PREFACE

Annual Report (2012-13), Part I – Kharif 2012, embodies the results of various research trial conducted with the view to test and develop technologies for augmenting forage resources in the country. The breeder seed produced against 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 development of technologies in different agro-climatic conditions as well as in national perspective. Chapter-3 deals with different aspects of plant protection in selected forage species, viz., maize, sorghum, pearl millet, cowpea, soybean, and rice bean and generation of technologies for pest management in the selected crops. Chapter-4 provides Breeder Seed Production status crop-wise and state-wise. Other chapters include details of in house research 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.

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Dated: April 23, 2013 — *A. K. Roy*

Place: Jhansi — Project Coordinator

CONTENTS

EXECUTIVE SUMMARY

The present report deals with the result of the coordinated trials conducted in different forage crops during Kharif 2012 at different locations/centers in the country placed in five zones *viz*., Hill, North-West, North-East, Central and South Zone under the programme of Crop Improvement, Crop Production and Crop Protection. Breeder Seed Production report from different producing centers is also included. 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 growth period.

A. FORAGE CROP IMPROVEMENT

In Kharif 2012, eighteen breeding trials of five annual and four perennial forage species including test entries with their respective national and zonal checks were conducted at 38 centres located in five zones. The forage species evaluated were Maize, Pearl millet, Cowpea, Rice bean and Soybean in annuals and *Lasiurus sindicus*, *Cenchrus setigerus*, Guinea grass and Bajra Napier hybrid in perennials. In annual, a total of three trials, one each in Pearl millet, Cowpea and Ricebean and one in perennial i.e. Guinea grass, has completed final year of evaluation whereas other trials are continued.

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:

ANNUAL FORAGES

MAIZE

IVT in forage maize comprised of three entries along with two national checks *viz.*, African Tall and J-1006. For GFY (q/ha), entries AFM-1 (9.1%) in Hill Zone and AFM-1 (3.7%) in North West Zone exhibited superiority however in other zones as well as at national level, African Tall maintained superiority. For DMY (q/ha), entries AFM-1 (7.2%) in Hill Zone and AFM-2 (5.6%) in North West Zone exhibited superiority whereas in other zones as well as at national level check African Tall was adjudged best performer. Similarly for fodder production potential (q/ha/day), entry PFM-7 ranked first for GFY whereas AFM-2 was adjudged best performer for DMY.

In forage hybrid maize, six entries along with two national checks *viz;* African Tall and J-1006 were evaluated in initial hybrid varietal trial. For GFY (q/ha), entries IHTFM (8.1%) and PMH-1 (3.7%) in Hill Zone, entries PMH-1 (24.1%), IHTFM (17.8%) and DHM-117 (10.5%) in North West Zone, entries PMH-1 (17.5%) and IHTFM (6.1%) in North East Zone exhibited superiority over national check. For DMY (q/ha), entries IHTFM (14.0%) and PMH-1 (6.9%) in Hill Zone, entries PMH-1 (40.2%), IHTFM (17.5%), PMH-3 (17.1%) and DHM-117 (11.3%) in North West Zone, entries DHM-117 ((13.7%), IHTFM (12.1%) and PMH-1 (8.6%) in North East Zone exhibited superiority.

PEARL MILLET

IVT in forage pearl millet comprised of five entries and three national checks. For GFY (q/ha) except for entry APFB-09-1 (3.0%) in North East Zone, national check Giant Bajra established its superiority in all zones and at national level. For DMY (q/ha), entries APFB-09-1 (15.1%), NDFB-936 (10.3%) and AFB-8 (5.4%) in North East Zone showed superiority, whereas national check Giant Bajra was found best performer in other zones and at national level.

For fodder production potential (q/ha/day), national check Giant Bajra ranked first both for green forage and dry matter production potential.

AVT-1 in forage pearl millet constituted of two entries along with three national checks i.e Raj Bajra Chari-2, Giant Bajra and AVKB-19. None of the test entries performed better for GFY and DMY (q/ha) over best check Giant Bajra.

AVT-2 in forage pearl millet comprised of three entries along with two national checks i.e. Raj Bajra Chari-2 and Giant Bajra. For GFY (q/ha) entry PAC-981 (2.0%) in Central Zone and for DMY (q/ha), entries PAC-981 (6.9%) and RBB-1 (6.2%) in North West Zone, entry PAC-981 (13.5%) in Central Zone exhibited superiority. At national level, entry PAC-981 (5.0%) ranked first for DMY.

AVT -2 (seeds) comprised of three entries namely PAC-981, RBB-1 and NDFB-904 along with two national checks *i.e.* Raj Bajra Chari-2 and Giant Bajra. Entry RBB-1 (2.3%) in Central Zone and PAC-981 (0.8%) in South Zone national check Raj Bajra Chari-2 in North West Zone and Giant Bajra in North East Zone recorded superiority for seed yield. At national level, check Giant Bajra with seed yield of 12.10 q/ha was adjudged best performer.

COWPEA

In IVT, five entries along with two national checks namely Bundel Lobia-1 and UPC-5286 and three zonal checks *viz*; UPC-622, BL-2 and UPC-9202 were evaluated. For GFY (q/ha), entry MFC-09-5 (4.7%) in Hill Zone, TNFC-0924 (12.7%) in North East Zone, TNFC-0924 (10.2%) and MFC-09-5 (2.5%) in South Zone exhibited superiority whereas for DMY (q/ha), entry MFC-09-5 (2.8 and 0.2%) in Hill and North West Zone, respectively, TNFC-0924 (12.5%) in North East Zone, TNFC-0924 (14.0%), and MFC-09-5 (8.2%) in South Zone exhibited their superiority with respect to best check. For fodder production potential (q/ha/day), entry TNFC-0924 for green forage as well as dry matter yield registered superiority.

