.64	0.49	0.44	1.00	0.53	0.74	0.88	1
Bidhan-1 (NC)	7.37	4.90	3.32	2.17	1.91		2.57	2.91	3.59	2	1.20	0.99	0.56	0.37	0.59		0.60	0.72	4
Mean	8.07	3.91	2.87	2.55	2.34	3.62	2.16	2.54	3.51		1.34	0.82	0.53	0.46	0.72	0.72	0.54	0.73	

## Table 11.3 IVT (Rice bean): Initial Varietal Trial in Rice bean: Green Forage Yield & Dry Matter Yield (q/ha/day)

## Table 11.4 IVT (Rice bean): Initial Varietal Trial in Rice bean: Crude Protein Yield (q/ha) & Crude Protein (%)

Entries				CPY (q/ha	)						CP (%)			
	Jorhat	Imphal	Jabalpur	Raipur	Bhubaneswar	Average	Rank	Jorhat	Imphal	Jabalpur	Raipur	Bhubaneswar	Average	Rank
JOR-14-1	4.5	2.3	6.9	10.8	8.3	6.6	3	12.1	5.2	13.5	14.9	15.0	12.1	5
JOR-14-2	6.1	3.1	8.3	6.8	7.5	6.4	4	13.4	5.0	13.4	13.2	15.3	12.1	4
BFRB-18	5.0	1.7	9.8	7.8	8.5	6.6	3	13.0	4.9	13.6	13.6	15.1	12.0	6
JRBJ-06-4	4.9	2.5	7.5	9.1	6.6	6.1	6	12.1	6.1	13.5	14.1	15.1	12.2	3
JRBJ-06-5	5.4	1.6	5.2	11.4	7.0	6.1	6	12.7	5.5	13.0	14.4	15.3	12.2	3
Bidhan-2 (NC)	8.5	5.0	9.4	8.4	10.8	8.4	1	14.0	5.4	13.5	13.9	15.7	12.5	1
RBL-6 (NC)	6.0	2.0	4.8	11.7	12.0	7.3	2	13.9	4.9	13.1	14.5	15.9	12.5	1
Bidhan-1 (NC)	6.7	1.8	6.0	7.5	9.5	6.3	5	14.1	5.6	13.3	13.3	15.0	12.3	2
Mean	5.9	2.5	7.2	9.2	8.8	6.7		13.2	5.3	13.4	14.0	15.3	12.2	

## Table 11.5 IVT (Rice bean): Initial Varietal Trial in Rice bean: Plant Height (cm) and Leaf Stem Ratio

					Plar	nt height (	(cm)										Leaf Ste	em Ratio				
Entries	Kal-	Ran-	Jor-	Imp-	Jabal-	Rai-	Palghar-	Vella-	Bhuba-	Aver-	Ra-	Kal-	Ran-	Jor-	Imp-	Jabal-	Rai-	Palgha-	Vella-	Bhuba-	Aver-	Ra-
	yani	chi	hat	hal	pur	pur	(Dapoli)	yani	neswar	age	nk	yani	chi	hat	hal	pur	pur	(Dapoli)	yani	neswar	age	nk
JOR-14-1	118.2	198.0	109.7	125.4	121.3	167.1	205.0	105.1	184.1	148.2	2	0.83	0.45	1.12	1.00	0.70	0.76	0.83	0.70	0.97	0.82	3
JOR-14-2	116.4	189.0	136.9	146.3	136.3	148.7	170.0	70.3	176.3	143.4	5	0.83	0.51	0.78	1.03	0.81	0.62	0.79	0.74	0.94	0.78	6
BFRB-18	122.6	197.0	116.3	115.3	155.0	140.9	160.0	99.6	189.3	144.0	4	0.90	0.42	0.82	1.12	0.86	0.64	0.73	0.76	1.09	0.82	3
JRBJ-06-4	118.2	198.0	127.2	120.2	125.9	192.7	170.0	102.1	162.1	146.3	3	0.83	0.50	0.83	1.14	0.72	0.72	0.98	0.75	0.85	0.81	4
JRBJ-06-5	116.9	189.0	124.1	109.2	107.8	121.3	197.5	66.9	173.6	134.0	8	0.75	0.39	0.75	1.09	0.62	0.73	0.98	0.88	0.88	0.79	5
Bidhan-2 (NC)	117.7	194.0	152.9	173.3	142.5	164.4	192.5	76.5	198.8	157.0	1	1.00	0.32	1.17	0.79	0.81	0.70	1.00	0.82	1.19	0.87	1
RBL-6 (NC)	115.4	188.0	131.8	112.9	105.2	154.8	184.8	69.8	204.6	140.8	6	1.00	0.45	0.90	0.81	0.67	0.77	0.78	0.65	1.25	0.81	4
Bidhan-1 (NC)	117.3	195.0	151.1	107.7	117.3	160.0		68.0	196.2	139.1	7	0.90	0.48	1.16	0.90	0.66	0.67		1.01	1.14	0.86	2
Mean	117.8	193.5	131.3	126.3	126.4	156.2	182.8	82.3	185.6	144.1		0.88	0.44	0.94	0.99	0.73	0.70	0.87	0.79	1.04	0.82	

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Entrica		No	rth West Zoi	ne	-		North I	East Zone	
Entries	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Jorhat	Average	Rank
VTBN-2013-1	945.6	312.2	562.5	606.8	3	289.3	712.9	501.1	6
VTBN-2013-2	960.3	177.2	211.2	449.6	11	291.7	639.9	465.8	7
VTBN-2013-3	1063.5	248.7	691.8	668.0	1	303.6	781.3	542.4	2
VTBN-2013-4	1261.9	164.0	560.5	662.1	2	296.4	788.2	542.3	3
VTBN-2013-5	976.2	291.0	119.3	462.2	10	288.1	739.0	513.6	4
VTBN-2013-6	884.9	314.8		599.9	4	286.9	823.2	555.1	1
VTBN-2013-7	746.0	209.0		477.5	9	289.3	489.9	389.6	10
VTBN-2013-8	1132.9	359.8	160.5	551.1	6	290.5	726.4	508.4	5
VTBN-2013-9	938.5	222.2	573.2	578.0	5	307.1	510.3	408.7	9
VTBN-2013-10	676.6	243.4	683.3	534.4	7	298.8	454.3	376.5	11
VTBN-2013-11	833.3	219.6		526.5	8	294.0	591.0	442.5	8
Mean	947.2	251.1	445.3	556.0		294.2	659.7	476.9	
CD at 5%	232.9	77.0	120.4			16.9	13.7		
CV%	9.0	17.9	15.4			3.4	9.4		

Table 12.1 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): Green Forage Yield (q/ha)

## Table 12.1 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): Green Forage Yield (q/ha)

			C	entral Z	one				So	uth Zone			All In	dia
Entries	Ana-	Rah-	Urulika-	Jabal-	Palghar –	Aver-	Ra-	Coimb-	Man-	Dhar-	Aver-	Ra-	Aver-	Ra-
	nd	uri	nchan	pur	Dapoli	age	nk	atore	dya	wad	age	nk	age	nk
VTBN-2013-1	2413.0	464.5	248.0	113.4	1431.4	934.1	3	1452.7	952.5	448.6	951.3	4	795.9	2
VTBN-2013-2	2704.0	586.8	216.8	108.6	1124.8	948.2	2	2069.4	710.0	409.7	1063.0	1	785.4	3
VTBN-2013-3	2592.0	504.6	192.8	108.6	1045.2	888.6	6	1472.2	733.9	397.4	867.8	9	779.7	4
VTBN-2013-4	2556.0	671.8	179.3	95.1	1103.4	921.1	5	1594.4	905.1	488.9	996.1	2	820.4	1
VTBN-2013-5	2472.0	681.7	252.2	85.6	1142.9	926.9	4	1416.6	964.8	454.2	945.2	5	760.3	7
VTBN-2013-6	2295.0	659.4	221.5	118.1	967.9	852.4	8	1394.4	802.2	487.3	894.6	7	771.3	5
VTBN-2013-7	2150.0	548.8	220.4	98.3	941.1	791.7	10	1830.5	763.0	349.5	981.0	3	719.6	9
VTBN-2013-8	2170.0	582.3	207.9	121.3	907.0	797.7	9	1424.9	905.3	421.3	917.2	6	723.9	8
VTBN-2013-9	2751.0	720.5	219.2	134.8	942.3	953.5	1	1458.3	679.4	441.0	859.6	10	761.4	6
VTBN-2013-10	2131.0	773.4	265.0	127.6	972.0	853.8	7	1352.7	794.7	506.1	884.5	8	713.8	10
VTBN-2013-11	1142.0	341.1	249.6	95.9	1337.7	633.3	11	1358.3	791.5	356.4	835.4	11	634.2	11
Mean	2306.9	594.1	224.8	109.8	1083.3	863.8		1529.5	818.4	432.8	926.9		751.4	
CD at 5%	87.5	91.6	2.5	24.4	135.2			152.2	66.4	28.4				
CV%	2.2	9.1	14.4	13.0	7.3			5.8	4.8	3.9				

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		No	rth West Zone				North East	Zone	
Entries									
	Ludhiana	Hisar	Bikaner	Average	Rank	Bhubaneswar	Jorhat	Average	Rank
VTBN-2013-1	206.1	109.0	172.8	162.6	4	65.5	168.9	117.2	5
VTBN-2013-2	212.2	56.3	69.0	112.5	10	64.3	143.1	103.7	7
VTBN-2013-3	236.1	89.3	180.0	168.5	2	67.8	175.2	121.5	3
VTBN-2013-4	283.9	57.4	169.7	170.3	1	65.5	187.0	126.3	2
VTBN-2013-5	217.7	100.3	37.5	118.5	9	63.0	167.3	115.2	6
VTBN-2013-6	185.8	105.8		145.8	7	67.9	189.0	128.4	1
VTBN-2013-7	155.2	66.1		110.7	11	64.3	119.4	91.8	10
VTBN-2013-8	251.5	139.1	55.1	148.6	6	65.5	173.3	119.4	4
VTBN-2013-9	199.9	77.5	216.7	164.7	3	69.0	125.9	97.5	8
VTBN-2013-10	142.1	81.6	243.0	155.6	5	64.3	113.0	88.7	11
VTBN-2013-11	177.5	64.6		121.1	8	61.9	130.8	96.3	9
Mean	206.2	86.1	143.0	143.5		65.4	153.9	109.6	
CD at 5%	91.7	30.3	41.8			6.2	7.8		
CV%	2.1	20.5	16.7			5.6	11.1		

Table 12.2 VTBN-2013 (2<sup>nd</sup> Year): Varietal Trial in Bajra Napier hybrid (Perennial): Dry Matter Yield (q/ha)

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			Cent	ral Zone					So	uth Zone			All In	dia
Entries	Ana-	Rah-	Urulika-	Jabal-	Palghar-	Aver-	Ra-	Coimb-	Man-	Dhar-	Aver-	Ra-	Aver-	Ra-
	nd	uri	nchan	pur	Dapoli	age	nk	atore	dya	wad	age	nk	age	nk
VTBN-2013-1	468.1	79.0	46.3	20.6	269.0	176.6	2	271.1	102.4	130.0	167.8	9	162.2	2
VTBN-2013-2	191.9	120.9	41.5	19.2	209.1	116.5	11	435.7	90.7	138.1	221.5	1	137.8	9
VTBN-2013-3	417.3	92.5	38.2	19.1	198.5	153.1	6	277.5	88.8	143.4	169.9	8	155.7	4
VTBN-2013-4	479.7	120.5	35.6	19.0	210.8	173.1	3	292.4	105.9	162.1	186.8	3	168.4	1
VTBN-2013-5	425.6	117.7	46.3	14.6	216.9	164.2	4	269.8	101.4	152.9	174.7	5	148.5	6
VTBN-2013-6	411.8	116.9	42.1	21.2	178.5	154.1	5	265.1	87.5	168.6	173.7	6	153.3	5
VTBN-2013-7	355.1	83.1	44.5	16.9	176.3	135.2	9	355.6	92.9	118.5	189.0	2	137.3	10
VTBN-2013-8	373.2	111.0	41.1	21.6	171.5	143.7	8	271.5	101.7	143.6	172.3	7	147.7	8
VTBN-2013-9	519.8	137.6	42.5	24.6	178.7	180.6	1	275.7	74.0	140.7	163.5	10	160.2	3
VTBN-2013-10	359.0	141.8	51.9	23.2	183.5	151.9	7	251.7	104.4	168.6	174.9	4	148.3	7
VTBN-2013-11	237.2	76.2	50.7	16.5	260.9	128.3	10	251.4	96.3	122.6	156.8	11	128.9	11
Mean	385.3	108.8	43.7	19.7	204.9	152.5		292.5	95.1	144.5	177.3		149.9	
CD at 5%	16.9	17.6	0.5	4.3	31.3			28.9	10.2	9.2				
CV%	2.4	9.5	11.4	13.0	9.0			5.8	6.3	3.7				

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				GFY (q/ha	a/day)							D	MY (q/ha	a/day)			
Entries	Ludh-	His-	Bika-	Ana-	Jabal-	Man-	Dhar-	Aver-	Ra-	Ludh-	His-	Bika-	Ana-	Jabal-	Dhar-	Aver-	Ra-
	iana	ar	ner	nd	pur	dya	wad	age	nk	iana	ar	ner	nd	pur	wad	age	nk
VTBN-2013-1	5.10	6.20	5.57	10.58	0.90	5.41	7.48	5.89	1	1.10	2.18	1.71	2.05	0.16	2.17	1.56	4
VTBN-2013-2	5.20	3.50	2.09	11.86	0.86	3.94	6.83	4.90	9	1.20	1.13	0.68	0.84	0.15	2.30	1.05	11
VTBN-2013-3	5.80	5.00	6.85	11.37	0.89	4.08	6.62	5.80	3	1.30	1.79	1.78	1.83	0.15	2.39	1.54	6
VTBN-2013-4	6.90	3.30	5.55	11.21	0.76	5.03	8.15	5.84	2	1.50	1.15	1.68	2.10	0.15	2.70	1.55	5
VTBN-2013-5	5.30	5.80	1.18	10.84	0.69	5.40	7.57	5.25	8	1.20	2.01	0.37	1.87	0.11	2.55	1.35	8
VTBN-2013-6	4.80	6.30		10.07	0.92	4.45	8.12	5.78	4	1.00	2.12		1.81	0.16	2.81	1.58	2
VTBN-2013-7	4.10	4.20		9.43	0.79	4.23	5.83	4.76	10	0.80	1.32		1.56	0.13	1.98	1.16	9
VTBN-2013-8	6.20	7.20	1.59	9.52	0.94	5.03	7.02	5.36	7	1.40	2.78	0.55	1.64	0.16	2.39	1.49	7
VTBN-2013-9	5.10	4.40	5.68	12.07	1.09	3.77	7.35	5.64	5	1.10	1.55	2.15	2.28	0.20	2.35	1.61	1
VTBN-2013-10	3.70	4.90	6.77	9.35	1.04	4.41	8.43	5.51	6	0.80	1.63	2.41	1.57	0.19	2.81	1.57	3
VTBN-2013-11	4.50	4.40		5.01	0.76	4.39	5.94	4.17	11	1.00	1.29		1.04	0.13	2.04	1.10	10
Mean	5.15	5.02	4.41	10.12	0.88	4.56	7.21	5.35		1.13	1.72	1.42	1.69	0.15	2.41	1.41	

Table 12.3 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): Green Forage Yield and Dry Matter Yield (q/ha/day)

## Table 12.4 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): Crude Protein Yield (q/ha) and Crude Protein (%)

						CPY (q	/ha)											CP (%)					
Entries	Ludh-	Bhuban-	Jor-	Ana-	Rah-	Urulika-	Jabal-	Palghar-	Man-	His-	Aver-	Ra-	Ludh-	His-	Jor-	Ana-	Rah-	Urulika-	Jabal-	Man-	His-	Aver-	Ra-
	iana	eswar	hat	nd	uri	nchan	pur	Dapoli	dya	ar	age	nk	iana	ar	hat	nd	uri	nchan	pur	dya	ar	age	nk
VTBN-2013-1	9.7	4.8	12.7		7.0	3.3	1.7	18.4	8.0	11.0	8.5	8	4.7	10.1	7.3		8.8	7.0	8.1	7.9	10.1	8.0	4
VTBN-2013-2	12.1	4.8	9.5	41.5	13.3	3.2	1.5	14.1	5.2	5.9	11.1	3	5.7	10.5	6.4	8.8	11.0	7.6	8.1	5.7	10.5	8.3	1
VTBN-2013-3	12.7	4.8	11.2	41.9	8.6	2.9	1.5	13.3	6.2	9.2	11.2	2	5.4	10.3	6.3	8.5	9.3	7.5	8.1	7.0	10.3	8.1	3
VTBN-2013-4	14.2	4.6	11.5	38.1	10.1	2.7	1.3	13.5	5.6	6.5	10.8	4	5.0	11.4	6.1	9.1	8.4	7.5	8.0	5.3	11.4	8.0	4
VTBN-2013-5	12.2	4.5	12.0	39.6	9.9	3.3	1.1	17.2	7.1	10.8	11.8	1	5.6	10.7	7.1	8.1	8.4	7.2	8.0	7.0	10.7	8.1	3
VTBN-2013-6	11.3	5.1	14.5	34.6	11.9	3.0	1.7	12.9	5.4	10.4	11.1	3	6.1	9.9	7.5	8.1	10.1	7.2	8.2	6.1	9.9	8.1	3
VTBN-2013-7	7.0	4.9	8.8	37.8	6.6	3.2	1.3	12.2	5.3	7.1	9.4	7	4.5	10.7	7.2	8.9	8.0	7.2	8.0	5.7	10.7	7.9	5
VTBN-2013-8	11.8	4.9	11.0	34.1	10.7	3.0	1.7	12.1	5.8	12.5	10.8	4	4.7	9.0	6.2	9.5	9.6	7.3	8.2	5.7	9.0	7.7	7
VTBN-2013-9	9.4	4.9	7.7	32.0	12.2	3.2	2.0	10.5	4.9	7.8	9.5	6	4.7	10.1	5.9	8.4	8.8	7.6	8.2	6.6	10.1	7.8	6
VTBN-2013-10	7.0	4.9	7.2	44.6	13.1	3.9	1.9	12.5	7.8	8.9	11.2	2	4.9	10.9	6.1	8.4	9.3	7.4	8.2	7.4	10.9	8.2	2
VTBN-2013-11		4.9	10.5	30.4	6.1	3.6	1.3	16.8	7.2	7.2	9.8	5	5.6	11.2	7.9	8.3	8.0	7.2	8.0	7.4	11.2	8.3	1
Mean	10.7	4.8	10.6	37.4	9.9	3.2	1.5	13.9	6.2	8.8	10.5		5.2	10.4	6.7	8.6	9.1	7.3	8.1	6.5	10.4	8.0	

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						Plant heig	ht (cm)										Leaf Ster	m Ratio				
Entries	Ludh-	His-	Bika-	Jor-	Ana-	Rah-	Urulikan-	Jabal-	Palghar-	Man-	Aver-	Ra-	His-	Bika-	Jor-	Rah-	Urulika-	Jabal-	Pal-	Man-	Aver-	Ra-
Entres	iana	ar	ner	hat	nd	uri	chan	pur	Dapoli	dya	age	nk	ar	ner	hat	uri	nchan	pur	ghar	dya	age	nk
																			Dapoli			
VTBN-2013-1	79.4	168.9	150.0	161.4	183.9	128.4	94.9	66.0	111.6	165.0	131.0	4	0.83	1.25	0.89	1.17	0.53	1.10	0.76	0.55	0.88	1
VTBN-2013-2	93.8	123.7	175.0	199.8	184.1	132.7	96.0	62.9	80.8	148.7	129.7	7	0.80	0.61	0.83	0.98	0.52	1.00	0.71	0.52	0.75	6
VTBN-2013-3	86.9	158.2	180.0	233.0	204.0	138.1	91.1	69.3	114.2	126.5	140.1	1	0.84	0.53	0.89	0.50	0.68	0.98	0.55	0.84	0.73	7
VTBN-2013-4	86.9	152.1	125.0	150.0	189.2	153.1	97.7	62.6	104.7	128.1	124.9	10	0.63	0.42	0.88	1.15	0.49	0.98	0.68	0.55	0.72	8
VTBN-2013-5	117.8	127.6	75.0	198.9	194.3	153.5	100.8	65.7	74.2	164.5	127.2	8	0.67	1.30	0.88	0.71	0.47	0.90	0.55	0.64	0.77	5
VTBN-2013-6	69.4	130.3		221.8	209.5	153.2	98.0	66.5	92.5	162.1	133.7	3	0.88		0.89	0.48	0.63	1.13	0.56	0.43	0.72	8
VTBN-2013-7	117.0	104.9		150.6	192.3	144.5	99.1	68.0	88.5	179.2	127.1	9	0.63		0.95	0.66	0.45	1.05	0.54	0.54	0.69	9
VTBN-2013-8	140.8	173.4	80.0	166.9	183.9	131.4	92.3	77.6	105.0	156.3	130.8	6	0.63	1.54	0.82	0.55	0.52	1.19	0.61	0.55	0.80	3
VTBN-2013-9	87.2	147.6	95.0	184.4	182.7	151.6	96.8	83.1	103.5	176.6	130.9	5	0.70	0.68	0.90	1.03	0.49	1.27	0.67	0.57	0.79	4
VTBN-2013-10	161.8	135.3	125.0	154.5	181.5	166.8	97.0	83.6	80.4	186.8	137.3	2	0.69	0.42	0.87	0.98	0.47	1.23	0.64	0.54	0.73	7
VTBN-2013-11	111.8	112.4		138.2	153.3	97.6	97.6	58.7	107.3	111.5	109.8	11	0.76		0.89	0.87	0.63	1.09	0.72	0.88	0.84	2
Mean	104.8	139.5	125.6	178.1	187.2	141.0	96.5	69.5	96.6	155.0	129.3		0.73	0.84	0.88	0.83	0.53	1.08	0.64	0.60	0.76	

Table 12.5 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): Plant height (cm) and Leaf Stem Ratio

## Table 12.6 VTBN-2013 (2<sup>nd</sup> year): Varietal Trial in Bajra Napier Hybrid (Perennial): ADF (%), NDF (%), IVDMD (%) & DDM (q/ha)

Entries		ADF	(%)			NDF	(%)			IVD	MD (%)		DDM (	(q/ha)
Entries	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank	Hisar	Rahuri	Average	Rank	Hisar	Rank
VTBN-2013-1	42.9	44.4	43.7	5	64.4	61.4	62.9	9	56.6	54.3	55.4	6	61.7	2
VTBN-2013-2	40.1	45.2	42.7	3	60.9	57.6	59.2	3	57.4	53.7	55.5	5	32.3	11
VTBN-2013-3	41.0	47.2	44.1	6	60.1	54.9	57.5	1	56.0	52.1	54.1	9	50.0	5
VTBN-2013-4	40.3	48.0	44.1	7	61.3	62.0	61.6	7	64.4	51.5	58.0	1	37.0	9
VTBN-2013-5	40.6	40.1	40.3	2	63.1	56.2	59.6	4	58.2	57.7	57.9	2	58.4	3
VTBN-2013-6	38.5	41.6	40.1	1	60.1	55.7	57.9	2	54.0	56.5	55.2	7	57.1	4
VTBN-2013-7	42.3	44.5	43.4	4	63.9	62.4	63.1	10	59.6	54.3	56.9	3	39.4	8
VTBN-2013-8	41.6	51.1	46.3	10	64.3	55.4	59.8	5	59.4	49.1	54.3	8	82.6	1
VTBN-2013-9	42.0	49.1	45.6	9	62.4	64.2	63.3	11	56.6	50.7	53.6	10	43.9	7
VTBN-2013-10	42.6	46.2	44.4	8	62.9	58.4	60.6	6	59.4	52.9	56.1	4	48.5	6
VTBN-2013-11	40.4	53.8	47.1	11	60.3	64.9	62.6	8	54.0	47.0	50.5	11	34.9	10
Mean	41.1	46.5	43.8		62.2	59.3	60.7		57.8	52.7	55.2		49.6	

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## 14. VT Dichanthium-2013 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN Dichanthium annulatum (PERENNIAL)

#### (Reference Table: 14.1 to 14.6)

In *Dichanthium annulatum*, a varietal evaluation trial comprising of eight entries was established initially in *Kharif*-2013 at fifteen locations of the country. The trial was finally established at eight locations of the country. Crop being perennial in nature, entries are in coded form as from VTD-1 to VTD-8. Decoding of entries will be done after completion of the trial. Results obtained from different centres clearly revealed that for green forage yield (q/ha), entry VTD-7 in North West Zone, VTD-4 in Central Zone, entry VTD-5 in South Zone established their superiority with respect to other entries. At national level, entry VTD-4 was adjudged best performer.

For dry matter yield (q/ha) entry VTD-6 in North West Zone and Central Zone, VTD-5 in South Zone were superior. At national level, entry VTD-4 was ranked first for this character. For fodder production potential, entry VTD-4 for green forage and entry VTD-1 for dry matter production potential ranked first. Entry VTD-8 for crude protein yield (q/ha) and entry VTD-2 for crude protein content (%) were found best performers. For plant height (cm), entry VTD-5 and for leafiness entry VTD-4 were adjudged best performers. For other quality parameters, entry VTD-4 for ADF (%) and VTD-7 for NDF and IVDMD (%) were ranked first.

## **15.** VTCC-2013 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN *Cenchrus ciliaris* (PERENNIAL)

## (Reference Table: 15.1 to 15.6)

In *Cenchrus ciliaris*, a varietal evaluation trial comprising nine entries was established in *Kharif*-2013. Crop being perennial in nature, entries are in coded form as from VTCC-1 to VTCC-9. Decoding of entries will be done after completion of the trial. Results obtained from seven testing locations clearly revealed that for green forage as well as dry matter yield (q/ha), test entry VTCC-8 was superior in North West and Central Zones while, VTCC-4 in South Zone ranked first. However in forage production potential (q/ha/day), entry VTCC-8 (1.58 q/ha/day) for green forage as well as dry matter production potential (0.53 q/ha/day) established its superiority. For evaluation against quality parameters, entry VTCC-8 (6.9 q/ha) for crude protein yield and VTCC-4 and VTCC-5 (7.7%) for crude protein content were superior. For the character plant height, entry VTCC-8 (93.9 cm) and for leafiness, entry VTCC-4 (0.95) established superiority. For NDF (%) and ADF (%), entry VTCC-5 and entry VTCC-1 for IVDMD (%) ranked first.

## 16. VT Clitoria-2013 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN Clitoria ternatea (PERENNIAL)

#### (Reference Tables: 16.1 to 16.6)

In *Kharif*-2013, a varietal trial in *Clitoria ternatea* comprising of seven entries was established in North West and Central Zone. Data received from eight testing locations clearly revealed that for green forage yield (q/ha), entry VTCT-7 was superior in both the zones and at national level also. For dry matter yield, entry VTCT-4 in North West zone and VTCT-7 in Central Zone as well as at all India level were superior. In fodder production potential (q/ha/day), entry VTCT-4 for green forage and VTCT-1 for dry matter production potential ranked first. Similarly for quality parameters, entry VTCT-7 for crude protein yield (q/ha) and entry VTCT-1 for crude protein content (%) were best superior. For growth parameters, entry VTCT-7 for plant height (cm) and VTCT-3 for leafiness were adjudged best performer. For other quality parameters like NDF (%), ADF (%) entry VTCT-4 was its superior while for IVDMD (%) and DDM (q/ha), entry VTCT-1 ranked first

Entries		North We	st Zone					Central Z	one			South Zo	one	All In	dia
Littles	Ludhiana	Bikaner	Average	Rank	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Average	Rank	Coimbatore	Rank	Average	Rank
VTD-1	414.0	15.3	214.6	5	174.0	1018.6	240.7	106.2	96.1	327.1	5	627.8	4	336.6	6
VTD-2	374.3				50.0	825.7	216.6	123.3	100.7	263.3	8	563.9	5	322.1	8
VTD-3	343.7	60.2	201.9	6	210.0	1051.0	194.9	135.6	98.6	338.0	4	741.6	2	354.4	4
VTD-4	453.0				117.0	1157.9	297.3	230.0	99.6	380.3	1	666.6	3	431.6	1
VTD-5	485.3	28.7	257.0	3	269.0	1048.3	216.6	81.6	89.5	341.0	3	802.7	1	377.7	2
VTD-6	476.0	83.5	279.8	2	369.0	1008.5	195.7	97.7	101.0	354.4	2	519.4	7	356.3	3
VTD-7	491.7	75.8	283.7	1	316.0	957.6	205.7	65.5	86.3	326.2	6	544.4	6	342.9	5
VTD-8	425.7	57.0	241.4	4	394.0	847.6	169.1	103.0	89.3	320.6	7	497.2	8	322.9	7
Mean	433.0	53.4	246.4		237.4	989.4	217.1	117.9	95.1	331.4		620.5		355.6	
CD at 5%	52.4	13.8			31.7	19.5	43.4	34.7	NS			75.2			
CV%	6.8	17.3			8.0	11.1	11.4	18.2	17.9			6.9			

Table 14.1 VT Dichanthium-2013 (2<sup>nd</sup> Year): Varietal Trial in Dichanthium (Perennial): Green Forage Yield (q/ha)

Table 14.2 VT Dichanthium-2013 (2nd Year): Varietal Trial in Dichanthium (Perennial): Dry Matter Yield (q/ha)

Entrico		North We	st Zone					Central Zo	one			South Zo	ne	All In	dia
Entries	Ludhiana	Bikaner	Average	Rank	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Average	Rank	Coimbatore	Rank	Average	Rank
VTD-1	149.0	5.3	77.1	5	54.3	301.4	44.9	32.1	21.9	90.9	5	94.7	4	87.9	7
VTD-2	116.0				16.8	210.4	39.6	30.8	21.0	63.7	6	89.3	6	74.9	8
VTD-3	115.7	23.0	69.3	6	76.2	324.5	34.0	41.8	23.1	99.9	3	109.3	2	93.4	5
VTD-4	142.0				38.4	328.9	56.1	56.1	20.2	99.9	3	100.3	3	106.0	1
VTD-5	167.0	10.3	88.6	3	92.2	307.4	39.7	24.2	18.9	96.5	4	119.3	1	97.4	4
VTD-6	153.0	34.6	93.8	1	123.6	315.6	35.4	26.4	21.1	104.4	1	83.1	7	99.1	2
VTD-7	152.3	29.8	91.1	2	107.7	321.8	37.3	22.4	20.3	101.9	2	92.6	5	98.0	3
VTD-8	149.0	22.2	85.6	4	144.6	279.3	29.3	28.0	18.3	99.9	3	75.6	8	93.3	6
Mean	143.0	20.9	84.3		81.7	298.7	39.5	32.7	20.6	94.6		95.5		93.8	
CD at 5%	20.9	5.0			10.8	11.3	7.9	9.6	N.S.			13.6			
CV%	8.3	16.2			7.7	6.4	11.4	17.9	18.7			8.1			

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Entrica		Green Fo	rage Yield (q/	ha/day)	·		Dry Mat	tter Yield (q/ha/	day)	
Entries	Bikaner	Anand	Jabalpur	Average	Rank	Bikaner	Anand	Jabalpur	Average	Rank
VTD-1	0.15	0.64	1.46	0.75	7	0.05	0.20	1.27	0.51	1
VTD-2		0.18	1.30	0.74	8		0.06	0.23	0.15	6
VTD-3	0.58	0.77	1.19	0.85	6	0.22	0.28	0.20	0.23	5
VTD-4		0.43	1.85	1.14	1		0.14	0.35	0.25	4
VTD-5	0.28	0.99	1.30	0.86	5	0.10	0.34	0.24	0.23	5
VTD-6	0.80	1.35	1.19	1.11	2	0.33	0.45	0.21	0.33	2
VTD-7	0.73	1.16	1.24	1.04	3	0.29	0.39	0.22	0.30	3
VTD-8	0.55	1.44	1.01	1.00	4	0.21	0.53	0.17	0.30	3
Mean	0.52	0.87	1.32	0.94		0.20	0.30	0.36	0.29	

Table 14.3VT Dichanthium-2013 (2<sup>nd</sup> Year): Varietal Trial in Dichanthium (Perennial): Green Forage Yield & Dry Matter Yield (q/ha/day)

 Table 14.4 VT Dichanthium-2013 (2<sup>nd</sup> Year): Varietal Trial in Dichanthium (Perennial): Crude Protein Yield (q/ha) & Crude Protein (%)

Entries		C	rude Prot	ein Yield (q/ha)					Crı	ide Proteii	n (%)		
	Anand	Jabalpur	Rahuri	Urulikanchan	Average	Rank	Ludhiana	Anand	Jabalpur	Rahuri	Urulikanchan	Average	Rank
VTD-1	2.9	3.2	2.4	1.6	2.5	5	5.3	5.7	7.1	7.5	7.3	6.6	3
VTD-2	0.9	2.7	2.4	1.7	2.0	6	5.6	5.1	7.0	7.9	8.3	6.8	1
VTD-3	3.5	2.2	3.1	1.7	2.6	4	5.4	5.1	6.6	7.4	7.5	6.4	4
VTD-4	2.0	4.0	4.2	1.7	3.0	2	5.3	5.3	7.2	7.5	8.3	6.7	2
VTD-5	4.5	2.7	1.9	1.4	2.6	4	5.4	5.1	7.0	8.0	7.6	6.6	3
VTD-6	6.5	2.3	1.9	1.5	3.0	2	5.5	4.9	6.5	7.1	7.2	6.2	5
VTD-7	5.9	2.5	1.7	1.7	2.9	3	5.1	5.3	6.9	7.5	8.2	6.6	3
VTD-8	8.0	1.8	1.8	1.3	3.2	1	4.8	5.4	6.2	6.3	7.3	6.0	6
Mean	4.3	2.7	2.4	1.6	2.7		5.3	5.2	6.8	7.4	7.7	6.5	

Table 14.5 VT Dichanthium-2013 (2<sup>nd</sup> Year): Varietal Trial in Dichanthium (Perennial): Plant Height (cm) & Leaf Stem Ratio

Entrica				Plant Heig	ght (cm)						Leaf	Stem Ratio		
Entries	Ludhiana	Bikaner	Anand	Jabalpur	Rahuri	Urulikanchan	Average	Rank	Bikaner	Jabalpur	Rahuri	Urulikanchan	Average	Rank
VTD-1	107.3	110.0	66.6	106.2	79.6	66.1	89.3	4	0.29	1.10	0.24	0.62	0.56	3
VTD-2	107.3		54.5	101.7	63.3	67.2	78.8	8		1.05	0.14	0.70	0.63	2
VTD-3	119.7	152.0	82.6	95.0	80.5	65.1	99.2	2	0.21	1.05	0.30	0.63	0.55	4
VTD-4	119.0		68.5	108.1	75.7	63.9	87.0	5		1.13	0.29	0.68	0.70	1
VTD-5	141.0	134.0	86.5	101.0	69.7	64.2	99.4	1	0.29	1.07	0.24	0.64	0.56	3
VTD-6	123.0	142.0	78.7	91.5	80.3	63.9	96.6	3	0.16	0.98	0.30	0.72	0.54	5
VTD-7	120.0	105.0	77.4	98.1	48.3	62.0	85.1	6	0.17	1.13	0.18	0.66	0.54	5
VTD-8	136.0	70.0	92.7	82.0	58.3	61.5	83.4	7	0.14	0.94	0.22	0.64	0.49	6
Mean	121.7	118.8	75.9	98.0	69.5	64.2	89.9		0.2	1.1	0.2	0.7	0.6	

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		ADF (%	)			<b>NDF</b> (9	%)		IVDMI	<b>)</b> (%)
Entries	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank	Rahuri	Rank
VTD-1	46.3	48.7	47.5	5	72.9	67.8	70.3	5	51.0	6
VTD-2	47.7	44.0	45.9	4	71.8	67.8	69.8	3	54.6	2
VTD-3	48.7	42.0	45.4	2	73.7	67.1	70.4	6	56.1	1
VTD-4	43.3	45.6	44.5	1	69.3	68.1	68.7	2	53.3	4
VTD-5	49.5	46.4	47.9	6	74.4	65.8	70.1	4	52.8	5
VTD-6	46.9	51.8	49.4	8	75	68.6	71.8	7	48.5	7
VTD-7	49.5	42.0	45.8	3	74.3	59.4	66.8	1	56.1	1
VTD-8	52.2	44.8	48.5	7	75.5	64.8	70.1	4	54.0	3
Mean	48.0	45.7	46.9		73.4	66.1	<b>69.</b> 7		53.3	

Table 14.6 VT Dichanthium-2013 (2<sup>nd</sup> Year): Varietal Trial in Dichanthium (Perennial): ADF (%), NDF (%) & IVDMD (%)

Table 15.1 VT Cenchrus ciliaris-2013 (2nd Year): Varietal Trial in Cenchrus ciliaris (perennial): Green Forage Yield (q/ha)

	N	lorth West	Zone				Central	Zone			South Z	one	All I	ndia
Entries	Ludh-	Bika-	Aver-	Ra-	Ana-	Rah-	Urulika-	Jha-	Aver-	Ra-	Coimb-	Ra-	Aver-	Ra-
	iana	ner	age	nk	nd	uri	nchan	nsi	age	nk	atore	nk	age	nk
VTCC-1		58.8			355.0	248.2	88.4	205.6	224.3	8	644.4	3	266.7	4
VTCC-2		53.1			396.0	319.8	97.3	269.6	270.7	4	436.1	6	262.0	6
VTCC-3														
VTCC-4	313.3	50.9	182.1	4	404.0	175.5	93.7	359.1	258.1	5	722.2	1	260.6	7
VTCC-5	283.7	79.7	181.7	5	354.0	225.9	99.2	240.8	230.0	7	427.8	7	265.1	5
VTCC-6	375.3	57.5	216.4	3	425.0	292.1	97.2	205.4	254.9	6	572.2	4	300.4	3
VTCC-7	392.7	79.7	236.2	2	435.0	375.3	94.6	327.9	308.2	3	650.0	2	319.8	1
VTCC-8	413.3	72.8	243.1	1	478.0	358.8	108.9	337.6	320.8	1	533.3	5	307.1	2
VTCC-9		53.1			480.0	330.9	97.1	327.2	308.8	2	380.5	8	257.7	8
Mean	355.7	63.2	211.9		415.9	290.8	97.0	284.2	272.0		545.8		279.9	
CD at 5%	37.7	18.5			54.8	60.2	NS	15.8			76.0			
CV%	5.6	16.8			7.6	11.8	13.8	2.9			8.0			

Note-VTCC-1 & VTCC-2 did not germinate at Ludhiana

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	N	orth West	Zone				Central Zo	ne			South	1 Zone	All	India
Entries	Ludh-	Bika-	Aver-	Ra-	Ana-	Rah-	Urulika-	Jha-	Aver-	Ra-	Coimb-	Ra-	Aver-	Ra-
	iana	ner	age	nk	nd	uri	nchan	nsi	age	nk	atore	nk	age	nk
VTCC-1		24.8			97.6	70.5	18.2	32.6	54.7	6	105.2	3	58.2	7
VTCC-2		22.9			119.8	70.1	19.4	56.4	66.4	4	72.3	6	60.1	6
VTCC-3														
VTCC-4	92.1	17.0	54.6	5	118.9	42.2	19.1	85.5	66.4	4	114.8	1	69.9	3
VTCC-5	91.9	32.0	62.0	4	93.6	52.9	20.0	40.2	51.7	7	65.7	8	56.6	8
VTCC-6	111.6	21.8	66.7	3	126.6	67.6	19.9	37.5	62.9	5	96.7	4	68.8	4
VTCC-7	117.2	30.4	73.8	2	115.4	94.8	18.7	54.8	70.9	3	106.9	2	76.9	2
VTCC-8	129.8	29.2	79.5	1	147.9	98.3	23.0	59.1	82.1	1	89.1	5	82.3	1
VTCC-9		21.5			145.4	85.4	18.8	73.8	80.8	2	66.5	7	68.6	5
Mean	108.5	25.0	67.3		120.7	72.7	19.6	55.0	67.0		89.7		67.7	
CD at 5%	24.9	6.0			16.4	14.9		6.2			12.7			
CV%	12.1	13.8			7.8	11.7		3.6			8.1			

Table 15.2 VT Cenchrus ciliaris-2013 (2<sup>nd</sup> Year): Varietal Trial in Cenchrus ciliaris (perennial): Dry Matter Yield (q/ha)

 Table 15.3 VT Cenchrus ciliaris-2013 (2nd Year): Varietal Trial in Cenchrus ciliaris (perennial): GFY & DMY (q/ha/day)

Entries	Green fe	orage yield (q/ha/d	ay)		Dry Matte	er Yield (q/ha/da	<b>y</b> )	
	Bikaner	Anand	Average	Rank	Bikaner	Anand	Average	Rank
VTCC-1	0.76	1.64	1.20	8	0.32	0.45	0.39	6
VTCC-2	0.69	1.83	1.26	7	0.30	0.55	0.43	5
VTCC-3								
VTCC-4	0.66	1.87	1.27	6	0.22	0.55	0.39	6
VTCC-5	1.04	1.64	1.34	5	0.42	0.43	0.43	5
VTCC-6	0.75	1.97	1.36	4	0.28	0.59	0.44	4
VTCC-7	1.03	2.01	1.52	2	0.39	0.53	0.46	3
VTCC-8	0.95	2.21	1.58	1	0.38	0.68	0.53	1
VTCC-9	0.69	2.22	1.46	3	0.28	0.67	0.48	2
Mean	0.82	1.92	1.37		0.32	0.56	0.44	

 Interim
 0.52
 1.52
 1.57
 0.52
 0.50
 0.44

 Table 15.4 VT Cenchrus ciliaris-2013 (2nd Year): Varietal Trial in Cenchrus ciliaris (perennial): Crude Protein Yield (q/ha) & Crude Protein (%)

Entries		Crude Pr	otein Yield (q/h	a)				Cru	de Protein (%)		
	Anand	Rahuri	Urulikanchan	Average	Rank	Ludhiana	Anand	Rahuri	Urulikanchan	Average	Rank
VTCC-1	6.9	5.3	1.5	4.5	7	7.0	6.2	7.5	8.1	7.2	4
VTCC-2	9.1	6.3	1.5	5.6	5	7.8	5.9	9.0	7.8	7.6	2
VTCC-3											
VTCC-4	9.2	3.8	1.5	4.8	6		6.3	9.0	8.0	7.7	1
VTCC-5	7.7	4.3	1.6	4.5	7	7.6	7.1	8.1	7.9	7.7	1
VTCC-6	11.1	5.2	1.6	6.0	3	5.8	7.2	7.7	8.0	7.2	4
VTCC-7	7.7	8.1	1.5	5.8	4	6.7	6.2	8.6	7.8	7.3	3
VTCC-8	11.9	6.9	1.9	6.9	1	5.7	6.3	7.1	8.1	6.8	5
VTCC-9	11.1	7.0	1.5	6.5	2	7.5	6.9	8.2	7.8	7.6	2
Mean	9.3	5.9	1.6	5.6		6.9	6.5	8.1	7.9	7.4	
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Entries			Pla	nt Height (	cm)				Ι	Leaf Stem Ratio		
	Ludhiana	Bikaner	Anand	Rahuri	Urulikanchan	Average	Rank	Bikaner	Rahuri	Urulikanchan	Average	Rank
VTCC-1		67.0	95.2	53.9	69.9	71.5	7	0.32	1.00	0.70	0.67	7
VTCC-2		99.0	98.9	64.2	67.9	82.5	5	0.50	0.82	0.77	0.70	5
VTCC-3												
VTCC-4	107.0	99.0	100.5	65.8	67.4	87.9	3	0.60	1.50	0.76	0.95	1
VTCC-5	110.3	78.0	94.3	57.6	72.1	82.5	5	0.36	1.50	0.72	0.86	3
VTCC-6	130.3	84.0	102.6	61.0	72.8	90.1	2	0.81	1.22	0.68	0.90	2
VTCC-7	121.3	72.0	104.9	53.7	68.5	84.1	4	0.50	0.43	0.82	0.58	8
VTCC-8	120.7	103.0	112.9	66.9	66.0	93.9	1	0.42	1.00	0.66	0.69	6
VTCC-9		82.0	114.1	70.8	62.2	82.3	6	0.88	0.67	0.65	0.73	7
Mean	117.9	85.5	102.9	61.7	68.4	84.3		0.55	1.02	0.72	0.76	

