



भारत  
ICAR

# **ANNUAL REPORT**

**(2011-12)**

**Part-I : Kharif - 2011**



## **ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS**

(Indian Council of Agricultural Research)

**IGFRI**

**Jhansi-284 003**

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## **PREFACE**

*The Annual Report (2011-12), Part I – Kharif 2011 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 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 Centres. They have been successful in conduct of trials and activities as per the technical programme and meeting the targets fixed for Kharif 2011. 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 linked to crop growth etc. The breeder seed produced under the DAC indent is also compiled and reported.*

*Results have been presented in the form of chapters. The results of forage crop improvement trials is given in Chapter 1, which includes multi- locations test performance of newly developed genetic material in annual and perennial forage species. The findings on crop production studies are presented in Chapter-2 which includes: optimization of nitrogen for sorghum in different cropping system, forage production potential of multi cut sorghum with forage legumes, location specific research on weed management and agronomical trial for AVT-2 entries of cowpea, and Setaria. Chapter-3 deals with different aspects of plant protection in selected forage species, viz., sorghum, maize, pearl millet, cowpea, soybean, and rice bean and generation of technologies for pest management in the selected crops. Other chapters include details of in house breeding activities, weather details 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 is gratefully acknowledged.*

*My colleagues at Project Coordinating unit, Dr. R.V. Kumar, PS & PI (Plant Breeding) and Dr. S.R.Kantwa, Sr. Scientist (Agronomy) and technical officers, Shri O.N. Arya, Shri S.K. Khare and Shri H. K. Agarwal provided support in distribution of seed/planting material for the trials; analysis and tabulation of data of trials conducted at all the locations. Forage Crop Protection trials have been conducted and coordinated by Shri R.B. Bhaskar. Their contributions are thankfully acknowledged.*

*The efforts of Shri S.K. Khare, Shri, V.K. Paliwal and Shri, Kamlesh in computer-based work of the Report and those of Shri Dayal and Shri Amar Singh in Xeroxing and arranging of this Report are sincerely acknowledged.*

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*Meeting all the targeted activities would not have been possible but for the active leadership support and encouragement received from Dr. S. Ayyappan, Secretary DARE & DG ICAR; Dr. Swapan K Datta, DDG(CS) and Dr R. P. Dua, ADG (FFC). Each and every one in the Team at AICRP on Forage Crops gratefully acknowledges this support.*

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Place: Jhansi

S. A. Faruqui  
Project Coordinator

## EXECUTIVE SUMMARY

The present report depicts 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 2011 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 as well as incidence of pest and diseases with weather parameters at different sites during crop period.

### A. FORAGE CROP IMPROVEMENT

In Kharif 2011, sixteen breeding trials of four annual and six perennial forage species including test entries with their respective national and zonal checks were conducted at 42 centres located in five zones. The forage species evaluated were Pearl millet, Cowpea, Rice bean and Soybean in annuals and Guinea grass, *Cenchrus ciliaris*, Bajra Napier hybrid, *Setaria anceps*, *Lasiurus indicus* and *Cenchrus setigerus* in perennials. One trials in annuals i.e. Cowpwa and four in perennials i.e. one each in Guinea grass, *Cenchrus ciliaris*, Bajra Napier hybrid and *Setaria anceps* has completed its final year of evaluation and other trials are continued.

These forage trials were classified into three groups viz., Initial Varietal Trial (IVT), Advanced Varietal Trial Stage-1 (AVT-1) and Advanced Varietal Trial Stage-2 (AVT-2). The summarized results of different cultivated annual and perennial forage evaluation trials are as below:

#### (a). ANNUAL FORAGES

##### PEARL MILLET

IVT in forage pearl millet comprised four entries and three national checks viz., Raj Bajra chari-2, Giant Bajra and Avika Bajra Chari (AVKB-19) and results revealed that for the character green forage yield entries RBB-2 (9.7%) and AFB-6 (2.0%) in North East Zone proved their superiority over national check whereas in other zones as well at national level national check performed better in comparison to other entries. For the character dry matter yield (q/ha), entry AFB-6 (3.4%) in North West Zone, entries RBB-2 (9.7%), AFB-6 (3.2%) and AFB-7 (3.0%) in North East Zone and entries RBB-2 (35.30%), AFB-6 (12.54%), NDFB-929 (3.98%) and AFB-7 (0.96%) in South Zone proved superiority. Whereas at national level, entries RBB-2 (5.0%) and AFB-6 (3.9%) exhibited their superiority over best national check Giant Bajra

Results of AVT-1 comprising three entries and two national checks revealed that for green forage yield (q/ha), entry PAC-981 proved good performer in North-West Zone with 65.2% superiority, 2.0% in North-East Zone, 18.4% in Central Zone and 8.5% superiority in South Zone. Other entry i.e. RBB-1 (4.2%) proved superiority in only North West Zone. At national level too, entry PAC-981 (28.5%) performed better than best national check.

Similarly for dry matter yield (q/ha), entries PAC-981 (57.9%) and RBB-1 (12.7%) in North West Zone, PAC-981 (8.2%) and NDFB-904 (6.4%) in North East Zone and PAC-981 with 20.2% in Central Zone and 16.5% in South Zone proved their superiority over best national check. Even at national level, entry PAC-981 (32.9%) was adjudged best performer.

## **COWPEA**

In IVT with six entries along with two national checks *i.e.*, Bundel Lobia-1 and UPC-5286 and three zonal checks *i.e.*, Bundel Lobia-2, UPC-622 and UPC-9202, for green forage yield (q/ha), entry UPC-1101 (14.5%) in North West Zone, UPC-1102 (4.1%) in Central Zone and Culture-1 (0.4%) in South Zone exhibited superiority over best national/zonal check. At national level entries UPC-1101 and UPC-1102 with 2.3 percent superiority was ranked best performer. For the character dry matter yield (q/ha), entries UPC-1101 (22.7%) and UPC-1102 (3.3%) in North West Zone, entry UPC-1102 (4.1%) in Central Zone and entries Culture-1 (16.8%), UPC-1102 (1.8%) and UPC-1101 (1.3%) in South Zone exhibited their superiority with respect to check. Coming to the national level, entries UPC-1102 (5.5%) and UPC-1101 (5.3%) proved their superiority over best check UPC-5286 for this character.

In AVT-1, for the character green forage yield (q/ha), entries RR-3 (23.0%) and MFC-09-1 (14.9%) in Hill Zone, MFC-09-1 (1.1%) in North-West Zone, RR-3 (1.9%) and MFC-09-1 (3.9%) in North-East Zone and MFC-09-1 (2.3 and 18.8%) in Central and South Zone respectively, exhibited their superiority whereas at national level entry MFC-09-1 (5.6%) ranked first for this character. Similarly for dry matter yield (q/ha) entry MFC-09-1 proved superiority with 45.1 percent in Hill Zone, 3.1 percent in North East Zone and 14.0 percent in South Zone. Another entry RR-3 exhibited superiority with 23.1 and 10.2 percent in Hill and North East Zone, respectively. Even at national level, entry MFC-09-1 (3.1%) recorded superiority over best national check.

In AVT-2, for green forage yield (q/ha) entry MFC-08-14 proved superiority in North East Zone by 0.9 percent, 14.8 percent in South Zone and at all India level it was 11.4 percent superior than best national check. On the other hand entry IL-1177 was found superior by 1.6 percent in North East Zone only. Similarly for dry matter yield (q/ha), entry MFC-08-14 (11.5%) and IL-1177 (7.7%) in North East Zone and MFC-08-14 (15.7%) in South Zone proved superiority. At national level too, entry MFC-08-14 (16.5%) exhibited superiority over national check.

Results obtained for varietal trial in forage cowpea for seed with two entries namely IL-1177 and MFC-08-14 clearly revealed that with respect to seed yield (q/ha), in North East Zone entry IL-1177 (3.4%) and in South Zone, entry MFC-08-14 (10.6%) established its superiority over national/zonal check. Coming to the national level, here entry MFC-08-14 with 6.92 (q/ha) seed yield gained 6.0 percent superiority over national check Bundel Lobia-1 (6.53 q/ha).



## **RICE BEAN**

Results of the IVT comprising five entries namely KRB-26, JRBJ-06-1, JRB-15, BFRB-16 and JRB-16 along with three national checks i.e. Bidhan-1, Bidhan-2 and RBL-6 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.

In AVT-1, three entries namely JRBJ-05-4, JRB-13 and BFRB-15 along with national check Bidhan-1 was evaluated at eight locations across the country. For the character green forage yield (q/ha), entries BFRB-15 (6.7%), JRBJ-05-4 (0.2%) and for dry matter yield (q/ha), entries BFRB-15 (12.7%), JRBJ-05-4 (5.6%) and JRB-13 (0.6%) proved their superiority over national check Bidhan-1.

## **SOYBEAN**

In AVT-2, four entries namely JSO7-21-7, ISO7-24-8, JSO7-24-1 and JSO7-24-13 were evaluated at six locations across the country. As there is no established check for forage soybean, performance of entries is compared over general mean for that particular character. Results revealed that for green forage yield (q/ha), entries JSO7-24-13 (9.1%) and JSO7-21-7 (7.5%) exhibited their superiority over general mean. Similarly was the case for dry matter yield (q/ha) where JSO7-21-7 (9.2%) and JSO7-24-13 (3.6%) established their superiority.

## **(b). PERENNIAL FORAGES**

### **SEWAN GRASS**

A varietal trial in sewan comprising seven entries was established in Kharif-2010 at five locations of North-West Zone. This is the second year of evaluation and trial will be continued.

### **GUINEA GRASS**

In Guinea grass, a total of two trials were undertaken in which one was established in 2008 and second one in 2009. The trial established in 2009 will be continued and trial established in 2008 has completed its cycle and final result is presented. This trial comprised seven entries and three checks namely PGG-616, Riversdale and Bundel Guinea-1. After compiling the data over the years (2009-2011), results revealed that for the character green forage yield (q/ha), entries JHGG-08-1 (17.6%) and RSDGG-2 (5.4%) and for dry matter yield entries JHGG-08-1 (13.6%) and TNGG-061 (12.4%) exhibited their superiority over best national check.

### ***Cenchrus ciliaris***

A varietal evaluation trial comprising four entries and two national checks namely IGFRI-3108 and CAZRI-75 was established in Kharif-2008. This was the fourth and final year of evaluation. After compiling the data over the years (2009-11), results clearly indicated that for green forage as well as dry matter yield (q/ha), national check CAZRI-75 established its superiority over all the test entries.

## BAJRA X NAPIER HYBRID

In Bajra x Napier hybrid, a varietal evaluation trial comprising nine entries and three national checks namely NB-21, CO-3 and PNB-233 was established during Kharif-2008. This is being the fourth and final year of evaluation. Data compiled over the years (2009-11), results clearly revealed that for the character green forage yield (q/ha), entries TNCN-074 (5.8%), BNH-3 (5.7%), and BNH-10 (1.5%) and entries BNH-3 (5.2%), TNCN-074 (5.0%) and BNH-10 (0.08%) for dry matter yield (q/ha) performed their superiority with respect to best national check.

## SETARIA

In Kharif-2008, a varietal trial in *Setaria anceps* grass comprising five entries and one check viz., S-92 was established in Himalayan hill region. Out of five test entries, data have been reported for four test entries i.e. S-18, S-20, S-21 and PSS-1 alongwith check S-92. Data compiled over the years (2009-11), clearly reveals that all testing entries exhibited their superiority with respect to check variety S-92 for green forage and dry matter yield (q/ha). Out of four entries, entries S-18 (48.3%), S-20 (40.5%), PSS-1 (31.7%) and S-21 (28.9%) for green forage yield and entries S-18 (45.4%), S-20 (33.3%), S-21 (27.5%) and PSS-1 (25.7%) for dry matter yield exhibited their superiority over check variety S-92.

## *Cenchrus setigerus*

In *Cenchrus setigerus*, a varietal evaluation trial comprising seven entries and one check variety namely CAZRI-76 was established in Kharif-2010. Crop is perennial in nature and this was the second year of evaluation and evaluation of trial will be continued further.

## B. FORAGE CROP PRODUCTION

In forage crop production programme during *Kharif* 2011, total of 13 trials for coordinated and location specific purpose were conducted at 21 sites under AICRP on forages crops. In forage crop production programme major areas of research included: Resource conservation techniques on forage production, nutrient management in different cropping system, forage crop production with intercrop legumes under varying seed rates, forage production with waste water under varied nutrient levels, tillage and nutrient management in food-fodder system, quality of BN hybrid under different growing environment and N levels, location specific research for management of sodic soils with amendments, weed management in sorghum and testing of new genotypes under different management for variety development. The summarized results of forage crop production programme during Kharif 2011 are as given below:

Experiment (AST-2) conducted for optimization of nitrogen for sorghum in different cropping system and its results revealed that adopting of berseem-sorghum cropping system recorded significantly highest sorghum fodder equivalent yield (2784 q/ha) and fetched highest net monetary returns of Rs.80163/ha followed by wheat-cowpea-sorghum and wheat-fallow-sorghum (for SEY). At Pantnagar, the green fodder yield and crude protein

yields and net monetary returns of sorghum was not influenced by cropping systems but the highest GFY (302.8 q/ha) and net monetary returns (₹3715/ha) of sorghum was recorded in sorghum-wheat cropping system. At Hisar, the highest green fodder yield (609.7 q/ha) and net monetary returns (₹24060/ha) of sorghum was recorded in sorghum-wheat cropping system. The application of 125% of recommended dose of nitrogen to sorghum recorded higher GFY and DMY and fetched highest monetary returns over its lower levels at these locations.

Under AST-3 experiment, the fodder yield of multi-cut sorghum with forage legumes (cowpea and guar/rice bean) was highest than sole sorghum at Ludhiana, Bikaner, Palampur and Pantnagar. At Ludhiana, planting of sorghum + 100% cowpea seed rate intercropping system recorded significantly highest green fodder yield (766.2 q/ha) over sole sorghum (678.2 q/ha). However, it remained at par with rest of the intercropping systems (sorghum + cowpea/guar). At Bikaner, sorghum + 100% guar SR intercropping system realized highest total green fodder (829.6 q/ha) and dry matter yields (119.33 q/ha) over rest of the intercropping systems and sole sorghum. At Pantnagar, sorghum + 50% cowpea SR recorded highest GFY (428.2 q/ha) and fetched maximum net monetary returns (₹12389/ha) and benefit cost ratio (0.93) over rest of the intercropping systems and sorghum sole. At Palampur, planting of sorghum + 75% ricebean SR intercropping system recorded significantly highest total GFY (476.31 q/ha), DMY (100.51 q/ha) and fetched highest net monetary returns (₹53173/ha), benefit cost ratio (5.48) and land equivalent ratio (1.77) over rest of the treatments.

At Ludhiana, a field experiment (AST-10) was conducted to evaluate the herbicides for the control of *Acrachne racemosa* weed in fodder sorghum and results revealed that weed was effectively controlled with all the herbicide treatments. The dry weight of weeds decreased significantly with herbicides (0.31 to 1.32 q/ha) than control (2.27 q/ha). The highest fodder yield (645.0 q/ha) was realized with pre emergence application of atrazine @ 0.75 kg /ha<sup>-1</sup> + stomp @ 2.5 l/ha which was significantly superior over rest of the treatments but it remained at par with atrazine 1.0 kg/ha<sup>-1</sup> + stomp 2.5 l /ha (618.3 q/ha). The combination of atrazine @ 0.75 or 1.0 kg/ha + lasso 2.5 l/ha or lasso alone @ 2.5 l/ha herbicides had toxic effect on the crop.

An AVT based trial (AST-12) was conducted at Palampur to findout the effect of nitrogen levels on forage yield of promising entries of *Setaria* grass. The entry S-20 recorded significantly highest green forage (252.36 q/ha), dry fodder (77.55 q/ha) and crude protein yields (7.52 q/ha) over rest of the entries. The growth parameters, yields and quality (only upto 80 kg N/ha) increased consistently with increasing levels of nitrogen upto 120 kg N/ha.

An AVT based cowpea trial (AST-13) was conducted at 8 locations to findout the response of promising entries of cowpea with supplementation of different doses of

phosphorus. On over all mean basis, Zonal check entry UPC-622 recorded highest GFY, DFY and crude protein yield over rest of the entries. Among all entries none of the testing entry was found superior over national or zonal checks for these parameters. The influence of phosphorus on GFY, DFY and CPY was linear upto the highest tested rate of P application (90 kg P<sub>2</sub>O<sub>5</sub>/ha).

### C. FORAGE CROP PROTECTION

Forage crop Protection trial in major Kharif forages included pest occurrence, evaluation of breeding material to pest and diseases resistance and pest management. These were conducted at Anand, Bhubneshwar, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri centres.

Monitoring of diseases, insect pest and nematodes in Sorghum, Pearl Millet, Maize and Cowpea revealed that 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. Their spread and development was favoured by high humidity 80-95% and maximum temperature ranged 30-35°C. At Ludhiana, grey leaf spot (*Cercospora sorghi*) predominated and progressed steadily under RH (85%) temperature (28°C) and reached to maximum diseases incidences (88.4%) in the first week of November. Incidences of zonate leaf spot (*Gleocercospora sorghi*) were also recorded (52%) on sorghum var. SL-44. At Bhubaneswar and Palampur, leaf spot and leaf blight incidences occurred in mild form (3.4 and 4.0%) respectively. Among the insect pest shoot fly (*Atherigona aproximata*) and aphid (*Rhopalosiphum maidis*) were recorded at Bhubaneswar, Jhansi and Rahuri. The natural enemy of aphid ladybird beetle and *Chrysopa cornea* were also recorded at Rahuri. In Maize and Pearl Millet shoot fly and aphid among the insect and leaf blight diseases were predominating at Bhubaneswar, Jhansi, Ludhiana, Palampur and Rahuri.

In Cowpea root rot (*Rhizoctonia spp.*) disease incidences 0-40% were recorded at Jhansi in different germplasm lines under evaluation. Other diseases like Anthracnose (*Colletotricum lindimuthianum*), leaf spot (*Cercospora cruenta*), bacterial blight (*Xanthomonas campestris pv. vignicola*) and mosaic (*Cowpea mosaic virus*) were also recorded with varying degree of incidences at Jhansi. At Bhubaneswar, yellow mosaic and leaf spot with 3.6 and 2.8 grade in 1-5 scale were recorded throughout the crop season. Root rot occurred late in the season with 20.30% diseases intensity. At Palampur, wilt/root rot (*Fusarium/Rhizoctonia spp.*) were severe (15-45%) during the month of July when high humidity (>85%) prevailed. Leaf spot and blight (*Ascochyta and Phyllosticta sp.*) were other major diseases appeared in cowpea. Flea beetle infestation (34%) and aphid population were observed throughout the crop season at Hyderabad. Moderate infestation of aphid and jassid (3-7.6/ plant) were recorded during second week of August at Rahuri.



In trial on evaluation of varietal resistance the result revealed that cowpea entry UPC-1101 showed multiple resistance to pest and diseases at different locations. In AVT entries UPC-622 and MFC-09-1 showed resistance to nematode and aphid respectively at Jhansi and Rahuri centers. In Pearl Millet IVT and AVT entries showed resistance to downey mildew at Hisar and Ludhiana. AVT entry NDFB-904 was resistance to leaf spot (*Pyricularia grisea*). Rice bean entries KRB-26 and BFRB-16 showed resistance to leaf blight and yellow mosaic virus at Bhubaneswar and Jhansi. AVT entry JRB-13 showed resistance to leaf blight at Bhubaneswar and JRBJ-05 to yellow mosaic and nematode at Jhansi.

In the trial on integrated management of diseases fodder maize revealed that all the treatments provided superior control of leaf blight at Ludhiana and Palampur. Whoever, T<sub>4</sub> (Seed treatment with vitavax @ 2g/kg seed + mancozeb spray @ 0.25% provided maximum diseases control 42.34 and 85.71% respectively at both locations.

In trial on management of shoot fly in forage sorghum the application of imidacloprid as foliar spray @ 0.3ml/L at 10 days after showing provided maximum reduction (>50%) in shoot fly incidence and considerable increase in GFY and DMY at Anand, Hyderabad and Jhansi.

A location specific trial on management of root rot of cowpea was conducted as Bhubaneswar the results revealed that seed treatment with Trichoderma viride @ 5g/kg seed + FYM @ 2t/ha provided minimum diseases incidences (13%) against untreated control (24.76%). GFY, DMY and Net monetary return/yr/ha were also significantly increased over untreated control.

A trial on evaluation of quality parameter of cowpea as influenced by the incidences of pest and diseases was conducted at Anand, Hyderabad, Ludhiana, Palampur and Rahuri centers. The result revealed that there was increase in quality parameters in protected crop over the unprotected.

#### **D. BREEDER SEED PRODUCTION**

The indent for breeder seed production in Kharif-2011 was received from DAC, GOI for 31 varieties in five major forage crops viz., Maize, Cowpea, Pearl millet, Sorghum and Ricebean. In comparison to earlier years Kharif indent; it was almost more than double for this season. The allocation of total quantity of breeder seed (360.57q) as per indent was made to twelve breeder seed producing centres of the different SAUs/ICAR/NGO institutes. Among quantity indented the maximum was for Sorghum i.e. 234.50 q (65.03%) followed by Maize (74.87q-20.76%) and Cowpea (42.65q-11.83%). The breeder seed production report (BSP-IV) received from different producing centres clearly indicated that in crops such as Maize, Pearl millet and Rice bean, the breeder seed production was either higher or equal with respect to the indented quantity. Whereas in the crops like Sorghum and Cowpea, the breeder seed production was less than the indented quantity. Coming to the crop wise scenario, as compared to indent in Maize (74.87q), the actual production was 76.60q

(1.73q surplus), in Pearl millet against indent of 5.55q, production was 6.30q (0.75q surplus) and in Rice bean indent and production was 3.00q. But the scenerio in crops like Sorghum and Cowpea was not very good. Against the indent of 234.50q in Sorghum, the production was only 52.51q that was around 77 percent less against the allocation. Similarly in Cowpea, against the indent of 42.65q, the production was only 12.10q which was around 72 percent less than the indent. The over all breeder seed production was 150.51q against the indent of 360.57q which was 210.06q less or around 58 percent less the quantity indented and allocated.

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

Zone	Coordinated Centers				Testing Location		
	Sl. No.	Location	Establishment Year	State	Sl. No.	Location	State
I. Hill States = 03 Locations = 2+2 = 4	1.	Palampur, CSKHPKV	1970	Himachal Pradesh	1.	Almora, VPKAS*	Uttarakhand
	2.	Srinagar, SKUAT	2010	Jammu & Kashmir			
II. North West States = 05 Locations = 4+5 = 9	3.	Ludhiana, PAU	1989	Punjab	2.	Meerut, SVBPUA&T	Uttar Pradesh
	4.	Hisar, CCS HAU	1970	Haryana	3.	Avikanagar, IGFR-RRS*	Rajasthan
	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 Locations = 6+2= 8	7.	Faizabad, NDUAT	1982	Uttar Pradesh	11.	Umiam (Barapani), ICAR Res. Complex for NEH Region*	Meghalaya
	8.	Ranchi, BAU	1970	Jharkhand	12.	Pusa, RAU	Bihar
	9.	Kalyani, BCKV	1972	West Bengal			
	10.	Bhubaneswar, OUAT	1987	Orissa			
	11.	Jorhat, AAU	1970	Assam			
	12.	Imphal, CAU	2010	Manipur			

Zone	Coordinated Centers				Testing Location (Coordinating Center)		
	Sl. No.	Location	Establishment Year	State	Sl. No	Location	State
IV. Central States = 5 Locations = 5+5 =10	13.	Anand, AAU	1970	Gujarat	13.	Kanpur, CSAU&T	Uttar Pradesh
	14.	Jabalpur, JNKVV	1970	Madhya Pradesh	14.	Jhansi, IGFR <sup>I</sup> *	Uttar Pradesh
	15.	Rahuri, MPKV	1971	Maharashtra	15.	Dhari & Jamnagar, GAU	Gujarat
	16.	Urulikanchan, BAIF	1982	Maharashtra	16.	Akola, PDKVV	Maharashtra
	17.	Raipur, IGKV	2010	Chhattisgarh	17.	Dapoli & Palghar, KKV	Maharashtra
V. South States =5 Locations = 4+3 = 7	18.	Mandya, UAS (B)	1986	Karnataka	18.	Dharwad, IGFR <sup>I</sup> -RRS*	Karnataka
	19.	Coimbatore, TNAU	1976	Tamil Nadu	19.	Pondicherry, PJLNCA & RI, Karaikal	Pondicherry
	20.	Vellayani, KAU	1971	Kerala			
	21.	Hyderabad, ANGRAU	1970	Andhra Pradesh			

Summary: Zone = 5, States = 23, Coordinating Centres = 21, Testing Locations = 19

\*ICAR Institute

**AICRP ON FORAGE CROPS: ENTRIES DECODE FOR KHARIF-2011**  
**Forage Breeding Trials**

Contributor	Entry Name	Code Name	Contributor	Entry Name	Code Name
<b>1. IVT Pearl Millet</b>			<b>2. AVT Pearl Millet-1</b>		
Anand	AFB-6	IVTPM-3	Faizabad	NDFB-904	AVTPM-1-2
Anand	AFB-7	IVTPM-7	Bikaner	RBB-1	AVTPM-1-4
Faizabad	NDFB-929	IVTPM-1	Advanta	PAC-981	AVTPM-1-1
Bikaner	RBB-2	IVTPM-5	NC	RBC-2	AVTPM-1-5
NC	RBC-2	IVTPM-6	NC	Giant Bajra	AVTPM-1-3
NC	Giant Bajra	IVTPM-4			
NC	AVKB-19	IVTPM-2			
<b>3. IVT Cowpea</b>			<b>4. AVT Cowpea-1</b>		
Mandya	MFC-09-2	IVTC-3	Mandya	MFC-09-1	AVTC-1-3
Jhansi	IPOK-1/52-1	IVTC-7	Jhansi	RR-3	AVTC-1-5
Jhansi	EC-548872-1	IVTC-4	NC	BL-1	AVTC-1-1
Vellayani	Culture-1	IVTC-1	NC	UPC-5286	AVTC-1-4
Pantnagar	UPC-1102	IVTC-8	ZC	BL-2	AVTC-1-2-1
Pantnagar	UPC-1101	IVTC-6	ZC	UPC-622	AVTC-1-2-2
NC	BL-1	IVTC-2	ZC	UPC-9202	AVTC-1-2-3
NC	UPC-5286	IVTC-9			
ZC	UPC-622	IVTC-5-1			
ZC	UPC-9202	IVTC-5-2			
ZC	BL-2	IVTC-5-3			
<b>5. AVT Cowpea-2</b>			<b>6. AVT Cowpea (Seed)-2</b>		
Mandya	MFC-08-14	AVTC-2-1	Mandya	MFC-08-14	AVTCS-2-2
Jhansi	IL-1177	AVTC-2-4	Jhansi	IL-1177	AVTCS-2-1
NC	BL-1	AVTC-2-5	NC	BL-1	AVTCS-2-4
NC	UPC-5286	AVTC-2-2	NC	UPC-5286	AVTCS-2-3
ZC	UPC-622	AVTC-2-3-1	ZC	UPC-622	AVTCS-2-5-1
ZC	UPC-9202	AVTC-2-3-2	ZC	UPC-9202	AVTCS-2-5-2
<b>7. IVT Ricebean</b>			<b>8. AVT Ricebean-1</b>		
Kalyani	KRB-26	IVTR-2	Bhubneshwar	BFRB-15	AVTR-1-4
Jorhat	JRB-15	IVTR-5	Jorhat	JRB-13	AVTR-1-2
Jorhat	JRB-16	IVTR-7	Jabalpur	JRBJ-05-4	AVTR-1-1
Jabalpur	JRBJ-06-1	IVTR-3	NC	Bidhan-1	AVTR-1-3
Bhubneshwar	BFRB-16	IVTR-6			
NC	Bidhan-1	IVTR-8			
NC	Bidhan-2	IVTR-4			
NC	RBL-6	IVTR-1			
<b>9. AVT Soybean-2</b>					
Jabalpur	JS07-21-7	AVTS-2-1			
Jabalpur	JS07-24-13	AVTS-2-4			
Jabalpur	JS07-24-8	AVTS-2-2			
Jabalpur	JS07-24-1	AVTS-2-3			

### Forage Breeding Trials Continue

Contributor	Entry Name	Code Name	Contributor	Entry Name	Code Name
<b>12. VTGG-2008</b>			<b>13. VTCC-2008</b>		
NC	Bundel Guinea-1	GG-08-1	NC	IGFRI-3108	CE-08-3
NC	PGG-616	GG-08-9	NC	Bundel Anjan-3	CE-08-absent
NC	Riversdale	GG-08-5	NC	CAZRI-75	CE-08-4
Jhansi	JHGG-08-2	GG-08-3	Bikaner	RCCB-04-6	CE-08-1
Jhansi	JHGG-08-1	GG-08-4	Bikaner	RCCB-03-8	CE-08-2
Coimbatore	TNGG-061	GG-08-10	CAZRI, Jodhpur	CAZRI-288	CE-08-5
Dharwad	RSDGG-2	GG-08-2	CAZRI, Jodhpur	CAZRI-657	CE-08-6
Ludhiana	PGG-702	GG-08-6			
Ludhiana	PGG-729	GG-08-7			
Ludhiana	PGG-710	GG—8-8			
<b>14. VT N X B Hybrid- 2008</b>					
Coimbatore	TNCN-071	NB-08-1			
Coimbatore	TNCN-072	NB-08-3			
Coimbatore	TNCN-073	NB-08-5			
Coimbatore	TNCN-074	NB-08-7			
Check	CO-3	NB-08-2			
Check	PNB-233	NB-08-4			
Check	NB-21	NB-08-12			
BAIF	BNH-3	NB-08-9			
BAIF	BNH-10	NB-08-11			
Dharwad (IGFRI)	DHN-9	NB-08-8			
Dharwad (IGFRI)	DHN-12	NB-08-6			
Faizabad	NHN-9	NB-08-10			

### AICRP ON FORAGE CROPS: ENTRIES DECODE FOR KHARIF-2011 Forage Agronomy Trial

<b>AST-13: Effect of phosphorus levels on forage yield of promising entries of cowpea</b>		
<b>S. No.</b>	<b>Entry name</b>	<b>Coding</b>
1.	MFC 08-14	AVC-1
2.	IL-1177	AVC-2
3.	UPC-5286 (NC)	AVC-5
4.	Bundel Lobia-1 (NC)	AVC-6
5.	UPC-622 (NE-ZC)	AVC-3
6.	UPC 9202 (SZ-ZC)	AVC-4



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

(Table Reference: 1.1 to 1.10)

An initial varietal trial in forage pearl millet comprising four entries and three national checks viz., Raj Bajra chari-2, Giant Bajra and Avika Bajra Chari (AVKB-19) was conducted at 19 locations distributed in four zones of the country. Results obtained from different centres revealed that for green forage yield (q/ha) only entries RBB-2 (9.7%) and AFB-6 (2.0%) in North East Zone proved their superiority over national check however in other zones as well as at national level none of the entries was found superior than check.

For the character dry matter yield (q/ha), entry AFB-6 (3.4%) in North West Zone, entries RBB-2 (9.7%), AFB-6 (3.2%) and AFB-7 (3.0%) in North East Zone and entries RBB-2 (35.30%), AFB-6 (12.54%), NDFB-929 (3.98%) and AFB-7 (0.96%) in South Zone proved superiority. Whereas at national level, entries RBB-2 (5.0%) and AFB-6 (3.9%) exhibited their superiority over best national check Giant Bajra. Similarly in green forage and dry matter production potential (q/ha/day), entries RBB-2 and AFB-6 was adjudged good performer.

In quality parameters like crude protein yield (q/ha) and crude protein content (%) national check Giant Bajra maintained superiority. For the character plant height too, national check Giant Bajra (207.1 cm) was adjudged best performer. For the character leafiness (L/S ratio), entries AFB-6 and RBB-2 along with check RBC-2 (0.56) maintained their superiority. For other quality parameters, NDFB-929 and AFB-7 for ADF (%) and NDFB-929 for NDF (%) ranked first whereas for IVDMD (%) and DDM (q/ha) national check AVKB-19 maintained superiority.

**Table-1.1 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha)**

Cont...

Entries	North West Zone								North East Zone					
	Ludhi- ana	Hisar	Bika- ner	Jal- our	Bal- wal	Ave- rage	Rank	Superi- ority%	Faiza- bad	Pusa	Bhuba- neswar	Ave- rage	Rank	Superi- ority%
NDFB-929	432.9	652.8	445.5	554.7	805.6	578.3	2		383.1	383.0	256.2	340.8	5	
AFB-7	428.2	611.1	501.9	467.2	685.2	538.7	6		254.9	467.0	318.7	346.9	4	
AFB-6	395.8	620.4	577.0	522.0	648.1	552.7	3		364.2	407.0	312.7	361.3	2	2.0
RBB-2	453.7	532.4	469.4	453.8	787.0	539.3	5		367.6	459.0	339.5	388.7	1	9.7
RBC-2 (NC)	277.8	324.1	391.1	458.9	583.3	407.0	7		327.5	438.0	252.0	339.2	6	
Giant Bajra (NC)	425.9	583.3	566.8	468.2	694.4	547.7	4		294.1	379.0	389.5	354.2	3	
AVKB-19 (NC)	504.6	587.9	438.9	447.5	986.1	593.0	1		354.4	367.0	295.8	339.1	7	
Mean	397.7	548.2	477.0	491.3	701.8	523.2			339.5	430.8	295.8	355.4		
CD at 5%	4.3	61.6	81.3	NS	82.3				82.2	31.4	43.5			
CV %	8.1	6.1	9.4	9.2	6.2				13.8	8.3	7.9			

\*Not included in Zonal and All India Average due to CV $\geq$ 20

**Table-1.1 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha)**

Entries	Central Zone										South Zone							All India		
	Anand	Rai-pur	Jabal-pur	Rahuri	Urulika-nchan	Jam-nagar	Jhansi*	Average	Rank	Superiority%	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank	Superiority%	Average	Rank	Superiority%
NDFB-929	545.0	339.5	470.7	579.8	596.3	290.0	121.9	470.2	3		291.7	166.7	449.1	380.7	322.1	6		445.7	4	
AFB-7	523.0	334.3	339.5	498.2	571.8	287.0	105.8	425.6	7		310.2	189.8	513.9	299.2	328.3	5		422.3	6	
AFB-6	578.0	453.3	437.4	465.5	588.2	308.0	139.0	471.7	2		312.5	189.8	495.4	396.6	348.6	3		448.4	3	
RBB-2	504.0	460.8	370.7	465.5	669.9	321.0	142.5	465.3	4		358.8	259.3	518.5	398.2	383.7	1	6.4	455.0	2	
RBC-2 (NC)	235.0	394.6	237.4	449.2	506.5	239.0		343.6	5		254.7	208.3	268.5	226.9	239.6	4		337.4	7	
Giant Bajra (NC)	388.0	358.5	316.6	861.6	808.7	416.0	76.1	524.9	1		305.6	194.4	569.4	373.5	360.7	2		466.3	1	
AVKB-19 (NC)	472.0	424.7	416.6	494.1	571.8	225.0	133.2	434.0	6		313.9	199.1	458.3	278.4	312.4	7		435.3	5	
Mean	477.0	396.5	371.1	491.6	586.5	289.0	127.3	435.3			305.6	202.8	449.1	340.3	324.4			421.8		
CD at 5%	54.2	38.4	81.2	108.2	45.9	27.1	NS				29.1	26.7	49.4	28.6						
CV %	6.6	6.4	12.3	11.2	15.2	5.1	29.9				5.4	7.5	5.9	4.8						

**Table-1.2 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha)**

**Cont...**

Entries	North West Zone						North East Zone					
	Ludhi-ana	Hisar	Bika-ner	Ave- rage	Rank	Superi- ority%	Faiza- bad	Pusa	Bhuba- neswar	Ave- rage	Rank	Superi- ority%
NDFB-929	159.7	115.5	113.4	129.5	5	3.4	85.3	87.0	54.9	75.7	7	
AFB-7	174.1	113.9	150.8	146.3	3		82.8	109.0	66.6	86.1	3	3.0
AFB-6	157.4	118.3	181.1	152.3	1		93.1	95.0	70.8	86.3	2	3.2
RBB-2	172.2	88.6	156.3	139.0	4		90.7	106.0	78.5	91.7	1	9.7
RBC-2 (NC)	80.5	52.9	119.6	84.3	7		92.4	97.0	56.1	81.8	5	
Giant Bajra (NC)	172.6	103.2	111.3	129.0	6		76.7	88.0	86.0	83.6	4	
AVKB-19 (NC)	202.8	109.8	129.4	147.3	2		85.8	82.0	65.8	77.9	6	
Mean	148.8	97.8	144.2	130.3			88.9	98.8	65.4	84.3		
CD at 5%	3.0	14.2	39.0				19.1	11.5	9.0			
CV %	9.1	7.9	15.9				12.4	9.1	7.4			

**Table-1.2 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha)**

Entries	Central Zone										South Zone								All India		
	Anand	Rai- pur	Jabal- pur	Rahuri	Uruli- kanchan	Jam- nagar	Jhansi*	Aver- age	Rank	Superi- ority%	Hyde- rabad	Dhar- wad	Coim- batore	Man- dya	Ave- rage	Rank	Superi- ority%	Ave- age	Rank	Superi- ority%	
NDFB-929	71.4	72.3	115.8	80.6	115.9	88.0	25.1	90.7	3		56.4	33.8	62.2	56.2	52.2	4	3.98	85.5	6		
AFB-7	75.3	71.2	80.4	56.7	128.4	74.0	22.5	81.0	6		62.3	42.4	72.8	42.7	55.0	3	0.96	87.7	4		
AFB-6	72.9	98.6	105.0	56.5	121.8	91.0	23.7	91.0	2		65.9	40.4	71.7	48.1	56.5	2	12.54	93.0	2	3.9	
RBB-2	76.6	104.3	88.1	50.3	137.6	83.0	31.5	90.0	4		74.0	54.5	84.4	58.8	67.9	1	35.30	94.0	1	5.0	
RBC-2 (NC)	30.0	84.4	52.7	58.6	110.9	61.0		66.3	7		48.8	47.7	35.7	29.5	40.4	6		66.1	7		
Giant Bajra (NC)	49.7	77.9	76.2	121.0	166.8	102.0	13.3	98.9	1		68.7	42.8	65.0	24.4	50.2	5		89.5	3		
AVKB-19 (NC)	65.3	90.5	101.0	74.5	116.1	72.0	29.3	86.6	5		61.5	42.1	58.4	38.8	50.2	5		87.2	5		
Mean	65.2	86.2	88.4	60.5	122.9	79.4	25.7	83.8			61.5	43.8	65.4	47.1	54.4			50.7			
CD at 5%	7.2	8.9	23.8	13.3	12.6	14.1	NS				9.3	4.9	12.5	8.6							
CV %	6.5	6.7	15.1	10.5	14.6	9.7	38.1				8.4	6.3	10.9	11.3							

**Table-1.3 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha/day)**

Cont...

Entries	Anand	Coimbatore	Dharwad	Jabalpur	Pusa	Jamnagar	Bikaner	Fiazabad	Rahuri
NDFB-929	11.85	11.82	3.03	6.82	6.18	3.92	6.45	5.39	11.60
AFB-7	11.37	13.52	3.45	4.92	7.18	3.88	6.79	3.74	11.32
AFB-6	11.56	12.38	3.45	6.24	6.67	4.17	7.80	5.27	10.12
RBB-2	11.20	12.96	4.71	5.29	7.17	4.34	6.34	5.57	9.70
RBC-2 (NC)	4.80	6.39	3.79	3.29	7.06	3.23	5.29	4.67	9.36
Giant Bajra (NC)	7.05	9.49	3.54	4.39	6.11	5.62	6.91	3.82	14.36
AVKB-19 (NC)	10.98	12.39	3.62	5.95	5.83	3.04	6.36	5.21	10.74
Mean	10.16	11.41	3.69	5.31	6.85	3.91	6.53	4.93	10.42

**Table-1.3 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha/day)**

Entries	Ludhiana	Hyderabad	Mandya	Urulikanchan	Hiasr	Raipur	Bhubaneswar	Average	Rank
NDFB-929	7.10	5.95	8.46	11.25	9.99	4.24	4.49	7.41	3
AFB-7	7.36	6.89	6.65	11.00	9.17	4.18	5.59	7.31	5
AFB-6	6.71	6.71	8.88	11.53	9.90	5.81	5.39	7.66	2
RBB-2	7.44	8.03	8.79	13.40	8.23	5.91	5.57	7.79	1
RBC-2 (NC)	4.48	5.37	5.12	9.93	5.20	4.99	4.27	5.45	7
Giant Bajra (NC)	6.76	4.98	8.04	15.30	8.50	4.54	6.09	7.22	6
AVKB-19 (NC)	8.27	6.67	6.32	11.00	9.53	5.44	5.28	7.29	4
Mean	6.62	6.59	7.58	11.42	8.50	5.03	5.06	7.13	



**Table-1.4 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha/day)**

Cont...

Entries	Anand	Coimbatore	Dharwad	Jabalpur	Pusa	Bikaner	Fiazabad	Rahuri	Ludhiana
NDFB-929	1.55	1.64	0.62	1.67	1.40	1.64	1.20	1.61	2.62
AFB-7	1.64	1.92	0.77	1.16	1.68	2.04	1.22	1.29	3.00
AFB-6	1.46	1.79	0.74	1.51	1.56	2.45	1.35	1.23	2.67
RBB-2	1.70	2.11	0.99	1.25	1.66	2.11	1.37	1.05	2.82
RBC-2 (NC)	0.61	0.85	0.87	0.73	1.56	1.62	1.32	1.22	1.30
Giant Bajra (NC)	0.90	1.08	0.78	1.05	1.42	1.36	1.00	2.02	2.74
AVKB-19 (NC)	1.52	1.58	0.77	1.44	1.30	1.88	1.26	1.62	3.32
Mean	1.39	1.66	0.80	1.26	1.57	1.97	1.29	1.28	2.48

**Table-1.4 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha/day)**

Entries	Hyderabad	Jhansi	Mandya	Urulikanchan	Hisar	Raipur	Bhubaneswar	Average	Rank
NDFB-929	1.15	0.45	1.25	2.19	1.75	0.91	0.96	1.41	5
AFB-7	1.38	0.41	0.95	2.47	1.71	0.89	1.17	1.48	4
AFB-6	1.41	0.43	1.08	2.39	1.89	1.26	1.22	1.53	2
RBB-2	1.66	0.59	1.30	2.75	1.37	1.34	1.29	1.59	1
RBC-2 (NC)	1.03		0.66	2.18	0.85	1.07	0.95	1.12	7
Giant Bajra (NC)	1.12	0.23	0.52	3.34	1.50	0.99	1.34	1.34	6
AVKB-19 (NC)	1.31	0.57	0.88	2.23	1.78	1.16	1.18	1.49	3
Mean	1.33	0.47	1.05	2.40	1.51	1.09	1.12	1.42	

**Table-1.5 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Crude Protein Yield (q/ha)**

Entries	Anand	Coimbatore	Jabalpur	Fiazabad	Rahuri	Ludhiana	Hyderabad	Mandya	Raipur	Bhubaneswar	Hisar	Urulikanchan	Average	Rank
NDFB-929	7.0	9.3	9.0	7.2	6.3	14.2	4.0	4.2	5.63	4.4	5.1	9.5	7.2	3
AFB-7	6.0	9.2	6.0	7.0	4.2	14.9	4.1	2.4	5.59	5.3	4.7	11.5	6.8	4
AFB-6	7.3	11.3	7.1	9.6	4.4	12.4	4.3	3.4	8.08	5.2	4.1	10.5	7.3	2
RBB-2	5.5	11.8	6.5	7.6	4.0	12.0	4.7	3.1	8.72	6.1	5.2	11.4	7.2	3
RBC-2 (NC)	2.7	4.2	3.7	7.8	4.6	6.5	3.7	2.3	6.81	4.5	3.2	9.6	5.0	6
Giant Bajra (NC)	4.0	12.0	5.8	6.0	9.5	11.7	6.0	1.5	6.23	6.7	7.9	12.6	7.5	1
AVKB-19 (NC)	5.7	7.7	7.5	7.1	5.7	14.9	5.4	2.1	7.35	5.0	2.9	9.3	6.7	5
Mean	5.7	9.2	6.5	7.8	4.7	12.0	4.2	3.1	7.0	5.1	4.5	10.5	6.7	

**Table-1.6 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Crude Protein (%)**

Entries	Anand	Coimbatore	Mandya	Fiazabad	Rahuri	Ludhiana	Hyderabad	Raipur	Bhubaneswar	Hisar	Urulikanchan	Average	Rank
NDFB-929	9.8	14.9	7.4	8.5	7.9	9.3	7.0	7.8	8.1	4.4	8.2	8.5	2
AFB-7	7.9	12.7	5.7	8.5	7.4	8.6	6.6	7.9	7.9	4.2	9.0	7.9	5
AFB-6	10.0	15.8	7.0	8.2	7.7	7.9	6.6	8.2	7.4	3.5	8.6	8.3	4
RBB-2	7.2	14.0	5.3	8.4	7.8	7.0	6.3	8.4	7.8	5.9	8.3	7.8	6
RBC-2 (NC)	9.7	11.8	7.9	8.4	7.8	8.1	7.4	8.1	8.1	6.1	8.7	8.4	3
Giant Bajra (NC)	8.0	18.4	6.1	7.8	7.9	6.8	8.8	8.0	7.8	7.7	7.5	8.6	1
AVKB-19 (NC)	8.8	13.1	5.3	8.3	7.6	7.4	8.8	8.1	7.6	2.6	8.0	7.8	6
Mean	8.9	13.8	6.7	8.4	7.7	8.2	6.8	8.0	7.8	4.8	8.6	8.2	

**Table-1.7 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Plant Height (cm)**

Entries	Jam-nagar	Anand	Coim-batore	Jabal-pur	Fiaza-bad	Rahuri	Ludhi-ana	Hyde-rabad	Jhansi	Hisar	Man-dya	Rai-pur	Bika-ner	Uruli-kanchan	Bhuba-neswar	Bawal	Ave-age	Rank
NDFB-929	224.0	203.7	226.9	173.0	229.5	150.0	205.0	186.8	160.4	244.0	197.2	195.27	180.0	176.0	211.5	204.0	198.0	5
AFB-7	187.0	201.6	218.4	141.1	235.8	157.0	215.0	168.0	157.6	227.9	170.9	193.07	176.0	182.2	224.6	187.7	190.2	7
AFB-6	236.0	203.7	226.6	166.4	230.5	153.0	203.3	164.3	163.4	237.7	176.1	205.67	250.0	190.6	230.1	203.3	202.5	2
RBB-2	220.0	202.3	229.7	177.7	198.7	147.0	220.0	184.4	164.7	223.8	184.6	208.77	235.0	186.3	229.5	193.0	200.3	3
RBC-2 (NC)	214.0	210.7	226.8	100.7	205.8	156.0	196.7	177.0		218.8	169.9	199.63	195.0	190.0	215.2	201.3	191.8	6
Giant Bajra (NC)	269.0	192.7	246.7	148.3	195.4	235.0	205.0	184.0	161.1	222.2	190.0	197.93	208.0	238.9	234.7	184.7	207.1	1
AVKB-19 (NC)	235.0	206.7	219.5	143.2	227.2	151.0	221.7	169.4	166.8	254.0	154.7	202.97	248.0	186.3	218.8	194.0	200.0	4
Mean	216.2	204.4	225.7	151.8	220.1	152.6	208.0	176.1	161.5	230.4	179.7	200.5	207.2	185.0	222.2	197.9	196.2	

**Table-1.8 IVTPM: Initial Varietal Trial in Forage Pearl Millet: Leaf Stem Ratio**

Entries	Jam-nagar	Coimba-tore	Jabal-pur	Pusa	Fiaza-bad	Rahuri	Ludhi-ana	Hyde-rabad	Jhansi	Hisar	Man-dya	Rai-pur	Bika-ner	Uruli-kanchan	Bhuba-neswar	Ave-age	Rank
NDFB-929	1.03	0.24	0.56	0.97	0.78	0.30	0.53	0.21	0.34	0.36	0.34	0.42	0.20	0.65	0.89	0.52	3
AFB-7	0.93	0.24	0.52	0.99	0.67	0.40	0.60	0.23	0.35	0.31	0.33	0.43	0.22	0.49	0.97	0.51	4
AFB-6	1.00	0.30	0.66	0.98	0.77	0.50	0.60	0.26	0.38	0.30	0.25	0.53	0.21	0.54	1.11	0.56	1
RBB-2	1.05	0.26	0.52	1.02	0.74	0.50	0.60	0.28	0.33	0.30	0.39	0.58	0.18	0.49	1.09	0.56	1
RBC-2 (NC)	1.01	0.22	0.60	0.99	0.70	0.20	1.00	0.28		0.31	0.31	0.48	0.23	0.53	0.94	0.56	1
Giant Bajra (NC)	0.87	0.25	0.62	0.97	0.68	0.30	0.66	0.21	0.39	0.33	0.34	0.43	0.23	0.61	1.14	0.54	2
AVKB-19 (NC)	0.95	0.22	0.95	0.97	0.74	0.20	0.33	0.28	0.28	0.31	0.43	0.52	0.21	0.47	0.98	0.52	3
Mean	1.00	0.25	0.57	0.99	0.73	0.38	0.67	0.25	0.35	0.32	0.32	0.49	0.21	0.54	1.00	0.54	

**Table-1.9 IVTPM: Initial Varietal Trial in Forage Pearl Millet: ADF (%) & NDF (%)**

Entries	ADF (%)		NDF (%)	
	Ludhiana	Rank	Ludhiana	Rank
NDFB-929	38.0	1	59.0	1
AFB-7	38.9	2	60.0	3
AFB-6	40.0	4	61.0	4
RBB-2	41.0	6	61.6	6
RBC-2 (NC)	39.4	3	59.8	2
Giant Bajra (NC)	41.8	7	61.8	7
AVKB-19 (NC)	40.6	5	61.4	5
Mean	39.5		60.3	

**Table-1.10 IVTPM: Initial Varietal Trial in Forage Pearl Millet: IVDMD (%) & DDM (q/ha)**

Entries	IVDMD (%)				DDM (q/ha)	
	Ludhiana	Hisar	Average	Rank	Hisar	Rank
NDFB-929	56.8	45.2	51.0	2	52.2	2
AFB-7	55.4	42.4	48.9	5	48.3	4
AFB-6	55.3	42.8	49.1	4	50.7	3
RBB-2	54.4	45.6	50.0	3	40.4	6
RBC-2 (NC)	55.0	39.4	47.2	7	20.9	7
Giant Bajra (NC)	54.8	41.4	48.1	6	42.7	5
AVKB-19 (NC)	55.6	52.0	53.8	1	57.1	1
Mean	55.4	43.1	49.2		42.5	

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

(Table Reference: 2.1 to 2.10)

In forage pearl millet, three entries namely PAC-981, NDFB-904 and RBB-1 along with two national checks i.e. Raj Bajra chari-2 (RBC-2) and Giant Bajra were evaluated in first advanced varietal trial conducted at 18 locations distributed in four zones of the country. Results reported from different centres clearly revealed that entry PAC-981 excelled in performance for green forage yield (q/ha) in North-West Zone with 65.2% superiority, 2.0% in North-East Zone, 18.4% in Central Zone and 8.5% superiority in South Zone. Other entry i.e. RBB-1 (4.2%) proved superiority in only North West Zone. At national level too, entry PAC-981 (28.5%) performed better than best national check. Similarly for dry matter yield (q/ha), entries PAC-981 (57.9%) and RBB-1 (12.7%) in North West Zone, PAC-981 (8.2%) and NDFB-904 (6.4%) in North East Zone and PAC-981 with 20.2% in Central Zone and 16.5% in South Zone proved their superiority over best national check. Even at national level, entry PAC-981 (32.9%) adjudged best performer.

In fodder production potential (q/ha/day), entries PAC-981 and RBB-1 maintained their superiority both for green forage and dry matter production potential with respect to national check Giant Bajra. In quality parameters, entry PAC-981 for crude protein yield (q/ha) and entries NDFB-904 and RBB-1 for crude protein content (%) was adjudged good performer. For growth parameter, PAC-981 (216.9cm) ranked first whereas for leafiness (L/S ratio), entry NDFB-904 (0.58) proved superiority with respect to check. For other quality parameters entry PAC-981 maintained its superiority for NDF (61.6%), ADF (40.2%), IVDMD (55.1%) and DDM (67.0q/ha) with respect to national check.

**Table-2.1 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha)**

Cont...

Entries	North West Zone							North East Zone					
	Ludhiana	Hisar	Bikaner	Jalour	Average	Rank	Superiority%	Faizabad	Pusa	Bhubaneswar	Average	Rank	Superiority%
PAC-981	1214.6	964.6	328.4	471.0	744.6	1	65.2	339.5	384.0	309.0	344.2	1	2.0
NDFB-904	531.3	468.8	376.9	376.8	438.4	4		294.7	377.0	323.5	331.7	3	
RBB-1	502.1	560.4	493.2	322.7	469.6	2	4.2	302.4	392.0	285.5	326.6	4	
RBC-2 (NC)	347.9	389.6	389.9	252.4	344.9	5		294.4	358.0	360.0	337.5	2	
Giant Bajra (NC)	558.3	635.4	312.2	296.9	450.7	3		216.9	349.0	265.7	277.2	5	
Mean	649.0	595.9	397.1	355.7	499.4			307.8	377.8	319.5	335.0		
CD at 5%	5.7	63.1	69.7	72.7				46.7	22.3	3.9			
CV%	4.9	6.7	11.9	13.7				10.5	8.7	4.2			

**Table-2.1 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha)**

Entries	Central Zone										South Zone							All India		
	Anand	Jam-nagar	Jabal-pur	Ra-huri	Uruli-kanchan	Jhansi	Dhari	Ave-rage	Rank	Superi- ority%	Hyde-rabad	Dhar-wad	Coim-batore	Man-dya	Ave-rage	Rank	Superi- ority%	Ave-rage	Rank	Superi- ority%
PAC-981	694.0	528.0	324.8	941.7	759.6	210.8	123.5	511.8	1	18.4	406.1	337.5	387.5	591.2	430.6	1	8.5	517.5	1	28.5
NDFB-904	475.0	271.0	413.2	422.6	468.6	125.3	98.2	324.8	5		252.0	202.1	375.0	279.1	277.1	5		337.2	4	
RBB-1	452.0	260.0	464.8	379.8	539.1	123.3	128.2	335.3	3		260.3	279.2	427.1	330.6	324.3	3		361.3	3	
RBC-2 (NC)	381.0	222.0	399.7	375.2	523.8		75.9	329.6	4		283.2	279.2	312.5	257.8	283.2	4		323.7	5	
Giant Bajra (NC)	515.0	348.0	434.1	795.3	683.1	143.4	107.5	432.3	2		347.8	264.6	504.1	470.7	396.8	2		402.7	2	
Mean	500.5	320.3	400.6	529.8	572.8	153.1	106.5	375.4			300.4	274.5	375.5	364.7	328.8			388.5		
CD at 5%	42.2	32.0	77.6	96.6	27.3	45.6	19.2				35.3	40.9	36.2	38.4						
CV%	5.4	6.4	12.4	10.8	18.8	18.7	11.7				7.4	9.8	5.8	6.5						



**Table-2.2 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha)**

Cont...