In AVT-1 for GFY (q/ha), entries UPC-1102 (4.8%) and UPC-1101 (3.8%) in North West Zone registered superiority whereas at national level, check UPC-5286 maintained superiority. Similarly for DMY (q/ha), only one entry Culture-1 (1.8%) proved its superiority in North East Zone whereas in other zones as well as at national level zonal / national check maintained superiority.

AVT-2 comprised of two entries namely MFC-09-1 and RR-3 along with two national checks *i.e.* BL-1 and UPC-5286 and three zonal checks *viz.*, UPC-622, BL-2 and UPC-9302. For GFY (q/ha), entries MFC-09-1 (7.9%) and RR-3 (6.9%) in Hill Zone and entry MFC-09-1 (14.2%) in South Zone registered superiority whereas at national level entry MFC-09-1 ranked first. For DMY (q/ha), RR-3 registered its superiority over best check with 3.7% in Hill Zone, 2.5% in North West Zone and 0.5% in North East Zone whereas entry MFC-09-1 (19.4%) ranked first in South Zone. At national level, entries MFC-09-1 (4.9%) and RR-3 (4.2%) were adjudged best performer.

In AVT -2 (seed), BL-2 in North West Zone, UPC-622 in North East Zone, BL-1 in Central Zone and entry MFC-09-1 (5.6%) in South Zone maintained superiority. At national level, entries MFC-09-1 (8.36 q/ha) and RR-3 (7.87 q/ha) was adjudged best performers.

RICEBEAN

In IVT, four entries namely JRBJ-06-2, JRB-17, KRB-26 and BFRB-17 along with three national checks *i.e.* Bidhan-1, Bidhan-2 and RBL-6 were evaluated. For GFY (q/ha), entry KRB-26 (4.7%) and for DMY (q/ha), national check Bidhan-1 maintained superiority. For fodder production potential (q/ha/day), entries KRB-26, JRBJ-06-2 and JRB-17 for GFY and check Bidhan-1 for DMY were best performers.

In AVT-2, for both GFY as well as DMY (q/ha), none of the entries were better than check.

In AVT-2 (seed), entry JRBJ-05-4 (8.84 q/ha) ranked first followed by BFRB-15 (8.32q/ha) and Bidhan-1 (7.81 q/ha). Entry JRBJ-05-4 established 13.2% superiority whereas BFRB-15 established 6.5% superiority for seed yield over national check Bidhan-1.

SOYBEAN

In forage soyabean, four entries namely JS07-21-7, JS 07-24-13, JS07-24-1 and JS 07-24-8 were evaluated for seed yield. As there is no established check for forage soyabean, performance of entries has been compared over general mean for seed production potential. Results obtained from different locations clearly revealed that entry JS07-24-8 (92.15 q/ha) with 12.40% superiority was adjudged highest seed producer with respect to other three test entries. Next to JS07-24-8 were JS07-21-7 (81.18 q/ha), JS07-24-1 (78.76 q/ha) and JS07-24-13 (75.87q/ha).

(b) **PERENNIAL FORAGES**

Sewan Grass (*Lasiurus sindicus*)

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

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. This is the third year of evaluation and trial will be continued.

Guinea grass

A varietal evaluation trial comprising four entries namely TNGG-06-02, JHGG-09-01, JHGG-09-02 and RSDGG-1 along with three national checks *i.e.* Riversdale, PGG-616 and Bundle Guinea-1 was established during Kharif-2009. This was the fourth and final year of evaluation. Compilation of data over the years (2010-12), revealed that entries TNGG-06-02 (38.2%), RSDGG-1 (33.8%) and JHGG-09-1 (1.5%) for GFY (q/ha) and entries TNGG-06-02 (35.6%), RSDGG-1 (30.3%) and JHGG-09-1 (5.7%) for DMY (q/ha) performed better than best national check Even for CPY (q/ha), these entries established their superiority.

B. FORAGE CROP PRODUCTION

The programme on forage crop production was undertaken at 23 sites in five agro-climatic zones of the country. In total 22 experiments were conducted, out of which 11 in network (8 coordinated and 3 AVT based) and 11 in location specific mode with the aim to generate region specific forage production technology for different growing conditions. Research aspect consisted of: resource conservation through forages; optimization of nitrogen for sorghum in different cropping systems; multi-cut sorghum with intercrop legumes under varying seed rates; forage production with waste water under varied nutrient levels; tillage and nutrient management in food-fodder cropping systems; production and quality of BN hybrid under different growing environment and N levels; dual purpose pearl millet under different cutting management practices and nitrogen levels; effect of nutrient management on productivity of perennial grasses under lowland condition; location specific research for optimization of nitrogen in maize based cropping systems; management of sodic soils with amendments; fodder production in banana based intercropping systems; weed management in sorghum; effect of levels of nitrogen on productivity of perennial grasses with and without tree shade; effect of time of sowing and seed rate on performance of fodder maize under rainfed condition; performance of fodder ricebean as influenced by dates of sowing and spacing; enhancing production potential of various forage crops through nutrient management; cropping system studies in fodder maize with legume intercropping; effect of varying seed rate of forage legumes on productivity of fodder maize; BN hybrid as influenced by micronutrients under irrigated conditions and testing of new genotypes under different management for varietal development.