Table 15.5 VT Cenchrus ciliaris-2013 (2nd Year): Varietal Trial in Cenchrus ciliaris (perennial): Plant Height cm & Leaf Stem Ratio

 Table 15.6 VT Cenchrus ciliaris-2013 (2nd Year): Varietal Trial in Cenchrus ciliaris (perennial): ADF (%), NDF (%) & IVDMD (%)

Entries		ADF (9	6)			NDF (	%)		IVDN	AD (%)
	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank	Rahuri	Rank
VTCC-1		34.0				47.0			62.5	1
VTCC-2		34.4				45.4			62.1	2
VTCC-3										
VTCC-4	49.0	38.7	43.8	3	74.1	43.4	58.7	2	58.8	3
VTCC-5	46.7	38.6	42.6	1	70.6	45.4	58.0	1	58.8	3
VTCC-6	47.6	39.9	43.7	2	70.8	50.0	60.4	4	57.9	5
VTCC-7	47.7	43.6	45.6	4	69.1	50.4	59.7	3	55.0	6
VTCC-8	46.3	48.1	47.2	5	70.3	53.6	61.9	5	51.4	7
VTCC-9		39.6				52.6			58.1	4
Mean	47.5	39.6	44.6		71.0	48.5	59.8		58.1	

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		Ne	orth West Zo	ne				Ce	ntral Zone				All Ir	ndia Average
Entries	Ludh-	Hi-	Bika-	Aver-	Ra-	Ana-	Rah-	Urulikan-	Jha-	Jabal-	Aver-	Ra-	Aver-	Ra-
	iana	sar	ner	age	nk	nd	uri	chan	nsi	pur	age	nk	age	nk
VTCT-1	395.3	181.3	133.7	236.8	4	347.0	97.5	685.9	293.0	433.6	371.4	5	320.9	5
VTCT-2	334.8	177.1	113.0	208.3	7	303.0	64.8	724.9	277.6	417.3	357.5	7	301.6	7
VTCT-3	336.5	172.9	130.8	213.4	6	281.0	59.7	810.6	278.7	410.6	368.1	6	310.1	6
VTCT-4	379.3	212.5	151.8	247.9	2	296.0	83.5	851.2	302.9	414.8	389.7	4	336.5	2
VTCT-5	370.8	187.5	111.5	223.3	5	304.0	77.7	902.1	301.3	404.0	397.8	2	332.4	4
VTCT-6	424.5	172.9	118.8	238.7	3	291.0	58.2	950.4	283.8	389.8	394.6	3	336.2	3
VTCT-7	440.0	183.3	134.5	252.6	1	291.0	82.3	1048.8	291.1	428.1	428.3	1	362.4	1
Mean	383.0	183.9	127.7	231.6		301.9	74.8	853.4	289.8	414.0	386.8		328.6	
CD at 5%	42.9	NS	31.5			29.8	12.9	61.2	37.4	19.8				
CV%	7.5	19.6	13.9			6.6	11.6	10.9	8.7	26.5				

Table 16.1 VT Clitoria-2013 (2<sup>nd</sup> year): Varietal Trial in Clitoria ternatea (Perennial): Green Forage Yield (q/ha)

Table 16.2 VT Clitoria-2013 (2<sup>nd</sup> year): Varietal Trial in Clitoria ternatea (Perennial): Dry Matter Yield (q/ha)

		Noi	rth West Zoi	ne				Centi	ral Zone				All India A	verage
Entries	Ludh-	His-	Bika-	Aver-	Ra-	Ana-	Rah-	Urulikan-	Jha-	Jabal-	Aver-	Ra-	Aver-	Ra-
	iana	ar	ner	age	nk	nd	uri	chan	nsi	pur	age	nk	age	nk
VTCT-1	80.8	62.2	52.7	65.2	3	72.4	25.5	153.2	73.1	76.4	80.1	6	74.5	5
VTCT-2	70.5	60.8	42.3	57.9	6	69.1	18.3	167.2	70.1	72.7	79.5	7	71.4	7
VTCT-3	72.5	49.9	47.0	56.5	7	68.4	15.2	192.9	70.3	70.8	83.5	5	73.4	6
VTCT-4	82.5	57.0	61.2	66.9	1	67.7	19.7	196.3	74.9	71.4	86.0	4	78.8	2
VTCT-5	82.0	56.1	42.5	60.2	5	66.9	19.6	204.9	80.2	69.3	88.2	2	77.7	4
VTCT-6	92.0	57.6	40.7	63.4	4	66.6	15.9	214.4	70.7	66.5	86.8	3	78.0	3
VTCT-7	96.8	56.4	44.5	65.9	2	68.5	23.9	240.1	72.2	75.0	95.9	1	84.7	1
Mean	82.4	57.1	47.3	62.3		68.5	19.7	195.6	73.1	71.7	85.7		76.9	
CD at 5%	12.0	NS	14.8			NS	3.5	11.9	7.8	2.9				
CV%	9.7	20.6	17.6			6.9	11.9	8.6	7.2	22.7				

Table 16.3 VT Clitoria-2013 (2<sup>nd</sup> year): Varietal Trial in Clitoria ternatea (Perennial): Green Forage Yield & Dry Matter Yield (q/ha/day)

Entries		Green	I Forage Yiel	ld (q/ha/day)				D	ry Matter Y	lield (q/ha/d	ay)	
Lintites	Hisar	Bikaner	Anand	Jabalpur	Average	Rank	Hisar	Bikaner	Anand	Jabalpur	Average	Rank
VTCT-1	3.30	1.35	1.23	1.57	1.86	2	1.13	0.53	0.26	0.27	0.55	1
VTCT-2	3.22	1.14	1.07	1.49	1.73	5	1.10	0.43	0.24	0.25	0.51	3
VTCT-3	3.14	1.32	0.99	1.48	1.73	5	0.91	0.47	0.24	0.25	0.47	6
VTCT-4	3.86	1.53	1.05	1.47	1.98	1	1.04	0.62	0.24	0.25	0.54	2
VTCT-5	3.41	1.13	1.07	1.45	1.77	4	1.02	0.43	0.24	0.25	0.49	5
VTCT-6	3.14	1.20	1.03	1.40	1.69	6	1.05	0.41	0.24	0.24	0.49	5
VTCT-7	3.33	1.36	1.03	1.55	1.82	3	1.03	0.45	0.24	0.27	0.50	4
Mean	3.34	1.29	1.07	1.49	1.80		1.04	0.48	0.24	0.25	0.50	

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			Crude	e Protein yi	eld (q/ha)						Crude	e Protein (%	)		
Entrica	Ana-	Rah-	Urulikan-	Jabal-	His-	Aver-	Ra-	Ludh-	Ana-	Rah-	Urulikan-	Jabal-	Hisar	Aver-	Ra-
Entries	nd	uri	chan	pur	ar	age	nk	iana	nd	uri	chan	pur		age	nk
VTCT-1	13.2	5.0	21.4	10.4	7.6	11.5	6	16.8	19.9	19.4	14.0	13.7	12.3	16.0	1
VTCT-2	12.1	2.7	23.7	9.8	7.3	11.1	7	18.6	18.1	14.5	14.2	13.6	12.0	15.2	4
VTCT-3	11.4	2.8	28.9	9.5	5.9	11.7	5	16.9	18.2	18.6	15.0	13.5	11.8	15.7	2
VTCT-4	13.1	3.3	29.2	9.6	6.6	12.4	2	16.6	19.8	16.8	14.9	13.6	11.6	15.5	3
VTCT-5	12.8	3.8	28.4	9.2	6.1	12.1	4	14.8	20.4	19.5	13.9	13.5	10.9	15.5	3
VTCT-6	12.1	2.3	31.0	8.9	6.8	12.2	3	15.9	18.8	14.2	14.5	13.5	11.8	14.8	5
VTCT-7	12.4	3.9	34.6	10.1	6.9	13.6	1	18.6	18.8	16.5	14.4	13.6	12.3	15.7	2
Mean	12.4	3.4	28.2	9.6	6.8	12.1		16.9	19.1	17.1	14.4	13.6	11.8	15.5	

Table 16.4 VT Clitoria-2013 (2<sup>nd</sup> year): Varietal Trial in Clitoria ternatea (Perennial): Crude Protein Yield (q/ha) & Crude Protein (%)

Table 16.5 VT Clitoria-2013 (2nd year): Varietal Trial in Clitoria ternatea (Perennial): Plant Height (cm) & Leaf Stem Ratio

				Plant	Height (cm)							Leaf S	Stem Ratio			
Entrico	His-	Bika-	Ana-	Rah-	Urulikan-	Jabal-	Aver-	Ra-	Ludh-	His-	Bika-	Rah-	Urulikan-	Jabal-	Aver-	Ra-
Entries	ar	ner	nd	uri	chan	pur	age	nk	iana	ar	ner	uri	chan	pur	age	nk
VTCT-1	135.3	95.0	79.3	40.9	96.0	133.2	96.6	3	1.52	0.38	0.76	1.17	1.65	1.28	1.13	2
VTCT-2	126.3	70.0	80.7	34.2	98.0	126.5	89.3	6	1.45	0.52	0.36	1.06	1.32	1.08	0.96	6
VTCT-3	119.6	80.0	80.3	35.6	94.4	118.1	88.0	7	1.69	0.58	0.59	1.50	1.79	1.10	1.21	1
VTCT-4	131.1	98.0	83.2	42.6	97.9	121.8	95.8	4	1.57	0.56	0.33	1.41	1.57	1.04	1.08	3
VTCT-5	132.5	116.0	79.7	37.2	99.8	115.3	96.8	2	1.51	0.53	0.40	1.25	1.66	1.04	1.07	4
VTCT-6	127.9	102.0	81.2	37.0	98.2	113.1	93.2	5	1.35	0.60	0.24	1.06	1.43	0.94	0.94	7
VTCT-7	122.8	137.0	59.9	38.3	99.6	130.8	98.1	1	1.43	0.42	0.32	0.85	1.71	1.14	0.98	5
Mean	127.9	<b>99.</b> 7	77.7	37.9	97.7	122.7	94.0		1.50	0.51	0.43	1.19	1.59	1.09	1.05	

## Table 16.6 VT Clitoria-2013 (2<sup>nd</sup> year): Varietal Trial in Clitoria ternatea (Perennial): ADF (%), NDF (%), IVDMD (%) & DDM (q/ha)

		ADF (	%)			NDF (	%)		IV	/DMD (%)		DDM	(q/ha)
Entries	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank	Rahuri	Hisar	Rank	Hisar	Rank
VTCT-1	42.1	34.9	38.5	3	57.3	42.0	49.6	3	61.7	49.1	1	30.5	1
VTCT-2	38.9	40.5	39.7	4	54.3	45.0	49.6	3	57.3	47.9	3	29.1	2
VTCT-3	42.8	40.7	41.8	6	55.7	46.0	50.9	4	57.2	45.2	5	22.6	8
VTCT-4	43.1	30.8	37.0	1	55.6	34.8	45.2	1	64.9	43.4	2	24.7	4
VTCT-5	44.2	38.3	41.3	5	58.2	44.1	51.1	5	59.0	42.2	6	23.7	6
VTCT-6	42.9	41.8	42.3	7	56.2	46.4	51.3	6	56.3	40.8	7	23.5	7
VTCT-7	40.3	35.9	38.1	2	52	42.3	47.1	2	60.9	43.6	4	24.6	5
Mean	42.0	37.6	39.8		55.6	42.9	49.3		59.6	44.6		25.5	

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## **Forage Crop Production**

The forage crop production programme was executed at 21 locations in five zones. In total 22 experiments comprising of 11 in net work (9 coordinated and two AVT based) and 11 in location specific mode were undertaken with the aim to generate region specific forage production technologies. The main emphasis of natural resource management under forage crops was to increase system productivity and resource use optimization in forage based systems. The salient research achievements have been discussed in this chapter for the forage crop production during *kharif* 2014.

#### A. ON GOING COORDINATED TRIALS

# PS-11-AST-1: Effect of growing environment and nitrogen levels on production and quality of BN hybrid [(Table Reference: PS-11-AST-1(a) to 1(g)] Locations: Palampur, Ludhiana, Anand, Rahuri and Hyderabad

A field experiment was started in *kharif* 2011 (as establishment year) at five locations to assess the effect of growing environment and N levels on yield, quality and anti-nutritional components. The treatments consisted of two growing environments (shaded and unshaded) and five levels of nitrogen (control, 50, 75, 100 and 125 % of recommended N) laid out in RBD with three replications. The data of third year (final) experimentation are presented in Tables PS-11-AST-1 (a) to (g).

On mean basis, growing of bajra napier hybrid under unshaded environment recorded higher GFY (801.4 q/ha), DMY (156.5 q/ha) and CPY (13.1 q/ha) over shaded environment (652.9, 124.6 and 11.2 q/ha, respectively). The magnitude of increase for GFY, DMY and CPY was 22.7, 25.6 and 10.0%. Highest yield was recorded at Ludhiana and lowest at Palampur. At all the locations growing of BN hybrid under unshaded condition recorded remarkably higher yields (except Hyderabad). On mean basis as well as location wise (except Hyderabad) under shaded condition, BN hybrid recorded higher protein content over unshaded condition. The green fodder, DMY, CPY and crude protein content (%) of BN hybrid increased consistently with increasing levels of nitrogen up to 125 % of recommended N. The magnitude of increase for GFY on location mean basis was 65.8, 29.5, 16.3 and 6.6 % over control, 50, 75 and 100 % of recommended N, respectively.

Unshaded environment produced taller plants with more number of tillers and leaf stem ratio of BN hybrid over shaded environment on mean basis. Plant height and number of tillers/plant increased gradually with higher levels of recommended N upto 125 % of RDN. Maximum plant height of BN hybrid was recorded at Palampur and lowest at Ludhiana. Growing of BN hybrid under unshaded environment fetched higher net return and B:C ratio at Palampur and Ludhiana. Net monetary return and B: C ratio increased consistently with increasing levels of nitrogen up to 125 % of recommended N on mean basis.

Anti-quality components of BN hybrid differed under different growing environment and nitrogen levels. On mean basis, higher values of NDF (%) was recorded under unshaded environment over shaded environment, whereas, higher values of ADF (%), nitrate content and oxalic acid was recorded under shaded environment. Growing of BN hybrid under unshaded condition recorded lower values of nitrate content (1127 ppm) compared to shaded condition (1466 ppm). Location wise highest values of nitrate content were recorded at Palampur and lowest at Hyderabad.

On mean basis, growing of BN hybrid without nitrogen (control) recorded highest values of NDF (55.9 %) and ADF (48.5 %) over its higher levels and its values decreased gradually with increasing levels of N up to highest level. However nitrate content and oxalic acid in dry matter were increased gradually with increasing level of N up to highest level (125 % RDN) on mean basis. IVDMD values increased with increasing level of nitrogen at Rahuri.

At Palampur, available N and K and organic carbon content in soil remained higher under shaded condition over unshaded condition after end of third year of experimentation. Application of N up to 125 % of recommended level of N recorded higher level of available N, P and K and organic carbon in soil compared to control and its lower levels. At Hyderabad, available N in soil was recorded higher under shaded environment over unshaded condition and reverse trend was observed for available K. Status of available nutrients in soil remained unchanged by application of different levels of nitrogen. At Rahuri, significantly higher available N in soil was recorded under shaded environment over unshaded condition whereas, available P & K and OC % did not differ significantly under different growing environment. The application of different levels of nitrogen in BN hybrid recorded significantly higher levels of available of N and K in soil as compared to its lower levels whereas non remarkable variation in soil available P and organic carbon was observed by application of different levels of nitrogen.

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		Green fodder yield (q/ha)							Dry matter yield (q/ha)							
Treatment	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean				
A. Growing environment																
Shaded	209.7	854.0	405.0	857.9	938.1	652.9	49.1	141.1	63.9	158.1	210.6	124.6				
Unshaded	340.3	1143.0	564.0	994.8	965.0	801.4	80.7	190.2	103.8	181.9	225.9	156.5				
SEm <u>+</u>		13.0	16.9	12.8	9.9			1.9	2.9	1.3	3.3					
CD (P=0.05)	8.4	38.8	102.9	77.7	NS		2.0	5.8	17.5	8.1	9.7					
B. Nitrogen levels																
Control	146.6	783.0	309.0	549.3	839.0	525.4	36.2	127.5	55.8	100.3	192.3	102.4				
50% of recommended N	241.4	921.0	433.0	865.0	902.0	672.5	56.2	150.3	76.1	154.1	203.6	128.1				
75% of recommended N	278.6	1032.0	488.0	927.0	1019.3	749.0	64.5	173.3	87.0	169.7	229.2	144.7				
100% of recommended N	335.9	1096.0	558.0	1070.6	1026.8	817.5	80.7	183.7	94.6	195.4	242.2	159.3				
125% of recommended N	372.6	1159.0	634.0	1219.6	970.5	871.1	87.0	193.4	105.7	230.4	224.6	168.2				
SEm <u>+</u>		20.5	14.8	19.1	15.6			3.1	3.2	2.9	5.1					
CD (P=0.05)	13.3	61.4	44.3	57.3	46.4		3.1	9.2	9.6	8.6	15.3					
C. Interaction: G X N																
SEm <u>+</u>		29.0	20.9	27.0	22.1			4.4	4.6	4.0	7.3					
CD (P=0.05)		NS	NS	NS	NS			NS	NS	NS	NS					
CV (%)		9.3	7.5	5.1				8.6	9.4	4.1						

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Table PS-11-AST-1(b): Effect of growing environment and nitrogen levels on crude protein yield and protein content of Bajra Napier hybrid

Treatment		Crude	protein yield	(q/ha)		Crude protein (%)						
rreatment	Palampur	Anand	Rahuri	Ludhiana	Mean	Palampur	Anand	Rahuri	Hyderabad	Ludhiana	Mean	
A. Growing environment												
Shaded	4.5	8.2	13.1	18.9	11.2	8.7	13.4	8.2	9.3	13.2	10.6	
Unshaded	7.9	13.2	14.9	16.2	13.1	9.6	13.2	8.1	9.6	8.4	9.8	
SEm <u>+</u>		0.3	0.1	0.3				0.1	0.1	0.2		
CD (P=0.05)	0.3	1.9	0.4	1.0		0.3		NS	NS	0.6		
B. Nitrogen levels												
Control	3.0	6.5	7.5	11.4	7.1	7.9	12.7	7.5	8.7	9.3	9.2	
50% of recommended N	4.7	9.9	12.3	14.6	10.4	8.3	13.5	8.0	9.2	10.1	9.8	
75% of recommended N	6.2	10.3	14.1	18.2	12.2	9.6	12.4	8.3	9.5	10.8	10.1	
100% of recommended N	8.2	12.3	16.4	20.8	14.4	10.1	13.6	8.4	10.0	11.6	10.7	
125% of recommended N	8.8	14.6	19.7	22.8	16.5	10.1	14.4	8.6	10.0	12.2	11.1	
SEm <u>+</u>		0.4	0.3	0.5			-	0.1	0.2	0.3		
CD (P=0.05)	0.5	1.2	0.8	1.5		0.5	-	0.2	0.6	1.0		
C. Interaction: G X N												
SEm <u>+</u>		0.6	0.4	0.7				0.1	0.26	0.4		
CD (P=0.05)		NS	NS	NS				NS	NS	NS		
CV (%)		9.4	4.5	6.3				1.9		6.2		

	Plant height (cm)					Number of tillers / plant				Leaf stem ratio					
Treatment	Palam- pur	Ludhi- ana	Ana- nd	Rah- uri	Hydera- bad	Mean	Ana- nd	Rah- uri	Ludhi- ana	Mean	Palam- pur	Ana- nd	Rah- uri	Hydera- bad	Mean
A. Growing environment															
Shaded	130.1	82.1	116.8	114.3	108.0	110.3	32.1	18.1	13.3	21.2	1.09	1.69	0.60	1.24	1.16
Unshaded	135.3	103.8	117.8	120.8	100.3	115.6	33.1	23.5	24.0	26.9	1.29	1.51	0.64	1.33	1.19
SEm <u>+</u>		1.2	2.1	0.5	1.6		0.3	0.2	0.5			-	0.003	0.024	
CD (P=0.05)	2.2	3.7	NS	3.1	4.61		NS	1.5	1.6		NS	-	0.02	0.071	
B. Nitrogen levels															
Control	84.9	81.6	113.1	104.3	97.1	96.2	29.4	15.8	14.8	20.0	0.78	1.02	0.48	1.14	0.86
50% of recommended N	132.7	87.9	116.0	118.1	104.4	111.8	30.2	20.7	17.3	22.7	1.06	1.27	0.63	1.23	1.05
75% of recommended N	144.0	93.2	117.5	119.3	102.7	115.3	32.8	21.5	18.8	24.4	1.20	1.48	0.66	1.39	1.18
100% of recommended N	147.7	99.6	119.3	123.0	107.2	119.4	33.6	22.2	20.4	25.4	1.43	1.82	0.67	1.34	1.32
125% of recommended N	154.2	102.7	120.5	123.2	109.3	122.0	36.9	23.7	21.9	27.5	1.47	2.44	0.67	1.34	1.48
SEm <u>+</u>		1.9	2.7	0.5	2.5		1.0	0.4	0.9				0.01	0.04	
CD (P=0.05)	3.5	5.8	NS	1.6	7.28			1.1	2.6		NS		0.04	0.11	
C. Interaction: G X N															
SEm <u>+</u>		2.7	3.8	0.8	3.5				1.2				0.02	0.05	
CD (P=0.05)		NS	NS	NS	NS		NS	0.5	3.6				NS	0.21	
CV (%)		7.3	5.5	1.11			1.4	NS	6.4				5.06		

#### Table PS-11-AST-1 (c): Effect of growing environment and nitrogen levels on growth parameters of Bajra Napier hybrid

Table PS-11-AST-1 (d): Effect of growing environment and nitrogen levels on net return and benefit cost ratio of Bajra Napier hybrid

		NMR (Rs/ha)		Benefit cos	st ratio	
Treatment	Palampur	Ludhiana	Mean	Palampur	Ludhiana	Mean
A. Growing environment						
Shaded	28115	26376	27246	1.96	0.90	1.43
Unshaded	53222	44337	48780	3.50	1.47	2.49
SEm <u>+</u>	-	844		-	0.03	
CD (P=0.05)	-	2526		-	0.09	
B. Nitrogen levels						
Control	18393	26283	22338	1.65	1.06	1.36
50% of recommended N	35277	32292	33785	2.69	1.17	1.93
75% of recommended N	40622	36867	38745	2.67	1.22	1.95
100% of recommended N	51722	39428	45575	3.32	1.24	2.28
125% of recommended N	57328	41913	49621	3.30	1.25	2.28
SEm <u>+</u>	-	1334		-	0.05	
CD (P=0.05)	-	3993		-	NS	
C. Interaction: G X N						
SEm <u>+</u>		1886			0.07	
CD (P=0.05)		NS			NS	
CV (%)		8.95			7.25	

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Treatment	Treatment Neutral Detergent Fibre (%)						Acid Deter	gent Fiber (	(%)	-	IVDMD (%)
Treatment	Palampur	Ludhiana	Anand	Rahuri	Mean	Palampur	Ludhiana	Anand	Rahuri	Mean	Rahuri
A. Growing environment											
Shaded	74.6	59.4	74.9	65.6	68.6	56.5	32.4	45.2	48.6	45.7	68.8
Unshaded	71.6	63.5	74.6	66.9	69.2	53.5	35.2	39.7	53.0	45.4	65.9
SEm <u>+</u>	-	0.3	0.6	0.2		-	0.3	0.7	0.5		0.2
CD (P=0.05)	-	1.0	NS	1.0		-	1.0	4.0	3.1		1.0
B. Nitrogen levels											
Control	73.8	64.9	76.0	70.7	71.4	55.9	36.3	47.6	54.1	48.5	64.6
50% of recommended N	73.6	63.4	74.1	67.9	69.8	55.2	34.8	43.3	51.5	46.2	66.7
75% of recommended N	72.7	62.1	74.8	66.8	69.1	54.8	33.7	39.7	50.3	44.6	67.7
100% of recommended N	72.7	60.0	73.6	64.5	67.7	55.2	32.9	40.2	49.3	44.4	68.5
125% of recommended N	72.8	57.0	75.4	61.9	66.8	53.9	31.2	41.5	48.6	44.4	69.3
SEm <u>+</u>		0.5	1.4	0.6			0.5	1.1	0.6	43.8	0.6
CD (P=0.05)		1.6	NS	1.8			1.5	3.1	1.7		1.8
C. Interaction : G X N											
SEm <u>+</u>		0.7	2.0	0.9			0.7	1.5	0.8		0.9
CD (P=0.05)		NS	NS	NS			NS	NS	NS		NS
CV (%)		6.3	4.7	2.2			5.9	6.1	2.8		2.2

#### Table PS-11-AST-1 (e): NDF (%), ADF (%) and IVDMD (%) as influenced by growing environment and nitrogen levels in BN hybrid

Table PS-11-AST-1(f): Nitrate content (ppm) and oxalic acid (%) as influenced by growing environment and nitrogen levels in BN hybrid

Treatment		Nitrat	e content (p	om)		Oxalic acid (%)					
reatment	Palampur	Ludhiana	Rahuri	Hyderabad	Mean	Palampur	Rahuri	Hyderabad	Mean		
A. Growing environment											
Shaded	3060.0	1973.0	623.0	209.5	1466.4	2.80	1.88	1.13	1.94		
Unshaded	2900.0	872.0	547.0	187.1	1126.5	1.51	1.85	1.20	1.52		
SEm <u>+</u>	-	82.4	0.67	2.3		-	0.01	0.02			
CD (P=0.05)	-	246.7	4.07	6.9		-	NS	0.07			
B. Nitrogen levels											
Control	2830.0	799.0	557.0	186.7	1093.2	1.96	1.76	1.19	1.64		
50% of recommended N	2900.0	1008.0	572.0	199.0	1169.8	2.12	1.85	1.12	1.70		
75% of recommended N	2960.0	1410.0	581.0	195.3	1286.6	2.16	1.88	1.23	1.76		
100% of recommended N	3050.0	1654.0	598.0	203.2	1376.3	2.25	1.90	1.15	1.77		
125% of recommended N	3150.0	2243.0	618.0	207.5	1554.6	2.29	1.93	1.12	1.78		
SEm <u>+</u>	-	130.2	3.3	3.7			0.01	0.04			
CD (P=0.05)	-	390.0	9.9	10.9			0.04	NS			
C. Interaction : G X N											
SEm <u>+</u>		184.2	4.7	5.2			0.02	0.05			
CD (P=0.05)		NS	NS	NS			NS	0.20			
CV (%)		6.3	1.4				1.68				

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	Palampur						Hyderabad	ł	Rahuri				
Treatments	Available nutrients (kg/ha) OC % pH			рΗ	Availabl	e nutrients	s (kg/ha)	Availab	le nutrient	s (kg/ha)	OC %	рН	
	N	Р	K			N	Р	K	N	Р	K		
A. Growing environment													
Shaded	250	13	340	0.83	5.5	219.4	35.4	504.3	186.0	13.8	511.0	0.40	7.8
Unshaded	238	14	335	0.68	5.5	213.0	34.2	513.9	181.0	13.7	507.0	0.40	7.7
SEm <u>+</u>						1.3	0.50	2.3	0.37	0.17	1.34	0.004	0.01
CD (P=0.05)						3.77	NS	6.9	2.28	NS	NS	NS	0.003
B. Nitrogen levels													
Control	212	13	331	0.70	5.5	213.3	34.8	504.3	174.0	13.4	496.0	0.37	7.7
50% of recommended N	230	14	338	0.77	5.5	214.3	32.8	510.0	179.0	13.7	502.0	0.40	7.7
75% of recommended N	250	13	338	0.78	5.5	214.7	34.5	512.5	184.0	13.8	509.0	0.41	7.7
100% of recommended N	261	14	338	0.76	5.5	221.6	35.5	511.2	186.0	13.9	517.0	0.41	7.8
125% of recommended N	268	14	344	0.77	5.5	217.7	36.3	507.7	193.0	14.0	524.0	0.42	7.8
SEm <u>+</u>						2.0	0.79	3.7	0.59	0.20	2.11	0.011	0.007
CD (P=0.05)						NS	NS	NS	1.76	NS	6.35	NS	0.020
C. Interaction : G X N													
SEm <u>+</u>						2.8	1.12	5.2	0.83	0.28	2.99	0.016	0.009
CD (P=0.05)						11.13	NS	20.4	2.49	NS	NS	NS	0.028
C.V (%)									0.79	3.47	1.01	7.13	0.21
Initial													
Unshaded	215	11	324	0.69	5.5								
Shaded	236	13	336	0.79	5.4								

## Table PS-11-AST-1(g): Soil properties as influenced by growing environment and nitrogen levels in BN hybrid

## K-12-AST-1: Performance of dual purpose pearl millet as influenced by different cutting management practices and nitrogen levels [Table Reference: K-12-AST-1 (a) to 1(f)]

#### Locations: Anand, Urulikanchan, Bikaner, Mandya, Hyderabad and Dharwad

A field experiment was started during *kharif* 2012 at six locations to study the effect of cutting management, nitrogen levels and varieties on the performance of dual purpose pearl millet. The treatment consisted of three varieties (BAIF Bajra-1, AVKB-19 and GFB-1), three cutting management practices (no cutting, first cut at 50 DAS and leave for grain, and first cut at 50 DAS & 2 cut at 40 days after 1<sup>st</sup> cut and leave for grain) and two levels of nitrogen (100 % and 150 % of recommended dose of nitrogen) laid out in factorial RBD and replicated three times.

Data of third year of experimentation (second year at Hyderabad) are presented in tables K-12-AST-1 (a) to (f). On location mean basis, planting of BAIF Bajra-1 recorded highest GFY (263.4 q/ha), grain yield (8.7 q/ha), and stover yield (121.4 q/ha) and lowest with AVKB-19. Highest DMY (47.4 q/ha) was recorded by GFB-1 on mean basis. At Urulikanchan, Mandya, Dharwad and Hyderabad BAIF Bajra-1 recorded significantly highest GFY and DMY over rest of the varieties. On mean basis cutting of pearl millet at 50 days after sowing and 2<sup>nd</sup> cut at 40 days after first cut and leave for grain recorded higher GFY (379.4q/ha), DMY (70.4 q/ha) and CPY (6.75 q/ha) compared to no cutting and cutting at 50 DAS & left for grain. With respect to nitrogen levels, on mean basis, application of 150 % recommended dose of nitrogen recorded higher GFY (268.9 q/ha), DMY (50.8 q/ha) and CPY (5.04 q/ha mean except Urulikanchan) over 100 % RDN. The magnitude of increase for GFY, DMY and CPY was 12.0, 21.0, and 26.0 percent more over 100 % RDN.

On mean basis BAIF Bajra-1 recorded highest grain yield (8.7 q/ha) and stover yield. At Bikaner and Anand GFB-1 variety recorded significantly highest grain yield (10.4 and 7.1 q/ha respectively) over AVKB-19 and BAIF Bajra-1. At Urulikanchan, Mandya, Hyderabad and Dharwad BAIF Bajra-1 recorded significantly highest grain yield. BAIF Bajra-1 recorded significantly highest stover yield across the centres over AVKB-19 and GFB-1.

On mean basis no cutting of pearl millet varieties recorded highest grain yield (12.2 q/ha) followed by first cut at 50 DAS and left for grain (7.8 q/ha) and lowest being with cutting at 50 DAS & 2<sup>nd</sup> cut at 40 DAS and left for grain (3.1 q/ha). Similar to grain yield, no cutting practice recorded highest stover yield (141.6 q/ha) over rest of the treatments. With respect to nitrogen levels on mean as well as location basis (except Urulikanchan), application of 150 % RDN to pearl millet varieties recorded highest grain (8.2 q/ha) and stover yields (104.6 q/ha) over 100 % RDN. The sowing of BAIF Bajra-1 fetched highest net monetary (Rs.34827 ha<sup>-1</sup> and benefit cost ratio (2.29) on mean basis. With respect to cutting management practices, on mean basis cutting of dual purpose pearl millet varieties at 50 DAS and left for grain fetched highest net monetary return (Rs. 33215 ha<sup>-1</sup>) and benefit cost ratio (2.25) over rest of the cutting management practices. On mean basis as well as location wise, application of 150 % of recommended dose of nitrogen realized highest net monetary return (Rs. 32674 ha<sup>-1</sup>) and benefit cost ratio (2.17) over its lower level of 100 % RDN. Planting of different varieties did not affect the available N, P and K in soil after harvest of crop at Dharwad. With respect to cutting management practices higher level of available NP and K in soil was recorded under no cutting treatment. Application of 150 % of RDN

Concentration of organic carbon in soil and available N was recorded higher in variety GFB-1. Under different cutting management practices uncut treatment recorded higher level of available N and K in soil over rest of the practices. With respect to nitrogen, application of 150 % of RDN to pearl millet varieties attained higher level of available N, P and K in soil over 100 % of RDN.

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		01											
			Green Fo	odder Yield	d (q/ha)			Dry Matter Yield (q/ha)					
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Treatment	Bika-	Ana-	Urulika-	Hydera-	Man-	Dhar-	Mean	Bika-	Ana-	Hydera-	Man-	Dhar-	Mean
i reatment	ner	nd	nchan	bad	dya	wad		ner	nd	bad	dya	wad	
A. Varieties			-										
BAIF Bajra-1	216.2	393.0	243.7	248.8	210.7	268.0	263.4	34.6	36.7	55.0	44.7	59.2	46.0
AVKB-19	245.1	371.0	230.0	202.9	179.7	238.6	244.6	43.4	43.3	44.8	41.8	54.7	45.6
GFB-1	228.7	446.0	206.5	223.6	186.6	241.1	255.4	39.3	50.8	49.8	41.5	55.8	47.4
SEm <u>+</u>	5.6	7.7	1.2	5.8	5.2	2.4		1.0	0.9	1.6	1.6	0.7	
CD (P=0.05)	16.1	22.5	5.1	16.8	14.9	6.8		2.7	2.7	4.6	NS	2.0	
B. Cutting management													
No cutting	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0
First cut at 50 DAS & leave for grain	272.9	314.0	207.5	248.1	286.3	204.0	255.5	46.4	30.2	55.5	63.6	48.5	48.8
First cut at 50 DAS & 2 <sup>nd</sup> cut at 40 days after	117 1	103.0	353.6	107.0	200.8	201 5	370 /	70.0	56.0	05.1	64.4	64.6	70.4
1 <sup>st</sup> cut and leave for grain	417.1	495.0	333.0	421.2	290.0	294.5	579.4	70.9	50.9	95.1	04.4	04.0	70.4
SEm <u>+</u>	5.6	6.3	1.2	5.8	5.2	2.4		1.0	0.8	1.6	1.6	0.7	
CD (P=0.05)	16.1	18.3	5.1	16.8	14.9	6.8		2.7	2.2	4.6	4.5	2.0	
C. Nitrogen levels													
100% of RDN	224.8	373.0	223.4	209.1	167.7	242.7	240.1	38.2	37.3	44.3	35.5	54.7	42.0
150% of RDN	235.2	434.0	230.0	241.1	217.0	255.8	268.9	40.0	49.8	56.0	49.9	58.4	50.8
SEm <u>+</u>	4.6	6.3	1.4	4.8	5.2	1.9		0.8	0.8	1.3	1.3	0.6	
CD (P=0.05)	NS	18.3	4.5	13.7	14.9	5.5		NS	2.2	3.8	3.7	1.7	
D. Interaction Variety X Nitrogen levels													
SEm <u>+</u>	8.0				7.4	4.1					2.2	1.2	
CD (P=0.05)	22.8	NS			NS	11.7					NS	3.5	
CV (%)		6.6	16.7						7.3				

Table K-12-AST-1 (a): Effect of varieties, cutting management and nitrogen levels on yield of dual purpose pearl millet

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Treatment		Grain yield (q/ha)						Stover yield (q/ha)							Maize fodder equivalent yield (q/ha)
	Bika-	Ana-	Urulika-	Hydera-	Man-	Dhar-	Mean	Bika-	Urulika-	Ana-	Hydera-	Man-	Dhar-	Mean	Urulika-
	ner	nd	nchan	bad	dya	wad		ner	nchan	nd	bad	dya	wad		nchan
A. Varieties															
BAIF Bajra-1	5.7	5.9	11.0	15.1	9.7	4.6	8.7	50.8	127.6	120.5	279.7	107.16	42.9	121.4	154.1
AVKB-19	9.6	4.5	10.2	5.4	6.9	4.2	6.8	42.0	89.4	83.8	137.7	58.79	35.9	74.6	120.2
GFB-1	10.4	7.1	9.7	6.0	8.1	4.3	7.6	37.1	94.7	112.7	191.4	87.81	39.2	93.8	96.3
SEm <u>+</u>	0.3	0.2	0.2	0.2	0.3	0.1		1.5	2.5	3.1	4.5	2.83	0.7		2.8
CD (P=0.05)	0.7	0.6	0.6	0.6	0.9	0.2		4.3	6.8	8.9	12.9	8.15	1.9		8.2
B. Cutting manageme	nt														
No cutting	18.3	10.4	13.5	11.3	13.1	6.6	12.2	89.9	113.5	181.8	264.7	140.93	58.6	141.6	80.2
First cut at 50 DAS &	74	57	10.2	11.6	73	45	7.8	23.7	105 1	99.4	287.8	72 58	11 I	105 5	106.0
leave for grain	7.4	5.7	10.2	11.0	7.5	ч.0	7.0	20.1	100.1	55.4	201.0	72.00		100.0	100.0
First cut at 50 DAS &															
2 <sup>nd</sup> cut at 40 days	0.0	13	73	38	43	20	31	16.3	93.1	35.8	56.3	40 25	15.2	42.8	182.3
after 1 <sup>st</sup> cut and leave	0.0	1.0	1.0	0.0		2.0	0.1	10.0	00.1	00.0	00.0	10.20	10.2	12.0	102.0
for grain															
SEm <u>+</u>	0.3	0.2	0.2	0.2	0.3	0.1		1.5	2.5	3.1	4.5	2.83	0.7		2.8
CD (P=0.05)	0.7	0.6	0.6	0.6	0.9	0.2		4.3	6.8	8.9	12.9	8.15	1.9		8.2
C. Nitrogen levels	1								1			1	1	1	
100% of RDN	8.2	5.2	10.6	7.9	6.8	4.2	7.2	38.6	101.3	94.7	190.3	68.20	38.9	88.7	122.3
150% of RDN	8.9	6.4	10.0	9.8	9.6	4.5	8.2	48.0	106.5	116.7	215.5	100.98	39.8	104.6	123.4
SEm <u>+</u>	0.2	0.2	0.1	0.2	0.3	0.1		1.2	1.5	2.5	3.7	2.31	0.5		1.8
CD (P=0.05)	0.6	0.5	0.3	0.5	0.7	0.2		3.5	4.6	7.3	10.5	6.66	NS		5.3
D. Interaction Variety	X Nitrog	en level	S												
SEm <u>+</u>	0.4				0.4	0.1		2.6				4.01	1.1		
CD (P=0.05)	1.2	NS			NS	0.3		7.4	NS	NS		NS	3.3		
CV (%)		0.2	15.2						17.7						17.8

Table K-12-AST-1 (b): Effect of varieties, cutting management and nitrogen levels on grain and stover yield, maize fodder equivalent yield of dual purpose pearl millet

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		PI	ant height	(cm)		Nu	mber of	tillers/ m	n row leng	th	Leaf Stem Ratio		tio
Treatment	Bika-	Ana-	Dhar-	Man-	Mean	Bika-	Ana-	Dhar-	Man-	Mean	Dhar-	Man-	Mean
	ner	nd	wad	dya		ner	nd	wad	dya		wad	dya	
A. Varieties													
BAIF Bajra-1	114.2	194.6	158.9	176.5	161.1	26.2	21.0	16.8	44.8	27.2	0.38	0.28	0.33
AVKB-19	126.2	180.1	156.8	181.0	161.0	55.1	18.3	15.8	45.0	33.6	0.36	0.29	0.33
GFB-1	127.4	193.0	154.2	179.6	163.6	37.6	20.7	16.0	45.8	30.0	0.37	0.32	0.35
SEm <u>+</u>	1.1	3.5	1.3	1.8		1.3	0.8	0.4	0.9		0.01	0.01	
CD (P=0.05)	3.3	10.2	3.6	NS		3.9	2.2	NS	NS		NS	0.03	
B. Cutting management													
No cutting	121.7	224.6	201.8	183.2	182.8	0.0	17.6	17.9	46.6	20.5	0.39	0.31	0.35
First cut at 50 DAS & leave for grain	122.0	200.6	142.7	176.0	160.3	57.4	20.0	16.5	43.8	34.4	0.38	0.28	0.33
First cut at 50 DAS & 2 <sup>nd</sup> cut at 40 days after 1 <sup>st</sup> cut	124.0	1/2 2		178.0	142.4	61.6	22.3		45.3	35.0		0.29	032
and leave for grain		142.2	125.4				22.5	14.2		55.9	0.35		0.52
SEm <u>+</u>	1.1	3.5	1.3	1.8		1.3	0.8	0.4	0.9		0.01	0.01	
CD (P=0.05)	NS	10.2	3.6	5.2		3.9	2.2	1.1	NS		0.02	0.03	
C. Nitrogen levels													
100% of RDN	119.3	183.4	151.4	162.3	154.1	39.0	18.8	15.4	35.8	27.3	0.35	0.26	0.31
150% of RDN	125.9	195.0	161.9	195.1	169.5	40.3	21.2	17.0	48.7	31.8	0.39	0.33	0.36
SEm <u>+</u>	0.9	2.9	1.0	1.5		1.1	0.6	0.3	0.7		0.01	0.01	
CD (P=0.05)	2.7	8.3	3.0	4.2		NS	1.8	0.9	2.1		0.02	0.03	
D. Interaction Variety X Nitrogen levels													
SEm <u>+</u>			2.2	2.6		2.3		0.7	1.3			0.01	
CD (P=0.05)		NS	6.3	NS		6.7	NS	1.9	NS			NS	
CV (%)		7.9					15.6						

Table K-12-AST-1 (c): Growth parameters of dual purpose pearl millet as influenced by varieties, cutting management and nitrogen levels

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Treatment		CP (%) Crude protein Yield (q/ha)												
		Bikan	er D	harwad	Mean	Bikan	er	Anand	Hyderaba	d	Mandya	Dhar	wad	Mean
A. Varieties														
BAIF Bajra-1		8.65	5	6.02	7.34	4.49		4.14	4.73		3.05	5.2	5	4.33
AVKB-19		9.44		5.66	7.55	6.14		4.45	3.89		2.90	4.5	4	4.38
GFB-1		10.6	4	5.73	8.19	6.28		5.72	4.29		2.57	4.7	6	4.72
SEm <u>+</u>		0.01		0.14		0.14		0.10	0.16		0.14	0.0	9	
CD (P=0.05)		0.02	2	NS		0.39		0.30	0.47		0.30	0.2	6	
B. Cutting management														
No cutting		0.00	)	6.42	3.21	0.00		-	0.00		0.0	3.7	5	0.94
First cut at 50 DAS & leave for grain		14.3	6	5.90	10.13	6.69	)	3.27	4.95		4.24	5.7	8	4.99
First cut at 50 DAS & 2 <sup>nd</sup> cut at 40 days		14.3	7		9.73	10.22	2	6.27	7.95		4.29			6.75
after 1 <sup>st</sup> cut and leave for grain				5.10								5.0	1	
SEm <u>+</u>		0.01		0.14		0.14		0.08	0.16		0.14	0.0	9	
CD (P=0.05)		NS		0.40		0.39		0.24	0.47		0.30	0.2	6	
C. Nitrogen levels														
100% of RDN		9.56	5	5.51	7.54	5.49		3.97	3.56		2.34	4.6	3	4.00
150% of RDN		9.60	)	6.10	7.85	5.79		5.97	5.04		3.34	5.0	7	5.04
SEm <u>+</u>		0.01		0.11		0.11		0.08	0.14		0.12	0.0	7	
CD (P=0.05)		0.02	2	0.32		NS		0.24	0.39		0.34	0.2	1	
D. Interaction Entry X Nitrogen levels														
SEm <u>+</u>		0.01		0.24		0.24					0.20	0.1	6	
CD (P=0.05)		0.03	}	0.69		0.68					0.61	0.4	5	
CV (%)								7.38						
Table K-12-AST-1(e): Economics	of dual	purpos	e pearl i	nillet va	rieties a	s influer	nced by	v cutting	g manager	nent a	nd nitrog	en leve	els	
Treatment		· ·	Net mor	etary retui	rn (Rs./ha)				<u> </u>	Ben	efit cost rati	о		
	Bika-	Ana-	Urulika-	Dhar-	Man-	Hydera-	Mean	Ana-	Urulikan-	Bika-	Hydera-	Man	Dhar-	Mean
	ner	nd	nchan	wad	dya	bad		nd	chan	ner	bad	-dya	wad	
A. Varieties														
BAIF Bajra-1	53563	37781	30414	16517	25307	45383	34827	1.77	1.67	3.06	2.50	3.02	1.72	2.29
AVKB-19	60868	26895	24042	13405	14913	16090	26036	1.26	1.53	3.45	1.60	2.19	1.40	1.91
GFB-1	56681	41586	19262	14129	21148	22937	29291	1.95	1.41	3.22	1.82	2.69	1.48	2.10
B. Cutting management														
No cutting	44517	34963	16044	14000	18865	18635	24504	2.05	1.40	2.92	1.72	2.61	1.77	2.08

Table K-12-AST-1(d): Quality parameters of dual purpose pearl millet as influenced by varieties, cutting management and nitrogen levels

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First cut at 50 DAS & leave for grain

after 1st cut and leave for grain

C. Nitrogen levels 100% of RDN

150% of RDN

First cut at 50 DAS & 2<sup>nd</sup> cut at 40 days

55909

70685

53884

60190

38409

32891

30647

40195

21207

36467

24458

24688

18043

12008

14200

15167

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1.82

1.01

1.52

1.55

2.25

1.99

1.89

2.17

2.32

1.87

1.89

2.05

3.15

3.67

3.11

3.38

2.98

2.32

1.81

2.67

1.44

1.77

1.54

1.53

25047

17358

15290

24324

40673

25102

24795

31478

33215

32419

27213

32674

1.80

1.28

1.46

1.86

			Man	dya					Dharv	vad
Treatment		Soil paramet	ers	Availabl	e nutrien (kg/ha)	ts in soil	Available n	utrients in	soil (kg/ha)	Total N uptake by crop (kg/ha)
	рΗ	EC (dsm <sup>-1</sup> )	OC (%)	Ν	Р	K	N	Р	K	
A. Varieties										
BAIF Bajra-1	6.88	0.14	0.59	275.43	25.67	192.53	298.96	8.72	183.94	128.60
AVKB-19	6.94	0.16	0.64	280.45	22.37	189.57	300.23	8.76	184.78	96.71
GFB-1	6.97	0.15	0.63	283.14	20.42	196.32	299.34	8.73	183.24	98.88
SEm <u>+</u>							0.70	0.02	0.88	1.96
CD (P=0.05)							NS	NS	NS	5.64
B. Cutting management										
No cutting	6.95	0.15	0.61	286.73	24.32	192.35	301.67	8.80	188.79	98.69
First cut at 50 DAS & leave for grain	6.96	0.14	0.60	279.75	25.67	182.56	300.23	8.76	182.68	128.35
First cut at 50 DAS & 2 <sup>nd</sup> cut at 40 days	6.89	0.16	0.64	281.62	27.32	186.37				
after 1st cut and leave for grain							296.63	8.66	180.49	97.15
SEm <u>+</u>							0.70	0.02	0.88	1.96
CD (P=0.05)							2.01	0.06	2.52	5.64
C. Nitrogen levels										
100% of RDN	6.91	0.15	0.60	276.19	29.17	190.32	298.43	8.71	182.63	100.39
150% of RDN	6.86	0.18	0.66	283.15	30.45	194.32	300.59	8.77	185.35	115.73
SEm <u>+</u>							0.57	0.02	0.72	1.60
CD (P=0.05)							1.64	0.05	2.06	4.60
Initial	6.98	0.13	0.58	298.16	34.13	203.58				

Table K-12-AST-1 (f): Effect of varieties, cutting management and nitrogen levels on soil fertility parameters after harvest of crop

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## PS-12-AST-1: Effect of nutrient management on productivity of perennial grasses under low land condition [(Table Reference: PS-12-AST-1 (a) to 1(d-1)] Locations: Bhubaneswar, Jorhat, Jabalpur, Kalyani

A field experiment was started during *kharif* 2012 (establishment year) at four locations to evaluate the performance of lowland grasses in relation to crop establishment, forage productivity and nutrient management. The treatments consisted of three grasses (para grass, koronga dol (*Saciolapsis interupta*) and local dol (*Hymanchne emplexicalis*) at Jorhat; para grass (*Brachiaria mutica*), humidicola grass (*Brachiaria humidicola*) and dol grass (*Hymanchne emplexicalis*) at Bhubaneswar; para grass, humidicola and guinea grasses at Jabalpur and para, humidicola and *Arundo donax* grasses at Kalyani) and four nutrient management practices (M<sub>1</sub>-100 % NPK through inorganic fertilizers; M<sub>2</sub>- 50 % NPK through inorganic fertilizers + FYM@ 5t/ha; M<sub>3</sub>-FYM@5t/ha and M<sub>4</sub>-farmer practice (without nutrient) laid out in FRBD and replicated three times. Data of second year experimentation (first year of Kalyani) is presented in Tables PS-12-AST-1 (a) to (d-1).