Entries	North West Zone						North East Zone					
	Ludhiana	Hisar	Bikaner	Average	Rank	Superiority%	Faizabad	Pusa	Bhubaneswar	Average	Rank	Superiority%
PAC-981	428.8	149.4	66.4	214.9	1	57.9	94.1	89.0	71.1	84.7	1	8.2
NDFB-904	202.2	83.3	102.8	129.4	4		86.6	88.0	75.2	83.3	2	6.4
RBB-1	191.0	103.7	165.4	153.4	2	12.7	70.4	89.0	62.6	74.0	4	
RBC-2 (NC)	111.3	68.0	93.9	91.1	5		68.7	83.0	83.2	78.3	3	
Giant Bajra (NC)	239.4	112.6	56.4	136.1	3		43.0	81.0	58.2	60.7	5	
Mean	233.3	101.1	107.1	147.2			80.0	87.3	73.0	80.1		
CDat 5%	6.0	10.1	27.6				7.6	6.4	8.0			
CV%	9.0	6.3	18.4				7.2	8.2	3.7			

**Table-2.2 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha)**

Entries	Central Zone										South Zone							All India		
	Anand	Jam-nagar	Jabal-pur	Rahuri	Uruli-kanchan	Dhari	Jhansi*	Ave- rage	Rank	Superi- ority%	Hydera- bad	Dhar- wad	Coim- batore	Man- dya	Ave- rage	Rank	Superi- ority%	Ave- rage	Rank	Superi- ority%
PAC-981	102.7	120.0	77.4	148.8	168.2	35.5	47.7	108.8	1	20.2	93.7	84.0	52.2	94.1	81.0	1	16.5	117.2	1	32.9
NDFB-904	53.9	74.0	100.3	49.7	108.0	24.5	28.4	68.4	4		52.8	47.2	55.1	42.9	49.5	5		77.9	4	
RBB-1	52.0	65.0	114.2	49.1	121.0	29.5	26.0	71.8	3		53.9	73.0	72.5	62.0	65.4	3		85.9	3	
RBC-2 (NC)	52.2	57.0	94.1	49.3	108.8	12.6		62.3	5		58.8	65.3	57.1	48.3	57.4	4		69.5	5	
Giant Bajra (NC)	69.1	84.0	105.8	105.7	146.1	32.5	25.2	90.5	2		69.5	68.0	76.8	63.6	69.5	2		88.2	2	
Mean	65.2	79.0	96.5	74.2	126.5	25.5	34.0	77.8			64.8	67.4	59.2	61.8	63.3					
CDat 5%	5.6	7.7	15.1	12.7	14.0	6.7	12.5				8.7	15.6	5.3	8.5						
CV%	5.5	6.2	10.0	10.2	17.4	16.3	24.6				8.6	15.0	5.5	8.9						

\*Not included in Zonal and All India Average due to CV $\geq$ 20

**Table-2.3 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha/day)**  
Cont...

Entries	Anand	Dhari	Coimbatore	Dharwad	Urulikanchan	Jabalpur	Jamnagar	Pusa	Bikaner
PAC-981	9.64	2.41	6.46	6.14	12.66	4.70	7.14	6.20	4.05
NDFB-904	11.10	1.93	10.13	3.67	9.19	5.98	3.66	5.98	5.09
RBB-1	10.50	2.43	12.20	5.08	10.78	6.83	3.51	5.94	6.66
RBC-2 (NC)	7.94	1.34	8.22	5.08	10.07	5.71	3.01	5.77	5.27
Giant Bajra (NC)	9.90	1.60	10.08	4.81	11.39	6.29	4.70	5.54	3.72
Mean	9.80	2.03	9.25	4.99	10.68	5.81	4.33	5.97	5.27

**Table-2.3 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Green Forage Yield (q/ha/day)**

Entries	Faizabad	Hyderabad	Ludhiana	Rahuri	Hisar	Mandya	Bhubaneswar	Average	Rank
PAC-981	4.92	6.04	14.99	8.88	15.62	15.68	4.98	8.16	1
NDFB-904	4.15	6.07	8.71	8.99	7.88	6.91	5.68	6.57	4
RBB-1	4.25	7.09	8.37	8.44	8.72	8.22	5.10	7.13	2
RBC-2 (NC)	4.21	6.96	5.61	7.98	5.79	5.84	6.21	5.94	5
Giant Bajra (NC)	2.85	5.70	6.89	13.48	10.13	8.46	4.36	6.87	3
Mean	4.38	6.54	9.42	8.57	9.50	9.16	5.49	6.95	

**Table-2.4 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha/day)**  
Cont...

Entries	Anand	Coimbatore	Dharwad	Urulikanchan	Jabalpur	Pusa	Bikaner	Faizabad	Hyderabad
PAC-981	1.43	0.87	1.53	2.80	1.12	1.44	0.82	1.36	1.39
NDFB-904	1.25	1.49	0.86	2.12	1.45	1.40	1.39	1.22	1.27
RBB-1	1.21	2.07	1.33	2.42	1.67	1.35	2.23	0.99	1.47
RBC-2 (NC)	1.09	1.50	1.19	2.09	1.34	1.34	1.27	0.98	1.44
Giant Bajra (NC)	1.33	1.54	1.24	2.44	1.53	1.29	0.67	0.57	1.14
Mean	1.25	1.48	1.23	2.36	1.40	1.38	1.43	1.14	1.39

**Table-2.4 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Dry Matter Yield (q/ha/day)**

Entries	Rahuri	Ludhiana	Hisar	Mandya	Jhansi	Bhubaneswar	Average	Rank
PAC-981	1.40	5.29	2.42	2.49	0.82	1.15	1.76	1
NDFB-904	1.06	3.31	1.40	1.06	0.58	1.32	1.41	3
RBB-1	1.09	3.18	1.61	1.54	0.59	1.12	1.59	2
RBC-2 (NC)	1.05	1.80	1.01	1.09		1.44	1.33	5
Giant Bajra (NC)	1.79	2.96	1.79	1.14	0.44	0.95	1.39	4
Mean	1.15	3.40	1.61	1.55	0.66	1.25	1.51	

**Table-2.5 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Crude Protein Yield (q/ha)**

Entries	Hyderabad	Jabalpur	Rahuri	Faizabad	Urulikanchan	Ludhiana	Anand	Coimbatore	Hisar	Mandya	Bhubaneswar	Average	Rank
PAC-981	5.7	5.9	11.7	7.9	12.4	30.0	9.4	6.2	7.5	5.6	5.4	9.8	1
NDFB-904	3.5	7.5	3.9	7.0	8.1	18.7	5.8	8.7	5.3	2.6	5.8	7.0	3
RBB-1	3.4	8.2	3.8	6.1	9.4	15.0	6.5	9.9	6.4	3.8	4.8	7.0	3
RBC-2 (NC)	3.7	7.1	3.8	5.3	8.6	7.9	6.9	8.0	3.9	2.8	6.7	5.9	4
Giant Bajra (NC)	3.8	7.6	7.2	3.2	12.3	19.3	6.2	9.1	6.9	3.6	4.0	7.6	2
Mean	4.1	7.2	5.8	6.6	9.6	17.9	7.1	8.2	5.8	3.7	5.7	7.4	

**Table-2.6 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Crude Protein (%)**

Entries	Hyderabad	Jabalpur	Rahuri	Faizabad	Urulikanchan	Ludhiana	Anand	Coimbatore	Hisar	Mandya	Bhubaneswar	Average	Rank
PAC-981	6.1	7.8	7.9	8.5	7.4	7.0	9.1	11.8	5.0	5.9	7.6	7.6	4
NDFB-904	6.6	7.5	7.9	8.1	7.5	9.3	10.8	15.8	6.4	5.9	7.8	8.5	1
RBB-1	6.4	7.3	7.8	8.6	7.7	7.9	12.4	13.6	6.1	6.1	7.7	8.3	2
RBC-2 (NC)	6.4	7.6	7.8	7.7	7.3	7.1	13.1	14.0	5.7	5.7	8.1	8.2	3
Giant Bajra (NC)	5.5	7.2	7.3	7.5	8.4	8.1	9.0	11.8	6.1	5.7	7.0	7.6	4
Mean	6.4	7.6	7.8	8.2	7.5	7.8	10.9	13.8	5.8	5.9	7.8	8.2	

**Table-2.7 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Plant Height (cm)**

Entries	Hyde-rabad	Jaba-lpur	Rahuri	Faiza-bad	Uruli-kanchan	Ludhi-ana	Jam-nagar	Anand	Coim-batore	Hisar	Mandya	Bhuba-neswar	Bikaner	Jhansi	Dhari	Average	Rank
PAC-981	227.5	140.9	288.0	235.1	189.8	266.3	265.0	193.0	231.7	178.5	235.7	234.5	224.0	189.9	153.3	216.9	1
NDFB-904	138.0	148.8	154.0	231.5	160.9	195.0	224.0	185.0	213.7	198.9	159.6	231.7	265.0	169.0	149.2	188.3	5
RBB-1	153.0	189.6	168.0	218.7	181.3	232.5	232.0	191.4	236.3	236.2	186.6	225.5	281.0	182.3	176.6	206.1	3
RBC-2 (NC)	142.5	166.7	169.0	222.0	193.3	226.3	217.0	206.3	235.3	231.3	184.2	238.4	248.0		173.5	203.8	4
Giant Bajra (NC)	176.5	170.2	227.0	201.4	267.9	263.8	276.0	210.7	265.8	209.4	222.3	204.7	186.0	183.5	132.9	213.2	2
Mean	165.3	161.5	194.8	226.8	181.3	230.0	234.5	193.9	229.3	211.2	191.5	232.5	254.5	180.4	163.2	203.4	

**Table-2.8 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: Leaf Stem Ratio (cm)**

Entries	Hyde-rabad	Jabal-pur	Rahuri	Faiza-bad	Uruli-kanchan	Ludhi-ana	Jam-nagar	Anand	Coim-batore	Hisar	Mandya	Bhuba-neswar	Bika-ner	Jhansi	Dhari	Pusa	Average	Rank
PAC-981	0.20	0.43	0.30	0.81	0.52	0.53	0.91	0.48	0.26	0.34	0.50	1.04	0.33	0.30	0.48	0.99	0.51	4
NDFB-904	0.23	0.53	0.40	0.75	0.45	1.00	1.09	0.65	0.20	0.32	0.22	1.08	0.28	0.50	0.56	0.98	0.58	1
RBB-1	0.23	0.41	0.34	0.80	0.43	0.66	1.02	0.60	0.23	0.31	0.29	0.97	0.21	0.37	0.52	1.01	0.53	3
RBC-2 (NC)	0.21	0.62	0.30	0.81	0.47	0.33	1.03	0.63	0.30	0.27	0.21	1.19	0.21		0.62	1.01	0.55	2
Giant Bajra (NC)	0.24	0.55	0.38	0.69	0.58	0.66	1.06	0.50	0.26	0.25	0.37	0.92	0.32	0.39	0.61	0.99	0.55	2
Mean	0.22	0.50	0.34	0.79	0.47	0.63	1.01	0.59	0.25	0.31	0.31	1.07	0.26	0.39	0.55	1.00	0.54	

**Table-2.9 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: NDF (%) & ADF (%)**

Entries	NDF (%)				ADF (%)			
	Ludhiana	Rahuri	Average	Rank	Ludhiana	Rahuri	Average	Rank
PAC-981	60.0	63.3	61.6	1	40.8	39.7	40.2	1
NDFB-904	59.2	67.5	63.4	4	39.0	47.3	43.1	2
RBB-1	61.2	68.6	64.9	5	40.1	47.6	43.8	4
RBC-2 (NC)	61.4	65.3	63.3	3	41.6	45.6	43.6	3
Giant Bajra (NC)	60.4	65.6	63.0	2	39.6	50.0	44.8	5
Mean	60.5	66.1	63.3		40.4	45.0	42.7	

**Table-2.10 AVTPM-1: Frist Advance Varietal Trial in Forage Pearl Millet: IVDMD (%) & DDM (q/ha)**

Entries	IVDMD (%)					DDM (q/ha)	
	Ludhiana	Rahuri	Hisar	Average	Rank	Hisar	Rank
PAC-981	55.0	65.6	44.8	55.1	1	67.0	1
NDFB-904	57.2	62.0	44.6	54.6	2	37.2	4
RBB-1	55.8	66.0	39.6	53.8	3	41.1	3
RBC-2 (NC)	55.5	59.4	44.2	53.0	5	30.1	5
Giant Bajra (NC)	56.6	60.7	43.2	53.5	4	48.6	2
Mean	55.9	63.2	43.3	54.1		43.8	



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

(Table Reference: 3.1 to 3.9)

In forage cowpea, six 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 23 locations across the four zones in the country. Results obtained from different testing locations revealed that for the character green forage yield (q/ha), entry UPC-1101 (14.5%) in North West Zone, UPC-1102 (4.1%) in Central Zone and Culture-1 (0.4%) in South Zone exhibited superiority over best national/zonal check. At national level entries UPC-1101 and UPC-1102 with 2.3 percent superiority was ranked best performer. For the character dry matter yield (q/ha), entries UPC-1101 (22.7%) and UPC-1102 (3.3%) in North West Zone, entry UPC-1102 (4.1%) in Central Zone and entries Culture-1 (16.8%), UPC-1102 (1.8%) and UPC-1101 (1.3%) in South Zone exhibited their superiority with respect to check. Coming to the national level, entries UPC-1102 (5.5%) and UPC-1101 (5.3%) proved their superiority over best check UPC-5286 for this character.

For fodder production potential (q/ha/day), entry UPC-1102 for green forage yield and check UPC-5286 for dry matter yield registered superiority. For evaluation against quality parameter, entries UPC-1101 and UPC-1102 for crude protein yield (q/ha) and Culture-1 for crude protein content (%) proved superiority. For the character plant height, entry UPC-1101 (150.3cm) and for leafiness (L/S ratio) national check BL-1 and UPC-5286 (0.80) ranked first. For other quality parameters, entries MFC-09-2 and UPC-1101 for ADF (%), entries UPC-1101 and UPC-1102 for NDF (%) and EC-548872-1 and Culture-1 for IVDM (%) registered their superiority over best national / zonal check.

**Table-3.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Cont...

Entries	North West Zone							North East Zone									
	Ludhi-ana	Hisar	Pant-nagar	Bika-ner	Ave- rage	Rank	Superi- ority%	Faiza- bad	Ran- chi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Shi- long*	Ave- rage	Rank	Superi- ority%
Culture-1	351.9	472.2	224.4	188.3	309.2	8	14.5	175.6	180.5	253.1	345.8	280.5	209.0	44.1	240.7	6	
MFC-09-2	391.2	550.9	250.0	230.5	355.7	5		200.9	208.3	256.6	361.4	252.6	236.0	47.0	252.6	5	
EC-548872-1	384.3	592.6	214.4	239.4	357.7	4		208.3	222.2	257.7	256.2	281.0	219.0	95.9	240.7	6	
UPC-1101	444.4	805.6	350.0	277.4	469.4	1		232.8	263.9	246.5	320.8	243.2	213.0	86.0	253.4	4	
IPOK-1/52-1	289.4	412.0	326.6	250.0	319.5	7		161.8	118.0	204.2	261.6	158.6	249.0	32.4	192.2	8	
UPC-1102	437.5	467.6	248.9	293.2	361.8	3		258.2	305.5	276.8	260.4	258.6	297.0	63.6	276.1	2	
BL-1 (NC)	280.1	523.1	194.4	326.0	330.9	6		163.4	159.7	236.5	323.9	235.7	183.0	67.7	217.0	7	
UPC-5286 (NC)	356.5	564.8		308.3	409.9	2		302.3	243.0	219.5	358.3	284.6	254.0		276.9	1	
ZC	349.5	453.7	208.9	212.3	306.1	9		254.1	236.1	269.5	275.0	299.4	199.0	52.5	255.5	3	
Mean	366.9	548.6	258.4	264.1	359.5			212.9	212.6	243.9	311.0	249.4	232.5	62.4	243.7		
CD at 5%	3.1	64.5	10.0	77.8				58.3	50.2	9.4	31.7	8.8	41.1	25.6			
CV%	6.8	6.9	2.5	17.6				15.5	11.4	3.1	6.0	10.6	12.4	23.9			

\*Not included in Zonal and All India Average due to CV $\geq$ 20

ZC [UPC-622 (NEZ), UPC-9202 (CZ,SZ), BL-2 (NWZ)]

**Table-3.1 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	Central Zone										South Zone										All India		
	An-and	Jha-nsi	Jabal-pur	Ra-huri	Uruli-kanchan	Kan-pur	Ave- rage	Rank	Superi- ority%		Coim-batore	Vela-yani	Man-dya	Hydera-bad	Dhar-wad	Pondi-cherry	Ave- rage	Rank	Superi- ority%		Ave- rage	Rank	Superi- ority%
Culture-1	344.0	250.2	185.3	418.7	537.0	260.6	332.6	8			226.8	303.0	311.5	199.2	342.6	129.9	252.2	1	0.4		281.4	5	
MFC-09-2	307.0	217.8	299.9	476.6	495.3	375.0	361.9	5			250.0	307.6	285.6	208.5	282.4	131.5	244.3	3			298.9	3	
EC-548872-1	338.0	245.6	260.3	349.3	597.1	326.4	352.8	7			254.6	340.0	147.5	180.7	236.1	149.6	218.1	6			286.4	4	
UPC-1101	333.0	282.6	306.2	367.8	569.4	358.8	369.6	3			226.8	328.0	252.4	217.8	226.9	141.2	232.2	5			318.6	1	2.3
IPOK-1/52-1	188.0	236.3	129.1	326.2	412.0	299.5	265.2	4			180.6	276.3	186.7	166.8	296.3	135.9	207.1	9			239.6	7	
UPC-1102	381.0	217.8	320.7	483.5	643.4	408.8	409.2	1	4.1		319.4	267.3	301.8	190.0	226.9	144.9	241.7	4			318.6	1	2.3
BL-1 (NC)	376.0	333.6	99.9	374.8	486.1	242.6	318.8	9			217.6	295.0	192.3	203.9	250.0	135.3	215.7	7			265.1	6	
UPC-5286 (NC)	305.0	203.9	302.0	444.2	569.4	318.5	357.2	6			245.4	288.0	253.5	217.8	342.6	160.6	251.3	2			311.5	2	
ZC	325.0	264.1	314.5	451.1	634.2	369.9	393.1	2			185.2	290.0	233.5	203.9	222.2	150.6	214.2	8					
Mean	321.5	248.5	237.9	405.1	538.7	323.8	345.9				240.2	300.7	241.4	198.1	275.5	141.1	232.8				290.0		
CD at 5%	57.7	4.4	46.5	56.9	27.2	51.0					37.3	34.2	18.1	30.9	48.1	7.4							
CV%	10.7	2.5	12.9	8.0	13.3	8.9					9.2	3.8	4.4	9.0	10.9	8.0							

**Table-3.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

**Cont...**

Entries	North West Zone							North East Zone									
	Ludhi- ana	Hisar	Pant- nagar	Bika- ner	Ave- rage	Rank	Superi- ority%	Faiza- bad	Ran- chi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Shi- long*	Ave- rage	Rank	Superi- ority%
Culture-1	114.4	78.8	31.4	29.0	63.4	9	22.7	33.5	32.6	40.9	81.7	51.7	45.4	6.6	47.6	7	
MFC-09-2	107.6	88.3	41.7	28.4	66.5	6		45.5	37.6	38.5	88.0	43.8	51.3	15.4	50.8	5	
EC-548872-1	105.7	92.7	36.7	42.4	69.4	5		52.3	43.3	41.8	62.1	53.3	48.7	11.7	50.2	6	
UPC-1101	133.3	139.6	57.2	43.4	93.4	1		54.7	44.7	40.6	77.2	46.3	46.3	25.7	51.6	3	
IPOK-1/52-1	101.3	70.2	54.9	52.5	69.7	4	3.3	41.7	12.0	30.4	59.9	31.0	56.6	10.5	38.6	9	
UPC-1102	153.1	74.6	37.8	48.9	78.6	2		65.6	49.3	44.9	63.2	49.5	66.0	19.9	56.4	2	
BL-1 (NC)	77.0	90.4	31.9	62.9	65.5	7		35.9	18.2	34.5	73.4	37.6	41.6	8.8	40.2	8	
UPC-5286 (NC)	89.1	94.2		44.9	76.1	3		75.2	47.8	31.4	85.0	56.6	55.2		58.5	1	
ZC	113.6	77.0	36.8	33.3	65.2	8		54.8	41.5	39.6	66.6	59.2	43.6	15.2	50.9	4	
Mean	110.2	91.1	41.6	44.1	72.8			50.5	35.7	37.9	73.8	46.2	51.4	14.1	49.3		
CD at 5%	2.9	12.4	3.9	12.9				12.2	9.2	1.3	6.9	4.8	11.7	NS			
CV%	10.9	7.9	5.5	17.5				13.9	14.4	2.9	5.5	13.4	9.4	64.8			

**Table-3.2 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	Central Zone									South Zone									All India		
	An-and	Jha-nsi	Jabal-pur	Ra-huri	Uruli-kanchan	Kan-pur	Ave- rage	Rank	Superi- ority%	Coimba- tore	Vela- yani	Man- dya	Hydera- bad	Dhar- wad	Pondi- cherry	Ave- rage	Rank	Superi- ority%	Ave- rage	Rank	Superi- ority%
Culture-1	42.4	65.6	36.2	57.5	81.5	61.4	57.4	7		34.7	59.1	54.5	25.5	78.3	18.5	45.1	1	16.8	52.5	5	
MFC-09-2	48.3	57.2	58.7	77.1	72.7	81.0	65.8	3		28.7	59.9	41.4	20.3	58.2	21.3	38.3	5		54.3	4	
EC-548872-1	42.9	61.9	50.8	51.9	71.7	73.2	58.7	6		36.7	66.3	22.6	19.2	49.8	23.5	36.3	6		52.2	6	
UPC-1101	43.7	64.7	62.2	59.8	74.5	80.1	64.2	4		36.9	63.9	37.8	26.9	47.2	22.0	39.1	3	1.3	59.2	2	5.3
IPOK-1/52-1	27.9	62.4	23.7	40.6	60.8	78.3	49.0	9		33.5	53.8	25.3	18.9	59.3	20.4	35.2	9		46.2	8	
UPC-1102	51.4	63.8	66.2	66.3	80.6	87.7	69.3	1	4.1	50.7	52.1	41.9	19.3	47.0	24.6	39.3	2	1.8	59.3	1	5.5
BL-1 (NC)	36.4	72.6	17.9	48.7	73.8	57.5	51.2	8		33.6	57.5	30.4	22.8	47.4	22.3	35.7	8		46.6	7	
UPC-5286 (NC)	45.1	50.5	60.6	62.2	71.0	79.4	61.5	5		37.3	56.2	39.5	22.6	46.6	29.3	38.6	4		56.2	3	
ZC	39.7	65.4	63.7	70.6	76.4	83.9	66.6	2		26.6	56.5	34.8	25.7	48.3	24.7	36.1	7				
Mean	42.3	62.3	47.0	58.0	73.3	74.8	59.6			36.5	58.6	36.7	21.9	54.2	22.7	38.4			53.3		
CD at 5%	7.6	2.7	9.1	8.3	10.3	13.1				5.9	6.7	6.6	7.7	10.8	4.4						
CV%	10.5	1.5	12.7	8.1	9.5	10.0				9.6	3.8	10.5	19.8	11.6	11.1						

**Table-3.3 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Cont...

Entries	Kal-yani	Jabal-pur	Ran-chi	Bika-ner	Faiza-bad	Hyde-rabad	Man-dya	Jor-hat	Uruli-kanchan	Ra-huri	Ludhi-ana	Jha-nsi	Vella-yani
Culture-1	3.33	2.05	1.84	2.38	2.34	3.58	4.82	3.74	7.36	6.34	3.70	3.16	4.98
MFC-09-2	3.38	3.40	2.15	2.92	2.57	3.68	4.20	3.37	6.69	7.94	4.12	2.87	4.96
EC-548872-1	2.83	2.95	2.31	3.03	2.93	2.95	2.51	3.75	8.29	4.72	4.04	2.96	5.48
UPC-1101	2.71	3.51	3.14	3.51	3.14	3.62	3.92	3.24	7.39	5.57	4.68	3.49	5.29
IPOK-1/52-1	2.69	1.45	2.15	3.17	2.31	3.97	3.31	3.55	5.28	4.80	3.05	3.04	4.45
UPC-1102	3.04	3.60	3.59	3.71	3.79	3.15	4.29	3.45	8.47	6.45	4.61	2.80	4.31
BL-1 (NC)	3.43	1.12	3.01	4.48	2.59	4.08	3.28	3.57	6.23	7.35	2.95	4.23	4.76
UPC-5286 (NC)	2.41	3.35	2.48	4.14	4.14	3.86	3.87	3.79	8.02	7.40	3.75	2.49	4.65
ZC	2.96	3.49	2.41	2.69	3.53	3.53	4.07	4.00	8.46	7.65	3.68	3.19	4.67
Mean	2.98	2.68	2.58	3.42	2.98	3.61	3.78	3.56	7.22	6.32	3.86	3.13	4.86

**Table-3.3 IVTC: Initial Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Entries	Kan-pur	An-and	Coimb-atore	Hi-sar	Bhuba-neswar	Pusa	Pondi-cherry	Kan-pur	Dhar-wad	Pant-nagar	Shi-long	Ave-rage	Rank
Culture-1	4.42	6.25	4.12	7.70	5.24	3.54	0.31	4.42	5.91	3.21	0.74	3.98	5
MFC-09-2	5.51	4.26	4.31	8.26	5.92	4.07	0.33	5.51	4.87	3.47	0.78	4.15	4
EC-548872-1	5.44	4.83	4.24	9.31	4.00	3.84	0.43	5.44	4.07	2.94	1.60	3.95	6
UPC-1101	4.27	4.76	3.66	11.73	4.86	3.74	0.42	4.27	3.91	4.01	1.43	4.18	3
IPOK-1/52-1	5.65	3.76	3.01	6.09	4.36	4.29	0.36	5.65	5.11	3.74	0.54	3.57	8
UPC-1102	6.01	5.44	4.91	7.46	4.20	5.03	0.36	6.01	3.91	2.87	1.06	4.27	1
BL-1 (NC)	4.11	6.37	3.63	8.22	4.83	3.10	0.27	4.11	4.31	2.33	1.13	3.90	7
UPC-5286 (NC)	5.06	4.24	4.23	8.65	6.07	4.38	0.46	5.06	3.75			4.38	2
ZC	5.14	4.51	3.09	6.42	4.74	3.49	0.34	5.14	3.83	2.49	0.87		
Mean	5.06	4.99	4.01	8.43	4.94	4.00	0.37	5.06	4.48	3.22	1.04	4.05	

**Table-3.4 IVTC: Initial Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Kal- yani	Jabal- pur	Ran- chi	Bika- ner	Faiza- bad	Hydera- bad	Jor- hat	Uruli- kanchan	Ludhi- ana	Coim- batore	Jha- nsi	Kan- pur	An- and	Hi- sar	Bhuba- neswar	Ra- huri	Pusa	Dhar- wad	Man- dya	Pant- nagar	Ave- rage	Rank
Culture-1	0.54	0.40	0.33	0.37	0.45	0.46	0.68	1.12	1.20	0.63	0.83	1.04	0.48	1.29	1.24	0.87	0.77	1.35	0.84	0.45	0.77	4
MFC-09-2	0.51	0.66	0.39	0.36	0.64	0.36	0.58	0.98	1.13	0.49	0.75	1.19	0.67	1.32	1.44	1.33	0.88	1.00	0.61	0.58	0.79	3
EC-548872-1	0.46	0.57	0.45	0.54	0.74	0.31	0.71	1.00	1.11	0.61	0.75	1.22	0.61	1.46	0.97	0.70	0.85	0.86	0.39	0.50	0.74	5
UPC-1101	0.45	0.71	0.53	0.55	0.73	0.45	0.61	0.97	1.40	0.60	0.80	0.95	0.62	2.03	1.17	0.96	0.81	0.81	0.59	0.66	0.82	2
IPOK-1/52-1	0.40	0.26	0.22	0.67	0.59	0.45	0.57	0.78	1.07	0.56	0.80	1.48	0.56	1.04	1.00	0.52	0.98	1.02	0.45	0.63	0.70	7
UPC-1102	0.49	0.74	0.58	0.62	0.96	0.32	0.66	1.06	1.61	0.78	0.82	1.29	0.53	1.19	1.02	0.83	1.12	0.81	0.59	0.44	0.82	2
BL-1 (NC)	0.50	0.20	0.34	0.86	0.57	0.46	0.56	0.95	0.81	0.56	0.92	0.98	0.62	1.42	1.10	0.96	0.70	0.82	0.52	0.38	0.71	6
UPC-5286 (NC)	0.34	0.67	0.49	0.60	1.03	0.40	0.75	1.00	0.94	0.64	0.62	1.26	0.63	1.44	1.44	1.16	0.95	1.35	0.60		0.86	1
ZC	0.44	0.70	0.42	0.42	0.76	0.44	0.79	1.02	1.20	0.44	0.79	1.17	0.55	1.09	1.15	1.20	0.77	0.83	0.61	0.43		
Mean	0.46	0.53	0.42	0.57	0.71	0.40	0.64	0.98	1.16	0.61	0.79	1.18	0.59	1.40	1.17	0.92	0.88	1.00	0.57	0.52	0.78	

**Table-3.5 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	Jabal-pur	Ran-chi	Faiza-bad	Hydera-bad	Man-dya	Jor-hat	Urulika-nchan	Rah-uri	Ludhi-ana	An-and	Coimb-atore	Hi-sar	Bhuba-neswar	Pondi-cherry	Ave- rage	Rank
Culture-1	4.6	5.3	5.4	3.8	10.0	7.4	12.4	8.3	23.2	5.6	8.2	12.4	12.1	3.4	8.7	4
MFC-09-2	7.9	5.9	6.6	3.5	5.9	6.2	11.2	10.7	21.1	6.1	6.9	12.2	12.7	3.8	8.6	5
EC-548872-1	6.5	7.2	7.9	2.9	3.6	7.5	11.4	7.3	22.0	5.5	7.7	14.0	9.5	4.8	8.4	6
UPC-1101	7.9	6.7	10.0	3.8	6.1	6.9	12.1	8.4	27.8	5.5	6.6	21.1	11.1	4.6	9.9	1
IPOK-1/52-1	3.1	1.8	7.0	2.5	4.6	4.5	9.8	6.1	20.0	3.7	7.2	9.7	8.8	3.6	6.6	8
UPC-1102	8.1	7.8	11.4	2.3	7.0	6.6	12.5	9.8	26.5	6.1	9.5	10.0	9.5	4.8	9.4	2
BL-1 (NC)	2.3	2.9	6.4	3.1	5.5	5.0	11.9	7.2	14.3	4.6	7.8	12.9	11.6	3.1	7.0	7
UPC-5286 (NC)	7.9	6.9	13.8	3.8	6.8	8.0	11.0	9.0	17.5	5.6	6.9	12.4	12.6	7.1	9.2	3
ZC	8.3	6.9	9.1	3.9	6.1	7.3	12.0	10.4	21.5	5.0	4.7	11.1	9.7	3.4		
Mean	6.0	5.6	8.6	3.2	6.2	6.5	11.5	8.3	21.6	5.3	7.6	13.1	11.0	4.4	8.5	

**Table-3.6 IVTC: Initial Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	Ran-chi	Faiza-bad	Hydera-bad	Man-dya	Jor-hat	Uruli-kanchan	Ra-huri	Ludhi-ana	Coim-batore	Hisar	Bhuban-eswar	An-and	Pondi-cherry	Ave- rage	Rank
Culture-1	16.2	16.2	14.9	18.4	14.5	15.2	14.4	20.3	23.6	15.8	14.8	13.3	14.4	16.3	1
MFC-09-2	15.8	14.5	17.5	14.4	14.4	15.4	13.9	19.6	24.1	13.8	14.4	12.7	15.8	15.9	4
EC-548872-1	16.6	15.1	14.9	15.8	14.3	15.9	14.1	20.8	21.3	15.1	15.3	12.8	15.3	15.9	4
UPC-1101	14.9	18.2	14.0	16.2	15.2	16.2	14.0	20.8	17.9	15.1	14.4	12.5	16.2	15.8	5
IPOK-1/52-1	15.3	16.8	13.6	18.2	14.8	16.1	15.0	19.8	21.4	13.8	14.6	13.2	14.5	15.9	4
UPC-1102	15.8	17.4	12.3	16.8	13.3	15.5	14.7	17.3	18.8	13.4	15.1	11.9	18.4	15.4	6
BL-1 (NC)	15.8	17.8	14.0	17.9	13.5	16.1	14.7	18.6	23.2	14.2	15.8	12.5	15.5	16.1	3
UPC-5286 (NC)	14.4	18.3	16.6	17.3	14.5	15.5	14.4	19.6	18.4	13.1	14.8	12.4	21.9	16.2	2
ZC	16.6	16.7	15.3	17.5	12.5	15.8	14.7	18.9	17.9	14.4	14.6	12.6	14.0		
Mean	15.6	16.8	14.7	16.9	14.3	15.7	14.4	19.6	21.1	14.3	14.9	12.7	16.5	15.9	



**Table-3.7 IVTC: Initial Varietal Trial in Forage Cowpea: Plant Height (cm)**

Entries	Kal-yani	Jabal-pur	Ran-chi	Bika-ner	Faiza-bad	Hyde-rabad	Man-dya	Jor-hat	Uruli-kanchan	Ra-huri	Ludhi-ana	Coim-batore	Jha-nsi	Vella-yani	Kan-pur	An-and	Bhuba-neswar	Pant-nagar	Hi-sar	Shi-long	Pondi-cherry	Ave- rage	Rank
Culture-1	120.9	216.0	95.2	75.7	188.2	77.3	60.3	131.5	186.7	171.0	286.7	100.1	264.7	81.6	110.3	124.6	237.2	123.3	186.7	40.0	56.3	139.7	6
MFC-09-2	123.6	204.2	94.3	95.7	167.8	73.4	55.1	135.7	179.2	164.0	275.0	88.0	191.7	69.0	101.2	107.1	245.7	161.0	175.0	116.0	53.0	136.9	7
EC-548872-1	123.0	219.4	142.3	158.7	159.2	82.8	50.7	129.0	201.7	188.0	281.7	94.8	122.3	84.3	110.7	107.3	184.7	168.3	241.0	91.0	60.7	142.9	4
UPC-1101	122.5	222.1	125.1	139.7	140.8	87.4	36.9	136.1	243.4	169.0	273.3	105.7	240.0	77.3	110.7	112.3	217.8	196.7	203.3	141.0	55.9	150.3	1
IPOK-1/52-1	118.8	169.1	81.7	133.7	150.6	67.7	42.2	134.0	185.6	90.0	219.0	87.0	112.7	74.6	93.0	137.1	204.3	230.0	195.3	66.0	56.1	126.1	8
UPC-1102	120.0	166.1	172.3	111.3	167.5	85.0	60.7	131.0	191.0	179.0	276.7	110.5	164.7	74.3	115.3	125.3	198.2	166.7	171.7	87.0	62.6	139.8	5
BL-1 (NC)	123.6	188.0	108.1	164.3	130.2	70.1	47.3	117.1	168.9	120.0	310.0	88.8	293.0	73.0	112.1	128.5	224.6	163.3	191.7	174.0	48.4	145.0	3
UPC-5286 (NC)	119.8	231.2	93.8	162.7	185.7	100.5	40.3	133.3	180.0	160.0	281.7	102.2	176.3	74.0	119.9	116.7	239.6		239.3		66.2	148.6	2
ZC	116.3	231.5	136.8	175.3	156.8	91.5	48.5	125.3	174.7	177.0	281.7	89.3	167.3	66.7	153.8	108.0	207.9	170.0	251.0	94.0	63.1		
Mean	121.5	202.0	114.1	130.2	161.3	80.5	49.2	131.0	192.1	155.1	275.5	97.1	195.7	76.0	109.2	119.9	219.0	172.8	200.5	102.1	57.4	141.2	

**Table-3.8 IVTC: Initial Varietal Trial in Forage Cowpea: Leaf Stem Ratio**

Entries	Kal-yani	Jaba-lpur	Ran-chi	Bika-ner	Faiza-bad	Hyde-rabad	Man-dya	Jor-hat	Uruli-kanchan	Ra-huri	Ludhi-ana	Coim-batore	Jha-nsi	Vella-yani	Kan-pur	Bhuba-neswar	Hi-sar	Pu-sa	Pondi-cherry	Shi-long	Pan-tnagar	Ave- rage	Rank
Culture-1	1.00	0.79	0.79	1.04	0.70	0.71	0.49	0.80	1.11	0.50	0.82	0.40	0.93	0.70	0.81	1.09	0.29	0.84	0.73	0.45	0.72	0.75	3
MFC-09-2	0.91	0.96	0.79	0.78	0.63	0.78	0.26	0.97	0.69	0.40	0.82	0.45	0.98	0.71	0.78	1.21	0.34	0.86	0.75	1.02	0.71	0.75	3
EC-548872-1	0.86	0.54	0.69	1.04	0.70	0.73	0.43	0.86	0.59	0.40	1.00	0.46	0.92	0.81	0.72	0.84	0.31	0.87	0.85	0.77	0.77	0.72	5
UPC-1101	0.83	0.60	0.66	1.02	0.67	0.69	0.35	0.84	1.06	0.50	1.00	0.46	0.96	0.79	0.72	0.98	0.37	0.86	0.83	0.59	0.80	0.74	4
IPOK-1/52-1	0.92	1.01	0.74	1.04	0.71	0.64	0.49	1.04	1.04	0.60	0.67	0.40	0.75	0.70	0.55	0.90	0.22	0.86	0.71	1.20	0.85	0.76	2
UPC-1102	0.97	0.54	0.82	1.09	0.70	0.79	0.27	1.17	1.12	0.50	0.82	0.41	0.95	0.73	0.74	0.87	0.37	0.87	0.77	0.60	0.82	0.76	2
BL-1 (NC)	1.00	0.87	0.64	1.03	0.65	0.66	0.29	1.00	0.93	0.70	0.81	0.37	0.88	0.72	0.61	1.01	0.31	0.83	0.81	1.81	0.83	0.80	1
UPC-5286 (NC)	0.96	0.86	0.93	0.98	0.78	0.84	0.30	0.97	1.07	0.40	1.00	0.40	0.82	0.73	0.83	1.17	0.38	0.89	0.92			0.80	1
ZC	0.73	0.80	1.03	1.06	0.69	0.73	0.43	1.02	1.11	0.50	0.82	0.43	0.59	0.76	0.48	0.94	0.25	0.84	0.72	0.56	0.75		
Mean	0.93	0.77	0.76	1.00	0.69	0.73	0.36	0.96	0.95	0.50	0.87	0.42	0.90	0.74	0.72	1.01	0.32	0.86	0.80	0.92	0.79	0.76	

**Table-3.9 IVTC: Initial Varietal Trial in Forage Cowpea: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)				NDF (%)					IVDMD (%)			
	Ranchi	Ludhiana	Average	Rank	Anand	Ranchi	Ludhiana	Average	Rank	Ludhiana	Hisar	Average	Rank
Culture-1	46.9	30.2	38.6	4	66.0	54.8	41.2	54.0	5	60.0	62.8	61.4	2
MFC-09-2	42.9	31.0	37.0	1	67.0	55.8	42.2	55.0	7	60.0	59.2	59.6	6
EC-548872-1	50.3	31.2	40.8	7	66.0	55.6	41.2	54.3	6	61.2	62.8	62.0	1
UPC-1101	44.7	31.2	38.0	2	64.0	54.4	41.2	53.2	1	61.2	58.0	59.6	7
IPOK-1/52-1	50.8	32.5	41.7	8	62.0	55.0	43.5	53.5	3	59.2	62.8	61.0	3
UPC-1102	49.4	31.0	40.2	6	64.0	52.8	43.0	53.3	2	58.8	62.8	60.8	4
BL-1 (NC)	47.7	30.6	39.2	5	71.0	55.2	42.2	56.1	8	58.4	59.8	59.1	8
UPC-5286 (NC)	44.5	32.0	38.3	3	65.0	53.6	42.9	53.8	4	59.9	59.6	59.8	5
ZC	48.5	32.3			67.0	53.2	42.4			58.0	62.6		
Mean	47.2	31.2	39.2		65.6	54.7	42.2	54.2		59.8	61.0	60.4	

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

(Table Reference: 4.1 to 4.10)

In forage cowpea, two entries namely RR-3 and MFC-09-1 along with national checks namely Bundel Lobial-1 (BL-1) and UPC-5286 and three zonal checks i.e. Bundel Labia-2 (BL-2), UPC-622 and UPC-9202 for respective zones at 23 locations across the five zones of the country. For the character green forage yield (q/ha), entries RR-3 (23.0%) and MFC-09-1 (14.9%) in Hill Zone, MFC-09-1 (1.1%) in North-West Zone, RR-3 (1.9%) and MFC-09-1 (3.9%) in North-East Zone and MFC-09-1 (2.3 and 18.8%) in Central and South Zone respectively, exhibited their superiority whereas at national level entry MFC-09-1 (5.6%) ranked first for this character.

Similarly for dry matter yield (q/ha) entry MFC-09-1 proved superiority with 45.1 percent in Hill Zone, 3.1 percent in North East Zone and 14.0 percent in South Zone. Another entry RR-3 exhibited superiority with 23.1 and 10.2 percent in Hill and North East Zone, respectively. Even at national level, entry MFC-09-1 (3.1%) recorded superiority over best national check. For fodder production potential (q/ha/day), entry MFC-09-1 maintained superiority both for green forage and dry matter production potential.

For evaluation against quality parameter MFC-09-1 (15.8%) adjudged good performer for crude protein whereas for crude protein yield, national check UPC-5286 ranked first. For the character plant height and leafiness (L/S ratio) respective national check and zonal check maintained superiority. For other quality parameters like NDF (%), ADF (%), IVDMD (%) and DDM (q/ha), national check Bundel Lobia-1 exhibited superiority over all testing entries.

**Table- 4.1 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

**Cont...**

Entries	Hill Zone			North West Zone							North East Zone									
	Al-mora	Rank	Superiority%	Ludhi-ana	Hisar	Pant-nagar	Bika-ner	Ave- rage	Rank	Superiority%	Faiza- bad	Ran- chi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Shi- long	Ave- rage	Rank	Superiority%
RR-3	367.7	1	23.0	622.9	489.6	186.6	286.3	396.3	4		299.0	192.8	167.7	255.8	250.9	314.0	61.0	220.2	2	1.9
MFC-09-1	343.3	2	14.9	611.5	543.8	277.4	307.6	435.0	1	1.1	257.7	200.6	176.9	344.9	234.2	281.0	76.9	224.6	1	3.9
BL-1 (NC)	251.0	5		587.5	552.1	172.4	236.2	387.0	5		219.4	145.9	126.2	266.8	214.2	232.0	58.0	180.3	5	
UPC-5286 (NC)	298.9	3		608.3	531.3	266.6	314.3	430.1	2		293.5	190.2	155.0	275.1	262.9	263.0	73.5	216.2	3	
ZC	290.6	4		515.6	589.6	244.1	287.0	409.1	3		184.7	169.3	212.9	293.8	224.2	259.0	84.3	204.0	4	
Mean	296.0			580.7	554.2	240.1	286.2	415.3			238.8	176.5	167.8	295.1	233.9	258.8	73.2	206.3		
CD at 5%	20.1			6.6	61.1	19.9	NS				56.4	37.2	14.5	2.9	6.4	34.5	8.5			
CV%	6.7			6.0	7.2	4.7	17.2				14.6	13.4	6.9	3.5	14.7	9.2	7.8			

ZC [BL-2 (NWZ), UPC-622 (NEZ,HZ), UPC-9202 (CZ,SZ)]

**Table- 4.1 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	Central Zone									South Zone								All India		
	An-and	Jha-nsi	Jabal-pur	Rah-uri	Uruli-kanchan	Kan-pur	Ave-age	Rank	Superi- ority%	Coim-batore	Vella-yani	Man-dya	Dhar-wad	Hyde-rabad	Ave-age	Rank	Superi- ority%	Ave-age	Rank	Superi- ority%
RR-3	210.0	168.7	77.0	339.5	527.0	454.6	296.1	5		187.5	271.8	165.8	145.8	162.4	186.7	4		269.8	3	
MFC-09-1	184.0	191.6	185.3	569.6	535.3	406.9	345.5	1	2.3	204.2	350.8	301.6	187.5	220.7	253.0	1	18.8	304.0	1	5.6
BL-1 (NC)	184.0	274.9	57.2	329.0	497.8	475.2	303.0	4		102.1	267.8	183.2	106.3	162.4	164.4	5		247.9	4	
UPC-5286 (NC)	151.0	162.4	192.5	532.9	510.3	477.3	337.7	2		214.6	296.8	234.6	137.5	181.2	212.9	3		288.0	2	
ZC	147.0	214.5	148.8	355.1	587.4	365.8	303.1	3		137.5	344.5	252.6	170.8	193.7	219.8	2				
Mean	166.5	210.9	146.0	446.7	532.7	431.3	322.3			164.6	315.0	243.0	150.5	189.5	212.5			277.4		
CD at 5%	36.7	1.4	34.9	64.0	29.2	38.9				25.3	52.1	21.6	19.5	40.5						
CV%	13.6	8.0	17.1	9.8	6.3	5.9				9.7	5.5	6.1	8.5	14.3						

**Table- 4.2 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

**Cont...**

Entries	Hill Zone			North West Zone							North East Zone									
	Al-mora	Rank	Superiority%	Ludhi-ana	Hi-sar	Pant-nagar	Bika-ner	Ave- rage	Rank	Superiority%	Faiza- bad	Ran- chi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Shi- long	Ave- rage	Rank	Superiority%
RR-3	57.6	2	23.1	155.7	80.8	28.1	47.0	77.9	3		77.5	41.1	25.2	60.5	45.5	66.8	9.5	46.6	1	10.2
MFC-09-1	67.9	1	45.1	152.9	87.0	39.7	49.7	82.3	2		56.6	37.6	21.4	80.3	38.4	63.9	6.8	43.6	2	3.1
BL-1 (NC)	39.3	5		146.9	91.1	25.8	45.7	77.4	4		52.1	27.1	18.7	62.9	40.5	50.4	5.3	36.7	5	
UPC-5286 (NC)	46.8	3		167.3	83.7	38.4	50.4	84.9	1		61.0	35.4	23.7	62.2	44.8	57.2	11.6	42.3	3	
ZC	45.5	4		103.1	95.8	35.2	49.5	70.9	5		46.6	30.7	34.2	66.8	40.0	56.3	9.8	40.6	4	
Mean	49.9			142.5	89.4	34.8	48.8	78.9			54.1	32.7	24.5	68.0	40.9	57.0	8.4	40.8		
CD at 5%	6.6			3.5	NS	2.9	NS				10.8	8.1	2.2	7.8	1.5	8.7	1.6			
CV%	5.2			10.6	8.3	4.6	17.5				11.9	15.3	7.0	3.8	8.2	9.1	12.0			

**Table- 4.2 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	Central Zone									South Zone								All India		
	Ana nd	Jha- nsi	Jaba- lpur	Rah- uri	Uruli- kanchan	Kan- pur	Ave- rage	Rank	Superi- ority%	Coim- batore	Vella- yani	Man- dya	Dhar- wad	Hydera- bad	Ave- rage	Rank	Superi- ority%	Ave- rage	Rank	Superi- ority%
RR-3	27.9	45.5	2.2	48.5	63.9	109.8	49.6	5		30.0	53.2	26.4	31.4	19.9	32.2	4		50.2	3	
MFC-09-1	23.9	46.1	37.6	69.8	62.7	91.4	55.3	2		27.3	68.8	43.4	38.2	25.2	40.6	1	14.0	53.8	1	3.1
BL-1 (NC)	25.9	65.9	10.3	42.1	69.7	114.4	54.7	3		14.4	52.5	34.3	20.2	18.9	28.1	5		46.7	4	
UPC-5286 (NC)	21.4	44.0	13.9	79.2	63.0	119.0	56.7	1		32.9	58.2	37.5	29.4	19.9	35.6	3		52.2	2	
ZC	20.7	58.7	28.5	46.3	77.8	92.6	54.1	4		21.0	67.6	30.7	38.3	22.1	35.9	2				
Mean	23.0	53.7	22.6	59.4	68.3	104.3	55.2			23.9	61.8	36.5	31.5	21.5	35.0			50.7		
CD at 5%	5.1	9.7	6.8	8.8	8.8	4.4				3.1	10.2	4.6	4.4	NS						
CV%	13.8	5.5	17.5	9.9	10.6	6.6				7.9	5.5	8.4	8.9	14.9						

**Table-4.3 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Entries	Kan-pur	An-and	Coim-batore	Jabal-pur	Bika-ner	Ran-chi	Faiza-bad	Kal-yani	Hyde-rabad	Man-dya	Ra-huri	Uruli-kanchan	Vella-yani	Jor-hat	Ludh-iana	Jha-nsi	Hi-sar	Bhuba-neswar	Pu-sa	Pant-nagar	Dhar-wad	Shi-long	Ave- rage	Rank
RR-3	5.41	4.12	2.88	0.85	3.62	1.89	3.93	2.18	2.77	2.75	4.99	7.22	4.38	2.97	6.56	2.19	7.25	4.49	5.32	2.17	2.43	0.76	3.69	4
MFC-09-1	5.35	3.35	3.35	2.08	3.89	2.20	3.57	2.39	4.07	4.97	11.39	7.14	5.67	2.66	6.44	2.57	8.95	5.39	4.68	3.19	3.13	0.93	4.43	1
BL-1 (NC)	8.80	3.61	1.76	0.63	2.99	1.62	2.92	1.66	3.80	3.22	4.77	6.55	4.32	3.23	6.18	3.59	9.56	4.23	4.07	2.10	1.77	0.69	3.73	3
UPC-5286 (NC)	6.04	2.10	3.41	2.16	3.98	1.90	4.19	1.76	3.06	3.76	10.25	7.09	4.78	3.18	6.40	2.06	8.08	4.74	4.61	3.09	2.29	0.88	4.08	2
ZC	5.08	2.10	2.29	1.67	3.63	1.73	2.49	2.39	3.74	4.34	5.22	7.94	5.56	3.30	5.43	2.89	9.43	4.82	4.54	2.95	2.85	1.03		
Mean	6.32	2.79	2.70	1.64	3.62	1.86	3.29	2.05	3.67	4.07	7.91	7.18	5.08	3.09	6.11	2.78	9.01	4.80	4.48	2.83	2.51	0.88	3.98	

**Table-4.4 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Kan-pur	An-and	Coim-batore	Jabal-pur	Bika-ner	Ran-chi	Faiza-bad	Kal-yani	Hyde-rabad	Man-dya	Ra-huri	Uruli-kanchan	Jor-hat	Ludh-iana	Jhansi	Hisar	Bhuba-neswar	Pusa	Dha-rwad	Pan-tnagar	Ave- rage	Rank
RR-3	1.31	0.55	0.46	0.15	0.60	0.40	1.02	0.33	0.34	0.44	0.71	0.88	0.53	1.64	0.57	1.20	1.06	1.13	0.52	0.33	0.71	3
MFC-09-1	1.20	0.44	0.45	0.42	0.63	0.38	0.78	0.29	0.47	0.72	1.40	0.84	0.42	1.61	0.59	1.43	1.26	1.06	0.64	0.46	0.77	1
BL-1 (NC)	2.12	0.51	0.25	0.11	0.58	0.30	0.69	0.25	0.44	0.60	0.61	0.92	0.61	1.55	0.88	1.58	1.00	0.88	0.34	0.31	0.73	2
UPC-5286 (NC)	1.51	0.30	0.52	0.42	0.64	0.33	0.87	0.27	0.34	0.60	1.52	0.87	0.54	1.76	0.57	1.27	1.07	1.00	0.49	0.45	0.77	1
ZC	1.29	0.30	0.35	0.32	0.63	0.31	0.63	0.38	0.43	0.53	0.68	1.05	0.59	1.09	0.78	1.53	1.10	0.99	0.64	0.43		
Mean	1.53	0.39	0.39	0.32	0.62	0.33	0.74	0.30	0.42	0.61	1.05	0.92	0.54	1.50	0.71	1.45	1.11	0.98	0.53	0.41	0.75	



**Table-4.5 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	Anand	Coim-batore	Jabal-pur	Ran-chi	Faiza-bad	Kal-yani	Hyde-rabad	Man-dya	Rah-uri	Uruli-kanchan	Jor-hat	Ludh-iana	Hisar	Bhuba-neswar	Ave- rage	Rank
RR-3	3.6	4.9	1.8	5.4	13.8	4.2	3.3	4.5	7.0	10.3	5.1	25.9	10.6	8.8	7.8	3
MFC-09-1	3.0	6.3	4.7	4.6	9.3	3.1	4.0	7.5	9.6	10.0	5.1	26.8	12.4	11.7	8.4	2
BL-1 (NC)	3.5	3.1	1.4	3.9	8.9	2.9	2.7	5.2	5.9	11.4	4.9	26.5	12.6	9.4	7.3	4
UPC-5286 (NC)	2.9	5.9	5.0	4.5	10.7	3.6	3.1	5.0	11.6	9.9	5.7	32.9	11.0	9.3	8.6	1
ZC	2.7	4.8	3.7	3.8	7.8	4.5	3.6	4.9	6.7	12.4	5.5	18.2	12.6	10.1		
Mean	3.0	5.0	3.7	4.2	9.2	3.5	3.4	5.7	8.5	10.9	5.3	26.1	12.1	10.1	8.0	

**Table-4.6 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	Anand	Coim-batore	Ran-chi	Faiza-bad	Kaly-ani	Hyde-rabad	Man-dya	Rah-uri	Uruli-kanchan	Jor-hat	Ludh-iana	Hisar	Bhuba-neswar	Pant-nagar	Ave- rage	Rank
RR-3	12.7	16.2	13.1	17.8	16.8	16.6	17.1	14.3	16.1	11.4	16.6	13.1	14.5	19.3	15.4	3
MFC-09-1	12.4	22.8	12.3	16.5	14.3	15.8	17.3	13.8	15.9	13.4	17.5	14.2	14.6	20.1	15.8	1
BL-1 (NC)	13.6	21.5	14.4	17.0	15.8	14.0	15.3	13.9	16.4	12.1	18.1	13.8	15.0	20.1	15.8	1
UPC-5286 (NC)	13.5	18.0	12.7	17.5	15.0	15.8	13.3	14.6	15.7	12.8	19.7	13.1	15.0	21.0	15.5	2
ZC	12.8	22.8	12.3	16.8	13.1	16.2	16.2	14.5	16.0	13.8	17.6	13.1	15.1	19.3		
Mean	13.1	21.2	12.9	17.0	14.5	15.5	15.5	14.2	16.0	13.0	18.2	13.6	14.9	20.1	15.6	

**Table-4.7 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Plant Height (cm)**

Entries	Kan-pur	An-and	Coim-batore	Jabal-pur	Bika-ner	Ran-chi	Faiza-bad	Kal-yani	Hyde-rabad	Man-dya	Uruli-kanchan	Jor-hat	Ludh-iana	Jha-nsi	Vella-yani	Bhuba-neswar	Pant-nagar	Hisar	Rah-uri	Shi-long	Ave- rage	Rank
RR-3	134.8	127.8	96.5	159.2	121.3	161.7	188.7	124.9	105.5	52.9	204.3	150.0	258.8	292.5	127.5	197.6	110.0	196.3	192.0	64.8	153.3	3
MFC-09-1	138.4	126.8	78.7	195.0	83.0	140.3	177.8	120.9	93.0	64.9	203.8	145.0	221.3	273.5	123.3	239.6	168.3	191.0	144.0	46.8	148.8	4
BL-1 (NC)	130.5	122.3	78.8	157.1	152.5	170.9	168.7	126.9	124.8	40.5	181.5	162.7	300.0	339.3	117.7	204.1	103.3	214.5	132.0	100.0	156.4	1
UPC-5286 (NC)	142.2	128.6	89.2	206.7	87.8	164.4	175.6	126.4	125.2	43.4	233.2	156.0	295.0	207.0	98.3	219.4	126.7	167.5	163.0	96.5	152.6	2
ZC	142.9	121.0	90.0	176.3	154.5	149.5	164.5	134.2	140.5	64.7	227.2	169.5	263.8	259.0	103.0	233.4	86.0	248.8	197.0	113.3		
Mean	138.5	124.7	84.2	183.8	119.4	156.3	171.7	127.1	120.9	53.4	211.4	158.3	270.0	269.7	110.6	224.1	121.1	205.4	159.0	89.1	152.8	

**Table-4.8 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: Leaf Stem Ratio**

Entries	Kan-pur	Coim-batore	Jabal-pur	Bika-ner	Ran-chi	Faiza-bad	Kaly-ani	Hydera-bad	Man-dya	Rah-uri	Uruli-kanchan	Jor-hat	Ludh-iana	Jha-nsi	Vella-yani	Bhuba-neswar	Pant-nagar	Hisar	Pusa	Shi-long	Ave- rage	Rank
RR-3	0.55	0.50	0.60	0.94	0.65	0.75	1.14	0.87	0.38	0.56	0.74	1.08	0.82	1.03	0.66	0.88	0.77	0.37	0.88	0.68	0.74	3
MFC-09-1	0.71	0.42	0.87	1.07	0.45	0.70	0.68	0.79	0.46	0.77	0.98	1.12	1.00	1.13	0.60	1.24	0.82	0.40	0.88	0.57	0.78	2
BL-1 (NC)	0.53	0.48	0.54	1.03	0.59	0.64	1.00	0.64	0.40	0.74	0.94	0.77	0.82	0.92	0.73	0.96	0.77	0.43	0.86	0.40	0.71	4
UPC-5286 (NC)	0.63	0.47	0.99	1.05	0.83	0.68	0.93	0.86	0.52	0.65	0.90	1.22	1.00	0.96	0.65	1.02	0.83	0.30	0.87	1.23	0.83	1
ZC	0.59	0.47	0.67	1.01	0.30	0.62	0.87	0.73	0.43	0.60	0.74	0.85	1.00	0.71	0.67	1.20	0.69	0.39	0.87	0.68		
Mean	0.62	0.46	0.77	1.04	0.54	0.66	0.87	0.76	0.45	0.69	0.89	0.99	0.96	0.93	0.66	1.10	0.78	0.38	0.87	0.72	0.76	

**Table-4.9 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: NDF (%) & ADF (%)**

Entries	NDF (%)						ADF (%)					
	Ranchi	Ludhiana	Rahuri	Pantnagar	Average	Rank	Ranchi	Ludhiana	Pantnagar	Rahuri	Average	Rank
RR-3	54.2	45.8	59.1	58.6	54.4	2	49.5	36.8	49.4	46.7	45.6	4
MFC-09-1	55.1	44.2	60.2	59.0	54.6	3	50.2	34.0	48.8	46.6	44.9	3
BL-1 (NC)	53.2	43.2	60.6	58.0	53.8	1	46.0	33.8	49.6	46.7	44.0	1
UPC-5286 (NC)	53.8	42.6	62.8	60.0	54.8	4	48.3	33.3	49.8	47.9	44.8	2
ZC	55.4	44.0	62.3	59.4			50.2	34.4	50.4	48.3		
Mean	54.4	43.5	61.5	59.1	54.4		48.7	33.9	49.7	47.4	44.8	

**Table-4.10 AVTC-1: First Advanced Varietal Trial in Forage Cowpea: IVDMD (%) & DDM (q/ha)**

Entries	IVDMD (%)							DDM (q/ha)	
	Ranchi	Ludhiana	Hisar	Rahuri	Pantnagar	Average	Rank	Hisar	Rank
RR-3	62.2	59.0	60.8	53.9	64.0	60.0	3	49.1	4
MFC-09-1	61.4	58.6	57.8	57.3	63.2	59.7	4	50.3	3
BL-1 (NC)	63.4	60.2	61.0	58.2	64.6	61.5	1	55.6	1
UPC-5286 (NC)	64.0	61.0	61.2	52.2	65.4	60.8	2	51.2	2
ZC	63.2	58.4	63.7	53.4	63.4				
Mean	63.0	59.6	60.9	55.3	64.2	60.5		51.6	

## 5. AVTC-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE COWPEA

(Table Reference: 5.1 to 5.9)

An advanced varietal trial in forage cowpea comprising two entries namely MFC-08-14 and IL-1177 along with two national checks i.e. Bundel Lobia-1 (BL-1) and UPC-5286 and two zonal checks viz., UPC-622 and UPC-9202 for respective zones was conducted at 11 locations in North East and South Zone of the country. Results of the trial obtained from different centres clearly revealed that for green forage yield (q/ha) entry MFC-08-14 proved superiority in North East Zone by 0.9 percent, 14.8 percent in South Zone and at all India level it was 11.4 percent superior than best national check. On the other hand entry IL-1177 was found superior by 1.6 percent in North East Zone only.