The summary of *Kharif*-2012 results is presented briefly as under:

AST-2: Optimization of nitrogen for sorghum in different cropping systems

At Ludhiana, planting of sorghum under berseem – sorghum cropping sequence being at par with oat – bajra – sorghum (588.0 q/ha GFY and 156.6 q/ha DMY), recorded significantly higher GFY (591.7 q/ha) and DMY (156.4 q/ha) over rest of the treatments. The net monetary returns and benefit cost ratio were also recorded significantly highest in berseem – sorghum cropping system. Application of 125% recommended dose of nitrogen to sorghum in different cropping sequences being at par with 100% RDN for DMY (150.6 q/ha) recorded significantly highest GFY (592.3 q/ha) and DMY (156.3 q/ha) as compared to its lower levels. At Pantnagar, the fodder yield, plant height and economics of sorghum cultivation under different cropping sequences did not differ significantly. The application of highest dose of nitrogen (125% of RDN) to sorghum under different cropping sequences recorded significantly highest GFY (528.6 q/ha), DMY (142.7 q/ha), CPY (11.27 q/ha), net monetary returns (Rs.20498/ha) and benefit cost ratio (1.24) as compared to rest of the treatments at the same location.

AST-3: Forage production potential of sorghum hybrid with forage legumes under varying Seed rates of intercrop

At Ludhiana, planting of sorghum + 75% cowpea seed rate intercropping system recorded significantly highest GFY (828.1 q/ha) over sole sorghum and sorghum + guar intercropping systems. At Palampur, GFY of sorghum with forage legumes (at 50 to 100% rice bean SR and at 75% cowpea SR) was significantly higher (473.03 to 541.33 q/ha) than sole crop of sorghum (438.71 q/ha), sorghum + 25% cowpea SR (406.8 q/ha), sorghum + 25% rice bean SR (445.64 q/ha), sorghum + 50% cowpea SR (452.84 q/ha) and sorghum + 100% cowpea SR (457.33 q/ha). At Bikaner, planting of sorghum + 75% cowpea SR intercropping system being at par with sorghum + 100% cowpea SR (263.65 q/ha) recorded significantly highest total GFY (269.68 q/ha) over rest of the treatments. At Pantnagar, planting of sorghum + 75% cowpea SR intercropping system recorded significantly higher GFY (620.7 q/ha) as compared to sorghum + 25% cowpea SR (564.3 q/ha) and remained at par with rest of the treatments.

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

On mean basis (mean of Palampur, Ludhiana, Anand, Rahuri and Hyderabad) growing of bajra napier hybrid under unshaded environment recorded higher GFY (773.93 q/ha), DMY (154.94 q/ha), and CPY (16.76 q/ha) over shaded environment (621.72, 113.07 and 13.41q/ha, respectively). The magnitude of increase for GFY, DMY and CPY was 24.48, 37.03 and 24.98%, whereas, plant height and number of tiller / plant increased gradually with higher levels of recommended N up to 125% of RDN. The growing of BN hybrid under unshaded environment fetched net return and benefit cost ratio at Palampur and Ludhiana over shaded environment. Net monetary return and B: C ratio increased consistently with increasing levels of nitrogen up to 125% of recommended N on mean basis. Anti-quality components of BN hybrid differed under different growing environment and nitrogen levels. On mean basis, higher values of NDF (%), ADF (%) and oxalic acid (%) were recorded under unshaded condition over shaded condition, whereas, higher nitrate content were recorded under shaded condition (1111.95 ppm) over unshaded condition (941.63 ppm). On mean basis, growing of BN hybrid without nitrogen (Control) observed highest values of NDF (%), whereas, reverse trend was observed for acid detergent fibre. Similarly to NDF, the application of highest level of nitrogen 125% of recommended N recorded highest values of nitrate content (1163.27 ppm) over its lower levels on mean basis. However, application of 100% recommended N to BN hybrid observed highest oxalic acid content in the fodder over its lower as well as higher level.

AST-7 (NT): Performance of dual-purpose pearl millet as influenced by different cutting management practices and nitrogen levels

On mean basis, planting of pearl millet var. BAIF Bajra-1 recorded highest GFY (296.64 q/ha), DMY (51.54 q/ha) and CPY (4.64 q/ha) and lowest being with AVKB-19. On mean basis, cutting at 50 days after sowing and 2nd cut at 40 days after 1st cut and left for grain recorded significantly higher GFY (396.95 q/ha), DMY (72.30 q/ha) and CPY (5.80 q/ha mean of Dharwad and Anand) over first cut at 50 DAS and left for grain. On mean basis, application of 150% recommended dose of nitrogen recorded higher GFY (294.36q/ha), DMY (50.48 q/ha) and CPY (4.60 q/ha mean of Dharwad and Anand) over 100% of RDN. Similarly to GFY, on mean basis BAIF Bajra-1 recorded highest grain yield (7.06 q/ha) and stover yield (113.82 q/ha) and lowest being with AVKB-19. The no cutting management practice of pearl millet varieties recorded highest grain yield (11.2 q/ha) followed by first cut at 50 DAS and left for grain (5.95 q/ha) and lowest being with cutting at 50 DAS & 2nd cut at 40 days after 1st cut and left for grain (2.57q/ha). With respect to nitrogen levels, on mean as well as location basis, application of 150% of RDN recorded highest grain, stover and maize fodder equivalent yield (at Urulikanchan) over its lower level of 100% RDN.