At **Jorhat**, significantly higher green fodder and dry matter yield was observed with local dol grass over para and koronga dol grasses. All the nutrient management practices resulted in significantly higher GFY over farmer's practice. However, highest GFY of low land grasses was obtained with application of 50 % NPK (inorganic fertilizers) + FYM 5t/ha but it remained at par with 10t/ha FYM. Application of 100 % (inorganic fertilizer), 50 % NPK (inorganic fertilizer) + FYM 5t/ha and 10 t FYM/ha increased green fodder yield by 28.5, 42.9 and 39.3%, respectively over farmer's practice. The corresponding values for DMY were 28.8, 43.1 and 39.5% higher respectively. The data on interaction between grasses and nutrient management practices revealed that planting of local dol with 50 % NPK (inorganic fertilizer) + 5 tFYM/ha produced significantly highest GFY (989.7 q/ha) and DMY (210.1 q/ha) over rest of the combinations. Among the grasses growing of para grass being at par with local dol (12.3 q/ha) recorded significantly highest CPY (12.5 q/ha) over koronga dol grass. With respect to nutrient management application of 50 % NPK (inorganic fertilizer) + 5 tFYM/ha recorded significantly highest CPY (13.7 q/ha) over rest of the treatments.

At **Bhubaneswar**, para grass produced significantly highest GFY (559.8q/ha), DMY (95.2q/ha), CPY (3.28q/ha), net returns (Rs. 39196/ha) and benefit cost ratio (2.54) over humidicola and dol grasses. Among nutrient management practices, application of 50 % NPK (inorganic fertilizer) + 5 t FYM/ha produced significantly highest GFY (419 q/ha), DMY (71.7 q/ha being at par with 100 % NPK through inorganic), CPY (2.79q/ha) and CP content (3.93%) over rest of the treatments. However, all nutrient management practices gave statistically higher GFY over farmer's practice. Application of 50 % NPK (inorganic fertilizer) + 5 t FYM/ha in low land grasses increased GFY by 3.9, 9.8 and 23.9 % over 100 % NPK through inorganic fertilizer, FYM 10 t/ha and farmer's practice, respectively. The corresponding values for DMY were 3.1, 7.7 and 22.4 % higher, respectively. The planting of para grass supplemented with 50 % NPK (inorganic fertilizer) + 5 t FYM/ha recorded highest GFY and DMY compared to rest of the treatment combinations.

At **Kalyani**, planting of para grass recorded significantly highest GFY (476.8q/ha), DMY (190.6 q/ha), and CPY (15.1 q/ha) over *Brachiaria humidicola* and *Arundo donax* grasses. With respect to nutrient management practices, application of 100 % NPK (inorganic fertilizer) to lowland grasses being at par with FYM 10t/ha recorded significantly highest GFY (322.9q/ha) over rest of the treatments. Where as highest DMY (129.5q/ha) was recorded with application of 50 % NPK through inorganic fertilizer + FYM 5t/ha in low land grasses. With respect to interaction effect, planting of para grass supplemented with 100 % NPK through inorganic fertilizers produced highest GFY (505 q/ha) of lowland grasses over rest of the combinations.

At **Jabalpur**, planting of para grass (*Brachiaria mutica*) recorded significantly highest GFY (408.5q/ha), DMY (53.4q/ha), CPY (2.8q/ha) and net monetary return (Rs. 24171/ha/year) over *Brachiaria humidicola* and guinea grasses. All nutrient management practices gave statistically higher GFY of grasses over farmer's practice. Application of 100 % NPK through inorganic fertilizers recorded highest GFY (235.6q/ha), DMY (41.5q/ha), CPY (2.3 q/ha) and net monetary return (Rs. 12415/ha/yr). Growing of para grass supplemented with 100 % NPK through inorganic fertilizers recorded highest GFY (459.8q/ha) and DMY (60.2 g/ha) over rest of the combinations.

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Treatments	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Plant height (cm) (3 <sup>rd</sup> Cut)	Tiller/tussock
A. Grasses					
G1: Para grass	789.8	177.7	1251.9	178.1	47.0
G2: Koronga Dol (Saciolapsis interupta)	750.4	159.1	1076.5	83.8	43.5
G3: Local Dol (Hymanchne emplexicalis)	858.7	182.1	1230.2	84.3	54.0
SEm <u>+</u>	5.8	1.3	9.6	1.4	0.7
CD (P=0.05)	19.6	4.3	37.3	4.6	2.3
B. Nutrient Management					
M1: 100 % NPK (inorganic fertilizer)	805.1	174.3	1220.4	116.1	46.9
M2: 50 % NPK (inorganic fert) +FYM 5t/ha	894.7	193.6	1370.6	118.1	51.4
M3: FYM 10t/ha	872.3	188.7	1317.2	118.4	50.6
M4: Farmer's practice (No nutrient)	626.3	135.3	836.5	108.9	43.7
SEm <u>+</u>	6.7	1.5	11.1	1.6	0.8
CD (P=0.05)	22.6	5.0	37.3	5.3	2.6
C. Interaction: Grasses X Nutrient Management					
SEm <u>+</u>	11.7	2.6	19.2	2.7	1.3
CD (P=0.05)	39.2	8.6	64.6	NS	NS
CV (%)	12.5	2.6	2.8	4.1	4.8

Table PS-12-AST-1 (a): Effect of nutrient management on productivity of perennial grasses under low land conditions at Jorhat

Table PS-12-AST-1 (a-1): Interaction effect of nutrient management and grasses on green fodder and dry matter yields under Lowland	
Conditions at Jorhat	

Entries		Gree	n fodder yield	(q/ha)		Dry matter yield (q/ha)							
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean			
G1	823.7	900.0	869.7	565.7	789.8	185.4	202.5	195.7	127.3	177.7			
G2	771.0	794.3	806.3	630.0	750.4	163.7	168.2	171.0	133.5	159.1			
G3	820.7	989.7	941.0	683.3	858.7	173.7	210.1	199.5	145.1	182.1			
Mean	805.1	894.7	872.3	626.3		174.3	193.6	188.7	135.3				
	М	G	MXG				М	G	MXG				
SEm <u>+</u>	6.7	5.8	11.7			SEm <u>+</u>	1.5	1.3	2.6				
CD (P=0.05)	22.6	19.6	39.2			CD (P=0.05)	5.0	4.3	8.6				
CV (%)			12.5			CV (%)			2.6				

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Treatments	Green fodder yield	Dry matter yield	Crude protein yield	Crude protein	Net returns	Benefit cost
rreatments	(q/ha)	(q/ha)	(q/ha)	(%)	(Rs.)	ratio
A. Grasses						
G1: Para grass (Brachiaria mutica)	559.8	95.2	3.28	3.44	39196	2.54
G2: Humidicola grass (Brachiaria humidicola)	393.3	68.2	2.83	4.14	23796	1.74
G3: Dol grass (Hymanchne emplexicalis)	203.8	36.5	1.40	3.84	6846	0.73
SEm <u>+</u>	4.6	1.8	0.07	0.02	461.5	0.03
CD (P=0.05)	13.5	5.3	0.21	0.06	1353.5	0.10
B. Nutrient Management						
M1: 100% NPK (inorganic fertilizer)	403.3	69.6	2.58	3.77	27088	1.95
M2: 50% NPK through inorganic fertilizer +	419.0		2 70	3.93	24761	1.38
FYM @ 5 t/ha		71.7	2.19			
M3: FYM @ 10 t/ha	381.7	66.6	2.52	3.83	16467	0.74
M4: Farmer's practice (No nutrient)	338.3	58.6	2.13	3.68	24800	2.61
SEm <u>+</u>	4.0	1.7	0.06	0.02	399.7	0.03
CD (P=0.05)	11.7	4.6	0.19	0.06	1172.1	0.08
C.Interaction: Grasses X Nutrient						
Management						
SEm <u>+</u>	8.0	3.1	0.13	0.04	799.4	0.06
CD (P=0.05)	23.4	9.2	0.37	0.11	2344.3	0.17
CV (%)	3.6	8.1	8.73	1.71	5.9	6.00

Table PS-12-AST-1 (b): Effect of nutrient management on productivity of perennial grasses under low land conditions at Bhubaneswar

Table PS-12-AST-1 (b-1): Interaction effect of nutrient management and grasses on green fodder and dry matter yields under low land Conditions at Bhubaneswar

Entries		Gree	n fodder yield	(q/ha)		Dry matter yield (q/ha)							
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean			
G1	590.0	607.0	560.0	482.0	559.8	100.4	102.1	96.3	81.9	95.2			
G2	410.0	422.0	389.0	352.0	393.3	70.5	72.3	68.5	61.6	68.2			
G3	210.0	228.0	196.0	181.0	203.8	37.8	40.8	35.1	32.2	36.5			
Mean	403.3	419.0	381.7	338.3		69.6	71.7	66.6	58.6				
	М	G	MXG				М	G	MXG				
SEm <u>+</u>	4.0	4.6	8.0			SEm <u>+</u>	1.6	1.8	3.1				
CD (P=0.05)	11.7	13.5	23.4			CD (P=0.05)	4.6	5.3	9.2				
CV (%)		3.6				CV (%)		8.1					

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Treatments	Green fodder yield	Dry matter yield	Crude protein yield	Crude protein	Leaf stem
A. Grasses	(q/lia)	(q/iia)	(q/iia)	(70)	1410
G1: Para grass (Brachiaria mutica)	476.8	190.6	15.1	7.9	0.59
G2: Humidicola grass (Brachiaria humidicola)	267.6	87.7	5.4	6.2	0.59
G3: Guinea grass	173.9	70.2	5.3	7.4	0.68
SEm <u>+</u>	3.9	2.3	0.2		
CD (P=0.05)	11.5	6.8	0.5		
B Nutrient Management					
M1: 100 % NPK (inorganic fertilizer)	278.7	97.2	6.1	6.0	0.55
M2: 50% NPK through inorganic fertilizer + FYM @ 5t/ha	313.3	116.4	8.0	6.6	0.59
M3: FYM @ 10t/ha	309.4	129.5	10.1	7.6	0.64
M4: Farmer practice (no nutrient)	322.9	121.6	10.3	8.3	0.71
SEm <u>+</u>	4.5	2.7	0.2		
CD (P=0.05)	13.2	7.8	0.6		
C. Interaction: Grasses X Nutrient Management					
SEm <u>+</u>					
CD (P=0.05)					
CV (%)					

Table PS-12-AST-1 (c): Effect of nutrient management on productivity of perennial grasses under low land conditions at Kalyani

Table- PS-12-AST-1 (c-1):	Interaction eff	fect of n	utrient	management	and grass	es on	green	fodder	and	dry	matter	yields	under	low	land
conditions at Kalyani															

Entries		Gree	n fodder yield	(q/ha)		Dry matter yield (q/ha)					
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean	
G1	448.7	473.2	480.5	505.0	476.9	153.3	186.2	215.9	206.8	190.6	
G2	243.8	289.2	256.0	281.3	267.6	86.1	88.6	88.2	87.9	87.7	
G3	143.7	177.7	191.7	182.5	173.9	52.1	74.6	84.2	70.1	70.3	
Mean	278.7	313.4	309.4	322.9		97.2	116.5	129.4	121.6		
	М	G	MXG				М	G	MXG		
SEm <u>+</u>						SEm <u>+</u>					
CD (P=0.05)						CD (P=0.05)					
CV (%)						CV (%)					

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Trastments	Green fodder yield	Dry matter yield	Crude protein yield	Crude protein	Net returns
Treatments	(q/ha)	(q/ha)	(q/ha)	(%)	(Rs.)
A. Grasses					
G1: Para grass (Brachiaria mutica)	408.5	53.4	2.8	4.7	24171.3
G2: Humidicola grass (Brachiaria humidicola)	160.8	30.5	2.4	5.3	7647.2
G3: Dol grass (Hymanchne emplexicalis)	54.5	28.1	1.5	4.6	-8977
SEm <u>+</u>	10.1	2.1	0.1	0.1	55.0
CD (P=0.05)	30.4	6.4	0.2	0.3	165.0
B. Nutrient Management					
M1: 100% NPK (inorganic fertilizer)	235.6	41.5	2.3	4.8	12414.7
M2: 50% NPK through inorganic fertilizer + FYM @ 5 t/ha	226.4	40.1	2.3	4.8	7605.1
M3: FYM @ 10 t/ha	203.9	36.8	2.3	4.9	786.7
M4: Farmer's practice (No nutrient)	165.8	31.1	2.2	5.1	9648.9
SEm <u>+</u>	11.1	1.1	0.04	0.1	48.0
CD (P=0.05)	34.3	3.3	0.12	0.3	144.0
C. Interaction: Grasses X Nutrient Management					
SEm <u>+</u>	3.0	0.2	0.07	0.1	27.0
CD (P=0.05)	11.0	0.7	0.21	0.2	81.0
CV (%)	10.0	8.0	3.40	3.0	14.0

Table PS-12-AST-1 (d): Effect of nutrient managem	nent on productivity of perennial	grasses under low land conditions at Jabalpur

Table PS-12-AST-1 (d-1): Interaction effect of nutrient management and grasses on green fodder and dry matter yields under low land conditions at Jabalpur

Entrico		Gree	n fodder yield	(q/ha)		Dry matter yield (q/ha)				
Entries	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean
G1	459.8	451.2	402.2	320.7	408.5	60.2	59.1	52.6	41.8	53.4
G2	182.9	172.0	158.1	130.1	160.8	34.9	32.7	30.0	24.5	30.5
G3	64.1	56.1	51.3	46.7	54.5	29.4	28.3	27.7	27.1	28.1
Mean	235.6	226.4	203.9	165.8		41.5	40.1	36.8	31.1	
	М	G	MXG				М	G	MXG	
SEm+	11.1	10.1	3.0			SEm+	1.1	2.1	0.2	
CD (P=0.05)	34.3	30.4	11.0			CD (P=0.05)	3.3	6.4	0.7	
CV (%)		10.0				CV (%)		8.0		

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### CS-12-AST-1: Effect of stubble management and INM on forage productivity in rice-oat cropping system

#### Location: Jorhat and Bhubaneswar

This was the third year of experimentation at Jorhat (second year at Bhubaneshwar) to study the effect of different cutting height of rice stubble and INM on crop establishment and forage productivity of oat. The results of the complete sequence will be reported in annual report of *Rabi* 2014-15.

### CS-13-AST-1: Study on different models for year round green fodder production under irrigated conditions

#### Location: Anand, Urulikanchan, Bikaner and Rahuri

This was the second year of experimentation to study the different combinations of perennial and seasonal fodder crops for productivity and to identify suitable crop combinations. After completion of sequence, result will be reported in annual report of *Rabi* 2014-15.

#### CS-13-AST-2: Evaluation of fodder crops under different rice fallow system

Location: Ranchi, Jabalpur and Bhubaneswar

This was the second year of experimentation at three locations to assess the impact of different methods of rice cultivation on establishment, yield and economics of fodder crops. After completion of the cropping sequence, results of second year experimentation will be reported in annual report of Rabi 2014-15.

### PS-14-AST-1: Effect of straw mulch on the water requirement, weeds and productivity of BN hybrid

#### Location: Ludhiana, Hisar, Bikaner and Raipur

A new experiment was started in summer 2014 with a view to study the effect of mulch and irrigation on water requirement, weed density and productivity of BN hybrid. Results of first year experimentation will be reported in annual report of Rabi 2014-15.

## CS-13-AST-3: Evaluation of different varieties of grasspea (*Lathyrus sativus* L.) as forage crop under different sowing methods in rice based cropping system Location: Raipur and Jorhat

# This experiment was started in *kharif* 2013 at two locations to compare the biomass and grain yield production among different varieties of grasspea under different sowing methods. After completion of the cropping sequence, data of second year experimentation will be reported in annual report of *Rabi* 2014-15.

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#### **B. LOCATION SPECIFIC TRIALS**

### PS-11-AST-2: Effect of levels of nitrogen on productivity of perennial grasses with and without tree shade [Table Reference: PS-11-AST-2 (a) to (c)]

#### Location: Jorhat

A field experiment was conducted by growing two perennial grasses Setaria (*Setaria sphacelata*) and Congosignal (*Brachiaria brizantha*) under the trees of Machillus *bombycini* under three levels of N at the Assam Agricultural University, Jorhat with split plot design replicated thrice. This is the third year of experiment. The treatment in the main plots comprised of tree shade and open condition. In the sub plot, six treatment combinations consisting of two perennial grasses (Setaria and Congo signal) and three levels of nitrogen (<25% RDNF, RDNF and >25% RDNF). RDNF stands for recommended dose of nitrogenous fertilizer along with common recommended fertilizer dose for phosphorus and potash to all the treatments.

Perusal of the data presented in PS-11-AST-2(a) revealed that the perennial grasses yielded 32% higher green forage and 25% higher dry matter under open condition than under shaded condition. Congosignal resulted in significantly higher green forage yield than Setaria. Same trend was also observed in respect of dry matter yield. It was revealed that with increasing levels of nitrogen, green fodder yield increased significantly under both the conditions. Increase in green fodder production was noticed with every increment of nitrogen level over its preceding level.

The highest crude protein yield was recorded in the treatment receiving 25 per cent > RDNF which was found to be significantly superior over RDNF, 25 per cent < RDNF. The effect of perennial grasses on tiller/tussock was found to be significant at all the cuts. No significant difference between for the factors viz; shade, perennial grasses and N levels on net monetary return was observed.

Interaction effect between shade x perennial grass and shade x nitrogen levels were found to be significant in respect of green fodder yield, dry matter yield, and total crude protein yield. However interaction effect on net monetary return was significant only with the combination of perennial grass x N levels and shade x perennial grass. Interaction effects of shade X perennial grass, shade X N levels and perennial grass X N levels were found to be significant in respect of plant height. However in respect of tiller/tussock interaction effect was significant except shade X N levels.

Treatments	Total GFY	Total DMY	Total CPY	NMR
	(q/ha)	(q/ha)	(Kg/ha)	(Rs/ha/year)
A.Growing condition				
Tree shade	889.3	190.9	1381.4	86947
Open	1176.6	255.3	1737.5	91065
SEm (±)	28.3	5.9	7.6	3240
CD (P=0.05)	95.3	20.0	25.7	NS
B. Perennial Grass				
Setaria	940.4	203.3	1394.8	280591
Congosignal	1125.5	242.9	1724.2	344511
SEm (±)	28.3	5.9	7.6	3240
CD (P=0.05)	95.3	20.0	25.7	NS
C.N levels				
25% <rdnf< td=""><td>1000.6</td><td>217.8</td><td>1493.7</td><td>101637</td></rdnf<>	1000.6	217.8	1493.7	101637
RDNF	1028.3	224.5	1539.7	103177
25%>RDNF	1070.0	227.1	1644.8	107737
S.Em ±	12.9	2.9	8.8	3742
CD (P=0.05)	42.3	7.1	29.7	NS
D. Interaction				
SxP				
SEm (±)	40.0	8.4	10.8	4582
CD (P=0.05)	134.7	28.3	36.4	NS
SxN				
SEm (±)	56.6	11.9	15.3	6481
CD (P=0.05)	190.5	40.0	51.4	21812
NxP				
SEm (±)	56.6	11.9	15.3	6481
CD (P=0.05)	190.5	40.0	51.4	21812
CV (%)	13.4	13.1	15.1	15.0

Table PS-11-AST-2(a): Effect of levels of nitrogen on productivity of perennial grass with and without tree shade.

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Table PS-11-AST-2 (b) Interaction effect of growing condition and nitrogen levels on total GFY of grasses (q/ha)

Two way table for	Shade x Perei	nnial Grass		Two way	table for s	hade and	nitrogen le	evels
	P1	P2	Total	Mean	N1	N2	N3	Mean
S1	768.9	1009.8	1778.7	889.3	854.5	892.7	920.8	889.3
S2	1112.0	1241.2	2353.2	1176.6	1146.7	1164.0	1219.2	1176.6
Mean	940.4	1125.5			1000.6	1028.3	1070.0	
Two way table for	Perennial gras							
	N1	N2	N3	Mean				
P1	913.7	942.2	965.5	940.4				
P2	1087.5	1114.5	1174.5	1125.5				
Total	2001.2	2056.7	2140.0					
Mean	1000.6	1028.3	1070.0					
	S	Р	N	SxP	S x N	РхN		
S.Em <u>+</u>	28.30		12.3	40.0	56.6	56.6		
CD (P=0.05)	95.3	95.3	41.3	134.7	190.5	190.5		
CV (%)	13.4							

Table PS-11-AST-2 (c) Interaction effect of growing condition and nitrogen levels on total dry matter yield of grasses (q/ha)

Two way table for	Shade x Per	ennial Grass	6	Two way tab	le for Shade x	Nitrogen leve	els
	P1	P2	Mean	N1	N2	N3	Mean
S1	165.4	216.6	190.9	186.8	196.4	189.7	190.9
S2	241.3	269.2	255.3	248.8	252.5	264.5	255.3
Mean	203.3	242.9		217.8	224.5	227.1	
Two way table for	Perennial gra	ass x Nitroge	en levels				
	N1	N2	N3	Mean			
P1	198.9	204.4	206.6	203.3			
P2	236.7	244.5	247.6	242.9			
Mean	217.8	224.5	227.1				
	S	Р	N	S x P	SxN	РхN	
S.Em <u>+</u>	5.9	5.9	2.9	8.4	11.9	11.9	
CD (P=0.05)	20.0	20.0	7.1	28.3	40.0	40.0	
CV (%)	13.1						

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### K-12-AST-2: Effect of time of sowing and seed rate on performance of fodder maize (*Zea mays*) under rainfed condition (Table Reference: K-12-AST-2 (a) to (b))

#### Location: Imphal

This was the third (final) year of experimentation. The experiment was laid out in FRBD with three replications and nine treatments. The treatments consist of three different date of sowing (26<sup>th</sup> May, 4<sup>th</sup> June, and 14<sup>th</sup> June) and seed rate (40 kgha<sup>-1</sup>, 60 kgha<sup>-1</sup> and 80 kgha<sup>-1</sup>). The data of third year experimentation is presented in Table K-12-AST-2 (a) to (b). The results revealed that among different dates of sowing, maize sown on 26<sup>th</sup> May produced significantly highest GFY (501.25 q/ha), DMY (124.79 q/ha), plant height (264.9cm), net return (Rs. 59017/ha) and benefit cost ratio (3.65). Maize sown at seed rate of 80 kg/ha recorded maximum GFY (424.1q/ha), DMY (102 q/ha) and leaf stem ratio (0.68). However, highest crude protein yield (7.86 q/ha) and crude protein content (7.72 %) was found at maize sown with a seed rate of 60 kg/ha. The green fodder yield of crop sown on 26<sup>th</sup> May has 28.49% and 44.67% superiority over crop sown on 4<sup>th</sup> June and 14<sup>th</sup> June, respectively. While, seed rate of 80 kg/ha has 4.53% and 3.96% more superiority over seed rate of 40 kg/ha and 60 kg/ha, respectively in terms of green fodder yield.

The combined effect of date of sowing and seed rate had significant influence on GFY, net return and benefit cost ratio.

Treatment	GFY	DMY	CPY	Crude	Plant	Leaf	Net return	B: C
	(q/ha)	(q/ha)	(q/ha)	protein (%)	height (cm)	stem	(Rs./ha)	ratio
						ratio		
A. Date of sowing								
D <sub>1</sub> : 26 <sup>th</sup> May	501.3	124.8	10.26	8.20	264.9	0.72	59017	3.65
D <sub>2</sub> : 4 <sup>th</sup> June	390.1	99.5	7.00	7.09	235.6	0.60	41679	2.47
D <sub>3</sub> : 14 <sup>th</sup> June	346.5	80.2	5.63	7.02	224.9	0.62	34468	1.97
SEm+	2.7	2.6	0.44	0.32	1.9	0.02	398	0.02
CD (P=0.05)	7.9	7.8	1.32	NS	5.9	NS	1192	0.07
B. Seed rate(kg/ha)								
S <sub>1</sub> : 40	405.7	101.9	7.58	7.37	246.2	0.61	46005	2.75
S <sub>2</sub> : 60	407.9	100.4	7.86	7.72	247.8	0.64	44460	2.67
S3: 80	424.1	102.2	7.45	7.22	231.6	0.68	44699	2.68
SEm+	2.7	2.6	0.44	0.32	1.9	0.02	398	0.02
CD (P=0.05)	7.9	7.8	1.32	NS	5.9	0.07	1192	0.07
C.Interaction: D X S								
SEm <u>+</u>	4.6	4.5	0.76	0.55	3.4	0.04	689	0.04
CD (P=0.05)	13.8	13.5	NS	NS	10.2	NS	2064	0.12

Table K-12-AST-2 (a): Effect of time of	sowing and	seed rate	on yield,	growth	parameters	and
economics of fodder maize under rainfed	l condition.					

Table K-12-AST-2 (b): Interaction effe	ect of time of sowing	ng and seed rate or	n green fodder	yield and
net return of fodder maize under rain	fed condition.			

Treatment	Ū.	Green foddei	r yield (q/ha)			Net return (Rs./ha)							
	S₁	S <sub>2</sub>	S₃	Mean	S <sub>1</sub>	S <sub>2</sub>	S₃	Mean					
<b>D</b> <sub>1</sub>	476.9	536.3	490.5	501.3	55374	64280	57399	59017					
<b>D</b> <sub>2</sub>	390.5	343.7	436.0	390.1	48570	34720	41745	41679					
<b>D</b> <sub>3</sub>	349.7	343.8	345.9	346.5	34072	34378	34953	34468					
Mean	405.7	407.9	424.1		46005	44460	44699						
	Date of	Seed	Date of sowing x		Date of	Seed rate	Date of so	wing x Seed					
	sowing	rate	Seed	l rate	sowing		r	ate					
SEm <u>+</u>	4.3	4.3	7	.4	644	644	1115						
CD	12.9	12.9	22	2.3	NS	NS	3342						
(P=0.05)													
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#### K-12-AST-3: Performance of fodder rice bean as influenced by dates of sowing and spacing [Table Reference: K-12-AST-3 (a) to (b)]

#### Location: Imphal

The experiment was initiated during *kharif* 2012 at CAU, Imphal with a view to assess performance of fodder rice bean [*Vigna umbellate* (Thumb) Ohwi and Ohashi] as influenced by dates of sowing and spacing. This was the third year of experimentation. The experiment was laid out in FRBD with two factors *viz.* date of sowing (26<sup>th</sup> May, 4<sup>th</sup> and 14<sup>th</sup> June) and spacing (25 cm, 35 cm and 45 cm row to row). The results revealed that there was significant effect of date of sowing and spacing on GFY, DMY, plant height and economics of fodder rice bean. The green fodder yield of crop sown on 26<sup>th</sup> May has 169.45% and 39.61% superiority over crop sown on 14<sup>th</sup> June and 4<sup>th</sup> June, respectively. While, spacing of 25 cm row to row has 8.29% and 3.51% superiority over spacing of 45 cm and 35 cm in terms of green fodder yield. Economic point of view, net monitory return and benefit cost ratio were also followed the same trend. Crude protein content (%) and crude protein yield (q/ha) was found to be non-significant on both the factors under study.

With respect to interactive effect, sowing of rice bean on 26<sup>th</sup> May with a row to row spacing of 35 cm produced maximum yield (321.9q/ha) and net monetary return (Rs. 32902/ha) over rest of the combinations.

Treatment	GFY	DMY	CPY	Crude	Plant height	L:S	Net return	B:C
	(q/ha)	(q/ha)	(q/ha)	protein (%)	(cm)		(Rs./ha)	ratio
A. Date of sowing								
26 <sup>th</sup> May (D <sub>1</sub> )	315.4	71.2	8.6	12.1	162.9	0.71	31913	2.07
4 <sup>th</sup> June (D <sub>2</sub> )	225.9	48.8	5.4	11.2	119.9	0.92	18491	1.20
14 <sup>th</sup> June (D <sub>3</sub> )	117.0	34.7	3.9	11.3	112.7	0.84	11163	0.72
SEm <u>+</u>	2.4	1.1	0.3	0.4	2.2	0.03	357	0.02
CD (P=0.05)	7.1	3.3	NS	NS	6.6	0.09	1069	0.07
B. Spacing (row to								
row)								
25 cm (S1)	248.6	52.9	6.5	12.0	135.1	0.74	21896	1.42
35 cm (S <sub>2</sub> )	240.2	52.6	6.0	11.4	124.8	0.94	20630	1.34
45 cm (S <sub>3</sub> )	229.6	49.0	5.5	11.1	135.7	0.80	19041	1.23
SEm <u>+</u>	2.4	1.1	0.3	0.4	2.2	0.03	357	0.02
CD (P=0.05)	7.1	3.3	0.9	NS	6.6	0.09	1069	0.07
C. Interaction: D X S								
SEm <u>+</u>	4.1	1.9	0.5	0.7	3.8	0.05	618	0.04
CD (P=0.05)	12.4	5.7	NS	NS	11.4	NS	1852	0.12

Table K-12-AST-3	(a):	Effect	of	date	of	sowing	and	spacing	on	yields,	growth	attributes	and
economics of rice l	bean												

Table K-12-AST-3 (b): Interaction effect of date of sowing and spacing on GFY and net return of rice bean

Treatment	G	Green fodder	yield (q/ha)			Net retu	ırn (Rs./ha)	
	<b>S</b> 1	<b>S</b> <sub>2</sub>	S <sub>3</sub>	Mean	S <sub>1</sub>	<b>S</b> <sub>2</sub>	S₃	Mean
<b>D</b> <sub>1</sub>	309.1	323.6	313.4	315.4	30974	33141	31624	31913
D2	254.2	220.0	203.4	225.9	22741	17608	15124	18491
<b>D</b> <sub>3</sub>	182.4	176.9	171.8	177.0	11974	11141	10374	11163
Mean	248.6	240.2	229.6		21896	20630	19041	
	Date of	Spacing	Date of s	sowing x	Date of	Spacing	Date of so	wing x Spacing
	sowing		Spa	cing	sowing			
SEm <u>+</u>	2.4	2.4	4	.1	357	357		618
CD			11	2.4				
(P=0.05)	7.1	7.1	12	2.4	1069	1069		1852

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### PS-12-AST-3: Enhancing the production potential of various forage crops in coconut gardens through nutrient management. [Table Reference: PS-12-AST-3(a) to (b)]

#### Location: Mandya

The experiment was initiated during *Kharif* 2012 to assess the performance of different crops and nutrient levels on productivity, quality and economics of forage crops in coconut garden. The treatment consisted of three crops (C<sub>1</sub>-BN hybrid, C<sub>2</sub>-guinea and C<sub>3</sub>-signal grass) and three levels of NPK (100% RDNF, 125% RDNF, and 150% RDNF) laid out in FRBD and replicated three times. Result of second year experimentation revealed that BN hybrid recorded significantly highest GFY (645.9q/ha), DMY (132.9q/ha) and net monetary returns (Rs.30463 /ha) over guinea & signal grass. The application of 150% RDF to different crop(s) recorded highest GFY (589.6q/ha), DMY (131.6q/ha), CPY (10.2q/ha), net monetary returns (Rs.28405/ha) & benefit cost ratio (2.81). Interaction effect among the crops & nutrient levels were found significant with respect to GFY, DMY & CPY. The maximum light interception in the bottom and middle of the canopy was observed in BN hybrid with application of 150% RDNF (46.95%, and 37.90% respectively).

Table	PS-12-AST-3(a):	Effect	of	crops	and	nutrient	levels	on	growth	attributes,	yield	and
econo	mics of forages u	nder co	ocor	nut garo	dens							

Treatment	Plant height (cm)	L:S ratio	GFY (q/ha	DMY (q/ha	CPY q/ha	Net returns (Rs./ha)	B: C ratio
A. Crops							
BN Hybrid	96.4	0.66	645.9	132.9	9.4	30463	2.70
Guinea grass	76.3	0.67	492.6	117.8	9.9	23956	2.84
Signal grass	53.1	0.52	455.4	115.7	8.1	21751	2.77
SEm <u>+</u>	1.5	0.015	11.8	4.1	0.2	-	-
CD (P=0.05)	4.4	0.045	35.3	12.3	0.7	-	-
B. Nutrients Le	evels (Kg/ha)						
100 % RDF	63.0	0.56	479.2	113.8	7.9	22784	2.75
125 % RDF	72.4	0.58	525.2	120.9	9.3	24982	2.74
150 % RDF	90.4	0.67	589.6	131.6	10.2	28405	2.81
SEm <u>+</u>	1.5	0.015	11.8	4.1	0.2	-	-
CD (P=0.05)	7.3	0.045	35.3	12.3	0.7	-	-
Interaction							
SEm <u>+</u>	2.6	0.015	10.0	7.1	0.5	-	-
CD (P=0.05)	7.7	NS	30.2	21.2	NS	-	-

 Table PS-12-AST-3 (a-1): Interaction effect of forage crops and nutrients level on green fodder yield

 Green fodder yield (g/ha)

		Groon loador Jiola (gina)		
Crono		Nutrien	nts level	
Crops	100 % RDF	125% RDF	150 % RDF	Mean
BN hybrid	585.9	630.1	721.8	645.9
Guinea grass	452.5	491.4	533.9	492.6
Signal grass	399.2	454.0	512.9	455.4
Mean	479.2	525.2	589.6	531.3
	Crops	Nutrients	Crops X Nutrients	
S.Em <u>+</u>	11.8	11.0	10.0	
CD (P=0.05)	35.3	33.0	30.2	
CV (%)	9.6	-	-	

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		Dry matter yield (q/ha)		
Grane		Nutrie	nts level	
Crops	100 % RDF	125% RDF	150 % RDF	Mean
BN hybrid	123.1	126.2	149.3	132.9
Guinea grass	110.5	118.4	124.3	117.8
Signal grass	107.8	118.1	121.3	115.7
Mean	113.8	120.9	131.6	122.1
	Crops	Nutrients	Crops x Nutrients	
S.Em <u>+</u>	4.1	3.1	7.1	
CD (P=0.05)	12.3	9.3	21.2	
CV (%)	10.1	-	-	

Table PS-12-AST-3 (a-2): Interaction effect of forage crops and nutrients level on dry matter yield (q/ha)

### Table PS-12-AST-3 (b): Interaction effect of forage crops and nutrients level on light interception at bottom and middle of the canopy

Tractmente	Bottom of t	he canopy	Middle of t	he canopy
Treatments	Percent light availability	Percent light Interception	Percent light availability	Percent light Interception
BN hybrid + 100% Nutrients level	59.23	40.77	70.23	29.77
BN hybrid + 125% Nutrients level	54.87	45.13	65.21	34.79
BN hybrid + 150% Nutrients level	53.05	46.95	62.10	37.90
Guinea grass + 100% Nutrients level	62.14	37.86	80.20	19.80
Guinea grass + 125% Nutrients level	63.33	36.67	76.52	23.48
Guinea grass + 150% Nutrients level	60.70	39.30	73.20	26.80
Signal grass + 100% Nutrients level	66.55	33.45	70.23	29.70
Signal grass + 125% Nutrients level	63.25	36.75	66.25	33.75
Signal grass + 150% Nutrients level	60.00	40	65.50	34.50

#### K-12-AST-4: Cropping system studies in fodder maize with legume intercropping

#### Location: Srinagar

This experiment was started in *Kharif* 2012 to evaluate the forage production potential of maize and legume intercropping in terms of total dry matter production and quality. Due to flood in *kharif* 2014 (third year of experimentation) at Srinagar, trial was failed.

### K-12-AST-5: Effect of varying seed rate of forage legumes on productivity of fodder maize Location: Srinagar

This experiment was started in *Kharif 2012* to study the effect of varying seed rate of forage legumes on productivity of fodder maize. Due to flood in *Kharif* 2014 (third year of experimentation) at Srinagar, trial was failed.

### PS-12-AST-2: Performance of bajra napier hybrid grass as influenced by micronutrients under irrigated conditions

#### Location: Coimbatore

This trial was initiated during *kharif* 2012 with an objective to study the conjoint application of organic manure, inorganic fertilizers and micronutrients on forage yield, economics of production and soil properties. The kharif 2012 was considered as establishment year and data of third year experimentation will be reported in annual report of Rabi 2014-15.

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### CS-13-AST-4: Residual effect of P applied to wheat on the succeeding summer fodders in sorghum-wheat-summer fodders cropping system [Table Reference: CS-13-AST-4 (a) to (b)]

#### Location: Ludhiana

The experiment was initiated during *Kharif* 2013 at PAU, Ludhiana with a view to identify suitable summer fodder crop in sorghum-wheat-summer fodder cropping system and to study the residual effect of P applied to wheat on succeeding summer fodder crops. The treatments consisted of three summer fodders (cowpea, maize and bajra) and five levels of P applied to summer fodders (control, 25, 50, 75 and 100 % of recommended P) laid out in FRBD with three replications. Results of first year experimentation are presented in Tables CS-13-AST-14 (a) to (b).

**Summer fodders:** Among the summer fodders, bajra gave maximum fodder yield (458.1 q/ha) followed by cowpea (378.0 q/ha) and maize (332.8 q/ha). Maize and bajra fodder yield increased significantly up to 25% of the recommended phosphorus dose. But further increase in P dose did not have any significant influence on green fodder yield of maize and bajra. In case of cowpea, there was no response to P application. Similar trend was followed in case dry matter yield of summer fodders.