Similarly for dry matter yield (q/ha), entry MFC-08-14 (11.5%) and IL-1177 (7.7%) in North East Zone and MFC-08-14 (15.7%) in South Zone proved superiority. At national level too, entry MFC-08-14 (16.5%) exhibited superiority over national check. For fodder production potential (q/ha/day), entry MFC-08-14 ranked first both for green forage and dry matter production potential.

For evaluation against quality parameter, entry MFC-08-14 ranked first for crude protein yield (q/ha) whereas entry IL-1177 ranked first for crude protein (%). For the character plant height, entry IL-1177 (137.29cm) and for leafiness (L/S ratio) entry IL-1177 (0.77) proved superiority against national check. For other quality parameters like ADF (%), NDF (%) and IVDMD (%) entry IL-1177 and MFC-08-14 exhibited their superiority with respect to national check.

**Table- 5.1: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha)**

Entries	North East Zone									South Zone								All India		
	Faiza- bad	Ran- chi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Ave- rage	Rank	Superi- ority%	Coim- batore	Vella- yani	Man- dya	Hyde- rabad	Dhar- wad	Ave- rage	Rank	Superi- ority%	Ave- rage	Rank	Superi- ority%
MFC-08-14	222.5	166.7	203.1	350.6	252.4	265.0	243.4	2	0.9	214.6	298.0	295.6	178.1	187.5	234.8	1	14.8	239.5	1	11.4
IL-1177	301.8	148.5	200.8	315.3	226.4	278.0	245.1	1	1.6	143.7	244.5	146.5	145.8	131.3	162.4	5		207.5	3	
BL-1 (NC)	308.2	164.1	178.3	273.5	216.4	231.0	228.6	4		218.7	267.5	181.6	176.0	150.0	198.8	3		215.0	2	
UPC-5286 (NC)	144.8	122.4	233.5	255.3	235.7	249.0	206.8	5		175.0	255.3	228.6	193.7	131.3	196.8	4		202.2	4	
ZC	242.3	182.3	245.0	241.7	278.3	258.0	241.3	3		172.9	276.0	241.3	161.4	170.8	204.5	2				
Mean	277.5	159.8	194.1	313.2	231.7	258.0	239.0			192.4	270.0	207.9	166.6	154.2	199.5			216.1		
CD at 5%	40.9	29.4	12.5	4.0	5.2	19.7				28.6	29.9	11.0	23.1	22.8						
CV%	10.6	12.2	4.7	4.7	11.9	11.3				10.0	3.6	3.3	8.8	9.6						

ZC [UPC-622 (NEZ), UPC-9202 (SZ)]

**Table- 5.2: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)**

Entries	North East Zone										South Zone								All India		
	Faiza- bad	Ra- nchi	Kal- yani	Bhuba- neswar	Jor- hat	Pusa	Ave- rage	Rank	Superi- ority%	Coim- batore	Vella- yani	Man- dya	Hyde- rabad	Dhar- wad	Ave- rage	Rank	Superi- ority%	Ave- age	Rank	Superi- ority%	
MFC-08-14	62.2	34.7	30.3	82.2	45.4	58.9	52.3	1	11.5	30.5	58.4	63.6	19.1	41.9	42.7	1	15.7	47.9	1	16.5	
IL-1177	68.4	25.2	30.5	76.3	41.9	60.4	50.5	2	7.7	21.0	47.9	36.5	13.6	28.1	29.4	5		40.9	3		
BL-1 (NC)	67.7	29.1	26.9	64.7	37.2	50.2	46.0	4		30.5	52.5	41.1	20.0	32.2	35.3	3		41.1	2		
UPC-5286 (NC)	41.5	26.9	38.0	61.5	40.3	55.3	43.9	5		24.9	50.1	53.9	18.7	24.9	34.5	4		39.6	4		
ZC	59.3	32.1	32.2	54.9	47.0	56.2	46.9	3		26.9	54.1	50.3	18.5	34.8	36.9	2					
Mean	66.1	29.7	29.2	74.4	41.5	56.5	49.6			27.3	52.9	47.1	17.6	32.4	35.8			42.4			
CD at 5%	11.8	5.8	1.9	9.5	1.7	7.3				4.5	3.6	7.7	4.2	4.4							
CV%	12.9	12.7	4.9	4.6	9.1	10.2				10.9	5.9	10.2	15.2	8.7							

**Table- 5.3: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)**

Entries	Coimbatore	Dharwad	Ranchi	Pusa	Vellayani	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Bhubaneswar	Average	Rank
MFC-08-14	3.46	3.13	1.70	4.49	4.97	3.13	3.35	4.35	2.94	4.68	5.48	3.79	1
IL-1177	2.48	2.19	1.93	4.79	4.00	4.19	2.67	3.18	2.21	2.57	4.78	3.18	3
BL-1 (NC)	3.37	2.50	2.05	4.05	4.45	4.05	3.48	3.04	1.96	3.23	4.48	3.33	2
UPC-5286 (NC)	3.02	2.19	1.26	4.37	4.25	2.13	3.22	3.31	3.07	3.68	4.26	3.16	4
ZC	3.14	2.85	2.05	4.37	4.60	3.23	2.89	3.91	2.69	3.88	4.17		
Mean	3.10	2.57	1.89	4.44	4.47	3.79	3.17	3.52	2.37	3.49	4.91	3.38	

**Table- 5.4: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)**

Entries	Coimbatore	Dharwad	Ranchi	Pusa	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Bhubaneswar	Average	Rank
MFC-08-14	0.49	0.70	0.35	1.01	0.87	0.36	0.78	0.44	1.01	1.29	0.73	1
IL-1177	0.36	0.47	0.33	1.04	0.95	0.25	0.58	0.34	0.64	1.16	0.61	2
BL-1 (NC)	0.47	0.54	0.36	0.88	0.89	0.40	0.52	0.30	0.73	1.06	0.61	2
UPC-5286 (NC)	0.43	0.41	0.28	0.97	0.61	0.31	0.56	0.50	0.87	1.03	0.60	3
ZC	0.49	0.58	0.36	0.95	0.79	0.33	0.66	0.35	0.81	0.95		
Mean	0.44	0.54	0.35	0.98	0.90	0.34	0.63	0.36	0.79	1.17	0.64	

**Table- 5.5: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)**

Entries	Coimbatore	Ranchi	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Bhubaneswar	Average	Rank
MFC-08-14	5.99	4.85	10.10	3.30	5.41	3.60	10.80	12.53	7.07	1
IL-1177	3.96	3.85	11.70	2.40	5.38	4.30	6.70	10.89	6.15	3
BL-1 (NC)	7.09	4.20	11.90	3.50	4.29	3.00	5.60	9.87	6.18	2
UPC-5286 (NC)	5.31	3.53	7.00	2.90	5.49	4.70	8.70	8.94	5.82	4
ZC	5.25	5.33	9.80	3.10	6.21	4.70	9.40	8.41		
Mean	5.68	4.30	11.23	3.07	5.03	3.63	7.70	11.10	6.31	

**Table- 5.6: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Crude Protein (%)**

Entries	Coimbatore	Ranchi	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Bhubaneswar	Average	Rank
MFC-08-14	19.70	14.00	16.20	17.50	12.10	11.75	17.10	15.23	15.45	3
IL-1177	18.80	15.30	17.10	17.50	13.10	14.12	18.40	14.29	16.08	1
BL-1 (NC)	23.40	14.40	17.50	17.50	11.70	11.31	13.60	15.26	15.58	2
UPC-5286 (NC)	21.20	13.10	16.80	15.50	13.80	12.25	16.20	14.51	15.42	4
ZC	19.50	16.60	16.50	16.90	13.40	14.50	18.80	15.34		
Mean	20.63	14.57	16.93	17.50	12.30	12.39	16.37	14.93	15.63	



**Table- 5.7: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Plant Height (cm)**

Entries	Coimbatore	Ranchi	Vellayani	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Bhubaneswar	Average	Rank
MFC-08-14	85.00	132.50	111.80	168.90	77.40	140.50	126.00	44.90	245.60	125.84	4
IL-1177	83.20	169.30	105.00	175.70	109.40	177.20	130.70	45.30	239.85	137.29	1
BL-1 (NC)	80.20	172.80	127.50	179.50	111.90	152.00	129.70	49.10	229.80	136.94	2
UPC-5286 (NC)	91.00	145.70	108.80	165.60	102.20	141.70	133.60	44.50	213.50	127.40	3
ZC	86.00	160.10	124.80	170.10	114.90	152.70	129.20	51.60	196.40		
Mean	82.80	158.20	114.77	174.70	99.57	156.57	128.80	46.43	238.42	131.90	

**Table- 5.8: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: Leaf Stem Ratio**

Entries	Coimbatore	Ranchi	Vellayani	Faizabad	Hyderabad	Jorhat	Kalyani	Mandya	Pusa	Bhubaneswar	Average	Rank
MFC-08-14	0.41	0.57	0.65	0.70	0.92	0.85	0.73	0.28	0.91	1.19	0.72	2
IL-1177	0.39	0.65	0.69	0.71	0.90	0.92	1.00	0.30	0.89	1.21	0.77	1
BL-1 (NC)	0.44	0.55	0.61	0.75	0.71	0.95	0.85	0.27	0.87	1.09	0.71	3
UPC-5286 (NC)	0.42	0.64	0.60	0.68	0.90	1.23	1.00	0.32	0.88	0.98	0.77	1
ZC	0.42	0.67	0.67	0.63	0.82	1.12	0.84	0.29	0.88	1.04		
Mean	0.41	0.59	0.65	0.72	0.84	0.91	0.86	0.28	0.89	1.16	0.74	

**Table- 5.9: AVTC-2: Second Advanced Varietal Trial in Forage Cowpea: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ranchi	Rank	Ranchi	Rank	Ranchi	Rank
MFC-08-14	47.5	2	55.2	3	64.0	1
IL-1177	44.0	1	53.8	1	63.0	3
BL-1 (NC)	49.0	4	54.4	2	63.2	2
UPC-5286 (NC)	47.9	3	54.4	2	55.2	4
Mean	47.1		54.5		61.4	

## **6. AVTC-2 (SEED): ADVANCED VARIETAL TRIAL IN FORAGE COWPEA (SEED)**

(Table Reference: 6)

Results for the advanced varietal trial in forage cowpea for seed with two entries namely IL-1177 and MFC-08-14 along with two national checks i.e. UPC-5286 and Bundel Lobia-1 and two zonal checks UPC-622 and UPC-9202 for North East and South Zone, respectively was conducted at 12 locations of these two zones. Results obtained from different location with respect to seed yield (q/ha) clearly revealed that in North East Zone entry IL-1177 (3.4%) and in South Zone, entry MFC-08-14 (10.6%) established its superiority over national/zonal check. Coming to the national level, here entry MFC-08-14 with 6.92 (q/ha) seed yield gained 6.0 percent superiority over national check Bundel Lobia-1 (6.53 q/ha).

**Table- 6: AVTC-2 (Seed): Second Advanced Varietal Trial in Forage Cowpea (Seed): Seed Yield (q/ha)**

Entries	North East Zone									South Zone									All India		
	Faiza-bad	Ran-chi	Kal-yani	Bhuba-neswar	Jor-hat	Pu-sa	Ave-rage	Ra-nk	Super-iority%	Coim-batore	Vella-yani	Man-dya	Hyde-rabad	Dhar-wad	Pondi-cherry	Ave-rage	Ra-nk	Super-iority%	Ave-rage	Ra-nk	Super-iority%
IL-1177	0.76	8.21	12.87	4.75	10.58	4.73	6.98	1	3.4	3.54	2.85	5.33	4.10	3.96	5.30	4.18	5		5.58	3	
MFC-08-14	0.44	5.99	13.22	6.14	9.25	3.58	6.44	3		7.29	3.49	14.60	4.80	7.85	6.35	7.40	1	10.6	6.92	1	6.0
UPC-5286 (NC)	0.75	5.86	13.12	5.56	9.15	3.21	6.28	5		4.90	2.71	6.08	4.00	3.46	7.48	4.77	4		5.52	4	
BL-1 (NC)	0.72	7.03	12.93	5.20	8.25	4.07	6.37	4		5.65	2.74	12.29	6.90	4.25	8.33	6.69	2		6.53	2	
ZC	1.08	7.82	13.02	5.74	8.25	4.59	6.75	2		7.08	2.58	5.49	2.90	4.17	9.15	5.23	3				
Mean	0.75	6.98	13.03	5.48	9.10	4.04	6.56			5.69	2.87	8.76	4.54	4.74	7.32	5.65			6.14		
CD at 5%	0.60	1.67	0.41	0.07	0.70	0.37				0.57	0.33	1.86	0.70	0.41	0.77						
CV%	16.5	15.9	2.5	4.2	7.9	6.2				6.6	3.7	13.8	9.5	0.6	6.8						

ZC [UPC-622 (NEZ), UPC-9202 (SZ)]

## 7. IVT RICE BEAN: INITIAL VARIETAL TRIAL IN FORAGE RICE BEAN

(Table Reference: 7.1 to 7.9)

An initial varietal trial in forage rice bean with five entries namely KRB-26, JRBJ-06-1, JRB-15, BFRB-16 and JRB-16 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 (q/ha/day). Even for quality parameters Bidhan-1 established best performance for crude protein yield (q/ha) and crude protein (%). With the plant height of 144.60 cm, Bidhan-1 adjudged best for growth. For the character leafiness (L/S ratio), entry JRB-16 (0.84) ranked first followed by JRB-15 (0.78). For other quality parameters like NDF (%) and ADF (%), Bidhan-2 maintained its superiority.

**Table- 7.1: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Green Forage Yield (q/ha)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Jabalpur	Raipur	Palghar	Shilong*	Average	Rank	Superiority%
KRB-26	267.6	263.8	255.2	246.2	279.0	216.6	183.3	257.7	270.9	6.7	248.9	6	
JRBJ-06-1	262.5	277.7	275.0	243.7	347.0	278.3	264.5	252.8	257.4	32.2	273.2	3	
JRB-15	178.3	159.7	264.5	322.3	338.0	305.0	106.2	245.0	276.4	24.7	243.9	8	
BFRB-16	173.2	180.5	300.0	318.3	353.0	313.3	127.0	264.0	255.3	24.4	253.8	4	
JRB-16	233.8	166.6	349.9	203.9	271.0	295.0	164.5	279.3	265.7	38.9	247.7	7	
Bidhan-1 (NC)	260.3	250.0	342.7	258.6	361.0	275.0	199.9	315.8	256.8	19.4	280.0	2	
Bidhan-2 (NC)	300.0	319.4	296.8	267.6	294.0	313.3	195.8	288.6	248.7	20.3	280.5	1	
RBL-6 (NC)	167.1	250.0	231.2	248.7	263.0	263.3	241.6	296.7	280.6	13.6	249.1	5	
Mean	229.3	216.4	297.9	265.5	324.8	280.5	174.2	269.1	263.8	24.4	257.9		
CD at 5%	19.7	75.0	30.2	11.9	34.6	29.9	51.0	29.8	30.3	20.6			
CV%	6.1	18.3	6.0	14.9	10.7	3.5	15.7	6.2	6.9	52.3			

\*Not included in All India Average due to CV $\geq$ 20

**Table- 7.2: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Dry Matter Yield (q/ha)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Jabalpur	Raipur	Palghar	Shilong*	Average	Rank	Superiority%
KRB-26	33.7	52.4	59.1	42.2	59.4	42.5	38.7	50.2	53.1	0.9	47.9	8	
JRBJ-06-1	29.9	50.4	63.4	47.1	72.3	54.6	57.2	49.8	50.5	4.4	52.8	3	
JRB-15	30.9	23.3	63.3	59.6	71.9	59.8	21.6	49.4	54.2	5.8	48.2	6	
BFRB-16	30.3	26.9	71.7	61.5	76.7	61.4	26.0	52.0	50.1	9.9	50.7	4	
JRB-16	40.3	27.9	83.9	35.6	57.7	57.8	34.3	54.0	52.1	3.9	49.3	5	
Bidhan-1 (NC)	44.5	49.8	82.7	48.2	76.8	53.9	42.5	63.7	50.4	4.6	56.9	2	
Bidhan-2 (NC)	55.3	65.5	71.0	51.5	62.6	61.5	41.4	55.1	48.8	4.9	57.0	1	
RBL-6 (NC)	29.6	29.1	54.6	45.8	57.2	51.6	51.8	58.3	55.0	7.1	48.1	7	
Mean	34.9	38.5	70.7	49.0	69.1	55.0	36.7	53.2	51.7	4.9	51.0		
CD at 5%	3.8	12.1	6.5	3.5	10.4	5.9	10.8	8.1	7.2	4.8			
CV%	7.4	16.8	5.4	10.2	9.2	3.5	15.8	8.5	8.4	53.1			

**Table- 7.3: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Green Forage Yield (q/ha/day)**

Entries	Kalyani	Jorhat	Vellayani	Ranchi	Jabalpur	Bhubaneswar	Pusa	Shilong	Raipur	Palghar	Average	Rank
KRB-26	2.50	3.03	3.61	2.64	1.60	2.36	3.49	0.10	2.48	4.36	2.62	8
JRBJ-06-1	2.45	3.00	4.64	2.78	2.36	2.64	4.34	0.49	2.38	4.15	2.92	5
JRB-15	2.05	3.97	5.08	2.66	0.92	2.70	4.12	0.37	2.31	4.45	2.86	6
BFRB-16	1.92	3.92	5.70	2.96	1.13	2.91	4.25	0.37	2.54	4.11	2.98	3
JRB-16	2.19	2.51	4.92	2.78	1.46	3.46	3.39	0.59	2.68	4.28	2.83	7
Bidhan-1 (NC)	2.43	3.19	4.58	2.50	1.76	3.23	4.40	0.29	3.07	4.14	2.96	4
Bidhan-2 (NC)	3.33	3.30	5.70	3.19	1.71	2.77	3.59	0.31	2.80	4.01	3.07	2
RBL-6 (NC)	1.86	3.71	4.39	4.90	2.11	2.29	3.25	0.21	2.88	4.52	3.01	1
Mean	2.26	3.27	4.76	2.72	1.54	2.88	4.00	0.37	2.58	4.25	2.86	

**Table- 7.4: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Dry Matter Yield (q/ha/day)**

Entries	Kalyani	Jorhat	Ranchi	Jabalpur	Bhubaneswar	Pusa	Raipur	Palghar	Average	Rank
KRB-26	0.32	0.52	0.49	0.34	0.55	0.74	0.48	0.55	0.50	5
JRBJ-06-1	0.28	0.58	0.51	0.51	0.61	0.90	0.47	0.53	0.55	2
JRB-15	0.34	0.73	0.39	0.18	0.65	0.88	0.47	0.57	0.53	4
BFRB-16	0.34	0.75	0.44	0.23	0.70	0.92	0.50	0.52	0.55	2
JRB-16	0.38	0.44	0.47	0.30	0.83	0.72	0.52	0.54	0.53	4
Bidhan-1 (NC)	0.42	0.59	0.50	0.37	0.78	0.94	0.62	0.53	0.59	1
Bidhan-2 (NC)	0.61	0.63	0.66	0.36	0.66	0.76	0.53	0.51	0.59	1
RBL-6 (NC)	0.33	0.68	0.48	0.45	0.54	0.71	0.56	0.57	0.54	3
Mean	0.35	0.60	0.47	0.32	0.69	0.85	0.51	0.54	0.54	



**Table- 7.5: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Crude Protein Yield (q/ha)**

Entries	Jorhat	Ranchi	Jabalpur	Bhubaneswar	Raipur	Average	Rank
KRB-26	7.53	7.11	3.62	8.40	6.89	6.71	6
JRBJ-06-1	8.76	7.06	8.33	9.24	6.88	8.05	3
JRB-15	11.10	3.05	2.70	9.03	6.70	6.52	7
BFRB-16	10.78	3.77	3.54	10.90	7.19	7.24	4
JRB-16	5.99	4.03	4.79	13.12	7.50	7.09	5
Bidhan-1 (NC)	8.73	6.76	6.04	12.64	9.05	8.64	1
Bidhan-2 (NC)	8.33	9.46	5.83	10.07	7.70	8.28	2
RBL-6 (NC)	8.61	4.07	7.50	7.85	8.22	7.25	4
Mean	8.82	5.30	4.84	10.55	7.37	7.37	

**Table- 7.6: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Crude Protein (%)**

Entries	Jorhat	Ranchi	Bhubaneswar	Raipur	Average	Rank
KRB-26	18.1	13.6	14.2	13.8	14.9	5
JRBJ-06-1	18.8	14.0	14.6	13.8	15.3	2
JRB-15	19.3	13.1	14.3	13.6	15.1	4
BFRB-16	17.7	14.0	15.2	13.8	15.2	3
JRB-16	17.1	14.4	15.6	13.9	15.3	2
Bidhan-1 (NC)	18.3	13.6	15.3	14.2	15.4	1
Bidhan-2 (NC)	16.3	14.4	14.2	14.0	14.7	6
RBL-6 (NC)	19.0	14.0	14.4	14.1	15.4	1
Mean	18.2	13.8	14.9	13.8	15.2	

**Table- 7.7: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Plant Height (cm)**

Entries	Kalyani	Jorhat	Vellayani	Ranchi	Jabalpur	Bhubaneswar	Shilong	Raipur	Palghar	Average	Rank
KRB-26	99.8	147.3	123.7	115.1	209.0	145.2	22.2	189.3	148.7	133.4	6
JRBJ-06-1	93.0	144.7	116.0	128.1	246.3	164.5	35.0	185.1	130.2	138.1	3
JRB-15	89.2	167.3	135.7	92.0	170.2	158.2	60.5	182.8	159.9	135.1	5
BFRB-16	81.8	162.0	106.7	96.9	173.7	170.1	45.3	193.9	149.6	131.1	8
JRB-16	90.2	132.3	141.0	89.3	186.1	178.9	25.8	198.9	151.1	132.6	7
Bidhan-1 (NC)	97.8	112.3	128.3	121.7	224.2	174.3	90.2	205.3	147.1	144.6	1
Bidhan-2 (NC)	99.8	148.3	131.0	124.0	229.9	160.2	42.7	200.8	133.9	141.2	2
RBL-6 (NC)	83.2	120.0	141.3	99.5	237.1	150.7	41.7	202.2	160.3	137.3	4
Mean	92.0	144.3	125.2	107.2	201.6	165.2	46.5	192.5	147.8	135.8	

**Table- 7.8: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: Leaf Stem Ratio**

Entries	Kalyani	Jorhat	Vellayani	Ranchi	Jabalpur	Bhubaneswar	Pusa	Shilong	Raipur	Palghar	Average	Rank
KRB-26	1.00	0.89	0.75	0.46	0.90	0.84	0.93	0.79	0.57	0.83	0.80	4
JRBJ-06-1	1.00	0.82	0.81	0.47	0.98	0.94	1.01	0.68	0.58	0.51	0.78	5
JRB-15	1.10	1.14	0.64	0.56	0.54	0.87	0.99	1.05	0.55	0.90	0.83	2
BFRB-16	0.70	1.22	0.73	0.73	0.79	1.02	0.98	0.60	0.60	0.86	0.82	3
JRB-16	0.80	1.29	0.72	0.44	0.76	1.14	0.89	0.90	0.61	0.84	0.84	1
Bidhan-1 (NC)	0.80	0.77	0.77	0.35	0.80	1.06	0.97	1.02	0.66	0.80	0.80	4
Bidhan-2 (NC)	0.70	0.68	0.72	0.31	0.87	0.97	0.99	1.18	0.62	0.55	0.76	6
RBL-6 (NC)	0.60	0.96	0.77	0.56	0.88	0.81	0.96	0.52	0.64	0.92	0.76	6
Mean	0.90	1.02	0.74	0.50	0.80	0.98	0.96	0.84	0.60	0.79	0.81	

**Table- 7.9: IVT (Rice Bean): Initial Varietal Trial in Rice Bean: ADF (%) & NDF (%)**

Entries	ADF (%)		NDF (%)	
	Ranchi	Rank	Ranchi	Rank
KRB-26	44.4	6	53.8	7
JRBJ-06-1	42.0	3	51.6	6
JRB-15	41.5	2	49.8	4
BFRB-16	43.5	5	47.2	2
JRB-16	42.2	4	51.2	5
Bidhan-1 (NC)	45.8	7	49.2	3
Bidhan-2 (NC)	33.4	1	42.2	1
RBL-6 (NC)	46.2	8	54.6	8
Mean	43.2		50.5	

## 8. AVT RICE BEAN-1: FIRST ADVANCED VARIETAL TRIAL IN FORAGE RICE BEAN

(Table Reference: 8.1 to 8.9)

In forage Rice bean, three entries namely JRB-05-4, JRB-13 and BFRB-15 along with national check Bidhan-1 was evaluated at eight locations across the country. For the character green forage yield (q/ha), entries BFRB-15 (6.7%), JRB-05-4 (0.2%) and for dry matter yield (q/ha), entries BFRB-15 (12.7%), JRB-05-4 (5.6%) and JRB-13 (0.6%) proved their superiority over national check Bidhan-1. Similarly for fodder production potential (q/ha/day), JRB-13 ranked first followed by BFRB-15 for green forage production potential whereas BFRB-15 followed by JRB-05-4 established its superiority for dry matter production potential. In quality parameter, entry BFRB-15 (9.26 q/ha, 16.0%) ranked first both for crude protein yield (q/ha) as well as for crude protein content(%).

For the character plant height and leafiness, all the testing entries surpassed their performance with respect to check Bidhan-1. For the character ADF (%), entry BFRB-1, for NDF (%), entry JRB-13 and for IVDMD (%) again entry BFRB-15 ranked first and established its superiority over national check.

**Table- 8.1: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Green Forage Yield (q/ha)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Jabalpur	Shilong	Average	Rank	Superiority%
JRBJ-05-4	298.8	218.8	267.3	245.1	354.0	203.6	289.6	40.3	239.7	2	0.2
JRB-13	343.3	125.0	222.0	307.5	358.0	282.4	214.4	40.7	236.7	4	
BFRB-15	365.5	208.4	314.7	269.6	379.0	236.6	224.8	44.0	255.3	1	6.7
Bidhan-1 (NC)	296.3	247.5	217.8	224.2	336.0	202.8	320.6	68.1	239.2	3	
Mean	335.9	184.1	268.0	274.1	363.7	240.9	242.9	41.7	243.9		
CD at 5%	13.0	48.2	29.2	6.4	25.1	24.3	50.4	1.7	1.7		
CV%	3.6	17.1	3.7	17.5	11.3	3.4	14.4	2.6			

**Table- 8.2: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Dry Matter Yield (q/ha)**

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Pusa	Vellayani	Jabalpur	Shilong	Average	Rank	Superiority%
JRBJ-05-4	51.9	55.8	62.7	46.2	77.0	39.9	57.0	3.5	49.2	2	5.6
JRB-13	61.9	23.1	52.6	59.1	74.6	55.4	44.3	4.1	46.9	3	0.6
BFRB-15	62.2	53.5	76.1	51.3	80.6	46.4	47.6	2.3	52.5	1	12.7
Bidhan-1 (NC)	45.9	56.9	51.8	36.0	70.0	39.8	68.9	3.3	46.6	4	
Mean	58.7	44.1	63.8	52.2	77.4	47.2	49.6	3.3	49.5		
CD at 5%	1.9	8.9	6.8	2.4	5.7	3.4	9.9	0.5	0.5		
CV%	3.0	13.8	3.6	15.2	7.4	4.8	13.2	11.3			

**Table- 8.3: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Green Forage Yield (q/ha/day)**

Entries	Vellayani	Kalyani	Jorhat	Ranchi	Jabalpur	Bhubaneswar	Pusa	Shilong	Average	Rank
JRBJ-05-4	3.27	2.35	3.60	2.29	2.50	2.45	4.37	0.60	2.68	4
JRB-13	5.04	2.84	4.65	1.60	1.89	2.20	4.48	0.54	2.90	1
BFRB-15	3.82	3.05	3.96	2.02	1.97	2.94	4.62	0.66	2.88	2
Bidhan-1 (NC)	3.27	2.45	3.39	2.43	2.86	2.11	4.20	1.03	2.72	3
Mean	4.04	2.75	4.07	1.97	2.12	2.53	4.49	0.60	2.82	

**Table- 8.4: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Dry Matter Yield (q/ha/day)**

Entries	Kalyani	Jorhat	Ranchi	Jabalpur	Bhubaneswar	Pusa	Average	Rank
JRBJ-05-4	0.41	0.67	0.54	0.50	0.58	0.95	0.61	2
JRB-13	0.51	0.89	0.30	0.38	0.52	0.93	0.59	3
BFRB-15	0.52	0.75	0.52	0.43	0.71	0.98	0.65	1
Bidhan-1 (NC)	0.38	0.54	0.55	0.62	0.50	0.88	0.58	4
Mean	0.48	0.77	0.45	0.44	0.60	0.95	0.62	

**Table- 8.5: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Crude Protein Yield (q/ha)**

Entries	Kalyani	Jorhat	Jabalpur	Ranchi	Bhubaneswar	Average	Rank
JRBJ-05-4	6.16	8.16	8.20	8.30	9.46	8.06	2
JRB-13	8.59	10.64	6.20	3.33	7.61	7.27	3
BFRB-15	10.88	9.17	6.70	7.71	11.82	9.26	1
Bidhan-1 (NC)	4.70	6.24	9.80	7.97	7.54	7.25	4
Mean	8.54	9.32	7.03	6.45	9.63	8.20	

**Table- 8.6: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Crude Protein (%)**

Entries	Kalyani	Jorhat	Jabalpur	Ranchi	Bhubaneswar	Average	Rank
JRBJ-05-4	11.9	18.0	14.4	14.9	15.1	14.9	3
JRB-13	13.9	18.2	14.3	14.4	14.5	15.0	2
BFRB-15	17.5	18.1	14.3	14.4	15.5	16.0	1
Bidhan-1 (NC)	10.3	17.7	14.5	14.0	14.6	14.2	4
Mean	13.4	18.0	14.4	14.4	14.9	15.0	

**Table- 8.7: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Plant Height (cm)**

Entries	Kalyani	Jorhat	Jabalpur	Ranchi	Bhubaneswar	Vellayani	Shilong	Average	Rank
JRBJ-05-4	95.6	135.3	230.7	128.6	170.7	127.4	29.3	131.1	2
JRB-13	97.8	181.8	194.7	99.4	163.5	137.4	55.5	132.9	1
BFRB-15	97.2	164.2	104.2	137.8	177.9	145.2	47.2	124.8	3
Bidhan-1 (NC)	96.1	145.3	149.2	130.4	160.2	118.8	37.6	119.7	4
Mean	96.9	160.4	176.5	121.9	170.7	136.7	44.0	129.6	

**Table- 8.8: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: Leaf Stem Ratio**

Entries	Kalyani	Jorhat	Jabalpur	Ranchi	Bhubaneswar	Pusa	Vellayani	Shilong	Average	Rank
JRBJ-05-4	0.70	1.00	0.91	0.35	1.04	0.98	0.85	2.70	1.07	1
JRB-13	1.10	1.34	0.65	0.57	0.98	0.97	0.83	1.16	0.95	2
BFRB-15	1.20	1.22	0.80	0.39	1.17	0.98	0.94	0.93	0.95	2
Bidhan-1 (NC)	0.90	1.13	0.93	0.41	0.93	0.95	0.80	0.52	0.82	3
Mean	1.00	1.19	0.79	0.44	1.06	0.98	0.87	1.60	0.99	



**Table- 8.9: AVT-1 (Rice Bean): First Advanced Varietal Trial in Rice Bean: ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ranchi	Rank	Ranchi	Rank	Ranchi	Rank
JRBJ-05-4	44.5	2	52.8	3	55.6	3
JRB-13	46.4	4	51.4	1	55.6	3
BFRB-15	43.3	1	52.2	2	61.4	1
Bidhan-1 (NC)	45.7	3	53.6	4	58.4	2
Mean	44.7		52.1		57.5	

## 9. AVT SOYBEAN-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE SOYBEAN

(Table Reference: 9.1 to 9.10)

In forage soybean, four entries namely JSO7-21-7, JSO7-24-8, JSO7-24-1 and JSO7-24-13 were evaluated at six locations across the country in second advanced varietal trial. As there is no established check for forage soybean, performance of entries is compared over general mean for that particular character. Results revealed that for green forage yield (q/ha), entries JSO7-24-13 (9.1%) and JSO7-21-7 (7.5%) exhibited their superiority over general mean. Similarly was the case for dry matter yield (q/ha) where JSO7-21-7 (9.2%) and JSO7-24-13 (3.6%) established their superiority.

In the fodder production potential i.e. green forage and dry matter yield (q/ha/day), entries JSO7 -21-7 and JSO7-24-13 maintained their superiority among the test entries. Even for the quality parameters like crude protein yield (q/ha) and crude protein (%), these two entries established their superiority. For plant height, entry JSO7-24-8 (98.2cm) ranked first whereas for leafiness, entry JSO7-24-1 (0.89) proved its superiority. For other quality parameters like for ADF (%) entry JSO7-24-1, NDF (%) entry JSO7-24-8 and JSO7-24-13, IVDMD (%) entry JSO7-24-1 and DDM (q/ha) entry JSO7-24-13 was adjudged best performer.

**Table- 9.1: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Green Forage Yield (q/ha)**

Entries	Rahuri	Jhansi	Jabalpur	Ranchi	Hisar	Pusa	Average	Rank	Superiority%
JS07-21-7	83.3	63.3	309.1	106.3	55.0	201.0	136.3	2	7.5
JS07-24-8	79.8	108.3	198.8	47.9	63.3	209.0	117.8	3	
JS07-24-1	84.5	103.3	223.8	62.5	71.7	142.0	114.6	4	
JS07-24-13	113.9	90.0	259.2	137.5	80.0	149.0	138.3	1	9.1
Mean	90.4	91.2	247.7	88.6	67.5	175.3	126.8		
CD at 5%	15.3	4.3	44.9	17.7	6.3	17.6			
CV%	12.2	1.5	13.3	14.5	6.7	9.4			

**Table- 9.2: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Dry Matter Yield (q/ha)**

Entries	Rahuri	Jhansi	Jabalpur	Ranchi	Hisar	Pusa	Average	Rank	Superiority%
JS07-21-7	14.3	17.5	64.2	15.2	9.0	42.8	27.2	1	9.2
JS07-24-8	13.0	25.0	40.2	8.8	10.8	45.4	23.9	3	
JS07-24-1	13.8	23.9	45.3	10.6	11.3	31.6	22.7	4	
JS07-24-13	18.2	20.5	53.2	15.8	14.0	33.1	25.8	2	3.6
Mean	14.8	21.7	50.7	12.6	11.3	38.2	24.9		
CD at 5%	2.5	2.2	8.6	3.2	1.5	6.8			
CV%	12.4	1.2	12.4	18.9	9.3	8.7			

**Table- 9.3: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Green Forage Yield (q/ha/day)**

Entries	Rahuri	Jhansi	Pusa	Jabalpur	Ranchi	Hisar	Average	Rank
JS07-21-7	1.94	0.88	3.24	4.90	1.93	1.10	2.33	1
JS07-24-8	1.90	1.55	3.43	3.05	0.96	1.21	2.02	3
JS07-24-1	1.92	1.47	2.41	3.48	1.28	1.31	1.98	4
JS07-24-13	2.53	1.26	2.53	4.05	2.41	1.42	2.37	2
Mean	2.07	1.29	2.90	3.87	1.65	1.26	2.17	

**Table- 9.4: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Dry Matter Yield (q/ha/day)**

Entries	Rahuri	Jhansi	Pusa	Jabalpur	Ranchi	Hisar	Average	Rank
JS07-21-7	0.33	0.24	0.69	1.01	0.28	0.18	0.46	1
JS07-24-8	0.31	0.35	0.74	0.61	0.18	0.21	0.40	3
JS07-24-1	0.31	0.33	0.53	0.70	0.22	0.21	0.38	4
JS07-24-13	0.40	0.28	0.56	0.83	0.28	0.25	0.43	2
Mean	0.34	0.30	0.63	0.79	0.24	0.21	0.42	

**Table- 9.5: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Crude Protein Yield (q/ha)**

Entries	Rahuri	Jabalpur	Ranchi	Hisar	Average	Rank
JS07-21-7	1.7	7.9	2.1	1.3	3.2	1
JS07-24-8	1.5	4.9	1.1	1.5	2.3	3
JS07-24-1	1.6	5.5	1.5	1.6	2.5	2
JS07-24-13	2.1	6.6	2.1	2.1	3.2	1
Mean	1.7	6.2	1.7	1.6	2.8	

**Table- 9.6: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Crude Protein (%)**

Entries	Rahuri	Jabalpur	Ranchi	Hisar	Average	Rank
JS07-21-7	11.6	12.5	13.6	14.4	13.0	1
JS07-24-8	11.7	12.3	12.7	14.2	12.7	3
JS07-24-1	11.4	12.2	14.0	14.2	12.9	2
JS07-24-13	11.5	12.5	13.1	14.7	12.9	2
Mean	11.5	12.4	13.3	14.4	12.9	

**Table- 9.7: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Plant Height (cm)**

Entries	Jhansi	Jabalpur	Ranchi	Hisar	Rahuri	Average	Rank
JS07-21-7	151.0	130.5	73.2	51.6	58.0	92.9	2
JS07-24-8	182.2	124.9	60.4	59.6	64.0	98.2	1
JS07-24-1	159.2	111.3	54.7	67.4	46.0	87.7	3
JS07-24-13	138.4	117.2	58.9	61.8	48.0	84.9	4
Mean	157.7	121.0	61.8	60.1	54.0	90.9	

**Table- 9.8: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: Leaf Stem Ratio**

Entries	Jhansi	Jabalpur	Ranchi	Hisar	Pusa	Rahuri	Average	Rank
JS07-21-7	0.76	0.91	0.70	0.45	0.76	0.94	0.75	4
JS07-24-8	0.82	0.80	1.06	0.51	0.78	1.01	0.83	2
JS07-24-1	1.03	0.88	1.15	0.52	0.77	1.00	0.89	1
JS07-24-13	0.96	0.87	0.88	0.42	0.74	1.03	0.82	3
Mean	0.89	0.87	0.95	0.48	0.76	1.00	0.82	

**Table- 9.9: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: ADF (%) & NDF (%)**

Entries	ADF (%)				NDF (%)			
	Rahuri	Ranchi	Average	Rank	Rahuri	Ranchi	Average	Rank
JS07-21-7	44.8	43.2	44.0	3	56.2	52.0	54.1	2
JS07-24-8	42.9	43.6	43.3	2	55.1	56.2	55.7	1
JS07-24-1	41.7	42.0	41.8	1	51.6	48.8	50.2	3
JS07-24-13	43.7	48.2	46.0	4	55.2	56.2	55.7	1
Mean	43.3	44.3	43.8		54.5	53.3	53.9	

**Table- 9.10: AVT-2 (Soy): Second Advanced Varietal Trial in Forage Soybean: IVDMD (%) & DDM (q/ha)**

Entries	IVDMD (%)					DDM (q/ha)	
	Rahuri	Ranchi	Hisar	Average	Rank	Hisar	Rank
JS07-21-7	55.5	57.8	59.4	57.6	2	5.4	4
JS07-24-8	53.0	52.8	59.4	55.1	3	6.4	3
JS07-24-1	59.6	59.4	62.6	60.5	1	7.1	2
JS07-24-13	51.7	50.2	59.8	53.9	4	8.3	1
Mean	55.0	55.1	60.3	56.8		6.8	

## **10. VT SEWAN-2010 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN SEWAN (PERENNIAL)**

(Table Reference: 10.1 to 10.6)

A varietal trial in sewan comprising seven entries was established in Kharif-2010 at five locations of North-West Zone. Crop being perennial in nature, entries are coded. The entry IVTS-4 didn't germinate / poorly germinate at all the centres, hence data of this entry has not been reported. This was the second year of evaluation and data has been reported from all the five centres. For the character green forage and dry matter yield (q/ha) entries IVTS-5 and IVTS-2 ranked first and second, respectively for these characters. In the fodder production potential (q/ha/day), entry IVTS-5 ranked first both for green forage and dry matter production potential. For evaluation plant height and leafiness (L/S/ ratio), entries IVTS-7, IVTS-1 and IVTS-6 recorded their superiority with respect other entries under evaluation.



**Table- 10.1: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Green forage Yield (q/ha)**

Entries	Jaisalmer	Bikaner	Jalore	Jodhpur	Fatehpur Shekhawati	Average	Rank
IVTS-1	40.6	120.8	230.0	73.8	228.3	138.7	6
IVTS-2	50.8	257.3	260.0	73.4	203.1	168.9	2
IVTS-3	56.9	226.5	260.7	68.3	217.3	166.0	4
IVTS-5	59.2	202.5	261.8	77.1	259.7	172.1	1
IVTS-6	66.3	205.7	260.9	81.3		153.6	5
IVTS-7	57.8	189.9	259.0	84.1	240.7	166.3	3
Mean	55.3	200.4	255.4	76.3	229.8	163.5	
CD at 5%	7.7	68.8	32.7	NS	8.6		
CV%	7.9	18.9	8.4	25.2	1.9		

**Table- 10.2: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Dry Matter Yield (q/ha)**

Entries	Jaisalmer	Bikaner	Jodhpur	Fatehpur Shekhawati	Average	Rank
IVTS-1	20.0	40.1	27.4	74.7	40.6	6
IVTS-2	24.5	85.1	27.4	65.0	50.5	2
IVTS-3	25.0	71.9	25.7	70.1	48.2	4
IVTS-5	27.5	63.3	29.4	84.2	51.1	1
IVTS-6	30.5	70.2	31.5		44.1	5
IVTS-7	26.0	60.8	32.3	78.7	49.4	3
Mean	25.6	65.2	28.9	74.5	48.6	
CD at 5%	4.0	22.3	NS		1.9	
CV%	9.1	18.8	24.7		1.4	

**Table- 10.3: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Green Forage Yield (q/ha/day)**

Entries	Jaisalmer	Bikaner	Jodhpur	Fatehpur Shekhawati	Average	Rank
IVTS-1	0.57	1.44	0.76	5.07	1.96	5
IVTS-2	0.68	3.06	0.76	4.32	2.21	3
IVTS-3	0.74	2.70	0.70	4.53	2.17	4
IVTS-5	0.70	2.41	0.79	5.90	2.45	1
IVTS-6	0.85	2.45	0.84		1.38	6
IVTS-7	0.70	2.26	0.87	5.47	2.33	2
Mean	0.71	2.39	0.79	5.06	2.23	

**Table- 10.4: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Dry Matter Yield (q/ha/day)**

Entries	Jaisalmer	Bikaner	Jodhpur	Fatehpur Shekhawati	Average	Rank
IVTS-1	0.28	0.49	0.28	1.66	0.68	5
IVTS-2	0.33	1.01	0.28	1.38	0.75	3
IVTS-3	0.32	0.86	0.26	1.46	0.73	4
IVTS-5	0.33	0.75	0.30	1.91	0.82	1
IVTS-6	0.39	0.84	0.32		0.52	6
IVTS-7	0.32	0.72	0.33	1.79	0.79	2
Mean	0.33	0.78	0.30	1.64	0.76	

**Table-10.5: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Plant Height (cm)**

Entries	Jaisalmer	Bikaner	Jodhpur	Fatehpur Shekhawati	Average	Rank
IVTS-1	97.7	123.7	103.4	125.0	112.5	2
IVTS-2	94.3	112.7	92.1	130.0	107.3	4
IVTS-3	92.7	119.0	106.2	127.0	111.2	3
IVTS-5	101.5	113.3	90.0	140.0	111.2	3
IVTS-6	88.7	119.3	96.2		101.4	5
IVTS-7	98.1	112.3	113.2	132.0	113.9	1
Mean	95.5	116.7	100.2	130.8	109.6	

**Table- 10.6: VT Sewan-2010 (2<sup>nd</sup> year): Varietal Trial in Sewan Grass (*Lasiurus indicus*): Leaf Stem Ratio**

Entries	Jodhpur	Bikaner	Fatehpur shekhawati	Average	Rank
IVTS-1	1.84	1.03	0.10	0.99	2
IVTS-2	1.61	0.80	0.10	0.84	5
IVTS-3	1.71	1.08	0.10	0.96	3
IVTS-5	1.89	0.72	0.10	0.90	4
IVTS-6	1.75	0.53		1.14	1
IVTS-7	1.42	0.73	0.10	0.75	6
Mean	1.70	0.82	0.10	0.93	

## 11. VTGG-2009 (3<sup>rd</sup> YEAR): VARIETAL TRIAL IN GUINEA GRASS (PERENNIAL)

(Table Reference: 11.1 to 11.9)

In Guinea grass, a varietal evaluation trial comprising four entries and three checks namely Riversdale, PGG-616 and JHGG-96-5 was established in kharif-2009 at 11 centres across the country. Crop being perennial in nature, entries are in coded form as from GG-09-1 to GG-09-7. Results obtained from all the testing locations clearly indicated that for green forage and dry matter yield (q/ha), entries GG-09-1 and GG-09-4 maintained their superiority with respect to all other testing entries. For fodder production potential (q/ha/day), entry GG-09-1 ranked first both for green forage and dry matter production potential. For evaluation against quality parameters, entry GG-09-1 ranked first for crude protein yield (q/ha) whereas entry GG-09-6 followed by GG-09-7 exhibited their superiority for crude protein content (%). For plant height, entry GG-09-7 ranked first whereas for leafiness (L/S ratio), entry GG-09-4 proved its superiority. For other quality parameters like NDF (%) and ADF (%), entry GG-09-4 ranked first whereas for IVDMD (%), GG-09-5 established superiority.