AST-12: Chemical control of *Acrachne racemosa* weeds in fodder sorghum

At Ludhiana, in fodder sorghum *Acrachne racemosa* weed was effectively controlled with all the herbicide treatments as compared to control. The dry weight of weeds decreased significantly with herbicides (1.62 to 4.51 q/ha) than control (9.34 q/ha). The pre-emergence application of atrazine @ 0.75 kg/ha + stomp @ 2.5 l/ha in the fodder sorghum being at par with atrazine 1 kg/ha PE, stomp 2.5 l/ha PE, treflan 2.5 l/ha PE, atrazine 0.75 + treflan 2.5 l/ha PE, atrazine 1.0 + stomp 2.5 l/ha PE and Atrazine 1.0 + treflan 2.5 l/ha PE recorded significantly highest GFY (598.5 q/ha), DMY (141.8 q/ha) and CPY (12.95 q/ha) over rest of the treatments (Table 12). 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 and recorded lower GFY, DMY and CPY of fodder sorghum as compared to control also.

AST -13: Effect of levels of nitrogen on productivity of perennial grass with and without tree shade

At Jorhat, planting of perennial grasses recorded significantly higher GFY, DMY, CPY and net monetary returns under open condition than under shade. The green forage, DMY, CPY and net monetary returns of Setaria and Congo-signal grass did not differ significantly with respect to each other. CPY of grass (s) was found to be highest in the treatment receiving 25 per cent > RDNF which was significantly superior over 25 per cent < RDNF and remained at par with RDNF. Similar to CPY, application of > 25 % RDNF to grasses being at par with RDNF, recorded significantly higher GFY (1007.8 q/ha), DMY (173.5 q/ha) and net monetary return (Rs. 93582/ha) over < 25 % RDNF.

AST – 14: Effect of time of sowing and seed rate on performance of fodder maize (*Zeamays*) under rainfed condition

At Imphal, among different date of sowing, maize sown on 4th June produced highest GFY (434.00 q/ha) and crude protein content (6.88%), whereas, highest DMY (118.58 q/ha), CPY (8.01 q/ha), plant height (219.26 cm) and maximum net return of Rs.55,280/-ha and benefit cost ratio (1:3.29) was found at maize sown on 26th May. Maize sown at seed rate of 40 kg/ha recorded maximum GFY (480.22 q/ha), DMY (138.06 q/ha), CPY (9.18 q/ha) and CP content (6.93%).

AST – 15: Performance of fodder rice bean [*Vigna umbellate* (Thumb) Ohwi and Ohashi] as influenced by dates of sowing and spacing

At Imphal, there was significant effect of date of sowing and spacing on GFY, DMY, CPY, plant height and economics of fodder rice bean. The performance of fodder rice bean was found to be best for all the characters under study with a net return of Rs. 26,574/ha and benefit cost ratio of 1:1.73 when sown on 26th May. Sowing of rice bean at 35 cm row to row spacing produced highest GFY (283.45 q/ha), DMY (55.00 q/ha), CPY (6.23 q/ha), plant height (113.11 cm) and maximum net return (Rs. 27,124/ha) and benefit cost ratio (1.76).

AST-17 (NT): Cropping system studies in fodder maize with legume intercropping

At Srinagar, GFY and DMY of sole maize was significantly higher than both sole legumes as well as different intercropping ratios. However, it (sole maize) remained at par with mixed intercropping of both cowpea and soybean. Sole maize had maximum crude protein yield (13.22 q/ha) than rest of the treatments and the minimum was found in maize + soybean (1:1) intercropping system.

AST–18 (NT): Effect of varying seed rate of forage legumes on productivity of fodder maize

At Srinagar, planting of sole maize at 30 cm spacing recorded significantly highest GFY (512.46 q/ha) and DMY (153.61 q/ha) over rest of the intercropping systems including sole cowpea and sole soybean. Maize + cowpea @ 60 kg/ha being at par with maize + cowpea @ 40 kg/ha, recorded significantly highest GFY (368.45 q/ha) among intercropping systems, whereas, sole cowpea recorded significantly highest CPY (16.4 q/ha) over rest of the treatments.

AST–21: Effect of nitrogen levels on forage yield of promising entries of pearl millet (AVT-2)

In North-West zone, South zone and national level, none of the test entry surpassed the national check Giant Bajra for GFY, DMY and CPY. In NW zone, on mean basis, application of 90 kg N/ha produced 40.74, 18.19 and 7.37 % more green fodder and 39.69, 26.07 and 9.78 % more dry matter over control, 30 and 60 kg N/ha, respectively. At Bhubaneswar, none of the testing entry surpassed the national check Giant Bajra in terms of GFY, DMY and CPY. In Central zone, on location mean basis testing entry PAC-981 produced highest green fodder (658.79 q/ha), dry matter (149.03 q/ha) and crude protein yield (13.04 q/ha). The herbage yield increased consistently with increasing levels of nitrogen up to 90 kg N/ha. The magnitude of increase for green fodder on location mean basis was 41.81, 21.83 and 8.50 % over control, 30 and 60 kg N/ha.