**Sorghum:** The maximum green fodder yield (190.4 q/ha) of sorghum was obtained in sorghum-wheat-cowpea cropping system which was significantly higher as compared to sorghum-wheat-maize (172.2 q/ha) and sorghum-wheat-bajra (151.4 q/ha) cropping system. Dry matter yield of sorghum also followed similar trend.

Wheat: There was no significant difference in wheat grain and straw yield in different cropping systems.

**System productivity:** With respect to system productivity, sorghum-wheat-cowpea cropping system recorded significantly highest system maize fodder equivalent yield (1471.7q/ha/yr). Application of P to summer fodders did not influence remarkably system maize fodder equivalent yield.

Treatments	Wheat	Wheat	Summe	r fodder	Sorgh	num	System maize
	grain yield	straw yield	GFY	DMY	GFY	DMY	fodder equivalent
	(q/ha)	(q/ha)	(q/ha)	(q/ha)	(q/ha)	(q/ha)	yield (q/ha)
Cropping system							
Sorghum-wheat-maize	42.2	43.6	332.8	62.9	172.2	29.9	1346.6
Sorghum-wheat-bajra	43.1	44.5	487.3	81.6	151.4	25.4	1381.4
Sorghum-wheat-cowpea	44.4	44.1	397.3	50.0	190.4	32.2	1471.7
CD (P=0.05)	NS	NS	36.98	5.93	11.62	1.92	65.5
P-applied to summer fodder (% of Rec	ommended P)						
0	43.3	44.1	340.2	53.8	160.4	27.2	1347.1
25	43.1	43.5	387.5	64.0	166.8	28.9	1390.8
50	4.6	44.3	402.2	67.8	173.1	29.2	1421.2
75	42.8	44.4	406.5	69.0	176.8	29.8	1413.9
100	43.2	43.9	411.8	69.6	179.4	30.8	1426.4
CD (P=0.05)	NS	NS	47.7	7.66	NS	NS	NS

Table CS-13-AST-4(a): Fodder and grain yields in sorghum-wheat-summer fodder cropping system

Table CS-13-AST-4 (b): Growth parameters of different crops in sorghum-wheat-summer fodder cropping system

Treetmente		Plant height (cm)		Til	lers or plants per m row	length
Treatments	Wheat	Summer fodder	Sorghum	Wheat	Summer fodder	Sorghum
Cropping system						
Sorghum-wheat-maize	10.0	128.0	155.4	101.0	24.5	22.3
Sorghum-wheat-bajra	98.0	182.8	149.7	98.0	66.1	22.3
Sorghum-wheat-cowpea	101.5	115.6	190.0	101.5	20.0	22.6
CD (P=0.05)	NS	10.37	7.27	NS	2.50	NS
P-applied to summer fodder (% of	of Recomme	ended P)				
0	99.9	126.8	155.7	61.1	35.3	20.8
25	99.9	142.3	162.8	60.4	36.4	22.2
50	100.8	145.4	166.6	61.4	37.1	22.6
75	100.3	146.8	169.5	60.8	37.7	23.2
100	100.0	149.3	170.5	60.9	37.8	23.1
CD (P=0.05)	NS	13.38	NS	NS	NS	NS

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#### K-13-AST-1: Weed management in multicut sorghum

#### [(Table Reference: K-13-AST-1(a) to 1(c)]

#### Location: Ludhiana

The experiment was started during kharif 2013 at Ludhiana to study the effect of weed management on the weed density, fodder yield and quality of multicut sorghum. The results of second year experimentation are presented in Tables K-13-AST-1(a) to (c). A perusal of data revealed that density of weeds was significantly higher in weedy check during all the year of study. The density of total weeds in weedy check was 194.7 weeds/m<sup>2</sup> which was significantly higher than density of total weeds in herbicide treatments and hand weeding. Among the weed control treatments, the density of total weeds was significantly higher in plots where atrazine or pendimethalin alone were applied and was least in atrazine 0.375 + pendimethalin 0.750 kg a.i./ha combination. Among herbicide treatments, the highest weed control efficiency was noticed in propaguizalofop 0.0625 and 0.075 kg a.i./ha (93.9 and 93.8 % WCE, respectively) closely followed by atrazine + pendimethalin combinations (92.9 % WCE). Herbicides vallore, pinoxaden, propaquizalofop and oxyfluorfen at all levels controlled weeds effectively but were toxic to the crop resulting in poor fodder yield of multicut sorghum. The highest green fodder yield (945 q/ha) and dry matter yield (194.4 g/ha) was obtained with hand weeding which was at par with atrazine + pendimethalin combinations. Among herbicides, the highest fodder yield (929 g/ha GFY and 187.9 g/ha DMY) was observed with atrazine 0.375 kg + pendimethalin 0.750 kg a.i./ha. The crude protein content of multicut sorghum was improved in all the herbicide treatments and hand weeding than weedy check. Application of atrazine 0.375 kg + pendimethalin 0.750 kg a.i./ha as PE in the multicut sorghum being at par with hand weeding (15.32 q/ha) recorded significantly higher CPY (14.75 q/ha) compared to rest of the treatments including control (9.1 g/ha).

Treatments	G	reen fodder yi	eld (q/ha)			Dry matter	yield (q/ha)	)
	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut	Total	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut	Total
T <sub>1</sub>	353.7	248.5	177.3	779.5	71.5	50.3	35.9	157.7
T <sub>2</sub>	326.7	261.3	182.5	770.5	67.7	54.3	37.9	159.9
T <sub>3</sub>	384.0	293.7	189.5	867.2	77.6	59.4	38.4	175.4
T <sub>4</sub>	412.0	322.2	194.8	929.0	83.4	65.1	39.3	187.9
T <sub>5</sub>	262.5	239.0	129.5	631.0	49.8	45.4	24.5	119.7
T <sub>6</sub>	222.0	177.8	136.2	536.0	42.6	34.3	26.3	103.2
<b>T</b> <sub>7</sub>	283.0	237.3	134.7	655.0	54.4	45.6	25.9	125.8
T <sub>8</sub>	276.3	244.7	135.7	656.7	53.9	47.6	26.5	127.9
T9	212.8	194.7	144.3	551.8	42.0	38.4	28.5	108.8
T <sub>10</sub>	230.0	193.3	145.2	568.5	46.5	39.0	29.3	114.8
T <sub>11</sub>	140.5	147.7	106.0	394.2	28.8	30.3	21.7	80.7
T <sub>12</sub>	158.7	144.2	108.7	411.5	31.5	28.7	21.6	81.8
<b>T</b> <sub>13</sub>	423.2	326.5	195.3	945.0	87.1	67.1	40.2	194.4
<b>T</b> 14	302.0	248.0	127.0	677.0	54.2	44.6	22.8	121.6
S Em <u>+</u>	16.90	14.61	16.21	25.79	3.56	2.947	3.34	5.82
CD (P=0.05)	49.38	42.70	47.38	75.39	10.41	8.61	9.76	17.02
CV (%)	10.27	10.80	18.66	6.67	10.92	11.00	19.33	7.59

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T1: Atrazine 0.5 kg/ha PE T4: Atrazine 0.375 + pendi 0.75 kg/ha PE T7: Oxyfluorfen 0.088 kg/ha PE

T<sub>2</sub>: Pendimethalin 0.75 kg/ha PE T<sub>5</sub>: Pinoxaden 0.0375 kg/ha Post-emer. T<sub>6</sub>: Pinoxaden 0.05 kg/ha Post-emer. T8: Oxyfluorfen 0.146 kg/ha PE

T3: Atrazine 0.25 + pendi 0.75 kg/ha PE

T<sub>14</sub>: Control

T9: Vallore (Imaze. + pendi) 0.560 kg/ha PE

T10: Vallore (Imaze. + pendi) 0.750 kg/ha PE T11: Propaguizalofop 0.0625 kg/ha Post-emer.

T<sub>12</sub>: Propaguizalofop 0.0750 kg/ha Post-emer. T<sub>13</sub>: Hand weeding

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Treatments	Weed	Weed dry	Weed control		CP (%)		Crude protein yield (q/ha)				
	population	weight	efficiency (%)	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Total	
	/m²	(q/ha)		cut	cut	cut	cut	cut	cut		
T <sub>1</sub>	8.29 (67.9)	5.24	55.4	7.40	7.64	7.78	5.29	3.84	2.80	12.00	
T <sub>2</sub>	7.01 (48.6)	4.02	65.8	7.48	7.72	7.82	5.07	4.19	2.97	12.27	
T <sub>3</sub>	5.49 (29.3)	1.57	86.6	7.52	7.79	8.02	5.84	4.63	3.08	13.64	
T <sub>4</sub>	3.86 (14.2)	0.83	92.9	7.56	7.84	8.15	6.31	5.10	3.21	14.75	
T₅	7.63 (57.5)	3.16	73.1	7.48	7.72	8.14	3.72	3.50	2.00	9.31	
T <sub>6</sub>	6.31 (39.3)	2.15	81.7	7.46	7.75	8.18	3.18	2.66	2.15	8.05	
<b>T</b> <sub>7</sub>	6.01 (35.3)	1.98	83.1	7.49	7.77	8.05	4.07	3.54	2.09	9.78	
T <sub>8</sub>	5.41 (28.3)	1.69	85.6	7.50	7.68	8.06	4.04	3.65	2.14	9.91	
Тэ	5.46 (29.4)	1.70	85.5	7.51	7.79	8.09	3.15	2.99	2.30	8.48	
T <sub>10</sub>	5.07 (24.9)	1.37	88.3	7.54	7.78	8.11	3.50	3.03	2.38	8.96	
<b>T</b> <sub>11</sub>	3.59 (12.0)	0.72	93.9	7.58	7.82	8.07	2.18	2.37	1.75	6.31	
<b>T</b> <sub>12</sub>	3.51 (11.4)	0.73	93.8	7.59	7.81	8.11	2.39	2.24	1.75	6.41	
T <sub>13</sub>	2.98 (8.0)	0.49	95.8	7.58	7.89	8.18	6.60	5.30	3.29	15.32	
<b>T</b> <sub>14</sub>	13.97 (194.7)	11.75	-	7.28	7.45	7.72	3.95	3.32	1.76	9.10	
S Em <u>+</u>	1.10	1.08	-	-	-	-	0.78	0.67	0.78	1.32	
CD (P=0.05)	0.38	0.37	-	-	-	-	0.27	0.23	0.27	0.45	
CV (%)	10.9	23.87	-	-	-	-	10.97	10.98	19.23	7.56	

Table K-13-AST-1(b): Effect of herbicides on weed biomass, weed control efficiency (I cut) and crude protein vield of multicut sorahum

Figures in parenthesis are the original values

#### Table: K-13-AST-1(c): Effect of herbicides on growth parameters of multicut sorghum

Treatments		Plant height (cm)		Tillers/m				
	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut		
T <sub>1</sub>	166.4	152.2	134.2	38.4	19.5	12.5		
T <sub>2</sub>	172.0	157.3	138.4	40.5	21.3	13.8		
T <sub>3</sub>	175.5	160.5	141.7	44.6	29.4	14.6		
<b>T</b> 4	178.4	162.1	145.2	52.4	30.2	18.5		
T <sub>5</sub>	122.6	114.2	104.2	28.4	14.2	11.2		
T <sub>6</sub>	118.4	109.3	96.8	26.5	14.9	11.0		
<b>T</b> <sub>7</sub>	160.4	132.8	110.3	36.4	16.3	12.4		
T <sub>8</sub>	172.8	140.1	114.6	42.0	17.0	13.2		
T9	119.6	108.2	96.8	22.4	20.4	14.2		
T <sub>10</sub>	100.0	101.3	94.2	22.0	19.2	13.6		
<b>T</b> <sub>11</sub>	107.2	101.2	95.4	18.4	16.3	11.2		
<b>T</b> <sub>12</sub>	104.5	99.4	91.2	17.2	15.8	10.5		
<b>T</b> <sub>13</sub>	179.2	164.7	148.2	46.3	31.2	19.6		
<b>T</b> <sub>14</sub>	126.5	115.8	102.4	35.2	21.4	13.5		
S Em <u>+</u>	22.8	19.6	14.3	7.12	4.32	2.14		
CD (P=0.05)	7.80	6.70	4.89	2.44	1.47	0.73		
CV (%)	10.12	11.24	9.24	9.56	8.25	6.34		

T1: Atrazine 0.5 kg/ha PE

T2: Pendimethalin 0.75 kg/ha PE

T4: Atrazine 0.375 + pendi 0.75 kg/ha PE T7: Oxyfluorfen 0.088 kg/ha PE

T3: Atrazine 0.25 + pendi 0.75 kg/ha PE T<sub>5</sub>: Pinoxaden 0.0375 kg/ha Post-emer. T<sub>6</sub>: Pinoxaden 0.05 kg/ha Post-emer. T9: Vallore (Imaze. + pendi) 0.560 kg/ha PE

T10: Vallore (Imaze. + pendi) 0.750 kg/ha PE T11: Propaquizalofop 0.0625 kg/ha Post-emer.

T8: Oxyfluorfen 0.146 kg/ha PE

T12: Propaquizalofop 0.0750 kg/ha Post-emer. T13: Hand weeding

T14: Control

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#### PS-13-AST-1: Effect of herbicides on the weed control in bajra napier hybrid [(Table Reference: PS-13-AST-1(a) to 1(c)]

#### Location: Ludhiana

The experiment was initiated during Kharif 2013 at Ludhiana to study the effect of herbicides on the weed density, fodder yield and quality of BN hybrid. The experimental results of second year study are presented in Table PS-13-AST-1(a) to (c). The density of weeds was significantly higher in weedy check during all the year of study. The density of total weeds in weedy check was 663 weeds/m<sup>2</sup> which was significantly higher than the density of total weeds in herbicides treatments, intercropping and hand weeding. Among the weed control treatments, density of total weeds was significantly higher in plots where atrazine (0.5 to 1.0 kg a.i./ha) alone was applied or in intercropping maize/cowpea/pearl millet with BN hybrid. Among the herbicide treatments, all the combinations of atrazine + pendimethalin combinations effectively controlled weeds. The weed control efficiency with atrazine alone, pendimethalin alone and atrazine + pendimethalin combinations ranged between 35.9 to 39.7, 50.3 to 55.7 and 60.8 to 86.9 % respectively as compared to 93.8 % WCE in hand weeding. Fodder yield was influenced significantly with weed control treatments. The highest green fodder yield (2102.3q/ha) was obtained with application of atrazine 0.75 + pendimethalin 0.75 kg a.i./ha combination in BN hybrid. Whereas highest dry matter yield (361.8 g/ha) was recorded in the plots receiving treatment of herbicide atrazine 0.50 + pendimethalin 0.75 kg a.i./ha. The fodder yield in intercropping treatments (BN hybrid + cowpea/pearl millet) recorded significantly higher over weedy check and atrazine @0.5 and 0.75 kg a.i./ha alone. The protein content in weed control treatments ranged between 7.3 to 11.0 % as compared to 8.7 in weedy check. The application of herbicide combination atrazine 0.500 kg + pendimethalin 0.0.560 kg a.i./ha in BN hybrid attained highest crude protein yield (37.6 q/ha). Higher B : C ratio was observed in herbicide treatments than weedy check and hand weeding. Among herbicide, B : C ratio was higher in atrazine and pendimethalin combinations than atrazine and pendimethalin alone. The highest net monetary return (Rs. 77943/ha) and B: C ratio (1.62) was fetched with atrazine 0.750 kg + pendimethalin 0.750 kg a.i/ha treatment.

Treatments	Broad leaves weeds	Grassy weeds	Total weeds	Weed dry weight (q/ha)	Weed control efficiency (%)
T <sub>1</sub>	11.24	22.91	25.59	20.56	-
	(125.7)	(537.0)	(663.0)		
T <sub>2</sub>	8.46	18.11	20.20	13.17	35.9
	(74.0)	(340.7)	(414.8)		
T <sub>3</sub>	8.22	15.88	18.04	12.39	39.7
-	(70.3)	(255.7)	(325.9)		
T₄	8.51	11.67	14.46	13.06	36.5
	(74.0)	(137.0)	(211.1)		
T₅	8.83	6.01	11.20	9.11	55.7
	(78.0)	(48.3)	(125.9)		
T <sub>6</sub>	7.64	5.27	9.34	10.22	50.3
	(63.0)	(29.7)	(92.6)		
<b>T</b> <sub>7</sub>	7.44	3.91	8.41	8.06	60.8
	(55.3)	(14.7)	(70.4)		
Tଃ	5.04	3.09	5.91	4.89	76.2
	(25.7)	(11.0)	(37.0)		
T₃	6.12	3.72	7.36	3.06	85.1
	(36.7)	(18.3)	(55.6)		
T <sub>10</sub>	6.65	3.46	7.52	3.48	83.1
-	(48.3)	(11.0)	(59.3)		
T <sub>11</sub>	7.42	3.91	8.41	3.11	84.9
	(55.7)	(14.7)	(70.4)		
T <sub>12</sub>	3.53	1.82	3.89	2.70	86.9
	(14.7)	(3.7)	(18.5)		
T <sub>13</sub>	4.45	4.65	6.31	3.72	81.9
	(26.0)	(33.3)	(59.3)		
<b>T</b> 14	8.07	6.58	10.56	6.72	67.3
	(66.7)	(44.3)	(111.1)	-	
<b>T</b> 15	8.23	7.00	11.23	3.67	82.1
	(67.0)	(51.7)	(125.9)		-
T <sub>16</sub>	2.64	2.64	3.93	1.28	93.8
	(7.33)	(7.33)	(11.2)	-	
SEm+	1.08	1.33	1.40	0.55	-
CD (P=0.05)	3.14	3.86	4.06	1.60	-
CV (%)	30.6	26.7	22/18	12.84	_

Table PS-13-AST-1(a): E	iffect of	herbicides	on t	the	weed	intensity,	weed	dry	matter	and	weed
control efficiency in BN	hybrid										

Figures in parenthesis are the original values

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Table PS-13-AST-1(b): Effect of herbicides on the fodder yield, crude protein and economics of B N hybrid

Treatments	Green	fodder	Dry mat	ter yield	Crude	CP Yield	Economics			
	First	(q/na) Total	(q/ First	na) Total	(%)	(q/na)	Total	Gross	Net	B·C
	cut	vield	cut	vield	(/0)		cost	returns	profit	ratio
	•	<b>J</b> .010	••••	<b>J</b> 1010			(Rs./ha)	(Rs./ha)	(Rs./ha)	
<b>T</b> 1	118.5	1110.2	20.4	183.9	8.7	16.0	46941	66611	19670	0.42
T <sub>2</sub>	182.2	1249.8	34.1	208.6	7.3	15.2	47150	74986	27836	0.59
T <sub>3</sub>	289.6	1669.4	52.9	282.2	9.6	27.1	47359	100167	52807	1.12
<b>T</b> 4	424.5	1900.0	78.7	335.4	7.7	25.8	47307	114000	66693	1.41
T <sub>5</sub>	455.8	1889.4	79.8	318.9	7.8	24.9	47569	113361	65793	1.38
T <sub>6</sub>	412.0	1873.4	75.2	332.8	8.7	29.0	47725	112403	64677	1.36
<b>T</b> <sub>7</sub>	487.0	2027.1	86.5	347.9	10.8	37.6	47934	121625	73691	1.54
T <sub>8</sub>	483.8	2086.3	85.9	361.8	10.1	36.5	48144	125181	77037	1.60
T9	505.5	2088.0	97.4	359.0	8.7	31.2	47987	125278	77291	1.61
T <sub>10</sub>	544.9	2102.3	99.4	361.1	9.4	33.9	48196	126139	77943	1.62
<b>T</b> <sub>11</sub>	518.3	1957.6	89.4	331.7	10.1	33.5	48405	117458	69053	1.43
T <sub>12</sub>	549.3	1985.9	98.9	337.1	10.6	35.7	56561	119153	62592	1.11
<b>T</b> <sub>13</sub>	432.2	1747.7	77.7	295.4	11.0	32.5	46523	104861	58338	1.25
T <sub>14</sub>	532.4	1834.7	99.9	316.9	9.1	28.8	47307	110083	62776	1.33
<b>T</b> 15	445.4	1533.3	80.3	265.7	10.8	28.7	48091	92000	43909	0.91
T <sub>16</sub>	554.2	2009.3	83.7	347.9	10.5	36.5	46941	120556	73614	1.57
S Em <u>+</u>	19.16	47.93	4.03	9.04	0.56	0.8				
CD (P=0.05)	55.62	139.11	11.70	26.24	1.7	2.4				
CV (%)	7.75	4.57	9.01	5.02	8.52	4.9				

Table PS-13-AST- (c): Effect of herbicides on the plant height and tillers/plant of BN hybrid

Treatments		Plant he	ight (cm)		Tillers/plant					
	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut	4 <sup>th</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	3 <sup>rd</sup> cut	4 <sup>th</sup> cut		
T <sub>1</sub>	73.2	113.7	87.4	83.1	11.9	19.1	21.0	22.1		
T <sub>2</sub>	77.1	115.3	84.7	89.5	11.2	23.1	20.9	25.5		
T <sub>3</sub>	92.5	118.3	91.4	88.7	13.7	25.7	21.7	24.0		
T4	101.5	118.9	80.5	88.3	15.7	24.8	21.4	23.0		
T5	99.5	124.0	86.6	89.7	15.8	25.4	21.7	24.4		
T <sub>6</sub>	107.7	122.2	85.5	89.5	16.9	24.9	20.3	22.3		
<b>T</b> <sub>7</sub>	101.1	122.3	85.3	86.7	16.7	25.1	20.8	24.6		
T <sub>8</sub>	109.4	126.8	84.3	90.7	19.3	24.7	22.2	22.8		
Т9	99.0	122.3	80.4	89.3	16.5	22.2	20.6	23.3		
T <sub>10</sub>	96.8	124.3	84.7	89.2	15.0	25.0	21.6	24.3		
T <sub>11</sub>	108.4	124.0	85.1	91.1	16.8	24.3	21.5	23.7		
<b>T</b> <sub>12</sub>	113.4	123.3	83.6	89.3	19.3	24.2	21.5	22.9		
T <sub>13</sub>	97.6	121.7	89.0	87.4	12.9	22.7	21.1	23.1		
<b>T</b> <sub>14</sub>	104.9	124.4	80.5	90.9	13.5	21.6	22.1	22.3		
T <sub>15</sub>	97.5	120.5	82.7	89.3	12.7	21.3	20.7	23.1		
<b>T</b> <sub>16</sub>	110.7	122.6	82.9	85.3	16.1	25.9	20.7	22.9		
SEm <u>+</u>	6.8	2.4	3.0	1.4	1.4	1.5	0.6	0.8		
CD (P=0.05)	19.7	6.9	NS	4.0	4.0	NS	NS	NS		

T1: Control

**T3:** Atrazine 0.75 kg a.i./ha PE **T5:** Pendimethalin 0.560 kg a.i./ha Pre-emergence

T7: Atrazine 0.5 kg + Pendimethalin 0.560 kg a.i./ha PE

T9: Atrazine 0.75 kg + Pendimethalin 0.560 kg a.i./ha PE

T11: Atrazine 1.00 kg + Pendimethalin 0.560 kg a.i./ha PE
T13: BN hybrid + cowpea
T15: BN hybrid + pearl millet

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T2: Atrazine 0.5 kg a.i./ha Pre-emergence (PE) T4: Atrazine 1.0 kg a.i./ha PE

T6: Pendimethalin 0.75 kg a.i./ha Pre-emergence T8: Atrazine 0.5 kg + Pendimethalin 0.75 kg a.i./ha PE

T10: Atrazine 0.75 kg + Pendimethalin 0.75 kg a.i./ha PE

T12: Atrazine 1.0 kg + Pendimethalin 0.75 kg a.i./ha PE T14: BN hybrid + maize

T16: Hand Weeding (2) - 21 and 42 DAS

### CS-14-AST-1: Studies on intensive fodder cropping systems for yield maximization Location: Raipur

The experiment was started during *Kharif* 2014 at Raipur to find out the appropriate cropping system for yield maximization and effect of cropping systems on soil fertility, nutrient use and water use efficiency. This was the first year of experiment and result of the experiment will be reported after completion of sequence in annual report of *Rabi* 2014-15.

#### A. AVT BASED TRIALS

#### K-14-AST-1 (NT): Effect of nitrogen levels on promising entries of pearl millet (AVTPM-2) [Table Reference: K-14-AST-1 (a) to (c)]

#### Location: Bhubneswar, Kalyani and Ranchi

A field trial was conducted to find out the response of promising AVTPM-2 entries of pearl millet with supplementation of graded doses of nitrogen. The study was undertaken at three locations with 6 entries (including 3 national checks) and 4 levels of nitrogen (0, 30, 60 and 90 Kg N/ha).

This trial was considered as failed due to poor germination and performance at Jorhat, Imphal and Faizabad. The results indicated that none of the entries under evaluation could surpass the national check Giant bajra at all the locations and also on mean basis. Although at Kalyani the highest green and dry yields were obtained from entry APFB-09-1 but it was statistically at par with Giant bajra. On mean basis Giant bajra produced 197.1 q/ha, 40.6 q/ha and 2.98 q/ha green fodder, dry matter and crude protein yields, respectively. Critical observation of data indicated that the entry APFB-09-1 was comparable with Giant bajra whereas, entry AFB-8 and national check Raj Bajra Chari were the poorest performers in term of fodder and protein yields. 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 forage yield increased by 127.4, 63.7 and 29.4 per cent over 0, 30 and 60 kg N/ha and respective increase with respect to dry matter yield was 127.9, 64.6 and 28.1 per cent. The interaction effect of entries and nitrogen levels indicated that yield of all the entries increased consistently with increasing levels of nitrogen application on the yields of entries was more pronounced at Kalyani and Ranchi with each increment in nitrogen level.

	Green	fodder yiel	d (q/ha)		Dry matter yield (q/ha)				
Treatment	Bhubaneswar	Kalyani	Ranchi	Mean	Bhubaneswar	Kalyani	Ranchi	Mean	
A. Entries									
AFB-8	78.1	81.9	101.7	87.2	16.9	17.4	24.8	19.7	
APFB-09-1	234.1	159.0	169.1	187.4	52.2	27.9	42.3	40.8	
NDFB-936	208.0	99.9	99.0	135.6	43.5	20.9	22.8	29.1	
Raj Bajra Chari (NC)	88.1	58.6	97.8	81.5	18.9	13.2	23.5	18.5	
Giant Bajra (NC)	256.6	157.5	177.3	197.1	54.9	26.1	40.8	40.6	
AVKB-19 (NC)	188.4	112.6	160.7	153.9	40.4	25.0	38.6	34.7	
SEm ±	3.51	5.2	2.2		1.01	1.0	0.5		
CD (P=0.05)	9.83	14.7	6.3		2.83	2.9	1.5		
CV (%)	6.93				9.27				
B. N levels (kg/ha)									
0	146.7	56.5	59.3	87.5	33.4	9.4	14.1	19.0	
30	171.1	80.8	112.7	121.5	36.4	15.6	26.9	26.3	
60	185.5	120.7	155.2	153.8	39.6	24.6	37.3	33.8	
90	198.9	188.3	209.8	199.0	41.8	37.8	50.2	43.3	
SEm <u>+</u>	2.87	4.2	1.8		0.83	0.8	0.4		
CD (P=0.05)	8.03	12.0	5.1		2.31	2.3	1.2		
C. Interaction									
SEm ±	7.02	10.3	4.4		2.0	2.0	1.1		
CD (P=0.05)	19.66	29.3	12.5		5.7	5.7	3.0		
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Table K-14-AST-1(a): Effect of entries and nitrogen levels on GFY and DMY (q/ha) of pearl millet (AVTPM-2)

Entries/ N levels		Green	n fodder yield	l (q/ha)			Dry matte	er yield (q/l	ha)			Crude prot	ein yield (	(q/ha)	
	0	30	60	90	Mean	0	30	60	90	Mean	0	30	60	90	Mean
AFB-8	68.3	74.9	80.0	89.4	78.1	16.4	16.7	17.1	17.5	16.9	1.3	1.4	1.5	1.5	1.4
APFB-09-1	197.0	230.6	247.5	261.3	234.1	48.3	50.5	53.1	56.8	52.2	3.6	4.0	4.4	4.9	4.2
NDFB-936	162.7	201.7	224.2	243.3	208.0	34.0	41.2	47.0	51.9	43.5	2.5	3.3	3.9	4.5	3.5
Raj Bajra Chari (NC)	78.3	84.9	90.0	99.4	88.1	18.4	18.7	19.1	19.5	18.9	1.5	1.5	1.6	1.7	1.6
Giant Bajra (NC)	219.4	256.2	269.9	280.9	256.6	50.7	52.9	56.8	59.0	54.9	3.8	4.1	4.7	5.1	4.4
AVKB-19 (NC)	154.3	178.2	201.7	219.2	188.4	32.3	38.4	44.8	46.0	40.4	2.5	3.0	3.8	4.0	3.3
Mean	146.7	171.1	185.5	198.9	175.6	33.4	36.4	39.6	41.8	37.8	2.5	2.9	3.3	3.6	3.1
	V	N	VXN				٧	N	VXN			V	Ν	VXN	
SEm <u>+</u>	3.5	2.9	7.0			SEm <u>+</u>	1.0	0.8	2.0		SEm <u>+</u>	0.1	0.1	0.2	
CD (P=0.05)	9.8	8.0	19.7			CD (P=0.05)	2.8	2.3	5.7		CD (P=0.05)	0.2	0.2	0.5	
CV (%)	6.9					CV (%)	9.3				CV (%)	9.2			

#### Table K-14-AST-1(a-1): Interaction effect of entries and N levels on GFY, DMY and CPY of pearl millet at Bhubaneswar

#### Table K-14-AST-1(a-2): Interaction effect of entries and N levels on GFY, DMY and CPY of pearl millet at Kalyani

Entries / N levels		Gree	n fodder yiel	d (q/ha)			Dry matte	er yield (q/l	ha)			Crude protei	n yield (q/h	ia)	
	0	30	60	90	Mean	0	30	60	90	Mean	0	30	60	90	Mean
AFB-8	48.1	49.4	83.3	146.7	81.9	8.3	11.4	19.7	30.1	17.4	0.6	0.9	1.7	2.4	1.4
APFB-09-1	63.3	114.4	162.2	296.1	159.0	9.6	18.7	29.7	53.8	27.9	0.5	1.6	2.4	5.0	2.4
NDFB-936	48.9	70.6	115.6	164.4	99.9	9.4	14.1	23.7	36.6	20.9	0.6	1.2	2.1	2.6	1.6
Raj Bajra Chari (NC)	31.7	47.2	65.0	90.6	58.6	7.1	10.7	13.5	21.5	13.2	0.5	0.8	1.1	1.3	0.9
Giant Bajra (NC)	86.7	119.4	164.4	259.4	157.5	11.3	17.8	28.4	46.8	26.1	0.7	1.4	1.7	3.6	1.9
AVKB-19 (NC)	60.3	83.9	133.3	172.8	112.6	10.8	20.7	30.5	38.0	25.0	0.8	1.7	2.6	3.3	2.1
Mean	56.5	80.8	120.6	188.3	111.6	9.4	15.6	24.2	37.8	21.8	0.6	1.3	1.9	3.0	1.7
	V	N	VXN				V	N	VXN			V	Ν	VXN	
SEm <u>+</u>	5.2	4.2	10.3			SEm <u>+</u>	1.0	0.8	2.0		SEm <u>+</u>	0.08	0.06	0.16	
CD (P=0.05)	14.7	12.0	29.3			CD (P=0.05)	2.9	2.3	5.7		CD (P=0.05)	0.22	0.18	0.05	
CV (%)		16.0				CV (%)		16.0			CV (%)				

#### Table K-14-AST-1(a-3): Interaction effect of entries and N levels on GFY, DMY and CPY of pearl millet at Ranchi

Entries/ N levels	Green fodder yield (q/ha)					Dry matter yield (q/ha)						Crude protein yield (q/ha)			
	0	30	60	90	Mean	0	30	60	90	Mean	0	30	60	90	Mean
AFB-8	53.7	78.9	100.5	173.6	101.7	12.3	18.1	25.1	43.4	24.8	0.8	1.2	1.6	2.8	1.6
APFB-09-1	61.9	176.2	216.3	221.9	169.1	15.5	44.0	54.1	55.5	42.3	1.0	2.8	3.5	3.6	2.7
NDFB-936	42.3	62.1	100.0	191.5	99.0	9.7	14.3	23.0	44.0	22.8	0.6	0.9	1.5	3.0	1.5
Raj Bajra Chari (NC)	49.2	82.3	109.9	150.0	97.8	11.8	19.7	26.4	36.0	23.5	0.8	1.3	1.7	2.4	1.5
Giant Bajra (NC)	63.4	149.3	213.4	283.2	177.3	14.6	34.3	49.1	65.1	40.8	0.9	2.2	3.1	4.4	2.7
AVKB-19 (NC)	85.3	127.6	191.1	238.6	160.7	20.5	30.6	45.9	57.3	38.6	1.3	1.9	2.9	3.6	2.5
Mean	59.3	112.7	155.2	209.8		14.1	26.8	37.3	50.2		0.9	1.7	2.4	3.3	
	V	N	VXN				V	N	VXN			V	N	VXN	
SEm <u>+</u>	2.2	1.8	4.4			SEm <u>+</u>	0.5	0.4	1.1		SEm <u>+</u>	0.04	0.03	0.07	
CD (P=0.05)	6.3	5.1	12.5			CD (P=0.05)	1.5	1.2	3.0		CD (P=0.05)	0.10	0.08	0.20	
CV (%)			7.4			CV (%)			10.3		CV (%)			12.04	

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Treatment		Plant height (c	:m)		Leaf stem ratio				
	Bhubaneswar	Kalyani	Ranchi	Mean	Bhubaneswar	Kalyani	Ranchi	Mean	
A. Entries/ N levels									
AFB-8	161.5	222.6	140.3	174.8	0.49	0.54	0.25	0.43	
APFB-09-1	177.5	225.2	140.0	180.9	0.74	0.64	0.25	0.54	
NDFB-936	175.8	209.4	128.3	171.2	0.68	0.37	0.27	0.44	
Raj Bajra Chari (NC)	162.6	230.8	146.2	179.9	0.56	0.46	0.25	0.42	
Giant Bajra (NC)	186.9	224.5	155.8	189.1	0.76	0.44	0.25	0.48	
AVKB-19 (NC)	167.5	254.3	138.7	186.8	0.65	0.30	0.26	0.40	
SEm ±	1.10	6.9	1.5		0.01	-	0.01		
CD (P=0.05)	3.08	19.6	4.3		0.02	-	NS		
B. N levels (kg/ha)									
0	134.6	204.3	125.5	154.8	0.55	0.41	0.28	0.41	
30	166.0	209.3	134.6	170.0	0.63	0.44	0.25	0.44	
60	188.4	227.2	147.3	187.6	0.68	0.48	0.23	0.46	
90	198.9	270.3	158.7	209.3	0.73	0.50	0.26	0.50	
SEm <u>+</u>	0.90	5.6	1.2		0.01	-	0.01		
CD (P=0.05)	2.52	16.0	3.5		0.02	-	0.02		
C. Interaction									
SEm ±	2.20	13.8	3.0		0.02		0.02		
CD (P=0.05)	6.17	NS	8.7		0.04		0.06		
Table K-14-AST-1 (c)	: Effect of entries and	nitrogen levels on	quality and CPY	of pearl m	illet (AVTPM-2)				
Treatment		Crude protein	yield (q/ha)				Crude Protein (%)		
A. Entries	Bhubaneswar	Kalyani	Ranchi		Mean Bhu	baneswar	Ranchi	Mean	

Table K-14-AST-1(b): Effect of entries and nitr	ogen levels on growth	h parameters of pearl millet (	AVTPM-2)
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AFB-8 1.42 1.40 1.58 1.47 8.40 6.39 7.40 APFB-09-1 4.22 2.38 2.72 3.11 8.06 6.43 7.25 NDFB-936 3.53 1.63 1.52 2.23 8.03 6.56 7.30 Raj Bajra Chari (NC) 0.90 1.53 1.33 8.30 6.46 7.38 1.57 Giant Bajra (NC) 4.42 1.86 2.65 2.98 8.04 6.46 7.25 AVKB-19 (NC) 3.32 2.10 2.45 2.62 8.17 6.37 7.27 SEm ± 0.08 0.08 0.04 0.05 0.03 CD (P=0.05) 0.23 0.22 0.10 0.14 0.08 9.17 2.12 CV% B. N Levels (kg/ha) 2.51 1.34 7.62 6.37 0 0.60 0.90 7.00 2.89 1.95 30 1.26 1.71 8.00 6.38 7.19 60 3.32 1.94 2.39 2.55 8.41 6.43 7.42 90 3.60 3.04 3.30 3.31 8.63 6.58 7.61 SEm+ 0.06 0.03 0.02 0.07 0.04 CD (P=0.05) 0.08 0.11 0.07 0.19 0.18 C. Interaction SEm ± 0.16 0.16 0.07 0.10 0.05 CD (P=0.05) 0.46 0.45 0.20 0.28 0.16

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#### K-14-AST-2: Effect of nitrogen levels on promising entries of maize (AVTHM-2) [Table Reference: K-14-AST-2 (a) to (c)]

#### Locations: Palampur, Hisar, Ludhiana, Bhubaneswar and Ranchi

A field trial was conducted to study the effect of nitrogen on the performance of AVTPM-2 entries of maize. The study was undertaken at five locations with 6 entries (including 2 national checks) and 4 levels of nitrogen (0, 30, 60 and 90 Kg N/ha).

This trial was considered as failed due to poor germination and performance at Faizabad, Jorhat and Srinagar.

The results indicated that in hill zone the performance of all the entries was similar with respect to green fodder yield whereas, dry matter was significantly more in IHTFM (PAC-745) but statistically similar to other entries under test except African tall. In North West zone PMH-1 and J-1006 (NC) were the high yielders. In North East zone, the performance of PMH-1 was better and was followed by African Tall. On over all mean basis, PHM-1 resulted in the production of 323.0 and 67.2 q/ha green forage and dry matter yields, respectively and was closely followed by J-1006 (NC) producing 297.5 and 65.0 q/ha green forage and dry matter. The crude protein yield of 5.89 q/ha was highest in DHM-117 but was comparable with PHM-1 (5.88q/ha) and J-1006 (NC) (5.66q/ha).

The growth parameters, herbage yield and crude protein yield increased consistently with increasing level of nitrogen up to 120 Kg N/ha. With the application of 120 kg N/ha the green forage yield increased by 78.3, 30.7 and 10.3 per cent over 0, 40 and 80 kg N/ha and respective increase with respect to dry matter yield was 86.3, 34.4 and 10.9 per cent. The interaction effect of entries and nitrogen levels indicated that yield of all the entries increased consistently with increasing levels of nitrogen.