**Table- 11.1: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Green Forage Yield (q/ha)**

Entries	Faizabad	Bhubaneswar	Urulikanchan	Mandya	Coimbatore	Dharwad	Anand	Ranchi	Hyderabad	Vellayani	Jhansi	Average	Rank
GG-09-1	451.4	914.9	1534.1	1389.4	2870.7	172.2	1714.0	666.7	878.8	1210.0	227.8	1093.6	1
GG-09-2	371.4	1028.5	1452.7	1041.6	1687.9	119.4	1302.0	508.3	660.2	880.0	177.8	839.1	3
GG-09-3	538.6	886.3	1277.7	1061.8	1734.7	120.8	841.0	462.5	549.8	758.3	277.8	773.6	4
GG-09-4	424.3	1006.3	1628.4	1585.3	2854.3	168.1	1294.0	516.7	808.0	1106.7	337.5	1066.3	2
GG-09-5	435.1	941.7	1185.6	934.6	1988.8	137.5	844.0	529.2	601.8	718.3	169.4	771.5	5
GG-09-6	731.3	1015.6	1167.7	528.4	1209.7	130.6	487.0	433.3	581.0	721.7	36.4	640.2	7
GG-09-7	553.7	861.5	1225.9	938.8	1127.7	129.2	884.0	425.0		863.3	176.4	718.6	6
Mean	500.8	950.7	1353.2	1068.6	1924.8	139.7	1052.3	506.0	679.9	894.0	200.4	843.3	
CD at 5%	98.7	35.9	83.0	102.7	136.4	22.9	272.2	103.5	145.4	89.6	69.6		
CV%	11.0	2.1	13.2	5.4	4.0	9.2	14.5	11.5	12.2	3.3	19.5		

**Table- 11.2: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Dry Matter Yield (q/ha)**

Entries	Faizabad	Bhubaneswar	Urulikanchan	Mandya	Coimbatore	Dharwad	Anand	Ranchi	Hyderabad	Vellayani	Jhansi	Average	Rank
GG-09-1	109.3	215.2	471.4	155.4	451.9	34.7	432.2	160.4	171.4	232.7	43.6	225.3	1
GG-09-2	101.4	232.8	433.8	105.0	264.5	25.7	340.3	143.9	141.1	169.3	34.3	181.1	3
GG-09-3	132.6	209.3	378.8	117.5	277.6	26.7	232.0	116.7	118.5	146.0	50.4	164.2	4
GG-09-4	107.7	225.7	487.5	170.4	457.2	37.7	338.2	127.5	159.1	213.0	60.5	216.8	2
GG-09-5	90.2	216.1	378.9	98.7	319.2	29.0	219.0	132.6	125.8	138.0	30.1	161.6	5
GG-09-6	175.0	228.6	366.3	49.3	190.0	27.4	139.4	129.7	127.3	139.0	6.2	143.5	7
GG-09-7	128.0	200.6	408.6	100.4	167.6	27.7	242.3	111.4		165.7	31.0	158.3	6
Mean	120.6	218.3	417.9	113.8	304.0	29.8	277.6	131.7	140.5	172.0	36.6	178.7	
CD at 5%	25.5	15.9	39.6	30.4	28.9	5.7	74.9	25.4	24.0	17.2	12.3		
CV%	12.4	4.1	11.9	15.0	5.3	10.7	15.1	10.8	9.7	3.3	18.9		

**Table- 11.3: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Green Forage Yield (q/ha/day)**

Entries	Anand	Ranchi	Faizabad	Hyderabad	Dharwad	Average	Rank
GG-09-1	4.93	1.83	1.65	6.76	2.65	3.56	1
GG-09-2	3.74	1.39	1.35	5.08	1.84	2.68	3
GG-09-3	2.42	1.27	1.96	4.23	1.86	2.35	5
GG-09-4	3.72	1.42	1.55	6.22	2.59	3.10	2
GG-09-5	2.43	1.45	1.59	4.63	2.12	2.44	4
GG-09-6	1.40	1.19	2.67	4.47	2.01	2.35	5
GG-09-7	2.55	1.16	2.02		1.99	1.93	6
Mean	3.0	1.4	1.8	5.2	2.2	2.6	

**Table- 11.4: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Anand	Ranchi	Faizabad	Hyderabad	Dharwad	Average	Rank
GG-09-1	1.24	0.44	0.40	1.32	0.53	0.79	1
GG-09-2	0.98	0.39	0.37	1.09	0.40	0.65	2
GG-09-3	0.67	0.32	0.48	0.91	0.41	0.56	4
GG-09-4	0.97	0.35	0.39	1.22	0.58	0.70	3
GG-09-5	0.63	0.36	0.33	0.97	0.45	0.55	5
GG-09-6	0.40	0.36	0.64	0.98	0.42	0.56	4
GG-09-7	0.70	0.31	0.47		0.43	0.48	6
Mean	0.8	0.4	0.4	1.1	0.5	0.6	

**Table- 11.5: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Crude Protein Yield (q/ha)**

Entries	Anand	Ranchi	Faizabad	Mandya	Hyderabad	Urulikanchan	Bhubaneswar	Average	Rank
GG-09-1	30.2	13.3	7.3	6.1	11.4	37.6	21.6	18.2	1
GG-09-2	24.9	11.3	5.4	5.1	10.0	35.3	22.1	16.3	3
GG-09-3	19.2	9.7	8.6	5.2	8.7	31.1	21.7	14.9	5
GG-09-4	23.7	11.7	6.3	7.5	10.4	39.3	20.9	17.1	2
GG-09-5	16.3	10.4	7.0	5.0	8.8	29.9	20.8	14.0	6
GG-09-6	10.6	11.4	13.3	2.6	9.5	29.3	20.8	13.9	7
GG-09-7	18.4	9.3	9.6	4.8		33.3	18.5	15.6	4
Mean	20.5	11.0	8.2	5.2	9.8	33.7	20.9	15.7	

**Table- 11.6: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Crude Protein (%)**

Entries	Anand	Ranchi	Faizabad	Mandya	Hyderabad	Urulikanchan	Average	Rank
GG-09-1	8.8	8.3	6.7	3.9	6.6	7.9	7.0	5
GG-09-2	8.9	7.9	5.3	4.8	7.1	8.1	7.0	5
GG-09-3	9.3	8.3	6.5	4.4	7.4	8.2	7.4	3
GG-09-4	8.0	9.2	5.8	4.4	6.6	8.1	7.0	5
GG-09-5	8.4	7.9	7.8	5.0	7.0	7.9	7.3	4
GG-09-6	9.0	8.8	7.6	5.3	7.5	8.0	7.7	1
GG-09-7	9.4	8.3	7.5	4.8		8.2	7.6	2
Mean	8.8	8.4	6.7	4.7	7.0	8.1	7.3	

**Table- 11.7: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Plant Height (cm)**

Entries	Vellayani	Anand	Ranchi	Faizabad	Mandya	Urulikanchan	Average	Rank
GG-09-1	132.7	151.9	77.2	112.5	120.4	81.6	112.7	2
GG-09-2	109.3	142.0	72.9	88.7	89.5	109.7	102.0	7
GG-09-3	100.7	133.7	74.9	113.5	94.5	102.8	103.4	6
GG-09-4	130.7	145.4	77.5	100.2	121.5	82.9	109.7	3
GG-09-5	137.7	128.8	71.4	105.7	101.0	106.9	108.6	4
GG-09-6	91.7	129.4	78.5	127.8	83.5	111.7	103.8	5
GG-09-7	122.3	150.4	65.6	124.5	120.1	108.9	115.3	1
Mean	117.9	140.2	74.0	110.4	104.4	100.6	107.9	

**Table- 11.8 VTGG-2009 (3rd Year): Varietal Trial in Guinea Grass (Perennial): Leaf Stem Ratio**

Entries	Vellayani	Ranchi	Faizabad	Mandya	Urulikanchan	Average	Rank
GG-09-1	1.23	1.30	1.20	0.38	0.83	0.99	3
GG-09-2	0.76	0.39	1.19	0.48	1.01	0.77	6
GG-09-3	0.71	1.46	1.27	0.62	1.02	1.02	2
GG-09-4	1.09	1.76	1.22	0.67	0.98	1.14	1
GG-09-5	0.75	1.09	1.37	0.64	0.85	0.94	5
GG-09-6	0.71	0.32	1.32	0.47	0.51	0.67	7
GG-09-7	0.80	1.24	1.31	0.66	0.86	0.97	4
Mean	0.9	1.1	1.3	0.6	0.9	0.9	



**Table- 11.9: VTGG-2009 (3<sup>rd</sup> Year): Varietal Trial in Guinea Grass (Perennial): NDF (%), ADF (%) & IVDMD (%)**

Entries	NDF (%)				ADF (%)		IVDMD (%)	
	Anand	Ranchi	Average	Rank	Ranchi	Rank	Ranchi	Rank
GG-09-1	77.5	80.0	78.8	4	51.1	6	83.4	3
GG-09-2	78.9	79.4	79.2	6	48.8	5	82.0	6
GG-09-3	82.9	75.0	79.0	5	44.0	1	83.2	4
GG-09-4	62.8	70.0	66.4	1	44.0	1	81.8	7
GG-09-5	81.3	74.2	77.8	2	46.2	4	85.4	1
GG-09-6	80.3	75.8	78.1	3	44.7	2	82.4	5
GG-09-7	82.5	76.4	79.5	7	45.5	3	83.6	2
Mean	78.0	75.8	76.9		46.3		83.1	

## **CORRIGENDUM**

### **11.A. VTGG-2009 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN GUINEA GRASS (PERENNIAL)**

(Table Reference: 11.A-1 to 11.A-2)

In Guinea grass, a varietal evaluation trial comprising four entries and three checks namely Riversdale, PGG-616 and JHGG-96-5 was established at 11 testing locations in Kharif-2009 but in the year 2010, data were compiled for only 10 locations and the data from Jhansi centre was left in compilation. Now the data from Jhansi centre is being included and is compiled based on 11 centres data. On the basis of data from all the centres, for the character green forage and dry matter yield (q/ha), entries GG-09-1 and GG-09-4 proved their superiority with respect to other test entries for both the characters. For rest of the characters results remain same as mentioned in Kharif-2010 Annual Report.

### Corrigendum

**Table- 11.A-1: VTGG-2009 (2<sup>nd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Green Forage Yield (q/ha)**

Entries	Faizabad	Bhubaneswar	Urulikanchan	Mandya	Coimbatore	Dharwad	Anand	Ranchi	Hyderabad	Vellayani	Jhansi	Average	Rank
GG-09-1	547.8	318.8	1155.6	1051.8	3824.9	163.9	1967.0	587.5	712.2	993.3	192.7	1046.9	1
GG-09-2	433.3	401.4	1374.8	566.2	1924.9	116.7	1496.0	520.8	522.7	660.0	180.6	745.2	4
GG-09-3	651.7	300.5	1249.5	507.6	1690.2	112.5	1140.0	445.8	318.6	500.0	236.1	650.2	5
GG-09-4	481.7	366.9	1276.3	954.9	3594.3	159.7	1846.0	454.2	683.1	870.0	358.3	1004.1	2
GG-09-5	550.7	321.1	1274.5	620.2	2263.8	133.3	1522.0	487.5	479.0	480.0	263.9	763.3	3
GG-09-6	728.3	392.4	1010.2	434.0	2008.3	133.3	917.0	475.0	474.8	476.7	220.8	661.0	6
GG-09-7	573.9	315.3	923.8	523.2	1475.5	111.1	1058.0	404.2		636.7	186.6	620.8	7
Mean	566.8	345.2	1180.7	665.4	2397.4	132.9	1420.9	482.1	531.7	659.5	234.1	784.5	
CD at 5%	146.9	24.8	102.1	70.3	116.0	18.7	217.0	88.9	109.5	91.8	77.2		
CV%	14.6	4.5	13.6	5.9	3.7	7.9	8.6	10.4	13.7	7.8	18.5		

**Table- 11.A-2: VTGG-2009 (2<sup>nd</sup> Year): Varietal Trial in Guinea Grass (Perennial): Dry Matter Yield (q/ha)**

Entries	Faizabad	Bhubaneswar	Urulikanchan	Mandya	Coimbatore	Dharwad	Anand	Ranchi	Hyderabad	Vellayani	Jhansi	Average	Rank
GG-09-1	117.5	79.5	273.9	141.2	621.2	33.0	433.3	175.3	138.9	177.4	38.7	202.7	1
GG-09-2	83.8	93.1	366.5	76.3	319.3	25.0	342.0	177.5	111.3	117.9	37.1	159.1	3
GG-09-3	143.3	71.6	343.7	69.0	279.6	24.9	273.1	130.8	64.7	89.3	44.4	139.5	6
GG-09-4	119.3	82.9	291.8	130.6	598.8	35.8	437.8	124.0	132.5	155.4	68.1	197.9	2
GG-09-5	120.1	80.3	344.7	80.3	363.2	28.2	345.6	152.0	97.2	85.7	50.5	158.9	4
GG-09-6	160.3	87.3	272.9	60.6	322.5	28.0	245.0	185.2	105.4	85.1	39.6	144.7	5
GG-09-7	127.2	73.6	233.2	61.7	240.7	23.9	263.3	103.8		115.2	34.6	127.7	7
Mean	124.5	81.2	303.8	88.5	392.2	28.4	334.3	149.8	108.3	118.0	44.7	161.5	
CD at 5%	16.6	12.9	48.6	12.4	31.1	4.7	51.5	45.7	21.9	17.6	15.0		
CV%	8.5	8.9	16.8	7.9	4.5	9.3	8.7	16.0	13.4	8.4	18.9		

## 12. VTGG-2008 (4<sup>th</sup> YEAR): VARIETAL TRIAL IN GUINEA GRASS (PERENNIAL)

(Table Reference: 12.1 to 12.11)

In Guinea grass, a varietal evaluation trial comprising seven entries and three checks namely PGG-616, Riversdale and Bundel Guinea-1 was established in Kharif-2008. This is being the fourth and final year of evaluation hence all the entries are decoded and results obtained from eight centres clearly revealed that for green forage yield (q/ha), entries JHGG-08-1 (14.0%), RSDGG-2 (10.6%) and JHGG-08-2 (1.1%) exhibited their superiority over national check. Similarly for dry matter yield (q/ha), entries TNGG-061 (15.1%), JHGG-08-1 (12.6%) and RSDGG-2 (5.9%) was found superior over national check. For fodder production potential (q/ha/day), entry RSDGG-2 ranked first followed by TNGG-061 both for green forage and dry matter production potential. For evaluation against quality parameter, entry TNGG-061 (25.9 q/ha) ranked first for crude protein yield and with 8.4 percent crude protein content exhibited its superiority.

For evaluation against growth parameters, entry TNGG-061 (150.1cm) ranked first and for leafiness (L/S ratio), national check Bundel Guinea-1 (1.19) proved its superiority. For other quality parameters, entry TNGG-061 for NDF (%) and JHGG-08-1 for ADF (%) and IVDMD (%) exhibited its superiority.

After compiling the data over the years (2009-2011), results revealed that for the character green forage yield (q/ha), entries JHGG-08-1 (17.6%) and RSDGG-2 (5.4%) and for dry matter yield entries JHGG-08-1 (13.6%) and TNGG-061 (12.4%) exhibited their superiority over best national check.

**Table- 12.1: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Green Forage Yield (q/ha)**

Entries	Faizabad	Vellayani	Dharwad	Mandya	Urulikanchan	Ranchi	Bhubaneswar	Anand	Average	Rank	Superiority%
TNGG-061			162.5		1229.3			991.0	794.3	6	
RSDGG-2		1076.6	131.9	1046.1	1145.5			1181.0	916.2	2	10.6
JHGG-08-2	416.6	1101.6	126.4	841.3	1056.9	378.1	1352.9	1427.0	837.6	3	1.1
JHGG-08-1	585.7	1228.3	174.3	1188.9	1299.7	437.5	1463.6	1178.0	944.5	1	14.0
PGG-702	320.4	1148.3	138.9	476.4	1298.8	318.7	1413.9	897.0	751.6	8	
PGG-729	241.4	1091.6	134.7	427.0	1206.4	340.6	1261.1	913.0	702.0	10	
PGG-710	454.7	1070.0	177.8	515.9	1260.7	343.7	1454.8	923.0	775.1	7	
PGG-616 (NC)	393.7	1188.3	138.9	560.0	1224.5	331.2		1090.0	703.8	9	
Riversdale (NC)	450.0	1101.6	119.4	816.5	1231.2	390.6	1333.7	1184.0	828.4	4	
Bundel Guinea-1 (NC)	539.4	1243.3	127.8	786.6	1006.5	371.9	1309.5	1208.0	824.1	5	
Mean	402.1	1129.2	148.2	722.2	1215.2	358.3	1389.3	1075.0	803.1		
CD at 5%	101.5	91.4	28.5	109.7	81.6	48.0	33.8	121.0			
CV%	15.9	2.7	11.6	8.6	8.4	9.0	1.4	7.5			

**Table- 12.2: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Dry Matter Yield (q/ha)**

Entries	Faizabad	Vellayani	Dharwad	Mandya	Urulikanchan	Ranchi	Bhubaneswar	Anand	Average	Rank	Superiority%
TNGG-061			35.3		389.4			241.0	221.9	1	15.1
RSDGG-2		217.6	28.4	144.6	334.1			296.0	204.1	3	5.9
JHGG-08-2	83.6	216.0	28.0	131.0	330.1	88.2	303.2	362.3	192.8	4	
JHGG-08-1	152.2	240.8	39.5	155.4	418.3	104.1	333.5	293.0	217.1	2	12.6
PGG-702	81.0	218.6	29.2	65.0	406.1	74.7	306.5	217.3	174.8	7	
PGG-729	46.2	214.1	28.8	63.0	387.9	85.6	282.6	235.4	168.0	8	
PGG-710	112.4	209.7	38.1	70.3	407.0	88.5	317.0	255.0	187.2	6	
PGG-616 (NC)	108.8	233.0	31.0	76.3	368.3	77.9		262.0	165.3	9	
Riversdale (NC)	109.3	216.0	25.3	107.0	365.0	97.7	291.0	289.4	187.6	5	
Bundel Guinea-1 (NC)	126.4	243.8	25.8	117.5	315.5	98.5	294.1	321.1	192.8	4	
Mean	97.4	221.4	32.3	100.8	380.2	86.5	308.6	270.3	191.4		
CD at 5%	28.8	18.6	7.9	31.6	45.9	16.0	21.4	32.0			
CV%	16.0	2.8	14.9	17.7	10.6	12.1	4.1	7.8			

**Table- 12.3: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Green Forage Yield (q/ha/day)**

Entries	Ranchi	Faizabad	Anand	Dharwad	Average	Rank
TNGG-061			2.84	2.50	2.67	2
RSDGG-2			3.38	2.03	2.71	1
JHGG-08-2	1.04	1.52	4.09	1.94	2.15	4
JHGG-08-1	1.20	2.14	3.38	2.68	2.35	3
PGG-702	0.87	1.17	2.57	2.14	1.69	9
PGG-729	0.93	0.88	2.62	2.07	1.63	10
PGG-710	0.94	1.66	2.64	2.74	2.00	6
PGG-616 (NC)	0.91	1.44	3.12	2.14	1.90	8
Riversdale (NC)	1.07	1.64	3.39	1.84	1.99	7
Bundel Guinea-1 (NC)	1.02	1.97	3.46	1.97	2.11	5
Mean	1.0	1.5	3.1	2.3	2.1	



**Table-12.4: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Ranchi	Faizabad	Anand	Dharwad	Average	Rank
TNGG-061			0.79	0.40	0.60	2
RSDGG-2			0.85	0.44	0.65	1
JHGG-08-2	0.24	0.30	1.04	0.43	0.50	5
JHGG-08-1	0.29	0.55	0.84	0.61	0.57	3
PGG-702	0.20	0.29	0.62	0.45	0.39	9
PGG-729	0.23	0.17	0.67	0.44	0.38	10
PGG-710	0.24	0.41	0.73	0.59	0.49	6
PGG-616 (NC)	0.21	0.40	0.75	0.48	0.46	8
Riversdale (NC)	0.27	0.40	0.83	0.39	0.47	7
Bundel Guinea-1 (NC)	0.27	0.46	0.92	0.40	0.51	4
Mean	0.2	0.4	0.8	0.5	0.5	

**Table- 12.5: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Crude Protein Yield (q/ha)**

Entries	Ranchi	Faizabad	Anand	Mandya	Urulikanchan	Bhubaneswar	Average	Rank
TNGG-061			22.1		29.8		25.9	1
RSDGG-2			27.9	10.8	24.4		21.0	2
JHGG-08-2	6.2	6.3	33.4	12.8	24.5	27.8	18.5	4
JHGG-08-1	8.7	10.4	28.6	9.1	31.7	31.6	20.0	3
PGG-702	5.9	4.1	20.3	5.3	31.2	37.4	17.4	7
PGG-729	6.7	2.6	24.2	5.0	30.6	26.7	16.0	9
PGG-710	6.6	6.5	22.3	4.7	29.9	30.4	16.7	8
PGG-616 (NC)	6.8	7.6	22.2	5.8	29.0		14.3	10
Riversdale (NC)	9.0	5.8	25.3	10.2	28.2	28.7	17.9	6
Bundel Guinea-1 (NC)	8.6	7.5	28.8	9.6	24.9	30.0	18.2	5
Mean	6.8	6.2	25.1	7.6	28.9	30.8	18.7	

**Table- 12.6: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Crude Protein (%)**

Entries	Ranchi	Faizabad	Anand	Mandya	Urulikanchan	Average	Rank
TNGG-061			9.1		7.6	8.4	1
RSDGG-2			8.8	7.4	7.3	7.8	5
JHGG-08-2	7.0	7.5	9.0	9.8	7.4	8.1	2
JHGG-08-1	8.3	6.8	9.4	5.9	7.6	7.6	6
PGG-702	7.9	5.0	9.4	8.1	7.7	7.6	6
PGG-729	7.9	5.7	10.2	7.9	7.9	7.9	4
PGG-710	7.4	5.8	8.8	6.6	7.4	7.2	7
PGG-616 (NC)	8.8	7.0	8.5	7.7	7.9	8.0	3
Riversdale (NC)	9.2	5.3	8.9	9.4	7.7	8.1	2
Bundel Guinea-1 (NC)	8.8	5.9	8.9	8.3	7.9	8.0	3
Mean	7.9	6.3	9.2	7.6	7.6	7.8	

**Table- 12.7: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Plant Height (cm)**

Entries	Vellayani	Ranchi	Faizabad	Anand	Mandya	Urulikanchan	Average	Rank
TNGG-061				150.4		149.8	150.1	1
RSDGG-2	114.7			152.4	92.4	141.6	125.3	2
JHGG-08-2	135.0	69.4	115.5	142.2	68.6	128.0	109.8	9
JHGG-08-1	131.7	66.8	118.7	156.4	84.8	137.0	115.9	4
PGG-702	136.6	73.0	90.8	152.7	64.7	150.4	111.4	6
PGG-729	146.3	70.3	109.5	160.5	61.8	157.0	117.6	3
PGG-710	119.0	68.8	104.7	151.1	64.7	156.9	110.9	7
PGG-616 (NC)	134.3	67.7	115.2	148.8	68.4	153.9	114.7	5
Riversdale (NC)	113.3	68.2	105.7	154.7	54.2	163.1	109.9	8
Bundel Guinea-1 (NC)	116.0	68.9	110.4	153.8	45.4	138.9	105.6	10
Mean	131.1	69.3	109.1	151.8	72.2	146.8	119.4	

**Table- 12.8: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): Leaf Stem Ratio**

Entries	Vellayani	Ranchi	Faizabad	Mandya	Urulikanchan	Average	Rank
TNGG-061					0.72	0.72	10
RSDGG-2	0.89			0.75	0.62	0.75	9
JHGG-08-2	0.97	1.27	1.10	0.57	0.60	0.90	8
JHGG-08-1	0.99	2.04	1.28	0.71	0.74	1.15	2
PGG-702	0.83	2.10	1.15	0.67	0.62	1.07	4
PGG-729	0.87	1.59	1.07	0.63	0.67	0.97	6
PGG-710	0.81	2.35	0.94	0.58	0.80	1.10	3
PGG-616 (NC)	0.86	1.52	1.18	0.46	0.54	0.91	7
Riversdale (NC)	0.83	1.80	1.32	0.54	0.66	1.03	5
Bundel Guinea-1 (NC)	1.02	2.37	1.20	0.50	0.87	1.19	1
Mean	0.9	1.8	1.1	0.6	0.7	0.9	

**Table- 12.9: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial): NDF (%), ADF (%) & IVDMD (%)**

Entries	NDF (%)				ADF (%)		IVDMD (%)	
	Anand	Ranchi	Average	Rank	Ranchi	Rank	Ranchi	Rank
TNGG-061	72.5		72.5	1				
RSDGG-2	79.3		79.3	9				
JHGG-08-2	82.1	77.6	79.9	10	55.6	8	78.6	7
JHGG-08-1	73.5	76.8	75.2	3	43.8	1	85.4	1
PGG-702	82.4	75.4	78.9	8	53.4	6	79.8	5
PGG-729	82.5	73.2	77.9	6	50.9	3	78.2	8
PGG-710	77.7	71.8	74.8	2	52.7	5	80.4	4
PGG-616 (NC)	81.6	74.6	78.1	7	54.5	7	81.6	2
Riversdale (NC)	77.8	72.8	75.3	4	51.0	4	81.0	3
Bundel Guinea-1 (NC)	83.0	71.0	77.0	5	50.6	2	79.4	6
Mean	79.0	74.9	77.1		51.8		80.7	

**Table- 12.10: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial):  
Pooled Green Forage Yield (q/ha) over the years 2009-2011**

Entries	2008*	2009	2010	2011	Average	Rank	Superiority%
TNGG-061	209.3	512.6	675.8	794.3	660.9	6	5.4
RSDGG-2	300.1	537.1	716.6	916.2	723.3	2	
JHGG-08-2	229.1	501.4	687.3	837.6	675.4	4	17.6
JHGG-08-1	367.4	588.5	888.4	944.5	807.1	1	
PGG-702	268.9	519.6	587.4	751.6	619.5	8	
PGG-729	296.1	503.7	570.2	702.0	592.0	10	
PGG-710	355.4	548.8	594.7	775.1	639.5	7	
PGG-616 (NC)	300.1	494.9	583.5	703.8	594.1	9	
Riversdale (NC)	284.5	526.7	667.5	828.4	674.2	5	
Bundel Guinea-1 (NC)	278.9	521.8	712.6	824.1	686.2	3	
Mean	290.8	525.8	663.0	803.1	664.0		

\*2008 being the establishment year, hence not taken in average

**Table- 12.11: VTGG-2008 (4<sup>th</sup> Year): Varietal Trial in Guinea Grass (Perennial):  
Pooled Dry Matter Yield (q/ha) over the years 2009-2011**

Entries	2008*	2009	2010	2011	Average	Rank	Superiority%
TNGG-061	42.1	136.5	184.7	221.9	181.0	2	12.4
RSDGG-2	66.7	119.7	155.5	204.1	159.8	4	
JHGG-08-2	52.2	115.3	157.1	192.8	155.1	5	
JHGG-08-1	66.2	133.1	198.6	217.1	182.9	1	13.6
PGG-702	69.3	116.9	140.0	174.8	143.9	8	
PGG-729	76.8	116.6	135.9	168.0	140.2	9	
PGG-710	94.1	126.7	138.3	187.2	150.7	7	
PGG-616 (NC)	64.1	114.2	129.6	165.3	136.4	10	
Riversdale (NC)	64.3	120.5	150.2	187.6	152.8	6	
Bundel Guinea-1 (NC)	65.9	121.8	168.5	192.8	161.0	3	
Mean	66.4	122.4	155.0	191.4	156.2		



### 13. VTCC-2008 (4<sup>th</sup> YEAR): VARIETAL TRIAL IN *Cenchrus ciliaris* (PERENNIAL)

(Table Reference: 13.1 to 13.7)

In *Cenchrus ciliaris*, a varietal evaluation trial comprising four entries and two national checks namely IGFR-3108 and CAZRI-75 was established in Kharif-2008. This is being the fourth and final year of evaluation hence all the entries are decoded and results obtained from four testing locations clearly revealed that for green forage as well as dry matter yield (q/ha), none of the test entries surpassed the performance of national check CAZRI-75. However in forage production potential (q/ha/day), entry CAZRI-288 (1.02 q/ha/day) for green forage as well as dry matter production potential (0.25 q/ha/day) established its superiority with respect to check. For evaluation against quality parameters, check CAZRI-75 (0.90 q/ha) for crude protein yield and IGFR-3108 (7.00%) for crude protein content, maintained its superiority. For the character plant height, entry CAZRI-288 (78.1cm) and for leafiness, entry RCCB-04-6 (1.13) established superiority. For NDF (%) and ADF (%), entry CAZRI-288 ranked first. After compiling the data over the years (2009-11), results clearly indicated that for green forage as well as dry matter yield (q/ha), national check CAZRI-75 established its superiority over all the test entries.

**Table- 13.1: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial): Green Forage & Dry Matter Yield (q/ha)**

Entries	Green Forage Yield (q/ha)							Dry Matter Yield (q/ha)					
	Jodhpur	Jalour	Jhansi	Rahuri	Average	Rank	Superiority%	Jodhpur	Jhansi	Rahuri	Average	Rank	Superiority%
RCCB-04-6	31.6	287.8	130.3	42.0	122.9	5		7.6	57.1	7.8	24.2	5	
RCCB-03-8	39.5	241.1	116.4	34.9	108.0	6		9.8	46.7	7.3	21.3	6	
CAZRI-288	67.6	266.4	138.7	47.3	130.0	3		16.3	60.7	12.7	29.9	2	
CAZRI-657	55.2	267.9	135.9	42.9	125.5	4		14.0	60.1	9.5	27.8	3	
IGFRI-3108 (NC)	59.3	321.5	131.9	36.8	137.4	2		13.8	59.9	7.3	27.0	4	
CAZRI-75 (NC)		363.8	211.8	58.2	211.3	1			105.5	14.7	60.1	1	
Mean	48.5	265.8	130.3	41.8	121.6			11.9	56.1	9.3	25.8		
CD at 5%	27.4	52.9	24.3	4.6				6.1	8.7	1.1			
CV%	28.8	12.1	11.4	7.0				26.2	9.0	7.4			

**Table- 13.2: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial): Green Forage & Dry Matter Yield (q/ha/day)**

Entries	Green Forage Yield (q/ha/day)		Dry Matter Yield (q/ha/day)	
	Jodhpur	Rank	Jodhpur	Rank
RCCB-04-6	0.48	5	0.11	4
RCCB-03-8	0.54	4	0.13	3
CAZRI-288	1.02	1	0.25	1
CAZRI-657	0.86	3	0.22	2
IGFRI-3108 (NC)	0.93	2	0.22	2
CAZRI-75 (NC)				
Mean	0.73		0.18	

**Table- 13.3: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial): Crude Protein Yield (q/ha) & Crude Protein (%)**

Entries	Crude Protein Yield (q/ha)		Crude Protein (%)	
	Rahuri	Rank	Rahuri	Rank
RCCB-04-6	0.51	4	6.56	2
RCCB-03-8	0.48	5	6.56	2
CAZRI-288	0.89	2	7.00	1
CAZRI-657	0.62	3	6.56	2
IGFRI-3108 (NC)	0.51	4	7.00	1
CAZRI-75 (NC)	0.90	1	6.12	3
Mean	0.63		6.67	

**Table- 13.4: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial): Plant Height (cm) & Leaf Stem Ratio**

Entries	Plant Height (cm)					Leaf Stem Ratio	
	Jhansi	Rahuri	Jodhpur	Average	Rank	Rahuri	Rank
RCCB-04-6	84.7	29.3	94.1	69.4	6	1.13	1
RCCB-03-8	78.5	32.4	99.8	70.3	4	0.89	5
CAZRI-288	87.8	36.5	110.0	78.1	1	1.08	2
CAZRI-657	83.4	37.6	102.6	74.5	2	0.96	4
IGFRI-3108 (NC)	80.9	35.0	105.4	73.8	3	0.82	6
CAZRI-75 (NC)	98.7	41.6		70.2	5	1.00	3
Mean	83.6	34.0	101.6	73.1		1.02	

**Table- 13.5: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial): NDF (%) & ADF (%)**

Entries	NDF (%)		ADF (%)	
	Rahuri	Rank	Rahuri	Rank
RCCB-04-6	70.0	2	52.4	2
RCCB-03-8	71.2	5	52.7	3
CAZRI-288	69.8	1	51.2	1
CAZRI-657	70.6	4	53.4	4
IGFRI-3108 (NC)	71.8	6	51.2	1
CAZRI-75 (NC)	70.4	3	54.7	5
Mean	70.4		52.4	

**Table- 13.6: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial):  
Pooled Green Forage Yield (q/ha) over the years 2009-2011**

Entries	2008*	2009	2010	2011	Average	Rank	Superiority%
RCCB-04-6	67.5	180.8	164.3	122.9	156.0	6	
RCCB-03-8	64.6	246.2	157.5	108.0	170.6	5	
CAZRI-288	110.6	220.2	184.5	130.0	178.2	3	
CAZRI-657	98.3	218.3	172.3	125.5	172.0	4	
IGFRI-3108 (NC)	98.0	232.9	169.4	137.4	179.9	2	
CAZRI-75 (NC)	94.8	286.0	223.6	211.3	240.3	1	
Mean	85.3	216.4	169.7	121.6	169.2		

**Table- 13.7: VTCC-2008 (4<sup>th</sup> year): Varietal Trial in *Cenchrus ciliaris* (Perennial):  
Pooled Dry Matter Yield (q/ha) over the years 2009-2011**

Entries	2008*	2009	2010	2011	Average	Rank	Superiority%
RCCB-04-6	17.5	34.0	27.6	24.2	28.6	6	
RCCB-03-8	17.0	39.6	29.0	21.3	30.0	5	
CAZRI-288	26.3	43.3	35.1	29.9	36.1	2	
CAZRI-657	24.5	43.6	30.5	27.8	34.0	3	
IGFRI-3108 (NC)	21.0	43.6	31.2	27.0	33.9	4	
CAZRI-75 (NC)	25.8	64.5	42.0	60.1	55.5	1	
Mean	21.3	40.1	30.6	25.8	32.2		

\*2008 being establishment year, hence not taken in average

#### **14. VT BXN HYBRID-2008 (4<sup>th</sup> YEAR) : VARIETAL TRIAL IN BAJRA X NAPIER HYBRID (PERENNIAL)**

(Table Reference: 14.1 to 14.10)

In Bajra x Napier hybrid, a varietal evaluation trial comprising nine entries and three national checks namely NB-21, CO-3 and PNB-233 was established during Kharif-2008. This is being the fourth and final year of evaluation hence all the entries are decoded. The results obtained from all the 16 testing locations clearly revealed that for green forage yield (q/ha), entries BNH-3 (14.5%), BNH-10 (10.4%) , TNCN-074 (10.3%) and TNCN-072 (0.5%) and for dry matter yield (q/ha), entries BNH-3 (13.1%), BNH-10 (6.5%) and TNCN-074 (4.5%) established their superiority with respect to best national check. For the character forage production potential (q/ha/day), entries BNH-10 and NHN-9 for green forage and entries BNH-10 and BNH-3 for dry matter production potential exhibited its superiority over other entries and check varieties. For evaluation against crude protein yield, entry TNCN-074 (20.5 q/ha) and for crude protein content, check variety NB-21 (10.4%) ranked first. Entry BNH-10 for plant height and NHN-9 for leafiness was adjudged best performer. Test entry BNH-3 was adjudged best performer for ADF (%), NDF (%) and IVDMD (%).

After compiling the data over the years (2009-11), results clearly revealed that for the character green forage yield (q/ha), entries TNCN-074 (5.8%), BNH-3 (5.7%), and BNH-10 (1.5%) and entries BNH-3 (5.2%), TNCN-074 (5.0%) and BNH-10 (0.08%) for dry matter yield (q/ha) performed their superiority with respect to best national check.

**Table- 14.1: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Green Forage Yield (q/ha)**

Entries	Vella- yani	Rah- uri	Man- dya	Hyde- rabad	Coim- batore	Palam- pur	Faiza- bad	Dhar- wad	Alm- ora	Ludh- iana	Ran- chi	Uruli- kanchan	Bhuba- neswar	An- and	Jabal- pur	Pant- nagar	Ave- rage	Rank	Superi- ority%
TNCN-071	1553.3	320.0	735.7	1082.9	1311.6		224.3	132.0	301.7	765.4	518.6	1584.0	3109.6	64.0	1016.0	1810.9	968.7	8	
TNCN-072	1496.7	261.3	792.0	1232.8	1779.4	195.5	269.2	131.0	328.9	754.2	588.0	1564.2	3077.7	108.0	882.0	2799.7	1016.3	4	0.5
TNCN-073	1436.7	254.7	832.2	858.0	1243.4	171.1	209.0	168.0	301.1	862.5	592.6	1618.6	3115.2	83.0	856.0	1610.9	888.3	11	
DHN-12	1511.7	455.2	787.5	1030.1	797.2		185.7	217.0	395.6	1025.0	597.3	1664.2	3113.6	120.0		1904.2	986.0	6	
TNCN-074	1746.7	410.5	931.0	1499.4	1734.7	248.8	60.3	111.0	472.9	1088.9	703.8	1803.7	3119.1	108.0	1029.0	2783.0	1115.7	3	10.3
DHN-9	1470.0	622.4	784.0	1002.4	812.5	229.9	250.8	197.0	445.6	894.4	625.0	1558.1	3146.6	73.0	797.0	2280.8	949.3	9	
BNH-3	1435.0	498.2	853.7	1041.3	985.8		446.5	149.0		938.9	592.6	1782.8	3196.4	106.0	959.0	3221.9	1157.7	1	14.5
NHN-9	1346.7	431.3	776.4	888.5	723.3	240.6	559.2	132.0	342.8	952.8	657.5	1472.9	3115.1	111.0		2999.7	983.3	7	
BNH-10	1705.0	360.0	1204.1	1638.2	767.5	234.4	285.1	163.0	310.6	1386.1	652.8	1764.2	3122.6	141.0	967.0	3166.4	1116.8	2	10.4
NB-21 (NC)				1332.8	665.3	242.9	350.8	139.0	466.1	1194.4	527.8	1540.8		79.0	702.0		658.3	12	
CO-3 (NC)	1411.7	509.1	784.8	852.4	1077.5	184.0	178.3	157.0	602.3	1052.8	625.0	1595.1	3026.4	77.0	919.0	2014.2	941.7	10	
PNB-233 (NC)	1435.0	423.7	1005.3	891.3	884.8	247.7	283.5	175.0	566.7	1298.6	694.5	1549.4	3219.0	144.0	1072.0	2288.7	1011.2	5	
Mean	1522.4	401.5	855.2	1141.5	1128.4	220.1	276.7	155.6	362.4	963.1	614.2	1645.9	3124.0	101.6	929.4	2508.6	1020.2		
CD at 5%	112.3	55.9	158.8	129.4	95.3	53.2	75.4	10.8	131.5	116.5	89.2	108.7	205.6	31.0	167.2	323.7			
CV%	2.5	7.9	10.8	6.9	5.3	13.7	16.2	12.2	18.7	6.8	8.6	9.2	3.9	18.0	10.6	7.7			

**Table- 14.2: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Dry Matter Yield (q/ha)**

Entries	Vella-yani	Rah- uri	Man- dya	Hyde- rabad	Coim- batore	Palam- pur	Faiza- bad	Dhar- wad	Al- mora	Ludh- iana	Ran- chi	Uruli- kanchan	Bhuba- neswar	An- and	Jabal- pur	Pant- nagar	Ave- rage	Rank	Superi- ority%
TNCN-071	352.2	59.1	123.3	227.1	207.5		60.8	38.2	49.5	262.7	117.4	392.8	740.1	14.4	211.0	475.2	222.1	8	
TNCN-072	339.4	50.7	139.4	234.4	289.6	53.0	72.5	47.0	65.9	243.4	118.9	378.2	725.9	23.7	188.3	691.8	228.9	6	
TNCN-073	325.8	43.5	145.3	188.8	204.5	42.8	50.3	56.7	75.4	272.7	118.0	423.8	719.3	18.5	186.0	411.3	205.2	11	
DHN-12	342.8	95.2	141.2	237.1	131.6		49.2	75.0	73.2	331.0	118.1	425.0	674.1	28.9		520.8	231.7	5	
TNCN-074	396.1	74.0	170.9	285.2	278.5	68.4	19.8	37.7	97.3	360.6	131.3	431.1	704.6	25.8	220.0	663.4	247.8	3	4.5
DHN-9	333.3	123.5	132.1	200.5	129.7	60.4	69.3	67.2	105.3	284.8	137.0	417.3	729.4	17.3	169.0	555.7	220.7	9	
BNH-3	325.4	90.2	146.6	228.2	158.3		113.5	47.4		314.3	117.7	432.6	687.9	21.4	206.0	863.6	268.1	1	13.1
NHN-9	305.6	82.5	140.0	195.3	113.1	58.1	138.6	43.9	63.4	304.0	131.5	354.8	694.8	23.6		738.6	225.9	7	
BNH-10	386.6	71.2	206.9	344.4	118.5	56.6	65.3	56.1	57.5	481.8	125.3	406.1	728.8	27.7	197.0	708.6	252.4	2	6.5
NB-21 (NC)				306.4	103.7	64.7	89.2	46.2	91.6	397.9	97.4	391.9		17.4	149.0		159.6	12	
CO-3 (NC)	320.1	102.1	132.2	187.6	173.9	51.3	46.6	52.9	111.4	341.3	115.1	420.9	701.8	18.6	198.0	502.6	217.3	10	
PNB-233 (NC)	325.4	84.6	178.7	200.4	139.3	61.0	65.9	58.0	117.2	431.0	139.8	384.6	714.6	31.3	221.0	641.7	237.1	4	
Mean	345.2	76.6	149.5	237.9	181.3	56.5	71.0	52.1	73.4	317.3	123.9	406.9	711.7	22.4	196.8	625.4	233.6		
CD at 5%	25.5	10.8	39.1	35.7	19.9	14.1	12.9	28.4	22.8	3.4	17.6	45.0	83.1	6.9	35.9	106.5			
CV%	2.5	8.0	15.3	8.9	6.9	14.0	10.9	10.8	16.2	8.3	8.5	7.6	6.9	18.3	10.8	10.2			



**Table- 14.3: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Green Forage Yield (q/ha/day)**

Entries	Anand	Ranchi	Faizabad	Hyderabad	Dharwad	Jabalpur	Pantnagar	Average	Rank
TNCN-071	0.32	1.42	1.66	7.22	2.20	3.06	5.65	3.08	9
TNCN-072	0.54	1.61	1.99	8.22	2.18	2.66	8.74	3.71	5
TNCN-073	0.41	1.62	1.55	5.72	2.80	2.58	5.03	2.82	12
DHN-12	0.59	1.64	1.37	6.87	3.61		5.95	3.34	8
TNCN-074	0.54	1.93	0.45	10.00	1.85	3.10	8.69	3.79	4
DHN-9	0.39	1.71	1.85	6.68	3.29	2.40	7.12	3.35	7
BNH-3	0.53	1.62	3.31	6.94	2.48	2.89	10.14	3.99	3
NHN-9	0.55	1.80	4.14	5.92	2.20		9.40	4.00	2
BNH-10	0.70	1.79	2.11	10.92	2.71	2.92	9.89	4.43	1
NB-21 (NC)	0.39	1.45	2.60	8.89	2.31	2.12		2.96	11
CO-3 (NC)	0.38	1.71	1.32	5.68	2.62	2.77	6.29	2.97	10
PNB-233 (NC)	0.72	1.90	2.10	5.94	2.92	3.23	7.15	3.42	6
Mean	0.50	1.66	2.10	7.74	2.56	2.72	7.85	3.55	

**Table- 14.4: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Anand	Ranchi	Faizabad	Hyderabad	Dharwad	Jabalpur	Pantnagar	Average	Rank
TNCN-071	0.07	0.32	0.45	1.51	0.64	0.63	1.49	0.73	8
TNCN-072	0.12	0.33	0.54	1.56	0.78	0.56	2.16	0.86	5
TNCN-073	0.09	0.32	0.37	1.26	0.95	0.56	1.28	0.69	11
DHN-12	0.14	0.32	0.36	1.58	1.25		1.62	0.88	4
TNCN-074	0.13	0.36	0.15	1.90	0.63	0.66	2.07	0.84	6
DHN-9	0.08	0.38	0.51	1.34	1.12	0.51	1.74	0.81	7
BNH-3	0.11	0.32	0.84	1.52	0.79	0.62	2.69	0.98	2
NHN-9	0.12	0.36	1.02	1.30	0.73		2.31	0.97	3
BNH-10	0.14	0.34	0.48	2.30	0.93	0.59	2.21	1.00	1
NB-21 (NC)	0.09	0.27	0.66	2.04	0.77	0.45		0.71	10
CO-3 (NC)	0.09	0.32	0.34	1.25	0.88	0.59	1.57	0.72	9
PNB-233 (NC)	0.16	0.38	0.49	1.34	0.97	0.66	2.00	0.86	5
Mean	0.11	0.33	0.54	1.63	0.86	0.57	1.95	0.85	

**Table- 14.5: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Crude Protein Yield (q/ha)**

Entries	Anand	Jabalpur	Ranchi	Faizabad	Hyderabad	Mandya	Rahuri	Palampur	Urulikanchan	Ludhiana	Bhubaneswar	Average	Rank
TNCN-071	2.19	16.5	9.8	3.9	14.7	7.4	5.0		32.2	25.3	75.8	19.3	2
TNCN-072	3.02	13.1	9.4	4.5	14.7	5.2	4.5	4.9	30.3	24.5	67.1	16.5	7
TNCN-073	2.19	13.3	9.3	2.8	10.1	7.4	3.8	4.0	34.1	29.1	52.8	15.3	9
DHN-12	3.64		10.3	3.2	18.9	7.8	8.0		33.4	31.8	55.7	19.2	3
TNCN-074	3.43	16.7	10.9	1.2	17.9	10.9	7.2	5.8	34.3	37.9	78.8	20.5	1
DHN-9	2.06	12.4	12.6	4.2	12.5	6.7	11.5	5.0	32.5	28.9	52.9	16.5	7
BNH-3	2.92	14.8	10.8	7.2	14.3	6.1	8.8		33.2	28.6	51.5	17.8	6
NHN-9	3.21		10.9	10.1	11.2	5.9	7.3	5.9	28.8	31.4	68.2	18.3	4
BNH-10	3.83	14.4	11.0	4.8	21.4	9.4	6.9	6.2	32.5	50.6	51.5	19.3	2
NB-21 (NC)	2.31	10.7	8.1	5.4	21.7			6.7	30.4	39.0		15.5	8
CO-3 (NC)	2.58	14.6	8.6	2.7	14.5	6.3	8.4	4.3	33.9	33.4	52.4	16.5	7
PNB-233 (NC)	3.87	15.9	10.4	3.5	14.0	9.4	6.8	5.9	29.3	45.8	52.6	17.9	5
Mean	2.9	14.0	10.3	4.7	15.7	7.4	7.0	5.5	32.2	32.7	61.6	17.8	

**Table- 14.6: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Crude Protein (%)**

Entries	Anand	Jabalpur	Ranchi	Faizabad	Hyderabad	Mandya	Rahuri	Palampur	Urulikanchan	Ludhiana	Dharwad	Average	Rank
TNCN-071	13.6	7.5	8.3	6.4	20.1	5.9	8.4		8.2	9.6	5.9	9.4	3
TNCN-072	11.9	7.0	7.9	6.2	19.5	3.7	8.9	9.3	8.0	10.1	3.7	8.7	7
TNCN-073	11.5	7.2	7.9	5.5	16.8	5.0	8.8	9.3	8.0	10.7	5.0	8.7	7
DHN-12	11.9		8.8	6.5	24.6	5.5	8.4		7.8	9.6	5.5	9.8	2
TNCN-074	13.0	7.6	8.3	5.9	19.5	6.3	9.8	8.5	8.0	10.5	6.3	9.4	3
DHN-9	12.1	7.4	9.2	6.0	19.5	5.0	9.3	8.2	7.8	10.2	5.0	9.0	6
BNH-3	13.1	7.3	9.2	6.3	19.5	4.2	9.8		7.7	9.1	4.2	9.0	6
NHN-9	12.9		8.3	7.3	18.0	4.2	8.9	9.6	8.1	10.3	4.2	9.2	4
BNH-10	13.1	7.9	8.8	6.5	19.5	4.6	9.8	9.9	8.0	10.5	4.6	9.4	3
NB-21 (NC)	12.2	7.2	8.3	6.0	21.9			9.9	7.8	9.8		10.4	1
CO-3 (NC)	12.5	7.4	7.4	5.8	24.0	4.8	8.3	8.5	8.1	9.8	4.8	9.2	4
PNB-233 (NC)	11.5	7.2	7.4	5.3	21.9	5.3	8.0	9.6	7.7	10.6	5.3	9.1	5
Mean	12.5	7.4	8.5	6.3	19.9	4.9	9.1	9.2	7.9	10.0	4.9	9.3	

**Table- 14.7: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Plant Height (cm)**

Entries	Vellayani	Anand	Jabalpur	Ranchi	Faizabad	Mandya	Palampur	Ludhiana	Urulikanchan	Rahuri	Average	Rank
TNCN-071	171.7	97.0	93.7	71.6	105.6	124.6		116.7	127.6	95.5	111.6	5
TNCN-072	181.7	90.8	76.1	72.7	111.4	126.0	111.8	116.7	128.8	87.3	110.3	6
TNCN-073	167.3	110.0	95.0	77.7	75.7	134.1	130.5	129.2	135.2	100.8	115.5	2
DHN-12	114.7	93.0		69.5	60.6	109.7		135.0	137.0	95.1	101.8	12
TNCN-074	116.0	89.0	100.0	79.1	93.5	88.9	166.6	127.2	141.7	95.9	109.8	7
DHN-9	136.0	91.0	84.8	65.9	105.6	121.5	155.4	130.8	135.0	108.8	113.5	3
BNH-3	109.0	91.3	86.1	80.9	115.2	127.9		127.5	124.9	103.5	107.4	10
NHN-9	145.3	77.0		65.6	140.5	126.9	105.6	117.5	114.8	78.1	107.9	9
BNH-10	144.0	90.3	92.0	86.6	136.6	145.1	128.5	138.3	136.2	105.8	120.3	1
NB-21 (NC)		94.8	86.2	70.0	120.5		136.4	129.2	127.1		109.2	8
CO-3 (NC)	125.3	104.5	83.1	68.9	100.2	118.0	114.7	128.0	125.3	102.7	107.1	11
PNB-233 (NC)	159.0	87.7	104.9	79.2	110.8	139.1	129.9	128.3	94.1	96.5	112.9	4
Mean	142.9	92.2	89.7	74.4	105.0	122.7	133.1	126.5	131.2	96.8	110.9	

**Table- 14.8: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): Leaf Stem Ratio**

Entries	Vellayani	Jabalpur	Ranchi	Faizabad	Mandya	Palampur	Ludhiana	Urulikanchan	Rahuri	Average	Rank
TNCN-071	0.76	0.90	1.24	0.90	0.63		1.00	0.99	1.20	0.95	12
TNCN-072	0.83	1.24	1.21	0.89	0.50	1.50	0.90	0.96	1.30	1.04	11
TNCN-073	0.75	1.00	1.13	0.95	0.57	2.10	1.33	1.04	1.26	1.13	9
DHN-12	1.02		1.91	0.90	0.49		1.16	0.97	1.40	1.12	10
TNCN-074	0.97	1.96	1.90	0.94	0.54	2.70	1.45	0.87	1.26	1.40	3
DHN-9	0.94	1.17	2.29	0.88	0.73	2.40	1.67	0.99	1.30	1.37	4
BNH-3	0.90	1.00	2.10	0.92	0.74		1.33	1.37	1.09	1.18	8
NHN-9	0.99		2.58	1.05	0.67	1.90	1.67	1.22	1.52	1.45	1
BNH-10	0.80	1.20	2.12	0.94	0.87	1.50	1.00	1.21	1.65	1.25	7
NB-21 (NC)		1.28	1.86	0.81		2.00	1.50	1.18		1.44	2
CO-3 (NC)	0.83	1.13	2.25	0.85	0.55	2.70	0.90	1.25	1.10	1.28	5
PNB-233 (NC)	0.81	1.03	2.50	0.75	0.76	2.40	1.00	0.95	1.22	1.27	6
Mean	0.88	1.21	1.83	0.93	0.64	2.02	1.28	1.07	1.33	1.21	

**Table- 14.9: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial): ADF (%), NDF (%) & IVDMD (%)**

Entries	ADF (%)						NDF (%)						IVDMD (%)					
	Ranchi	Palampur	Ludhiana	Rahuri	Average	Rank	Ranchi	Palampur	Ludhiana	Rahuri	Average	Rank	Ranchi	Palampur	Ludhiana	Rahuri	Average	Rank
TNCN-071	49.5		38.7	54.9	47.7	3	68.6		58.4	68.4	65.1	1	78.4		56.0	66.0	66.8	3
TNCN-072	61.8	54.2	36.2	55.2	51.9	10	72.8	74.4	56.4	66.8	67.6	8	78.4	54.2	57.2	68.4	64.6	7
TNCN-073	52.7	53.4	36.2	54.4	49.2	7	69.6	70.2	55.4	66.2	65.4	2	76.2	53.4	57.8	58.8	61.6	12
DHN-12	54.4		38.7	56.8	50.0	9	73.4		58.0	69.4	66.9	5	75.4		56.0	70.8	67.4	2
TNCN-074	50.5	51.0	36.7	51.6	47.5	2	72.8	70.6	56.1	67.8	66.8	4	77.8	51.0	57.4	64.6	62.7	11
DHN-9	51.7	53.4	37.4	52.9	48.9	5	71.6	74.8	56.9	65.4	67.2	6	76.2	53.4	57.0	71.0	64.4	9
BNH-3	49.2		39.2	49.7	46.0	1	68.8		58.4	68.2	65.1	1	79.2		55.9	68.0	67.7	1
NHN-9	55.6	54.0	36.7	50.4	49.2	7	70.4	75.4	57.0	68.4	67.8	9	78.0	54.0	57.0	71.6	65.2	4
BNH-10	56.2	53.8	35.2	51.3	49.1	6	71.8	74.2	56.1	65.6	66.9	5	77.2	53.8	57.4	71.8	65.1	5
NB-21 (NC)	53.4	54.2	39.2		48.9	5	70.6	72.2	57.3		66.7	3	77.6	54.2	56.5		62.8	10
CO-3 (NC)	51.6	54.6	38.2	53.4	49.5	8	71.2	75.2	57.3	65.6	67.3	7	79.8	54.6	56.5	67.2	64.5	8
PNB-233 (NC)	50.2	53.0	36.9	52.1	48.1	4	70.2	73.4	54.9	68.2	66.7	3	79.6	53.0	57.8	69.2	64.9	6
Mean	53.5	53.4	37.4	53.0	48.8		71.0	73.1	57.0	67.4	66.6		77.4	53.4	56.8	67.9	64.8	

**Table-14.10: VT B X N Hybrid-2008 (4<sup>th</sup> year): Varietal trial in Bajra X Napier Hybrid (Perennial):  
Pooled Green Forage Yield (q/ha) & Dry Matter Yield (q/ha) over the years 2009-2011**

Entries	Green Forage Yield (q/ha)							Dry Matter Yield (q/ha)						
	2008*	2009	2010	2011	Average	Rank	Superiority%	2008*	2009	2010	2011	Average	Rank	Superiority%
TNCN-071	206.0	984.4	896.5	968.7	949.9	8		40.8	215.6	189.6	222.1	209.1	8	
TNCN-072	280.8	870.5	1017.9	1016.3	968.2	6		59.1	181.8	214.5	228.9	208.4	9	
TNCN-073	333.9	890.1	969.2	888.3	915.9	10		72.2	192.8	210.4	205.2	202.8	10	
DHN-12	146.0	828.4	1007.6	986.0	940.7	9		41.9	181.9	224.6	231.7	212.7	7	
TNCN-074	427.0	999.8	1130.0	1115.7	1081.8	1	5.8	93.9	226.7	242.6	247.8	239.0	2	5.0
DHN-9	124.0	859.8	916.5	949.3	908.5	11		35.9	188.4	198.2	220.7	202.4	11	
BNH-3	384.8	1024.6	1061.7	1157.7	1081.3	2	5.7	79.9	224.8	225.7	268.1	239.5	1	5.2
NHN-9	253.0	944.7	975.5	983.3	967.8	7		48.9	214.7	212.3	225.9	217.6	6	
BNH-10	207.1	929.5	1068.4	1116.8	1038.2	3	1.5	45.8	198.3	232.8	252.4	227.8	3	0.08
NB-21 (NC)		787.4	819.3	658.3	755.0	12			182.8	175.2	159.6	172.5	12	
CO-3 (NC)	298.0	1009.8	1083.2	941.7	1011.6	5		62.6	215.1	235.1	217.3	222.5	5	
PNB-233 (NC)	301.9	1017.9	1038.6	1011.2	1022.6	4		64.5	218.5	227.2	237.1	227.6	4	
Mean	262.5	925.8	1004.8	1020.2	983.6			57.6	202.8	216.7	233.6	217.7		

\*2008 being establishment year, hence not taken in average



## 15. VT SETARIA-2008 (4<sup>th</sup> YEAR): VARIETAL TRIAL IN *Setaria anceps* (PERENNIAL)

(Table Reference: 15.1 to 15.4)

In Kharif-2008, a varietal trial in *Setaria anceps* grass comprising five entries and one check viz., S-92 was established in Himalayan hill region. Out of five test entries, data have been reported for four test entries i.e. S-18, S-20, S-21 and PSS-1 alongwith check S-92. Data received from three testing locations i.e. Almora, Palampur and Kullu, clearly revealed that for green forage yield (q/ha) entries PSS-1 (103.1%), S-20 (101.3%), S-18 (100.3%) and S-21 (50.3%) and for dry matter yield entries S-18 (108.3%), PSS-1 (106.9%), S-20 (94.5%) and S-21 (57.7%) exhibited their superiority with respect to check variety S-92. Similarly for evaluation against quality parameters, entries S-18 and PSS-1 for crude protein yield (q/ha) and crude protein content (%) and entry PSS-1 for plant height (cm) and leafiness were adjudged best performer. Even for other quality parameters like NDF (%), ADF (%) and IVDMD (%), entry PSS-1 maintained its superiority over check variety S-92. After compiling the data over the years (2009-11), results clearly reveals that all testing entries exhibited their superiority with respect to check variety S-92 for green forage and dry matter yield (q/ha). Out of four entries, entries S-18 (48.3%), S-20 (40.5%), PSS-1 (31.7%) and S-21 (28.9%) for green forage yield and entries S-18 (45.4%), S-20 (33.3%), S-21 (27.5%) and PSS-1 (25.7%) for dry matter yield exhibited their superiority over check variety S-92.