AST-22: Effect of phosphorus level on forage yield of promising entries of ricebean (AVT-2)

Under North-East zone on mean basis the testing entry JRBJ-05-4 remained at par with national check Bidhan Ricebean-1 in terms of GFY, DMY and CPY. The response of phosphorus increased gradually with increasing levels of phosphorus up to highest tested dose of 90 kg P_2O_5/ha. In Central zone, testing entry JRBJ-05-4 recorded significantly higher green fodder yield (362.50 q/ha), dry matter yield (69.98 q/ha) over national check Bidhan Ricebean-1 (338.3 q/ha and 64.84 q/ha, respectively). The application of 90 kg P_2O_5/ha to ricebean recorded significantly highest GFY, DMY and CPY over its lower levels. In South zone (at Vellayani) the testing entry JRBJ-05-4 recorded significantly lower GFY over national check Bidhan Ricebean-1. The response of phosphorus increased significantly up to 30 kg P_2O_5/ ha only. The interaction of entries and nitrogen levels was significant at Vellayani. On over all mean basis (mean of three zones) testing entry JRBJ-05-4 recorded numerically higher GFY (261.38 q/ha), DMY (53.39 q/ha) and CPY (7.25 q/ha) over national check Bidhan Ricebean-1 (256.42 q/ha GFY, 52.85 q/ha DMY and 7.25 q/ha CPY).

AST-23: Effect of phosphorus levels on forage yield of promising entries of soybean (AVT-2)

JS 07-24-13 out yielded on mean basis in terms of GFY and was closely followed by JS 07-21-7. Whereas, JS 07-21-7 recorded highest DMY on mean basis. The response of phosphorus was gradual with increasing level up to 90 kg P_2O_5/ha. Interaction of entries with P levels was evident at Jabalpur and Imphal. CPY (4.64 q/ha) was highest with JS 07-24-13 closely followed by JS 07-24-1 (4.55 q/ha) on location mean basis, however no remarkable variation was observed among entries for CPY. The CPY increased consistently with increasing levels of phosphorus on location mean basis. On mean basis application of 90 kg P_2 O_5/ha to soybean registered percent increase of 25.72, 11.14 and 3.23 for GFY, 24.21, 11.54 and 4.26 for DMY and 21.14, 12.47 and 4.96 for CPY over control, 30 kg P_2 O_5/ha and 60 kg P_2 O_5/ha, respectively.

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, Bhubaneswar, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri centres.

Pest occurrence: 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 range of 30-35°C. At Ludhiana, grey leaf spot (*Cercospora sorghi*) predominated and progressed steadily under RH (90%) temperature (30°C) and reached to maximum disease incidences (68.3%) in the first week of November. Incidences of zonate leaf spot (*Gleocercospora sorghi*) were also recorded (49.1%) on sorghum *var*. SL-44. At Bhubaneswar and Palampur, leaf spot and leaf blight incidences occurred. Among the insect pest, shoot fly (*Atherigona aproximata*), leaf defoliators and aphid (*Rhopalosiphum maidis*) were recorded at Bhubaneswar, 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 (30%) were recorded at Jhansi in var UPC-5286. Anthracnose (*Colletotricum lindimuthianum*) and mosaic (*Cowpea mosaic virus*) were also recorded with varying degree of incidences at Jhansi. At Bhubaneswar, yellow mosaic and leaf spot with 3.2 and 2.2 grade in 1-5 scale were recorded thought out the crop season. Root rot occurred late in the season with 5-43% diseases intensity. At Palampur, wilt/root rot (*Fusarium/Rhizoctonia spp.)* were severe (25-47%) during July when high humidity (>85%) prevailed. Leaf spot, blight (*Ascochyta and Phyllosticta sp.)* and Anthracnose also appeared in cowpea. Flea beetle infestation (34%) and aphid population were observed through out the crop season at Hyderabad and Bhubaneswar. Moderate infestation of aphid and jassid (3-7.6/ plant) were recorded during second week of August at Rahuri. At Palampur, pod borer infestation was 5-7% during month of August.

In Maize, leaf blight incidence started from first week of August and progressed up to first week of September (2.8) on 1-5 scale at Bhubaneswar. At Ludhiana, severity of maydis leaf blight was observed on J1006 variety with disease severity of 41.3% at max RH above 80-90% and mean temperature 30°C. At Palampur, leaf blight (*H. maydis* and *H. turcecium*) appeared in the second week of July and continued to increase (20% severity) up to end of August. *Helminthosporium* leaf blight disease was observed in severe form in maize seed production plot throughout the crop period at Rahuri. Infestation of foliage feeders and stem borer was recorded at Bhubaneswar and Palampur.

Evaluation of breeding material: In trial on evaluation of varietal resistance, cowpea entries MFC-09-5 and TNFC-0924 showed multiple resistances to pest and diseases at different locations. The aphid and flea beetle population was least in AVT entry culture-1 at Rahuri and Bhubaneswar centre. All the AVT entries of cowpea were resistant for YMV at all the centers.

In Pearl Millet, IVT and AVT entries showed resistance to leaf spot at Hisar and Bhubaneswar. In AVT-2 all the entries showed resistance to downy mildew at Ludhiana. PAC-981 and NDFB-904 were resistant to moderately resistant for ergot and smut at Ludhiana.

In IVT maize, all the entries were resistant to moderately resistant for leaf blight at Hisar, Palampur and Bhubaneswar. In hybrid trials, all the entries were moderately resistant except African tall and REHF-2011-9, which were moderately susceptible at Ludhiana for maydis leaf spot. Entries, African tall, J 1006, DHM-117, REHF-2011-8 and REHF-2011-9 were found resistant for leaf blight at Hisar and Bhubneshwar while all the entries were moderately resistant except DHM-117 which was susceptible for leaf blight at Palampur.