	Green fodder yield (q/ha)								Dry matter yield (q/ha)							
Treatment	HZ		NWZ			NEZ		Over	HZ		NWZ			NEZ		Over
Treatment	Palam-	His-	Ludh-	Mean	Bhuban-	Ran-	Mean	all	Palam-	His-	Ludh-	Mean	Bhuban-	Ran-	Mean	all
	pur	ar	iana		eswar	chi		Mean	pur	ar	iana		eswar	chi		Mean
A. Entries																
PMH-1	554.3	187.9	226.4	207.2	386.3	260.2	323.3	323.0	109.3	37.3	48.3	42.8	85.8	55.5	70.7	67.2
PMH-3	554.3	154.2	185.2	169.7	298.5	147.7	223.1	268.0	115.8	34.6	38.2	36.4	69.0	34.1	51.6	58.3
DHM-117	527.5	212.4	161.9	187.2	342.0	221.8	281.9	293.1	110.4	47.4	32.1	39.8	78.4	53.7	66.1	64.4
IHTFM (PAC-745)	566.6	163.5	193.4	178.5	285.9	174.9	230.4	276.9	119.9	37.3	38.3	37.8	68.1	43.1	55.6	61.3
African Tall (NC)	553.2	139.9	114.7	127.3	410.6	184.1	297.4	280.5	116.1	25.5	25.2	25.4	88.1	42.9	65.5	59.6
J-1006 (NC)	520.3	192.9	218.1	205.5	420.4	135.6	278.0	297.5	108.9	41.8	45.7	43.8	90.7	37.8	64.3	65.0
SEm ±	11.2	6.7	3.8		3.8	2.9			3.2	1.8	0.9		2.3	1.0		
CD (P=0.05)	NS	19.2	10.9		10.5	8.2			10.1	5.2	2.5		6.5	2.7		
CV (%)			12.4		3.6						10.3		10.0			
B. N levels(kg/ha)																
0	355.1	117.4	137.0	127.2	313.8	79.5	196.7	200.6	66.9	25.7	27.2	26.5	72.8	18.4	45.6	42.2
40	511.4	168.5	168.4	168.5	351.1	168.7	259.9	273.6	103.3	35.9	35.4	35.7	78.6	39.3	59.0	58.5
80	624.5	198.7	194.1	196.4	374.5	229.0	301.8	324.2	135.1	41.5	41.2	41.4	83.1	53.5	68.3	70.9
120	676.6	216.0	233.6	224.8	389.8	272.4	331.1	357.7	148.2	46.1	48.2	47.2	85.5	65.0	75.3	78.6
SEm <u>+</u>	8.5	5.5	3.1		3.1	2.3			2.2	1.5	0.7		1.9	0.8		
CD (P=0.05)	24.5	15.7	8.9		8.6	6.7			6.3	4.2	2.0		5.3	2.2		
C. Interaction																
SEm ±	20.9		7.7		7.5	5.7			5.4		1.8		4.6	1.9		
CD (P=0.05)	59.9		21.9		21.0	16.4			15.5		5.0		12.9	5.5		

Entrine / N. Javala	Green fodder yield (q/ha)							Dry matter yield (q/ha)					
Entries/ N levels	0	30	60	90	Mean	0	30	60	90	Mean			
PMH-1	337.3	481.3	625.2	674.6	529.6	62.6	94.8	133.3	146.4	109.3			
PMH-3	374.3	538.9	629.3	674.6	554.3	70.3	107.7	138.1	147.0	115.8			
DHM-117	382.5	501.8	617.0	608.8	527.5	72.4	99.6	136.5	133.1	110.4			
IHTFM (PAC-745)	345.5	431.9	686.9	802.1	566.6	65.8	87.4	151.4	175.1	119.9			
African Tall (NC)	349.6	567.6	625.2	670.5	553.2	65.9	117.4	133.6	148.1	116.1			
J-1006 (NC)	341.4	547.1	563.5	629.3	520.3	64.7	112.8	118.3	139.6	108.9			
Mean	355.1	511.4	624.5	676.6		66.9	103.3	135.1	148.2				
	V	N	VXN				V	N	VXN				
SEm <u>+</u>	11.2	8.5	20.9			SEm <u>+</u>	3.2	2.2	5.4				
CD (P=0.05)	NS	24.5	59.9			CD (P=0.05)	10.1	6.3	15.5				
CV (%)						CV (%)							

Table K-14-AST-2(a-1): Interaction effect of entries and nitrogen levels on GFY & DMY (a/ha) of	of forage hybrid maize at Palampur
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Table K-14-AST-2 (a-2): Interaction effect of entries and nitrogen levels on GFY & DMY (q/ha) of forage hybrid maize at Ludhiana

Entrice/ N lovale		G	reen fodder yield (q/ł	Dry matter yield (q/ha)						
Enules/ Nievels	0	30	60	90	Mean	0	30	60	90	Mean
PMH-1	159.7	186.1	239.4	320.3	226.4	34.8	39.6	50.8	68.1	48.3
PMH-3	151.7	170.8	182.8	235.6	185.2	29.2	35.5	38.8	49.5	38.2
DHM-117	139.7	159.7	163.6	184.4	161.9	26.2	31.9	34.0	36.4	32.1
IHTFM (PAC-745)	120.0	161.4	225.3	266.9	193.4	22.8	31.5	45.6	53.4	38.3
African Tall (NC)	61.9	120.0	129.7	147.2	114.7	12.7	27.0	28.5	32.4	25.2
J-1006 (NC)	189.2	212.2	223.9	247.2	218.1	37.3	46.7	49.3	49.4	45.7
Mean	137.0	168.4	194.1	233.6		27.2	35.4	41.2	48.2	
	V	N	VXN				V	N	VXN	
SEm <u>+</u>	3.8	3.1	7.7			SEm <u>+</u>	0.9	0.7	1.8	
CD (P=0.05)	10.9	8.9	21.9			CD (P=0.05)	2.5	2.0	5.0	
CV (%)	12.4					CV (%)	10.3			

Table K-14-AST-2(a-3): Interaction effects of entries and nitrogen levels on GFY & DMY (q/ha) of forage hybrid maize at Bhubaneswar

Entrine / N lovale		Gr	een fodder yield (q/l	na)	Dry matter yield (q/ha)					
Enules/ IN levels	0	30	60	90	Mean	0	30	60	90	Mean
PMH-1	344.7	367.7	409.2	423.7	386.3	77.2	85.0	90.4	90.5	85.8
PMH-3	283.9	297.3	302.7	310.1	298.5	66.8	67.1	69.8	72.2	69.0
DHM-117	301.2	308.9	357.9	400.1	342.0	69.3	71.8	82.3	90.0	78.4
IHTFM (PAC-745)	267.8	277.2	296.2	302.5	285.9	67.6	68.2	68.1	68.6	68.1
African Tall (NC)	322.5	429.2	442.9	447.6	410.6	72.8	91.1	92.5	95.9	88.1
J-1006 (NC)	362.5	426.2	438.3	454.7	420.4	83.3	88.6	95.4	95.5	90.7
Mean	313.8	351.1	374.5	389.8		72.8	78.6	83.1	85.5	
	V	N	VXN				V	N	VXN	
SEm <u>+</u>	3.8	3.1	7.5			SEm <u>+</u>	2.3	1.9	4.6	
CD (P=0.05)	10.5	8.6	21.0			CD (P=0.05)	6.5	5.3	12.9	
CV (%)			3.6			CV (%)			10.0	

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Entrino / N. Jovala		Gree	n fodder yield	d (q/ha)		Dry matter yield (q/ha)					
Entries/ IN levels	0	30	60	90	Mean	0	30	60	90	Mean	
PMH-1	103.4	253.4	323.2	360.8	260.2	22.1	54.0	68.9	77.1	55.5	
PMH-3	68.7	115.5	188.6	217.9	147.7	14.6	27.0	44.0	50.8	34.1	
DHM-117	100.3	206.1	253.6	327.2	221.8	23.4	48.0	59.2	84.0	53.7	
IHTFM (PAC-745)	63.3	121.0	212.5	302.9	174.9	15.6	29.9	52.4	74.6	43.1	
African Tall (NC)	76.9	191.2	231.3	236.9	184.1	18.0	44.6	53.9	55.2	42.9	
J-1006 (NC)	64.2	124.9	165.0	188.3	135.6	16.5	32.0	42.3	48.3	34.8	
Mean	79.5	168.7	229.0	272.0		18.4	39.3	53.5	65.0		
	V	N	VXN				V	Ν	VXN		
SEm <u>+</u>	2.9	2.3	5.7			SEm <u>+</u>	1.0	0.8	1.9		
CD (P=0.05)	8.2	6.7	16.4			CD (P=0.05)	2.7	2.2	5.5		
CV (%)			4.1			CV (%)			4.1		

Table K-14-AST-2(a-4): Interaction effects of entries and nitrogen lev	evels on GFY & DMY (q/ha) of forage hybrid maize at Ranch
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Table- K-14-AST-2(b): Effect of entries and nitrogen levels on growth parameters and quality of forage hybrid maize

Plant height (cm) Leaf							eaf stem ratio	af stem ratio			
Treatment	Palam-	His-	Ludh-	Bhubanes-	Ran-	Mean	Palampur	His	Bhuban-	Ranchi	Mean
rreatment	pur	ar	iana	war	chi			-ar	eswar		
A. Entries										_	
PMH-1	260.6	150.8	144.3	222.3	174.8	190.6	0.34	0.33	1.03	0.24	0.49
PMH-3	253.4	144.5	120.7	206.7	155.7	176.2	0.32	0.37	0.82	0.31	0.46
DHM-117	239.5	156.5	127.5	213.3	163.2	180.0	0.37	0.38	0.92	0.26	0.48
IHTFM (PAC-745)	261.1	145.4	118.6	205.7	159.9	178.1	0.32	0.40	0.82	0.27	0.45
African Tall (NC)	241.4	112.7	137.2	259.1	157.0	181.5	0.38	0.39	1.11	0.21	0.52
J-1006 (NC)	290.8	149.6	169.8	243.0	145.3	199.7	0.36	0.36	1.16	0.22	0.53
SEm ±	1.8	5.7	1.3	2.86	1.5		0.25	0.01	0.02	0.01	
CD (P=0.05)	5.6	16.2	3.7	8.02	4.3		0.03	0.03	0.05	0.04	
CV (%)			17.2	4.41					6.07		
B. N levels (kg/ha)											
0	210.4	119.7	117.9	216.6	143.4	161.6	0.35	0.35	0.88	0.37	0.49
40	250.8	141.7	133.2	222.3	152.5	180.1	0.35	0.37	0.96	0.24	0.48
80	272.2	152.3	148.0	227.7	165.2	193.1	0.34	0.39	1.01	0.22	0.49
120	297.8	159.5	146.3	233.4	176.1	202.6	0.35	0.38	1.06	0.19	0.50
SEm+	2.0	4.6	1.1	2.34	1.2		0.19	0.01	0.01	0.012	
CD (P=0.05)	5.7	13.3	3.0	6.55	3.5		NS	NS	0.04	0.03	
C. Interaction											
SEm ±			2.6	5.73	3.0				0.03	0.03	
CD (P=0.05)			7.5	16.03	8.6				0.10	NS	

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Treatment	atment Crude protein yield(q/ha)							Crude protein (	%)			
	Pala-	His-	Ludh-	Bhuban-	Ranc	Mean	Palam-	Ludh-	Bhubanes-	His-	Ran-	Mean
	mpur	ar	iana	eswar	hi		pur	iana	war	ar	chi	
A. Entries			•					•	•		•	-
PMH-1	11.9	3.8	2.6	6.9	4.18	5.88	10.7	5.3	8.0	10.1	7.4	8.3
PMH-3	12.3	3.6	3.6	5.6	2.62	5.54	10.5	9.2	8.0	10.4	7.6	9.1
DHM-117	12.2	4.7	2.1	6.3	4.14	5.89	10.9	6.3	8.1	9.8	7.6	8.5
IHTFM (PAC-745)	13.1	3.7	2.5	5.4	3.33	5.61	10.6	6.2	8.0	9.9	7.6	8.5
African Tall (NC)	12.7	2.5	1.5	7.2	3.28	5.44	10.6	5.7	8.1	9.9	7.6	8.4
J-1006 (NC)	11.7	4.2	2.4	7.4	2.62	5.66	10.6	5.3	8.2	10.0	7.4	8.3
SEm ±	0.4	-	0.06	0.2	0.07		0.2	0.2	0.05	-	0.04	
CD (P=0.05)	1.1	-	0.17	0.5	0.21		NS	0.6	0.10	-	0.11	
CV (%)			7.4	10.2				9.4	2.2			
B. N levels (kg/ha)				-			•					
0	6.4	2.4	1.6	5.6	1.31	3.46	9.5	5.6	7.7	9.1	7.1	7.8
40	11.0	3.6	2.2	6.3	2.92	5.20	10.6	6.1	8.0	9.9	7.5	8.4
80	15.0	4.3	2.6	6.9	4.10	6.58	11.1	6.4	8.3	10.4	7.7	8.8
120	17.0	4.9	3.5	7.1	5.12	7.52	11.5	7.2	8.3	10.7	7.9	9.1
SEm+	0.3	-	0.05	0.2	0.06		0.1	0.2	0.04	-	0.03	
CD (P=0.05)	0.8	-	0.14	0.4	0.17		0.4	0.7	0.10	-	0.09	
C. Interaction					•							
SEm ±			0.1	0.4	0.14			0.5	0.1		0.07	
CD (P=0.05)			0.3	1.1	0.41			1.6	0.3		0.21	

Table K-14-AST-2(c): Effect of entries and nitrogen levels on quality of forage hybrid maize

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#### **B. NEW RESEARCH TRIALS**

### K-14-AST-3 (NT): Study of intercropping system of pigeon pea with different annual fodder crops Location: Ranchi and Raipur

This trial was initiated during *kharif* 2014 with an objective to find out the appropriate intercropping for maximum yield of pigeon pea as well as fodder yield. After harvesting of pigeon pea, experimental results of the trial will be reported in annual report of *Rabi* 2014-15.

### CS-14-AST-2: Study of intensive annual fodder crop based cropping system Location: Raipur

This trial was started during *kharif* 2014 with a view to find out appropriate cropping system for maximum fodder production and to study the effect of maximum forage production on soil fertility, NUE and WUE. This was the first year of experimentation and after completion of cropping sequence; results will be reported in annual report of *Rabi* 2014-15.

### K-14-AST-4: Study of intercropping system of different vegetable with forage maize Location: Raipur

Due to technical reason (height of fodder maize), this trial could not be conducted during *kharif* 2014.

### PS-14-AST-2: Impact of Mg and B on nutrient uptake, quality and yield of bajra napier hybrid Location: Vellayani

This trial was initiated during *kharif* 2014 (as establishment year) to assess the influence of Mg and B nutrition on the performance of bajra napier hybrid. Experimental results will be reported in annual report of *kharif* 2015.

#### **Plant Protection**

Forage crop protection trials were conducted during *kharif* 2014 on three major aspects *viz.*, occurrence of insect-pest, diseases and nematodes; evaluation of improved breeding materials for their reaction to insect-pests and diseases; and management of pests. In all 06 trials were conducted at different locations *viz.*, Bhubaneswar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri centres. The major emphasis was given on occurrence of diseases and insect-pests in different *Kharif* crops under different agro-climatic conditions and eco-friendly management of insect-pests and diseases.

# PPT-1. MONITORING OF DISEASE, INSECT PESTS AND NEMATODES IN COWPEA, MAIZE, PEARL MILLET AND SORGHUM UNDER FIELD CONDITION.

#### Locations: Bhubaneswar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri

Four cultivated forage crops sorghum, pearl millet, maize and cowpea were screened with objectives to observe the occurrence and abundance of diseases, insect pests and nematodes in relation to abiotic factors at different locations. The crop-wise occurrence of pests and their abundance has been recorded as follows:

#### Sorghum

**Diseases:** At Jhansi, zonate leaf spot (*Gleocercospora sorghi*), anthracnose (*Colletotrichum graminicola*) and gray leaf spot (*Cercospora sorghi*), sooty stripe (*Ramulispora sorghi*) and leaf blight (*Helminthosporium turcicum*) were predominating diseases on sorghum *var* MP Chari. The incidence of diseases was found in the range of 20 to 50%. The disease development and spread was favoured by mean temperature around 30°C and humidity 80%. Among all the diseases, zonate leaf spot was observed at maximum level (25%).

At Palampur, leaf blight incidence by *Helminthosporium turcicum* was initiated in the mid of July (3%) and progressed up to (20%) by last week of August. Zonate leaf spot was more severe (5 - 30%) as compared to leaf blight (3-20%).

At Ludhiana, severe incidence of zonate and gray leaf spot was observed on SL-44 variety of sorghum. The disease showed steady and steep progression during the period with maximum disease severity of 45.0%. Disease was favored by mean temperature range of 31.3 -37.6°C and mean RH of 70-85%. Maximum disease severity was observed in October (45.0%) with pinkish fungal growth (sporodochia) and sporulation under the lesions due to high humidity (90%) during morning hours. Grey leaf spot appeared during the third week of July in the crop sown during first week of June. The disease spread rapidly up to first week of September (65-77%) due to occurrence of rains and temperature of 28.9-31.3°C. Thereafter, in the last week of September, the disease development stopped (47.6%) due to absence of showers. With the maturity of crop decrease in temperatures 30°C the disease development slowed down with maximum disease severity of 59.5%.

At Bhubaneswar, in variety SL-44, incidence of leaf blight was observed from  $2^{nd}$  week of August and increased up to (60%)  $2^{nd}$  week of September.

*Insect fauna:* At Bhubaneswar, larval population of defoliator's at the time of harvesting was 2.2 larvae/10 plants. At Jhansi, per cent dead hearts due to shoot fly was maximum (25-30%) during first week of August in late sown Sorghum.

#### Pearl millet

**Diseases:** At Bhubaneswar, leaf blight (*Helminthosporium sp.*) incidence (35.0%) was recorded in Giant Bajra during the crop season while severity of sheath blight (*Rhizoctonia solani*) was low (3.6 %) at the time of harvesting. At Jhansi, leaf spot (*Pyricularia grisea*) was severe (30-35%) in the last week of August.

At Ludhiana, leaf spot disease (*Pyricularia spp.*) started appearing in the third week of July. Disease progressed steadily during the crop season from first week of September till last week of September with favourable temperature range of  $28.2-31.3^{\circ}$ C and RH of 70-85 %. Maximum disease severity (57.0%) was recorded. At Palampur, leaf blight (*Helminthosporium sp*) appeared in the 2<sup>nd</sup>week of July (2%) and progressed up to end of August (30%).

*Insect fauna:* At Bhubaneswar, infestation of insect pest started from  $2^{nd}$  week of August. Pest load was low in Pearl Millet (foliage feeder = 2.0 /10 plants). At Hyderabad, incidence of stem fly was observed during  $1^{st}$  week of August (16.60%) and remained up to second week of September (30.7%).

*Plant parasitic nematodes:* Nematode population at the time of sowing was recorded to be 124 /250 gm of soil sample which increased up to 181/250 gm of soil sample at the time of harvesting. Population of *Caloosia exilis* was maximum (96/250 gm soil sample) while population of *Helicotylenchus dihystera* was minimum (21 /250 gm soil sample) at the time of harvesting.

**Beneficial insect fauna:** Various predators/ parasites/pollinators were also recorded during the monitoring period *viz.*, Coccinellid beetles, Black ant, Butterfly, Flies, Spiders and Wasps. At the time of harvesting population of *Coccinellid* beetle was 5.2 /10 numbers of plants, Spiders 4.8 / 10 numbers of plants recorded while population of black ants was found maximum 26.6 /10 plants.

#### Maize

**Disease:** At Bhubaneswar in African tall, leaf blight incidence started from first week of August and progressed up to (52.0%) in second week of September. At Ludhiana, severity of maydis leaf blight noticed in the last week of July on var. J 1006 and progressed rapidly up to third week of September with 43.3 % severity (a max RH above 70-85% and mean temperature 27.6-31.3°C). Thereafter, as the crop reached physiological maturity and no rain was received after mid September leading to reduction in humidity, the disease progressed slowly with max disease severity of 55.0%. At Palampur, leaf blight (*H. maydis* and *H tercecium*) appeared in the third week of July and severity continued to increase (25%) up to the last week of August. Banded leaf and sheath blight (*Rhizoctonia sp*) were also observed in mild form (9%). At Jhansi, 20.1% incidences of maydis leaf blight were recorded during the crop season.

*Insect fauna:* Infestation of foliage feeders started from  $1^{st}$  week of August and increased steadily up to  $2^{nd}$  week of September (2.4 larvae/10 plants) during the time of harvesting at Bhubaneswar. The stem borer was also observed in the month of August at Palampur and Hyderabad. The incidence of stem borer on maize was negligible throughout the crop period at Rahuri however at Hyderabad it was severe (60%) in second week of August. Aphid infestation was also in the range of (25.0 to 66.3%) in the month of September.

#### Cowpea

**Diseases:** At Bhubaneswar in EC-4216, cowpea mosaic was reported in  $3^{rd}$  week of August and at the time of harvesting, it was 64.0%. Root rot incidence started from last week of July (8.0%) and steadily increased up to reach peak level (72%) during second week of September. At Jhansi, incidence of root rot (*Rhizoctonia solani, R. bataticola and Sclerotium rolfsii*) was observed (10-30%). Cowpea mosaic also appeared in traces at Jhansi and Hyderabad.

At Palampur, wilt / root rot (*Fusarium and Rhizoctonia sp*) were severe (12-45%) during July. Leaf spot and leaf blight (*Ascochyta and Phyllosticta* sp) appeared in the first week of July and increased continuously (up to 35%) in the last week of August. *Phytophthora* blight appeared in the second week of July and increased up to third week of July (10-25%). Anthracnose (*Colletotrichum lindemuthianum*) was observed in last week of July (10%) and increased up to (25%) by first week of August. However, mosaic disease appeared late in the season and remained stationary till the end of August. At Rahuri, yellow mosaic virus was moderate throughout the crop period.

*Insect fauna:* At Bhubaneswar, cowpea aphid (28.2-170.4 numbers/top leaf with 10 cm petiole) and flea beetle (9.0-98.0 holes/plant) were recorded during the crop season. At Hyderabad, aphid infestation started during the last week of July (10%) with maximum infestation (40%) in the mid of August. Flea beetle was also observed throughout the crop season. At Palampur, pod borer infestation was 3-15% during July to August. At Rahuri, very low infestation of aphids and jassids was recorded (1.67-3.0 / plant) in the month of August to mid September. The population of coccinellids was also very low during the infestation of aphids.

#### PPT-2. EVALUATION OF VARIETAL TRIALS OF COWPEA, MAIZE AND PEARL MILLET FOR RESISTANCE TO DISEASES, INSECT - PESTS AND NEMATODES

#### Locations: Bhubaneswar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri

#### 2.1. Cowpea

In the Initial Varietal Trial (Table PPT 2.1.1 & 2.1.2), All the entries were found free from infestations of aphids at Rahuri. However, at Hyderabad flea beetle incidence (14.26-27.0%) was observed. All the entries showed highly susceptible to moderately resistant reaction of leaf blight and root rot at Palampur. However all the entries showed resistant reaction at Ludhiana and Jhansi. At Rahuri and Ludhiana, the entries did not differ in the incidences of yellow mosaic virus disease. At Hyderabad all the entries were resistant to moderately resistant for YMV (Table PPT 2.1.1 & 2.1.2).

In AVT, all the entries were resistant for YMV and root rot at Bhubaneswar and Jhansi except entry TNFC 0926 at Bhubaneswar. At Palampur only two entries TNFC 0926 & MFC-09-9 were found moderately resistant to Anthracnose and Phytophthora while all the entries were susceptible for root rot (Table PPT 2.1.3). Flea beetles incidence (24.6-26.2%) was recorded at Hyderabad (Table PPT 2.1.3).

Table PPT 2.1.1. Screening for	pest resistance in Cowpea-	<b>Initial Varietal Trial</b>
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	Aphid infestation	Jassids/ leaf	Stem and leaf	Root rot/ wilt
Entries			diseases (%)	(%)
	Rahuri	Rahuri	Palampur	Palampur
UPC-5286	-	-	25.0	24.0
UPC-622	-	-	60.0	26.0
APFC-1011	-	-	90.0	38.0
IGFRI-06-01	-	-	60.0	26.0
MFC-09-13	-	-	50.0	27.0
Bundel Lobia-1	-	-	45.0	28.0
HFC-11-2	-	-	45.0	29.0

Table PPT 2.1.2 Screening for disease resistance in Cowpea- Initial Varietal Trial

	Root rot (%)		Yellow mosaic virus (1-5 scale)				Flea
Entries							beetles
	Jhansi	Ludhiana	Ludhiana	Jhansi	Rahuri	Hyderabad	Hyderabad
UPC-5286	0.0	0.0	2.8	1.3	1.0	2.0	27.0
APFC-10-11	0.0	0.0	2.8	2.0	-	1.0	24.7
IGFRI-06-01	0.0	0.0	2.8	0.0	-	1.0	19.7
UPC-9202	10.0	-	-	-	1.0	1.0	14.2
MFC-09.13	2.3	0.0	3.7	1.0	1.0	1.0	27.0
Bundel Lobia-1	1.0	0.0	3.7	2.4	-	2.0	24.1
HFC-11-2	1.0	0.0	2.6	1.0	-	1.0	22.1

Table PPT 2.1.3. Screening for disease resistance in	<b>Cowpea- Advance</b>	Varietal Trial
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Entries	Root rot (%)			Anthracnose and	YMV	Flea beetles
Entrics				Phytophthora		
	Jhansi	Bhubaneswar	Palampur	Palampur	Jhansi	HYD
TNFC-0926	20.0	25.0	29.0	15.0	0.0	26.1
MFC-09-9	5.0	5.0	28.0	15.0	0.0	24.8
UPC-9202	25.0	-	35.0	40.0	0.0	24.6
Bundel Lobia-1	5.0	5.8	27.0	35.0	0.0	26.3
UPC-5286	5.3	6.2	28.0	42.0	0.0	26.2
UPC-1301	6.4	8.7	28.0	41.0	0.0	24.8

#### 2.2. Pearl Millet

In Initial Varietal Trial (Table PPT 2.2.1), all the entries were found resistant to leaf spot at Ludhiana and Jhansi Centre. All the entries were diseases free for downy mildew at Ludhiana and leaf spot at Rahuri. Rust was found in traces at Hyderabad.

In Advance Varietal trial all the entries were observed highly resistant to leaf spot and downy mildew at Ludhiana and Jhansi, respectively (Table PPT 2.2.2). However, these entries gave moderate resistant to moderately susceptible reaction against leaf spot at Ludhiana.

 Table PPT 2.2.1 Screening for disease resistance in Pearl Millet- IVT

Entries	Downy mildew	Leaf spot (1-5 scale)		<b>Rust</b> (%)		
Lintres	Ludhiana	Ludhiana	Jhansi	Rahuri	Hyderabad	
APFB-09-10	DF	2.9	1.0	DF	Т	
AVKB-19	DF	2.9	0.0	DF	Т	
Giant Bajra	DF	5.5	1.6	DF	Т	
AFB-10	DF	3.7	-	DF	Т	
RBB-5	DF	3.3	1.0	DF	Т	
Raj Bajra Chari-2	DF	1.8	1.2	DF	Т	
HFC-081	DF	2.5	-	DF	Т	
PAC-982	DF	1.4	1.0	DF	Т	

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Table PPT 2.2.2	. Screening f	for disease and	pest resistance in	Pearl Millet- A'	VT2
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Entries	Downy Mildew incidence (%)	Leaf spot (%)		
Entries	Ludhiana	Ludhiana	Jhansi	
NDFB-936	0.0	22.5	0.0	
Giant Bajra	0.0	25.5	0.0	
AVKB-19	0.0	20.3	0.0	
Raj Bajra Chari-2	0.0	18.5	2.0	
AFB-8	0.0	27.0	2.3	
APFB-09-1	0.0	19.9	0.0	

In AVTPM-1, all the entries showed resistant reaction to leaf spot and Downy Mildew at Ludhiana and Jhansi and Rahuri centre (Table PPT 2.2.3).

Table PPT 2.2.3.	Screening for	r disease and	pest resistance in	<b>Pearl Millet- AVT1</b>

Entring	Downy Mildew incidence (%)	Leaf spot (1-5 scale)			
Entries	Ludhiana	Ludhiana	Jhansi	Rahuri	
Giant Bajra	0.0	1.8	0.0	0.0	
AVKB-19	0.0	2.9	0.0	0.0	
Raj Bajra Chari-2	0.0	2.2	0.0	0.0	
DFMP-30	0.0	0.7	0.0	0.0	
NDFB-939	0.0	2.2	0.0	0.0	
AFB-9	0.0	1.1	0.0	0.0	
RBB-4	0.0	1.8	0.0	0.0	

#### 2.3 Maize

In Initial Varietal Trial, (Table PPT 2.3.1), all the entries were found susceptible to moderately resistant for leaf blights at Ludhiana. At Rahuri, all the entries showed resistance reaction to stem borer. All the entries were found resistant to moderately resistant for leaf blights at Jhansi and Palampur except MPC-1 which showed susceptible reaction at Palampur. Stem borne incidence was also recorded at Hyderabad and Rahuri centre.

In AVT trials, all the entries were found moderately resistant for leaf blights at Palampur, Bhubaneswar and Jhansi except AFM-3 at Palampur (Table PPT 2.3.2). However, at Ludhiana all the entries were found moderately susceptible for maydis leaf blight except AFM-2, which gave moderately resistant reaction.

<b>Table PPT 2.3.1</b> .	Screening for	diseases and	pest resistance in	IVT on Maize
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Entries	Maize leaf blig (Maydis and <i>Tr</i>	nts severity <i>urcicum</i> blight)	Score values of Stem borer incidence		
	Ludhiana (%)	Palampur (%)	Jhansi (%)	Hyderabad	Rahuri
JHM-14-1	24.42	22.0	5.0	2.37	1.53
MPC-1	26.27	27.0	4.0	1.79	1.67
MFM-6	24.05	21.0	3.3	2.32	1.73
PAC-746	21.83	12.0	2.3	1.90	1.20
MFM-4	23.31	18.0	0.0	2.56	1.60
African Tall	26.27	17.0	0.0	4.03	1.00
J-1006	25.16	19.0	1.0	1.20	1.47
BAIF Maize-4	24.42	15.0	1.0	2.55	1.33
AFM-4	24.05	23.0	2.0	3.51	1.20
Entries		Maize leaf h (Maydis and 2	Score values of Stem borer incidence		
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Entries	Ludhiana	Palampur	Bhubaneswar	Jhansi	Rahuri
J-1006	25.9	24.0	20.0	10.0	1.47
AFM-1	28.4	12.0	32.0	10.0	1.20
AFM-3	25.5	29.0	26.0	12.0	1.00
African Tall	27.3	21.0	20.0	10.0	1.87
PFM-7	29.9	22.0	26.0	13.0	1.53
JHM-13-1	27.3	20.0	26.0	12.0	1.33
AFM-2	24.7	23.0	20.0	10.0	1.27

 Table PPT 2.3.2. Screening for diseases and pest resistance in AVT on Maize

In hybrid trials, (Table PPT 2.3.4) all the entries were found resistant to moderately resistant at Palampur and moderately resistant at Bhubaneswar for maize leaf blight while, at Jhansi all the entries were found resistant for leaf blight. In AHTM trial, for seed, all the entries were resistant to moderately resistant at Palampur, Jhansi, Ludhiana and Bhubaneswar except DHM-117 at Palampur.

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Entrica	Maize leaf blight (T. turcicum) (1-5 scale)					
Entries	Jhansi	Palampur	Bhubaneswar			
PMH-1	1.0	2.0	2.5			
J-1006	1.2	3.0	2.0			
IHTFM (PAC-745)	1.3	3.0	2.2			
African Tall	1.0	3.0	2.0			
DHM-117	1.0	2.0	2.0			
PMH-3	1.0	3.0	2.0			

 Table PPT 2.3.5. Screening for diseases and pest resistance in Hybrid Trial on Maize (Seed)

Entries	Maize leaf blights	severity (%)	(Maydis and Turcicum blight)		
Entries	Ludhiana	Jhansi	Palampur	Bhubaneswar	
PMH-1	15.5	5.0	10.0	2.5	
J-1006	22.5	5.2	24.0	2.0	
IHTFM (PAC-745)	24.7	5.6	12.0	2.2	
African Tall	24.0	6.3	18.0	2.0	
DHM-117	23.6	5.0	29.0	1.7	
PMH-3	23.3	5.0	14.0	2.0	

## 2.4 Rice bean

In IVT all entries were found resistant to root rot, leaf blight and leaf spot at Jhansi. At Bhubaneswar, entries exhibit moderately resistant were JOR-14-2, BFRB-18 and JRBJ-06-5 (Table PPT. 2.5.1).

Entries	Leaf blight and le	af spot (%)	Root rot	
Entries	Bhubaneswar	Jhansi	Jhansi	
JOR-14-1	60.0	5.0	0.0	
Bidhan-2	51.0	4.6	0.0	
JOR-14-2	45.0	0.0	1.2	
BFRB-18	40.0	2.3	0.0	
RBL-6	51.0	2.4	1.3	
JRBJ-06-4	51.0	0.0	1.0	
JRBJ-06-5	45.0	0.0	1.0	
Bidhan-1	51.0	0.0	1.0	

Table PPT. 2.5.1. Screening for pest resistance in IVT Rice bean

### PPT: 14 MANAGEMENT OF FOLIAR DISEASES OF FORAGE SORGHUM

#### Locations: Bhubaneswar, Palampur, Ludhiana and Jhansi

The trial was conducted in third year for management of foliar diseases of sorghum with following treatments

T<sub>1</sub>: Seed treatment with carbendazim 2g/kg seed

T<sub>2</sub>: Seed treatment with *T.viride* 5g/kg seed

T<sub>3</sub>: Two foliar sprays of *T. viride* 0.5%

**T**<sub>4</sub>: Two foliar sprays of propiconazole 0.1%

T<sub>5</sub>: Two foliar sprays of copper oxy chloride 0.3%

**T**<sub>6</sub>: T1 + two foliar sprays of propiconazole 0.1%

T7: T2 + two foliar sprays of propiconazole 0.1%

**Ts**: T1 + two foliar sprays of copper oxy chloride 0.3%

**T**<sub>9</sub>: T2 + two foliar sprays of copper oxy chloride 0.3%

T<sub>10</sub>: Control

**Bhubaneswar:** All the treatments were found significantly effective to reduce disease incidence and increase in the green forage yield as compared to untreated control plot. Among different treatments, lowest disease incidence (21.6%) as well as highest forage yield (296.66 q/ha) were recorded in T<sub>6</sub> treatments (Table PPT 14.1).

**Jhansi:** All the treatments were found significantly effective to reduce leaf blight incidence and increase the green forage yield as compared to untreated control plot. Among different treatments, lowest disease incidence was recorded in  $T_6$  followed by  $T_4$  as well as highest forage yield were recorded in  $T_4 \& T_6$ . (Table PPT 14.1).

**Ludhiana and Palampur:** Seed treatment with carbendazim + two foliar sprays of propiconazole 0.1% (T<sub>6</sub>) showed significantly the least blight severity (24.4 and 11.4%, Respectively) followed by (T<sub>4</sub>) two foliar spray of propiconazole (25.7 %) at Ludhiana. However at Palampur (T<sub>6</sub>) seed treatment with *T.viride* 5g/kg seed + two foliar sprays of propiconazole 0.1% showed (13.7%) blight severity (Table PPT 14.1). The green fodder yield was also more in these treatments as compared to control.



	Leaf blight severity/ incidence (%)					GFY (q/ha)			
Treatments	Bhuban	eswar	Jhansi	Ludhiana	Palampur	Jhansi	Bhubaneswar	Ludhiana	Palampur
	Incidence	Severity	Incidence	Severity	Severity				
$T_1$	14.8	53.3	5.0	34.2	45.9	266.6	237.0	579.1	254.3
$T_2$	17.2	61.6	10.5	39.0	54.6	221.6	223.6	550.0	251.7
T <sub>3</sub>	22.7	45.0	11.2	38.1	46.1	252.5	242.0	558.3	260.9
$T_4$	10.0	43.3	2.3	25.7	18.5	300.8	251.6	591.6	276.4
T <sub>5</sub>	20.0	51.6	5.4	47.5	57.1	250.0	236.0	508.3	250.9
T <sub>6</sub>	6.3	21.6	2.0	24.4	11.4	300.8	296.6	604.0	289.1
<b>T</b> <sub>7</sub>	11.2	33.3	3.3	26.6	13.7	269.1	268.0	583.3	284.0
T <sub>8</sub>	15.6	41.6	8.4	40.8	49.1	255.0	252.6	525.0	264.0
T <sub>9</sub>	11.4	56.6	10.0	42.1	52.9	270.8	234.3	516.6	259.7
T <sub>10</sub>	37.3	81.6	11.0	61.2	76.1	220.8	198.0	483.3	241.6
CD (p=0.05)	4.7	10.6	6.4	5.6	2.3	17.3	27.0	NS	8.3

## Table PPT 14.1. Efficacy of foliar spray on foliar diseases and GFY of forage sorghum

## PPT-15. INTEGRATED MANAGEMENT OF ROOT ROT AND FOLIAR DISEASES OF FORAGE COWPEA

## Locations: Bhubaneswar, Palampur, Ludhiana and Jhansi

The experiment was conducted to evaluate the losses due to root rot and foliar diseases of cowpea by using different dates of sowing with seed treatment by biocontrol agents and foliar spray of fungicides.

The trial consisted of following main plots and sub-plots

Main plot: three dates of sowing *viz*;

- DOS 1= 15 days before normal date of sowing,
- DOS 2= normal date of sowing
- DOS 3= 15 days after normal date of sowing.

**Sub-plots:** There were 4 sub plots with 4 treatments:

- $T_1$  = No treatment (Control)
- T<sub>2</sub>=Seed treatment with *Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval.
- $T_3$  =Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP (50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval.
- $T_4$  =Seed treatment with metalaxyl 8% + Mancozeb 64% @ 2.5g/kg seed + NSKP (50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval.

**Bhubaneswar**: The results of the trial revealed that, among all treatments of sowing of forage cowpea, late sowing (DOS 3) with seed treatment of *Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval (T<sub>2</sub>) recorded significantly lowest per cent plant mortality (12.0%) due to damping off and root rot incidence and highest green forage yield (227.31 q/ha) and dry matter yield (47.0 q/ha) as compared to other treatments. Late sowing (DOS 3) recorded minimum root rot incidence and highest yield followed by DOS 2 and DOS 1. During the period average sunshine hrs, average rainfall and average relative humidity were recorded 4.86 hrs, 63.88 mm and 84.67%, respectively (Table PPT 15.1 & 15.2).

(On Average Week wise Basis)								
Treatment (Date	Average Max	Average Min	Average Relative	Average Rainfall				
of Sowing)	Temp. (°C)	Temp. (° C)	Humidity (%)	(mm)				
DOS 1	31.79	24.61	87.28	87.18				
DOS 2	31.99	24.53	86.89	79.20				
DOS 3	32.58	24.32	84.67	63.88				

 Table PPT 15.1 Averages of Max., Min., Temp., Relative Humidity and Rainfall during the crop period at different period of sowing.

Table PPT-15.2 Effect of date of sowing	; on diseases a	and yield of	forage cowpea
at Bhubaneswar			

Treatments		Root rot incidence (%)	Yield (q/ha)		
Main (DOS)	Sub.		GFY	DMY	
DOS 1	$T_1$	58.67	103.29	21.7	
	$T_2$	26.67	185.67	38.3	
	T <sub>3</sub>	37.33	158.93	33.4	
	$T_4$	44.00	143.82	30.6	
DOS 2	$T_1$	55.33	114.43	24.4	
	$T_2$	21.33	202.60	41.8	
	$T_3$	25.33	191.76	40.3	
	$T_4$	35.33	164.53	35.1	
DOS 3	$T_1$	54.67	112.93	23.7	
	$T_2$	12.00	227.31	47.0	
	T <sub>3</sub>	18.00	212.31	44.6	
	$T_4$	24.00	198.71	43.7	

Treatment	Root rot (%)	GFY yield (q/ha)	DMY yield (q/ha)
DOS 1	40.06	147.93	31.02
DOS 2	35.53	168.33	35.42
DOS 3	30.58	187.81	39.75
Mean	35.39	168.02	35.39

	ROOT ROT (%)		GFY YIELD (q/ha)			DMY YIELD (q/ha)		
	SEm	CD 0.5%		SEm	CD 0. 5%		SEm	CD 0.5%
A	1.104	4.335	A	4.342	17.044	A	0.910	3.572
S	0.622	1.847	S	2.686	7.979	S	0.552	1.639

A = Main Plot (Date of Sowing)., S = Sub Plot (Treatments)

**Ludhiana:** Early sowing (DOS 1) showed higher disease incidence as compared to other two dates of sowing. Occurrence of root rot was negligible (Table PPT 15.3). The mean of green fodder yield was maximum (497.58 q/ha) in  $T_3$  plots besides high incidence of mosaic, the green fodder yield was maximum in early sowing (DOS 1) followed by crop sown later. Mosaic was quiet less in  $T_3$  plots as compared to other treatments.

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### Table PPT-15.3 Effect of date of sowing on diseases and yield of forage cowpea at Ludhiana

Treatments		Severity	/ incidence of	Green Fodder	Dry Matter
		Diseases		Yield (q/ha)	Yield (q/ha)
Main (DOS)	Sub.	YMV	Root rot		
DOS 1	$T_1$	12.22	1.11	670.83	114.04
(09/07/2014)	$T_2$	10.37	0.37	762.50	129.63
	$T_3$	8.89	0.37	829.17	140.96
	$T_4$	9.63	0.00	891.67	151.58
DOS 2	$T_1$	6.30	0.74	408.33	69.42
(17/07/2014)	$T_2$	5.93	0.37	445.83	75.79
	$T_3$	5.19	0.00	470.83	80.04
	$T_4$	5.56	0.00	541.67	92.08
DOS 3	$T_1$	5.19	0.37	187.50	31.88
(04/08/2014)	$T_2$	4.44	0.37	241.67	41.08
	T <sub>3</sub>	3.70	0.00	208.33	35.42
	T₄	4 07	0.00	187 50	31.88

## Interaction Tables:

### Cowpea mosaic incidence

	DOS 1	DOS 2	DOS 3	Mean
<b>T</b> <sub>1</sub>	12.22	6.30	5.19	7.90
$T_2$	10.37	5.93	4.44	6.91
<b>T</b> <sub>3</sub>	8.89	5.19	3.70	5.92
T <sub>4</sub>	9.63	5.56	4.07	6.42
Mean	10.28	5.74	4.35	
CD (p=0.05)		NS		

Mean incidence of mosaic was quite less in plots where seed was treated with T<sub>3</sub> [tebuconazole 2DS @ 1g/kg seed + NSKP(50 g/kg seed)] followed by foliar spray of (propiconazole @ 1ml/l) at 15 days interval followed by T<sub>4</sub> seed treatment with [metalaxyl 8% + mancozeb 64% @ 2.5g/kg seed + NSKP(50 g/kg seed)] followed by foliar spray of propiconazole @ 1ml/l at 15 days interval and T<sub>2</sub> seed treatment with [*Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed] each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval respectively as compared to check. First date of sowing (9/07/2014) showed higher disease incidence as compared to other two dates of sowing (17/07/2014 & 04/08/2014)

## Cowpea root rot incidence

	DOS 1	DOS 2	DOS 3	Mean				
T	1 1 1	0.74	0.27	0.74				
11	1.11	0.74	0.37	0.74				
$T_2$	0.37	0.37	0.37	0.37				
<b>T</b> <sub>3</sub>	0.37	0.00	0.00	0.12				
T <sub>4</sub>	0.00	0.00	0.00	0.00				
Mean	0.46	0.28	0.19					
CD (p=0.05)		NS						

The treatments *viz.*, T<sub>4</sub> [seed treatment with metalaxyl 8% + Mancozeb 64% @ 2.5g/kg seed + NSKP(50 g/kg seed)] were free from root rot and was followed by T<sub>3</sub> [seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP(50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval]. Occurrence of root rot was quite apparent in check and T<sub>2</sub> [seed treatment with *Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval]. Root rot was predominant on early sowing (9/7/2014) followed by second (17/07/2014) and third date of sowing (04/08/2014). The root rot plants were observed in untreated plots on all the three dates of sowing.

	DOS 1	DOS 2	DOS 3	Mean				
<b>T</b> <sub>1</sub>	670.83	408.33	187.50	422.22				
$T_2$	762.50	445.83	241.67	483.33				
<b>T</b> <sub>3</sub>	829.17	470.83	208.33	502.78				
T <sub>4</sub>	891.67	541.67	187.50	540.28				
Mean	788.54	466.67	206.25					
CD (p=0.05)		81.67						

### Cowpea Green Fodder Yield (q/ha)

The green fodder yield was maximum in plots with T<sub>4</sub> treatment [seed treatment with metalaxyl 8% + mancozeb 64% @ 2.5g/kg seed + NSKP(50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval] followed by T<sub>3</sub> [tebuconazole 2DS @ 1g/kg seed + NSKP(50 g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval] and T<sub>2</sub> [Seed treatment with *Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval] respectively as compared to untreated plot. Besides high incidence of mosaic, the green fodder yield was maximum on first date of sowing (09/07/2014) followed by crop sown on 17/07/2014 and 4/08/2014 respectively.

**Palampur:** The data in Table PPT 15.4 revealed that root rot incidence increased with the delay in sowing of the crop. Minimum incidence (11.4%) was observed in early sown crop & maximum (41.4%) in late sown crop. However, the disease severity of Anthracnose increased with the delay in the sowing of crop being maximum (26.3%) on 4<sup>th</sup> June sown crop & minimum (12.5%) in crop sown on 4<sup>th</sup> July. In case of leaf blight, the severity was maximum (25.4%) in the normal sowing date (19 June) & minimum (13.4%) in late sown crop. The nematode population also increased with the delay in sowing.

For the management of diseases & nematode,  $T_3$  [seed treatment with fungicides tebuconazole 2DS or metalaxyl + mancozeb] and NSKP followed by foliar spray with propiconazole were found effective. Both the treatments i.e.  $T_3$  [seed treatment with tebuconazole + NSKP followed by sprays of propiconazole] and  $T_4$  [seed treatment with metalaxyl + mancozeb + NSKP followed by sprays of propiconazole] were found very effective & gave maximum control of root rot, anthracnose, leaf blights and nematode in all the three dates of sowing with maximizing the GFY. Data in table PPT 15.4 revealed that the appearance of the root rot and leaf blight was delayed with the delay in sowing. The incidence of root rot was maximum (45%) where as disease severity of leaf blight was minimum (25%) in the late sown crop.

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Treatmo	ent	Sev	erity/ inci	Yield (q/ha)				
Main	Sub	Root	Anthra	Leaf	Nemato	Nematodes /g of soil		DFY
(DOS)		rot	cnose	blight	Before	After		
					sowing	harvest		
DOS 1	<b>T</b> <sub>1</sub>	11.0	14.0	17.8	132.0	279.0	43.0	14.6
(04/06/14)	$T_2$	7.8	8.0	4.9	132.0	189.7	48.1	15.1
	<b>T</b> <sub>3</sub>	3.8	8.4	4.9	132.0	184.7	53.3	16.5
	$T_4$	4.0	8.1	4.5	132.0	169.7	54.4	16.5
DOS 2	<b>T</b> <sub>1</sub>	17.5	22.8	24.5	147.0	306.7	47.6	15.1
(19/06/14)	$T_2$	16.6	5.9	6.7	147.0	190.3	52.5	16.3
	T <sub>3</sub>	8.3	6.4	6.7	147.0	184.7	54.4	16.6
	$T_4$	8.2	6.5	6.1	147.0	184.7	56.8	16.8
DOS 3	$T_1$	31.9	11.7	13.2	155.0	344.7	41.2	14.4
(04/07/14)	$T_2$	31.0	4.5	5.1	155.0	196.0	41.8	15.1
	T <sub>3</sub>	15.3	4.2	4.5	155.0	198.3	45.3	16.0
	<b>T</b> <sub>4</sub>	16.0	4.3	4.8	155.0	191.3	48.4	16.1
A (Date of so	owing)	1.69	1.70	1.49	0.03	7.36	1.53	0.21
B (Treatm	ents)	1.35	2.01	1.56	NS	9.37	1.21	0.31
A x B		2.33	3.48	2.71	NS	16.22	2.10	NS

Table PPT-15.4 Effect of date of sowing on diseases and nematodes of forage cowpea at Palampur

**Jhansi:** All the treatments in three sowing dates were found effective against the root rot and foliar disease (Table PPT 15.5). Among different treatments,  $T_3$  [Seed treatment with *Trichoderma viride* + *Paecilomyces lilacinus* @ 5 g/kg seed each followed by foliar sprays of propiconazole @ 1ml/l at 15 days interval] was found to be the best treatment as it reduced the disease to maximum extent and in turn provided maximum GFY in early sowing. The data in Table PPT 15 revealed that root rot incidence increased with the delay in sowing of the crop. Minimum incidence (2.7%) was observed in early sown crop & maximum (30.6%) in normal date sown crop for anthracnose as well as root rot.