**Table- 15.1: VT Setaria- 2008 (4<sup>th</sup> year): Varietal Trial in *Setaria anceps* (Perennial): Green Forage Yield & Dry Matter Yield (q/ha)**

Entries	Green Forage Yield (q/ha)						Dry Matter Yield (q/ha)					
	Almora	Palampur	Kullu	Average	Rank	Superiority%	Almora	Palampur	Kullu	Average	Rank	Superiority%
S-18	728.8	461.9	959.7	716.8	3	100.8	79.8	124.9	193.9	132.9	1	108.3
S-20	853.4	435.9	867.2	718.8	2	101.3	92.2	108.7	171.5	124.1	3	94.5
S-21	501.8	354.1	753.4	536.4	4	50.3	53.6	94.9	153.4	100.6	4	57.7
PSS-1	771.4	450.0	953.3	724.9	1	103.1	76.5	112.8	206.7	132.0	2	106.9
S-25												
S-92 (NC)	447.2	364.5	259.4	357.0	5		63.3	77.4	50.6	63.8	5	
Mean	674.9	413.3	758.6	615.6			72.8	103.7	155.2	110.6		
CD at 5%	116.3	65.7	93.4				16.3	25.6	21.9			
CV%	11.4	10.5	8.0				14.9	16.0	9.2			

**Table- 15.2: VT Setaria- 2008 (4<sup>th</sup> year): Varietal Trial in *Setaria anceps* (Perennial):  
Crude Protein Yield (q/ha), Crude Protein (%), Plant Height (cm) & Leaf Stem Ratio**

Entries	Crude ProteinYield (q/ha)		Crude Protein (%)		Plant Height (cm)				Leaf Stem Ratio	
	Palampur	Rank	Palampur	Rank	Palampur	Kullu	Average	Rank	Palampur	Rank
S-18	13.4	1	10.8	1	66.7	75.3	71.0	4	2.50	1
S-20	9.7	3	8.9	4	79.2	76.6	77.9	2	2.30	2
S-21	7.5	4	7.9	5	80.8	73.6	77.2	3	2.10	3
PSS-1	11.6	2	10.3	2	81.9	76.2	79.1	1	2.50	1
S-25										
S-92 (NC)	7.4	5	9.6	3	72.8	55.3	64.1	5	2.00	4
Mean	9.9		9.5		76.3	71.4	73.8		2.28	

**Table- 15.3: VT Setaria- 2008 (4<sup>th</sup> year): Varietal Trial in *Setaria anceps* (Perennial): NDF (%), ADF (%) & IVDMD (%)**

Entries	NDF (%)		ADF (%)		IVDMD (%)	
	Palmpur	Rank	Palmpur	Rank	Palmpur	Rank
S-18	66.0	3	52.2	5	49.6	3
S-20	69.8	5	51.0	3	55.4	1
S-21	65.2	2	51.4	4	48.6	4
PSS-1	64.0	1	48.6	1	50.0	2
S-25						
S-92 (NC)	67.2	4	50.2	2	47.0	5
Mean	66.4		50.7		50.1	

**Table- 15.4: VT Setaria- 2008 (4<sup>th</sup> year): Varietal Trial in *Setaria anceps* (Perennial):  
Pooled Green Forage Yield (q/ha) & Dry matter Yield (q/ha) over the years 2009-2011**

Entries	Green Forage Yield (q/ha)						Dry Matter Yield (q/ha)					
	2009	2010	2011	Average	Rank	Superiority%	2009	2010	2011	Average	Rank	Superiority%
S-18	501.7	617.8	716.8	612.1	1	48.3	79.4	102.1	132.9	104.8	1	45.4
S-20	413.2	608.1	718.8	580.0	2	40.5	65.2	99.1	124.1	96.1	2	33.3
S-21	522.8	537.1	536.4	532.1	4	28.9	79.1	95.9	100.6	91.9	3	27.5
PSS-1	467.9	438.1	724.9	543.6	3	31.7	72.7	67.0	132.0	90.6	4	25.7
S-25												
S-92 (NC)	370.7	510.7	357.0	412.8	5		59.1	93.4	63.8	72.1	5	
Mean	455.3	542.4	610.8	536.1			71.1	91.5	110.7	91.1		

## 16. VTCS-2010 (2<sup>nd</sup> YEAR): VARIETAL TRIAL IN *Cenchrus setigerus* (PERENNIAL)

(Table Reference: 16.1 to 16.8)

In *Cenchrus setigerus*, a varietal evaluation trial comprising seven entries and one check variety namely CAZRI-76 was established initially in Kharif-2010 at 12 locations of the country. The trial was finally established at nine locations of the country. Crop being perennial in nature, entries are in coded form as from VTCS-10-1 to VTCS-10-8. 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), entries VTCS-10-3, VTCS-10-1 and VTCS-10-4 in North-East Zone, entries VTCS-10-4 and VTCS-10-6 in Central Zone and entry VTCS-10-4 in South Zone established their superiority with respect to other entries. Even at national level, entry VTCS-10-4 was adjudged best performer.

Similarly for dry matter yield (q/ha) entries VTCS-10-3, VTCS-10-1 in North-East Zone, VTCS-10-4 and VTCS-10-7 in Central Zone and VTCS-10-4 and VTCS-10-5 in South Zone maintained their superiority. Even at national level, entry VTCS-10-4 was ranked first. For fodder production potential entries VTCS-10-3 and VTCS-10-1 exhibited its superiority both for green forage and dry matter production potential. Entry VTCS-10-4 for crude protein yield (q/ha) and entry VTCS-10-3 for crude protein content (%) was found good performer. For evaluation against plant height (cm), again entry VTCS-10-4 and for leafiness entry VTCS-10-3 was adjudged best performer. For evaluation against other quality parameters, entry VTCS-10-5 was ranked first both for NDF (%) and ADF (%).

**Table- 16.1: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Green Forage Yield (q/ha)**

Entries	North East Zone						Central Zone						South Zone			All India	
	Jodh-pur*	Jal-ore	Pali	Bika-ner	Ave- rage	Rank	Jha- nsi	Rah- uri	Dhari	An- and	Ave- rage	Rank	Coim- batore	Rank	Superi- ority%	Ave- rage	Rank
VTCS-10-1	96.4	315.8	153.5	209.5	226.3	2	191.5	138.9	55.5	149.0	133.7	7	1581.9	3		349.5	3
VTCS-10-2	91.9	225.1	119.1	169.3	171.2	8	183.9	148.9	56.9	132.0	130.4	8	1163.8	8		274.9	8
VTCS-10-3	94.0	300.7	164.9	220.5	228.7	1	221.3	113.8	52.4	195.0	145.6	4	1168.0	7		304.6	5
VTCS-10-4	95.8	337.7	168.1	148.1	218.0	3	235.3	221.2	59.1	137.0	163.2	1	2104.1	1		426.3	1
VTCS-10-5	108.1	348.4	118.2	183.1	216.6	4	226.6	141.5	47.2	145.0	140.1	5	1786.0	2		374.5	2
VTCS-10-6	100.1	298.8	132.2	154.4	195.1	5	299.5	95.3	51.2	179.0	156.2	2	1413.8	4		328.0	4
VTCS-10-7	109.6	323.6	117.4	83.0	174.7	7	237.5	130.1	58.1	167.0	148.2	3	1227.0	6		293.0	7
VTCS-10-8	126.6	330.9	131.0	79.1	180.3	6	212.2	115.5	48.6	171.0	136.8	6	1318.6	5		300.9	6
Mean	102.8	310.1	138.1	155.9	201.3		226.0	138.1	53.6	159.4	144.3		1470.4			331.5	
CD at 5%	NS	34.5	12.7	31.3			73.0	20.3	19.9	NS			100.1				
CV%	37.9	6.4	8.7	11.5			18.3	8.4	21.2	17.6			3.9				

\* Not included in Zonal and All India Average due to CV≥20

**Table- 16.2: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Dry Matter Yield (q/ha)**

Entries	North East Zone			Central Zone						South Zone		All India	
	Jodh-pur*	Bika-ner	Rank	Jha-nsi	Ra-huri	Dhari	Anand	Ave- rage	Rank	Coim-batore	Rank	Average	Rank
VTCS-10-1	21.3	74.7	2	56.3	44.8	11.3	24.4	34.2	4	261.9	3	78.9	3
VTCS-10-2	20.4	60.7	4	53.6	40.1	12.9	17.8	31.1	8	185.9	8	61.8	7
VTCS-10-3	21.7	83.3	1	55.4	34.3	11.5	25.6	31.7	6	194.8	7	67.5	5
VTCS-10-4	32.2	56.4	6	71.3	70.2	14.1	20.0	43.9	1	359.1	1	98.5	1
VTCS-10-5	24.7	64.1	3	57.2	46.6	11.4	21.3	34.1	5	302.0	2	83.8	2
VTCS-10-6	23.2	57.8	5	81.0	30.2	12.0	24.0	36.8	3	233.9	4	73.1	4
VTCS-10-7	25.8	28.9	7	67.6	44.5	13.6	23.9	37.4	2	200.9	6	63.2	6
VTCS-10-8	26.7	26.8	8	57.2	32.2	11.4	24.4	31.3	7	215.1	5	61.2	8
Mean	24.5	56.6		62.5	42.9	12.3	22.7	35.1		244.2		73.5	
CD at 5%	NS	11.3		18.0	6.3	5.0	NS			16.9			
CV%	39.7	11.4		16.4	8.4	23.3	15.8			3.9			

**Table- 16.3: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Green Forage Yield (q/ha/day)**

Entries	Anand	Dhari	Bikaner	Jodhpur	Average	Rank
VTCS-10-1	0.41	1.10	2.49	1.40	1.35	2
VTCS-10-2	0.37	1.20	2.01	1.37	1.24	4
VTCS-10-3	0.54	1.16	2.63	1.40	1.43	1
VTCS-10-4	0.38	1.30	1.76	1.16	1.15	6
VTCS-10-5	0.40	0.99	2.18	1.46	1.26	3
VTCS-10-6	0.50	1.03	1.84	1.42	1.20	5
VTCS-10-7	0.46	1.22	0.99	1.44	1.03	8
VTCS-10-8	0.47	1.03	0.94	1.89	1.08	7
Mean	0.44	1.13	1.86	1.44	1.22	

**Table- 16.4: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Dry Matter Yield (q/ha/day)**

Entries	Anand	Bikaner	Jodhpur	Average	Rank
VTCS-10-1	0.07	0.89	0.31	0.42	2
VTCS-10-2	0.05	0.72	0.30	0.36	5
VTCS-10-3	0.07	0.99	0.32	0.46	1
VTCS-10-4	0.06	0.67	0.39	0.37	4
VTCS-10-5	0.06	0.76	0.33	0.38	3
VTCS-10-6	0.07	0.69	0.33	0.36	5
VTCS-10-7	0.07	0.34	0.34	0.25	7
VTCS-10-8	0.07	0.32	0.40	0.26	6
Mean	0.07	0.67	0.34	0.36	



**Table- 16.5: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Crude Protein Yield (q/ha) & Crude Protein (%)**

Entries	Crude Protein Yield (q/ha)				Crude Protein (%)			
	Rahuri	Anand	Average	Rank	Rahuri	Anand	Average	Rank
VTCS-10-1	2.74	1.26	2.00	4	6.12	5.70	5.91	7
VTCS-10-2	2.63	0.76	1.70	7	6.56	5.70	6.13	6
VTCS-10-3	2.25	1.36	1.81	6	6.56	7.40	6.98	1
VTCS-10-4	4.91	0.87	2.89	1	7.00	5.40	6.20	5
VTCS-10-5	3.47	1.01	2.24	2	7.44	6.30	6.87	2
VTCS-10-6	2.11	0.97	1.54	8	7.00	5.70	6.35	4
VTCS-10-7	2.92	1.13	2.03	3	6.56	5.60	6.08	6
VTCS-10-8	2.39	1.26	1.83	5	7.44	5.90	6.67	3
Mean	2.93	1.08	2.00		6.84	5.96	6.40	

**Table- 16.6: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Plant Height (cm)**

Entries	Anand	Dhari	Rahuri	Bikaner	Pali	Jodhpur	Jhansi	Average	Rank
VTCS-10-1	95.1	76.7	31.6	74.0	90.9	94.3	91.6	79.2	2
VTCS-10-2	87.1	77.3	28.9	72.0	78.9	83.4	84.4	73.1	8
VTCS-10-3	83.2	79.3	28.7	68.3	94.6	90.9	86.5	75.9	7
VTCS-10-4	91.0	79.5	48.5	81.7	108.0	98.1	103.0	87.1	1
VTCS-10-5	76.8	73.0	27.8	78.0	92.4	92.0	96.4	76.6	6
VTCS-10-6	95.4	71.3	27.6	76.3	86.0	91.3	95.6	77.6	5
VTCS-10-7	92.4	73.0	28.7	70.7	94.1	93.8	94.7	78.2	4
VTCS-10-8	99.5	83.1	28.6	63.3	94.6	87.6	93.1	78.5	3
Mean	90.1	76.7	31.3	73.0	92.4	91.4	93.2	78.3	

**Table- 16.7: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): Leaf Stem Ratio**

Entries	Dhari	Rahuri	Bikaner	Average	Rank
VTCS-10-1	0.90	0.82	1.19	0.97	5
VTCS-10-2	0.80	1.00	0.57	0.79	8
VTCS-10-3	0.80	1.50	1.02	1.11	1
VTCS-10-4	0.80	0.82	0.99	0.87	7
VTCS-10-5	0.80	1.38	1.01	1.06	3
VTCS-10-6	0.90	1.13	1.06	1.03	4
VTCS-10-7	0.80	1.17	1.30	1.09	2
VTCS-10-8	0.80	0.89	1.16	0.95	6
Mean	0.83	1.09	1.04	0.98	

**Table- 16.8: VTCS- 2010 (2<sup>nd</sup> year): Varietal Trial in *Cenchrus setigerus* (Perennial): NDF (%) & ADF (%)**

Entries	NDF (%)		ADF (%)	
	Rahuri	Rank	Rahuri	Rank
VTCS-10-1	64.2	5	52.7	5
VTCS-10-2	64.6	6	52.8	6
VTCS-10-3	65.6	7	52.4	4
VTCS-10-4	63.6	3	53.7	7
VTCS-10-5	61.8	1	51.5	1
VTCS-10-6	64.2	5	52.0	2
VTCS-10-7	64.0	4	54.2	8
VTCS-10-8	62.8	2	52.2	3
Mean	63.9		52.7	

## Forage Production Technology

The forage crop production programme was executed at 21 locations in five zones identified under this project. In total 13 experiments were conducted, out of which 8 in net work (6 coordinated and 2 AVT based) and 5 in location specific mode were under taken with the aim to generate region specific forage production technology. The main emphasis of natural resource management under forage crops was to increase system productivity and resource use optimization including forage production through waste water, use of soil amendments in forage based systems. The salient research achievements have been discussed in this chapter for the forage crop production during *kharif* 2011.

### COORDINATED TRIALS

#### **AST-1: Influence of resource conservation techniques on forage production and physio- chemical status of soil**

**AST-1.1:** Effect of vegetative barrier and improved forage species on conservation of degraded grassland (Rainfed conditions)

**(Location: Hill Zone – Palampur and Rajouri)**

**AST-1.2 (a):** Effect of different tillage practices on productivity of forage crop in the prevalent crop sequence (Irrigated conditions)

**(Location: North West Zone – Ludhiana, Hisar and Pantnagar)**

**AST-1.2 (b):** Conservation of rangelands by incorporating grass species in alleys of improved variety of Khejari (*Prosopis cineraria*) (Rainfed condition)

**(Location: North West Zone – Bikaner)**

**AST-1.3:** Effect of planting methods and forage crop combinations on fodder productivity through moisture conservation

**(Location: Central Zone – Rahuri, Jabalpur, Anand and Urulikanchan)**

**AST-1.4:** Effect of moisture conservation practices on productivity of perennial grasses

**(Location: North East Zone – Jorhat, Faizabad, Ranchi, Bhubaneswar and Kalyani)**

**AST-1.5 (a):** Intensive forage production through silvipasture system under rainfed ecosystem

**(Location: South Zone – Hyderabad, Coimbatore and Mandya)**

**AST-1.5 (b):** Cassava based sustainable alley farming system for rainfed areas of the humid tropics

**(Location: South Zone – Vellayani)**

This experiment (AST-1) was initiated in kharif 2009 (Initial soil studies) and executed in kharif 2010 at 20 locations to study the effect of resource conservation technologies (RCT) on forage yield, physico-chemical properties of soil and economics of the system. The first year results of the experiment have been reported in Rabi 2011-12. The results of the second year experimentation would be reported in annual report of Rabi 2011-12.

**AST-2 (AST-3): Optimization of nitrogen for sorghum in different cropping systems  
(Locations: Ludhiana, Pantnagar and Hisar)**

The experiment was conducted to find out the nitrogen requirement of sorghum in different cropping systems. This was the second year (first year at Hisar) of the experiment and data has been reported in Tables 2 (a) to 2 (f).

At Ludhiana, planting of sorghum under different cropping systems did not caused significant variation in green fodder, dry matter and crude protein yields. However, numerically higher GFY, DFY and CPY was observed in berseem-sorghum cropping system. Sorghum fodder equivalent yield was recorded significantly highest in berseem-sorghum cropping system (2784 q/ha) followed by wheat-cowpea-sorghum and wheat-fallow-sorghum. In berseem-sorghum system, plant height, tillers/m row length, crude protein content, nitrogen content and nitrogen uptake was recorded highest as compared to rest of the cropping systems. The net monetary returns and benefit cost ratio were also highest in berseem-sorghum cropping system and registered percent increase of 30.2, 51.6, 63.1, 58.0, and 40.6 for net returns over wheat-fallow-sorghum, wheat-cowpea-sorghum, wheat-bajra-sorghum, oat-cowpea-sorghum and oat-bajra-sorghum cropping systems, respectively. Application of 125 % of recommended dose of nitrogen to sorghum being at par with 100 % RDN recorded significantly highest GFY, DFY, crude protein yield and sorghum fodder equivalent yield as compared to lower levels of nitrogen. Similarly, the highest level of nitrogen (125 % RDN) registered significantly highest uptake of nitrogen (255 Kg N/ha) and fetched higher net monetary returns and benefit cost ratio over its lower levels.

At Pantnagar, the fodder and crude protein yields of sorghum was not influenced by cropping systems but highest green fodder yield (302.8 q/ha) of sorghum was observed in sorghum-wheat cropping system closely followed by sorghum-berseem system. The net monetary returns and benefit cost ratio were also not influenced significantly by cropping systems. The fodder yields, net monetary returns and benefit cost ratio were not influenced significantly by application of different levels of nitrogen. Whereas, application of 125 % of RDN to sorghum recorded significantly higher crude protein yield over its lower levels.

At Hisar, the fodder yield, plant height and leaf stem ratio of sorghum was not influenced significantly by cropping systems but the highest green fodder yield (609.7 q/ha) of sorghum was recorded in sorghum-wheat cropping system closely followed by sorghum-oat-maize cropping system. The planting of sorghum in sorghum-wheat cropping system fetched highest net monetary returns (₹24060/ha) and benefit cost ratio (1.92) over rest of the cropping systems. Application of 125 % of recommended dose of nitrogen to sorghum recorded significantly highest GFY (655.1 q/ha) and DFY (163.8 q/ha) over its lower levels. Similarly, same level fetched highest net monetary returns (₹26760/ha) and benefit cost ratio (2.13) over its lower levels.

**Table-2 (a): Yield of sorghum as influenced by nitrogen levels and crop sequences at Ludhiana**

Treatment	Green Fodder Yield (q/ha)	Dry Matter Yield (q/ha)	Crude Protein Yield (q/ha)	Sorghum Fodder Equivalent yield (q/ha)
<b>A. Cropping Systems</b>				
Wheat – fallow – sorghum	540.5	139.4	13.7	2217
Wheat – cowpea - sorghum	551.6	143.2	14.3	2278
Wheat – bajra - sorghum	526.4	136.2	12.4	2170
Berseem - sorghum	566.7	145.7	15.5	2784
Oat – cowpea - sorghum	559.9	144.4	15.1	2074
Oat - bajra - sorghum	532.9	137.6	13.3	1983
SEm±	10.1	3.9	1.6	34.9
CD at 5%	NS	NS	NS	100.2
<b>B. Nitrogen Level (% of RDN)</b>				
50% of RDN	514.8	132.9	12.2	2162
75% of RDN	539.4	139.5	13.6	2230
100% of RDN	558.6	144.1	14.5	2281
125% of RDN	572.3	148.0	15.9	2329
SEm±	8.3	2.3	1.2	22.6
CD at 5%	23.8	6.5	3.5	64.7
<b>C. Interaction Cropping System X Nitrogen Level</b>				
SEm±	20.4	5.5	3.0	55.3
CD at 5%	NS	NS	NS	NS
CV%	6.5	6.8	6.7	4.3

**Table 2(b): Growth, nitrogen content and nitrogen uptake of sorghum as influenced by nitrogen levels and crop sequences at Ludhiana**

Treatment	Plant Height (cm)	Tillers/m Row Length	Crude Protein (%)	Nitrogen Content (%)	Nitrogen Uptake (kg/ha)
<b>A. Cropping Systems</b>					
Wheat – fallow – sorghum	146.8	19.1	9.80	1.57	219
Wheat – cowpea - sorghum	147.5	19.0	9.98	1.60	289
Wheat – bajra - sorghum	142.7	18.1	9.08	1.45	198
Berseem - sorghum	156.3	20.2	10.53	1.70	249
Oat – cowpea - sorghum	152.0	19.6	10.41	1.67	241
Oat - bajra - sorghum	144.8	18.4	9.67	1.55	213
SEm±	1.8	0.4			4.7
CD at 5%	5.6	1.2			14.8
<b>B. Nitrogen Level (% of RDN)</b>					
50% of RDN	142.0	17.8	9.19	1.47	196
75% of RDN	146.9	18.6	9.74	1.56	218
100% of RDN	150.8	19.4	10.03	1.61	232
125% of RDN	153.7	20.6	10.74	1.72	255
SEm±	1.5	0.4			4.1
CD at 5%	4.2	1.1			11.4
<b>C. Interaction Cropping System X Nitrogen Level</b>					
SEm±	3.5	1.0			9.9
CD at 5%	NS	NS			NS
CV%	4.1	8.7			7.6

**Table 2(c): Economics of sorghum as influenced by nitrogen levels and crop sequences at Ludhiana**

Treatment	Cost of Cultivation (₹/ha)	Gross Monetary Return (₹/ha)	Net Monetary Return (₹/ha)	Benefit Cost Ratio
<b>A. Cropping Systems</b>				
Wheat – fallow – sorghum	28229	89802	61573	2.18
Wheat – cowpea - sorghum	39335	92201	52867	1.35
Wheat – bajra - sorghum	38741	87896	49155	1.27
Berseem - sorghum	32604	112767	80163	2.46
Oat – cowpea - sorghum	33233	83978	50745	1.53
Oat - bajra - sorghum	32639	80308	57029	1.46
SEm±				
CD at 5%				
<b>B. Nitrogen Level (% of RDN)</b>				
50% of RDN	33549	87578	54029	1.64
75% of RDN	33936	90332	56395	1.70
100% of RDN	34323	92373	58050	1.73
125% of RDN	34710	94351	59641	1.75
SEm±				
CD at 5%				
<b>C. Interaction Cropping System X Nitrogen Level</b>				
SEm±				
CD at 5%				
CV%				

**Table-2 (d): Yield and growth of sorghum as influenced by nitrogen levels and crop sequences at Pantnagar**

Treatment	Green Fodder Yield (q/ha)	Dry Matter Yield (q/ha)	Crude Protein Yield (q/ha)	Plant Height (cm)
<b>A. Cropping Systems</b>				
Sorghum – Wheat	302.8	107.2	7.85	266.2
Sorghum – Wheat – Maize	266.4	93.8	6.89	244.0
Sorghum – Wheat – Cowpea	258.3	90.3	6.59	244.2
Sorghum – Berseem	293.4	103.0	7.53	277.7
Sorghum – Oat – Maize	281.4	100.1	7.31	265.5
Sorghum – Oat – Cowpea	291.6	103.3	7.55	265.5
SEm $\pm$	17.9	6.4	0.5	8.7
CD at 5%	NS	NS	NS	26.9
<b>B. Nitrogen Level (% of RDN)</b>				
50% of RDN	271.6	96.0	6.15	251.7
75% of RDN	279.1	98.6	7.10	257.0
100% of RDN	283.4	102.0	7.85	264.6
125% of RDN	295.2	101.8	8.04	268.8
SEm $\pm$	8.4	3.0	0.2	3.0
CD at 5%	NS	NS	0.6	8.5
<b>C. Interaction</b>				
<b>Cropping System X Nitrogen Level</b>				
SEm $\pm$	25.2	8.9	0.7	10.8
CD at 5%	NS	26.5	1.92	32.4



**Table-2 (e): Economics and leaf stem ratio of sorghum as influenced by nitrogen levels and crop sequences at Pantnagar**

Treatment	Leaf Stem Ratio	Gross Monetary Return (₹/ha)	Net Monetary Return (₹/ha)	Benefit Cost Ratio
<b>A. Cropping systems</b>				
Sorghum – Wheat	0.51	18165	3715	0.257
Sorghum – Wheat – Maize	0.51	15985	1535	0.105
Sorghum – Wheat – Cowpea	0.51	15500	1050	0.073
Sorghum – Berseem	0.45	17600	3150	0.218
Sorghum – Oat – Maize	0.51	16885	2435	0.169
Sorghum – Oat – Cowpea	0.50	17495	3045	0.211
SEm±	0.03	1073	1073	0.07
CD at 5%	0.08	NS	NS	NS
<b>B. Nitrogen level (% of RDN)</b>				
50% of RDN	0.49	16293.3	2293.3	0.164
75% of RDN	0.50	16746.7	2446.7	0.171
100% of RDN	0.49	17003.3	2403.3	0.165
125% of RDN	0.50	17710.0	2810.0	0.189
SEm+	0.02	501	501	0.03
CD at 5%	0.07	NS	NS	NS
<b>C. Interaction Cropping system X Nitrogen level</b>				
SEm+	0.06	1482	1482	
CD at 5%	NS	NS	NS	NS

**Table-2 (f): Yield, Growth and Economics of Sorghum as influenced by Nitrogen Levels and Crop sequences at Hisar**

Treatment	Plant Height (cm) at Harvest	Plant Population/m Row Length	Leaf Stem Ratio	Green Fodder Yield (q/ha)	Dry Matter Yield (q/ha)	Gross Monetary Return (₹/ha)	Net Monetary Return (₹/ha)	B : C Ratio
<b>A. Cropping Systems</b>								
Sorghum-Wheat	348.3	10.3	0.35	609.7	152.4	36600	24060	1.92
Sorghum-Wheat-Maize	348.6	10.4	0.35	600.7	150.2	36060	23520	1.88
Sorghum-Wheat-Cowpea	348.4	11.1	0.34	595.4	148.9	35700	23160	1.85
Sorghum-Berseem	350.1	11.6	0.34	583.3	145.8	34980	22440	1.80
Sorghum-Oat-Maize	350.3	12.2	0.36	601.9	150.5	36120	23580	1.88
Sorghum-Oat-Cowpea	351.7	11.4	0.35	594.9	148.7	35700	23160	1.85
SEm±	1.55	0.43	0.01	6.57	1.64			
CD at 5%	NS	NS	NS	NS	NS			
<b>B. Nitrogen Levels (% of RDN)</b>								
50% of RDN	338.3	11.6	0.32	544.6	136.2	32700	20160	1.61
75% of RDN	346.4	11.4	0.35	578.1	144.5	34680	22140	1.77
100% of RDN	354.6	11.0	0.35	612.8	153.2	36780	24240	1.93
125% of RDN	358.9	10.6	0.36	655.1	163.8	39300	26760	2.13
SEm±	1.20	0.38	0.01	7.64	1.91			
CD at 5%	3.47	NS	NS	22.01	5.51			
<b>C. Interaction</b>								
<b>Cropping System X Nitrogen Level</b>								
SEm±								
CD at 5%	NS	NS	NS	NS	NS			

**AST- 3 (AST-4): Forage production potential of sorghum hybrid with forage legumes under varying seed rates of intercrop**

**(Locations: Ludhiana, Bikaner, Pantnagar and Palampur)**

The different seed rates (SR) of forage legumes (cowpea, guar/rice bean) were tested in sorghum to get good quality of fodder with higher productivity. The data of second year has been reported in Tables 3(a) to 3 (f) and experiment was started in *Kharif* 2010.

At Ludhiana, the fodder yield of sorghum with forage legumes (cowpea and guar) was significantly higher (435.2 to 497.7 q/ha) in the first cutting than the sole crop of sorghum (349.5 q/ha). However, it (sole sorghum fodder yield) remained at par with sorghum + 25 % of guar (388.9 q/ha) and sorghum + 25 % of cowpea seed rate (398.1 q/ha). In the first cutting, the fodder yield increased with increase in seed rate of forage legumes up to 100 %. In the second cutting, the fodder yield was highest in sole sorghum (328.7 q/ha) followed by sorghum + 25 % cowpea SR (317.1 q/ha) and decreased with increase in seed rate of legumes. The planting of sorghum +100 % cowpea SR intercropping system recorded significantly highest green fodder yield (766.2 q/ha) over sole sorghum (678.2 q/ha). However it remained at par with rest of the intercropping systems (sorghum with cowpea/guar). Similarly, in first cutting sorghum + 100 % cowpea SR intercropping system recorded highest dry matter yield whereas in second cutting sole sorghum recorded highest dry matter yield followed by sorghum + 25 % cowpea SR and decreased with increase in seed rates of legumes. The crude protein and IVDMD content were higher in sorghum + cowpea than sorghum + guar intercropping systems. The crude protein content was higher under first cutting than second cutting whereas, the IVDMD contents were almost similar under both the cuttings. In the first cutting, the crude protein content ranged between 8.92 to 14.17 % and IVDMD ranged between 54.0 to 58.3 %. The lowest crude protein content (8.92 %) and IVDMD content (54.0 %) were observed in pure sorghum.

At Bikaner, in the first cutting, sorghum + 100 % guar SR and sorghum + 25 % cowpea SR intercropping systems recorded significantly higher green fodder yield (278.19 and 269.81 q/ha, respectively) over rest of the treatments and lowest being with sorghum + 100 % cowpea SR system (149.53 q/ha). In second cutting, sorghum + 25 % cowpea SR system observed significantly highest green fodder yield over sorghum + 50% cowpea SR, sorghum + 75 % cowpea SR and sorghum + 100 % cowpea SR and being at par with rest of the treatments. In third cutting, green fodder yield of sorghum recorded highest under sorghum + 100 % guar SR intercropping system. Sorghum + 100 % guar SR intercropping system recorded highest total green fodder (829.6 q/ha) and dry matter yields (119.33 q/ha) over rest of the cropping systems and sole sorghum.

At Pantnagar, the highest green fodder yield (428.2 q/ha) was recorded with sorghum + 50 % cowpea SR intercropping system whereas, significantly highest dry fodder yield (117.3 q/ha) was observed with sole sorghum (being at par with sorghum + 50 % cowpea SR) over rest of the cropping systems. The fodder yield increased with increase in seed rate of forage legumes up to 50 %. Further increase in seed rate of forage legumes to 75 % and 100 %, the fodder yield decreased. The sorghum + 25 % cowpea SR intercropping system observed significantly highest crude protein yield (15.83 q/ha) over rest of the treatments. The cropping system sorghum + 50 % cowpea SR fetched highest net monetary returns (₹12389/ha) and benefit cost ratio (0.93) over rest of the cropping systems and sole sorghum.

At Palampur, the fodder yield of sorghum with forage legumes (at 50 % to 75 % cowpea/ricebean SR) was significantly higher (403.67 to 476.31 q/ha) than sole crop of sorghum (377 q/ha), sorghum + 25 % cowpea (343.8 q/ha) and sorghum + 25 % ricebean (374.62 q/ha). Similarly to GFY, sorghum +75 % rice bean intercropping system recorded significantly highest dry fodder yield (100.51 q/ha) over rest of the treatments. The fodder yield increased with increase in seed rate of forage legumes up to 75 %. The further increase in seed rate of forage legumes to 100 %, the GFY and DFY decreased significantly. Whereas, the crude protein content of fodder increased with increase in seed rates of forage legumes to 100 % (15.9 % with cowpea and 16.0 % with ricebean). In sole rice bean the crude protein content was 19.5 % as compared to 17.9 % in sole cowpea. The net monetary returns (ranging between ₹39973 to ₹53173/ha) in sorghum with forage legumes were significantly higher than sole sorghum (₹36733/ha), sole cowpea (₹5790/ha) and sole rice bean (₹9030/ha). Similar to net returns, sorghum +75 % ricebean registered significantly highest benefit cost ratio (5.48) followed by sorghum + 75 % cowpea (4.95) and lowest being with sole cowpea (0.60), sole rice bean (0.93) and sole sorghum (4.32). The land equivalent ratio (LER) was highest with sorghum +75 % rice bean (1.77) followed by sorghum + 75 % cowpea (1.66) and lowest being with sorghum + 25 % cowpea (0.98).

**Table - 3(a): Yield and Plant characteristics as influenced with Fodder Sorghum and Forage Legumes under varying seed rates of intercrop at Ludhiana**

Treatments	Green Fodder Yield (q/ha)			Dry Matter Yield (q/ha)			Plant Height (cm)		Tillers/m Row Length		Leaf Stem Ratio	
	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	Total	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	Total	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut
<b>Sorghum+ 25 % cowpea</b>	398.1	317.1	715.2	62.9	59.5	122.4	160.5	187.5	12.7	14.3	0.73	0.75
<b>Sorghum+ 50 % cowpea</b>	435.2	305.6	740.8	68.8	57.4	126.2	161.9	184.7	12.3	14.0	0.73	0.77
<b>Sorghum+ 75 % cowpea</b>	467.6	294.0	761.6	71.6	55.1	126.7	163.7	180.5	11.8	13.7	0.73	0.78
<b>Sorghum+ 100 % cowpea</b>	497.7	268.5	766.2	78.7	50.8	129.5	167.0	178.7	11.5	13.3	0.72	0.8
<b>Sorghum+ 25 % guar</b>	388.9	312.5	701.4	61.4	58.7	120.1	160.3	183.7	13.0	14.7	0.73	0.76
<b>Sorghum+ 50 % guar</b>	449.1	277.8	726.9	71.1	52.2	123.4	161.9	178.3	12.8	14.3	0.72	0.77
<b>Sorghum+ 75 % guar</b>	469.9	259.3	729.2	74.2	48.8	123.0	163.1	175.3	12.5	14.0	0.71	0.79
<b>Sorghum+ 100 % guar</b>	487.3	243.1	730.4	76.9	45.6	122.5	165.3	172.7	12.2	13.7	0.71	0.80
<b>Sorghum sole</b>	349.5	328.7	678.2	55.2	61.9	117.1	159.2	189.7	13.3	15.0	0.74	0.78
<b>Cowpea sole</b>	247.7	-	247.7	39.1	-	39.1	106.7	-	11.7	-	1.00	-
<b>Guar sole</b>	281.3	-	281.3	45.7	-	45.7	93.3	-	16.7	-	0.84	-
<b>SEm<sub>±</sub></b>	16.64	14.76	22.07	2.84	2.75	3.92	3.49	3.64	0.81	0.56	-	-
<b>C D 5 %</b>	49.1	44.2	65.1	8.4	8.2	11.6	10.3	NS	2.4	NS	-	-
<b>CV %</b>	7.09	8.83	5.94	7.68	8.74	6.25	4.00	3.47	10.97	6.89	-	-

**Table - 3(b): Crude Protein and IVDMD as influenced with Fodder Sorghum and Forage Legumes under varying seed rates of intercrop at Ludhiana**

Treatments	CP Content (%)		Crude Protein Yield (q/ha)		IVDMD Content (%)		IVDMD Yield (q/ha)	
	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut	1 <sup>st</sup> cut	2 <sup>nd</sup> cut
<b>Sorghum+ 25 % cowpea</b>	9.10	7.25	5.72	4.31	54.9	54.9	34.51	32.66
<b>Sorghum+ 50 % cowpea</b>	12.42	7.65	8.53	4.39	56.3	55.3	38.68	31.74
<b>Sorghum+ 75 % cowpea</b>	13.30	7.35	9.51	4.05	57.2	56.0	40.90	30.86
<b>Sorghum+ 100 % cowpea</b>	14.17	7.25	11.14	3.68	58.3	58.4	45.84	29.65
<b>Sorghum+ 25 % guar</b>	9.10	7.35	5.58	4.31	54.9	54.6	33.69	32.04
<b>Sorghum+ 50 % guar</b>	10.32	7.30	7.34	3.81	55.4	56.0	39.38	29.23
<b>Sorghum+ 75 % guar</b>	12.07	7.35	8.95	3.58	56.0	56.9	41.54	27.72
<b>Sorghum+ 100 % guar</b>	13.30	7.70	10.22	3.51	57.2	57.9	43.93	26.39
<b>Sorghum sole</b>	8.92	7.35	4.92	4.54	54.0	54.9	29.81	33.93
<b>Cowpea sole</b>	18.75	-	7.33	-	62.0	-	24.25	-
<b>Guar sole</b>	14.58	-	6.66	-	60.2	-	27.52	-
<b>C D 5 %</b>	-	-	1.07	0.54	-	-	4.06	3.93
<b>SEm<sub>±</sub></b>	-	-	0.37	0.18	-	-	1.38	1.31
<b>CV %</b>	-	-	8.12	7.92	-	-	6.59	7.46

**Table- 3(c): Yield and plant characteristics as influenced with Fodder Sorghum and Forage Legumes under varying seed rate of intercrop (Legume) at Bikaner**

Treatment	Green Fodder Yield (q/ha)			Total Green Fodder Yield (q/ha)	Dry Fodder (q/ha)	No. of Shoots/ m <sup>2</sup>	Plant Height (cm)	Leaf Stem Ratio
	I cut	II cut*	III cut*					
<b>Sole sorghum</b>	191.11	160.24	274.83	626.18	91.33	125.67	203.73	0.20
<b>Sorghum + guar 25% SR</b>	213.24	163.67	266.00	642.91	82.67	131.00	197.40	0.20
<b>Sorghum + guar 50% SR</b>	216.00	162.04	291.17	669.21	101.00	186.00	162.80	0.22
<b>Sorghum + guar 75% SR</b>	208.20	168.42	313.67	690.29	113.67	202.00	192.60	0.21
<b>Sorghum + guar 100% SR</b>	278.19	188.74	362.67	829.60	119.33	201.00	208.67	0.21
<b>Sorghum +cowpea 25% SR</b>	269.81	195.02	317.50	782.33	112.70	157.00	190.00	0.22
<b>Sorghum + cowpea 50% SR</b>	168.46	142.88	303.67	615.01	106.67	142.33	190.93	0.21
<b>Sorghum + cowpea 75% SR</b>	178.73	141.46	284.83	605.02	89.17	140.00	198.80	0.22
<b>Sorghum + cowpea 100% SR</b>	149.53	129.61	270.67	549.81	86.17	118.00	168.27	0.20
<b>SEm<sub>±</sub></b>	14.72	11.55	23.47	-	11.35	17.39	11.90	-
<b>CD at 5%</b>	42.12	34.62	70.36	-	34.03	52.15	NS	-
<b>CV%</b>	12.25	12.40	13.63	-	19.02	19.33	10.82	-

\* Only sorghum

**Table - 3(d): Yield and Economics as influenced with Fodder Sorghum and Forage Legumes under varying seed rates of intercrop at Pantnagar**

<b>Treatment</b>	<b>Green Fodder Yield (q/ha)</b>	<b>Dry Matter Yield (q/ha)</b>	<b>Crude Protein Yield (q/ha)</b>	<b>Gross Monetary Return (₹/ha)</b>	<b>Net Monetary Return (₹/ha)</b>	<b>Benefit Cost Ratio</b>
<b>Sole Sorghum</b>	407.3	117.3	9.16	24438	10938	0.81
<b>Sorghum + Cowpea 25%</b>	412.3	104.3	15.83	24740	11740	0.90
<b>Sorghum + Cowpea 50%</b>	428.2	110.3	14.00	25689	12389	0.93
<b>Sorghum + Cowpea 75%</b>	351.1	96.8	13.17	21066	7466	0.55
<b>Sorghum + Cowpea 100%</b>	366.7	99.4	13.24	22001	8001	0.57
<b>Sorghum + Rice bean 25%</b>	338.5	81.5	9.84	20313	7313	0.56
<b>Sorghum + Rice bean 50%</b>	366.7	93.2	11.67	22001	8601	0.64
<b>Sorghum + Rice bean 75%</b>	330.2	80.9	9.27	19814	6014	0.44
<b>Sorghum + Rice bean 100%</b>	343.7	86.3	9.43	20622	6422	0.45
<b>SEm±</b>	10.2	2.76	0.43	609	609	0.04
<b>CD at 5%</b>	29.6	8.06	1.26	1777	1777	0.13
<b>CV%</b>	5.5	5.71	7.34	5.5	13.9	13.7



**Table - 3(e): Yield and Economics as influenced with Fodder Sorghum and Forage Legumes under varying seed rates of intercrop at Palampur**

<b>Treatment</b>	<b>Total Green Fodder Yield (q/ha)</b>	<b>Total Dry Matter Yield (q/ha)</b>	<b>Crude Protein Yield (q/ha)</b>	<b>Crude Protein (%)</b>	<b>Net Return (₹/ha)</b>	<b>Benefit Cost Ratio</b>	<b>Land Equivalent Ratio</b>
<b>Sorghum + 100 % cowpea</b>	397.33	88.63	15.5	14.9	44353	4.43	1.47
<b>Sorghum + 75 % cowpea</b>	446.34	92.87	14.5	14.0	48013	4.95	1.66
<b>Sorghum + 50 % cowpea</b>	392.84	84.34	12.3	11.6	42073	4.47	1.29
<b>Sorghum + 25 % cowpea</b>	343.80	77.61	9.9	9.3	39253	4.31	0.98
<b>Sorghum + 100 % Ricebean</b>	432.78	88.78	15.9	15.2	46153	4.61	1.58
<b>Sorghum + 75 % Ricebean</b>	476.31	100.51	13.9	14.0	53173	5.48	1.77
<b>Sorghum + 50 % Ricebean</b>	403.67	90.22	10.7	10.4	42193	4.49	1.31
<b>Sorghum + 25 % Ricebean</b>	374.62	81.22	9.8	9.2	39973	4.39	1.11
<b>Sole Sorghum</b>	377.00	85.17	8.8	8.4	36733	4.32	-
<b>Sole Cowpea</b>	129.00	20.64	17.9	17.2	5790	0.60	-
<b>Sole Ricebean</b>	397.33	23.11	19.3	18.1	9030	0.93	-
<b>SEm±</b>	8.30	1.60	0.34	0.26	1039	0.12	0.03
<b>CD at 5%</b>	24.50	4.73	1.01	0.76	3064	0.32	0.09
<b>CV %</b>	4.03	3.65	6.10	3.30	4.87	4.87	4.08

**Table - 3(f): Yield attributes as influenced with Fodder Sorghum and Forage Legumes under varying seed rates of intercrop at Palampur**

Treatment	Plant height (cm)				Shoot/ plant number/ m row length			
	Sorghum 1 <sup>st</sup> cut	Sorghum 2 <sup>nd</sup> cut	Cowpea	Ricebean	Sorghum 1 <sup>st</sup> cut	Sorghum 2 <sup>nd</sup> cut	Cowpea	Ricebean
<b>Sorghum + 100 % cowpea</b>	138.7	84.9	72.9	-	32.3	25.3	11.3	-
<b>Sorghum + 75 % cowpea</b>	157.4	72.5	64.3	-	32.7	25.7	9.0	-
<b>Sorghum + 50 % cowpea</b>	146.2	72.5	64.5	-	36.3	29.3	7.7	-
<b>Sorghum + 25 % cowpea</b>	132.9	77.5	63.0	-	39.7	31.0	6.0	-
<b>Sorghum + 100 % Ricebean</b>	163.4	84.3	-	73.0	30.0	23.0	-	14.3
<b>Sorghum + 75 % Ricebean</b>	135.0	79.9	-	72.7	32.0	25.0	-	11.0
<b>Sorghum + 50 % Ricebean</b>	156.3	77.0	-	73.8	32.3	25.3	-	8.7
<b>Sorghum + 25 % Ricebean</b>	155.7	75.2	-	72.8	33.0	26.3	-	7.3
<b>Sole Sorghum</b>	144.5	79.5	-	-	37.7	25.3	-	-
<b>Sole Cowpea</b>	-	-	71.2	-	-	-	11.7	-
<b>Sole Ricebean</b>	-	-	-	75.9	-	-	-	14.3
<b>SEm±</b>	4.7	7.8	1.4	1.0	1.8	1.48	0.3	0.4
<b>CD at 5%</b>	14.1	NS	4.6	NS	5.3	4.42	1.0	1.4
<b>CV %</b>	5.5	10.0	3.6	2.3	9.0	9.66	5.8	6.8

**AST-4 (AST-5): Performance of forage crops raised through waste water under varied nutrient levels**

**(Locations: Coimbatore and Hyderabad)**

This experiment was started in Kharif 2010 at two locations to assess the production, quality and economics of various forage crops raised through waste water under varied nutrient level. Twenty treatments consisted of combinations of forage crops (4) and nutrient levels (5) laid out in split plot design. The first data has been reported in Rabi 2010-11 annual report and second year data will be reported in annual report of Rabi 2011-12.

**AST-5 (AST-6): Effect of tillage and nutrient management on productivity of rice-oat cropping system**

**(Locations: Bhubaneswar, Ranchi, Kalyani, Jorhat and Raipur)**

The experiment was conducted in second year (kharif 2011) at five locations (first year at Raipur) to study the effect of tillage and nutrient management in oats on the productivity of rice-oat cropping system. The data of complete sequence of second year experimentation would be reported in annual report of Rabi 2011-12.

**AST-6 (NT): Effect of growing environment and nitrogen levels on production and quality of BN hybrid**

**(Locations: Palampur, Ludhiana, Anand, Rahuri and Hyderabad)**

A new field experiment was initiated in Kharif 2011 at five locations to study the effect of growing environment and nitrogen levels on production and quality of bajra napier hybrid. Since, 2011 was considered as establishment year, the data of the experiment would be reported in Kharif 2013.

**LOCATION SPECIFIC TRIALS**

**AST-7 (NT): Optimization of nitrogen for maize in different forage based cropping systems**

**(Location: Shillong)**

A new field experiment was started in kharif 2011 to study on optimization of nitrogen for maize in different forage based cropping systems. The result of the complete sequence would be reported in annual report of Rabi 2011-12.

**AST-8: Effect of soil amendments on productivity of rice-berseem and changes in soil properties of sodic soils**

**(Location: Faizabad)**

This was the third year of experimentation at Faizabad to study the effect of soil amendments on productivity of rice-berseem and changes in soil properties of sodic soil. The result of the complete sequence will be reported in annual report of Rabi 2011-12.

**AST-9 (AST-10): Banana based fodder intercropping in the homesteads of Kerala**

**(Location: Vellayani)**

This was the second year of experimentation (started in *Kharif* 2010) at Vellayani to evaluate the production potential, quality and economics of fodder crops in banana based production system. The data of the experiment will be reported in annual report of Rabi 2011-12.

**AST-10 (AST-11): Chemical control of *Acrachne racemosa* weeds in sorghum fodder**

**(Location: Ludhiana)**

A field experiment was conducted to evaluate the herbicides for the control of *Acrachne racemosa* weed in sorghum fodder. This was the second year of experimentation and data has been given in Tables 10 (a) to 10 (b). *Acrachne racemosa* weed was effectively controlled (weed control efficiency ranges from 41.9 to 86.3 %) with all the herbicide treatments as compared to control. The population of *Acrachne racemosa* weed in sorghum fodder was 7.5 to 26.0 weeds/m<sup>2</sup> in herbicide treatments as compared to 39.5 weeds/m<sup>2</sup> in control (weedy check). The dry weight of weeds decreased significantly with herbicides (0.31 to 1.32 q/ha) than control (2.27 q/ha). Among herbicides, the combinations of atrazine + stomp/treflan/lasso were more effective than the application of single herbicide (except treflan) in controlling weeds in forage sorghum. The highest fodder yield (645 q/ha) was obtained with pre-emergence application of atrazine 0.75 kg/ha + stomp 2.5 l/ha which was significantly superior over rest of the treatments but it remained at par with atrazine 1.0 kg/ha + stomp 2.5 l/ha (618.3 q/ha). The combination of atrazine 0.75 or 1.0 kg/ha + lasso 2.5 l/ha or lasso alone @ 2.5l/ha herbicides had toxic effect on the crop. The crude protein content increased with the application of herbicides (8.65 to 9.97 %) as compared to 7.87 % in control. The highest crude protein yield (14.57 q/ha) was recorded with pre-emergence application of atrazine 0.75 kg/ha + stomp 2.5 l/ha and lowest crude protein yield (5.18 q/ha) was being with lasso 2.5 l/ha.

**Table 10 (a): Effect of Herbicides on the Fodder Yield and Plant characteristics of Sorghum at Ludhiana**

Treatments	Green Fodder (q/ha)	Dry Matter (q/ha)	Plant Height (cm)	Tiller s/m	Leaf Stem Ratio
Control	466.7	112.8	229.1	7.7	0.78
Atrazine 1kg/ha PE	595.0	145.9	253.4	9.3	0.83
Stomp 2.5 l/ha PE	568.3	136.5	249.3	9.6	0.74
Treflan 2.5 l/ha PE	513.3	125.1	243.6	7.3	0.69
Lasso 2.5 l/ha PE	236.7	58.2	240.2	5.8	0.68
Atrazine 0.75 + Stomp 2.5 l/ha PE	645.0	157.9	258.7	10.3	0.64
Atrazine 0.75 + Treflan 2.5 l/ha PE	530.0	130.0	244.3	9	0.63
Atrazine 0.75 + Lasso 2.5 l/ha PE	283.3	67.9	240.8	5.7	0.8
Atrazine 1.0 + Stomp 2.5 l/ha PE	618.3	151.7	255.7	9.7	0.65
Atrazine 1.0 + Treflan 2.5 l/ha PE	518.3	128.5	244.6	9	0.73
Atrazine 1.0 + Lasso 2.5 l/ha PE	483.3	118.4	238.7	5.6	0.66
SEm $\pm$	18.32	3.86	3.35	0.44	-
CD at 5 %	54.1	11.4	9.9	1.29	-
CV %	6.40	5.50	6.37	9.31	-

**Table 10 (b): Effect of herbicides on the weed intensity, dry weight  
(30 days after sowing) and crude protein in sorghum at Ludhiana**

Treatments	Weed Intensity/ m <sup>2</sup> (no)	Weeds Dry wt. (q/ha)	WCE (%)	CP Content (%)	CP Yield (q/ha)
Control	47	10.02	-	7.87	8.88
Atrazine 1kg/ha PE	33	4.75	45.8	9.22	13.45
Stomp 2.5 l/ha PE	8	3.11	61.7	8.87	12.11
Treflan 2.5 l/ha PE	8	2.75	70.0	9.30	11.63
Lasso 2.5 l/ha PE	24	7.10	41.9	8.92	5.18
Atrazine 0.75 + Stomp 2.5 l/ha PE	3	1.50	81.1	9.22	14.57
Atrazine 0.75 + Treflan 2.5 l/ha PE	8	3.75	74.4	9.97	12.96
Atrazine 0.75 + Lasso 2.5 l/ha PE	14	2.25	70.5	9.40	6.38
Atrazine 1.0 + Stomp 2.5 l/ha PE	3	1.25	61.7	9.10	13.80
Atrazine 1.0 + Treflan 2.5 l/ha PE	8	1.27	86.3	9.45	12.14
Atrazine 1.0 + Lasso 2.5 l/ha PE	11	6.07	84.6	8.65	10.24
SEm±	-	0.20	-	-	0.68
CD at 5 %	-	0.59	-	-	2.01
CV %	-	9.13	-	-	9.86

**AST-11 (NT): Effect of levels of nitrogen on productivity of perennial grasses with and without tree shade**

**(Location: Jorhat)**

A new field experiment was started in *Kharif* 2011 at Jorhat to study the effect of levels of nitrogen on productivity and quality of perennial grasses under open and tree shade conditions. Since, 2011 was considered as establishment year, the data of the experiment would be reported in *Kharif* 2013.

**AVT BASED TRIALS**

**AST-12: Effect of nitrogen levels on forage yield of promising entries of *Setaria* grass**

**(Location: Palampur)**

An AVT based experiment was conducted at Palampur during *Kharif* 2010 to study the effect of nitrogen levels on forage yield of promising entries of *Setaria* grass. Sixteen treatments consisted of four number of entries (S-20, S-21, PSS-1 and S-92) and four levels of nitrogen (0, 40, 80 and 120 kg N/ha) laid out in RBD design and replicated three times. The data of this experiment has been presented in Tables 12 (a) to 12 (a-3). The results revealed that no significant effect on shoot numbers/m<sup>2</sup> and crude protein content (%) was observed among entries, whereas with respect to other parameters under study significant variation among entries was observed. The entry PSS-1 being at par with entry S-20 produced significantly taller plants than S-21 and S-92. With respect to leaf stem ratio entry S-92 recorded significantly highest leaf stem ratio over rest of the entries. Entry S-20 maintained its superiority over other entries by producing highest green forage, dry forage and crude protein yields. The growth parameters, yields and quality (up to 80 kg N/ha) increased consistently with increasing levels of nitrogen up to 120 Kg N/ha. For green fodder yield, application of 120 Kg N/ha to *Setaria* grass recorded percent increase of 221, 84.6 and 11.1 over control, 40 and 80 kg N/ha, respectively.

The interaction effect of entries and nitrogen levels on green fodder, dry fodder and crude protein yields indicated that among all entries, significantly highest GFY, DFY and CPY was obtained with the application of 120 Kg N/ha.