All Rice bean entries were found resistant to leaf blight at Bhubaneswar.

Diseases and Pest Management:

- In fodder maize, seed treatment with Vitavax powder (2 g/kg) seed followed by two sprays of mancozeb (0.25 %) was very effective for the management of three important diseases i.e. Leaf blight, Brown spot and Banded leaf blight at Palampur and Ludhiana centers.
- In forage sorghum, seed treatment with thiomethoxam significantly reduced the shoot fly incidence and increased the forage yield. Maximum reduction was obtained at Rahuri (8.7%) followed by Hyderabad (10.4%) and Jhansi (14%).

- At Bhubaneswar, for management of root rot of cowpea, seed treatment with *Trichodarma viride* (5g/kg) seed + FYM (2t/ha) and seed treatment with carbendazim (2 g/Kg seed) were superior in respect to lowest root rot incidence (37.5 & 36.3%), GFY, DMY and Net monitory return/yr/ha were also significantly increased over untreated control.
- Increase in quality parameters in protected forage cowpea crop over the unprotected was observed at Anand, Hyderabad, Ludhiana, Palampur and Rahuri.
- In trial on Management of foliar diseases of forage sorghum, lowest disease incidence as well as highest forage yield were recorded in seed treatment with carbendazim (2 g/kg) seed + Two foliar sprays of propiconazole (0.1%) and seed treatment with *T. viride* (5g/kg) seed + Two foliar sprays of propiconazole (0.1 %) at Bhubaneswar, Ludhiana, Palampur and Jhansi.

D. BREEDER SEED PRODUCTION

In Kharif-2012, the indent for Breeder Seed Production was received from DAC, GOI for 31 varieties in six forage crops *viz.*, Maize, Cowpea, Pearl Millet, Sorghum, Guar and Ricebean. The total indent was for 221.55 q however the actual allocation of 177.75 q was made to thirteen centers of the different SAUs/ICAR/NGO institutes. The maximum quantity allocated was for Maize (99.38 q) followed by Sorghum (32.85q), Cowpea (28.95q), Guar (8.40q), Pearl Millet (5.47 q) and minimum was for Ricebean (2.70q).

The final Breeder Seed Production Report (BSP-IV) received from different centers revealed that in Maize, Sorgum and Pearl Millet, the overall breeder seed production was higher than allocated quantity whereas in Cowpea, Guar and Ricebean, the breeder seed production was less than the allocated quantity. Coming to the crop wise scenario, as compared to allocation in Maize (99.38 q), the estimated production was 109.25 q (9.87 q surplus), in Sorghum against the indent of 32.85 q the actual production was 73.64 q (40.79 q surplus) and in Pearl Millet the production was 9.22 q (3.75 q surplus) against the allocation of 5.47 q, in Cowpea the production was 13.72 q (15.23 q deficit) against the allocation of 28.95 q. Similarly in Guar there was 3.00 q deficit in production with respect to 8.40 q allocation and in Ricebean, against the allocation of 2.70 q the actual production was 2.25 q (0.45 q deficit). The overall breeder seed production was 213.48 q against the allocation of 177.75 q, which was 35.73 q surplus, or 20.10 percent higher than the quantity 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, IGFRI-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, IGFRI*	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, IGFRI-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 CODE FOR KHARIF 2012