Treatments		Severity / incid	Severity / incidence of Diseases (%)			Yield
Main (DOS)	Sub.	Root rot	Anthracnose	(q/ha)		
DOS 1	<b>T</b> <sub>1</sub>	0.0	3.2		512.5	
(24.6.2014)	T <sub>2</sub>	0.0	3.8		492.5	
	T <sub>3</sub>	0.0	2.7		612.5	
	$T_4$	0.0	2.9		550.0	
DOS 2	T1	10.0	4.9		443.7	
(9.7.2014)	T <sub>2</sub>	10.0	5.1		475.0	
	T <sub>3</sub>	24.3	6.6		455.0	
	<b>T</b> 4	30.6	13.5		425.0	
DOS 3	T <sub>1</sub>	15.3	8.2		362.5	
(1.8.2014)	T <sub>2</sub>	11.5	7.2		350.0	
	T <sub>3</sub>	11.2	9.3		318.7	
	$T_4$	24.6	11.2		312.5	

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	DOS 1	DOS 2	DOS 3	Mean
$T_1$	0.0	10.0	15.3	8.4
$T_2$	0.0	10.0	11.5	7.1
<b>T</b> <sub>3</sub>	1.0	24.3	11.2	12.1
$T_4$	0.0	30.6	24.6	18.4
Mean	0.25	18.7	15.6	
CD (P=0.05)		NS	5	

### **Interaction Table: Cowpea root rot incidence**

### PPT 17: BIOLOGICAL MANAGEMENT OF DEFOLIATORS ON COWPEA

### Locations: Jhansi, Rahuri and Ludhiana

The trial was conducted to evaluate the efficacy of bio-pesticides in management of defoliators on cowpea with following treatments *viz.*,  $T_1$ : *Beauveria bassiana* @ 5 g(cfu 10<sup>6</sup>),  $T_2$ : *Nomurae relyi*@ 5 g(cfu 10<sup>6</sup>),  $T_3$ : NSE 5%,  $T_4$ : *Pseudomonas fluorescence* @5 g(cfu 10<sup>6</sup>),  $T_5$ : Untreated control

**Ludhiana:** The treatment of  $T_1$  (*Beauveria bassiana*) and  $T_2$  (*Nomurae rileyi*) were found significantly superior for management of defoliators in forage cowpea. These treatments were recorded 4.33 larvae/m<sup>2</sup> with highest green forage yield (323.81 and 321.91 q/ha, respectively) and dry matter yield (55.05 and 54.72 q/ha, respectively).

cowpea								
Treatment	Av. Number of la	arvae/m <sup>2</sup> at 7 days	GFY (q/h)					
	after	spray						
	Ludhiana	Jhansi	Ludhiana	Jhansi				
T <sub>1</sub>	4.33	1.33	323.81	313.3				
T <sub>2</sub>	4.33	0.67	321.91	328.0				
T <sub>3</sub>	7.33	1.06	316.19	316.7				
$T_4$	8.67	1.50	310.48	316.7				
T <sub>5</sub>	12.33	2.00	304.76	303.3				
CD (p=0.05)	2.83		NS					

 Table PPT 17.1 Effect of Bio- pesticides on survival population of defoliators on cowpea

**Jhansi:** At Jhansi centre, foliar application of  $T_2$  (*N. rileyi*) recorded lesser number of larvae per square meter (0.67) as compared to other treatments. However,  $T_1$  (*B. bassiana*) showed 1.33 larvae/m<sup>2</sup> and it was lower than untreated control. The highest green forage yield was obtained in plot treated with *N. rileyi* @ 5g/lit. of water. Next promising treatments in order to their merits were  $T_3$ ,  $T_4$  and  $T_1$ which recorded 31.67, 31.67 and 31.33 q/ha green forage yield of forage cowpea.

## **Rahuri Center**

**Result:** During the kharif-14, infestation of defoliators was not observed on cowpea throughout the crop period hence the spray treatments were not been given to the crop. Therefore, the data of the trial is not included.

## Breeder Seed Production in Forage Crops (*Kharif-2014*) (Table Reference: Tables 1 & 2)

In *Kharif*-2014, the indent for Breeder Seed Production was received from DAC, GOI for 12 varieties of four forage crops *viz.*, Maize, Pearl millet, Cowpea and Guar. The total indent for breeder seed production was 141.68 q was allocated to seven SAUs/ICAR/NGO institutes. Among the quantity allocated for different forage crops, the maximum was for Maize (135.48 q) followed by Cowpea (4.95 q), Guar (1.0 q) and minimum was for Pearl millet (0.25 q).

The final Breeder Seed Production Report (BSP-IV) received from different seed producing centres revealed that in crops such as Maize and Pearl millet, the overall breeder seed production was higher in comparison to allocated quantity whereas in crops like Cowpea and Guar the breeder seed production was less than the allocated quantity. Coming to the crop wise scenario, as compared to allocation in Maize, the production was 152.8 q (17.32 q surplus) and in Pearl millet production was 0.55q (0.30 q surplus). However in cowpea, the production was 1.95 q (3.0 q deficit) against the allocation of 4.95 q. Similarly in Guar against the allocation of 1.0 q the actual production was 0.80 q (0.20 deficit). The overall breeder seed production was 156.1 q against the allocation of 141.68 q, which was 14.42 q surplus or 10.18 per cent higher than the quantity allocated.

S. N.	Producing centre/ State	Variety	Сгор	DAC indent	Actual Allocation	Actual Production	Production Surplus (+)/
Mał	arachtra						Denen (-)
		AC' T 11	N4 '	15.0	15.0	10.0	()
1.	BAIF, Urulikanchan	African Tall	Maize	15.0	15.0	12.8	(-) 2.2
2.	MPKV, Rahuri	African Tall	Maize	44.68	44.68	60.0	(+) 15.32
		Giant Bajra	Pearl Millet	0.05	0.05	0.05	-
Pun	jab		L				
3.	PAU, Ludhiana	J-1006	Maize	72.1	72.1	74.0	(+) 1.9
		CL-367	Cowpea	0.4	0.4	0.5	(+) 0.10
		Ageta Guara-112	Guar	0.4	0.4	0.4	-
		Guara-80		0.4	0.4	0.4	-
Raja	asthan						
4.	RRS, IGFRI,	Avika Bajra	Pearl Millet	0.2	0.2	0.5	(+) 0.3
	Avikanagar	Chari-19					
5.	MPUAT, Udaipur	Pratap Makka	Maize	3.70	3.7	6.0	(+) 2.3
	-	Chari-6					
Utta	rakhand				-		
6.	GBPUAT, Pantnagar	UPC-628	Cowpea	1.5	1.5	0.2	(-) 1.3
		UPC-625		2.15	2.15	0.25	(-) 1.9
Utta	r Pradesh				-		
7.	IGFRI, Jhansi	Bundel Guar-3	Guar	0.2	0.2	Nil	(-) 0.20
		EC-4216	Cowpea	0.9	0.9	1.0	(+) 0.10
Tota	ıl			141.68	141.68	156.1	(+) 14.42

 Table 1: Centre wise Breeder Seed Production (q) during Kharif-2014

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Сгор	Variety	Year of Notification	DAC indent	Allocation As per BSP-1	Actual Production	Production Surplus (+)/ Deficit (-)
Maize	African Tall	1983	59.68	59.68	72.8	(+) 13.12
	J-1006	1992	72.10	72.10	74.0	(+) 1.9
	Pratap Makka Chari-6	2009	3.7	3.7	6.0	(+) 2.3
	Total		135.48	135.48	152.8	(+) 17.32
Pearl Millet	Avika Bajra Chari-19	2009	0.20	0.20	0.50	(+) 0.30
	Giant Bajra	1985	0.05	0.05	0.05	-
	Total		0.25	0.25	0.55	(+) 0.30
Cowpea	CL-367	2006	0.40	0.40	0.50	(+) 0.10
	EC-4216	1978	0.90	0.90	1.0	(+) 0.10
	UPC-625	2009	2.15	2.15	0.25	(-) 1.9
	UPC-628	2010	1.50	1.50	0.20	(-) 1.30
	Total		4.95	4.95	1.95	(-) 3.0
Guar	Ageta Guara-112	1983	0.40	0.40	0.40	-
	Bundel Guar-3	1999	0.20	0.20	Nil	(-) 0.20
	Guara-80	1983	0.40	0.40	0.40	-
	Total		1.0	1.0	0.80	(-) 0.20
Total			141.68	141.68	156.1	(+) 14.42

Table 2: Variety-wise Breeder Seed Production (q) during *Kharif*-2014

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## All India Coordinated Research Project on Forage Crops

## FTDs ALLOTED TO AICRP (FC & U) CENTRES FOR KHARIF- 2014

Centre	Crop-wise FTDs to be conducted during Kharif-2014								Total no. of FTDs	
	BN hyb.	Rice bean	Maize	Maize + cowpea	Setaria	Bajra	Cowpea	Guinea	Guar	
								grass		
Jorhat	15				15					30
Bhubaneswar	10						10			20
Kalyani	10	10	10				10			40
Ranchi	30		35				20	30		115
Faizabad	15					15				30
Jabalpur	10	7	10							27
Anand	10					10				20
BAIF Urul.	10			10		10				30
Bikaner						15	5		5	25
Ludhiana	30		20			30				80
Coimbatore	10		10					5		25
Hyderabad	20		20			20	20			80
Mandya	5		10				10	5		30
Rahuri	10		10			10				30
Palampur	20				20					40
Srinagar			10							10
Imphal		5	5							10
Raipur	10		5				10			25
Hisar						15	15			30
Vellayani	5						5	5		15
Karikal	5					5				10
Pantnagar	15		10				10			35
Total	240	22	155	10	35	130	115	45	5	757

Name of Centre	Monitoring Team	Date of Monitoring
AAU, Jorhat	Dr. D. P. Awasthi	16 Sep, 2014
OUAT, Bhubaneswar	Drs. Ritu Mawar and Nitish Tiwari	20-24 Sep, 2014
BCKV, Kalyani	Drs. N. K. Shah and A. K. Mehta	17-18 Sep, 2014
BAU, Ranchi	Dr. D. P. Awasthi	25 Sep, 2014
NDUAT, Faizabad	Dr. A. B. Tambe	12-13 Sep, 2014
JNKVV, Jabalpur	Drs. U. S. Tiwana and C. Babu	15-16 Sep, 2014
AAU, Anand	Drs. A. K. Mall and M. R. Patel	21-23 Sep, 2014
BAIF, Urulikanchan	Drs. A. K. Mall and B. T. Sinare	19-20 Sep, 2014
MPKV, Rahuri	Drs. A. K. Mall and S. R. Kulkarni	16-17 Sep, 2014
RAU, Bikaner	Drs. V. K. Sood and Naveen Kumar	22 Sep, 2014
PAU, Ludhiana	Drs. S. R. Kantwa, Ritu Mawar and A. K. Mall	28 Aug, 2014
CCS HAU, Hisar	Drs. Naveen Kumar and S. S. Shekhawat	6-9 Sep, 2014
GBPUA&T, Pantnagar	Dr. Rahul Kapoor	24 Sep, 2014
TNAU, Coimbatore	Drs. A. H. Sonane and B. G. Shekara	9 Sep, 2014
ANGRAU, Hyderabad	Drs. Usha Thomas and P. S. Takawale	14-15 Sep, 2014
UAS, B (ZRS, Mandya)	Dr. Usha Thomas	12-13 Sep, 2014
CSK HPKV, Palampur	Drs. S. R. Kantwa and Upasana Rani	2 Oct, 2014
KAU, Vellayani	Dr. M. R. Krishnappa	19 Sep, 2014
IGKV, Raipur	Drs. Ritu Mawar and C. Babu	12-13 Sep, 2014
CAU, Imphal	Drs. Durgesh and K. K. Sharma	7-8 Sep, 2014
SKUA & T, Srinagar	Flood	

## Monitoring details of Kharif 2014-15 AICRP (FC & U) Trials

## Forage In-house Breeding Activities-Kharif, 2014

## Anand Agricultural University, Anand

<b>I.</b> (1) New collections		
Crop	Number	Source
Sorghum	12	National Dairy Development Board
Cactus	2	National Dairy Development Board

(2) Germplasm maintained

Сгор	Total number of lines
Sorghum	583
Maize	159
Pearl millet	55
Cowpea	31
Sorghum sterile lines & maintainer	8
Pearl millet sterile lines & maintainer	4

II. Forage Bajra: Following segregating materials were developed.

 $\begin{array}{ll} F_2: & 34 \ (IPS) \\ F_3: & 17 \ (IPS) \\ F_4: & 20 \ (IPS) \\ F_5: & 4 \ (IPS) \\ Bulk: 8 \end{array}$ 

**III. Sorghum Breeding:** With a view to develop high yielding (Single/multi cut) varieties with better quality, following materials were developed

 $\begin{array}{rrrrr} F_1: & 5 \\ F_2: & 16 \\ F_3: & 18 \\ F_4: & 20 \\ F_5: & 8 \\ Bulk: & 7 \end{array}$ 

**IV. Forage Maize:** For the development of high yielding composite maize variety coupled with better quality, eight populations were raised and after selecting superior plants allowed them to inter-mating and seeds were obtained for next cycle.

### **Population**

(a) African Tall-Anand
(b) J-1006-Anand
(c) African Tall-Rahuri
(d) J-1006-Rahuri
(e) African Tall-Urulikanchan
(f) J-1006-Urulikanchan
(g) J-1006 x [BAIF-245, Pratap chari-6, GWL-15, 3-2-5 (Fs) &1-66-1 (F5)]
(h) African Tall x [BAIF-245, Pratap chari-6, GWL-15, 3-2-5 (Fs) & 1-66-1 (F5)]

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## **BAIF, Urulikanchan**

Breeding works on Maize, Forage Pearl Millet, Bajra Napier Hybrid and Lucerne were continued in the season.

### Pearl millet

• **Evaluation:** Progeny of fifteen landraces and four IPS from base population of BAIF Bajra-1 were grown. The material is being evaluated for dual purpose *i.e.* first cut at 50 days for green fodder and second cut for grain and straw production. In the second cut, most of the landraces and IPS have shown good growth. Individual plants selections for desirable characters were selected and selfed for further studies.

**B** x N hybrid:

- **Evaluation:** Three crosses namely BAIF Bajra-1 x BRN 01, BAIF Bajra-1 x FD 444 and Bajra Landrace-3 x BRN 01 were attempted during *Kharif* 2011. Crossed seed of these crosses was sown for evaluation during *Rabi* 2011-12. After six cuttings, based on the phenotypic characters, fifteen promising individual clumps were selected. A station trial was established in randomized block design for evaluation of the progeny of the clumps in comparison with BNH-10 for yield and quality parameters. Five cut were obtained so far and four hybrids showed better performance with respect to GFY over the check.
- **Crossing programme:** Three new crosses were attempted involving the promising accessions of Bajra and Napier grasses. Those crosses were
  - 1. BAIF Bajra-1 x BRN 01
  - 2. BAIF Bajra-1 x FD 444
  - 3. Bajra Landrace-3 x BRN 01

#### Maize

- National breeding programme: Under the population improvement programme, F<sub>7</sub> progeny of bulked seed of selections done from F<sub>6</sub> population of G-I lot (crosses with African Tall developed at Urulikanchan) was grown in isolation. Tall, green thick stem with broad leaves and tasseling at 50-55 days were the desired characters.
- **Crossing programme:** Five crosses using six promising inbred lines and African Tall variety were attempted during *kharif*-2013.

BAIF 299 x BAIF 295 BAIF 296 x African Tall BAIF 297 x African Tall BAIF 302 x African Tall BAIF 303 x African Tall

Crossed seed was obtained from all the crosses except BAIF 303 x African Tall cross. The progeny of four crosses were grown for further evaluation.

## SKUAS&T, Srinagar

### **Population improvement in maize:**

• Collection of local maize biodiversity has been undertaken to identify the germplasm base available for use in the future breeding programmes. The promising local lines will be crossed to generate population bulks for exploiting dual maize types for food/ fodder as exclusive maize for fodder is not in vogue in Kashmir and all the maize is used for dual purpose of food and fodder. African Tall variety will be used as a tester for crossing with local types to get forage traits from African tall and other agronomic traits from local ones.

## **BAU, Ranchi**

- Cowpea, Maize and Rice bean germplasm lines were evaluated.
- In cowpea, five new crosses were attempted during *Kharif*-2014.
- In Bajra Napier Hybrid, twenty five entries were evaluated.
- Two in cowpea, three in Rice bean and two entries in Maize were grown for seed multiplication.

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## TNA&U, Coimbatore

**Genetic diversity studies on fodder cowpea:** A total of 22 fodder cowpea genotypes were analyzed for 10 quantitative characters along with three quality parameters and seven qualitative characters.

**Genetic diversity for quantitative characters:** Based on  $D^2$  statistics, all the 22 genotypes were grouped into four clusters using Tocher's method. Cluster I contained 17 genotypes from different regions, followed by cluster II comprising 3 genotypes, and clusters III and IV composed of one accession each. The clustering pattern of genotypes indicated that there is no formal relationship between geographical origin and genetic diversity.

Cluster number	No. of genotypes	Genotypes
Ι	17	FDC 2244, FDC 2248, FDC 2254, FDC 2258, FDC 2263, FDC 2265,
		FDC 226, FDC 2270, FDC 2273, FDC 1162, FDC 1259, FDC 1269,
		FDC 1348, CO 5, CO (FC) 8, TNFC 0924 and TNFC 0926
II	3	FDC 2239 (UPC 953), FDC 2027 (N 4300) and FDC 2245 (CL 334)
III	1	FDC 2256 (IFC 95/03)
IV	1	FDC 2240 (UPC 9103)

 Table 1: Cluster composition of fodder cowpea genotypes based on quantitative traits

Green fodder yield contributed maximum to the total divergence followed by days to 50 per cent flowering and days to maturity. Traits, plant height, crude fibre content, number of main branches per plant and leaf/stem ratio contributed the least.

#### Genetic diversity for qualitative characters

The cluster analysis using simple matching coefficient for seven different qualitative characters across 22 fodder cowpea genotypes resulted in eight major groups at 61 per cent similarity index. Groups I, II, III and V were further classified into sub-groups at different similarity coefficient levels. The similarity coefficient ranged from 0.35 to 0.86. Group I was the biggest and comprised of six genotypes, followed by group II (5 genotypes), group III and V had 3 genotypes each and group IV had 2 genotypes. The groups VI, VII and VIII were solitary. The pairs of cowpea genotypes *viz.*, (FDC 2240, FDC 1269), (FDC 2027, CO 5), (FDC 2267, FDC 2273), (FDC 2245, FDC 2248), (FDC 2263, FDC 1259), (FDC 2254, TNFC 0926), (FDC 2270, CO (FC) 8) and (FDC 2258, TNFC 0924) had a highest similarity level of 86 per cent between the individuals.

**New Variety:** Multicut fodder sorghum CO 31 was released during 2014. It was found to possess low HCN content to the tune of 172 ppm at harvesting stage (initiation of flowering) besides high fodder and seed yield.

#### **Special features**

- Higher green fodder yield (192 t/ha/year)
- Enhanced seed yield due to intact seeds
- Low HCN (172 ppm) and crude fibre (19.80 %)
- High dry matter yield (49.73 t/ha/yr)
- Superior ratooning ability renders 6-7 harvests per year.
- Highly palatable, preferred by milch cattle, goat and sheep

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## ANGRAU, Hyderabad (PJTSAU, Hyderabad)

1.	Germ	plasm	Holding

<u>Utill</u>	piusin monung.		
S. N.	Сгор	No. of	Source
		Collections	
1.	Fodder Cowpea	40	1. NBPGR, Regional Station, Hyderabad
			2. RARS, ANGRAU, Tirupathi
2.	Fodder Maize	45	Maize Research centre, ANGRAU, Hyderabad.
3.	Fodder Bajra	16	ICRISAT, Hyderabad.
4.	Napier Lines	10	TNAU, Coimbatore.

**Fodder Cowpea:** 

- Seed multiplication of APFC 10-1 was taken up. The entry performance in 3<sup>rd</sup> year of minikit of the state for *Kharif*, 2014 by feedback from farmers revealed that the entry has shown an average of 13.5 -18.3% increase green fodder yield over local check.
- Evaluation of six lines in station OVT, Kharif 2014, along with two check varieties revealed that the entries APFC 11-6 (CO4 X UPC 625) and APFC 11-8(UPC5286 X CS8) were promising with 12% and 8% increased green fodder yield and dry fodder yield over the best check variety BL-1.
- Five uniform bulks were made in F6 generation of following crosses.

Ŭ	U
Cross	No. of Bulks
CO5 X UPC 5286	1
NDFC-6 X B.L	1
B.L X selection local	1
CO4 X SK-57	1
CO4 X TPTC-1	1

• During Kharif 2014-15, twenty three germplasm lines obtained from NBPGR, Regional Station, Hyderabad were evaluated.

### Fodder Maize:

- F6 population of G1 group (African tall) and G2 group (J1006) were sown during *Kharif*-2014. Further individual plants of desirable characters i.e. more plant height, broad and long leaves; more number of leaves, early duration etc were selected and allowed for random mating. Seeds harvested from selected plants were bulked and will be evaluated in station yield trial during *Kharif* 2015.
- 19 germplasm lines obtained from NBPGR were evaluated during *Kharif 2014*.
- First cycle of in breeding was attempted in source population of African tall.

**Multicut bajra:** The F5 generation of following cross combinations of Multic*ut* bajra genotypes were advanced during *Kharif* -2014.

S.N.	Cross
1.	MRB 8 X ICMV 05 555
2.	Giant bajra X MRB-8
3.	Giant bajra X Jakarana
4.	ICMV 05 555 X Giant bajra
5.	Rijco bajra X Giant bajra

• The seed multiplication of APFB 09-1 was taken up during Kharif 2014, as the culture will be proposed for 3<sup>rd</sup> year of minikit testing in the state during *Kharif 2015*.

### **Bajra Napier hybrids:**

• Fifty four Bajra Napier hybrids obtained from AICRP-FC, TNAU, Coimbatore were established at the centre. Among the 54 cross combinations 15 were identified promising with high tillering, long plant height, long, broad & soft leaves, glabrous nodes. These identified 15 promising BN hybrids will be evaluated in replicated station trial during Kharif 2015.

## JNKVV, Jabalpur

#### **Forage breeding**

Crop	Existing accession	New collection	Total accession	Source
Soybean	51	6	57	NRC Indore & Sehore
Rice Bean	31	4	35	NBPGR, New Delhi

### Generation of materials/entries/crosses made during-*Kharif* 2014:

Сгор	Cross Made	Cross Advanced	Selection made
Soybean	4	3F <sub>1</sub>	-
		5F <sub>2</sub>	14
		4F <sub>3</sub>	9
		6F <sub>4</sub>	5

• Single plant progenies and promising genotypes were also evaluated for different fodder traits.

### **Rice bean**

- Four 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 4 hrs treatments)
- New crossing programme was initiated using diverse genotypes of rice bean.
- Single plant selections were made using different fodder traits.

## Assam Agricultural University, Jorhat

**1.** Germplasm Collection: During *Kharif*-2014, 24 germplasm were collected from Nagaland Arguage and Assam Details of the germplasm is listed below:

Nagaland, Arunachar Fradesh and Assam. Details of the gemphasm is listed below.		
Сгор	Total no. Collected	Collected from
Ricebean	4	Nagaland
Maize	2	Arunachal pradesh
Lathyrus	18	Assam

**2. Evaluation of Rice bean Germplasm:** Seventy one ricebean germplasms including checks were evaluated for their earliness, productivity and disease resistance. Promising entries were selected.

**3. National hybridization programme on Ricebean:** The performances of selected  $F_{5's}$  were evaluated during *Kharif*-2014. New crosses were also attempted taking with the 10 parents.

**4**. **Evaluation of maize germplasm**: Fifteen maize germplasm were tested along with the check African Tall.

**5. Hybridization programme on Forage cowpea**: Five local cowpea germplasm were crossed in the month of May with 12 cowpea entries received from GB Pant University of Technology, Pantnagar. The successful crossed materials were sown in the month of September with the parents for evaluation.

## UAS, Bangalore, ZRS Mandya

**Maize:** Two hundred ninety six lines of Downy mildew resistant inbred lines were evaluated for forage traits and out of these 226 lines showed promise in forage traits which are S8 cycle.

**Cowpea:** Thirty two cross combinations were attempted and these  $F_1$ 's generations were evaluated and identified top 5 cross combinations for higher green forage yield & dry matter yield.

Green fodder yield (t acre <sup>-1</sup> )	Per se performance	Dry matter yield (t acre <sup>-1</sup> )	Per se performance
CPD-31 $\times$ NBC-2	24.12	CPD-31 $\times$ NBC-2	3.03
CPD-31 × IC-1071	17.41	CPD-31 × IC-1071	2.6
MFC-09-13 × IC-1071	16.72	MFC-09-09 × EC-170578-1-1	2.31
EC-458505 × NBC-2	16.31	MFC-09-13 × IC-1071	2.18
MFC-09-09 × EC-170578-1-1	16.23	IC-402174 × IC-1071	2.12

The crosses like CPD-31 x NBC-2, CPD-31 x IC-1071 and MFC-09-13 X IC-1071 with higher green fodder yield will be further evaluated in large scale over locations and seasons to confirm their potentiality and stability for exploitation and their use in commercial cultivation.

## **CSKHPKV**, Palampur

#### **Germplasm Holding**

Crop	Number of collections
Setaria (Setaria anceps)	40
Paspalum (Paspalum wetstenii)	2
Maize (Zea mays)	20

i i onnising Germphusin beturn			
Attributes	Entries		
Low oxalates	S-6, S-7, S-10, S-13, S-17, S-30, S-33, S-18 and S-20		
Crude protein content	S-6 and S-12		
Leaves/plant	S-6,S-11 and S-25		
Leaf/stem ratio	S-9,S-18, S-20 and S-39		
Tillers/plant	S-21		

### Promising Germplasm - Setaria

#### Setaria grass

- Genetic diversity analysis based on D<sup>2</sup> statistic and SSR markers revealed that genotypes S-6, S-25, S-17, S-92, S-21, S-27, PSS-1, S-16 and S-11 exhibited maximum diversity and can be used as superior parents in polycross breeding programme for development of synthetic varieties for increased fodder yield in Setaria grass.
- Evaluation of thirty one collections against 3 checks revealed superiority of selections S-6 and S-17 for fodder yield and other traits.
- Two new synthetic populations were synthesized and three new clonal selections were also made.

#### Maize

• Twenty land races/populations of maize were maintained. Land races PMG 3, PMG 41 and PMG 52 and composites PMG 93-1 and PMG 93-2 gave numerically higher fodder yield but were statistically at par with African tall for fodder yield.

### Bajra Napier hybrid programme

• Evaluation of sixteen hybrids revealed superiority of two hybrids, namely, NDFB 7 x FD 464, NDFB 4 x FD 482 for fodder yields.

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## GBPUA&T, Pantnagar

### Cowpea germplasm evaluation:

• A total of 400 cowpea germplasm lines including indigenous and exotic materials were evaluated.

### **Breeding materials/cowpea Progenies evaluation:**

A total of 218 progenies including early generation  $(F_3-F_5)$  and advanced  $(F_6 \text{ onwards})$ generations cowpea breeding materials were evaluated and single plant/family selections were made in these generations. The breeding materials of different filial generations evaluated during the season were derived from the following crosses: TVu 3531-1-1-5 x Co-5, EC 394-1 x V92-2 and C-88 x Co-5 (F5): IT 82E x UPC 8705, IT82E x UPC 9202. CL -370 x UPC 607, V5716/V3A-1//UPC4200, UPC 2201/IT82D-875//UPC 287, V5716/V879//V618, V3017-2/V6342//V622 and TVu6/PLL-149-2//TVu6/UPC 618 (F<sub>6</sub>); H-140-2 x UPC 9202, CX 39-1 x UPC 5286, MS 9020-10-15 x UPC 9202, MS 9020-10-13 x UPC 9202, UPC 617 x UPC 4200, IT82E-60 x UPC 607 and IT 380-5 x UPC 942 (F<sub>7</sub>); IT 81D-380-5 x UPC 9202, Singapore x UPC 606, EC 6280-1 x UPC 952 and MS 9020-1-1 x UPC 952 (F<sub>8</sub>) V 1008/HLD-1// UPC 879/H244, EC 101959-2-2 x UPC 8705, UPC 953 x UPC 5286, TVu 6/ PLL-149-3//PLL-149-2/TVu6, IT85F958//P542/No. 1418, UPC 9202 x IT 86D-719, UPC 930//H244/Cx 30, EC 2453-2 x UPC 9204, No. 443-2-2 x IT 82D-716, No. 443-2-2 x UPC 2201, No. 1 x UPC 706, UPC 8703 x H-244, UPC 2201 x IT81D-875, PLL-149-2/TVu6//UPC 124, TVu 4649-3E x IT81D-4425 and IT82E-32/HLD-1//UPC124 (F9).

### Nucleus/Basic Seed Production:

• The basic seeds of twenty-two promising lines including pre-released improved lines (UPC 626, UPC 631, UPC 801, UPC 802, UPC 803, UPC 804 and UPC 805) and the released varieties from Pantnagar Centre were increased /multiplied during the season.

## SKRAU, Bikaner

S. No.	Range grass/ fodder crop	No. of accessions
1	Lasiurus sindicus	330
2	Cenchrus ciliaris	40
3	Cenchrus setigerus	80
4	Cymbopogon jwarancusa	40
5	Pearl millet	30

### Germplasm maintenance, evaluation and collection

**Pasture grasses:** Ten promising entries of *Lasiurus sindicus*, six of *Cenchrus ciliaris* and twelve of *Cenchrus setigerus* were evaluated in RBD. Ten promising entries of *Cenchrus ciliaris* were evaluated in large plot size. Two entries of *Cenchrus ciliaris* are being tested at national level in coordinated trial. One variety of *Cenchrus ciliaris* RCCB-2 (Bikaneri Dhaman) developed and tested in AICRP trials during 2006 to 2009 has been released at state level by the State Seed Sub Committee for Agricultural and Horticultural Crops, Jaipur.

**Other Fodder Crops:** Available germplasm of pearl millet was evaluated. New crosses were made among plants of RBC-2, Giant Bajra, RBB-1, AVKB-19, RBB-2 and RBB-4. Selection of superior plants was also done to make a better composite. Material in hybridization nursery was evaluated for selection of superior plants. Two pearl millet entries contributed by Bikaner centre were tested in coordinated trials in IVT and AVT-1 during Kharif-2014. One variety of pearl millet RBB-1 (Raj Bajra-1) has been released at state level.

**Genetic studies in fodder crops:** Twenty nine cowpea genotypes including three check varieties were evaluated for GFY and related morphological characters in RBD with three replications.

## CCS HAU, Hisar

## Fodder Cowpea

- **Evaluation of germplasm:** Twenty germplasm lines of fodder cowpea were evaluated. Lines HFC 11-6 and HFC 11-8 were found promising for GFY whereas, lines EC 201095 and V 92-2 were found promising for DMY.
- Station trial: One station trial *viz.*, SST on fodder cowpea was conducted
- Small Scale Trial: In Small Scale Trial (SST), 8 genotypes were tested against two checks *viz.*, CS 88 and BL 1. Genotype HFC 11-3 was found promising for GFY.
- **Hybridization:** Six fresh crosses were developed in fodder cowpea. These were CS 88 x EC 4216, EC 394-1 x EC 101980, CO 2 x CS 88, EC 394-1 x IC 249141, BL 1 x CS 88 and EC 249141 x CS 88. 7 F<sub>1</sub>'s and 7 F<sub>2</sub>'s were advanced to next generation.

## Fodder Pearl millet:

- Maintenance of germplasm: Fifty germplasm lines were maintained.
- Station trial: One station trial viz., SST on fodder pearl millet was conducted.
- **Small Scale Trial:** Eight genotypes were tested against two checks *viz.*, RBC-2 and HC 20. Genotypes HFP 11-2 and HFP 11-4 were found promising for GFY.
- **Hybridization:** Five fresh crosses were developed. Five F<sub>1</sub>'s and 6 F<sub>2</sub>'s were advanced.

## MPKV, Rahuri

#### Maize population improvement programme

Season	Activity		
Rabi 2011-12	Initial Crossing Programme		
	Female: African Tall		
	Male: Pratap Makka Chari-6, GWL-15, BAIF-245, 3-2-5 (F5), 1-66-1(F5)		
Kharif 2012	Equal number of above crossed was included in C1 bulk and the same was sown in		
	isolation for random mating. Stratified bulk harvesting		
Kharif 2014	Sowing of bulk seed produced during Kharif-2012 in large plot. IPS and development		
	of full sibs. Harvest full sibs individually.		
Summer 2015	Sowing of bulk seed of full sibs in isolation for random mating. Harvest in bulk (C <sub>2</sub> ).		
Kharif 2015	Sowing of C <sub>2</sub> bulk. IPS and development of full sibs. Harvest full sibs individually.		
Summer 2016	Sowing of full sibs in isolation for random mating. Harvest in bulk $(C_3)$ .		

#### Pearl millet population improvement programme:

Kharif, 2012	Sowing of C <sub>1</sub> bulk seed. Random Matting. Harvest in bulk
Kharif, 2014	Sowing of bulk seed (in isolation). IPS and Selfing. Harvest individually
Kharif, 2015	Sowing of IPS. Random Matting in isolation. Harvest in bulk.
Summer, 2016	Sowing of bulk seed (in isolation). IPS and Selfing. Harvest individually

### **Development of Bajra Napier hybrids**

**Hybridization:** Total 83  $F_1$  seed of bajra x Napier crosses (27 Grass Breeding scheme + 56 TNAU Coimbtore) were sown during summer 2013. From these 83 crosses, 272 heterotic clones were selected and sown in augmented block design with check Phule Jaywant during kharif-2013. On the basis of green forage yield and other attributes, 95 B x N hybrids are selected and grown in station trials during Kharif-2014 along with checks Phule Jaywant, Co-3 and NB-21 for further yield and quality evaluation.

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## PAU, Ludhiana

**New Germplasm Acquired**: A total 200 germplasm accessions have been acquired from ICRISAT, Hyderabad.

#### New crosses attempted:

- **Pearl millet:** A total of 32 new crosses were developed using hand pollination method.
- **Cowpea:** A total of thirty five new crosses were synthesized by crossing lines selected on the basis of erectness, late flowering and high green fodder yield.
- **Maize:** A total of twelve new top crosses were synthesized which will be evaluated in *Spring/Kharif* 2015.

#### Breeding material maintained/handled/generated in different crops:

- Pearl millet: Maintenance and development of male sterile lines: 75
- Seventy six male sterile lines from all 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	41	A2	3
A3	4	A4	15
A5	6	Gero	2
Vio	3	AG	1

Inbred lines (B&R) maintained: 385

**Cowpea**: Following breeding material was maintained and handled:

Type of Material	Number
Germplasm accessions	278
Crosses	32
$F_2$	24
$BC_1$ and $BC_2$	10

### Local trials:

**Pearl Millet:** Twenty two hybrids were evaluated in a local fodder trial under multi-cut system. The hybrids *viz.*, PHB 3053, PHB 3149, PHB 3144, PHB 2707, 308 A x Giant Bajra exhibited superiority over the best check FBC 16.

**Napier Bajra hybrid:** Sixty three Napier Bajra hybrids were evaluated in two trials out of which one was multi-location trial consisting of seven entries and other was local trial consisting of fifty six entries sown in augmented design. Seven hybrids *viz.*, PBN 342, PBN 346, PBN 351, PBN 354, PBN 359, ICMV05222 × FD485, Baif bajra × FD460 were found to be superior to check PBN 233.

**Cowpea:** Seven genotypes were tested in a multi-location trial conducted at Ludhiana and Gurdaspur and the entries CL 400, CL 391 and CL 396 out-performed the check CL 367.

**Maize:** Three local trials were conducted, two in spring and one in *Kharif* season. Forty three entries were evaluated against the local as well as national check J 1006. During *Spring* PMH 3 x J 1006, P 3396 x African Tall, PMH 3 x African Tall, J 1006 x Vijay, PMH1 x vijay, Vijay x J 1006, PMH 1, DKC 9108 performed better than the check J 1006, whereas, in *Kharif* season crosses *viz.*, Vijay x J 1006, PMH 1, J 1006 x Vijay out-yielded the check.

Name of the trial	Location	No. of Entries	Best performing entries (GFY q/ha basis)
Station trial -1 in maize (spring season)	Ludhiana	15+1(c)	PMH 3 x J 1006, P 3396 x Af.Tall, PMH 3 x African Tall, J 1006 x Vijay, PMH1 x vijay, Vijay x J 1006
Station trial-2* in maize (spring season)	Ludhiana	11+1(c)	PMH 1, DKC 9108
Station trial-3 in maize ( <i>Kharif</i> season)	Ludhiana	17+1(c)	Vijay x J 1006, PMH 1, J 1006 x Vijay
Multilocation trial in NBH	Ludhiana Gurdaspur Kapurthala	7+1(c)	PBN 342, PBN 346, PBN 351, PBN 354, PBN 359
Local Fodder Trial in Pearl millet	Ludhiana	22+3	PHB 3053, PHB 3149, PHB 3144, PHB 2707, 308 A x Giant Bajra

#### Local trials conducted during Kharif 2014

## Available Germplasm of different crops

S. N.	Сгор	Number of Accessions
1.	Bajra CMS lines	75
2.	Bajra inbred lines	385
3.	Napier grass	35
4.	Guinea grass	24
5.	Cowpea	260
6.	Sorghum CMS lines	22
7.	Sudan grass	72
8.	Cluster bean	80
9.	Teosinte	01
	Total	954

#### No. of entries in AICRP (FC) trials and their status:

Name of Trial	Name of	Remarks	
	entry		
AVHTM-2	PMH 1	Proposal of PMH 1 will be presented in Varietal	
	PMH3	Identification Committee during NGM Kharif, 2015	
VTNB-Perennial	PBN342,	Trial will continue up to <i>Kharif</i> 2016	
(2013)	PBN 346		

### Varieties released at Central or State level (in last 5 years):

Variety	Year of release	Remarks
HG 365	2014	
OL 10	2014	
PSC 4	2015	
PHB 2884	2015	
PBN 346		in adaptive trials

#### **APPENDIX-II**

## AICRP FC & U, AAU, ANAND

#### Publications (books, research papers, bulletins etc.)

#### **Research papers:** 2

- Patel, P.M., M.R. Patel, G.J. Mistry, J.C. Shroff, and H.P. Parmar, (2014). Effect of irrigation and nitrogen management on seed production of forage oats. Green Farming, 5(6): 1009-1011.
- Akabari, V.R. and H.P. Parmar, (2014). Heterosis response and combining ability for green fodder yield and its quality traits in forage sorghum, Journal of Progressive Agriculture, 5 (1): 9-14.

#### Books: 2

Parmar, H.P., P.M. Patel, M.R. Saiyad, J.C. Shroff, and D.H. Desai, (2014). Grasscharana Pakoni Vaignanic Kheti

Parmar, H.P., P.M. Patel, M.R. Saiyad, J.C. Shroff, and D.H. Desai, (2014). Grasscharana Pako.

#### **Popular articles: 3**

- Parmar, H.P., M.R. Saiyad, P.M. Patel, and J.C. Shroff, (2014). Rajka tatha Grasschara juwarna gunvatta sabhar bij Utapadan matena chavirup muddavo, Krishijiran. February : 18-22.
- Parmar, H.P., M.R. Saiyad, P.M. Patel, and J.C. Shroff, (2014). Grasschara utapadakta vadharva mate Gujarat Anand Anjan Grass-1 Ugado. Krishijivan, March pp: 16.

Patel, P.C. and H.P. Parmar, (2014). Grasschara mate Unalu rutuma ayojan Krujivan, pp. 13-14.

## Pamphlets: 2

#### **Students guided**

- Plant Breeding : 1
- Agronomy : 4

#### **FTDs conducted:**

- Hybrid Napier Bajra : 10
- Forage *Bajra* : 10

Krushimahotsav: 2014 (summer); 2014 (Rabi)

#### Seed/ planting materials sold

• Hybrid Napier Bajra: Rs. 1,44,820

#### Externally funded project: One

• Evaluation of performance of makkhan grass hybrid (Advanta: UPL Ltd.)

## AICRP FC & U, OUAT, BHUBANESWAR

#### Publications (books, research papers, bulletins etc.) **Research papers:** 5

- Tripathy, S.K., A. Panda, P.K. Navak, S.Dash, D. Lenka, R.K. Kar, N. Senapati and G. B. Dash. (2014) Somaclonal variation for genetic improvement in grass pea. (Lathyrus sativa L.) Legume Research (Accepted).
- Bastia, D.K., S. Tripathy and S.Pradhan (2014). Carbon sequestration opportunities in Organic Agriculture. Journal of Crop and Weed. 10: 2.

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- Awasthi, D.P., S.S. Mahapatra and R. Mawar. (2014). Occurrence and initial report of leaf spot and leaf blight of oat under Agro-climatic conditions of Odisha. *Journal of Plant Protection and Environment*. 11 (1): 113-125.
- Sarkar, S and D.P. Awasthi (2014). Effect of different culture medium on linear growth and mycelia dry weight of *Colletotrichum gloeosporioides* causal organisum of mango anthracnose. *Journal of Plant Protection and Environment.* 11 (1): 119-121.
- Sarkar, S., D.P. Awasthi and S. Das. (2014). In vivo and in vitro effect of pH level on growth of Fusarium moniliforme var. subglutinans causal organism of mango malformation J. Mycopathol Res. 52(1) :159-161.

Student(s) guided: M.Sc. (Agri.) – 1 FTDs conducted: = 30. (Kharif 20 + Rabi 10). Training conducted for farmers/ NGO/ Govt. officials: 1 TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 4

Root Slips Distributed to Farmers and Extension FunctionariesHNB(Var. CO-4)2, 00000 (Number).

## AICRP FC & U, SKRAU, BIKANER

#### Students guided - Ph. D -1, M.Sc. -1

& Teaching courses—Ph. D - (1), M. Sc (1)

### **Trainings for farmers organized**

- Round the year green fodder production & availability –02 (RKVY)
- Sewan grass seed collection technique/sewan seed week 01(RKVY)
- **Field Days organized** 
  - Green fodder production 03
  - Sewan Seed Chetna Diwas 01

#### Seed/ planting material produced/sold (Rs 4,50,000/-)

Sewan grass seed- 11.84 q @ 350/- kg Govt./ private

NB Hybrid root slips - 15,000 for AICRP Agron trial

NBH stem cutting- 35,000 Govt./ private

Green fodder sale - 30 tones @ Rs. 1/-kg

Dry fodder sale - 2.0 tones @ 3.5/-kg

Seed production of perennial sorghum COFS-29: 15 kg (approx.)

RKVY projects trials conducted- 02 projects, 5 trials

Success stories generated: 02

Varietal evaluation trial for inclusion in POP, in Zone Ic- 02 (rabi season 2014-15)

Green Fodder Demonstration – 184 (RKVY)

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## AICRP FC&U, ANGRAU, HYDERABAD

#### **Awards and Honours**

- Dr.M.Shanti received 'Best Poster Award' for poster presentation entitled "Evaluation of Sweet Sorghum Varieties under different N levels for fodder quality" at National Symposium on ECOBASM (Emerging Challenges and Opportunities in biotic and abiotic stress management), held at DRR, Hyderabad during Dec, 13<sup>th</sup> to 14<sup>th</sup> 2014.
- Dr.M.Shanti was elected as councilor to the Indian Society of Soil Science.