**Table 12(a): Effect of nitrogen levels on the performance of promising entries of Setaria grass at Palampur**

Treatments	Plant Height (cm)	Shoot Number (m <sup>2</sup> )	L : S	Green Fodder Yield (q/ha)	Dry Fodder Yield (q/ha)	Crude Protein Content (%)	Crude Protein Yield (q/ha)
<b>Entries</b>							
S-20	104.5	129	0.63	252.36	77.55	9.50	7.52
S-21	99.7	110	0.61	240.62	73.96	9.55	7.20
PSS-1	105.1	121	0.61	230.03	70.70	9.53	6.83
S-92	76.1	117	0.70	143.00	37.65	9.58	3.67
SEm $\pm$	1.54	4.68	0.01	2.59	0.83	0.1	0.08
CD at 5%	4.45	NS	0.02	7.45	2.39	NS	0.24
<b>Nitrogen Levels (kg/ha)</b>							
0	64.4	79	0.49	97.99	29.32	8.68	2.54
40	94.3	111	0.62	170.37	51.03	9.65	4.94
80	108.5	137	0.71	283.14	85.14	9.88	8.38
120	118.0	149	0.73	314.52	94.38	9.95	9.37
SEm $\pm$	1.54	4.68	0.01	2.59	0.83	0.1	0.08
CD at 5%	4.45	13.54	0.02	7.45	2.39	0.2	0.24
<b>Interaction</b>	8.91	NS	NS	14.90	4.80	NS	0.48

**Table 12(a-1): Interaction effect of nitrogen levels on green fodder yield of Setaria grass at Palampur**

Entry/ N Levels	Green fodder yield (q/ha)				
	0	40	80	120	Mean
S-20	106.34	193.24	334.56	375.31	252.36
S-21	106.66	199.01	316.45	340.37	240.62
PSS-1	107.06	167.08	311.39	334.59	230.03
S-92	71.88	122.15	170.16	207.79	143.00
<b>Mean</b>	97.99	170.37	283.14	314.52	
	<b>Entry</b>	<b>N Levels</b>	<b>Entry X N Levels</b>		
SEm $\pm$	2.59	2.59			
CD at 5%	7.45	7.45	14.90		



**Table 12(a-2): Interaction effect of nitrogen levels on dry matter yield of Setaria grass at Palampur**

Entry/ N levels	Dry matter yield (q/ha)				
	0	40	80	120	Mean
S-20	32.64	59.37	102.83	115.37	77.55
S-21	32.78	61.21	97.27	104.59	73.96
PSS-1	32.94	51.40	95.65	102.82	70.70
S-92	18.93	32.15	44.80	54.73	37.65
<b>Mean</b>	29.32	51.03	85.14	94.38	
	<b>Entry</b>	<b>N Levels</b>	<b>Entry X N Levels</b>		
SEm±	0.83	0.83			
CD at 5%	2.39	2.39	4.80		

**Table 12(a-3): Interaction effect of nitrogen levels on crude protein yield of Setaria grass at Palampur**

Entry/ N levels	Crude protein yield (q/ha)				
	0	40	80	120	Mean
S-20	2.79	5.76	10.08	11.46	7.52
S-21	2.87	5.94	9.63	10.35	7.20
PSS-1	2.79	5.02	9.34	10.15	6.83
S-92	1.69	3.02	4.45	5.51	3.67
<b>Mean</b>	2.54	4.94	8.38	9.37	
	<b>Entry</b>	<b>N Levels</b>	<b>Entry X N Levels</b>		
SEm±	0.08	0.08			
CD at 5%	0.24	0.24	0.48		

**AST-13: Effect of phosphorus levels on forage yield of promising entries of cowpea**

**(Location: North Eastern Zone: Faizabad, Ranchi, Kalyani and Bhubaneshwar,**

**Southern zone: Coimbatore, Vellayani, Mandya and Dharwad)**

A field trial was conducted to find out the response of promising AVT-2 entries of cowpea with supplementation of graded doses of phosphorus. The study was under taken at 8 locations with 5 entries (including 2 national and one zonal checks) and 3 levels of phosphorus (30, 60 and 90 kg  $P_2O_5$ /ha). The data presented in Tables 13 (a) to 13 (g) revealed that on over all mean basis, Check entry UPC-622 recorded highest green fodder, dry fodder and crude protein yields over rest of the entries. None of the testing entry was found superior over national or zonal checks for GFY, DFY and CPY. The green fodder yield of UPC-622 ranged between 212.3 to 300.8 q/ha in the different regions. The north eastern zone recorded higher green fodder yield (ranged between 221.2 to 255.2 q/ha) of entries over southern zone (ranged between 188.1 to 197.8 q/ha). In north –eastern zone, zonal check UPC-622 recorded highest green fodder, dry matter and crude protein yields over rest of the entries. In southern zone, on mean basis national check entry UPC 5286 observed highest green fodder yield, whereas, testing entry MFC 08-14 recorded highest dry fodder and crude protein yields over rest of the entries. The influence of phosphorus on these parameters was linear up to the highest tested rate of P application (90 kg  $P_2O_5$ /ha) and registered percent increase of 17.25 and 4.80 for GFY and 16.57 and 4.63 for DFY over 30 and 60 Kg  $P_2O_5$ /ha, respectively.

AST-13 (a): Effect of Phosphorus Levels on Green Fodder Yield of promising entries of Cowpea

Treatment	Green Fodder Yield (q/ha)										
	North East Zone					South Zone					Over all Mean
	Faiza-bad	Ran-chi	Kal-yani	Bhuba-neswar	Mean	Coim-batore	Vella-yani	Man-dya	Dhar-wad	Mean	
<b>A. Entries</b>											
MFC 08 -14	201.2	229.5	184.0	269.9	221.2	232.4	212.2	267.4	78.2	197.6	209.4
IL – 1177	200.0	234.8	219.0	272.8	231.7	281.5	218.2	191.7	62.2	188.4	210.0
UPC 622	212.3	284.6	223.0	300.8	255.2	-	-	-	-	-	255.2
UPC 9202	-	-	-	-	-	235.2	240.6	217.4	59.1	188.1	188.1
UPC 5286	205.7	211.6	232.0	289.3	234.7	244.4	244.0	216.1	86.7	197.8	216.2
Bundel lobia-1	220.3	230.2	178.0	322.4	237.7	263.0	217.6	227.2	69.9	194.4	216.1
SEm±	3.7	1.3	5.0	1.4		5.1	3.3	4.1	3.8		
CD at 5%	10.9	3.7	14.5	4.2		14.7	9.5	12.0	10.8		
<b>B. Phosphorus Level (kg/ha)</b>											
30	180.8	193.6	188.0	277.3	209.9	232.2	232.3	198.7	60.8	181.0	195.5
60	206.6	241.6	227.0	294.0	242.3	251.1	224.2	235.2	70.1	195.2	218.7
90	226.7	279.1	207.0	301.9	253.7	270.6	223.1	242.8	82.7	204.8	229.2
SEm±	3.2	1.0	4.0	1.1		4.0	2.5	3.2	2.8		
CD at 5%	9.4	2.9	11.6	3.2		11.4	7.4	9.3	8.1		
<b>C. Interaction: Entry X Phosphorus Level</b>											
SEm±	6.4	2.2	8.0	2.5		8.8	5.7	7.2			
CD at 5%	NS	6.4	23.2	7.2		25.5	16.5	NS			
CV%	5.4		6.7	3.5			2.5	5.6			

**AST-13 (a-1): Interaction effect of Phosphorus Levels and AVT-2 entries on Green Fodder Yield of Cowpea at Ranchi**

Entry/P Level	Green Fodder Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	181.3	235.9	271.3	229.5
IL – 1177	204.8	232.8	266.7	234.8
UPC 622	232.0	288.0	333.7	284.6
UPC 5286	156.8	219.3	258.7	211.6
Bundel lobia-1	193.3	232.0	265.3	230.2
<b>Mean</b>	193.6	241.6	279.1	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	1.3	1.0	2.2	
CD at 5%	3.7	2.9	6.4	
CV %				

**AST-13 (a-2): Interaction effect of Phosphorus Levels and AVT-2 entries on Green Fodder Yield of Cowpea at Kalyani**

Entry/P Level	Green Yodder Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	177.0	227.0	255.0	184.0
IL – 1177	199.0	196.0	243.0	219.0
UPC 622	175.0	256.0	161.0	223.0
UPC 5286	207.0	218.0	199.0	232.0
Bundel lobia-1	224.0	197.0	174.0	178.0
<b>Mean</b>	188.0	227.0	207.0	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	5.0	4.0	8.0	
CD at 5%	14.4	11.6	23.2	
CV %			6.7	

**AST-13 (a-3): Interaction effect of Phosphorus Levels and AVT-2 entries on Green Fodder Yield of Cowpea at Bhubaneswar**

Entry/P Level	Green Fodder Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	249.14	276.55	284.12	269.94
IL – 1177	264.39	271.69	282.38	272.82
UPC 622	295.41	302.04	304.96	300.80
UPC 5286	277.17	289.68	301.17	289.34
Bundel lobia-1	300.44	329.97	336.91	322.44
<b>Mean</b>	277.31	293.98	301.91	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	1.4	1.1	2.5	
CD at 5%	4.2	3.2	7.2	
CV %			3.5	

**AST-13 (a-4): Interaction effect of Phosphorus Levels and AVT-2 entries on Green Fodder Yield of Cowpea at Vellayani**

Entry/P Level	Green Fodder Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	232.0	219.0	186.0	212.2
IL – 1177	192.0	232.0	231.0	218.2
UPC 9202	269.0	230.0	223.0	240.6
UPC 5286	243.0	243.0	246.0	244.0
Bundel lobia-1	226.0	198.0	229.0	217.6
<b>Mean</b>	232.3	224.2	223.1	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	3.3	2.5	5.7	
CD at 5%	9.5	7.4	16.5	
CV %			2.5	

**AST-13 (a-5): Interaction effect of Phosphorus Levels and AVT-2 entries on Green Fodder Yield of Cowpea at Coimbatore**

Entry/P Level	Green Fodder Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	197.20	241.67	258.33	232.40
IL – 1177	247.20	286.10	311.10	281.47
UPC 9202	227.77	233.33	244.43	235.18
UPC 5286	230.53	230.53	272.23	244.43
Bundel lobia-1	258.33	263.90	266.67	262.97
<b>Mean</b>	232.21	251.11	270.55	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	5.10	4.00	8.80	
CD at 5%	14.73	11.41	25.51	
CV %				

**AST-13 (b): Effect of Phosphorus Levels on Dry Matter Yield of promising entries of Cowpea**

Treatment	Dry Matter Yield (q/ha)										Over all Mean
	North East Zone					South Zone					
	Faizabad	Ranchi	Kalyani	Bhuba- neswar	Mean	Coimba- tore	Vellayani	Mandya	Dharwad	Mean	
<b>A. Entries</b>											
MFC 08 -14	46.6	37.5	34.2	64.6	45.7	37.9	26.1	43.4	23.7	32.8	39.3
IL – 1177	46.0	44.9	40.3	65.2	49.1	47.1	25.7	30.7	18.9	30.6	39.9
UPC 622	48.9	49.6	41.2	71.8	52.9	-	-	-	-	-	52.9
UPC 9202	-	-	-	-	-	38.1	29.0	34.7	17.8	29.9	29.9
UPC 5286	47.4	34.5	43.0	68.6	48.4	38.6	29.6	34.5	25.3	32.0	40.2
Bundel lobia-1	50.7	41.8	32.2	77.0	50.4	43.1	26.4	37.0	20.8	31.8	41.1
SEm±	0.8	0.6	1.1	0.4		1.4	0.5	0.7	1.1		
CD at 5%	2.5	1.8	3.3	1.1		4.0	1.5	1.9	3.0		
<b>B. Phosphorus Levels (kg/ha)</b>											
30	40.7	36.4	34.3	66.7	44.5	37.6	28.4	31.4	18.6	29.0	36.8
60	47.5	40.9	42.8	70.1	50.3	41.1	26.6	37.7	21.2	31.7	41.0
90	52.4	47.7	37.5	71.5	52.3	44.2	27.0	39.0	24.1	33.6	42.9
SEm±	0.7	0.5	0.9	0.3		1.1	0.4	0.5	0.7		
CD at 5%	2.1	1.4	2.5	0.8		3.1	1.2	1.5	2.0		
<b>C. Interaction: Entry X Phosphorus Level</b>											
SEm±	1.5	1.1	1.9	0.6		2.4	0.9	1.1			
CD at 5%	NS	3.0	5.7	1.8		NS	2.6	NS			
CV%	5.4		8.9	3.6			3.2	5.6			

**AST-13 (b-1): Interaction effect of Phosphorus Levels and AVT-2 entries on Dry Matter Yield of Cowpea at Ranchi**

Entry/P Level	Dry Matter Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	32.2	34.4	45.9	37.5
IL – 1177	42.6	46.1	45.9	44.9
UPC 622	44.5	49.5	54.7	49.6
UPC 5286	28.2	33.3	42.1	34.5
Bundel lobia-1	34.3	40.9	50.0	41.8
<b>Mean</b>	36.4	40.9	47.7	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.6	0.5	1.1	
CD at 5%	1.8	1.4	3.0	
CV %				

**AST-13 (b-2): Interaction effect of Phosphorus Levels and AVT-2 entries on dry Matter Yield of Cowpea at Kalyani**

Entry/P Level	Dry Matter Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	32.1	40.2	48.4	34.2
IL – 1177	39.7	36.1	44.0	40.3
UPC 622	30.9	46.4	28.9	41.2
UPC 5286	37.8	41.2	36.6	43.0
Bundel lobia-1	42.8	36.8	31.2	32.3
<b>Mean</b>	34.3	42.8	37.5	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	1.1	0.9	2.0	
CD at 5%	3.2	2.5	5.7	
CV %			8.9	



**AST-13 (b-3): Interaction effect of Phosphorus Levels and AVT-2 entries on dry Matter Yield of Cowpea at Bhubaneswar**

Entry/P Level	Dry Matter Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	60.02	65.96	67.80	64.59
IL – 1177	63.77	65.02	66.72	65.17
UPC 622	71.00	72.21	72.17	71.79
UPC 5286	66.48	68.63	70.79	68.63
Bundel lobia-1	72.21	78.88	79.78	76.96
<b>Mean</b>	66.70	70.14	71.45	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.4	0.3	0.6	
CD at 5%	1.1	0.8	1.8	
CV %			3.6	

**AST-13 (b-4): Interaction effect of Phosphorus Levels and AVT-2 entries on Dry Matter Yield of Cowpea at Vellayani**

Entry/P Level	Dry Matter Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	28.6	26.9	22.8	26.1
IL – 1177	23.3	26.0	27.8	25.7
UPC 9202	33.1	27.0	26.9	29.0
UPC 5286	29.5	29.4	29.8	29.6
Bundel lobia-1	27.5	23.9	27.8	26.4
<b>Mean</b>	28.4	26.6	27.0	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.5	0.4	0.9	
CD at 5%	1.5	1.2	2.6	
CV %			3.2	

**AST-13 (b-5): Interaction effect of Phosphorus Levels and AVT-2 entries on Dry Matter Yield of Cowpea at Coimbatore**

Entry/P Level	Dry Matter Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	31.70	39.28	42.76	37.91
IL – 1177	42.15	47.47	51.57	47.06
UPC 9202	37.02	38.10	39.16	38.09
UPC 5286	34.55	37.08	44.16	38.60
Bundel lobia-1	42.45	43.41	43.48	43.11
<b>Mean</b>	37.57	41.07	44.23	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm <sub>±</sub>	1.40	1.10	2.41	
CD at 5%	4.01	3.10	NS	
CV %				

**AST-13(c): Effect of Phosphorus Levels on Crude Protein Yield of promising entries of Cowpea**

Treatment	Crude Protein Yield (q/ha)										Over all Mean
	North East zone					South zone					
	Faizabad	Ranchi	Kalyani	Bhuba- neswar	Mean	Coimba- tore	Vellayani	Mandya	Dharwad	Mean	
<b>A. Entries</b>											
MFC 08 -14	6.4	5.5	4.0	9.9	6.5	6.4	4.2	6.4	3.8	5.2	5.8
IL – 1177	7.2	6.2	5.0	10.0	7.1	6.8	4.4	4.4	3.1	4.7	5.9
UPC 622	7.9	7.5	4.7	11.2	7.8	-	-	-	-	-	7.3
UPC 9202	-	-	-	-	-	5.8	4.9	5.3	2.9	4.7	4.7
UPC 5286	7.5	5.0	3.8	10.4	6.7	5.5	5.0	5.2	4.1	5.0	5.9
Bundel lobia-1	8.1	6.4	3.4	11.9	7.5	7.5	4.5	5.5	3.4	5.2	5.7
SEm±	0.1	0.1	0.1	0.1		0.3	0.2	0.2	1.6		
CD at 5%	0.4	0.3	0.4	0.4		0.9	0.7	0.5	4.7		
<b>B. Phosphorus levels (kg/ha)</b>											
30	6.2	5.1	3.5	10.0	6.2	6.3	4.8	4.6	2.9	4.7	5.4
60	7.7	6.0	4.2	11.0	7.2	6.2	4.7	5.7	3.4	5.0	6.1
90	8.6	7.2	4.8	11.1	7.9	6.7	4.3	5.9	4.0	5.2	6.6
SEm±	0.1	0.1	0.1	0.1		0.2	0.2	0.1	1.3		
CD at 5%	0.3	0.2	0.4	0.3		NS	NS	0.4	3.8		
<b>C. Interaction:Entry X Phosphorus level</b>											
SEm±	0.2	0.2	0.3	0.2		0.6	0.4	0.3			
CD at 5%	NS	0.5	0.7	0.7		1.6	1.2	0.8			
CV%	5.3		10.5	3.9			9.3	8.6			

**AST-13 (c-1): Interaction effect of Phosphorus Levels and AVT-2 entries on Crude Protein Yield of Cowpea at Ranchi**

Entry/P Level	Crude Protein Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	4.39	5.00	7.02	5.47
IL – 1177	5.74	6.29	6.46	6.16
UPC 622	6.48	7.6	8.43	7.50
UPC 5286	3.80	4.9	6.40	5.03
Bundel lobia-1	5.21	6.07	7.84	6.38
<b>Mean</b>	5.12	5.97	7.23	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.1	0.1	0.2	
CD at 5%	0.3	0.2	0.5	
CV %				

**AST-13 (c-2): Interaction effect of Phosphorus Levels and AVT-2 entries on Crude protein Yield of Cowpea at Kalyani**

Entry/P Level	Crude Protein Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	2.6	5.8	3.5	4.0
IL – 1177	5.1	5.1	4.6	5.0
UPC 622	4.2	3.7	2.3	4.7
UPC 5286	4.1	5.3	3.9	3.8
Bundel lobia-1	4.9	3.4	3.9	3.4
<b>Mean</b>	3.5	4.2	4.8	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.1	0.1	0.3	
CD at 5%	0.4	0.3	0.7	
CV %			10.5	

**AST-13 (c-3): Interaction effect of Phosphorus Levels and AVT-2 entries on Crude Protein Yield of Cowpea at Bhubaneswar**

Entry/P Level	Crude protein yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	8.97	9.96	10.69	9.87
IL – 1177	9.31	10.16	10.56	10.01
UPC 622	10.87	11.44	11.21	11.17
UPC 5286	9.82	10.71	10.71	10.41
Bundel lobia-1	10.78	12.57	12.44	11.93
<b>Mean</b>	9.95	10.97	11.12	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.14	0.11	0.24	
CD at 5%	0.40	0.31	0.70	
CV %			3.91	

**AST-13 (c-4): Interaction effect of Phosphorus Levels and AVT-2 entries on Crude Protein yYeld of Cowpea at Vellayani**

Entry/P Level	Crude Protein Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	5.1	4.0	3.5	4.2
IL – 1177	4.2	4.8	4.0	4.4
UPC 9202	5.1	5.0	4.5	4.9
UPC 5286	4.6	5.1	5.4	5.0
Bundel lobia-1	5.0	4.7	3.8	4.5
<b>Mean</b>	4.8	4.7	4.3	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.2	0.2	0.4	
CD at 5%	0.7	NS	1.2	
CV %			9.3	

**AST-13 (c-5): Interaction effect of Phosphorus Levels and AVT-2 entries on Crude Protein Yield of Cowpea at Coimbatore**

Entry/P Level	Crude Protein Yield (q/ha)			
	30	60	90	Mean
MFC 08 -14	6.29	5.48	7.28	6.35
IL – 1177	6.83	6.49	7.04	6.79
UPC 9202	5.20	4.88	7.19	5.75
UPC 5286	5.14	4.87	6.45	5.49
Bundel lobia-1	7.80	9.13	5.49	7.47
<b>Mean</b>	6.25	6.17	6.69	
	<b>Entry</b>	<b>P Levels</b>	<b>Entry X P Levels</b>	
SEm±	0.32	0.23	0.55	
CD at 5%	0.93	NS	1.60	
CV %				

**AST-13 (d): Effect of Phosphorus Levels on Plant Height of promising entries of Cowpea**

Treatment	Plant Height (cm)								
	Faizabad	Ranchi	Kalyani	Bhubaneswar	Coimbatore	Vellayani	Mandya	Dharwad	Mean
<b>A. Entries</b>									
MFC 08 -14	125.1	162.4	78.33	210.7	98.9	147.0	50.6	44.7	114.7
IL – 1177	123.1	177.4	83.62	245.3	103.3	139.1	38.9	46.1	119.6
UPC 622	139.9	229.9	83.78	277.4	-	-	-	-	182.7
UPC 9202	-	-	-	-	102.9	148.8	44.2	45.4	85.3
UPC 5286	127.0	160.9	87.24	266.8	99.5	158.2	46.5	52.6	124.8
Bundel lobia-1	124.8	184.0	84.28	259.4	100.3	141.2	50.0	52.1	124.5
SEm±	2.7	1.8	1.02	1.9	2.5	4.1	1.9	1.3	
CD at 5%	8.0	5.3	2.96	5.4	NS	11.9	5.6	3.7	
<b>B. Phosphorus levels (kg/ha)</b>									
30	130.5	165.7	82.85	224.6	96.4	149.3	40.5	44.7	116.8
60	110.0	178.9	86.24	253.1	101.3	134.4	48.7	48.5	120.1
90	190.6	204.2	81.26	278.1	105.1	157.0	49.0	51.3	139.6
SEm±	2.4	1.4	0.79	1.4	1.9	3.2	1.5	0.9	
CD at 5%	7.0	4.1	2.29	4.2	5.6	9.2	4.4	2.4	
<b>C. Interaction: Entry X Phosphorus level</b>									
SEm±	4.7	3.1	1.77	3.2	4.3	7.1	3.4		
CD at 5%	NS	9.1	5.12	9.4	NS	20.5	NS		
CV%	6.4		3.7			4.8	12.7		

**AST-13 (e): Effect of Phosphorus Levels on Plant population of promising entries of Cowpea**

Treatment	Plant Population/ m <sup>2</sup>						
	Ranchi	Kalyani	Bhubaneswar	Coimbatore	Vellayani	Mandya	Mean
<b>A. Entries</b>							
MFC 08 -14	32.9	26.0	26.0	33.0	28.0	30.0	33.5
IL – 1177	34.9	26.3	27.3	32.7	27.9	30.6	34.0
UPC 622	42.9	26.4	26.7	-	-	-	32.0
UPC 9202	-	-	-	32.3	28.3	30.9	37.5
UPC 5286	37.1	25.3	26.3	32.4	28.2	30.7	34.1
Bundel lobia-1	39.6	25.7	27.3	32.6	27.9	30.3	34.6
SEm±	0.7	0.4	0.7	0.2	0.1	0.5	
CD at 5%	2.0	NS	NS	NS	NS	NS	
<b>B. Phosphorus levels (kg/ha)</b>							
30	35.0	25.5	27.0	32.6	28.1	31.0	33.9
60	37.5	25.5	26.4	32.4	27.8	29.9	34.1
90	39.9	26.8	26.8	32.8	28.2	30.5	34.9
SEm±	0.5	0.3	0.6	0.1	0.1	0.4	
CD at 5%	1.6	0.9	NS	NS	0.3	NS	
<b>C. Interaction: Entry X Phosphorus level</b>							
SEm±		0.8	1.3	0.4	0.2	0.8	
CD at 5%	NS	NS	NS	NS	NS	NS	
CV%		5.1	8.2		4.6		



**AST-13 (f): Effect of Phosphorus Levels on Leaf Stem Ratio of promising entries of Cowpea**

Treatment	Leaf Stem Ratio						
	Faizabad	Ranchi	Coimbatore	Vellayani	Mandya	Dharwad	Mean
<b>A. Entries</b>							
MFC 08 -14	0.62	0.56	0.38	0.81	0.50	1.29	0.75
IL – 1177	0.61	0.67	0.38	0.81	0.37	1.25	0.70
UPC 622	0.67	0.68	-	-	-	-	0.68
UPC 9202	-	-	0.39	0.90	0.39	1.22	0.73
UPC 5286	0.65	0.51	0.41	0.83	0.44	1.24	0.73
Bundel lobia-1	0.63	0.66	0.38	0.82	0.45	1.29	0.74
SEm±	0.01	0.01	0.01	0.02	0.02	0.01	
CD at 5%	0.03	0.03	NS	0.06	0.06	NS	
<b>B. Phosphorus levels (kg/ha)</b>							
30	0.64	0.58	0.37	0.88	0.40	1.19	0.68
60	0.57	0.60	0.38	0.78	0.44	1.27	0.67
90	0.70	0.67	0.42	0.84	0.46	1.32	0.74
SEm±	0.01	0.01	0.01	0.01	0.02	0.02	
CD at 5%	0.02	0.03	0.02	0.04	0.04	0.05	
<b>C. Interaction: Entry X Phosphorus level</b>							
SEm±	0.02	0.02	0.01	0.03	0.03		
CD at 5%	NS	0.06	NS	0.11	NS		
CV%	4.7			4.57			

**AST-13 (g): Effect of Phosphorus Levels on Crude Protein Content of promising entries of Cowpea**

Treatment	Crude Protein (%)							
	Faizabad	Ranchi	Bhubaneswar	Coimbatore	Vellayani	Mandya	Dharwad	Mean
<b>A. Entries</b>								
MFC 08 -14	15.6	14.5	15.3	16.9	16.1	15.3	15.8	15.6
IL – 1177	15.8	13.9	15.4	14.5	17.3	14.4	16.4	15.4
UPC 622	16.2	15.2	15.6	-	-	-	-	15.5
UPC 9202	-	-	-	15.1	17.1	15.0	16.2	15.8
UPC 5286	15.9	14.5	15.2	14.3	17.1	15.2	16.2	15.4
Bundel lobia-1	16.1	14.9	15.5	17.4	15.3	14.7	16.2	15.7
SEm±	0.2	0.1	0.2	0.5	0.08	0.4	0.07	
CD at 5%	NS	0.2	0.5	1.5	0.24	NS	0.2	
<b>B. Phosphorus levels (kg/ha)</b>								
30	15.1	13.9	14.9	16.6	17.1	14.8	15.8	15.8
60	16.0	14.6	15.6	14.9	16.9	15.2	16.2	15.8
90	16.6	15.3	15.6	15.3	15.8	14.8	16.6	15.6
SEm±	0.2	0.2	0.1	0.4	0.06	0.3	0.1	
CD at 5%	0.5	0.5	0.3	1.2	0.18	NS	0.3	
<b>C. Interaction: Entry X Phosphorus level</b>								
SEm±	0.4	0.13	0.3		0.1	0.8		
CD at 5%	NS	0.38	0.8		0.4	NS		
CV%	3.9		3.0		0.8			

## Annual Report Kharif-2011

Forage crop protection trials in major kharif forages included pest occurrence, evaluation of varietal resistance in improved breeding materials and pest management. The trials were conducted at Anand, Bhubneshwar, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri. The major emphasis was on occurrence of disease and pests in different Kharif crops under different agroclimatic conditions, strengthening pest management.

### **PPT-1. MONITORING OF DISEASE, INSECT PESTS AND NEMATODES IN SORGHUM, PEARLMILLET, MAIZE AND COWPEA ECOSYSTEM.**

#### **Locations:**

**(Anand, Bhubneshwar, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri)**

Four cultivated forage crops sorghum, pearl millet, maize and cowpea were screened with an objective to record the occurrence and abundance of disease, insect pests and nematodes and their relationships with weather parameters 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 the major disease occurred in various sorghum germplasm lines in the month of July and September. During this period the mean temperature was around 30-37 °C and humidity 80-95% this favoured the spread and development of the diseases. The increases in disease severity continued up to the grain formation stage of the crop. At Palampur leaf blight (*H. turcicum*) only occurred in the mid of July (4% DI) and continued to increase (25% DI) up to 3<sup>rd</sup> week of August. At Ludhiana leaf spot appeared on SL-44 variety of sorghum in the second week of August in the crop sown during first week of June. The disease progressed steadily up to mid September when the mean RH (85%) and Temperature (28 °C) prevailed. Maximum disease incidence (88.4%) was recorded in the first week of November. Later on disease started declining. Zonate leaf spot (*G. sorghi*) on variety SL-44 appeared in the last week of August but progression started in the first week of September. Maximum disease severity (52%) was recorded during the season. This was favoured by mean temperature range 24-27°C and mean RH 70-75%. At Bhubaneswar, leaf spot and leaf blight incidences occurred from third week of July to third week of September with maximum disease severity (3.4) in 1-5 scale.

## **Insect fauna**

At Bhubaneswar, defoliator's infestation ranged from 1.3 insect/10 plants to 3.6 insect/ 10 plants during the month of August. At Rahuri, the incidence of shoot fly was observed in the moderate to high intensity in the sorghum crop sown during third week of July. The maximum percentages of dead hearts (55.47%) were recorded during second week of August. The incidences of stem borer were mild. The aphid (*Rhopalosiphum maidis*) population in leaf whorl was 11.30 aphids /plant during second week of September. The populations of predatory ladybird beetle (2 adults and 2.6 grubs /plant) and *chrysopa carnea* (1.6-2 / plants) were recorded during the crop season. At Jhansi, shoot fly infestation ranged from 3.0-6.0% in different germplasm lines. The stem borer 3-10% infestation was also recorded during the crop season.

## **Nematode fauna**

At Jhansi, three major and dominant plant parasitic nematodes viz., *Tylenchorhynchus vulgaris*, *Pratylenchus zea* and *Helicotylenchus dihystra* were found to be associated with the crop. The population density of these nematodes species was observed to be 32.4, 21.2 and 13.4% respectively of the total nematodes population. The total nematodes population density varied from 490-940/ 250 g soil. This population of nematodes was recorded at the 50% flowering stage of the crop. The population was often found to be associated with stunted and chlorotic patches of the plants. Peak population densities of these nematodes were observed during middle of October.

## **Pearl millet**

### **1.2.1 Diseases**

At Bhubaneswar, leaf spot and blight (*Helmithosporium sp.*) incidences were 1.0-2.8 were recorded on 1-5 scale during the crop season. At Jhansi, severe incidences of rust (*Puccinia penniseti*) and leaf spot (*Pyricularia grisea*) were recorded in different germplasm lines of the crop. Maximum severity (4.6) was recorded in the month of October when the crop was at grain formation stage. At Ludhiana, leaf spot disease (*Pyricularia spp.*) started appearing in the last week of August. The disease progressed steadily during the crop season with favorable temperature range of 25-28 °C and RH 70%. Maximum disease severity (45.0%) was recorded during the crop season. At Palampur, leaf blight (*Helminthosporium sp*) appeared in the second week of July (4.0%) and continued to spread and develop up to third week of August (25% disease severity).

### **1.2.2 Insect fauna**

At Bhubaneswar, foliage feeders occurred 1.2-4.6/10 plants from third week to eighth week of sowing. At Jhansi, heavy infestation of (30%) of shoot fly was recorded during early vegetative stage of the crop. At Rahuri, shoot fly (*Atherigona approximata*) incidence was appeared on crop sown during third week of July and remained up to the harvest with 5% infestation.

### 1.2.3 Nematode fauna

Five major nematodes viz., *Helicotylenchus*, *Pratylenchus*, *Hoplolaimus*, *Tylenchorhynchus* and *Meloidogyne* spp. were recorded with moderate to high population densities (120-740/250 g soil) at Jhansi. High population density of the nematods was considerably lower than the previous Kharif season (246-1020/250 g soil) due to erratic rainfall. Lesion nematode, *P. zeae* were often found to be recorded from the roots and rhizosphere of the crop showing patches of stunted and yellowing of the plants. Sporadic incidences of root knot nematodes were also recorded this year. In addition, lower population of this nematode was often associated with high spore density (545/100g soil) and root colonization (72%) of VAM fungi.

### Maize

#### Diseases

At Bhubneshwar, leaf blight (*H. turcicum*) and maize mosaic virus incidences were severe with 3.2 and 2.6, respectively on 1-5 scale. At Jhansi, mild incidences (16.2%) of brown leaf spot (*Helminthosporium maidis*) was recorded in various germplasm lines. At Ludhiana, severe disease incidence (62.9%) was recorded under high humidity (80%) and temperature range (26-30°C). The disease progressed up to physiological maturity of the crop. At Palampur, leaf blight (*H. maidis* and *H. turcicum*) appeared in the first week of July and continued to increase the severity (20%) up to third week of August. Banded leaf and sheath blight (*Rhizoctonia* sp) were also observed in mild form.

#### Insect fauna

Moderate incidences of defoliators were observed at Jhansi and Bhubneshwar (0.8-4.2/10 plants). Shoot borer, Shoot fly and *Myloccerus* weevil infestations were low to moderate (2-7 insect/plant) at Hyderabad. The stem borer appeared in the first week of August and continued to increase (78%) till the last week of August.

### 1.3.3 Nematode fauna

At Jhansi, stunt nematode, (*T. vulgaris*) was found to be the major and dominant nematode species and high population density (650-856/250g soil) of this nematode was often found to be associated with irregular patches of thin chlorotic and stunted plant populations. The root systems of heavily infested plants were also observed to be highly reduced. Sporadic incidences of root knot nematode *Meloidogyne* sp. in the form of small galls on the roots were also observed at few localities. Maize appears to be a very good host of VAM fungi especially for *Glomus* spp. since high root colonization (60-77%).

## **Cowpea**

### **Diseases**

At Bhubneshwar, Yellow mosaic and leaf spot diseases occurred through out the crop season with 3.6 and 2.8 grade in 1-5 scale. The root rot disease incidences started from third week (3.66%) and continued to increase (20.33%) upto eighth week of after sowing. At Ludhiana, moderate incidences of anthracnose and *Cercospora* leaf spot were recorded. At Jhansi, severe incidences (22-40%) of root rot (*Rhizoctinia spp*) was observed in different germplasm lines. Other diseases like Anthracnose (*Colletotricum lindimuthianum*), leaf spot (*Cercospora cruenta*), bacterial blight (*Xanthomonas campestris pv. vignicola*) and mosaic (*Cowpea mosaic virus*) were also observed to a moderate level (12-18.6%). At Hyderabad, maximum mosaic incidence (34%) occurred in the third week of September. At Palampur, wilt / root rot (*Fusarium and Rhizoctonia sp*) were severe (15-45%) during the month of July. Leaf spot and leaf blight (*Ascochyta and phyllosticta sp*) appeared in the last week of July and continued to increase the incidences (25%) up to the third week of August. *Phytophthora* blight appeared in the third week of July and increase up to first week of August (5-10%). Anthracnose (*C. Lindemuthianum*) and mosaic diseases appeared late in the season and continued to increase (15-20%) unto third week of August. At Rahuri, mosaic incidence of occurred during entire crop season.

### **Insect fauna**

At Bhubneshwar, cowpea aphid (21.2-78.2/leaf) and flea beetle (6.8-98.6 holes/plant) were recorded during the crop season. Leaf defoliators were mild 1.2-6.4/ 10 plants. At Hyderabad, flea beetle appeared in the second week of August with maximum infestation (34%) in the last week of August. Aphid population remained associated with the crop throught out the season. At Jhansi, the infestation of semilooper and flea beetle were severe (30-46%) during the entire crop season. Aphids infestation was also observed in some germplasm lines during the season. At Palampur, pod borer infestation was 5-10% during month of August. and semilooper appeared as predominating insect pest of the crop with an infestation range of 25-45 percent. At Rahuri, moderate to high infestations of aphids and jassids were recorded during the second week of August. The range of jassid population was 3.0-7.67/plant whereas the aphid population was highest from (5.33-1267aphids/plant).

### **Nematode fauna**

High root knot nematodes (*Meloidogyne spp.*) incidences (RKI>3) was invariably found to be associated in the high root rot diseases incidences at Jhansi. Association of reniform nematode (*Rotylenchulus reniformis*) with the crop was also recorded. The population was 210/250g soil. At Bhubaneswar, pre and post harvest of *Hoplolaimum indicus* 68-252, *Helicotylenchus dihystra* (56-188), *Caloosia exilis* (16-84) and *Dorylaimus sp* (21-114) were found associated with the crop.

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

**Location: (Bhubaneswar, Hisar, Hyderabad, Jhansi, Ludhiana and Rahuri)**

### **2.1. Cowpea**

The cowpea entries of initial and advance varietal trials were evaluated for reaction to various diseases, insect-pests and nematodes. The results for insect-pest and root knot nematode in IVT entries are presented in table PPT 2.1. The aphid and jassid population was minimum (1.86-7.3/leaf) in UPC 1101 entry at Bhubaneswar, Hyderabad and Rahuri. Flea beetle infestation was also less in this entry at Bhubaneswar. The same entry showed moderately resistance (RKI=1.5) to nematode, (*Meloidogyne spp.*) at Jhansi. The reaction of various diseases in the initial varietal trial entries is shown in the table PPT 2.2. At Bhubaneswar entry UPC-1101 showed minimum root rot disease (1.99 %) followed by entry IPOK/52-1 (2.33%). Rest of the entries did not differ significantly in disease incidence. UPC-1101 showed least mosaic Incidences at Bhubneswar, Rahuri and Hisar. Entries EC-548872-1, UPC-9202 and BL-2 were found free from root rot at Jhansi. Thus, IVT entry UPC-1101 showed good performance in terms of pest resistance. Pest reaction among entries of AVT is presented in table PPT 2.3. The aphid population was least (90.9/leaf) in MFC-09-1 and jassid (2.17/leaf) was also recorded in the same entry at Rahuri center. UPC-622 showed resistance (RKI=1.0) against root knot nematode, (*Meloidogyne spp.*) at Jhansi. The disease reaction among different entries of advance varietal trial is presented in Table PPT 2.4. The entries, RR-3 and Bundel lobia-2 showed resistance to root rot at Jhansi however, at Hyderabad entries BL-1 and BL-2 showed least root rot incidence. At Rahuri, Hisar, Bhubaneswar and Ludhiana all the entries did not differ in the incidences of yellow mosaic virus disease.

### **2.2. Pearl Millet**

The results of initial varietal trial entries to various pests are presented in table PPT 2.5. The leaf spot disease incidence did not differ in severity across the centers Hisar, Jhansi and Ludhiana. All the entries were found resistance to downey mildew at Hisar and Ludhiana. Entry Gaint Bajra showed resistance to root lesion nematode.

In advance varietal trial NDFB-904 showed resistance to leaf spot at Jhansi. Entries did not differ in respect to shoot fly incidences at Jhansi. All the entries showed rsistance to downy mildew at Hisar and Ludhiana. Entry PAC-981 was found moderately resistant to nematode, *P.zeae* at Jhansi. (Table PPT 2.6).

## 2.3 Soybean

In AVT (Table 2.7) all the entries showed less than 10% incidences of YMV at Hisar and Jhansi. Gidde beetle infestation was found to be at par in all the entries. Entries JS-07-24-13 found to be moderately resistant to root knot nematode.

## 2.4 Ricebean

In IVT (Table 2.8) all entries except KRB-26 and Bidhan-1 were found resistant to leaf blight at Jhansi and Bhubneswar. Entry BFRB-16 showed least yellow mosaic virus incidence at Jhansi and Bhubaneswar. The same entry BFRB-16 was moderately resistant reaction to root knot nematode. In AVT (Table 2.9) the leaf blight incidences were least in JRB-13 at Bhubneswar and Jhansi. Entry JRGB-05-4 was found to be resistant to yellow mosaic virus and nematode at Jhansi.

**Table PPT 2.1. Screening for pest resistance in Cowpea- Initial Varietal Trial**

Entry	Aphid infestation			Flea Beetle	Jassids/ leaf	Nematode <i>M. incognita</i>	
	Bhuba-neswar	Rahuri	Hyderabad	Bhuba-neswar	Rahuri	RKI	Reaction
Culture-1	11.8	11.3	7.4	-	3.67	2.5	MS
BL-1	-	5.9	7.9	5.6	2.67	3.0	S
MFC-09-2	-	7.0	8.9	-	2.11	2.5	MS
EC-548872-1	-	8.7	8.2	4.8	3.00	3.5	HS
UPC-622	7.4	7.4	8.4	5.8	2.56	2.5	MS
UPC-9202	-	-	-	-	-	2.0	MR
BL-2	-	-	-	-	-	2.5	MS
UPC-1101	4.8	5.3	7.3	2.4	1.86	1.5	MR
IPOK-1/52-1	9.7	7.0	8.7	1.7	3.00	1.5	MR
UPC-1102	17.6	9.2	8.9	-	2.78	1.2	MR
UPC-9286	32.2	7.4	8.3	-	3.00	3.5	HS



**Table PPT 2.2. Screening for disease resistance in Cowpea- Initial Varietal Trial**

Entry	Root rot		Leaf spot	Yellow mosaic virus				
	Bhub-neswar	Jhansi	Bhub-neswar	Ludhi-ana	Bhub-neswar	Ra-huri	Hisar	Hyde-rabad
Culture-1	3.3	16.60	1.2	1.73	3.2	3.3	1.0	1.2
BL-1	2.33	14.20	1.4	2.7	2.4	1.6	1.0	1.2
MFC-09-2	4.66	12.60	1.6	1.5	2.6	1.3	2.3	1.0
EC-548872-1	3.99	0.00	1.4	2.0	2.8	2.6	1.6	0.3
UPC-622	2.66	8.40	1.2	3.0	1.4	2.0	1.0	0.6
UPC-9202	-	0.00	-	-	-	-	-	-
BL-2	-	0.00	-	-	-	-	-	-
UPC-1101	1.99	14.40	1.4	2.5	1.2	1.3	1.0	0.4
IPOK-1/52-1	2.33	12.40	1.2	5.0	1.2	2.6	1.6	1.0
UPC-1102	3.33	22.20	-	3.2	1.4	2.0	1.0	0.4
UPC-9286	5.00	28.00	-	3.1	1.8	2.3	1.0	1.0

**Table PPT 2.3. Screening for pest resistance in Cowpea- Advance Varietal Trial 2**

Entries	Aphid/leaf		Jassids/leaf		<i>Meloidogyne</i> spp (Jhansi)	
	Jhansi	Rahuri	Rahuri	Jhansi	RKI	Reaction
BL-1	10.2	7.33	2.75	4.2	2.0	MR
BL-2	0.0	5.67	2.33	4.6	1.5	R
UPC-622	22.4	-	-	2.4	1.0	R
UPC-9202	18.2	-	-	2.6	2.6	MS
MFC-09-1	27.4	0.09	2.17	5.2	3.5	HS
UPC-9286	18.4	3.50	2.59	5.6	4.0	HS
RR-3	0.0	6.42	2.67	5.8	3.2	HS

**Table PPT 2.4. Screening for disease resistance in Cowpea- Advance Varietal Trial-1**

Entry	Root rot		Yellow mosaic virus			
	Hyderabad	Jhansi	Bhubaneswar	Rahuri	Ludhiana	Hisar
BL-1	8.1	14.6	2.66	2.59	4.5	1.5
BL-2	4.8	3.2	3.33	1.00	3.9	2.0
UPC-622	-	18.2	-	-	-	-
UPC-9202	-	20.6	-	-	-	-
MFC-09-1	26.5	12.4	3.00	1.00	2.6	1.0
UPC-9286	43.0	10.2	4.99	1.00	2.8	2.0
RR-3	15.0	8.4	3.66	1.00	3.1	2.0

**Table PPT 2.5. Screening for disease resistance in Pearl Millet- Initial Varietal Trial**

Entries	Leaf spot			Downy mildew		Nematode	
	Hisar	Jhansi	Ludhiana	Ludhiana	Hisar	Root Lesion Index	Reaction
NDFB-929	3.0	2.4	2.8	0.24	1	2.5	MS
AVKB-90	3.6	2.6	2.5	0.37	1	3.0	MS
AFB-6	3.6	2.6	2.4	0.24	1	3.5	S
Gaint Bajra	3.0	2.2	3.1	0.37	1	1.0	R
RBB-2	3.6	2.8	3.2	0.24	1	3.5	S
RBC-2	3.6	2.6	2.9	0.00	1	3.0	MS
AFB-7	3.0	2.0	2.2	0.00	1	3.2	S

**Table PPT 2.6. Screening for pest resistance in Pearl Millet - Advance Varietal Trial-2**

Entries	Shoot Fly %	Leaf Spot			Downy mildew		P. Zeae	
	Jhansi	Jhansi	Hisar	Ludhiana	Hisar	Ludhiana	Root Lesion Index	Reaction
PAC-981	12.2	2.2	2.0	2.6	1	0.22	1.8	MR
NDFB-904	11.8	1.8	4.0	2.4	1	0.37	2.2	MS
Gaint Bajra	12.6	2.2	3.0	2.4	1	0.29	3.4	S
RBB-1	12.4	2.6	2.5	2.2	1	0.44	2.4	MS
RBC-2	12.2	3.0	3.5	2.0	1	0.51	3.0	MS
Scale for Downy mildew and leaf spot					Scale for nematodes			
1-No symptom = Highly Resistant (1)					1= Resistant			
Upto 10% (infected plants) =Resistant (2)					2= Moderately resistant			
11-25% ((infected plants) = Moderately resistant (3)					3= Moderately Susceptible			
26-50 ((infected plants) = Susceptible (4)					4= Susceptible			
>50 ((infected plants) =Highly susceptible (5)					5=Highly susceptible			

**Table PPT. 2.7 Screening for pest resistance in Soybean- Advance Varietal Trial-1**

Entries	Hisar	Jhansi			
	YMV	Girdle beetle % severity	YMV	<i>Meloidogyne</i> spp.	
				RKI	Reaction
JS07-21-7	7.8	100	3.5	2.5	MS
JS07-24-8	8.6	50	2.8	2.5	MS
JS07-24-1	3.8	75	4.0	1.5	MR
JS07-24-13	9.0	60	3.2	4.0	S

**Table PPT. 2.8 Screening for pest resistance in Rice bean - Initial Varietal Trial**

Entry	Leaf blight		Mosaic virus		<i>Meloidogyne</i> spp	
	Bhuba- neswar	Jhansi	Bhuba- neswar	Jhansi	RKI	Reaction
RBL-6	-	0.0	1.2	0.6	2.0	MR
KRB-26	3.4	1.8	0.8	0.2	1.5	MR
JRB7-06-1	-	0.0	1.4	1.2	2.4	MS
Bidhan-2	-	0.0	0.6	0.8	1.5	MR
JRB-15	-	0.0	1.2	1.4	2.5	MS
BRFB-16	-	0.0	0.4	0.4	1.2	MR
JRB-16	-	0.2	1.2	1.6	3.0	S
Bidhan-1	6.2	1.6	1.4	1.2	2.5	MS

**Table PPT. 2.9 Screening for pest resistance in Rice bean - Advance Varietal Trial-2**

Entry	Leaf blight (%)		Mosaic virus 1-5		<i>Meloidogyne</i> spp	
	Bhubanes war	Jhansi	Bhuba- neswar	Jhansi	RKI	Reaction
JRBJ-05-4	4.4	6.2	0.8	1.0	1.5	MR
JRB-13	2.8	4.6	1.2	1.4	2.0	MS
Bidhan-1	13.2	8.2	1.8	1.6	2.0	MS
BFRB-15	3.4	5.4	1.4	1.2	1.5	MR

#### **PPT.7. INTEGRATED DISEASE MANAGEMENT IN FODDER MAIZE**

##### **Locations: (Ludhiana and Palampur)**

The trial was conducted for the second year for integrated disease management of maize diseases at Ludhiana and Palampur. The trial consisted of ten treatments involving three seed treatments viz., vitavax @ 2g/kg, *Trichoderma viridae* @ 5g/kg and *Pseudomonas fluorescens* @5g/kg and their combinations with spray of mancozeb @ 0.25% and *Pseudomonas fluorescens* @3g/lit compared against untreated control.

The results of various disease incidences and fodder yield in different treatments are presented in Table 7.1. All of the treatments at Palampur provided superior control of the leaf blight, brown spot and banded leaf blight. At both the locations T<sub>4</sub> (ST vitavex @ 2g/kg + mancozeb spray @ 0.25%) provided maximum control of leaf blight diseases.

The fodder yield in different treatments significantly increased in all the treatments as compared to untreated control. The maximum green fodder yield was obtained in T<sub>4</sub> (ST vitavex @ 2g/kg + mancozeb spray @ 0.25%) at both the locations, Palampur and Ludhiana.

**Table PPT. 7.1 Per cent disease severity in different treatments**

Treatment	Leaf Blight		Brown Spot	Banded Leaf Blight	Green fodder yield q/ha	
	Ludhi-ana	Palam-pur	Palam-pur	Palam-pur	Palampur	Ludhiana
T <sub>1</sub>	47.88	15.5	10.5	2.3	312.7	254.41
T <sub>2</sub>	45.22	21.4	13.2	4.1	308.5	256.88
T <sub>3</sub>	44.78	18.3	10.6	3.1	310.6	261.82
T <sub>4</sub>	35.02	3.7	4.2	0.8	326.5	278.11
T <sub>5</sub>	34.58	9.8	7.8	2.3	310.3	281.58
T <sub>6</sub>	35.91	9.2	7.1	1.9	313.3	276.44
T <sub>7</sub>	42.56	9.5	6.5	1.4	317.7	271.70
T <sub>8</sub>	43.89	12.2	10.2	2.7	312.3	264.29
T <sub>9</sub>	46.55	11.3	10.3	2.2	312.7	255.64
T <sub>10</sub>	60.74	25.2	16.2	5.9	300.4	247.00
CD (5%)	6.46	1.2	1.16	0.45	3.73	22.18

T<sub>1</sub> = Seed treatment (ST) vitavex @ 2g/kg, T<sub>2</sub> = ST *Trichoderma viridae* @ 5g/kg, T<sub>3</sub> = ST *Pseudomonas fluorescens* @5g/kg, T<sub>4</sub> = T<sub>1</sub> + mancozeb spray @ 0.25%, T<sub>5</sub> = T<sub>2</sub> + mancozeb spray @ 0.25%, T<sub>6</sub> = T<sub>2</sub> + mancozeb spray @ 0.25%, T<sub>7</sub> = T<sub>1</sub> + *Pseudomonas fluorescens* spray @3g/lit, T<sub>8</sub> = T<sub>2</sub> + *Pseudomonas fluorescens* spray @3g/lit, T<sub>9</sub> = T<sub>3</sub> + *Pseudomonas fluorescens* spray @3g/lit, T<sub>10</sub> = Untreated control

## PPT .9. Management of shootfly in forage sorghum

**Locations: (Anand, Hyderabad and Jhansi)**

The trial PPT 9 was conducted in second year during this year for the management of shoot fly in forage sorghum at four locations with eight treatments viz. T<sub>1</sub> = Seed treatment with Thiomethoxam @ 2g/kg seed; T<sub>2</sub> = Seed treatment with NSK powder @50g/kgseed followed by NSE spray @ 5% at 10 days after sowing; T<sub>3</sub> = Seed treatment with imidacloprid @ 5g/kg seed; T<sub>4</sub> = Foliar spray of Thiomethoxam 25 WSC @ 0.0125% at10 days after sowing; T<sub>5</sub> = Foliar spray of NSE @ 5% at 10 days after sowing; T<sub>6</sub> = Foliar spray with imidacloprid @ 0.3ml/l at 10 days after sowing; T<sub>7</sub> = Foliar spray with Endosulfan @ 0.07% at10 days after sowing; T<sub>8</sub> = Untreated control.

The results presented in table 9.1 revealed that all the treatment significantly reduced the shoot fly incidence and increase the forage yield to a varying degree. Maximum reduction was obtained at Hyderabad (9.9%) in T<sub>6</sub> and at Jhansi (14.4%) in T<sub>4</sub>, at Rahuri (12.96%) in T<sub>3</sub> and at Anand (40%) in T<sub>1</sub> against 33.1, 36.5, 48.65 and 60% respectively. The same treatment yielded maximum GFY and DMY at the above centers (Table PPT.9.1).

**Table PPT. 9.1. Shoot fly incidence and fodder yield in different treatments.**

Treatment	Shoot fly (% infestation)				GFY (q/h)			DMY (q/h)		
	An-and	Jha-nsi	Hyde-rabad	Rah-uri	An-and	Jha-nsi	Rah-uri	An-and	Jha-nsi	Rah-uri
T <sub>1</sub>	40	14.6	20.3	15.25	218.06	295.6	408.83	58.22	67.9	90.29
T <sub>2</sub>	57	22.4	24.7	33.05	226.39	308.3	341.62	52.75	70.9	69.72
T <sub>3</sub>	47	12.6	18.9	12.96	223.61	286.1	399.31	63.95	65.8	87.52
T <sub>4</sub>	45	14.4	23.3	16.53	311.11	308.3	406.03	83.69	70.9	87.77
T <sub>5</sub>	55	24.6	23.0	31.29	222.22	302.7	344.98	50.22	69.6	72.43
T <sub>6</sub>	52	18.7	9.9	17.38	245.83	291.6	404.91	68.83	67.06	89.00
T <sub>7</sub>	48	24.2	11.6	25.84	283.33	330.5	383.06	77.63	76.01	84.11
T <sub>8</sub>	60	36.5	33.1	48.65	200.00	283.3	306.34	47.60	65.15	63.73
CD (5%)	5.32	5.24	3.36	4.29	36.32	12.17	59.38	2.13	2.37	13.40

T<sub>1</sub> = Seed treatment with Thiomethoxam @ 2g/kg seed; T<sub>2</sub> = Seed treatment with NSK powder @50g/kgseed followed by NSE spray @ 5% at 10 days after sowing; T<sub>3</sub> = Seed treatment with imidacloprid @ 5g/kg seed; T<sub>4</sub> = Foliar spray of Thiomethoxam 25 WSC @ 0.0125% at10 days after sowing; T<sub>5</sub> = Foliar spray of NSE @ 5% at 10 days after sowing; T<sub>6</sub> = Foliar spray with imidacloprid @ 0.3ml/l at 10 days after sowing; T<sub>7</sub> = Foliar spray with Endosulfan @ 0.07% at10 days after sowing; T<sub>8</sub> = Untreated control.

## PPT. 10. Management of root rot disease in cowpea

**Location: (Bhubneshwar)**

The experiment was conducted for the first year as location specific trial with seven different treatments viz. T<sub>1</sub> = Seed treatment with *Trichoderma viridae* @ 5 g/kg seed + FYM @ 2t/ha.; T<sub>2</sub> = Seed treatment with *Pseudomonas fluorescence* @ 5 g/kg seed; T<sub>3</sub> = Seed treatment with Neem Seed Kernal Powder @ 50 g/kg seed; T<sub>4</sub> = Seed Soaking in solution of gum of Asafoetida @ 0.4 % for 4 hrs; T<sub>5</sub> = Seed treatment with Carbendazim @ 2 g/kg seed; T<sub>6</sub> = Soil drenching with 3% pitcher compost at the time of sowing; T<sub>7</sub> = Untreated control. The results presented in table PPT 10.1 revealed that all the treatment significantly reduced the disease incidence and increased the GFY and DMY. However, seed treatment with *Trichoderma viridae* @ 5 g/kg seed + FYM @ 2t/ha provided minimum root rot disease incidence (13.00%) with maximum GFY (277.25/ha), DMY (66.51q/ha) and net monetary return Rs.13180/ha/yr. as compared to the untreated control (Rs.5700/ha/yr.).

**Table PPT.10.1 Percent disease incidence, green and dry fodder yield and net monetary return in different treatments.**

Treatment	Percent disease incidence	GFY (q/ha)	DFY (q/ha)	Net monetary return (Rs/ha/year)
T <sub>1</sub>	13.0	277.25	66.51	13180
T <sub>2</sub>	15.25	255.77	60.10	11462
T <sub>3</sub>	15.5	198.17	48.79	6854
T <sub>4</sub>	18.0	206.25	47.96	7500
T <sub>5</sub>	13.5	237.25	57.65	9980
T <sub>6</sub>	16.6	232.72	55.35	9618
T <sub>7</sub>	24.75	183.75	45.08	5700
CD (5%)	4.32	30.58	8.48	2446.26

**PPT.12 Validation of effective treatment for the management of sucking pest and yellow mosaic virus in cowpea seed crop.**

**Locations: (Bhubaneswar, Hyderabad, Ludhiana, Palampur and Rahuri)**

The experiment was conducted under large plot conditions (100 m<sup>2</sup>) with two best treatments recorded on the bases of pervious year experiment with untreated control. The protected treatment were spraying of *Verticillium leccani* @ 5g/L at 10 days interval (T<sub>1</sub> biocontrol) and spraying of Imidaclopride 17.8 SL@ 0.3 ml /L at 15 days interval (T<sub>2</sub> chemical) were applied. The results presented in Table 12.1 revealed that both the treatment biological and chemical significantly reduced the sucking pest and yellow mosaic virus incidence and in term increase the seed yield. The chemical treatment proved more effective then biocontrol treatment.