Contributor	Entry Name	Code	Contributor	Entry Name	Code
1. IVTM			**7. IVTC**		
Anand	AFM-1	IVTM-3	Mandya	MFC-09-5	IVTC-6
Anand	AFM-2	IVTM-4	Hyderabad	APFC-10-4	IVTC-7
	Filler-1	IVTM-5	Pantnagar	UPC-1201	IVTC-8
	Filler-2	IVTM-6	Coimbatore	TNFC-0924	IVTC-9
Palampur	PFM-7	IVTM-7	Ludhiana	CL-396	IVTC-10
NC	African Tall	IVTM-1	NC	BL-1	IVTC-1
NC	J 1006	IVTM-2	NC	UPC-5286	IVTC-2
2. IHTM			ZC (HZ/ NEZ)	UPC-622	IVTC-3
Hyderabad	DHM-117	IHTM-3	ZC (NWZ)	B Lobia-2	IVTC-4
Advanta	IHTFM	IHTM-4	ZC (CZ/ SZ)	UPC-9202	IVTC-5
Ludhiana	PMH-1	IHTM-5	**8. AVTC-1**		
Ludhiana	PMH-3	IHTM-6	Pantnagar	UPC-1101	AVTC-3
NC	African Tall	IHTM-1	Pantnagar	UPC-1102	AVTC-4
NC	J 1006	IHTM-2	Vellayani	Culture-1	AVTC-5
Kanpur	REHF-2011-8	IHTM-7	NC	BL-1	AVTC-1
Kanpur	REHF-2011-9	IHTM-8	NC	UPC-5286	AVTC-2
3. IVTPM			ZC (HZ/ NEZ)	UPC-622	AVTC-6
Anand	AFB-8	IVTPM-1	ZC (NWZ)	BL-2	AVTC-7
Bikaner	RBB-3	IVTPM-2	ZC (CZ/ SZ)	UPC-9202	AVTC-8
Faizabad	NDFB-936	IVTPM-3			
Hisar	HFP-11-4	IVTPM-7	**9. AVTC-2**		
Hyderabad	APFB-09-1	IVTPM-8	Mandya	MFC-09-1	AVTC-2-3
NC	Raj Bajra-2	IVTPM-4	Jhansi	RR-3	AVTC-2-4
NC	Giant Bajra	IVTPM-5	NC	BL-1	AVTC-2-1
NC	AVKB-19	IVTPM-6	NC	UPC-5286	AVTC-2-2
4. AVTPM-1			ZC (HZ/ NEZ)	UPC-622	AVTC-2-5
Bikaner	RBB-2	AVTPM-4	ZC (NWZ)	BL-2	AVTC-2-6
Anand	AFB-6	AVTPM-5	ZC (CZ/ SZ)	UPC-9202	AVTC-2-7
NC	Raj Bajra-2	AVTPM-1	**10. AVTC-2 (Seed)**		
NC	Giant Bajra	AVTPM-2	Mandya	MFC-09-1	AVTS-2-6
NC	AVKB-19	AVTPM-3	Jhansi	RR-3	AVTS-2-7
5. AVTPM-2			NC	BL-1	AVTS-2-1
Advanta	PAC-981	AVTPM-2-3	NC	UPC-5286	AVTS-2-2
Bikaner	RBB-1	AVTPM-2-4	ZC (HZ/NEZ)	UPC-622	AVTS-2-3
Faizabad	NDFB-904	AVTPM-2-5	ZC (NWZ)	BL-2	AVTS-2-4
NC	Raj Bajra-2	AVTPM-2-1	ZC (CZ/ SZ)	UPC-9202	AVTS-2-5
NC	Giant Bajra	AVTPM-2-2	**11. IVT (R. bean)**		
6. AVTPM-2 (Seed)			Jabalpur	JRBJ-06-2	IVTR-1
Advanta	PAC-981	AVTPMS-3	Jorhat	JRB-17	IVTR-2
Bikaner	RBB-1	AVTPMS-4	Kalyani	KRB-26	IVTR-3
Faizabad	NDFB-904	AVTPMS-5	NC	K-1(Bidhan-1)	IVTR-4
NC	Raj Bajra-2	AVTPMS-1	NC	Bidhan-2	IVTR-5
NC	Giant Bajra	AVTPMS-2	NC	RBL-6	IVTR-6
			Bhubneshwar	BFRB-17	IVTR-7

AICRP ON FORAGE CROPS: ENTRIES CODE FOR KHARIF 2012

Contributor	Entry Name	Code	Contributor	Entry Name	Code
12. AVT-2 (R. bean)					
Bhubneshwar	BFRB-15	AVTR-2-1	**17. VTGG- 2009: Guinea grass**		
Jabalpur	JRBJ-05-4	AVTR-2-3	Coimbatore	TNGG-062	GG 09-1
NC	K-1(Bidhan-1)	AVTR-2-2	Jhansi	JHGG 09-01	GG 09-2
13. AVT-2 (R. bean) (Seed)			Jhansi	JHGG 09-02	GG 09-3
Bhubneshwar	BFRB-15	AVTRS-2-1	Dharwar	RSD GG-1	GG 09-4
Jabalpur	JRBJ-05-4	AVTRS-2-2	NC	Makuni/ Riversdale	GG 09-5
NC	K-1(Bidhan-1)	AVTRS-2-3	NC	PGG-616	GG 09-6
			NC	Bund guinea-1 (JHGG-96-5)	GG 09-7
14. AVT-2 (Soy) (Seed)					
Jabalpur	JS07-21-7	AVTSY-1			
Jabalpur	JS07-24-13	AVTSY-2			
Jabalpur	JS07-24-1	AVTSY-3			
Jabalpur	JS07-24-8	AVTSY-4			

DECODES OF ENTRIES OF AVT BASED AGRONOMICAL TRIALS (Kharif-2012)

AST-21: Effect of nitrogen levels on forage yield of promising entries of pearl millet

S. No.	Entry name	Coding
01.	RBB-1	AVTPM-2-1
02.	NDFB-904	AVTPM-2-2
03.	PAC-981	AVTPM-2-3
04.	Raj Bajra Chari (NC)	AVTPM-2-4
05.	Giant Bajra (NC)	AVTPM-2-5

AST-22: Effect of phosphorus levels on forage yield of promising entries of rice bean

S. No.	Entry name	Coding
01.	Bidhan Ricebean (NC)	AVTRB-2-1
02.	JRBJ-05-4	AVTRB-2-3

AST-23: Effect of phosphorus levels on forage yield of promising entries of soybean

S. No.	Entry name	Coding
01.	JS 07-24-13	AVTSB-2-1
02.	JS 07-24-1	AVTSB-2-2
03.	JS 07-24-8	AVTSB-2-3
04.	JS 07-21-7	AVTSB-2-4

CHAPTER-1

FORAGE CROP IMPROVEMENT

1. IVTM: INITIAL VARIETAL TRIAL IN FORAGE MAIZE

Three entries along with two national checks viz; African Tall and J-1006 were evaluated at 21 locations distributed in the five zones. For green forage yield (q/ha), entries AFM-1 (9.1%) and AFM-2 (1.1%) in Hill Zone, entries AFM-1 (3.7%) and AFM-2 (2.2%) in North West Zone exhibited superiority over best national check African Tall. However in other zones as well as at national level, African Tall maintained superiority.