## Publications (books, research papers, bulletins *etc.*)

### **Research Papers: 5**

- V. Chandrika and M. Shanti (2013) Performance of forage crops and accumulation of heavy metals raised on waste water under varied nutrient levels. *Annals of plant physiology* 28, (1).
- T. Shashikala, R.V.T. Balazzii Naaiik, M. Shanti, R. Susheela, V.Chandrika and K. Loka Reddy (2013). Fodder performance of different Oat (*Avena sativa* L.,) genotypes under Agro climatic conditions of Telangana state. Progressive Agriculture 14 (1):141-150.
- R. Balaji Naik, V. Chandrika, T. Shashikala, K. B. Sunitha Devi and M. Shanti (2014). Evaluation of forage production potential of maize grown for baby corn and green cob. *Progressive Agriculture* 14 (1):192-196.
- B. Srinivas, M. Shanti, V. Chandrika, and P. Surendra Babu (2014). Performance of forage crops raised through waste water under varied nutrient levels. *Journal of Research*, ANGRAU 42(1).
- M. Shanti, Y. Radhakrishna, M. Raghu Babu and P. Ravindra Babu (2014). Screening of blackgram varieties for tolerance to saline irrigation water. *Legume Research*, 37(4): 439-442

#### Seminar/Symposium- 12

- T. Shashikala "Studies on genetic potential of Lucerne genotypes for fodder production and quality traits for sustainable livestock production" National Symposium on "Climate Resilient Forage Production and Utilization" at BCKV, Kalyani during November 13<sup>th</sup> & 14<sup>th</sup>,2014.
- M. Shanti, M. C. Patnaik, R. Balazzii Naiikk, C. H. Chiranjeevi and T. Shashikala (2014). Evaluation of forage crops raised through sewage water in Musi, Hyderabad. Annual convention of ISSS held during Nov, 24-27 at Hyderabad
- M. Shanti, R. Susheela, T. Shashikala and M. Anuradha (2014). Evaluation of forage quality of multicut sorghum hybrids. National Symposium on "ECM Technology" at Pantnagar during Oct 10-11
- M. Shanti, R. Susheela, T. Shashikala and M. Anuradha (2014). Evaluation of sweet sorghum varieties under different Nitrogen levels for fodder quality in National conference on ECOBASM at DRR, Hyd during Dec 13-14.
- R. Susheela (2014). Yield and quality of multicut fodder bajra genotypes at different dates of sowing National Symposium on "ECM Technology" at Pantnagar during Oct 10-11.

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- R. Susheela (2014). Effect of different levels of sulphur on yield and use efficiency of soybean by using S-35 radioisotope. National Symposium on "ECM Technology" at Pantnagar during Oct 10-11.
- R. Susheela (2014). Evaluation of different forage crops under silvipastoral system for fodder production an effect on soil properties" Annual convention of ISSS held during Nov,24-27 at Hyderabad.
- R. Susheela (2014). Fodder yield, quality and water use efficiency of different fodder crops as influenced by different levels of irrigation during lean period in National conference on ECOBASM at DRR, Hyd during Dec 13-14.
- R. Susheela (2014). Influence of high efficacy herbicides on yield and economics of direct wet seeded rice in National conference on ECOBASM at DRR, Hyd during Dec 13-14.
- M. Shanti, R. Susheela, V. Chandrika, T. Shashikala and K. Loka (2014). Reddy Studies on effect of shade and nitrogen levels on production and anti-nutritional factors in bajra napier hybrids. National Symposium on "Climate Resilient Forage Production and Utilization" at BCKV, Kalyani during November 13-14.
- M. Shanti, G. Bhupal Raj, D. Naga Lakshmi, C.H. Chiranjeevi, T. Shashikala and Balazzii Naiikk (2014). Survey and nutritional evaluation of forage value trees and plants of Mahboobnagar district of Telangana. National Symposium on "Climate Resilient Forage Production and Utilization" at BCKV, Kalyani during November 13-14.
- M. Anuradha, M. Shanti R. Susheela, T. Shashikala and K. Loka Reddy (2014). Studies on forage quality of cowpea as influenced by foliar diseases and insect-pests. National Symposium on "Climate Resilient Forage Production and Utilization" at BCKV, Kalyani during November 13-14.

#### Important persons visited to AICRP-FC centre

- Dr. D .Vishnuvardhan Reddy, ADR, STZ, RARS, Palem.
- Dr.Balaguruvaiah, University Head, Dept. of Soil Science and Head RTL.
- The Director of Research & Director of Extension Dr.Raji Reddy.

#### FTDs conducted: 80

Radio talks: 4, TV Programmes: 3

**TSP activities:** Issued sheep/goat along with fodder seed to 20 tribal families of Chinnagunturupalli and Sarangapalli villages in Mulugu mandal of Warangal district

seed/ pla	seed/ planting material sold to farmers/ others, NGO and Govt. staff Forage crops seed production details (2014-15)					
S. No.	No. Forage crops Total quantity (kg)					
		Breeder seed	Foundation seed	TFL seed	Total	
1.	Maize-African Tall	-	2250	-	2250	
2.	Sorghum-CoFS 29	-	-	25	25	
	Grand Total	- 2250 25 22				

#### Quantity of planting material produced and supplied (2014-15)

S. No.	Crop	Planting material produced(Nos.)	Planting material supplied (Nos.)
1.	APBN-1	1,85,000	1,15,000
2.	Co-4	50,000	33000

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## AICRP FC & U, AAU, JORHAT

Publications (books, research papers, bulletins *etc.*)

1

- Research Paper -1
- Bulletin-

Student(s) guided: M.Sc. (Agri.) – 5, Ph. D-1

FTDs conducted: 40

Training conducted for farmers/ NGO/ Govt. officials: 8

TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 8

Details of seed/ planting material sold to farmers/ others, interaction with farmers, NGO and Govt. staff

Forage crops seed/planting materials supplied (2014-15)

S. No.	Forage crops	Total quantity (kg)			
		Total Slips (No)	Foundation seed	TFL seed	
1.	Hybrid Napier CO-3,CO-4	75600			
2.	Setaria Kazungula,PSS-1	40200	-		
3.	Rice bean Var. Shyamalima		41		
4.	Oat Var. Kent nnd JHO 822			76	
	Grand Total	115800	41	76	

**Externally funded projects: 2** 

## AICRP FC & U, BCKV, KALYANI

#### Publications (books/ research papers/ bulletin etc.)

Research Papers: 4, Books: 1, Abstracts: 4, Bulletin: 1

#### Important persons visited to AICRP- FC centre

- Dr. T. K. Dutta, Head, NDRI, ERS, WB.
- Dr. N. Samanta, Deputy Director of Agriculture, (Seed Certification), GOWB, WB
- Director, RSFPD, Kalyani, Nadia, WB
- Managing Director, WBSSC, GOWB, WB.

Student(s) guided:

M. Sc. (Ag.): 2, Ph. D: 4

FTDs conducted: 40

Training conducted for farmers / NGO/Govt. officials: 7

Details of seed/planting material sold to farmers / others, interaction with farmers, NGO and Govt. staff

### **Breeder Seed**

A. Ricebean:

1. Ricebean – Bidhan Ricebean-1:330 Kg2. Ricebean – Bidhan Ricebean-2:160 Kg

Total: 4 90 Kg

**B. Job's Tear/ Coix - (Bidhan Coix-1: 25 Kg** Externally Funded Project: 3 (Private Companies)

AICRP on Forage Crops	D E	$\overline{}$	Annual Report Kharif-2014
	D-0		

## AICRP FC & U, PAU, LUDHIANA

#### **Publications:**

#### **Research paper:** 6

- Rahul Kapoor (2014) Genetic variability and association studies in guar [*Cyamopsis tetragonoloba* (L.) Taub.) for green fodder yield and quality traits. *Electronic J Plant Breed* 5(2): 294-99.
- Ruchika Bharadwaj, Sohu R S, Johar Sngh, Rahul Kapoor, Devinder Pal singh, Pankaj Rathore, Bajaj RK, Manoj Srivastava (2014) PHB 2884: A new high yielding Pearl Millet (grain) hybrid. J Res (PAU): 51 (3&4):338-339.
- Pardeep Singh, Rahul Kapoor and Chinka Batra (2014) Heterosis and combining ability in forage pearl millet under stress and non-stress environment. *Applied Biological Research* 16 (2): 214-222.
- Rahul Kapoor and Chinka Batra (2014) Genetic variability and association studies in maize (*Zea mays* L.) for green fodder yield and quality traits. *Electronic J Plant Breed:* (Accepted)
- Goyal M and Soni G 2014 Induction and optimization of cellulases using various agro-wastes by Trichoderma virdii: Effect of alkali pretreatment. *African J Biotechnol.* 13: 3426-32
- Bhardwaj R, Kaur M, Goyal M, Sohu RS and Satyavati CT (2014) Pearl millet for health and nutritional security. *Electronic J Plant Breeding*. **5:** 573-76

#### Seminars Symposia: 12

- Rahul Kapoor and Chinka Batra (2014) Genetic divergence in parental genotypes and its relation with heterosis, F<sub>1</sub> performance and general combining ability in oats (*Avena sativa* L.) In: Proc. Nat. Symp. on Crop Improvement For Inclusive Sustainable Development. November 7-9, 2014, Ludhiana, India: pp.423-425.
- Rahul Kapoor (2014) Combining ability analysis for green fodder yield and its components in top cross hybrids of forage pearl millet [Pennisetum glaucum (L.) R. Br.]. In: Proc.
- Rahul Kapoor, Chinka Batra and Archita Mohan (2014) Variation and association studies for green fodder yield and related traits in fodder oats (*Avena sativa* L.). In: Proc. Nat. Symp. on Crop Improvement For Inclusive Sustainable Development. November 7-9, 2014, Ludhiana, India: pp.441-443.
- Rahul Kapoor<sup>1</sup>, Chawla JS and Goyal M (2014) Genetic analysis of maize hybrids for fodder yield and silage quality. In: Proc. Nat. Symp. on Crop Improvement For Inclusive Sustainable Development. November 7-9, 2014, Ludhiana, India: pp.805-807.
- Kaur R, Goyal M and Tiwana US (2014) Influence of nitrogen fertilization on biochemical parameters of Napier bajra hybrid. Proc. Of National Symposium on "Crop improvement for inclusive sustainable development" at Punjab Agricultural University, Ludhiana Nov 7-9 pp 477-78
- Goyal M and Tiwana US (2014) Green forage production and nutritional quality of hydroponically grown forage crops. Proc. Of National Symposium on "Crop improvement for inclusive sustainable development" at Punjab Agricultural University, Ludhiana Nov 7-9 pp 775
- Pandher S, Singh S, Rathore P, Goyal M and Sharma S (2014) Elucidating mechanism of tolerance in *Gossypium hirsutum* germplasm to cotton leaf hopper, *Amrasca biguttyla* (Ishida). Proc. Of National Symposium on "Crop improvement for inclusive sustainable development" at Punjab Agricultural University, Ludhiana Nov 7-9 pp 487-88

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- Tiwana US, Singh S and Goyal M (2014) Forage yield and quality of multicut oats as influenced by nitrogen management. Proc. Of National Symposium on "Crop improvement for inclusive sustainable development" at Punjab Agricultural University, Ludhiana Nov 7-9 pp 850-51
- Singh C, Singh DP, Bhardwaj R and Goyal M (2014) Analysis of combining ability for forage traits Cowpea (Vigna unguiculata (L.) walp.). Proc. Of National Symposium on "Crop improvement for inclusive sustainable development" at Punjab Agricultural University, Ludhiana Nov 7-9 pp 157-58.
- Tiwana US, Rani U, Kapoor R, Singh S and Goyal M (2014) Feed and fodder scenario in Punjab. In Souvenir of National Group Meet of All India Coordinated Research project on Forage Crops on August 26-27,2014 held at Punjab Agricultural University pp 14-19
- Goyal M 2014 Nutritional and anti nutritional components in forage crops. In Souvenir of National Group Meet of All India Coordinated Research project on Forage Crops on August 26-27, 2014 held at Punjab agricultural University pp 14-19
- Goyal M, Tiwana US, Rani U, Kapoor R (2014) Preservation of surplus fodder. In Souvenir of National Group Meet of All India Coordinated Research project on Forage Crops on August 26-27, 2014 held at Punjab agricultural University pp 14-19

#### **Important Persons visited:**

- Dr. P.K. Ghosh, Director, IGFRI, Jhansi
- Dr. A.K. Roy, PC, AICRP (FC &Utilization), IGFRI, Jhansi
- Dr. J. P. Yadvendra, Ex-Professor (Forage Breeding) & QRT Member

#### Students guided: M. Sc. - 3, Ph. D. -1

#### FTDs conducted: 250

- Pearl millet; FBC 16 = 50
- Maize; J 1006 = 100
- NBH; PBN 233 = 100

#### TV/Radio talks:

- TV talks = 2
- Radio talks = 2

**Details of seed/Planting material sold to farmers:** 

Сгор	Variety	C/S (q)	TL (q)	Total (q)
Cowpea	CL 367	-	-	0.97
Guinea grass	PGG 518	-	0.30	0.86
Guar	Ageta 112	-	4.95	4.95
	HG 365	-	45.00	46.10
Maize	J 1006	108.98	1387.24	1635.38
Bajra	FBC 16	0.00	46.62	49.31
	PCB 164	-	-	1.22

#### **External funded Projects:** 2

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## AICRP FC & U, MANDYA, KARNATAKA

# Publications (books, research papers, bulletins *etc.*): Research Paper:

B. G. Shekara, M R Krishnappa, Nagesh Chikkarugi and N Manasa. "Economics of Cultivation of Fodder sorghum in Saline Alkali Soils" *Research Journal of Agricultural Sciences*. (Accepted).

Abstracts: 1

#### Important persons visited to AICRP\_FC centre

- Dr. M.Mahadevappa, former Ex-Chairman, ASRB
- Dr.Narayanagowda, Vice chancellor UAS, Bangalore.
- Dr.M.A.Shankar, Director of Research, UAS, Bangalore
- Dr. N.Nagaraj, Director of Extension, UAS, Bangalore.

Student(s) guided: M.Sc. (Agri.) – 1; M.Sc. (Agri.) in Agronomy- 1 FTDs conducted: 30 (10 each)

S. No.	Сгор	Variety	GFY(q/ha)	DMY(q/ha)
1	Guinea Grass	JHGG-08-1	355	57.00
2	Cowpea	MFC-08-14	298.8	66.23
3	Maize	African tall	312.00	68.84

#### Training conducted for farmers/ NGO/ Govt. officials:

• 1-Training programme & 5-Field days

#### TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 1

#### Seed/ planting material sold

#### Quantity of planting material produced and supplied (2014-15)

S. No.	Сгор	Planting material (Nos.)Supplied to farmers
1.	Hybrid Napier Bajra (Co3)	74,000
2.	Guinea grass (JHGG-08-1)	40,000

#### **Externally funded projects:** 4

#### GOK projects

- Development of High oil corn (Zea mays) hybrids for high quality feeds
- Maintenance breeding of Fodder crop varieties (Maize African tall and cowpea,KBC-2,MFC-08-14,MFC-09-1)

#### **RKVY projects**

- Augmenting Fodder Production and establishing fodder seed bank at University of Agricultural Sciences, Bangalore (2013-14)(RKVY project)
- Enhancing quality seed production in important fodder crops and demonstration of production technologies and low cost forage equipments to accelerate fodder production in Karnataka

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## AICRP FC & U, PANTNAGAR

#### Publication (Books, Research paper, bulletins etc.)

#### **Research paper: 1**

Rawat, N.S. and J.S. Verma, 2014. Genetic analysis of fodder and grain yield in released varieties of oat (*Avena sativa* L.). *Pantnagar J. Res.* (Accepted).

**Popular article: 2** 

Verma, J.S. 2015. Scientific cultivation of improved forage cowpea, maize and sorghum varieties. *Kisan Bharti* 44 (6) : 31-32.

Verma, J. S. 2015. Quality seed production in forage cowpea. Kisan Bharti 46 (6): 21-23.

**Ph. D. Genetics and Plant Breeding:** 2

M. Sc. Genetics and Plant Breeding: 1

FTDs conducted : - 45 (29 Berseem + 16 Oat)

**TSP Activities** : - 32 demonstration.

**TV/Radio Talk: Five radio talks** on new Forage Varieties and Scientific cultivation of Cowpea, Maize and Sorghum Forages.

**Forage Crops/ Breeder Seed Production**: Breeder seed of forage cowpea UPC 625 (4.0 qtl) and UPC 628 (4.0 qtl).

## AICRP FC&U, CSK HPKV, PALAMPUR

#### Publications (Books, Research papers, Bulletins etc.)

#### Research paper: 3

Jai Dev, G. Katna, Indu Bala, Amar Singh and V K Sood. 2014. Genotype x Environment interaction in soybean (*Glycine max* (L.) Merr.) genotypes. *Soybean Research* (Special issue) 12 (1): 9-14

Rajan Katoch and Naveen Kumar 2014. Productivity and quality attributes of maize varieties (Zea mays L.). Range Mgmt. & Agroforestry. 35: 32-37

V. K. Sood, I. Rana, W. Hussain & H. K. Chaudhary. 2014. Genetic diversity of Genus Avena from North Western-Himalayas using molecular markers. *In: Proc. Nat. Acad. Sci., India, Sect. B Biol.Sci.* DOI 10.1007/s40011-014-0427-3

#### Seminar / Symposium: 4

- K K Katoch and Naveen Kumar 2014 Climate change and livelihood enhancement in Himachal Pradesh. In: National Conference on Sustainable livelihood security for the hills of India and climatic resilence for mitigating natural calamity. March 10-11,2014 IARI New Delhi. Organsed by Vivekanand Parvatiya Krishi Anusandhan Santhan, Almora. 1-10
- Naveen Kumar, V.K. Sood, S.R. Kantwa and Sunil Kumar 2014. Performance of improved Setaria grass (*Setaria anceps* Stapf.) genotypes at varying levels of nitrogen under mid hill of North-Western Himalayas. In: *National Symposim on Agricultural Diversification for sustainable livelihood and environment security Nov. 18-20,2014. Ind. Soc. of Agronomy and ICAR, Extended summaries of voluntary papers. 255*
- D Badiyala, A D Bindra and Naveen Kumar 2014. Diversification –issues and opportunities with special reference to Himachal Pradesh. In: *National Symposim on Agricultural Diversification for sustainable livelihood and environment security Nov. 18-20, 2014. Ind. Soc. of Agronomy and ICAR Extended summaries of lead papers.* 21-22
- Singh, Amar., Dev, Jai., Banyal, D. K. and Katna, G. 2014. Screening of soybean (*Glycine max*) germplasm for multiple disease resistance. *In: International Soybean Research Conference* (SOYCON 2014) at DSR Indore on 22-24 Feb., 2014. 254-55p

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#### **Book Chapter**

Naveen Kumar, B R Sood and S K Gupta 2014. Management of forage resources in north-western Himalayas. In: Livestock health & production with emphasis in hilly areas. Ed S K Gupta, R K sharma, M A Malik and Arvind Kumar. Notion Press Chennai, Pp 181-192

#### **Bulletin:**

Pankaj, Naveen, Purbi, Madhumeet, Navneet, Daisy, Pradeep, Shivani and Ashok 2014: Pashu Prajanan Samsayaon Ko Nyuntam Karne Sambhandhit Sujhav. (In Hindi)

#### Student(s) guided: M.Sc. - 4, Ph. D-3 FTDs conducted: 40

**TSP activities:** 50 Families selected

#### Training conducted for farmers/ NGO/ Govt. officials:

Name of training	Duration	Organiser			
Fodder Production and Grassland	10-11.11.2014	Directorate of Extension Education, CSK			
Management for the farmers of		HPKV Palampur			
Chamba district					
Fodder Production and Grassland	9-10.1.2015	Directorate of Extension Education, CSK			
Management for the farmers of Lahaul		HPKV Palampur			
& Spiti district		_			

#### HRD for the AICRP-FC staff: -

#### TV/ Radio talk delivered by AICRP-FC staff/ extension activities:

• Lecture delivered to farmers and developmetal officers = 10

#### Seed/ planting material

#### Seed/seedlings sold to farmers and other agencies

Сгор	Seedlings	Seed (kg)
Setaria grass	2,18,000	6
NBH	1,82,000	-
Kikuya grass	20,000	-
Fescue grass	11,000	15.5
Brome grass	-	10
White clover	-	7

## **Breeder Seed Production:** Setaria grass = 15 kg

## Linkage with Departments

- Department of Agriculture (HP)
- Department of Forest (HP)
- Department of Animal Husbandry (HP)
- Watershed Development Programmes (HP)

#### Linkage with NGOs

- ERA, Khudian, Distt. Kangra (HP)
- CORD, Sidhbari, Distt. Kangra (HP)

Externally funded projects: Project scientists associated in Three Ad hoc projects

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## AICRP FC & U, MPKV, RAHURI

#### Publications: Research papers: 7 Popular articles: 5 Important Persons Visited to AICRP FC centre

• QRT consisting Dr. Panjab singh, Chairman, Dr. P.S. Pathak, Dr. C.L. Acharya, Dr. K.S. Ramchandra, Dr. K.K. Dutta, Dr. J.P. Yadvendra, members, Dr. Sunil Tiwari, Secretary and Dr. A.K. Roy, Project Coordinator (FC&U) visited to project on 3<sup>rd</sup> August, 2014 for review of research activities.

Student Guide: M.Sc. (Agri.): -1, Entomology: -1, Biochemistry: -1, Agronomy: -1.

#### FTDs conducted: 30

(Maize- African Tall-10, Giant Bajra-10 and BXN Phule Jaywant-10)

**TSP activities:** Selected beneficiary farmers at Karanji Bk., Tal. Navapur, Dist. Nandurabar **TV/Radio talk delivered by AICRP-FC staff/ extension activities:** 

- Radio talk :03
- Lectures to farmers in training programme: 03

# Details of seed/planting materials sold to farmers/others, interaction with farmers, NGO and Govt. staff

S. No.	Сгор	Tentative Breeder seed yield (q)	Tentative Truthful seed yield (q)
1.	Maize (African Tall)	12.00	-
2.	Bajra (Giant bajra)	0.15	1.0
3.	Cowpea (Sweta)	0.10	-
4.	BXN hybrid	-	20,000 sets

#### Seed Production (kharif-14)

**Visits of farmers and Govt. Staff of Agril. Department of Maharashtra State** No. of Farmers: 1200

No. of Farmers: 1200

No. of Govt. officers/staff visited: 17

Externally funded project: 02 (Product testing)

## AICRP FC & U, SRINAGAR

## Publications (books, research papers, bulletins etc.)

#### **Research paper:4**

Ahmad, M., G. Zaffar, S.D. Mir, Z.A. Dar, S. Iqbal, and M. Habib, (2014). Genetic analysis for fodder yield and its important traits in oats (*Avena sativa* L.). *Indian Journal of Genetics and Plant Breeding* 74(1):1-3

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- Ahmad, M., G. Zaffar (2014). Evaluation of oat (*Avena sativa* L.) genotypes for beta-glucan, grain yield and physiological traits. *Applied Biological Research* 16(1):1-3
- Ahmad, M. and G. Zaffar, (2014). Stability analysis for forge yield and its contributing traits in Oats (Avena Sativa L.). Trends in Bioscience (Accepted).
- Ahmad, M. and G. Zaffar, (2014).Study of heterosis, inter-relationship and path analysis of green fodder yield and its contributing traits in oats (*Avena Sativa L.*). *Research Journal of Agriculture Sciences* (Accepted).

Important persons visited to AICRP\_FC centre

Dr. Panjab Singh, Former Director General, ICAR & Secretary, DARE, and Former VC, BHU

Dr. P.S. Pathak, Ex Director IGFRI & Ex. ADG, ICAR

- Dr. K. S. Ramachandra, Advisor National Rainfed Area Authority, NASC Complex, Pusa, New Delhi
- Dr. K. K. Dutta, HOD, Dairy Economics, NDRI, Karnal
- Dr. C. L. Acharya, Former Director, IISR, Bhopal
- Dr. J. P. Yadvendra, Ex-Professor (Forage Breeding)
- Dr. Sunil Kumar Tiwari, HOD, Crop Production Division, IGFRI, Jhansi
- Dr. P. K. Ghosh, Director, IGFRI-Jhansi
- Dr. A.K.Roy, Project Coordinator, AICRP-FC, IGFRI-Jhansi

Student(s) guided: Ph. D in PBG-1

FTDs conducted: 10 (African tall)

Training conducted for farmers/ NGO/ Govt. officials: 2

TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 4

## AICRP FC & U, VELLAYANI

## Publications (Books, Research papers, Bulletins etc.)

Popular articles- 2 (Malayalam)

- Silage for lean period- Kerala Karshakan November 2014
- Fodder varieties- Karshakan November 2014

#### **Conference papers: 2**

Usha C. Thomas, Mareen Abraham and Saru. S. R, 2014. Cassava based fodder alley farming system for food-fodder security. Third Indian Biodiversity Congress., p.192

Mareen Abraham, Usha C T and Kamala Nair, 2014.Biofuels for bio energy.Symposium on bioenergy for sustainable development.-the potential role of sugar crops. Sugarcane breeding institute, Coimbatore.126-128

Student(s) guided: M.Sc. (Agri.) – 2, Ph. D– 1, MSc. (Agri.) in Agronomy-1

### FTDs conducted: 20

**TSP activities:** At Uriyakode tribal colony of Vellanad panchayat kid goats and planting materials of Hybrid Napier var. Suguna was distributed to 15 tribal beneficiaries.

#### HRD for AICRP-FC staff:

#### Seminar / symposium attended:

- One day seminar on Global Warming & Climate Change in COA, Vellayani conducted by NARP (SR) on 4-12-14.
- one day Symposium on World soil day at Kanakakkunnu conducted by the Dept of Soil survey and Soil conservation
- Indian Biodiversity Congress (IBC 2014), SRM University, Chennai

#### **Details of sale of seeds/ planting material**

- Slips and cuttings of Guinea grass and Hybrid Napier
- Total income from sales- Rs. 18,752

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## AICRP FC & U, URULIKANCHAN

**Publications (books, research papers, bulletins** *etc.*) One research article on BAIF Bajra -1

Important persons visited to AICRP\_FC centre

- Prof. Suresh S. Honnappagol, Animal Husbandry Commissioner, Dept. Of AHDF, Ministry of Agriculture, GOI, New Delhi
- Dr. Panjab Singh, President- FAARD, Varanasi
- Dr. Mahesh Katara, CEO, Rajasthan Livestock Development Board, Jaipur
- FTDs conducted: Thirty five FTDs of Maize, Hy. Napier and Bajra-Cowpea
- **TSP activities:** Activities were planned for distribution of good quality bucks to the Tribal families in two villages of Nandurbar district of Maharashtra.
- **Training conducted for farmers/ NGO/ Govt. officials:** Seven training programmes of three days duration on "Livestock Management and Fodder Development" were organised by the organisation and 329 individuals have participated in the training programme.
- **TV/ Radio talk delivered by AICRP-FC staff/ extension activities:** Attended two meetings of Agricultural Advisory Committee for Krishidarshan Programme of Doordarshan Kendra, Pune. A success story of two farmers on Goat Rearing and fodder cultivation was narrow casted on Doordarshan, Pune (Maharashtra).
- Details of seed/ planting material sold to farmers/ others, interaction with farmers, NGO and Govt. staff
- Participatory seed production programme of Forage Maize and Bajra was organised at farmer's field in BAIF's operational area of Maharashtra. The technical inputs in fodder seed production were given by the technical staff of the project and were also involved in monitoring of the programme.

## AICRP FC & U, TNAU, COIMBATORE

#### Publications (books, research papers, bulletins *etc.*) Research paper: 3

Babu, C., K. Iyanar, K. Velayutham and A. Kalamani (2014). A high yielding Lucerne variety CO 2. *Electron J Plant Breed*, 5(3): 345-349.

- Babu, C., K. Iyanar and A. Kalamani. 2014. High green fodder yielding new grass varieties. *Electron J Plant Breed*, 5(2): 220-229.
- Ramakrishnan, P., C. Babu and K. Iyanar (2014). Genetic diversity in Guinea grass (*Panicum maximum* Jacq.) for fodder yield and quality using morphological markers. *Int J Plant Biol Res* 2(1): 1006.

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#### Important persons visited to AICRP FC centre

- Shri. Jignesh Shah, Director, Pushpak Pvt. Ltd., Mumbai
- Shri. K. Sridharan, Vice President, T. Stanes and Company Limited, Coimbatore

Student(s) guided:

M.Sc. (Agri.) - 1; Ph. D. - 1; Ph.D. in Agronomy- 1

FTDs conducted: 35

Training conducted for farmers/ NGO/ Govt. officials: 5

TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 4

Details of seed/ planting material sold to farmers/ others, interaction with farmers, NGO and Govt. staff.

S.	Forage crops	Total quantity (kg)				
No.		Breeder	Foundation	TFL	Total	
		seed	seed	seed		
1.	Multicut fodder sorghum CO (FS) 29	275	1,265	1,423	2,963	
2.	Multicut fodder sorghum CO 31	-	-	139	139	
3.	Fodder maize- African tall	-	10,843	1,430	12,273	
4.	Fodder cowpea CO (FC) 8	-	574	148	722	
5.	Lucerne CO 2	-	-	8	8	
6.	Hedge Lucerne	-	-	417	417	
7.	Subabul	-	-	10	10	
8	Agathi	-	-	230	230	
	Grand Total	275	12,682	3,805	16,762	

#### Forage crops seed production details (2014-15)

#### Quantity of planting material produced and supplied (2014-15)

S. No.	Сгор	Planting material (Nos.)
1.	BN hybrid CO (BN) 5	2,83,140
2.	BN hybrid CO (CN) 4	8,23,164
3.	Guinea grass CO (GG) 3	35,285

Externally funded projects: 3 Guest lecturers delivered: 7

## AICRP FC & U, CCS HAU, HISAR

#### Publications (books, research papers, bulletins *etc.*) Research paper: 1

Yogesh Jindal, G. S. Dahiya and D.S. Phogat (2014). Evaluation of genetic variability in berseem after mutagenesis. *Forage research* Vol 39 (4): 201-204.

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#### Books: 1

R.K. Pannu; R.K. Walia and Y. Jindal (2014). Significant Achievements – COA for the year 2013-14. Published by College of Agriculture, CCS HAU, Hisar

## Pamphlets: 2

- Y. Jindal, S.K. Pahuja, S.P. Singh, L.K. Midha and A.S. Godara (2014). सर्दियों का बेहतरीन हरा चारा बरसीम Tech. Bull. Forage Section, CCS HAU, Hisar.
- D.S. Phogat, S.K. Pahuja, S.P. Singh, L.K. Midha and Yogesh Jindal (2014). जई–सर्दियों का बढ़िया हरा चारा Tech. Bull. Forage Section, CCS HAU, Hisar.

#### **Students guided:** M. Sc. - 3, Ph. D. - 1

#### FTDs conducted: 15

Pearl millet; HC 20

# AICRP FC & U, CAU, IMPHAL

#### **Publications:**

Jamkhogin Lhungdim, S.K. Chongtham, R.J. Koireng and M.P. Neupane (2014). Seed invigoration and yield of Lentil (*Lens Culinaris* Medikus) through seed priming under different seeding rates. *Journal of Environment & Ecology*, 31(3):1207-1212.

#### **Important Persons visited:**

- Dr. Ram Badan Singh, Chancellor, CAU, Imphal
- Dr. S.N. Puri, Vice-Chnacellor, CAU, Imphal
- Dr. Dhiraj Singh, Director, Directorate of Rapeseed & Mustard, Bharatpur
- Md. Abdul Nasir, Hon'ble Agriculture Minister, Manipur

#### FTDs conducted: 10

Rice bean; Bidhan-1 - 5 Maize; J 1006 - 5

## Training conducted for farmers/NGO/Govt. Officials: 1 TV/Radio talks: 2

#### Details of seed/Planting material sold to farmers:

Сгор	Variety	Cuttings (Nos.)	Total (Nos.)
Napier hybrid	CO-1	500	500
	CO-2	500	500
	CO-3	500	500
	-	Total	1500

# AICRP FC & U, JNKVV, JABALPUR

#### **Awards and Honours:**

**Best Oral Presentation Award:** National seminar on Challenges and opportunities for agriculture crop productivity under climate change September 21-22, 2014



#### **Publications:**

#### **Research papers: 5**

- Jha A K., Arti Shrivastva and N. S., Raguvanshi (2014).Effect of different phosphorus levels on growth, fodder yield and economics of various cowpea genotypes under Kymore plateau and Satpura hills zone of Madhya Pradesh. *International Journal of Agricultural Science*, 10 (1) 409-411.
- Shri Sonam, A.K. Jha, and Arti, Shrivastava (2014). Evaluation of different intercropping system for maximum productivity and economics in maize. *Ann. Agric. Res. New Series*, 35 (2) 201-205.
- Jha A K., Arti, Shrivastva and N. S., Raguvanshi (2014). Effect of weed control practices on the fodder and seed productivity of Berseem under irrigated condition of Madhya Pradesh. *Range management & Agroforestry* (accepted).
- Vrema Deepika, A.S., Gontia and Amit Jha (2014). Suitability as cereal fodder wheat, barley and oat crops with reference to their physiological performance. *Asian Resonce Voil* 3 (2)43-45.
- Gurjar, M. S. A.S., Gontia, A.K., Mehta, Anubha, Upadhaya and Satrupa, Rao (2013). Evaluation of pearl millet genotypes for physiological efficiency and productivity. JNKVV Res. 46 (2) (In Press)

#### Seminar /Symposium: 3

- Bornare S.S. S.K Mittra. and A.K. Mehta, A.H. Madakemohekar, L.B. Gaur and A.S.Chavhan (2013) Identification of best putative lines based on floral traits in CMS and restorer lines of rice. Crop Improvement (Special issue) 355-56 Int. con on Sustainable Agriculture for Food and Lively-hood Security. Nov. 25-28.
- Mehta, A.K. and S.K., Bilaiya (2013) Status of forage resources in Madhya –Pradesh- An overview Souvenir : National Group Meet 7-8 September 2013, held at JNKVV, Jabalpur pp18-22.
- Jha, A.K. A.K. Mehta, Arti, Shrivastava N.S. Raghuvanshi and G. Jha (2013) Performance of New Maize cultivars for higher grain yield. Int. corn on Impact of Technology under Global warming Scenario held at Shobit University Meerut.May. 11-12 2013. p.141

## **Important Persons visited:**

- Board Members of Vishwa Vidyalaya.
- Dr.P.M.Gaur International Scientist, ICRESAT Hyderabad.
- Dr Sawpan Kumar Datta DDG, Crop Science ICAR

#### Students guided: M. Sc. - 1

#### FTDs conducted:

- Maize; African Tall = 10
- NBH; IGFRI 7 = 5
- Ricebean ;JRBJ05-2=8
- **TSP activity:** 23 demostration of different fodder crops at tribal block of Dindori (M.P.)
- TV/Radio talks:
- Radio talks = 4

# AICRP FC & U, IGKV, RAIPUR

Publications (books, research papers, bulletins etc.): One

- FTDs conducted: 15 in Kharif
- TV/ Radio talk delivered by AICRP-FC staff/ extension activities: 2

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#### WEATHER REPORT FOR KHARIF 2014

The weather report of the AICRP-FC coordinating, cooperating and voluntary centres across the different zones during *Kharif* 2014 programme have been presented in this section. The weather parameters from 26<sup>th</sup> Standard Meteorological Week (June 25, 2014) to 44<sup>th</sup> Standard Meteorological Week (October 29-November 04, 2014) were taken into consideration, which covers the *Kharif* 2014 season for all the testing locations for trial conduction [Table MET- 1.1 (a) to 1.4 (n)]. 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 have wide impact on establishment, growth, yield and quality of different forage crops and their varieties. The weather parameters have also shown close correlation with the incidence and surveillance of insect-pest and diseases of forage crops. Weather parameters influenced the establishment, growth and performance of different annual and perennial forage crops and their varieties.

#### Temperature:

In Hill Zone, Almora remained the coolest location recording 6.9°C during 44<sup>th</sup> SMW. At Srinagar, maximum temperature was recorded (32.9°C) during 31<sup>st</sup> SMW. The average minimum temperature over the season was also recorded lowest at Srinagar. In North-East zone, Ranchi and Imphal recorded the lowest minimum temperature (13.2°C) during 44<sup>th</sup> & 43<sup>rd</sup> SMW, respectively followed by Faizabad (14.9°C) during 44<sup>th</sup> SMW. Maximum temperature was recorded at Faizabad (37.1°C) during 26<sup>th</sup> SMW. Least variation for maximum temperature over the season was observed at Bhubaneswar followed by Jorhat and Ranchi. Least variation in minimum temperature over the season was observed at Bhubaneswar. In North-West Zone, Bikaner recorded lowest minimum temperature (13.1°C) during 44<sup>th</sup> SMW followed by Hisar (14.2°C) during same week. Maximum temperature was recorded at Bikaner (42.9°C) during 28<sup>th</sup> SMW.

In Central Zone, Jabalpur recorded the lowest minimum temperature (12.7°C) during 44<sup>th</sup> SMW followed by Rahuri (14.0°C) in the same week. The maximum temperature was recorded at Jhansi (42.3°C) during 28<sup>th</sup> SMW followed by Kanpur (40.6°C) during 26<sup>th</sup> SMW. Rahuri recorded lower minimum temperature over the season as compared to rest of the locations. The least fluctuation in maximum temperature over the season was at Urulikanchan. In South zone, the lowest minimum temperature was recorded at Dharwad (15.1°C) during 44<sup>th</sup> SMW followed by Mandya (17.0°C) during 44<sup>th</sup> SMW. The maximum temperature was recorded at Hyderabad viz., 35.9°C during 26<sup>th</sup> & 27<sup>th</sup> SMW. Hyderabad experienced higher maximum temperature over the crop season as compared to other locations in the Zone and least fluctuation in minimum and maximum temperature was observed at Vellayani.

## Rainfall:

During *kharif* season some of the states received very less amount of rainfall especially Tamil Nadu and Karnataka. In Hill Zone, Palampur received highest rainfall (891.6 mm) followed by Almora (552.3 mm in 36 rainy days). Srinagar centre experienced floods during kharif season. In North East Zone, Bhubaneswar received highest rainfall (1261.7 mm) followed by Jorhat (1036.9 mm) and lowest being with Faizabad (511.7mm). The maximum number of rainy days was also recorded at Bhubaneswar (77 rainy days) followed by Kalyani (70 rainy days) and lowest being with Faizabad (32 rainy days).

In North-West Zone, Pantnagar received highest rainfall (602.6 mm) followed by Bikaner (427.9mm) and lowest being at Hisar (168.2 mm). In Central Zone, maximum rainfall (1057.4 mm) was received at Raipur followed by Anand (962.8 mm) and lowest being with Rahuri (324.8mm in 23 rainy days).

Maximum number of rainy days was observed at Raipur (52 RD) followed by Kanpur (38 RD) and lowest being with Urulikanchan (19 RD). In South Zone, Vellayani received maximum rainfall (1121.2 mm) in 52 rainy days followed by Dharwad (604.2 mm in 51 RD) and lowest total rainfall was at Hyderabad (443.3 mm in 30 RD). In the same zone the good distribution of rainfall was observed at Vellayani and Dharwad.

#### **Relative Humidity:**

In hill Zone, the morning RH was highest at Almora (100 % in 29, 30, 34, 37, 38, 39 and 40 to 44<sup>th</sup> SMW). Morning RH was recorded higher throughout the crop season at Almora in comparison to Palampur. In North-East Zone, maximum RH of 97.1% was recorded at Kalyani during morning hours in 33<sup>rd</sup> SMW followed by 97.0 % at Bhubaneswar during 35<sup>th</sup> SMW. Minimum RH during morning and afternoon hours was recorded at Faizabad (64.9% in 26<sup>th</sup> SMW) and Bhubaneswar (51.0% in 44<sup>th</sup> SMW), respectively. However, the average RH was recorded highest at Kalyani (93.4%) during 27<sup>th</sup> SMW.

In North-West Zone, RH ranged from 37.2 to 92.4 % in morning hours and between 27.0 to 81.0% in afternoon. The lowest RH during morning hours was at Bikaner (37.2%) during 41<sup>st</sup> SMW, whereas, highest morning RH was recorded at Pantnagar (92.4 %) during 29<sup>th</sup> SMW. In the same zone, the maximum afternoon RH was recorded at Bikaner (81.0%) during 36<sup>th</sup> SMW.

In Central Zone, maximum RH in morning hours (100 %) was recorded at Anand during 42<sup>nd</sup> SMW and lowest RH (56.0%) in morning was observed at Rahuri centre during 44<sup>th</sup> SMW. In South Zone, the maximum RH (96.1%) was recorded in the morning hours at Vellayani during 36<sup>th</sup> SMW. The minimum fluctuation in the morning RH was recorded at Mandya. The lowest afternoon RH was recorded at Hyderabad (24.0%) during 44<sup>th</sup> SMW.

#### Sunshine hours:

In Hill Zone, maximum sunshine hours were recorded at Palampur (8.6 during 41<sup>st</sup> SMW) followed by 8.5 h in 44<sup>th</sup> SMW at Almora. In the same zone, over the season, the maximum sunshine was recorded higher at Palampur than Almora. In North-West Zone, sunshine hours were recorded highest at Bikaner (11.4 h in 28<sup>th</sup> SMW). On mean basis Bikaner and Hisar recorded maximum sunshine hours (8.1 and 7.1 h, respectively) followed by Ludhiana (6.6h).

In North-East Zone, Kalyani recorded maximum sunshine hours (9.0 h) followed by Ranchi (8.8 h). Maximum average sunshine hours were recorded at Ranchi (6.0 h) followed by Kalyani (5.3 h) and Faizabad (5.0h) and lowest being with Bhubaneswar (4.4 h). Imphal experienced lowest sunshine hours over the season as compared to other locations.

In Central Zone, the maximum sunshine hours were recorded at Jhansi (10.1 h in 39<sup>th</sup> SMW). On mean basis, the maximum sunshine hours was recorded at Jhansi (7.0 h) followed by Kanpur (6.4 h) and lowest being with Raipur (4.3 h). In South Zone maximum sunshine hours was recorded at Coimbatore (8.5 h) followed by Hyderabad (8.3 h). On mean basis, Hyderabad recorded maximum sunshine hours (4.9 h) followed by Coimbatore (5.5h) and lowest being with Mandya (4.7 h).