**Table PPT.12.1 Percent incidence of sucking pest and YMB in different treatments.**

Treatment	Bhubaneswar		Hyderabad		Ludhiana		Palampur		Rahuri	
	SP	YMB	SP	YMB	SP	YMB	SP	YMB	SP	YMB
T <sub>1</sub>	18.06	23.61	5.8	12.3	2.67	3.47	3.3	6.2	6.4	2.57
T <sub>2</sub>	4.86	14.77	3.0	25.4	2.33	2.93	0.5	1.2	1.0	1.14
T <sub>3</sub>	32.8	45.54	67.8	23.7	3.33	3.93	5.6	13.9	36.62	4.07
CD5%	4.36	9.33	2.43	1.61	0.62	0.73	0.36	2.32	4.94	-

**PPT.12.2. Seed yield (q/ha) of Cowpea under different treatments.**

Treatment	Bhubaneswar	Hyderabad	Ludhiana	Palampur	Rahuri
T <sub>1</sub>	2.60	3.5	9.27	52.5	5.20
T <sub>2</sub>	3.17	4.46	9.47	59.5	5.82
T <sub>3</sub>	1.80	2.1	8.77	51.1	4.21
CD5%	1.17	0.85	0.33	1.76	0.86



**PPT.13. Effect of foliare diseases and insect pests on quality parameters of forage cowpea.**

**Locations: (Anand, Hyderabad, Ludhiana, Palampur and Rahuri)**

The experiment was conducted to evaluate the qualitative losses due to the pest incidences in forage cowpea. The trial consisted of two treatments i.e. protected and unprotected. The protection of the crop was done by applying seed treatment with imidacloprid 70WS @ 5g /kg seed + carbendazim @ 2g /kg seed followed by foliar spray of imidacloprid 17.8SL @ 0.3 ml / L at 15 days interval for insect pest management and spray of mancozeb and metalaxyl + mancozeb @ 2.5g /L at 10 and 15 days interval for the management of diseases. At 50% flowering stage the crop was harvested and sampled for the analysis of quality factors. The results presented in Table PPT.13.1 revealed that all the locations their was increase in the quality parameters of the cowpea forage and at the same time there was reduction in the anitiquality factors.

**PPT.13.1. Cowpea quality parameters under different treatments at different locations**

**Anand**

Treatment	DM (%)	CP (%)	NDF (%)	ADF (%)	Hemicell (%)	Chl a. Mg/g	Chl b.	Total Chl
T <sub>1</sub>	15.90	12.35	58.54	50.53	8.00	2.93	3.41	7.83
T <sub>2</sub>	16.09	11.93	59.58	51.11	8.57	3.17	3.19	7.82

**Ludhiana**

Treatment	IVDMD (%)	CP (%)	NDF (%)	ADF (%)	Ash	T. Phenol	Chl a. Mg/g	Chl b.	Total Chl
T <sub>1</sub>	60.20	18.80	44.20	32.06	8.60	0.56	10.00	12.60	22.60
T <sub>2</sub>	59.30	17.00	45.30	32.80	9.30	0.39	3.03	3.70	6.73
CD5%	0.52	0.10	0.51	0.52	0.42	0.36	0.97	0.53	0.51

**Hyderabad**

Treatment	ADF-N (%)	CP (%)	NDF (%)	ADF (%)	Hemicell (%)	Chl a. Mg/g	Chl b.	Total Chl
T <sub>1</sub>	5.91	17.10	33.4	27.3	6.1	2.05	0.56	189.29
T <sub>2</sub>	6.24	14.66	33.0	25.4	7.6	1.01	0.27	158.65
CD5%	0.78	0.89	0.76	0.88	0.14	0.22	0.005	0.614

**Palampur-1.**

Treatment	(%)RR	(%)LB	SP/Leaf	YMB (%)	GFY (q/ha)	DMY (%)	CP (%)
T <sub>1</sub>	32.7	19.7	3.6	2.9	60.1	37.8	18.37
T <sub>2</sub>	26.7	43.3	5.7	10.7	58.4	37.7	14.87

**Palampur-2.**

Treatment	T. Phenol	NDF (%)	ADF (%)	Hemicell (%)	Chl a. Mg/g	Chl b.	Total Chl
T <sub>1</sub>	0.44	61.1	53.2	7.8	0.434	0.282	0.717
T <sub>2</sub>	0.53	62.9	54.5	8.3	0.446	0.340	0.786

**Rahuri-1**

Treatment	DM (%)	CP (%)	NDF (%)	ADF (%)	Hemicell (%)	IVDMD (%)	Ash (%)
T <sub>1</sub>	17.67	15.81	56.9	46.0	10.8	49.2	11.02
T <sub>2</sub>	16.99	14.28	59.2	47.9	11.2	46.3	12.99
tcal	12.27	7.77	12.75	12.55	5.29	12.21	30.66

**Rahuri-2**

Treatment	ADF-N (%)	T. Phenol	Chl a. Mg/g	Chl b.	Total Chl	Carbohydrate (%)
T <sub>1</sub>	6.76	0.68	0.568	0.917	1.484	35.88
T <sub>2</sub>	6.31	1.02	0.211	0.341	0.552	34.47
tcal	11.74	19.05	66.55	72.90	89.77	-

## BREEDER SEED PRODUCTION IN FORAGE CROPS (KHARIF-2011)

(Table Reference: 1 & 2)

The indent for breeder seed production in Kharif-2011 was received from DAC, GOI for 31 varieties in five major forage crops viz., Maize, Cowpea, Pearl millet, Sorghum and Ricebean. In compaison to earlier years Kharif indent, it was almost more than double for this season. The allocation of total quantity of breeder seed (360.57q) as per indent was made to twelve breeder seed producing centres of the different SAUs/ICAR/NGO institutes. Among quantity indented the maximum was for Sorghum i.e. 234.50 q (65.03%) followed by Maize (74.87q-20.76%) and Cowpea (42.65q-11.83%) whereas in rest of forage crops i.e. Pearl millet (5.55q-1.54%) and Rice bean (3.00q-0.83%) it was around 6.08 percent which shows that among several Kharif forage crops, breeder seed of crops like Sorghum, Maize and Cowpea had a demand in substantial quantity in this year.

The final breeder seed production report (BSP-IV) received from different producing centres clearly indicated that in crops such as Maize, Pearl millet and Rice bean, the breeder seed production was either higher or equal with respect to the indented quantity. Whereas in the crops like Sorghum and Cowpea, the breeder seed production was less than the indented quatity. Coming to the crop wise scenerio, as compared to indent in Maize (74.87q), the actual production was 76.60q (1.73q surplus), in Pearl millet against indent of 5.55q, production was 6.30q (0.75q surplus) and in Rice bean indent and production was 3.00q. But the scenerio in crops like Sorghum and Cowpea was not very good. Against the indent of 234.50q in Sorghum, the production was only 52.51q that was around 77 percent less against the allocation. Similarly in Cowpea, against the indent of 42.65q, the production was only 12.10q whiuch was around 72 percent less than the indent. The over all breeder seed production was 150.51q against the indent of 360.57q which was 210.06q less or around 58 percent less the quantity indented and allocated.

The production of Sorghum variety Punjab Sudex Chari-1 couldn't take place due to hybrid nature of variety and simultaneously in other sorghum variety Gujrat Fodder Sorghum-5, production couldn't take place because this variety is not notified hence not in the seed chain. Some of the reason for less production of breeder seed was abrupt increse in quantity of indent in some forage varieties and less availability of nucleus seed of that particular variety.

**Table 1: Centre-wise Breeder Seed Production**

(Indent and production in quintal)						
Sl. No.	Name of Producing Centre	Name of Variety	DAC Indent	Actual Allocation	Actual Production	Production Surplus (+)/ Deficit (-)
1.	BAIF, Urilikanchan	African Tall	27.00	27.00	25.00	(-) 2.00
2.	MPKV, Rahuri	African Tall	25.12	25.12	26.60	(+) 1.48
3.	PAU, Ludhiana	J-1006	17.75	17.75	20.00	(+) 2.25
		Punjab Sudex Chari-1	2.00	2.00	Nil *	(-) 2.00
		CL-367	1.90	1.90	Nil**	(-) 1.90
		FBC-16	4.00	4.00	4.20	(+) 0.20
		PCB-164	1.05	1.05	1.10	(+) 0.05
4.	GBPUAT, Pantnagar	UPC-9202	1.00	1.00	2.00	(+) 1.00
		UPC-8705	0.50	0.50	2.00	(+) 1.50
		UPC-628	1.00	1.00	2.00	(+) 1.00
		UPC-5287	10.00	10.00	Nil	(-) 10.00
		UPC-5286	1.00	1.00	2.00	(+) 1.00
		Pant Chari-6	1.60	1.60	3.00	(+) 1.40
		Pant Chari-5	1.25	1.25	3.00	(+) 1.75
5.	IGFRI, Jhansi	EC-4216	19.25	19.25	3.0	(-) 16.25
		Bundel Lobia-2	7.00	7.00	Nil	(-) 7.00
		MP Chari	38.10	38.10	15.0	(-) 23.10
6.	IARI RRS, Karnal	Pusa Chari-23	43.00	43.00	13.97***	(-) 29.03
		Pusa Chari-9	36.00	36.00	6.70	(-) 29.30
		Pusa Chari-6	108.00	108.00	6.40	(-) 101.60
		Pusa Chari-615	0.60	0.60	0.74	(+) 0.14
7.	RAU, Bikaner	RBC-2	0.50	0.50	1.00	(+) 0.50
8.	BCKV, Kalyani	Bidhan-1	2.00	2.00	2.00	-
		Bidhan-2	1.00	1.00	1.00	-
9.	TNAU, Coimbatore	CO(FS)-29	1.00	1.00	1.00	-
10.	MPUAT, Udaipur	Pratap Makka Chari-6	5.00	5.00	5.00	-
11.	GAU, Anand	Gujarat Fodder Sorghum-5	0.60	0.60	Nil****	(-) 0.60
12.	CCS HAU, Hisar	HL-88 (CS-88)	1.00	1.00	1.10	(+) 0.10
		HC-136	0.25	0.25	0.30	(+) 0.05
		HC-171	1.00	1.00	1.10	(+) 0.10
		HC-308	0.25	0.25	0.40	(+) 0.15
		S-513 (HJ-513)	0.85	0.85	0.90	(+) 0.05
Total			360.57	360.57	150.51	(-) 210.06

Remarks: \*- hybrid in nature \*\*- crop damaged due to heavy rains \*\*\*-including carry over seeds  
\*\*\*\*-variety not notified

**Table 2: Variety -wise Breeder Seed Production**

(Indent and production in quintal)

Sl. No.	Varieties	Actual Allocation	Actual Production	Production Surplus (+)/Deficit (-)
1.	<b>Maize</b>			
	African Tall	52.12	51.60	(-) 0.52
	J-1006	17.75	20.00	(+) 2.25
	Pratap Makka Chari-6	5.00	5.00	-
	<b>Total</b>	<b>74.87</b>	<b>76.60</b>	<b>(+) 1.73</b>
2.	<b>Cowpea</b>			
	CL-367	1.90	Nil	(-) 1.90
	UPC-9202	1.00	2.00	(+) 1.00
	Haryana Lobia-88 (CS-88)	1.00	1.10	(+) 0.10
	UPC-8705	0.50	2.00	(+) 1.50
	EC-4216	19.25	<b>3.0</b>	(-) 16.25
	UPC-628	1.00	2.00	(+) 1.00
	UPC-5287	10.00	Nil	(-) 10.00
	UPC-5286	1.00	2.00	(+) 1.00
	Bundel Lobia-2	7.00	0.00	(-) 7.00
	<b>Total</b>	<b>42.65</b>	<b>12.10</b>	<b>(-) 30.55</b>
3.	<b>Pearl Millet –</b>			
	FBC-16	4.00	4.20	(+) 0.20
	Raj Bajra Chari-2	0.50	1.00	(+) 0.50
	PCB-164	1.05	1.10	(+) 0.05
	<b>Total</b>	<b>5.55</b>	<b>6.30</b>	<b>(+)0.75</b>
4.	<b>Sorghum -</b>			
	Pant Chari-6	1.00	3.00	(+) 2.00
	Pant Chari-5	1.25	3.00	(+) 1.75
	Pusa Chari-23	43.00	13.97	(-) 29.03
	Pusa Chari-9	36.00	6.70	(-) 29.30
	Pusa Chari-6	108.00	6.40	(-) 101.60
	Pusa Chari-615	0.60	0.74	(+) 0.14
	HC-136	0.25	0.30	(+) 0.05
	MP Chari	38.10	15.0	(-) 23.10
	Punjab Sudex Chari-1	2.00	Nil	(-) 2.00
	HC-171	1.00	1.10	(+) 0.10
	HC-308	0.25	0.40	(+) 0.15
	S-513 (HJ-513)	0.85	0.90	(+) 0.05
	Gujarat Fodder Sorgghum-5	0.60	Nil	(-) 0.60
	CO(FS)-29	1.00	1.00	-
	<b>Total</b>	<b>234.50</b>	<b>52.51</b>	<b>(-) 181.99</b>
5.	<b>Ricebean :</b>	2.00	2.00	-
	Bidhan-1			
	Bidhan-2	1.00	1.00	-
	<b>Total</b>	<b>3.00</b>	<b>3.00</b>	<b>-</b>
<b>Grand Total</b>		<b>360.57</b>	<b>150.51</b>	<b>(-) 210.06</b>

## WEATHER REPORT FOR KHARIF-2011

The weather report of the AICRP-FC Coordinating and Cooperating centres across the different zones during kharif-2011 programme has been presented in this section. The weather parameters from 26<sup>th</sup> Standard Metrological Week (June 25-July 01, 2011) to 44<sup>th</sup> Standard Metrological Week (October 29-Nov.04, 2011) were taken into consideration, which covers the *kharif* 2011 season for all the testing locations for trial conduction [Table MET-1.1(a) to 1.4(z)]. During the reporting period, weather variations are clearly visible in maximum and minimum temperature, rainfall, rainy days and sunshine hours in different zones, which has wide impact on growth and yield of different forage crops and varieties. The weather parameters have also shown close correlation with the incidence and surveillance of insect-pest and diseases. Weather parameters influenced the establishment, growth and performance of different annual and perennial forage crops and their varieties.

### Temperature :

Minimum temperature was recorded in Hill Zone irrespective of locations. Within Hill Zone Srinagar remained the coolest location recording 3.8 °C in 43<sup>rd</sup> to 44<sup>th</sup> standard meteorological week. Among Hill Zone locations, maximum average temperature was also recorded highest at Srinagar i.e. 32.7 °C during 34<sup>th</sup> SMW. In the same Zone the average minimum temperature over the season was also recorded lowest at Srinagar. Similarly the average highest temperature was also recorded at Srinagar location. In North-West Zone, Hisar recorded lowest minimum temperature (11.8 °C) during 44<sup>th</sup> standard meteorological week. Whereas maximum temperature was recorded highest at Jaisalmer (42.5 °C) during 30<sup>th</sup> Standard Meteorological Week followed by Bikaner (39.7 °C) during 27<sup>th</sup> SMW. In the same zone the average maximum temperature over the season was recorded highest at Jaisalmer. Whereas the average minimum temperature over the season recorded lowest at Hisar location. In North-East Zone, Imphal recorded the lowest temperature i.e. 11.5 °C during 44<sup>th</sup> SMW. In same zone, the maximum temperature was recorded highest at Jorhat (35.1 °C) during 35<sup>th</sup> SMW followed by Kalyani (34.5 °C) during 40<sup>th</sup> to 41<sup>st</sup> SMW. In Central Zone, Jabalpur recorded the lowest minimum temperature (11.0 °C) during 44<sup>th</sup> SMW followed by Jhansi (12.7 °C) and Kanpur (12.9 °C) during same week. In the same zone, the maximum temperature was recorded highest at Anand (37.9 °C) during 42<sup>nd</sup> SMW followed by Jhansi (35.9 °C) during 41<sup>st</sup> SMW. Anand and Jhansi locations recorded higher temperature during 26<sup>th</sup> to 44<sup>th</sup> SMW in comparison to rest of the Central zone locations. Whereas, Urullikanchan recorded lowest minimum temperature over the season as compared to other locations. In South zone, the lowest temperature was recorded during 44<sup>th</sup> SMW at Mandya (10 °C) followed by Hyderabad (19.7 °C) and Coimbatore (21.9 °C) and during 29<sup>th</sup> SMW at Vellayani (23.6 °C). The maximum temperature was recorded

highest at Hyderabad (35.0 °C) during 26<sup>th</sup> SMW followed by Coimbatore (33.4 °C) during 40<sup>th</sup> SMW and Mandya (33.0 °C) during 26<sup>th</sup> & 40<sup>th</sup> SMW.

#### **Rainfall :**

About 80-90 percent rainfall in Indian Sub-continent is mostly contributed through south-west monsoon. This phenomenon is reflected in the data on rainfall and rainy days as in most of the locations, rains were received during this period. In Hill zone, Palampur received highest rainfall (1716.6 mm) followed by Almora (754.0 mm). Whereas Srinagar received lowest rainfall (164.7 mm) in the same zone. In North-West Zone Ludhiana received highest rainfall (909.4 mm) during the period under report and more than 55% of rainfall (507.0 mm) was received in the month of August. At Jaisalmer, lowest rain (164.0 mm) in just 21 rainy days was received during this period followed by Bikaner (249.1 mm in 10 rainy days). In North-East Zone, Ranchi received highest rainfall (1514.4 mm) followed by Kalyani (1483 mm) and Bhubaneswar (1268.2 mm) and lowest being with Imphal (875.7 mm) during the period under the report. Whereas, the highest number of rainy days was recorded at Kalyani (79 days) followed by Bhubaneswar (72 days) and lowest being with Faizabad (48 days). In Central Zone, maximum rainfall (1542.5 mm) was received at Jabalpur followed by Raipur (1186.8 mm) and lowest being with Urulikanchan (260.8 mm). Whereas, similar to rainfall the maximum rainy days (53) was also recorded at Jabalpur and lowest being with Urulikanchan (260.8 mm in 20 rainy days). In South Zone, Hyderabad received maximum rainfall (513.4 mm) in 32 rainy days followed by Coimbatore (483.3 mm), whereas, Vellayani received minimum rainfall (309.5 mm) in 26 rainy days. In the same zone the well distribution of rainfall was observed at Mandya (37 rainy days).

#### **Relative Humidity :**

In Hill Zone, the morning relative Humidity (RH) was higher (98.0% in 44<sup>th</sup> SMW) at Almora as compared to Palampur (97.1% in 30<sup>th</sup> SMW) and Srinagar (93.7% in 43<sup>rd</sup> SMW). Similar to morning RH, the lowest afternoon RH was also recorded at Almora (34.4% and 36.0% in 44<sup>th</sup> & 42<sup>nd</sup> SMW, respectively) followed by Srinagar (44.4% in 39<sup>th</sup> SMW). In North-West Zone relative humidity ranged from 46.0 to 96.3% in morning hours and in afternoon ranged between 16.0% to 82.0%. The lowest RH was recorded at Bikaner in morning (46.0%) and afternoon (16.0%) hours in 42<sup>nd</sup> SMW. In the same zone, the maximum RH was recorded in morning at Hisar (96.3%) in afternoon at Ludhiana (82.0%). In North-East Zone maximum RH of 99.1% and 96.3% was recorded at Kalyani during morning and afternoon hours, respectively. Whereas, the minimum RH during morning and afternoon hours was recorded at Ranchi (82.4%) and Bhubaneswar (37.0%), respectively. However, the average RH was recorded highest at Kalyani (97.7%). In Central Zone, minimum RH (75.4%) was recorded in morning at Anand and maximum RH (99.7 to 100% from 35<sup>th</sup> SMW to 44<sup>th</sup> SMW) was recorded at Urulikanchan center. At Urulikanchan relative humidity in

morning hours ranged between 94.1 to 100%. In South Zone, during most of the meteorological weeks the relative humidity at Mandya and Hyderabad was higher in morning as compare to Vellayani. In the same zone the maximum RH (96.0%) was recorded in the morning hours at Vellayani. Similar to morning hours RH, maximum afternoon RH over the season was observed at Mandya center.

#### **Sunshine hours:**

Sunshine hours were recorded at various locations in the different zone. In Hill Zone, sunshine hours were recorded maximum (9.8 h) at Palampur followed by Srinagar (9.1 h) and Almora (8.9 h). In the same zone, over the season the maximum sunshine hours were recorded higher at Srinagar followed by Palampur and lowest being at Almora. In North-West Zone, sunshine hours were recorded highest at Ludhiana (11.3 h) followed by Bikaner (10.3 h). On mean basis over the crop season under report, Bikaner recorded maximum sunshine hours (7.64 h) followed by Jodhpur (7.20 h) and lowest being with Ludhiana (6.18 h). In North-East Zone, Ranchi recorded maximum sunshine hours (9.5 h) followed by Imphal (9.2 h). On mean basis across the crop season maximum sunshine was recorded at Ranchi (6.58 h) followed by Kalyani (5.15 h) and Jorhat (5.07 h) in the same zone. Whereas, lowest sunshine hours (4.33 h) was recorded at Imphal. In Central zone, the maximum sunshine hours were recorded at Jhansi (9.9 h and 9.8 h) followed by Anand (9.8 h). On the mean basis over the crop season the maximum sunshine hours (5.9 h) was recorded at Jhansi followed by Kanpur (5.53 h) in the same zone. In South Zone maximum sunshine hours was recorded at Mandya (9.2 h) followed by Coimbatore (9.0 h). Whereas, on the mean basis over the crop season, Mandya recorded maximum sunshine hours (6.16 h) followed by Coimbatore (5.23 h) and lowest being with Hyderabad (4.95 h).



**Table MET -1.1 (a): Temperature ( $^{\circ}\text{C}$ ) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Hill zone					
	Palampur		Almora		Srinagar	
	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	26.5	20.1	28.1	20.9	31.4	18.2
27 July 02-July 08, 2011	27.3	19.1	28.4	20.4	29.0	15.5
28 July 09-July 15, 2011	27.0	19.8	28.8	20.6	29.1	16.2
29 July 16-July 22, 2011	26.8	20.9	28.2	20.7	30.0	16.5
30 July 23-July 29, 2011	24.5	20.1	29.2	21.2	31.1	19.4
31 July 30-Aug.05, 2011	26.5	20.0	29.0	21.6	32.6	16.2
32 Aug.06-Aug.12, 2011	25.9	19.7	28.4	20.7	29.8	18.3
33 Aug.13-Aug.19, 2011	24.0	17.7	23.2	19.1	28.8	14.6
34 Aug.20-Aug.26, 2011	25.1	19.7	29.2	20.6	32.7	18.0
35 Aug.27-Sep.02, 2011	26.7	19.5	30.4	20.9	26.9	16.9
36 Sep.03-Sep.09, 2011	27.2	18.9	29.9	19.9	30.7	16.4
37 Sep.10-Sep.16, 2011	25.5	18.8	28.7	19.8	27.2	16.4
38 Sep.17-Sep.23, 2011	26.0	16.1	28.4	18.2	25.3	10.1
39 Sep.24-Sep.30, 2011	26.2	15.4	29.6	16.3	28.2	08.7
40 Oct. 01- Oct.07, 2011	25.5	15.7	29.5	16.1	25.8	09.0
41 Oct. 08- Oct.14, 2011	27.1	14.4	29.1	12.9	23.8	06.6
42 Oct. 15- Oct.21, 2011	25.9	12.5	27.9	10.2	24.1	04.0
43 Oct. 22- Oct.28, 2011	24.2	11.7	26.2	06.9	18.4	03.8
44 Oct. 29- Nov.04, 2011	23.4	10.8	24.3	06.6	18.3	03.8

**Table MET -1.1 (b): Temperature (°C) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North West Zone									
	Jaisalmer		Hisar		Bikaner		Jodhpur		Ludhiana	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	41.9	28.3	36.7	27.0	39.2	29.2	38.2	28.8	31.0	25.6
27 July 02-July 08, 2011	41.3	28.5	35.5	25.7	39.7	30.1	38.7	28.8	34.2	26.5
28 July 09-July 15, 2011	40.9	26.2	34.7	26.0	39.6	27.3	37.0	26.9	34.1	27.2
29 July 16-July 22, 2011	41.2	26.8	36.6	25.9	38.2	27.3	37.0	26.9	33.7	28.3
30 July 23-July 29, 2011	42.5	27.2	36.4	27.1	38.0	26.9	36.0	27.7	32.8	27.3
31 July 30-Aug.05, 2011	42.4	28.2	35.9	26.9	38.1	25.9	36.7	28.2	34.6	26.7
32 Aug.06-Aug.12, 2011	40.0	27.0	34.5	26.3	36.0	26.8	34.5	26.6	32.4	27.2
33 Aug.13-Aug.19, 2011	34.7	26.6	32.3	24.3	33.7	25.4	31.3	25.3	29.9	24.0
34 Aug.20-Aug.26, 2011	38.5	26.5	33.3	25.7	34.4	26.1	33.6	26.1	32.9	26.2
35 Aug.27-Sep.02, 2011	38.1	25.1	35.1	26.4	36.6	26.6	34.9	25.8	33.0	26.9
36 Sep.03-Sep.09, 2011	33.3	25.1	32.8	24.7	31.6	24.6	32.0	25.4	31.5	25.7
37 Sep.10-Sep.16, 2011	35.6	25.2	33.5	24.8	34.5	26.7	32.7	25.5	32.0	25.4
38 Sep.17-Sep.23, 2011	35.5	23.9	32.6	22.2	34.6	27.7	32.3	23.6	31.8	22.9
39 Sep.24-Sep.30, 2011	37.1	21.6	33.5	19.8	35.0	22.6	33.9	21.4	32.7	22.2
40 Oct. 01- Oct.07, 2011	37.6	20.6	34.1	18.3	34.5	20.8	34.3	20.2	32.9	22.3
41 Oct. 08- Oct.14, 2011	40.7	18.1	34.0	17.7	35.9	20.4	37.4	21.3	33.6	19.1
42 Oct. 15- Oct.21, 2011	40.1	16.7	33.7	13.9	36.0	19.2	37.3	18.5	32.8	15.8
43 Oct. 22- Oct.28, 2011	36.5	14.3	31.5	13.5	33.8	17.6	35.5	18.9	30.4	14.6
44 Oct. 29- Nov.04, 2011	-	-	31.5	11.8	33.5	13.9	34.5	16.1	29.8	13.9

**Table MET -1.1 (c): Temperature ( $^{\circ}\text{C}$ ) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North East Zone											
	Faizabad		Bhubaneswar		Jorhat		Ranchi		Imphal		Kalyani	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	31.0	25.7	34.1	24.8	33.0	25.7	29.8	19.5	28.7	22.1	31.0	26.3
27 July 02-July 08, 2011	33.8	26.7	32.3	24.7	32.3	25.2	30.9	22.4	30.6	21.2	30.6	25.2
28 July 09-July 15, 2011	33.5	26.5	33.9	26.0	32.1	25.6	34.3	23.3	32.2	22.7	33.9	27.2
29 July 16-July 22, 2011	32.0	26.7	31.5	25.1	31.0	25.5	29.8	22.7	28.3	22.1	30.7	26.1
30 July 23-July 29, 2011	30.5	26.2	32.8	25.5	33.0	25.5	30.5	20.9	32.2	21.9	33.1	26.1
31 July 30-Aug.05, 2011	31.6	26.1	34.1	25.8	33.0	25.8	32.9	22.3	30.6	22.7	33.6	27.4
32 Aug.06-Aug.12, 2011	29.7	26.0	31.8	25.6	30.6	25.5	28.0	21.2	29.9	21.6	28.2	25.2
33 Aug.13-Aug.19, 2011	30.9	26.0	32.7	25.4	30.6	25.0	28.1	21.7	29.9	21.6	29.9	25.3
34 Aug.20-Aug.26, 2011	32.5	26.4	31.9	25.1	33.0	25.6	30.8	22.0	30.7	21.3	32.1	26.4
35 Aug.27-Sep.02, 2011	34.3	27.0	30.6	24.7	35.1	25.4	28.1	21.9	32.0	21.6	31.8	26.2
36 Sep.03-Sep.09, 2011	32.6	26.2	30.2	24.6	33.7	25.7	26.6	20.1	29.7	22.0	31.3	26.3
37 Sep.10-Sep.16, 2011	32.0	25.9	31.5	24.9	33.6	25.9	30.0	21.2	30.1	21.8	32.3	26.4
38 Sep.17-Sep.23, 2011	32.5	25.5	30.8	24.6	32.8	25.9	29.2	20.9	29.0	21.5	30.6	25.4
39 Sep.24-Sep.30, 2011	30.7	23.0	33.5	25.1	32.4	25.2	27.3	19.3	31.5	20.0	31.9	25.1
40 Oct. 01- Oct.07, 2011	32.6	22.5	34.0	24.3	33.8	23.7	28.0	18.9	28.7	19.5	34.5	26.0
41 Oct. 08- Oct.14, 2011	33.5	21.4	33.7	24.7	31.4	22.7	30.4	19.1	31.2	17.2	34.5	25.7
42 Oct. 15- Oct.21, 2011	31.5	17.7	33.7	23.4	30.1	20.1	27.9	16.7	26.2	19.5	32.8	25.2
43 Oct. 22- Oct.28, 2011	31.2	17.0	32.5	22.0	27.9	16.7	27.1	17.1	28.2	15.0	31.2	22.1
44 Oct. 29- Nov.04, 2011	29.8	14.7	32.6	18.4	28.2	14.5	25.8	12.5	26.6	11.5	30.8	18.9

**Table MET -1.1 (d): Temperature (<sup>0</sup>C) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Central zone							
	Anand		Jhansi		Urulikanchan		Jamnagar	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	36.6	27.8	30.7	24.2	29.6	22.5	-	-
27 July 02-July 08, 2011	36.2	26.0	34.9	25.1	30.3	21.4	34.1	26.0
28 July 09-July 15, 2011	30.1	25.0	33.7	24.6	28.8	21.2	29.9	26.2
29 July 16-July 22, 2011	33.0	26.1	32.2	24.5	27.0	22.2	33.0	26.2
30 July 23-July 29, 2011	32.7	25.9	31.8	25.0	30.1	21.7	32.7	26.3
31 July 30-Aug.05, 2011	33.0	25.3	33.2	25.7	28.8	21.9	31.0	25.6
32 Aug.06-Aug.12, 2011	30.4	25.4	30.6	25.4	28.4	22.6	31.1	26.2
33 Aug.13-Aug.19, 2011	30.0	25.0	34.4	25.2	29.8	21.5	30.4	25.6
34 Aug.20-Aug.26, 2011	31.0	25.5	33.5	25.6	30.2	21.6	31.1	25.3
35 Aug.27-Sep.02, 2011	31.4	24.9	34.5	26.2	27.6	21.4	31.5	24.8
36 Sep.03-Sep.09, 2011	30.7	25.3	31.7	24.7	27.9	22.3	31.0	25.8
37 Sep.10-Sep.16, 2011	31.1	25.0	32.3	24.7	30.3	21.7	30.1	25.1
38 Sep.17-Sep.23, 2011	31.5	24.4	33.1	24.2	30.2	20.1	31.0	23.4
39 Sep.24-Sep.30, 2011	33.0	23.9	34.3	21.6	31.7	20.4	32.1	22.5
40 Oct. 01- Oct.07, 2011	34.3	23.8	35.2	20.0	32.2	20.9	32.4	22.4
41 Oct. 08- Oct.14, 2011	37.3	24.1	35.9	19.0	33.4	21.2	34.1	23.9
42 Oct. 15- Oct.21, 2011	37.9	22.0	35.3	16.5	33.2	20.4	-	-
43 Oct. 22- Oct.28, 2011	36.9	18.4	34.2	15.4	33.1	15.3	-	-
44 Oct. 29- Nov.04, 2011	35.8	19.9	32.5	12.7	32.2	18.2	-	-

**Table MET -1.1 (e): Temperature (°C) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Central zone							
	Raipur		Rahuri		Kanpur		Jabalpur	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	30.6	24.0	31.2	22.6	31.3	25.9	27.4	22.8
27 July 02-July 08, 2011	33.4	25.1	32.1	21.7	34.5	27.3	32.8	23.8
28 July 09-July 15, 2011	32.6	25.5	29.2	21.8	33.9	27.1	32.0	23.5
29 July 16-July 22, 2011	29.7	24.1	30.4	22.7	30.9	25.2	30.3	22.8
30 July 23-July 29, 2011	30.0	25.1	30.4	22.1	32.4	26.4	29.9	22.7
31 July 30-Aug.05, 2011	32.2	25.8	30.3	22.0	33.1	27.1	31.1	23.6
32 Aug.06-Aug.12, 2011	28.9	24.7	30.7	22.3	30.0	25.6	28.7	22.7
33 Aug.13-Aug.19, 2011	30.1	24.6	30.9	21.8	31.1	24.9	29.8	22.7
34 Aug.20-Aug.26, 2011	30.8	24.5	30.0	21.7	33.1	26.0	30.9	22.9
35 Aug.27-Sep.02, 2011	29.4	24.6	28.7	24.4	34.5	26.8	31.5	22.8
36 Sep.03-Sep.09, 2011	28.3	24.3	29.3	21.7	32.2	25.5	29.5	22.6
37 Sep.10-Sep.16, 2011	30.1	24.4	31.1	20.8	32.1	24.8	29.7	22.4
38 Sep.17-Sep.23, 2011	31.0	24.0	30.4	19.6	32.7	23.9	30.8	21.9
39 Sep.24-Sep.30, 2011	31.2	23.8	30.9	20.2	32.4	23.1	31.3	20.8
40 Oct. 01- Oct.07, 2011	32.4	21.8	30.0	20.3	33.9	21.8	32.2	18.6
41 Oct. 08- Oct.14, 2011	32.4	24.0	32.6	20.1	34.2	19.2	32.4	19.1
42 Oct. 15- Oct.21, 2011	32.6	20.8	32.6	20.7	33.7	15.8	32.6	15.8
43 Oct. 22- Oct.28, 2011	31.8	17.7	32.1	15.8	32.4	15.5	31.8	13.9
44 Oct. 29- Nov.04, 2011	-	-	31.9	14.3	31.5	12.9	31.0	11.0

**Table MET -1.1 (f): Temperature (<sup>0</sup>C) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	South Zone							
	Hyderabad		Vellayani		Coimbatore		Mandya	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26 June 25-July 01, 2011	35.0	24.2	30.7	24.9	31.4	22.9	33.0	21.5
27 July 02-July 08, 2011	31.3	22.4	30.7	24.3	31.7	23.1	30.9	17.6
28 July 09-July 15, 2011	30.7	22.6	29.1	24.3	31.6	23.4	30.0	17.0
29 July 16-July 22, 2011	31.6	23.3	29.6	23.6	30.2	23.3	30.5	18.0
30 July 23-July 29, 2011	30.6	21.9	28.9	24.1	30.8	23.1	30.5	18.0
31 July 30-Aug.05, 2011	29.5	22.6	29.6	24.2	30.5	23.2	29.4	20.2
32 Aug.06-Aug.12, 2011	31.4	23.3	29.8	24.1	32.1	22.7	30.7	20.6
33 Aug.13-Aug.19, 2011	31.7	23.2	30.4	24.6	31.5	22.6	30.0	20.6
34 Aug.20-Aug.26, 2011	30.2	22.2	29.5	24.2	30.8	22.5	28.3	20.6
35 Aug.27-Sep.02, 2011	27.7	22.1	29.4	24.3	30.3	23.0	30.9	20.3
36 Sep.03-Sep.09, 2011	29.7	22.2	29.9	24.6	30.7	22.8	28.7	20.4
37 Sep.10-Sep.16, 2011	31.3	22.5	28.5	23.8	32.3	22.3	28.7	19.8
38 Sep.17-Sep.23, 2011	30.5	22.4	29.8	24.2	31.7	21.9	30.4	20.4
39 Sep.24-Sep.30, 2011	31.7	20.7	30.5	24.2	32.5	21.7	32.6	21.0
40 Oct. 01- Oct.07, 2011	32.4	20.5	30.9	24.4	33.4	22.5	33.0	21.2
41 Oct. 08- Oct.14, 2011	32.0	21.1	31.6	24.1	33.0	22.9	30.4	20.2
42 Oct. 15- Oct.21, 2011	32.9	19.9	31.3	24.1	31.6	22.6	30.0	19.4
43 Oct. 22- Oct.28, 2011	31.7	19.9	29.7	23.7	29.7	22.6	30.0	20.1
44 Oct. 29- Nov.04, 2011	29.5	19.7	28.9	24.0	27.7	21.9	30.0	10.0

**Table MET -1.2 (g): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Hill zone			
	Palampur	Almora		Srinagar
	RF	RF	RD	RF
26 June 25-July 01, 2011	167.0	149.5	5	0.0
27 July 02-July 08, 2011	117.4	8.0	3	7.2
28 July 09-July 15, 2011	87.8	35.0	7	11.0
29 July 16-July 22, 2011	61.8	63.0	5	3.0
30 July 23-July 29, 2011	104.4	18.0	4	9.8
31 July 30-Aug.05, 2011	106.0	24.5	4	0.0
32 Aug.06-Aug.12, 2011	191.4	72.5	5	17.0
33 Aug.13-Aug.19, 2011	335.0	247.5	7	6.0
34 Aug.20-Aug.26, 2011	209.2	30.0	4	11.2
35 Aug.27-Sep.02, 2011	68.8	5.0	1	12.2
36 Sep.03-Sep.09, 2011	103.0	21.0	3	14.8
37 Sep.10-Sep.16, 2011	83.6	32.5	4	39.6
38 Sep.17-Sep.23, 2011	12.2	0.0	-	4.2
39 Sep.24-Sep.30, 2011	32.4	0.0	-	0.0
40 Oct. 01- Oct.07, 2011	32.2	36.5	2	1.5
41 Oct. 08- Oct.14, 2011	0.0	0.0	-	9.0
42 Oct. 15- Oct.21, 2011	0.0	11.0	1	0.0
43 Oct. 22- Oct.28, 2011	2.6	0.0	-	17.4
44 Oct. 29- Nov.04, 2011	1.8	0.0	-	0.8

**Table MET -1.2 (h): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North West Zone								
	Jaisalmer		Hisar	Bikaner		Ludhiana		Jodhpur	
	RF	RD	RF	RF	RD	RF	RD	RF	RD
26 June 25-July 01, 2011	-	-	21.7	00.0	0	104.6	4	0.0	0
27 July 02-July 08, 2011	3.5	1	22.7	00.0	0	26.8	2	0.0	0
28 July 09-July 15, 2011	36.0	3	14.1	22.3	2	24.0	2	18.0	2
29 July 16-July 22, 2011	8.0	2	35.0	00.0	0	45.5	2	46.7	1
30 July 23-July 29, 2011	-	-	10.7	60.5	1	18.0	1	27.6	2
31 July 30-Aug.05, 2011	-	-	0.0	31.0	1	27.1	2	0.0	0
32 Aug.06-Aug.12, 2011	12.5	3	24.6	29.0	2	443.8	3	64.0	2
33 Aug.13-Aug.19, 2011	26.5	2	4.6	21.0	1	32.1	1	24.6	3
34 Aug.20-Aug.26, 2011	4.5	1	62.9	18.6	2	4.0	1	12.2	1
35 Aug.27-Sep.02, 2011	55.5	6	5.1	37.5	1	7.4	2	34.2	2
36 Sep.03-Sep.09, 2011	17.5	3	79.2	29.2	0	52.5	3	70.0	4
37 Sep.10-Sep.16, 2011	-	-	26.6	00.0	0	123.6	4	2.3	0
38 Sep.17-Sep.23, 2011	-	-	33.8	00.0	0	0.0	0	5.3	0
39 Sep.24-Sep.30, 2011	-	-	0.0	00.0	0	0.0	0	0.0	0
40 Oct. 01- Oct.07, 2011	-	-	0.0	00.0	0	0.0	0	0.0	0
41 Oct. 08- Oct.14, 2011	-	-	0.0	00.0	0	0.0	0	0.0	0
42 Oct. 15- Oct.21, 2011	-	-	0.0	00.0	0	0.0	0	0.3	0
43 Oct. 22- Oct.28, 2011	-	-	0.0	00.0	0	0.0	0	0.0	0
44 Oct. 29- Nov.04, 2011	-	-	0.0	00.0	0	0.0	0	0.0	0



**Table MET -1.2 (i): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North East Zone					
	Kalyani		Faizabad		Bhubaneswar	
	RF	RD	RF	RD	RF	RD
26 June 25-July 01, 2011	51.80	7	126.8	6	37.4	6
27 July 02-July 08, 2011	39.70	6	22.0	1	79.2	6
28 July 09-July 15, 2011	12.40	5	97.6	2	67.1	3
29 July 16-July 22, 2011	332.30	6	73.8	4	144.0	7
30 July 23-July 29, 2011	22.70	3	37.6	2	53.4	3
31 July 30-Aug.05, 2011	48.00	4	99.2	5	57.7	5
32 Aug.06-Aug.12, 2011	406.10	7	179.7	6	113.6	5
33 Aug.13-Aug.19, 2011	107.8	7	136.2	4	17.5	4
34 Aug.20-Aug.26, 2011	73.00	4	5.0	1	89.6	6
35 Aug.27-Sep.02, 2011	22.40	5	0.0	-	215.3	7
36 Sep.03-Sep.09, 2011	28.30	6	72.5	3	215.3	7
37 Sep.10-Sep.16, 2011	30.90	3	86.1	5	42.2	4
38 Sep.17-Sep.23, 2011	169.1	7	68.1	1	78.9	4
39 Sep.24-Sep.30, 2011	59.5	4	69.2	3	0.0	-
40 Oct. 01- Oct.07, 2011	0.0	-	0.0	-	44.5	1
41 Oct. 08- Oct.14, 2011	8.4	3	0.0	-	7.2	2
42 Oct. 15- Oct.21, 2011	1.6	-	0.0	-	2.5	1
43 Oct. 22- Oct.28, 2011	69.0	2	0.0	-	2.8	1
44 Oct. 29- Nov.04, 2011	0.0	-	0.0	-	0.0	-

**Table MET -1.2 (j): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North East Zone				
	Ranchi		Jorhat		Imphal
	RF	RD	RF	RD	RF
26 June 25-July 01, 2011	183.1	4	97.2	4	105.7
27 July 02-July 08, 2011	71.1	2	42.6	5	44.1
28 July 09-July 15, 2011	18.0	2	201.5	4	65.8
29 July 16-July 22, 2011	179.5	5	86.0	5	153.3
30 July 23-July 29, 2011	130.5	1	114.4	6	32.2
31 July 30-Aug.05, 2011	49.0	4	87.5	5	109.2
32 Aug.06-Aug.12, 2011	338.0	6	120.7	3	105.7
33 Aug.13-Aug.19, 2011	116.4	4	80.3	5	32.9
34 Aug.20-Aug.26, 2011	4.6	1	22.6	4	30.8
35 Aug.27-Sep.02, 2011	52.4	5	44.1	3	1.4
36 Sep.03-Sep.09, 2011	116.1	5	77.6	4	43.4
37 Sep.10-Sep.16, 2011	73.4	3	36.3	5	34.3
38 Sep.17-Sep.23, 2011	132.9	4	13.9	2	48.3
39 Sep.24-Sep.30, 2011	29.0	2	39.3	2	29.4
40 Oct. 01- Oct.07, 2011	0.0	0	0.0	-	13.3
41 Oct. 08- Oct.14, 2011	14.2	1	7.2	2	0.0
42 Oct. 15- Oct.21, 2011	6.2	0	19.7	3	25.2
43 Oct. 22- Oct.28, 2011	0.0	0	10.8	1	0.70
44 Oct. 29- Nov.04, 2011	0.0	0	0.7	1	0.00

**Table MET -1.2 (k): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Central zone									
	Jabalpur		Anand		Jhansi		Urulikanchan		Jamnagar	
	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD
26 June 25-July 01, 2011	91.3	4	0.0	0	223.0	7	-	-	-	-
27 July 02-July 08, 2011	15.2	2	64.0	2	32.2	1	-	-	10.0	1
28 July 09-July 15, 2011	46.4	3	44.7	5	94.6	5	23.2	1	64.0	2
29 July 16-July 22, 2011	429.1	6	13.9	3	54.6	2	34.6	3	43.5	2
30 July 23-July 29, 2011	119.2	3	15.6	2	63.4	3	-	-	19.5	1
31 July 30-Aug.05, 2011	140.0	5	105.8	3	65.0	5	-	-	41.0	3
32 Aug.06-Aug.12, 2011	118.5	6	147.1	4	51.0	5	-	-	39.0	2
33 Aug.13-Aug.19, 2011	57.6	3	122.2	5	60.4	4	-	-	12.5	1
34 Aug.20-Aug.26, 2011	14.6	3	113.3	2	13.2	2	24.4	2	20.0	1
35 Aug.27-Sep.02, 2011	150.6	7	114.8	5	03.0	1	46.3	4	125.0	6
36 Sep.03-Sep.09, 2011	221.6	4	99.4	5	57.2	3	9.8	1	115.5	4
37 Sep.10-Sep.16, 2011	92.2	3	11.1	1	97.4	4	32.3	3	115.0	3
38 Sep.17-Sep.23, 2011	41.0	4	24.9	3	00.6	-	-	-	33.5	2
39 Sep.24-Sep.30, 2011	0.0	0	1.0	0	00.0	-	-	-	00.0	0
40 Oct. 01- Oct.07, 2011	5.2	1	0.0	0	00.0	-	-	-	00.0	0
41 Oct. 08- Oct.14, 2011	0.0	0	0.0	0	00.0	-	36.0	3	00.0	0
42 Oct. 15- Oct.21, 2011	0.0	0	0.0	0	00.0	-	54.2	3	-	-
43 Oct. 22- Oct.28, 2011	0.0	0	0.0	0	00.0	-	-	-	-	-
44 Oct. 29- Nov.04, 2011	0.0	0	0.0	0	00.0	-	-	-	-	-

**Table MET -1.2 (I): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Central zone						
	Dhari		Rahuri		Kanpur		Raipur
	RF	RD	RF	RD	RF	RD	RF
26 June 25-July 01, 2011	-	-	3.0	-	214.2	5	11.3
27 July 02-July 08, 2011	45.0	3	94.9	3	6.6	1	23.4
28 July 09-July 15, 2011	67.0	5	13.5	1	17.5	4	58.0
29 July 16-July 22, 2011	134.4	4	2.4	-	136.6	5	207.0
30 July 23-July 29, 2011	84.2	4	44.2	2	18.4	3	50.8
31 July 30-Aug.05, 2011	70.0	3	4.0	-	6.5	1	75.0
32 Aug.06-Aug.12, 2011	05.0	1	1.3	-	121.6	5	93.0
33 Aug.13-Aug.19, 2011	34.0	2	6.3	2	101.0	4	76.9
34 Aug.20-Aug.26, 2011	94.0	4	54.0	6	38.8	3	59.6
35 Aug.27-Sep.02, 2011	61.0	4	50.3	6	0.5	0	150.1
36 Sep.03-Sep.09, 2011	76.9	4	27.2	3	34.8	4	226.0
37 Sep.10-Sep.16, 2011	-	-	15.6	2	52.2	4	87.0
38 Sep.17-Sep.23, 2011	-	-	5.2	1	6.0	1	66.3
39 Sep.24-Sep.30, 2011	28.0	2	29.1	2	0.5	0	2.4
40 Oct. 01- Oct.07, 2011	-	-	1.0	-	0	0	0.0
41 Oct. 08- Oct.14, 2011	-	-	3.5	-	0	0	0.0
42 Oct. 15- Oct.21, 2011	-	-	17.2	2	0	0	0.0
43 Oct. 22- Oct.28, 2011	-	-	-	-	0	0	0.0
44 Oct. 29- Nov.04, 2011	-	-	-	-	0	0	-

**Table MET -1.2 (m): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	South Zone							
	Hyderabad		Vellayani		Coimbatore		Mandya	
	RF	RD	RF	RD	RF	RD	RF	RD
26 June 25-July 01, 2011	9.6	1	8.5	1	4.1	1	1.2	0
27 July 02-July 08, 2011	89.0	4	20.0	1	1.2	-	0.0	0
28 July 09-July 15, 2011	38.8	2	31.5	3	17.6	2	2.8	1
29 July 16-July 22, 2011	15.0	1	14.0	3	11.6	2	12.4	3
30 July 23-July 29, 2011	48.2	4	8.0	1	1.5	-	25.6	2
31 July 30-Aug.05, 2011	10.4	1	4.5	1	0.8	-	13.8	2
32 Aug.06-Aug.12, 2011	1.8	0	14.5	2	-	-	21.2	4
33 Aug.13-Aug.19, 2011	11.0	2	1.5	-	4.0	1	61.8	2
34 Aug.20-Aug.26, 2011	106.6	3	-	-	1.5	-	3.2	0
35 Aug.27-Sep.02, 2011	61.5	5	86.5	5	25.2	2	4.6	1
36 Sep.03-Sep.09, 2011	30.6	2	6.5	1	10.4	1	6.8	1
37 Sep.10-Sep.16, 2011	0.0	0	43.0	2	33.5	1	1.8	0
38 Sep.17-Sep.23, 2011	12.0	1	1.5	-	-	-	4.4	1
39 Sep.24-Sep.30, 2011	3.5	1	0.5	-	-	-	14.6	3
40 Oct. 01- Oct.07, 2011	8.2	1	-	-	-	-	55.6	2
41 Oct. 08- Oct.14, 2011	28.5	2	-	-	71.5	2	78.6	5
42 Oct. 15- Oct.21, 2011	1.0	0	23.5	1	111.4	4	49.8	2
43 Oct. 22- Oct.28, 2011	10.2	1	21.0	3	39.0	5	26.6	4
44 Oct. 29- Nov.04, 2011	27.5	1	24.5	2	150.0	6	57.6	5

**Table MET – 1.3 (n): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	Hill zone								
	Palampur			Almora			Srinagar		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	93.7	91.3	92.5	95.6	84.7	90.2	69.3	52.8	61.1
27 July 02-July 08, 2011	86.1	81.3	83.7	88.9	67.1	78.0	74.1	53.7	63.9
28 July 09-July 15, 2011	96.1	85.0	90.6	92.6	72.9	82.8	78.1	49.8	64.0
29 July 16-July 22, 2011	92.3	85.4	88.9	91.2	74.3	82.8	76.1	53.7	64.9
30 July 23-July 29, 2011	97.1	90.1	93.6	92.9	74.7	83.8	80.7	53.4	67.1
31 July 30-Aug.05, 2011	94.3	87.9	91.1	93.9	66.0	80.0	73.0	47.4	60.2
32 Aug.06-Aug.12, 2011	95.7	90.6	93.2	89.2	74.3	81.8	79.1	54.3	66.7
33 Aug.13-Aug.19, 2011	91.0	91.1	91.1	97.3	88.0	92.7	79.7	55.0	67.4
34 Aug.20-Aug.26, 2011	96.7	90.4	93.6	92.6	80.4	86.5	75.0	48.1	61.6
35 Aug.27-Sep.02, 2011	91.6	91.3	91.5	92.3	57.0	74.7	90.6	59.4	75.0
36 Sep.03-Sep.09, 2011	95.9	87.1	91.5	90.5	65.4	78.0	84.0	48.3	66.2
37 Sep.10-Sep.16, 2011	93.6	88.6	91.1	91.7	66.9	79.3	88.3	60.6	74.5
38 Sep.17-Sep.23, 2011	92.4	77.7	85.1	90.6	53.2	71.9	87.6	52.1	69.9
39 Sep.24-Sep.30, 2011	89.3	80.3	84.8	92.4	57.0	74.7	87.6	44.4	66.0
40 Oct. 01- Oct.07, 2011	92.3	81.4	86.9	88.9	59.6	74.3	87.3	48.6	68.0
41 Oct. 08- Oct.14, 2011	84.7	60.3	72.5	93.2	43.7	68.5	92.6	55.4	74.0
42 Oct. 15- Oct.21, 2011	75.7	52.9	64.3	93.8	36.0	64.9	88.7	53.3	71.0
43 Oct. 22- Oct.28, 2011	71.6	55.1	63.4	93.7	49.7	71.7	93.7	77.8	85.8
44 Oct. 29- Nov.04, 2011	81.6	66.1	73.9	98.0	34.4	66.2	87.4	71.6	79.5

**Table MET – 1.3 (o): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	North West Zone								
	Jaisalmer			Bikaner			Ludhiana		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	66.7	35.0	50.9	66	32	49.0	94.0	70.0	82.0
27 July 02-July 08, 2011	65.8	36.4	51.1	54	30	42.0	88.0	62.0	75.0
28 July 09-July 15, 2011	68.0	32.8	50.4	70	36	53.0	89.0	59.0	74.0
29 July 16-July 22, 2011	67.8	27.7	47.8	70	37	53.5	88.0	69.0	78.5
30 July 23-July 29, 2011	63.4	24.2	43.8	76	51	63.5	89.0	74.0	81.5
31 July 30-Aug.05, 2011	69.5	42.2	55.9	66	44	55.0	91.0	64.0	77.5
32 Aug.06-Aug.12, 2011	66.5	46.8	56.7	77	70	73.5	87.0	78.0	82.5
33 Aug.13-Aug.19, 2011	77.4	50.0	63.7	86	56	71.0	96.0	80.0	88.0
34 Aug.20-Aug.26, 2011	82.8	58.7	70.8	86	56	71.0	93.0	70.0	81.5
35 Aug.27-Sep.02, 2011	81.0	52.1	66.6	85	50	67.5	92.0	73.0	82.5
36 Sep.03-Sep.09, 2011	84.1	72.7	78.4	89	68	78.5	93.0	82.0	87.5
37 Sep.10-Sep.16, 2011	90.2	74.5	82.4	83	53	68.0	95.0	78.0	86.5
38 Sep.17-Sep.23, 2011	73.0	56.7	64.9	82	44	63.0	96.0	67.0	81.5
39 Sep.24-Sep.30, 2011	80.5	52.1	66.3	81	33	57.0	92.0	61.0	76.5
40 Oct. 01- Oct.07, 2011	87.7	49.1	68.4	77	28	52.5	90.0	54.0	72.0
41 Oct. 08- Oct.14, 2011	85.2	37.0	61.1	63	25	44.0	93.0	43.0	68.0
42 Oct. 15- Oct.21, 2011	69.5	41.8	55.7	46	16	31.0	92.0	33.0	62.5
43 Oct. 22- Oct.28, 2011	78.2	49.4	63.8	64	30	47.0	91.0	36.0	63.5
44 Oct. 29- Nov.04, 2011	-	-	-	56	17	36.5	93.0	41.0	67.0

**Table MET – 1.3 (p): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	North West Zone					
	Hisar			Jodhpur		
	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	80.3	59.3	69.8	66.0	39.0	52.5
27 July 02-July 08, 2011	87.7	67.0	77.4	63.0	37.0	50.0
28 July 09-July 15, 2011	83.9	62.0	73.0	79.0	49.0	64.0
29 July 16-July 22, 2011	86.0	55.9	71.0	78.0	50.0	64.0
30 July 23-July 29, 2011	82.0	57.4	69.7	78.0	49.0	63.5
31 July 30-Aug.05, 2011	83.3	57.6	70.5	76.0	48.0	62.0
32 Aug.06-Aug.12, 2011	88.9	63.4	76.2	80.0	64.0	72.0
33 Aug.13-Aug.19, 2011	89.3	71.6	80.5	91.0	72.0	81.5
34 Aug.20-Aug.26, 2011	92.7	69.1	80.9	88.0	64.0	76.0
35 Aug.27-Sep.02, 2011	88.7	61.3	75.0	83.0	62.0	72.5
36 Sep.03-Sep.09, 2011	96.3	79.0	87.7	88.0	73.0	80.5
37 Sep.10-Sep.16, 2011	93.7	73.4	83.6	91.0	63.0	77.0
38 Sep.17-Sep.23, 2011	93.7	59.4	76.6	89.0	57.0	73.0
39 Sep.24-Sep.30, 2011	88.6	45.4	67.0	83.0	43.0	63.0
40 Oct. 01- Oct.07, 2011	83.0	39.7	61.4	80.0	36.0	58.0
41 Oct. 08- Oct.14, 2011	88.6	38.1	63.4	59.0	20.0	39.5
42 Oct. 15- Oct.21, 2011	86.0	31.0	58.5	56.0	16.0	36.0
43 Oct. 22- Oct.28, 2011	88.1	31.6	59.9	53.0	22.0	37.5
44 Oct. 29- Nov.04, 2011	87.6	28.3	58.0	56.0	22.0	39.0



**Table MET – 1.3 (q): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	North East Zone								
	Bhubaneswar			Jorhat			Ranchi		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	93	70	82	90.4	72.1	81.3	83.4	70.1	76.8
27 July 02-July 08, 2011	93	81	87	92.4	72.9	82.7	85.4	71.3	78.4
28 July 09-July 15, 2011	92	78	85	93.1	80.6	86.9	83.9	71.9	77.9
29 July 16-July 22, 2011	96	89	93	94.0	76.1	85.1	85.3	72.7	79.0
30 July 23-July 29, 2011	91	76	84	92.3	77.3	84.8	86.1	73.3	79.7
31 July 30-Aug.05, 2011	92	71	82	93.7	75.9	84.8	84.1	73.4	78.8
32 Aug.06-Aug.12, 2011	96	85	91	92.6	76.7	84.6	85.4	72.9	79.2
33 Aug.13-Aug.19, 2011	95	79	87	93.6	80.9	87.2	83.3	72.4	77.9
34 Aug.20-Aug.26, 2011	96	84	90	90.7	78.1	84.4	83.6	71.0	77.3
35 Aug.27-Sep.02, 2011	96	92	94	91.3	65.9	78.6	84.9	72.9	78.9
36 Sep.03-Sep.09, 2011	97	94	96	91.7	70.8	81.3	83.3	71.0	77.2
37 Sep.10-Sep.16, 2011	96	81	89	91.9	72.0	81.9	84.9	71.0	78.0
38 Sep.17-Sep.23, 2011	96	81	89	90.6	71.4	81.0	85.0	71.8	78.4
39 Sep.24-Sep.30, 2011	89	61	75	93.7	69.3	81.5	83.1	71.9	77.5
40 Oct. 01- Oct.07, 2011	91	65	78	91.3	62.6	76.9	82.4	71.3	76.9
41 Oct. 08- Oct.14, 2011	93	68	81	90.7	66.0	78.4	84.1	73.4	78.8
42 Oct. 15- Oct.21, 2011	88	57	73	92.7	66.7	79.7	82.6	73.1	77.9
43 Oct. 22- Oct.28, 2011	90	48	69	95.3	63.6	79.4	85.7	72.7	79.2
44 Oct. 29- Nov.04, 2011	87	37	62	93.7	58.6	76.1	84.4	72.1	78.3

**Table MET – 1.3 (r): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	North East Zone								
	Faizabad			Kalyani			Imphal		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	89.2	78.0	84.1	97.6	85.7	91.6	93.7	85.3	89.5
27 July 02-July 08, 2011	85.8	63.1	74.5	95.6	82.4	89.0	92.6	75.4	84.0
28 July 09-July 15, 2011	83.7	65.7	74.7	93.6	72.1	82.9	91.3	73.6	82.5
29 July 16-July 22, 2011	92.0	76.7	84.4	96.9	86.7	91.8	94.7	86.1	90.4
30 July 23-July 29, 2011	86.1	67.1	76.6	91.7	67.9	79.8	90.3	75.6	83.0
31 July 30-Aug.05, 2011	92.8	75.5	84.2	93.6	73.0	83.3	92.7	75.9	84.3
32 Aug.06-Aug.12, 2011	90.7	76.5	83.6	99.1	96.3	97.7	94.9	83.7	89.3
33 Aug.13-Aug.19, 2011	89.8	78.7	84.3	98.3	87.7	93.0	95.3	82.3	88.8
34 Aug.20-Aug.26, 2011	89.7	71.0	80.4	96.4	74.9	85.6	89.9	75.6	82.8
35 Aug.27-Sep.02, 2011	87.4	65.1	76.3	94.3	76.7	85.5	88.4	63.0	75.7
36 Sep.03-Sep.09, 2011	88.5	74.0	81.3	95.6	77.0	86.3	90.4	73.3	81.9
37 Sep.10-Sep.16, 2011	92.2	73.0	82.6	94.7	77.0	85.9	89.7	70.4	80.1
38 Sep.17-Sep.23, 2011	93.4	71.5	82.5	98.5	84.6	91.5	89.0	74.7	81.9
39 Sep.24-Sep.30, 2011	92.0	74.5	83.3	96.7	82.3	89.5	89.0	62.7	75.9
40 Oct. 01- Oct.07, 2011	86.2	65.1	75.7	90.6	63.1	76.9	91.0	68.6	79.8
41 Oct. 08- Oct.14, 2011	88.0	57.2	72.6	93.0	61.1	77.1	84.9	53.7	69.3
42 Oct. 15- Oct.21, 2011	88.4	54.1	71.3	92.7	70.0	81.4	89.6	73.0	81.3
43 Oct. 22- Oct.28, 2011	88.4	61.5	75.0	95.0	59.1	77.1	85.3	53.4	69.4
44 Oct. 29- Nov.04, 2011	90.1	58.4	74.3	92.7	42.9	67.8	89.0	45.9	67.5

**Table MET – 1.3 (s): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	Central zone								
	Urulikanchan			Jamnagar			Jhansi		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	94.1	60.5	77.3				93.0	76.0	84.5
27 July 02-July 08, 2011	98.0	57.3	77.6	83	62	72.5	84.0	61.0	72.5
28 July 09-July 15, 2011	99.7	64.1	81.9	91	72	81.5	93.0	76.0	84.5
29 July 16-July 22, 2011	97.6	77.4	87.5	89	66	77.5	94.0	82.0	88.0
30 July 23-July 29, 2011	97.3	60.3	78.8	90	73	81.5	93.0	76.0	84.5
31 July 30-Aug.05, 2011	98.1	65.1	81.6	93	78	85.5	94.0	78.0	86.0
32 Aug.06-Aug.12, 2011	94.6	65.7	80.1	89	76	82.5	94.0	84.0	89.0
33 Aug.13-Aug.19, 2011	96.3	58.7	77.5	92	74	83.0	92.0	78.0	85.0
34 Aug.20-Aug.26, 2011	98.1	59.6	78.9	91	77	84.0	93.0	68.0	80.5
35 Aug.27-Sep.02, 2011	100.0	78.3	89.1	94	78	86.0	91.0	67.0	79.0
36 Sep.03-Sep.09, 2011	100.0	86.4	93.2	94	81	87.5	93.0	76.0	84.5
37 Sep.10-Sep.16, 2011	100.0	73.7	86.9	95	86	90.5	95.0	72.0	83.5
38 Sep.17-Sep.23, 2011	100.0	67.3	83.6	93	68	80.5	92.0	61.0	76.5
39 Sep.24-Sep.30, 2011	100.0	60.0	80.0	89	60	74.5	86.0	45.0	65.5
40 Oct. 01- Oct.07, 2011	99.9	61.9	80.9	85	52	68.5	82.0	37.0	59.5
41 Oct. 08- Oct.14, 2011	100.0	61.4	80.7	82	44	63.0	86.0	36.0	61.0
42 Oct. 15- Oct.21, 2011	100.0	58.7	79.4	-	-	-	83.0	30.0	56.5
43 Oct. 22- Oct.28, 2011	99.7	39.1	69.4	-	-	-	84.0	36.0	60.0
44 Oct. 29- Nov.04, 2011	100.0	55.0	77.5	-	-	-	86.0	26.0	56.0

**Table MET – 1.3 (t): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	Central zone								
	Rahuri			Anand			Jabalpur		
	M	AN	AV	M	AN	AV	M	AN	AV
26 June 25-July 01, 2011	94	59	76.5	75.4	47.9	61.4	90.0	80.0	85.0
27 July 02-July 08, 2011	95	61	78.0	85.9	59.9	72.9	86.0	61.0	73.5
28 July 09-July 15, 2011	92	65	78.5	95.9	82.0	89.0	92.0	71.0	81.5
29 July 16-July 22, 2011	92	63	77.5	90.9	74.6	82.8	93.0	83.0	88.0
30 July 23-July 29, 2011	94	61	77.5	93.3	74.3	83.8	90.0	70.0	80.0
31 July 30-Aug.05, 2011	93	63	78.0	93.6	74.7	84.2	92.0	82.0	87.0
32 Aug.06-Aug.12, 2011	93	57	75.0	94.9	89.6	92.3	93.0	85.0	89.0
33 Aug.13-Aug.19, 2011	91	58	74.5	96.6	86.1	91.4	92.0	78.0	85.0
34 Aug.20-Aug.26, 2011	94	69	81.5	96.7	78.9	87.8	93.0	70.0	81.5
35 Aug.27-Sep.02, 2011	94	74	84.0	98.1	85.4	91.8	96.0	71.0	83.5
36 Sep.03-Sep.09, 2011	93	70	81.5	96.6	79.6	88.1	94.0	80.0	87.0
37 Sep.10-Sep.16, 2011	91	57	74.0	96.9	76.0	86.5	93.0	73.0	83.0
38 Sep.17-Sep.23, 2011	92	54	73.0	96.4	65.9	81.2	93.0	67.0	80.0
39 Sep.24-Sep.30, 2011	91	53	72.0	88.3	56.4	72.4	86.0	56.0	71.0
40 Oct. 01- Oct.07, 2011	91	57	74.0	83.9	45.0	64.5	90.0	47.0	68.5
41 Oct. 08- Oct.14, 2011	90	44	67.0	81.7	40.0	60.9	92.0	43.0	67.5
42 Oct. 15- Oct.21, 2011	93	44	68.5	89.0	34.0	61.5	89.0	31.0	60.0
43 Oct. 22- Oct.28, 2011	90	33	61.5	81.4	26.6	54.0	87.0	30.0	58.5
44 Oct. 29- Nov.04, 2011	91	39	65.0	75.9	27.7	51.8	86.0	24.0	55.0

**Table MET – 1.3 (u): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2011**

Met. Week & Month	South Zone									
	Hyderabad			Vellayani			Coimbatore	Mandya		
	M	AN	AV	M	AN	AV	AV	M	AN	AV
26 June 25-July 01, 2011	75	44	59.5	86.6	72.1	79.4	86.0	91.0	44.0	67.5
27 July 02-July 08, 2011	91	64	77.5	87.0	71.1	79.1	86.0	85.0	59.0	72.0
28 July 09-July 15, 2011	84	64	74.0	94.1	79.6	86.9	84.0	86.0	70.0	78.0
29 July 16-July 22, 2011	82	59	70.5	89.4	72.7	81.1	75.0	91.0	31.0	61.0
30 July 23-July 29, 2011	93	65	79.0	95.4	78.1	86.8	86.0	90.0	38.0	64.0
31 July 30-Aug.05, 2011	87	65	76.0	92.3	76.9	84.6	77.0	91.0	52.4	71.7
32 Aug.06-Aug.12, 2011	90	63	76.5	88.7	71.3	80.0	91.0	91.0	53.4	72.2
33 Aug.13-Aug.19, 2011	89	76	82.5	85.7	68.4	77.1	93.0	91.0	55.7	73.4
34 Aug.20-Aug.26, 2011	95	73	84.0	90.7	76.1	83.4	92.0	91.0	51.7	71.4
35 Aug.27-Sep.02, 2011	89	80	84.5	94.4	80.3	87.4	80.0	91.0	51.7	71.4
36 Sep.03-Sep.09, 2011	90	79	84.5	94.6	75.3	85.0	86.0	91.0	58.9	75.0
37 Sep.10-Sep.16, 2011	89	74	81.5	91.0	78.5	84.8	91.0	91.0	58.9	75.0
38 Sep.17-Sep.23, 2011	83	69	76.0	96.0	74.4	85.2	89.0	91.0	48.3	69.7
39 Sep.24-Sep.30, 2011	88	74	81.0	87.4	71.1	79.3	88.0	91.0	42.3	66.7
40 Oct. 01- Oct.07, 2011	89	74	81.5	73.8	69.4	71.6	88.0	91.0	41.9	66.5
41 Oct. 08- Oct.14, 2011	91	64	77.5	73.2	68.2	70.7	87.0	91.0	51.0	71.0
42 Oct. 15- Oct.21, 2011	90	67	78.5	74.7	71.4	73.1	95.0	91.0	53.0	72.0
43 Oct. 22- Oct.28, 2011	91	76	83.5	95.2	82.2	88.7	91.0	91.0	53.7	72.4
44 Oct. 29- Nov.04, 2011	91	61	76.0	95.6	89.3	92.5	95.0	91.0	65.0	78.0

**Table MET – 1.4 (v): Sunshine (h) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Hill Zone		
	Palampur	Almora	Srinagar
26 June 25-July 01, 2011	2.1	1.9	8.2
27 July 02-July 08, 2011	5.5	3.6	6.7
28 July 09-July 15, 2011	4.5	3.3	7.0
29 July 16-July 22, 2011	4.0	2.6	7.8
30 July 23-July 29, 2011	2.7	2.6	6.1
31 July 30-Aug.05, 2011	3.5	3.1	9.1
32 Aug.06-Aug.12, 2011	2.8	2.8	6.6
33 Aug.13-Aug.19, 2011	0.3	0.8	6.9
34 Aug.20-Aug.26, 2011	2.4	4.8	7.2
35 Aug.27-Sep.02, 2011	2.6	6.8	4.0
36 Sep.03-Sep.09, 2011	4.4	4.6	7.3
37 Sep.10-Sep.16, 2011	0.3	4.4	5.5
38 Sep.17-Sep.23, 2011	7.6	7.5	6.9
39 Sep.24-Sep.30, 2011	7.9	7.5	8.8
40 Oct. 01- Oct.07, 2011	4.7	7.8	6.1
41 Oct. 08- Oct.14, 2011	7.3	7.4	7.2
42 Oct. 15- Oct.21, 2011	9.8	8.8	7.1
43 Oct. 22- Oct.28, 2011	8.1	8.9	6.3
44 Oct. 29- Nov.04, 2011	8.1	7.3	4.6

**Table MET – 1.4 (w): Sunshine (h) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North west zone			
	Ludhiana	Jodhpur	Hisar	Bikaner
26 June 25-July 01, 2011	2.9	5.6	4.6	4.4
27 July 02-July 08, 2011	6.7	6.0	2.6	5.2
28 July 09-July 15, 2011	5.9	7.3	5.9	7.0
29 July 16-July 22, 2011	5.6	6.7	7.2	6.4
30 July 23-July 29, 2011	2.3	6.1	5.6	6.0
31 July 30-Aug.05, 2011	11.3	8.4	5.8	8.6
32 Aug.06-Aug.12, 2011	4.0	5.3	6.6	5.5
33 Aug.13-Aug.19, 2011	4.9	3.7	4.9	7.2
34 Aug.20-Aug.26, 2011	5.9	5.4	6.5	6.9
35 Aug.27-Sep.02, 2011	4.1	6.2	7.7	8.2
36 Sep.03-Sep.09, 2011	1.0	4.8	4.6	5.1
37 Sep.10-Sep.16, 2011	5.7	7.0	6.5	8.8
38 Sep.17-Sep.23, 2011	9.2	7.6	8.8	8.6
39 Sep.24-Sep.30, 2011	9.7	10.0	10.0	9.6
40 Oct. 01- Oct.07, 2011	9.5	9.8	9.9	10.0
41 Oct. 08- Oct.14, 2011	8.3	9.4	8.9	8.9
42 Oct. 15- Oct.21, 2011	6.9	9.6	9.3	10.3
43 Oct. 22- Oct.28, 2011	7.9	9.4	8.1	9.6
44 Oct. 29- Nov.04, 2011	5.6	8.5	6.8	9.0

**Table MET – 1.4 (x): Sunshine (h) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	North East zone					
	Bhubaneswar	Jorhat	Ranchi	Kalyani	Faizabad	Imphal
26 June 25-July 01, 2011	2.3	3.8	1.94	1.1	2.5	0.6
27 July 02-July 08, 2011	1.2	2.0	8.83	3.2	4.4	5.4
28 July 09-July 15, 2011	6.1	3.4	8.63	6.7	5.1	3.1
29 July 16-July 22, 2011	1.2	2.2	5.24	2.4	2.9	1.5
30 July 23-July 29, 2011	6.0	4.3	6.14	8.6	2.3	5.1
31 July 30-Aug.05, 2011	5.9	4.6	7.87	3.9	0.3	2.2
32 Aug.06-Aug.12, 2011	0.4	3.1	2.61	0.3	1.5	2.0
33 Aug.13-Aug.19, 2011	3.9	2.8	3.17	2.4	3.0	2.1
34 Aug.20-Aug.26, 2011	3.5	4.7	8.4	4.4	6.4	3.7
35 Aug.27-Sep.02, 2011	2.9	8.5	5.6	6.8	8.9	6.5
36 Sep.03-Sep.09, 2011	0.7	5.3	5.87	4.1	5.0	3.2
37 Sep.10-Sep.16, 2011	3.3	5.5	7.43	4.5	4.2	3.4
38 Sep.17-Sep.23, 2011	2.3	4.3	5.07	2.6	6.1	3.6
39 Sep.24-Sep.30, 2011	7.6	4.5	6.41	6.1	5.0	7.0
40 Oct. 01- Oct.07, 2011	6.9	7.7	8.21	8.9	6.9	5.2
41 Oct. 08- Oct.14, 2011	7.3	6.7	7.7	8.7	5.8	8.0
42 Oct. 15- Oct.21, 2011	7.3	7.1	8.3	6.6	7.2	3.4
43 Oct. 22- Oct.28, 2011	7.2	7.5	8.2	8.2	6.3	7.0
44 Oct. 29- Nov.04, 2011	8.4	8.4	9.47	8.3	5.2	9.2



**Table MET – 1.4 (y): Sunshine (h) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	Central zone			
	Kanpur	Anand	Jhansi	Jabalpur
26 June 25-July 01, 2011	2.1	1.4	3.1	0.4
27 July 02-July 08, 2011	4.6	4.1	6.5	4.9
28 July 09-July 15, 2011	5.4	1.3	4.1	3.1
29 July 16-July 22, 2011	1.3	2.3	2.4	2.5
30 July 23-July 29, 2011	3.7	2.3	4.1	9.4
31 July 30-Aug.05, 2011	3.2	4.3	5.0	3.9
32 Aug.06-Aug.12, 2011	2.4	0.6	1.9	1.5
33 Aug.13-Aug.19, 2011	5.2	2.2	5.2	4.0
34 Aug.20-Aug.26, 2011	8.3	1.9	5.9	6.3
35 Aug.27-Sep.02, 2011	2.3	2.5	7.7	5.8
36 Sep.03-Sep.09, 2011	4.8	2.9	3.5	1.2
37 Sep.10-Sep.16, 2011	6.4	3.5	5.7	3.9
38 Sep.17-Sep.23, 2011	8.7	7.0	8.9	5.1
39 Sep.24-Sep.30, 2011	7.6	8.0	0.4	6.9
40 Oct. 01- Oct.07, 2011	8.9	9.2	9.9	9.0
41 Oct. 08- Oct.14, 2011	8.3	8.1	9.7	8.3
42 Oct. 15- Oct.21, 2011	8.2	8.6	9.8	9.3
43 Oct. 22- Oct.28, 2011	7.1	9.8	9.1	8.9
44 Oct. 29- Nov.04, 2011	6.5	8.8	9.2	9.0

**Table MET – 1.4 (z): Sunshine (h) at AICRP-FC trial locations during crop growth period, Kharif 2011**

Met. Week & Month	South zone		
	Coimbatore	Hyderabad	Mandya
26 June 25-July 01, 2011	4.8	1.5	7.0
27 July 02-July 08, 2011	5.3	2.5	8.3
28 July 09-July 15, 2011	6.3	5.6	6.8
29 July 16-July 22, 2011	3.0	5.2	9.0
30 July 23-July 29, 2011	3.7	5.2	8.0
31 July 30-Aug.05, 2011	3.2	3.2	3.6
32 Aug.06-Aug.12, 2011	5.0	4.9	5.3
33 Aug.13-Aug.19, 2011	3.6	6.2	6.3
34 Aug.20-Aug.26, 2011	3.2	3.5	0.7
35 Aug.27-Sep.02, 2011	3.9	1.5	5.7
36 Sep.03-Sep.09, 2011	5.7	5.2	4.9
37 Sep.10-Sep.16, 2011	4.9	6.2	3.2
38 Sep.17-Sep.23, 2011	7.4	4.9	6.5
39 Sep.24-Sep.30, 2011	9.0	6.5	7.6
40 Oct. 01- Oct.07, 2011	8.8	6.8	7.9
41 Oct. 08- Oct.14, 2011	7.8	5.5	6.4
42 Oct. 15- Oct.21, 2011	6.4	8.2	6.5
43 Oct. 22- Oct.28, 2011	4.0	7.1	4.3
44 Oct. 29- Nov.04, 2011	3.4	4.4	9.2

# APPENDIX I : Forage Crops Breeding Trials at a Glance: Kharif - 2011

Name of Location	Peral Millet		Cowpea				Rice Bean		Soya
	IVTPM	AVT-1 PM	IVTC cowpea	AVTC-1 cowpea	AVTC-2 cowpea	AVTC-2 (seed)	IVT R.Bean	AVT-1 R. Bean	AVT-1 Soy
<b>HZ</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1. Srinagar	-	-	-	-	-	-	-	-	-
2. Rajouri	-	-	-	DNR	-	-	-	-	-
3. Palampur	-	-	-	-	-	-	-	-	-
4. Almora	-	-	-	DR	-	-	-	-	-
5. Kullu	-	-	-	-	-	-	-	-	-
<b>NWZ</b>									
6. Pali	-	-	-	-	-	-	-	-	-
7. Ludhiana	DR	DR	DR	DR	-	-	-	-	-
8. Hisar	DR	DR	DR	DR	-	-	-	-	DR
9. Pantnagar	-	-	DR	DR	-	-	-	-	-
10. Udaipur	DNR	-	DNR	-	-	-	DNR	-	-
11. Meerut	-	-	-	-	-	-	-	-	-
12. Jalour	DR	DR	-	-	-	-	-	-	-
13. Avikanagar	-	-	-	-	-	-	-	-	-
14. Bikaner	DR	DR	DR	DR	-	-	-	-	-
15. Jodhpur	-	-	-	-	-	-	-	-	-
16. Jaisalmer	-	-	-	-	-	-	-	-	-
17. Fatehpurshekhawati	-	-	-	-	-	-	-	-	-
18. Bawal	DR	-	-	-	-	-	-	-	-
<b>NEZ</b>									
19. Ranchi	-	-	DR	DR	DR	DR	DR	DR	DR
20. Faizabad	DR	DR	DR	DR	DR	DR	-	-	-
21. Bhubneswar	DR	DR	DR	DR	DR	DR	DR	DR	-
22. Jorhat	-	-	DR	DR	DR	DR	DR	DR	-
23. Pusa	DR	DR	DR	DR	DR	DR	DR	DR	DR
24. Kalyani	-	-	DR	DR	DR	DR	DR	DR	-
25. Imphal	-	-	DNR	-	-	-	DNR	-	DNR
26. Shilong	-	-	DR	DR	-	DR	DR	DR	-
27. Palghar	-	-	-	-	-	-	DR	-	-
<b>CZ</b>									
28. Anand	DR	DR	DR	DR	-	-	-	-	-
29. Jhansi	DR	DR	DR	DR	-	-	-	-	DR
30. Jabalpur	DR	DR	DR	DR	-	-	DR	DR	DR
31. Rahuri	DR	DR	DR	DR	-	-	-	-	DR
32. Urulikanchan	DR	DR	DR	DR	-	-	-	-	-
33. Dhari	-	DR	-	-	-	-	-	-	-
34. Jamnagar	DR	DR	-	-	-	-	-	-	-
35. Kanpur	-	-	DR	DR	-	-	-	-	-
36. Raipur	DR	-	-	-	-	-	DR	-	-
<b>SZ</b>									
37. Hyderabad	DR	DR	DR	DR	DR	DR	-	-	-
38. Coimbatore	DR	DR	DR	DR	DR	DR	-	-	-
39. Vellayani	-	-	DR	DR	DR	DR	DR	DR	-
40. Mandya	DR	DR	DR	DR	DR	DR	-	-	-
41. Dharwad	DR	DR	DR	DR	DR	DR	-	-	-
42. Pondicherry	-	-	DR	DNR	DNR	DR	-	-	-
<b>Total</b>	<b>19/20</b>	<b>18/18</b>	<b>23/25</b>	<b>23/25</b>	<b>11/12</b>	<b>13/13</b>	<b>10/12</b>	<b>8/8</b>	<b>6/7</b>

Name of Location	Sewan	Guinea Grass		Cen.C	BXN hy	Setaria	Cen.S	Total
	VT Sewan 2 010 (2 <sup>n</sup> yr)	VTGG- 2009 (3 <sup>rd</sup> yr)	VTGG- 2008 (4 <sup>th</sup> yr)	VTCC- 2008 (4 <sup>th</sup> yr)	VTBXN- 2008 (4 <sup>TH</sup> yr)	VTs- 2008 (4 <sup>th</sup> yr)	VTCS- 2010 (2 <sup>nd</sup> yr)	
<b>HZ</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	
1. Srinagar	-	-	-	-	-	-	-	
2. Rajouri	-	-	-	-	-	-	-	1
3. Palampur	-	-	-	-	DR	DR	-	2
4. Almora	-	-	-	-	DR	DR	-	3
5. Kullu	-	-	-	-	-	DR	-	1
<b>NWZ</b>								
6. Pali	-	-	-	-	-	-	DR	1
7. Ludhiana	-	-	-	-	DR	-	-	5
8. Hisar	-	-	-	-	-	-	-	5
9. Pantnagar	-	-	-	-	DR	-	-	3
10. Udaipur	-	-	-	-	-	-	-	3
11. Meerut	-	-	-	-	-	-	-	
12. Jalour	DR	-	-	DR	-	-	DR	5
13. Avikanagar	-	-	-	-	-	-	-	
14. Bikaner	DR	-	-	-	-	-	DR	6
15. Jodhpur	DR	-	-	DR	-	-	DR	3
16. Jaisalmer	DR	-	-	-	-	-	-	1
17. Fatehpurshekhawati	DR	-	-	-	-	-	-	1
18. Bawal	-	-	-	-	-	-	-	1
<b>NEZ</b>								
19. Ranchi	-	DR	DR	-	DR	-	-	10
20. Faizabad	-	DR	DR	-	DR	-	-	9
21. Bhubneswar	-	DR	DR	-	DR	-	-	11
22. Jorhat	-	-	-	-	-	-	-	6
23. Pusa	-	-	-	-	-	-	-	9
24. Kalyani	-	-	-	-	-	-	-	6
25. Imphal	-	-	-	-	-	-	-	3
26. Shilong	-	-	-	-	-	-	-	5
27. Dapoli	-	-	-	-	-	-	-	1
<b>CZ</b>								
28. Anand	-	DR	DR	-	DR	-	DR	8
29. Jhansi	-	DR	-	DR	-	-	DR	8
30. Jabalpur	-	-	-	-	DR	-	-	8
31. Rahuri	-	-	-	DR	DR	-	DR	8
32. Urulikanchan	-	DR	DR	-	DR	-	-	7
33. Dhari	-	-	-	-	-	-	DR	2
34. Jamnagar	-	-	-	-	-	-	-	2
35. Kanpur	-	-	-	-	-	-	-	2
36. Raipur	-	-	-	-	-	-	-	2
<b>SZ</b>								
37. Hyderabad	-	DR	-	-	DR	-	DNR	9
38. Coimbatore	-	DR	-	-	DR	-	DR	9
39. Vellayani	-	DR	DR	-	DR	-	-	9
40. Mandya	-	DR	DR	-	DR	-	-	9
41. Dharwad	-	DR	DR	-	DR	-	-	9
42. Pondicherry	-	-	-	-	-	-	-	4
<b>Total</b>	<b>5/5</b>	<b>11/11</b>	<b>8/8</b>	<b>4/4</b>	<b>16/16</b>	<b>3/3</b>	<b>9/10</b>	<b>187/197</b>

DR – Data Reported

DNR – Data Not Reported

DataReporting(%)=187/197=94.92%

## APPENDIX II: FORAGE CROP PRODUCTION TRIALS AT A GLANCE: KHARIF-2011

Location/ Trial	AST-1	AST-2	AST-3	AST-4	AST-5	AST-6	AST-7	AST-8	AST-9	AST-10	AST-11	AST-12	AST-13	Total (TC & DR)/ Total Allotted
<b>HILL ZONE</b>														
Palampur	TC			DR								TC		4/4
Rajouri	TNC													0/1
<b>NORTH WEST ZONE</b>														
Hisar	TC												DR	2/2
Pantnagar	TC		DR	DR										3/3
Bikaner	TC			DR									DR	2/2
Ludhiana	TC		DR	DR							DR		DR	5/5
<b>NORTH EAST ZONE</b>														
Faizabad	TC							TC					DR	3/3
Ranchi	TC					TC								3/3
Kalyani	TC					TC								3/3
Bhubaneswar	TC					TC							DR	3/3
Jorhat	TC					TC								3/3
Shillong		TNC							TC					1/1
<b>CENTRAL ZONE</b>														
Jabalpur	TC													1/1
Rahuri	TC												DR	2/2
Urulikanchan	TC													1/1
Anand	TC												DR	2/2
<b>SOUTH ZONE</b>														
Hyderabad	TC				TC								DR	3/3
Mandya	TC						TC							2/2
Coimbatore	TC				TC								DR	3/3
Vellayani	TC									TC				1/1
<b>Total (DR &amp; TC)</b>	<b>18/19</b>	<b>3/3</b>	<b>4/4</b>	<b>2/2</b>	<b>6/6</b>	<b>5/5</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>1/1</b>	<b>8/8</b>	<b>52/53</b>

**Abbreviations:** DR = Data reported, TC = Trial continued and data to be reported after completion of the sequence, TNC = Trial not conducted

Success index (%) for TC/DR = 98.11%

Success index (%) for DR = 17/17 = 100%

### APPENDIX III: Forage Crops Protection Trials at a Glance: Kharif-2011

Trial	Hill Zone	North West Zone		North East Zone	Central Zone			South Zone	Total No. (DR/A)	Success Index (%)
	Palam-pur	His-sar	Ludhi-ana	Bhuba-neswar	Ana-nd	Jha-nsi	Rah-uri	Hyder-abad		
PPT-1	DR		DR	DR		DR	DR	DR	6/6	100
PPT-2		DR	DR	DR		DR	DR	DR	6/6	100
PPT-7	DR		DR						2/2	100
PPT-9					DR	DR	DR	DR	4/4	100
PPT-10				DR					1/1	100
PPT-12	DR		DR	DR			DR	DR	5/5	100
PPT-13	DR		DR		DR		DR	DR	5/5	100
Total No. (DR/A)	4/4	1/1	5/5	4/4	2/2	3/3	5/5	5/5	29/29	100%
Success Index (%)	100	100	100	100	100	100	100	100		

DR = Data Reported

## APPENDIX IV: FORAGE BREEDING ACTIVITIES AT AICRP-FC DURING KHARIF-2011

### A. HILL ZONE

#### 1. PALAMPUR, CSKHPKV

##### I. New Germplasm Collection

Crop	No. of collections	Source
Black spear grass ( <i>Heteropogon contortus</i> )	4	Distt. Kangra (HP)
Golden beard grass ( <i>Chrysopogon gryllus</i> )	3	Distt. Kangra (HP)

##### II. Promising Germplasm

Crop	Entries
Setaria	
Low oxalates	S-6, S-7, S-10, S-13, S-17, S-30, S-33, S-18 and S-20
Frost Tolerance	S-20 and S-21
Maize	
Leaf-stem ratio	PMG 9, PMG 40, PMG 52 and PMG 62

### Breeding work

#### I. Setaria:

Polycross progenies of 10 diverse parents namely PSS-1, PS-2, PS-3, PS-4, PS-5, S-92, PS-7, PS-8, PS-25 and PS-10 were evaluated for forage and quality attributes. Entries PS-3, S-92 and PS-8 were good general combiners for most of the traits and will be used further for the constitution of synthetic variety.

Evaluation of clonal selections of Setaria over years revealed superiority of selections S-13, S-18 and S-20 for fodder yields, quality traits and frost tolerance.

Five new clonal selections were also made.

#### II. Maize:

Thirty six land races/populations of maize were maintained. Land races PMG 33, PMG 62, PMG 95 and composite PMG 52-1 gave numerically higher fodder yield but were statistically at par with African tall for fodder yield.

### B. NORTH WEST ZONE

#### 1. LUDHIANA, PAU

##### I. Bajra:

CMS and restorers lines identified for fodder purpose were used in hybridization programme and a total of one hundred and twelve hybrids (Top cross and single cross) have been synthesised using superior CMS lines. (Table 1)

Forty three hybrids (top cross and single cross) synthesised during Kharif 2010 were evaluated in four fodder trials (RBD, three replications). Perusal of the data revealed that eight cross hybrids viz; 91777A x Giant Bajra, 91777A x Bajra Bawal, 93333A x Baif Bajra, 92333A x NDFB2, 93333A x DB1, 93333A x NDFB2, 93333A x RBC2, 263A x FBCO8 and five single cross hybrids viz; 1220A x PIB 503, 98666A x PIB 929, 09333A x PIB 681, 543A x PIB 831, 0411A x PIB 236 were promising for GFY than the check PHBF 1.

##### II. Napier Bajra Hybrid:

52 new B x N crosses received from Coimbatore were established and a trial was conducted in augmented design. This trial will be continued for three consecutive years. Perusal of the first year data revealed that the entries viz; PBN 342 and PBN 346 are performing better than the check PBN 233.

Attempts were made to synthesize new bajra x napier hybrids by using different superior fodder type bajra CMS lines and napier restorer lines. Seeds could be obtained in only four cross combinations viz; 305A x Capricorn, 220A x Capricorn, 220A x Make Mega and ICMA 92222A x M 30086.

### **III. Guara:**

One fodder trial (RBD, three replication) was conducted consisting of twelve entries. Maintenance breeding was carried out. A total of seventy one germplasm lines of guara were evaluated for various morpho-agronomic traits and green fodder yield in a replicated trial (RBD, three replications).

### **IV. Maize:**

Under maize population improvement programme being run under the aegis of AICRP (FC), Jhansi, selections have been made from two populations received. Two new populations were received this year and the selections were made from those populations too.

### **V. Cowpea:**

Thirty six new crosses (Table 2) have been synthesised using superior fodder type cowpea lines. Mutation breeding programme has been initiated (using gamma irradiations) in varieties viz; C 88 and CL 367. 81 F<sub>7</sub> progenies have been screened/advanced following standard breeding procedures and methods. 100 germplasm lines (Augmented design) have been evaluated for various morpho-agronomic parameters. A total of 236 germplasm lines were evaluated for fodder traits and resistance to root rot, mosaic and aphids. Out of these lines with high fodder yield, erect plant type, earliness, resistant to cowpea mosaic virus and root rot have been selected which would be used in hybridization programme. Ten entries were tested in local trial, out of which CL-396 and CL-391 showed 6.33 % and 3.36% increase in green fodder yield over the check CL 367.

### **VI. Guinea grass:**

Maintenance breeding was taken up. One trial consisting of 12 entries was conducted in RBD with three replications.

## **2.HISAR, CCSHAU**

### **I. Fodder Cowpea:**

#### **Evaluation of germplasm**

Twenty germplasm lines of fodder cowpea were evaluated. The germplasm lines HFC 11-6 and HFC 11-8 were found promising for GFY whereas, the germplasm lines EC 201095 and V 92-2 were found promising for dry matter yield. Evaluation of varietal trials for fodder yield and its components. One station trial viz., SST on fodder cowpea was conducted.

#### **Small Scale Trial (SST):**

In Small Scale Trial (SST), 7 genotypes were tested against two checks viz., CS 88 and BL 1. Genotype HFC 10-4 was found promising for GFY.

#### **Special breeding programme in fodder cowpea:**

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. Mutation Breeding Programme in Fodder cowpea M 3 generation of two cowpea genotypes namely CS 88 and GFC 4 treated with 60, 70 and 80 kr gamma rays were grown and advanced to M<sub>4</sub> generation.

### **II. Fodder Pearl millet:**

#### **Maintenance of germplasm**

Fifty germplasm lines of fodder pearl millet were maintained. Evaluation of varietal trials for fodder yield and its components. One station trial viz., SST on fodder pearl millet was conducted. Small Scale Trial (SST): In Small Scale Trial (SST), 7 genotypes were tested against two checks viz., RBC-2 and HC 20. Genotypes HFP 10-5 and HFP 10-7 were found promising for green fodder yield.



### Special breeding programme in fodder pearl millet

Five fresh crosses were developed in fodder pearl millet. These were Bajri Bawal x GFB 1, MRB 8 x Bajri Bawal, RBC 2 x GFB 1, GFB 1 x BAIF Bajra, and Giant Bajra x RBC 2. 7 F<sub>1</sub>'s and 7 F<sub>2</sub>'s were advanced to next generation.

### Seed Multiplication of Test Entries and checks

About 16 genotypes which were tested under various trials were also grown separately for seed multiplication also.

**III. Nucleus Seed Production:** 10 Kg N seed of CS 88 was produced.

## 3. PANTNAGAR, GBPUAT

### I. Cowpea Germplasm Evaluated: 450

### II. Genetic Donors Identified:

The following genetic donors were identified based on evaluation of germplasm lines during Kharif – 2011.

Genotypes	Parameters
EC101980	Indeterminate, profuse growth, high biomass
EC 394 – 1	Leafy biomass, long pods, high protein and DMD
V – 92 – 2	Dual purpose, medium late, stay green biomass
V – 628	Better quality fodder, high biomass
TVu3531 – 1 – 5	Dual purpose better forage and seed yield
V 5287	Leafy profuse biomass and better seeds
H – 115 – 2	Tall, profuse growth, high biomass
EC – 101958	High foliage and biomass
CK 93 – 2	-do-
CK 93 – 3	Luxuriant lush green growth, better podding ability
H 140 – 2	- do-
TVu 2050	- do-

### III. Cowpea Progeny Evaluation:

A total of 77 F<sub>3</sub> progenies and 180 F<sub>4</sub> progenies were evaluated during the season.

## 4. BIKANER, SKRAU

### I. Germplasm Maintenance , Evaluation and Collection:

Germplasm evaluation and maintenance work was done for the germplasm as given in the following table:

S. No.	Range grass	No. of accessions
1	<i>Lasiurus indicus</i>	350
2	<i>Cenchrus ciliaris</i>	50
3	<i>Cenchrus setigerus</i>	90

50 germplasm collections were done for *Cymbopogon jwarancusa* pasture grass in this Kharif season, which will be further evaluated in Kharif-2012.

### II. Breeding Work:

#### Pasture Geasses:

Some promising entries of the three range grasses were evaluated in RBD. Entries were 10 for *Lasiurus indicus*, six for *Cenchrus ciliaris* and 12 for *Cenchrus setigerus*. 10 promising entries of *Cenchrus ciliaris* were evaluated in large plots of 100 m<sup>2</sup> size. At this time three entries of *Cenchrus setigerus* and six entries of *Lasiurus indicus* are being tested at national level in coordinated trials, which have been contributed from Bikaner centre.

### III. OTHER CROPS

Besides the work for range grasses, two entries of pearl millet were tested in coordinated trials at national level during Kharif-2011. One entry was in AVT-1 and one in IVT. As a participating centre for breeding programme in BN Hybrids, 52 hybrids were received from Coimbatore centre for evaluation during Kharif-2010. The hybrid seed received was evaluated in RBD with three replications during Kharif-2010. For 29 entries, no hybrid plant could be obtained. Some hybrid plants were obtained only in 23 entries. The hybrid plants were evaluated in Kharif-2011-12 also for their growth performance and fodder yield potential.

### C. NORTH EAST ZONE

#### 1. FAIZABAD, NDUAT

#### Forage Breeding Activities at NDUAT Faizabad during Kharif-2011

##### I. Germplasm collection evaluation & maintenance:

Sr. No.	Crop	Existing	New Collection	Total Collection	Source
1.	Forage Bajra	70	12	82	Farmers fields of Barabanki & Gazipur
2.	Forage cowpea	30	5	35	Farmers fields of Barabanki & Gazipur
3.	Hybrid napier	20		20	
4.	Range grasses	5	3	8	Local areas of Faizabad & Sultanpur district

##### II. Berseem Programme in Forage Bajra:

##### Crosses made during Kharif-2011

Sr. No.	Cross Combinations	Sr. No.	Cross Combinations
1.	NDFB 13 X RBC 2	13.	NDFB 922 X RBC 2
2.	NDFB 13 X AFB 4	14.	NDFB 922 X AFB 4
3.	NDFB 13 X Giant Bajra	15.	NDFB 922 X Giant Bajra
4.	NDFB 912 X RBC 2	16.	NDFB 936 X RBC 2
5.	NDFB 912 X AFB 4	17.	NDFB 936 X AFB 4
6.	NDFB 912 X Giant Bajra	18.	NDFB 936 X Giant Bajra
7.	NDFB 904 X RBC 2	19.	NDFB 915 X RBC 2
8.	NDFB 904 X AFB 4	20.	NDFB 915 X AFB 4
9.	NDFB 904 X Giant Bajra	21.	NDFB 915 X Giant Bajra
10.	NDFB 916 X RBC 2	22.	NDFB 2 X RBC 2
11.	NDFB 916 X AFB 4	23.	NDFB 2 X AFB 4
12.	NDFB 916 X Giant Bajra	24.	NDFB 2 X Giant Bajra

Segregating generation

F<sub>1</sub>-9

F<sub>2</sub>-13

F<sub>3</sub>-7

Advance lines 11

## 2. RANCHI, BAU

### I. Forage Maize:

Twenty seven forage maize lines have been evaluated in replicated trial against the check variety. The seeds of Twelve different crosses made earlier was planted on random hill allowed for 1<sup>st</sup> random mating. Under national breeding programme, population received from MPKV, Rahuri including crosses involving African Tall was grown for 2<sup>nd</sup> random mating. Selected plants harvested separately for further random mating.

### II. Forage Cowpea:

- (i) F<sub>3</sub> generation seeds of nine crosses were grown for further advancement of generation.
- (ii) 19 germplasm received from different sources were maintained.
- (iii) Four different fresh crosses were made in forage cowpea.

### III. Ricebean:

Breeder seed of Bidhan-1 variety was planted for further multiplication.

### IV. Bajra Napier hybrid programme:

16 clones selected from Hybrid Napier materials received from TNAU, Coimbatore. These were planted in replicated trial for evaluation.

## 3. JORHAT, AAU

### I. Germplasm Collection:

During Kharif 2011, 4 germplasm were collected from Karbi Anglong District Assam. Detail of the germplasm is listed below:

Crop	Total No. Collected	Collected From
Ricebean	2	Karbi Anglong, Assam
Maize	2	Karbi Anglong, Assam

### II. Evaluation of Ricebean Germplasm:

40 ricebean germplasm were evaluated for their earliness, productivity and disease resistance. Promising entries were selected.

### III. Hybridization programme on Ricebean:

As per decision of Special Breeder's Meeting held at IGFR Jhansi, in May 2009, a breeding programme has been formulated. According to the technical programme crosses were made between 10 entries of ricebean contributed by different AICRP centre viz. Kalyani, Jabalpur, Bhubaneswar, Vilayni and Jorhat Centre in all possible combinations. The performances of F<sub>2</sub>s were evaluated during *kharif* 2011. New crosses were also attempted taking the same 10 parents. F<sub>2</sub> progenies developed by Kalyani centre were also evaluated.

### IV. Evaluation of Maize germplasm:

56 maize entries were evaluated for their fodder quality.

V. Growing of two groups of cross material involving Africal tall and J-1006 as parent: Seeds of selected plants of two crossed group of Maize developed by Rahuri centre were sown in different dates and allowed for open pollination during *kharif* 2011.

## D. CENTRAL ZONE

### 1. Anand, AAU

#### I. New Collections:

Sr. No	Name of the crop	Number of samples	Source
1.	Sorghum	5	Kutchh district
2.	Lucerne	12	Kutchh district
3.	Fodder Bajra	8	Kutchh district

## II. Maintenance of germplasm:

Sr. No.	Name of the crop	Total number of lines
1.	Sorghum	517
2.	Maize	172
3.	Pearl millet	55
4.	Cowpea	31
5.	Sorghum sterile lines & its maintainer	8

## III. Breeding Programme:

### (A). Forage Maize:

- For the development of high yielding composite maize variety coupled with better quality, six populations were raised and after selecting superior plants allowed them to intermating and seeds were obtained for next cycle.

(1)	Anand	:	G <sub>1</sub> (African Tall)
(2)	Anand	:	G <sub>2</sub> (J-1006)
(3)	Rahuri	:	G <sub>1</sub> (African Tall)
(4)	Rahuri	:	G <sub>2</sub> (J-1006)
(5)	Urulikanchan	:	G <sub>1</sub> (African Tall)
(6)	Urulikanchan	:	G <sub>2</sub> (J-1006)

- Following crossing programme was taken during *kharif*-2011 and cross seeds were obtained.

Sr. No	Female Parent	Sr. No	Male Parent
1.	African Tall	1.	BAIF-245
2.	J-1006	2.	Pratap Makka Chari-6
		3.	GWL-15
		4.	3-2-5 (F <sub>5</sub> )
		5.	1-66-1 (F <sub>5</sub> )

- Forty Five F<sub>2</sub> progenies were raised and 74 superior plants were selected on the basis of morphological characters for next generation.
- Ten F<sub>1</sub> were sown and their self seeds obtained for next generation.

### (B). Forage Bajra:

- Twenty two F<sub>1</sub> seeds were grown and selfed for next generation.
- Six F<sub>2</sub> progenies were grown and 11 superior plants were selected for next generation.
- Twelve F<sub>5</sub> progenies were raised and 24 superior plants were selected.

### (C). Forage Sorghum:

- Maintenance of A and B lines: 8 nos.
- With a view to develop high yielding single/multicut variety, crosses were made during *kharif*-2011.

#### ➤ Heterosis breeding:

With a view to develop of high yielding (Single / multicut) early and better quality type hybrids, 240 F<sub>1</sub> were attempted using 8 CMS lines and 30 parents during *Kharif*-2011.

## IV. Breeding Seed Production Programme :

Breeder seed production programme of Forage Sorghum Var. Gujarat Fodder Sorghum-5 (0.60 q.) was allotted at Anand centre. But this variety is not notified. Therefore, programme is not taken.

## 2. JABALPUR, JNKVV

### I. Forage breeding:

Crop	Existing Accession	New Collection	Total Accession	Source	Area of collection
Soybean	63	8	71	NRC Indore & Sehore	-
Rice bean	31	3	34	NBPGR, New Delhi	-

### II. Generation of materials/entries/crosses made during Kharif-2011.

Sr. No.	Crop	Cross Made	Cross Advanced	Selection Made
1.	Soybean	4	6F <sub>1</sub>	
			5F <sub>2</sub>	27
			7F <sub>3</sub>	17
			8F <sub>4</sub>	11
			5F <sub>5</sub>	04

### III. Rice bean

Three new accessions were obtained by NBPGR, New Delhi

Selections were made for different fodder traits in the mutation derived M<sub>5</sub> populations of

### IV. Bidhan -1

(EMS 0.4% and 0.8% for 1, 2 and 4hrs treatments)

New crossing programme was initiated using diverse genotypes of rice bean.

Single plant selections were made using different fodder traits.

## 3. URULIKANCHAN, BAIF

### I. Germplasm collection and maintenance:

Collection: Explorations were made to collect the landraces of maize and bajra from Vidharba region of Maharashtra and Kutch area of Gujarat states during the period. Fifteen landraces of maize and ten landraces of Bajra were collected from farmer's field. Present status of the plant genetic resources (PGR) at the center is as under.

Sr. No.	Crop	No. of Accessions
1.	Maize	197
2.	Napier	12
3.	Pearl millet	13
4.	Lucerne	32
5.	<i>Stylosanthes</i>	20
6.	Range grasses & legumes	20
7.	Sugarcane (Fodder type)	5

Maintenance: Germplasm of Napier grass, *Stylosanthes*, Sugarcane, Range grasses and legumes was maintained in the field.

### II. Maize breeding

Special breeding programme (cycle 1): Under the population improvement programme, F<sub>2</sub> progenies of G-I (crosses with A. T. developed at Urulikanchan) and G-II (crosses with J 1006 developed at Anand) were grown in isolation for further selection.

G-I: Individual plant selections (32) having tall and green thick stem with broad leaves and flowering in 55-60 days were made. Seeds were obtained from this IPs and bulked for further population improvement programme.

G-II: There was no scope for selection of desirable plants and the progeny was weak hence the population improvement programme was discontinued.

Special breeding programme (cycle 2): Seeds of 7 parental lines were sown for development of fresh crosses using African Tall and J 1006 as females.

Following crosses were attempted and seeds were obtained from these crosses.

G1	G2
African Tall x BAIF 245	J 1006 x BAIF 245
African Tall x GWL-15	J 1006 x GWL-15
African Tall x 3-2-5	J 1006 x 3-2-5
African Tall x 1-66-1	J 1006 x 1-66-1
African Tall x Pratap makka chari-6	J 1006 x Pratap makka chari-6

Evaluation of germplasm: seeds of ten landraces were grown in paired row. Data on quantitative fodder traits was collected for characterization of germplasm. Simultaneously individual plants of similar phenotypic characters were selected and selfed for developing inbred lines.

Composite development-  $F_3$  progeny of the population advanced from base population of BAIF Maize- 1 was grown for further selection and population improvement programme. Short duration (flowering in 55-60 DAS), tall and thick stem, broad and long leaves were the criteria used for selection of individual plants. Initially 115 IPS were made on morphological characters and out of those, seeds from 15 IPS were collected and bulked for further improvement programme.

### III. Pearl millet breeding

Characterization of germplasm: seeds of two landraces were grown in paired row. Data on quantitative fodder traits was collected for characterization of germplasm. Three identical plants each of both the landraces were selfed for inbred development.

Crossing programme of Bajra and Napier: Six crosses were performed in Bajra and Napier grass and seed of following four crosses was obtained.

BAIF Bajra-1	x BRN 01
BAIF Bajra-1	x FD 444
BAIF Bajra 1-1	x BRN 01
Bajra Landrace-3	x BRN 01

Breeder seed production- Programme was implemented for Maize A. T. on 1.40 ha area. The allotment for production of breeder seed was 27 Q.

## E. SOUTH ZONE

### 1. MANDYA, UAS

#### I. Cowpea

No. of new crosses effected	-
Segregating material advanced/handled and selections made	
F2s advanced to F3	31
Advanced Breeding Lines ( $F_5$ )	24

#### II. Maize

Inbred development ( $F_5$ )	490
New Crosses generated	300
No. of composites developed	6
Two populations received from Rahuri center were grown and seeds were bulked from the tall plants.	

#### III. Bajra Napier Hybrid

About 65 selections are being evaluated which were isolated from 52 Bajra x Napier crosses received from Coimbatore center during 2010 Kharif and 6 Bajra x Napier crosses developed at Mandya.

## 2. COIMBATORE, TNAU

### I. National crossing programme in Bajra Napier Hybrid

The Coimbatore centre had initiated the crossing programme of BN hybrids during 2011. As a result, a total of 60 new crosses have been effected involving six parents of bajra received from ICRISAT through ANGRAU, Hyderabad, two from RAU, Bikaner and 12 new diverse parents from our own germplasm pool. The seeds after harvest will be sent to the Project Co-ordinator unit for onward transmission to the participating centres so to enable the centres to evaluate the BNH during *Kharif* 2012.

### II. Poly cross breeding programme in Lucerne

A new Polycross breeding programme in Lucerne has been initiated at this centre during *rabi* 2011-12 for which the trial has been taken up on 24.10.2011 with five entries.

### III. Advanced entries in Fodder Cowpea

Two advanced entries in fodder cowpea viz., TNFC 0924 (CO 5 x Bundel lobia 2) and TNFC 0926 (CO 5 x KBG 2) superior to the released variety CO (FC) 8 in terms of fodder yield and quality have been selected and are under multiplication for further promotion.

## 3. HYDERABAD, ANGRAU

### I. Germplasm Holding:

Sr. No.	Crop	Number of Collections	Source
1.	Fodder Cowpea	30	1.NBPGR, Regional Station, Hyderabad 2.RARS, ANGRAU, Tirupathi
2.	Fodder Maize	25	Maize Research centre, ANGRAU, Hyderabad.
3.	Fodder Bajra	16	ICRISAT, Hyderabad.
4.	Napier Lines	10	TNAU, Coimbatore.

### II. Fodder Cowpea:

About 24 single plant selections were made from F3 segregating population of 8 crosses during *Kharif-2011*. The progeny rows of single plant selections will be taken up during *Rabi-2011* for their further evaluation and selection. Seed multiplication of APFC 10-1, a promising culture developed by selection in local collection TPTC-1 was taken up for proposing in minikit trials of the state. In *Kharif-2011*, twenty germplasm lines were evaluated and characters were documented.

### III. Fodder Maize:

F2 population of G1 group (African tall) and G2 group (J1006) were received from BAIF, Urlikanchan were sown during *Kharif-2011*. Further individual plants of desirable characters were selected and allowed for random mating. Seeds harvested from selected plants were bulked together to take up further cycles of selection and random mating until desired level of uniformity.

### IV. Fodder Bajra:

A half –sib population of APFB2 was developed by random mating with Gaint Bajra and BAIF Bajra in isolation during *Rabi* 2009-10. In *Rabi 2010-11*, the half –sib population was grown and desirable plants having tall plant nature, vigorous growth, heavy tillering ability, long and broad leaves were selected and selfed and harvested in bulk. The bulked seed was sown in *Kharif -2011*, selected desirable plants and allowed for random mating and harvested in bulk. Further cycles of selection and random mating will be taken up until the desired level of uniformity.

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