Mat			Hill Z	Zone			North West Zone									
Week	Pala	mpur	A	mora	Srin	agar	Lud	hiana	Bik	aner	Hi	sar	Panti	nagar		
Week	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
26	29.3	19.2	31.1	19.2	28.1	12.4	39.3	28.1	39.3	24.1	38.0	26.3	36.9	26.6		
27	28.4	19.5	30.2	20.4	30.1	14.6	36.6	26.7	38.5	23.0	38.0	27.6	32.3	25.4		
28	29.1	20.0	30.4	21.1	28.3	14.0	36.7	27.2	42.9	23.2	38.5	28.2	33.5	26.9		
29	26.6	19.7	24.9	20.2	30.7	16.9	38.7	29.7	40.1	27.3	38.5	27.8	30.5	25.6		
30	24.7	19.7	28.3	20.6	30.2	16.1	33.9	27.8	37.9	24.2	37.6	27.7	32.5	26.2		
31	27.3	20.0	31.1	21.5	32.9	19.6	33.3	27.5	34.3	18.1	35.6	26.9	33.5	25.8		
32	26.9	19.5	30.8	20.6	32.5	16.9	34.5	27.5	37.4	26.3	35.2	26.8	33.3	26.3		
33	26.6	18.8	29.0	20.8	31.1	16.4	34.1	27.3	36.1	19.6	36.1	26.5	32.3	25.6		
34	27.8	18.3	29.9	19.8	27.6	14.3	33.9	26.9	38.7	20.8	38.5	25.8	34.2	25.9		
35	27.6	18.2	30.6	19.8	27.8	13.4	35.5	27.1	33.1	19.0	35.3	25.5	33.9	25.7		
36	25.1	18.3	29.9	18.4	25.6	12.3	32.6	25.2	34.0	20.0	33.0	25.5	33.2	25.1		
37	26.5	15.8	28.4	18.6			30.8	24.2	37.7	22.1	34.4	24.7	32.0	23.5		
38	27.6	16.6	30.6	17.8			32.3	24.0	37.5	23.0	36.2	22.9	33.2	23.3		
39	25.3	15.5	27.6	13.7			33.6	24.8	36.0	23.8	36.0	21.6	32.7	21.3		
40	25.4	16.0	27.4	12.9			33.3	23.4	35.6	23.2	37.0	21.7	32.0	22.3		
41	25.8	13.2	27.1	9.9			34.1	24.1	36.9	25.1	34.6	18.9	32.7	17.9		
42	23.2	11.4	24.1	6.9			31.1	17.9	35.6	19.1	29.8	15.3	26.9	15.5		
43	23.7	12.2	25.5	9.6			30.1	15.7	35.6	19.1	32.4	19.0	30.9	16.6		
44	22.7	10.1	25.9	6.9			30.4	17.9	32.2	19.9	30.7	14.6	28.5	13.1		

Table MET -1.1 (a): Temperature (°C) during crop growth period, Kharif 2014

Week	Faiza	ıbad	Im	phal	Bhuba	neswar	Kaly	ani	Jor	hat	Ra	nchi
WEEK	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	37.1	26.9	30.9	22.1	34.8	24.7	34.32	26.64	32.7	25.7	32.7	22.2
27	32.4	25.8	33.5	23.3	31.9	24.4	31.85	26.80	33.4	26.0	27.9	22.8
28	34.7	26.7	32.8	23.4	33.7	25.2	34.38	27.31	33.3	26.2	32.0	23.3
29	31.9	26.7	32.6	23.2	28.8	24.5	32.00	27.11	32.7	25.4	30.3	23.3
30	34.0	26.5	32.0	22.4	31.8	24.9	33.10	26.74	33.5	25.2	31.5	22.2
31	34.3	25.9	33.5	22.9	30.8	24.7	33.67	26.94	33.9	25.6	30.8	22.2
32	33.2	25.9	32.9	22.8	32.4	24.8	35.01	27.18	34.4	25.7	27.9	22.5
33	33.8	25.9	32.2	22.0	33.5	24.4	33.44	25.87	30.0	25.0	29.8	23.0
34	36.2	26.5	30.4	22.4	34.8	25.0	35.04	26.25	31.8	25.0	30.8	23.0
35	34.5	25.8	32.1	22.2	31.1	24.4	33.25	26.10	33.4	25.8	28.3	22.1
36	32.4	25.5	32.2	21.6	29.2	23.6	33.42	26.18	33.1	25.3	28.7	21.3
37	31.2	25.0	31.9	22.2	33.6	24.6	35.01	26.20	32.7	24.5	30.0	22.3
38	33.9	25.1	30.2	21.9	30.7	24.4	32.30	25.98	31.3	24.6	29.8	22.6
39	33.6	23.8	28.5	20.7	34.1	24.6	36.02	25.31	29.6	23.4	29.8	19.5
40	32.8	21.6	30.3	18.4	33.8	23.1	36.05	25.08	33.1	23.2	30.4	19.9
41	30.5	19.7	30.5	18.4	31.2	23.7	33.70	25.28	33.2	24.1	29.7	20.1
42	29.2	17.7	29.3	19.8	32.5	22.2	33.72	22.17	31.6	22.2	26.5	15.2
43	30.6	17.4	29.4	13.2	30.6	20.5	31.8	21.45	30.3	18.9	27.9	14.9
44	29.5	14.9	26.7	15.9	30.4	19.4	32.44	19.75	30.0	17.8	27.7	13.2

Mat	Central Zone													
Week	Kan	pur	Urulika	nchan	Ana	Ind	Rah	uri	Raip	our	Jabal	pur	Jh	ansi
week	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	40.6	25.7	28.8	26.2	38.5	27.7	35.9	22.5	35.7	26.0	29.2	23.5	39.1	26.6
27	35.9	22.7	30.0	26.7	38.5	28.3	34.4	23.3	37.7	27.0	30.5	24.0	38.3	25.1
28	38.3	25.2	27.8	25.4	37.2	27.6	32.7	23.4	34.3	23.8	31.1	24.3	42.3	29.0
29	32.3	23.1	27.1	24.8	33.2	25.3	30.8	24.0	28.5	24.6	29.2	23.6	33.5	25.2
30	32.4	25.3	27.1	24.9	30.5	25.3	29.1	22.3	28.7	23.8	30.0	23.9	31.0	25.0
31	33.4	26.8	27.7	25.2	31.0	25.2	29.0	22.6	29.8	24.8	28.7	23.6	33.4	26.0
32	32.2	26.2	28.8	25.8	31.6	25.1	30.5	21.9	30.2	24.8	29.4	23.2	30.6	25.0
33	34.0	27.0	30.3	26.3	33.1	24.7	31.7	21.9	31.8	25.3	27.9	23.3	33.6	24.8
34	37.4	27.6	29.1	25.7	34.4	25.7	32.7	22.6	32.3	25.1	28.5	23.2	37.0	24.8
35	350	27.1	31.2	26.3	33.0	24.0	28.6	21.8	31.8	25.0	31.4	23.1	34.8	24.2
36	32.7	26.0	31.8	26.8	30.9	24.5	29.5	22.2	25.1	28.3	32.6	23.7	31.9	23.9
37	31.0	24.9	32.6	26.6	29.9	26.0	30.7	21.0	30.5	24.3	26.6	20.0	32.0	23.6
38	34.0	25.4	30.2	26.1	32.8	26.2	31.9	21.0	32.1	24.6	31.8	23.4	34.2	22.9
39	35.1	24.4	30.9	25.9	35.1	26.8	33.6	20.0	33.4	24.0	28.9	22.9	35.6	21.6
40	350	24.0	31.9	27.7	36.9	24.1	34.1	22.2	33.2	24.0	29.7	21.8	36.7	20.7
41	31.9	21.4	33.1	27.1	37.3	21.4	34.0	19.6	30.4	23.6	30.1	18.4	34.5	19.2
42	30.2	18.1	33.3	27.3	37.0	19.2	33.7	20.9	31.5	22.5	29.4	18.8	31.9	16.4
43	31.8	18.2	32.5	27.5	36.0	18.8	29.4	16.1	29.1	19.4	30.7	15.4	33.3	15.0
44	31.2	17.0	32.4	26.5	35.9	19.4	32.0	14.0	30.1	16.9	28.9	12.7	32.8	15.7

# Table MET -1.1 (c): Temperature (°C) during crop growth period, Kharif 2014

Table MET -1.1 (d): Temperature (°C) during crop growth period, Kharif 2014

Mat					South Zone	9				
Met.	Vellayar	ni	Man	dya	Coimb	oatore	Hyder	abad	Dhar	wad
week	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	30.5	25.0	33.0	18.9	33.9	23.4	35.9	24.9	31.9	20.8
27	30.4	24.7	31.9	18.6	32.9	22.9	35.9	24.6	30.4	20.8
28	29.7	24.2	30.1	18.6	29.6	23.0	31.2	23.2	26.8	20.6
29	30.1	24.2	30.0	18.3	29.9	23.5	29.7	23.7	25.3	21.1
30	29.9	24.2	29.7	18.9	29.9	23.7	30.7	23.2	25.9	20.8
31	29.2	23.5	29.9	18.8	29.6	23.2	30.4	22.2	25.2	21.0
32	29.4	23.5	29.6	18.7	30.1	22.8	32.0	22.7	25.5	20.7
33	29.7	24.0	28.4	18.8	31.2	22.7	33.3	24.5	27.8	20.3
34	29.8	24.0	30.4	19.0	39.9	23.3	34.0	24.0	29.4	20.5
35	29.9	23.9	28.9	18.4	29.7	23.7	28.1	22.1	24.8	20.1
36	29.2	23.9	28.9	18.4	30.8	23.1	27.5	22.6	25.9	20.3
37	30.1	24.5	29.6	18.1	32.3	22.0	31.0	22.8	28.2	20.0
38	30.5	24.6	29.6	18.9	32.7	27.3	31.1	22.2	28.0	19.9
39	31.1	24.1	30.4	18.6	32.3	23.0	32.3	22.1	30.5	20.9
40	30.7	23.9	31.3	19.2	31.7	21.1	34.1	21.9	30.5	19.7
41	30.7	24.2	30.9	17.7	31.0	22.6	32.4	20.3	29.9	20.4
42	30.3	23.7	30.7	19.1	29.1	22.3	32.8	19.2	31.2	19.5
43	30.2	23.5	28.6	18.1	28.7	22.4	28.3	19.0	27.6	18.7
44	30.5	23.5	29.5	17.0	29.1	22.1	30.4	18.4	29.0	15.1

M-4		Hill Zo	one			N	orth West Z	lone	
Week	Palampur	Alm	nora	Srinagar	Ludhiana	Bik	aner	Hisar	Pantnagar
WEEK	RF	RF	RD	RF	RF	RF	RD	RF	RF
26	28.8	2.0	0	0.7	12.8	0.0	0	14.5	2.8
27	24.4	7.6	3	11.8	6.2	10.5	1	0.0	50.8
28	233.2	53.7	3	34.2	8.6	0.0	0	0.0	50.6
29	173.2	258.5	6	4.8	0.0	0.0	0	7.6	265.6
30	176.6	75.1	6	8.8	6.8	22.5	3	9.1	15.8
31	9.9	8.0	1	1.4	110.0	175.0	2	33.2	72.0
32	20.3	8.0	2	1.0	67.8	0.2	0	0.0	34.4
33	18.3	42.0	1	0.0	38.4	0.0	0	0.0	27.0
34	32.6	0.0	0	46.0	0.0	0.0	0	0.0	00.0
35	36.0	7.0	2	25.0	0.0	138.0	3	1.0	01.2
36	5.5	16.9	3	49.0	11.2	81.7	3	76.7	01.2
37	60.8	9.5	3		81.4	0.0	0	4.8	5.4
38	15.6	0.0	0		59.0	0.0	0	0.0	29.4
39	24.8	11.5	2		0.0	0.0	0	0.0	01.0
40	11.0	2.5	1		0.0	0.0	0	0.0	05.6
41	19.0	41.5	2		4.8	0.0	0	20.3	01.6
42	0.0	8.5	1		5.6	0.0	0	0.0	38.2
43	1.6	0.0	0		0.0	0.0	0	0.0	0.0
44	0.0	0.0	0		2.5	0.0	0	1.0	0.0

# Table MET -1.2 (e): Rainfall (RF, mm) and Rainy days (RD, No.) during crop growth period, Kharif 2014

Table MET -1.2 (f): Rainfall (RF, mm) and Rainy days (RD, No.) during crop growth period, Kharif 2014

M-4					North East Zo					
Week	Faizat	oad	Imphal	Bhuba	aneswar	Kal	yani	Jor	nat	Ranchi
week	RF	RD	RF	RF	RD	RF	RD	RF	RD	RF
26	29.0	2	4.4	106.1	5	122.10	4	108.0	6	35.4
27	193.0	3	6.2	51.6	4	43.70	5	35.2	3	119.8
28	1.40	0	0.9	100.1	6	5870	5	37.5	4	9.3
29	55.6	6	5.5	128.0	6	85.10	7	83.0	6	19.8
30	17.6	2	3.0	12.2	3	48.20	5	149.4	6	16.2
31	38.4	2	2.0	151.8	6	77.70	5	16.6	2	79.0
32	8.4	3	4.4	25.7	5	8.20	3	93.5	5	69.6
33	26.1	2	9.5	25.2	4	176.80	6	65.7	4	32.0
34	0.0	-	19.1	61.6	4	18.60	4	71.2	4	16.5
35	12.5	2	3.3	164.4	7	66.90	5	23.4	2	29.0
36	11.6	3	2.5	115.6	6	39.10	6	93.2	5	45.9
37	17.9	4	0.8	45.2	5	41.60	2	20.6	2	80.3
38	0.0	0	4.5	111.1	7	51.6	5	124.5	5	36.5
39	0.0	0	7.4	0.0	0	89.2	3	37.9	3	0.0
40	4.4	1	0.0	26.1	3	7.0	1	0.0	0	0.0
41	86.4	1	1.6	84.4	3	69.6	3	11.4	2	36.3
42	9.4	1	0.5	51.6	3	4.3	1	22.8	2	0.0
43	0.0	0	0.0	1.0	0	1.0	0	43.0	3	3.1
44	0.0	0	2.0	0.0	0	00	0	0.0	0	0.0

Mot	Central Zone													
Week	Kanp	ur	Urulikan	chan	Ana	nd	Rahu	ıri	Raip	ur	Jabal	pur	Jhar	nsi
week	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD
26	-	-	0.0	0	0.0	0	0.0	0	27.6	2	15.5	3	21.2	1
27	28.4	4	0.0	0	0.0	0	11.8	1	9.0	1	0.0	0	15.0	2
28	7.0	1	0.0	0	41.0	1	16.8	2	152.8	7	0.0	0	0.0	-
29	107.2	6	18.0	2	150.4	4	8.0	1	260.2	6	0.0	0	91.2	5
30	38.6	2	44.4	2	217.8	5	23.4	3	37.2	4	0.0	5	29.2	3
31	59.8	5	50.8	2	81.6	7	13.2	2	136.0	7	210.2	4	12.6	2
32	25.5	7	0.0	0	61.8	3	1.6	0	42.1	3	145.0	3	25.2	2
33	-	-	0.0	0	10.6	2	34.0	1	45.0	3	184.3	5	0.0	-
34	-	-	240.0	5	8.6	1	44.4	3	25.8	2	57.2	З	0.0	-
35	18.6	2	66.6	3	61.0	3	130.0	5	84.8	4	86.8	2	52.2	3
36	37.4	4	6.2	1	245.2	5	15.8	1	79.5	4	0.0	0	128.6	5
37	80.7	5	7.6	1	47.2	3	0.0	0	41.0	3	46.2	3	34.2	2
38	-	-	0.0	0	36.8	1	4.0	1	57.6	3	6.0	2	0.0	-
39	-	-	20.4	1	0.0	0	0.0	0	0.0	0	69.0	3	0.0	-
40	-	-	6.0	1	0.8	0	0.0	0	0.0	0	18.4	2	0.0	-
41	38.8	1	0.0	0	0.0	0	7.4	1	52.2	2	0.0	0	1.6	-
42	21.6	1	0.0	0	0.0	0	13.4	2	1.2	0	16.4	1	1.0	-
43	-	-	8.6	1	0.0	0	1.0	0	5.4	1	0.0	0	0.0	-
44	-	-	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-

Table MET -1.2 (g): Rainfall (RF, mm) and Rainy days (RD, No.) during crop growth period, Kharif 2014

Table MET -1.2 (h): Rainfall (RF, mm) and Rainy days (RD, No.) during crop growth period, Kharif 2014

Mot				S	outh Zone					
Week	Vellaya	ani	Mand	уа	Coimb	atore	Hydera	bad	Dharwa	ad
week	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD
26	33.9	2	31.2	1	0.0		10.0	1	0.0	0
27	7.6	2	32.4	2	0.5		64.0	2	2.6	0
28	24.2	3	7.4	1	12.0	1	12.6	1	18.4	3
29	19.4	2	1.0	0	5.3	2	11.3	1	48.8	7
30	14.6	2	0.3	0	11.6	2	17.1	3	93.6	5
31	94.2	4	2.2	0	22.8	2	3.0	1	102.6	5
32	88.7	4	13.2	2	1.0		8.6	2	47.0	5
33	4.0	1	39.2	3	46.1	4	25.5	2	8.0	2
34	219.0	4	59.2	3	6.8	1	12.2	2	51.8	5
35	206.0	6	0.0	0	4.8	1	160.6	6	32.4	5
36	80.0	5	0.0	0	0.0		12.2	1	19.4	3
37	3.0	0	0.0	0	3.0		12.6	3	0.0	0
38	0.0	0	32.7	3	7.6	1	9.4	1	6.2	1
39	74.4	3	108.5	4	75.9	3	15.0	1	70.0	3
40	9.0	1	101.6	2	74.6	2	40.2	1	36.8	3
41	20.6	1	59.2	3	27.2	2	0.8	0	2.6	1
42	163.0	6	39.8	5	154.7	5	6.2	1	0.6	0
43	35.6	4	36.7	3	70.6	4	22.0	1	63.4	3
44	24.0	2	0.0	0	25.6	2	0.0	0	0.0	0

AICRP on Forage Crops

	Hill Zone									North-West Zone											
MetWeek	F	Palampu	r		Almora			Srinaga	r		Ludhiana	a		Bikane	r		Hisar		Р	antnaga	r
	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV
26	73.0	76.0	74.0	76.7	56.4	66.6	74.0	45.9	60.0	65.0	38.0	51.5	63.2	29.4	46.3	68.5	43.5	56.0	77.7	52.9	65.3
27	79.0	66.0	73.0	92.3	67.9	80.1	78.6	42.3	60.5	71.0	47.0	59.0	63.4	31.5	47.5	64.7	43.5	54.1	88.3	66.6	77.4
28	84.0	64.0	74.0	91.8	67.3	79.6	78.9	48.6	63.8	74.0	49.0	61.5	58.8	27.0	42.9	63.7	42.5	53.1	87.7	71.0	79.4
29	93.0	90.0	92.0	100.0	83.3	91.7	76.6	51.6	64.1	70.0	45.0	57.5	77.7	30.8	54.3	66.5	50.3	58.4	92.4	79.7	86.1
30	96.0	91.0	94.0	100.0	73.0	86.5	77.0	53.7	65.4	77.0	63.0	70.0	68.0	52.8	60.4	69.5	52.0	60.8	88.0	67.3	77.6
31	94.0	86.0	90.0	92.1	63.9	78.0	80.9	44.9	62.9	83.0	67.0	75.0	75.0	71.2	73.1	91.2	64.2	77.7	90.1	66.6	78.4
32	92.0	84.0	88.0	89.1	74.4	81.8	76.3	42.9	59.6	83.0	67.0	75.0	75.2	53.1	64.2	83.3	54.7	69.0	88.0	67.9	77.9
33	93.0	86.0	90.0	95.0	76.1	85.6	78.6	52.7	65.7	87.0	68.0	77.5	73.7	41.7	57.7	78.3	48.1	63.2	89.4	71.1	80.3
34	90.0	79.0	84.0	100.0	75.3	87.7	81.3	55.3	68.3	81.0	59.0	70.0	55.5	40.1	47.8	70.0	37.4	53.7	90.0	64.0	77.0
35	88.0	70.0	79.0	97.4	72.0	84.7	80.0	56.4	68.2	80.0	49.0	64.5	80.5	77.4	79.0	84.4	60.9	72.6	86.3	61.9	74.1
36	95.0	86.0	90.0	96.1	61.0	78.6	88.3	59.5	73.9	83.0	64.0	73.5	89.1	81.0	85.1	91.9	66.7	79.3	84.9	63.0	73.9
37	84.0	76.0	80.0	100.0	64.7	82.4				91.0	79.0	85.0	81.4	68.6	75.0	89.4	59.0	74.2	92.0	66.9	79.4
38	87.0	72.0	79.0	100.0	57.4	78.7				91.0	73.0	82.0	77.9	54.0	66.0	77.4	39.3	58.4	88.6	62.7	75.6
39	88.0	80.0	84.0	100.0	57.4	78.7				90.0	66.0	78.0	66.9	45.1	56.0	74.1	37.6	55.9	88.9	58.0	73.4
40	88.0	80.0	84.0	98.7	64.1	81.4				87.0	57.0	72.0	65.9	35.3	50.6	76.3	31.6	53.9	89.7	60.3	75.0
41	74.0	59.0	66.0	100.0	67.9	84.0				89.0	55.0	72.0	37.2	29.2	33.2	79.7	38.6	59.1	86.6	54.6	70.6
42	79.0	59.0	69.0	100.0	56.3	78.2				91.0	44.0	67.5	59.0	28.4	43.7	89.7	38.0	63.9	91.3	50.7	71.0
43	78.0	62.0	70.0	100.0	64.4	82.2				89.0	40.0	64.5	59.0	28.4	43.7	85.3	47.1	66.2	84.9	54.6	69.7
44	58.0	46.0	52.0	100.0	35.3	67.7				87.0	50.0	68.5	66.4	44.1	55.3	88.1	34.9	61.5	91.3	46.1	68.7

# Table MET- 1.3 (i): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) during crop growth period, Kharif 2014

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Table MET- 1.3 (j): Relative humidity (M = Morning, AN = Afternoon, AV = Average ;%) during crop growth period, Kharif 2014

Mot									North-Ea	ast Zone	9							
Week	F	aizaba	ł		Imphal		Bh	ubanes	war		Kalyani			Jorhat			Ranchi	
WEEK	М	AN	AV	М	AN	AV	М	AN	AV	Μ	AN	AV	М	AN	AV	М	AN	AV
26	64.9	52.0	77.5	87.4	74.0	80.7	92.0	72.0	82.0	95.0	78.7	86.9	94.0	72.0	83.0	83.0	65.4	74.2
27	78.5	68.4	88.7	78.3	74.1	76.2	93.0	79.0	86.0	96.7	90.0	93.4	95.0	75.0	85.0	85.9	74.4	80.2
28	74.9	66.2	83.5	75.4	66.6	71.0	92.0	79.0	85.5	95.0	78.1	86.6	93.0	79.0	86.0	82.1	68.3	75.2
29	82.0	75.0	89.1	85.3	70.9	78.1	95.0	90.0	92.5	96.6	88.7	92.6	94.0	75.0	85.0	82.4	72.0	77.2
30	74.2	62.0	86.5	80.6	70.4	75.5	91.0	77.0	84.0	94.6	77.1	85.9	93.0	76.0	85.0	82.9	74.0	78.5
31	75.0	64.5	85.5	73.9	61.6	67.8	95.0	86.0	90.5	95.0	78.1	86.6	92.0	77.0	85.0	82.4	73.6	78.0
32	76.2	66.7	85.7	83.6	67.4	75.5	92.0	77.0	84.5	92.6	74.0	83.3	93.0	75.0	84.0	81.9	73.3	77.6
33	74.1	62.4	85.8	86.9	78.3	82.6	93.0	77.0	85.0	97.1	84.1	90.6	95.0	86.0	91.0	83.4	73.4	78.4
34	66.5	52.0	81.1	87.6	75.9	81.8	94.0	70.0	82.0	94.3	75.1	84.7	96.0	83.0	90.0	82.1	72.1	77.1
35	72.5	63.5	81.7	83.4	69.1	76.3	97.0	89.0	93.0	96.1	75.9	86.0	93.0	72.0	83.0	83.9	71.4	77.7
36	75.2	66.4	84.0	83.6	62.0	72.8	96.0	81.0	88.5	95.4	79.7	87.6	95.0	80.0	88.0	82.0	73.0	77.5
37	79.9	71.8	88.0	85.4	65.0	75.2	94.0	79.0	86.5	93.0	72.0	82.5	94.0	79.0	87.0	82.3	73.7	78.0
38	75.5	63.2	81.7	93.4	70.1	81.8	95.0	81.0	88.0	94.4	85.0	89.7	96.0	85.0	91.0	81.4	71.7	76.6
39	70.3	59.1	81.5	93.0	78.7	85.9	93.0	60.0	76.5	94.0	70.6	82.3	95.0	79.0	87.0	84.6	72.0	78.3
40	74.1	63.0	85.2	91.3	59.4	75.4	93.0	63.0	78.0	88.3	67.1	77.7	96.0	71.0	84.0	80.9	71.7	76.3
41	75.5	64.1	87.0	88.9	65.4	77.2	92.0	74.0	83.0	92.3	77.4	84.9	95.0	75.0	85.0	81.4	71.4	76.4
42	72.7	61.0	84.5	92.0	66.7	79.4	96.0	62.0	79.0	87.3	62.9	75.1	94.0	77.0	86.0	81.1	70.9	76.0
43	69.9	59.4	80.4	90.7	53.6	72.2	94.0	62.0	78.0	83.7	69.0	76.4	95.0	72.0	84.0	81.1	68.9	75.0
44	68.3	55.0	81.7	90.3	70.9	80.6	90.0	51.0	70.5	83.7	59.7	71.7	95.0	67.0	81.0	81.6	57.6	69.6

Table MET- 1.3 (k): Relative humidity (M = Morning, AN = Afternoon, AV = Average ;%) during crop growth period, Kharif 2014

									Centra	l Zone								
Met. Week	Uru	ulikanch	nan		Anand			Rahuri			Raipur			Jabalpu	r		Jhansi	
WEEK	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV
26	98.4	93.1	79.6	77.0	42.0	59.5	66.0	35.0	50.5	78.0	50.0	64.0	89.0	75.0	82.0	73.0	43.0	58.0
27	93.8	84.7	66.4	76.0	45.0	60.5	72.0	52.0	62.0	72.0	44.0	58.0	93.0	81.0	87.0	74.0	43.0	58.5
28	96.7	90.4	76.9	84.0	55.0	69.5	73.0	52.0	62.5	92.0	72.0	82.0	95.0	79.0	87.0	67.0	40.0	53.5
29	98.6	96.1	84.6	95.0	75.0	85.0	72.0	64.0	68.0	95.0	88.0	91.5	93.0	84.0	88.5	91.0	81.0	86.0
30	98.3	95.9	85.0	98.0	90.0	94.0	76.0	63.0	69.5	95.0	82.0	88.5	93.0	78.0	85.5	92.0	77.0	84.5
31	97.3	92.4	80.4	99.0	84.0	91.5	75.0	68.0	71.5	95.0	86.0	90.5	95.0	80.0	87.5	93.0	72.0	82.5
32	96.0	85.7	68.9	95.0	79.0	87.0	72.0	57.0	64.5	91.0	71.0	81.0	95.0	80.0	87.5	93.0	83.0	88.0
33	95.3	84.1	61.9	94.0	73.0	83.5	70.0	50.0	60.0	91.0	70.0	80.5	96.0	83.0	89.5	88.0	60.0	74.0
34	91.1	91.5	60.7	91.0	65.0	78.0	79.0	51.0	65.0	92.0	73.0	82.5	94.0	81.0	87.5	86.0	46.0	66.0
35	98.1	89.1	51.7	97.0	72.0	84.5	81.0	72.0	76.5	91.0	76.0	83.5	92.0	64.0	78.0	89.0	68.0	78.5
36	94.6	76.7	50.4	97.0	84.0	90.5	75.0	66.0	70.5	94.0	83.0	88.5	89.0	63.0	76.0	94.0	74.0	84.0
37	98.4	88.1	57.0	97.0	83.0	90.0	71.0	57.0	64.0	95.0	79.0	87.0	80.0	62.0	71.0	92.0	75.0	83.5
38	95.0	84.9	62.6	97.0	66.0	81.5	71.0	51.0	61.0	94.0	68.0	81.0	90.0	57.0	73.5	87.0	55.0	71.0
39	98.0	84.4	57.1	93.0	56.0	74.5	70.0	41.0	55.5	93.0	57.0	75.0	95.0	77.0	86.0	83.0	43.0	63.0
40	90.7	74.8	49.7	86.0	46.0	66.0	70.0	40.0	55.0	91.0	57.0	74.0	93.0	72.0	82.5	84.0	41.0	62.5
41	95.6	75.9	44.7	93.0	39.0	66.0	64.0	33.0	48.5	89.0	66.0	77.5	95.0	50.0	72.5	87.0	44.0	65.5
42	96.4	71.4	37.0	100.0	40.0	70.0	72.0	43.0	57.5	91.0	56.0	73.5	94.0	60.0	77.0	84.0	40.0	62.0
43	94.4	70.2	42.7	89.0	43.0	66.0	72.0	57.0	64.5	92.0	52.0	72.0	91.0	36.0	63.5	87.0	32.0	59.5
44	97.3	74.1	43.1	88.0	37.0	62.5	56.0	36.0	46.0	94.0	37.0	65.5	93.0	36.0	64.5	85.0	32.0	58.5

Mat						So	outh Zon	e					
Week	V	'ellayani			Mandya		H	yderaba	d		Dharwa	ad	Coimbatore
week	М	AN	AV	М	AN	AV	М	AN	AV	М	AN	AV	М
26	92.7	79.1	85.9	89.5	39.5	64.5	71.1	48.3	59.7	82.0	57.6	69.8	87.0
27	90.9	79.1	85.0	88.6	37.4	63.0	81.6	48.7	65.2	84.3	70.6	77.4	83.0
28	92.9	80.4	86.7	88.5	41.5	65.0	83.1	64.1	73.6	89.1	87.0	88.1	77.0
29	90.4	76.7	83.6	86.4	51.9	69.2	68.7	68.7	68.7	94.0	87.6	90.8	76.0
30	91.6	73.6	82.6	89.2	49.8	69.5	65.6	64.9	65.3	93.1	81.6	87.4	75.0.
31	95.3	85.9	90.6	87.9	52.3	70.1	84.6	63.7	74.2	94.3	88.6	91.4	78.0
32	88.6	77.3	83.0	88.9	54.0	71.5	83.1	61.0	72.1	91.0	85.7	88.4	84.0
33	89.7	79.6	84.7	91.9	52.8	72.4	81.4	53.0	67.2	88.7	78.4	83.6	91.0
34	94.0	80.9	87.5	89.1	51.2	70.2	88.6	58.6	73.6	90.3	73.1	81.7	860
35	87.6	84.1	85.9	90.9	57.4	74.2	92.6	80.7	86.7	93.6	91.1	92.4	780
36	96.1	79.3	87.7	88.5	58.2	73.4	86.0	66.4	76.2	89.6	82.0	85.8	81.0
37	89.3	74.1	81.7	91.3	51.9	71.6	87.0	62.0	74.5	88.7	76.0	82.4	85.0
38	85.0	75.6	80.3	89.0	53.5	71.3	90.0	63.0	76.5	85.6	72.1	81.5	86.0
39	93.3	84.9	89.1	91.3	59.1	75.2	86.0	51.0	68.5	84.7	68.1	76.4	91.0
40	95.4	73.6	84.5	92.5	59.2	75.9	80.0	45.0	62.5	80.0	72.6	76.3	92.0
41	73.6	85.9	79.8	90.7	62.1	76.4	78.0	49.0	63.5	88.3	77.0	82.6	92.0
42	82.4	92.4	87.4	91.9	70.7	81.3	85.0	47.0	66.0	73.6	53.3	63.4	94.0
43	80.9	93.6	87.3	91.1	67.2	79.2	89.0	68.0	78.5	87.1	69.1	78.1	94.0
44	86.1	85.1	85.6	90.4	53.6	72.0	80.0	24.0	52.0	65.4	42.9	54.1	92.0

Table MET- 1.3 (I): Relative humidity (M = Morning, AN = Afternoon, AV = Average ;%) during crop growth period, Kharif 2014

Table MET -1.4	(m): Sunshine	at AICRP-FC trial	locations during cr	rop growth	period, Kharif 2014
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Met.		Hill Zone			North West Zo	ne
Week	Palampur	Almora	Srinagar	Ludhiana	Bikaner	Hisar
26	6.2	5.3	7.9	7.5	6.4	6.5
27	6.8	4.2	7.1	4.8	6.6	5.2
28	5.1	2.2	8.7	8.5	11.4	4.8
29	2.4	0.9	7.4	9.4	5.5	4.7
30	0.6	2.4	7.8	6.0	5.6	3.8
31	3.5	5.3	8.9	1.7	6.7	6.5
32	3.8	5.1	9.4	6.2	8.3	5.3
33	4.7	4.6	5.9	6.4	9.0	8.6
34	6.8	8.0	7.8	8.5	10.2	10.4
35	5.9	6.5	7.7	10.1	6.2	6.3
36	2.1	5.4	5.4	4.4	5.9	5.4
37	7.9	4.5		3.7	8.7	7.0
38	8.6	6.1		7.1	10.2	10.0
39	5.4	4.9		9.0	10.2	9.9
40	4.6	5.7		9.5	10.1	9.5
41	8.6	5.2		2.9	9.9	9.0
42	8.1	5.2		8.3	8.7	8.0
43	8.1	7.6		8.7	8.7	7.0
44	8.1	8.5		3.3	5.4	6.4

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Mat			North East	Zone			Centra	al Zone				South	Zone	
Week	Faiza	Imp	Bhuban	Kaly	Jorh	Ran	Kan	Ana	Raip	Jabal	Jhan	Man	Hydera	Coimba
week	bad	hal	eswar	ani	at	chi	pur	nd	ur	pur	si	dya	bad	tore
26	3.9	3.1	2.6	2.1	3.8	6.3	8.4	9.5	3.3	3.9	9.0	7.1	1.5	7.6
27	5.2	4.0	3.5	1.7	5.0	2.7	5.7	8.7	5.3	2.9	5.6	4.4	5.3	6.4
28	3.6	3.2	3.8	6.4	4.3	6.9	6.6	6.5	2.0	3.0	7.4	2.6	3.1	2.4
29	5.1	1.0	0.0	2.4	4.1	2.1	3.3	2.5	0.5	3.0	1.6	5.4	1.0	4.2
30	1.2	4.0	3.0	4.0	5.7	5.3	4.4	1.6	1.6	3.5	3.5	5.6	3.8	4.5
31	3.9	4.0	2.0	5.7	6.2	5.0	5.2	2.2	1.9	3.1	5.4	2.6	2.7	3.4
32	5.2	3.7	4.6	5.7	5.5	1.8	4.1	4.6	2.8	3.0	5.1	1.7	7.0	3.1
33	4.7	2.4	3.9	2.7	1.3	5.8	5.7	5.2	5.5	3.1	6.2	5.5	6.4	5.8
34	5.2	3.0	5.8	3.8	2.2	7.1	9.5	5.9	3.4	4.1	8.2	6.1	6.8	7.4
35	7.8	4.6	4.5	5.6	5.7	6.1	5.9	4.3	3.6	7.2	6.6	2.2	1.5	4.0
36	6.5	5.6	2.4	6.6	4.5	6.0	5.1	3.1	0.5	7.9	4.7	3.3	5.1	6.3
37	6.1	5.4	5.7	7.9	4.2	8.0	4.4	2.5	3.4	3.5	6.6	7.6	5.8	8.5
38	1.7	3.3	2.9	3.5	2.5	6.7	7.9	7.9	4.4	5.9	9.8	4.4	4.2	8.0
39	7.0	3.6	6.8	7.9	2.3	8.2	9.6	8.3	8.3	6.6	10.1	6.7	6.4	7.8
40	7.1	8.3	7.1	7.8	7.6	8.8	7.4	9.2	8.3	5.5	9.6	5.9	7.6	7.0
41	6.0	6.6	5.0	5.1	5.5	6.3	7.6	9.4	4.9	8.3	8.7	4.5	4.3	5.7
42	4.2	5.7	7.3	9.0	5.3	8.3	8.5	9.6	8.4	6.8	8.8	5.0	8.2	4.2
43	5.5	8.6	5.9	5.8	6.8	4.7	8.1	7.4	5.9	8.3	8.9	3.3	4.0	4.6
44	5.4	5.2	6.3	8.0	9.6	8.6	4.1	7.2	8.0	7.8	7.7	5.1	8.3	3.3

Table MET -1.4 (n): Sunshine at AICRP-FC trial locations during crop growth period, Kharif 2014

Met. Week		Met. Week	
26	June 25-July 01,2014	36	Sep. 03-Sep. 09, 2014
27	July 02-July 08, 2014	37	Sep. 10-Sep. 16, 2014
28	July 09-July 15, 2014	38	Sep. 17-Sep. 23, 2014
29	July 16-July 22, 2014	39	Sep. 24-Sep. 30 2014
30	July 23-July 29, 2014	40	Oct. 01-Oct. 07, 2014
31	July 30-Aug. 05, 2014	41	Oct. 08-Oct. 14, 2014
32	Aug. 06-Aug 12, 2014	42	Oct.15-Oct. 21, 2014
33	Aug. 13-Aug. 19, 2014	43	Oct. 22-Oct.28, 2014
34	Aug. 20-Aug. 26, 2014	44	Oct. 29-Nov. 04, 2014
35	Aug. 27-Sep. 02, 2014		

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# APPENDIX-IV: FORAGE CROPS BREEDING TRIALS AT A GLANCE: (KHARIF-2014)

		Trial-1	Trial-2	Trial-3	Trial-4	Trial5	Trial6	Trial7	Trial -8	Trial-9	Trial.10	Trial11	Trial-12	Trial -14	Trial -15	Trial -16	Total
Zone	Location	IVTM	AVTM-1	AVTHM-2	AVTHM-2 (Seed)	IVTPM	AVTPM-1	AVTPM-2	AVTPM-2 (Seed)	іутс	AVTC-1	IVT Rice bean	VTBN- 2013 (lInd Year)	VT Dichanthium- 2013 (IInd Year)	VT Cenchrus ciliaris-2013 (IInd Year)	VT Clitoria- 2013 (lInd Year)	
HZ																	
1	Palampur	DR	DR	DR	DR					DR	DR		DNR				6/7
2	Srinagar	DNR	DNR	DNR	DNR					DNR	DNR						0/6
3	Almora	DR	DR	DR	DNR								DNR				3/5
NWZ																	
4	Bikaner					DR	DR			DR			DR	DR	DR	DR	7/7
5	Jalore	DR	DR			DR	DR			DR							5/5
6	Hisar	DR	DR	DR	DR	DR	DR			DR			DR	DNR	DNR	DR	9/11
7	Ludhiana	DR	DR	DR	DNR	DR	DR			DR			DR	DR	DR	DR	10/11
8	Pantnagar	DNR	DR							DR							2/3
9	Udipur	DR	DR	DR	DR					DR							5/5
10	Meerut					DR				DR							2/2
CZ																	
11	Jhansi	DR	DR			DNR	DNR			DR			DNR	DR	DR	DR	6/9
12	Rahuri	DR	DR			DR	DR			DR			DR	DR	DR	DR	9/9
13	Urulikanchan	DR	DR			DR	DR			DR			DR	DR	DR	DR	9/9
14	Kanpur	<b>D</b> D					55	-		DR		-		00		00	1/1
15	Anand					DR	DR			DR			DR	DR			9/9
10	Japaipur		DR			DR	DR			-			DR	DR	DNR	DR	8/9
17	Raipui Dalabar	DK	DK										ΠP				2/2
10	Faiyilai Jampagar(Dhari)					DP	DP					DK	DR				2/2
NE7	Jannagar(Dhan)					DI	DIX										2/2
20	lorhat	ΠP	DP	DP	DP				DNP	DP	DP	DP	DP				8/11
20	Kalvani			DIX	DIX		DNR	DR	DR	DR	DR	DR	DIX	DNR			5/7
22	Bhubaneswar	DR	DR	DNR	DNR	DR	DR	DR	DR	DR	DR	DR	DR	DNR			10/13
23	Ranchi	DR	DR	DR	DR	DR	DR	DR	DNR	DR	DR	DR	DNR	DNR			11/13
24	Pusa					DR	DR	DR	DNR			DR					4/5
25	Faizabad	DNR	DNR	DNR	DNR	DNR	DNR	DNR	DNR	DR	DR						2/10
26	CAU Imphal	1					DNR	DNR	DNR			DR					1/4
27	Shillong	1										DNR					0/1
SZ	-																
28	Hyderabad	DR				DR	DR			DR	DR		DNR	DNR	DNR		5/8
29	Mandya	DR				DR	DR			DR	DR		DR	DNR	DNR		6/8
30	Coimbatore	DR				DR	DR			DR	DR		DR	DR	DR		8/8
31	Dharwad									DR	DR		DR	DNR			3/4
32	Vellayani	DR								DR	DR	DR					4/4
33	Raichur	DR				DR				DR							3/3
34	Karaikkal						DR			DR	DR						3/3
Total Loc	cation	20/23	16/18	7/10	5/10	17/19	16/21	4/7	2/7	25/26	12/13	10/11	13/18	8/15	7/11	8/8	171/217

DR=Data Reporting, DNR=Data not reporting, Data Reporting (%) =171/217=78.80

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## APPENDIX V: FORAGE CROP PRODUCTION TRIALS AT A GLANCE: (KHARIF-2014)

Location/ Trial	PS-11- AST -1	K-12- AST -1	PS-12- AST -1	CS-12- AST-1	CS- 13- AST -1	CS- 13- AST -2	PS- 14- AST -1	CS-13- AST-3	PS- 11- AST -2	K-12- AST -2	K-12- AST -3	PS- 12- AST -3	K-12- AST -4	K-12- AST -5	PS- 12- AST- 2	CS- 13- AST -4	K- 13- AST -1	PS- 13- AST -1	CS- 14- AST-1	K-14- AST -1(NT)	K- 14- AST -2	K- 14- AST -3	CS- 14- AST- 2	K-14- AST -4	PS- 14- AST-2	Total (DR&TC)/ Allotted
																					(NT)	(NT)				
												H	IILL ZO	ONE												
Palampur	DR																				DR					2/2
Srinagar													TF	TF							TF					0/3
				-								NORT	HWES	ST ZON	IE				_							-
Hisar							TC														DR					2/2
Ludhiana	DR						TC									DR	DR	DR			DR					6/6
Bikaner		DR			TC		TC																			3/3
Pantnagar																										
												NORT	TH EAS	T ZON	E											
Faizabad																				TF	TF					0/2
Ranchi			TNC			TC														DR	DR	TC				4/5
Kalyani			DR																	DR						2/2
Bhubaneswar			DR	TC		TC														DR	DR					5/5
Jorhat			DR	TC				TC	DR											TF	TF					4/6
Imphal										DR	DR									TF						2/3
Shillong																										
												CEN	ITRAL	ZONE												
Jabalpur			DR			TC																				2/2
Rahuri	DR				TC																					2/2
Urulikanchan		DR			TC																					2/2
Anand	DR	DR			TC																					3/3
Raipur							TC	TC											TC			TC	TC	TNC		5/6
												SC	DUTH Z	ONE												
Hyderabad	DR	DR																								2/2
Mandya		DR										DR														2/2
Coimbatore															TC											1/1
Vellayani																									TC	1/1
Dharwad		DR																								1/1
Total (DR & TC)/ Alloted	/ 5/5	6/6	4/5	2/2	4/4	3/3	4/4	2/2	1/1	1/1	1/1	1/1	0/1	0/1	1/1	1/1	1/1	1/1	1/1	3/6	5/8	2/2	1/1	0/1	1/1	51 /61

Abbreviations: DR = Data reported, TC = Trial continued and data to be reported after completion of the sequence, TNC = Trial not conducted, TF = Trial failed, Success index (%) = 51/61\* 100 = 83.6%

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Locations /Trial	PPT-1	PPT-2	PPT-14	PPT-15	PPT-16	PPT-17	Total	Success index (%)
Bhubaneswar	A (DR)	A (DR)	A (DR)	A (DR)			4/4	100 (%)
Hyderabad	A (DR)	A (DR)					2/2	100 (%)
Jhansi	A (DR)	A (DR)	A (DR)	A (DR)		A (DR)	5/5	100 (%)
Palampur	A (DR)	A (DR)	A (DR)	A (DR)			4/4	100 (%)
Rahuri	A (DR)	A (DR)			A (DR)	A (DR)	4/4	100 (%)
Ludhiana	A (DR)	A (DR)	A (DR)	A (DR)		A (DR)	5/5	100 (%)

# APPENDIX-VI: FORAGE CROP PROTECTION TRIAL AT A GLANCE (KHARIF-2014)

Abbreviations A=Trial Allotted, DR=Trial Conducted and Data reported

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