For dry matter yield (q/ha), entries AFM-1 (7.2%) and AFM-2 (2.1%) in Hill Zone, entry AFM-2 (5.6%) in North West Zone proved superiority whereas in other zones as well as at national level check African Tall was adjudged best performer. Similarly for fodder production potential (q/ha/day), entry PFM-7 ranked first for green forage yield whereas AFM-2 was adjudged best performer for dry matter production potential.

In quality parameters like crude protein yield (q/ha) and crude protein content (%), national checks African Tall and J-1006, respectively established superiority. For the character plant height and leaf stem ratio again national check African Tall established superiority. For other quality parameters, AFM-2 for ADF (%) and J-1006 for NDF and IVDMD (%) maintained superiority.

(Table Reference: 1.1to1.9)

2. IHTM: INITIAL HYBRID VARIETAL TRIAL IN FORAGE MAIZE

Six entries along with two national checks viz; African Tall and J-1006 were evaluated in initial hybrid varietal trial at 19 locations. For the character green forage yield (q/ha), entries IHTFM (8.1%) and PMH-1 (3.7%) in Hill Zone, entries PMH-1 (24.1%), IHTFM (17.8%) and DHM-117 (10.5%) in North West Zone, entries PMH-1 (17.5%) and IHTFM (6.1%) in North East Zone exhibited superiority over best national check African Tall whereas in other zones as well as at national level African Tall maintained superiority. For dry matter yield (q/ha), entries IHTFM (14.0%) and PMH-1 (6.9%) in Hill Zone, entries PMH-1 (40.2%), IHTFM (17.5%), PMH-3 (17.1%) and DHM-117 (11.3%) in North West Zone, entries DHM-117 ((13.7%), IHTFM (12.1%) and PMH-1 (8.6%) in North East Zone established superiority over best national check whereas at national level check African Tall established superiority.

For fodder production potential (q/ha/day), entries PMH-1 and IHTFM for green forage as well as dry matter yield recorded superiority. For evaluation against quality parameter, African Tall for crude protein yield (q/ha) and entries REHF-2011-8 and REHF-2011-9 for crude protein content (%) was adjudged best performer. **(Table Reference: 2.1 to 2.9)**

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

Cont.....

Entries	Hill Zone						North West Zone						
	Palampur	Srinagar	Almora	Average	Rank	Sup%	Ludhiana	Hisar	Udaipur	Pantnagar	Average	Rank	Sup%
AFM-1	524.0	290.0	504.7	439.6	1	9.1	342.6	305.6	457.4	732.5	459.5	1	3.7
AFM-2	382.7	330.0	509.3	407.3	2	1.1	421.3	282.4	327.8	778.8	452.6	2	2.2
Filler-1	401.2	300.0	388.9	363.4	7		435.2	268.5	328.7	735.0	441.9	4	
Filler-2	426.5	320.0	393.6	380.0	4		321.8	254.7	404.2	743.8	431.1	7	
PFM-7	517.2	280.0	338.0	378.4	5		421.3	254.7	487.1	616.3	444.8	3	0.4
A-Tall (NC)	400.6	285.0	523.2	402.9	3		259.3	236.1	426.9	821.3	435.9	6	
J-1006 (NC)	372.1	310.5	416.7	366.4	6		449.1	282.4	349.1	691.3	443.0	5	
Mean	**432.0**	**302.2**	**439.2**	**391.1**			**378.7**	**269.2**	**397.3**	**731.3**	**444.1**		
CD at 5%	74.4	1.8	69.0				32.5	NS	28.1	58.0			
CV%	9.7	0.3	9.0				9.3	10.4	17.5	4.5			

Cont....

Entries	North East Zone						Central Zone							
	Faiza.	Bhuban.	Ranchi	Jorhat	Average	Rank	Anand	Raipur	Jabal.	Rahuri	Uruli.	Jhansi	Average	Rank
AFM-1	39.2	322.9	462.8	203.7	257.1	6	434.0	491.2	172.1	531.2	776.2	344.9	458.2	4
AFM-2	53.1	317.7	453.6	228.3	263.2	4	460.0	435.9	170.0	520.1	817.0	324.1	454.5	5
Filler-1	15.5	354.1	546.1	228.0	285.9	3	548.0	449.6	185.4	580.8	768.0	273.2	467.5	7
Filler-2	50.7	361.4	500.0	242.3	288.6	2	522.0	396.0	129.8	638.1	719.0	321.8	454.4	6
PFM-7	36.8	363.5	407.2	215.9	255.8	7	722.0	496.5	371.4	501.3	800.7	262.5	525.7	2
A-Tall (NC)	99.7	403.1	564.7	193.6	315.3	1	544.0	531.1	308.3	691.6	988.6	388.9	575.4	1
J-1006 (NC)	30.2	379.1	453.6	181.6	261.1	5	585.0	509.4	259.5	553.4	882.4	342.6	522.0	3
Mean	**46.4**	**357.4**	**484.0**	**213.3**	**275.3**		**545.0**	**472.8**	**228.1**	**573.8**	**821.7**	**322.6**	**494.0**	
CD at 5%	9.0	2.4	84.7	6.3			37.1	45.5	49.0	101.5	55.9	18.6		
CV%	11.0	4.6	9.7	9.2			5.3	5.4	12.1	9.9	10.6	10.5		

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

Entries	South Zone						All India Average	
	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank	Average	Rank
AFM-1	653.3	416.7	651.4	464.1	546.4	3	434.3	4
AFM-2	500.4	541.7	580.2	434.1	514.1	6	422.3	7
Filler-1	648.7	351.9	756.9	422.0	544.9	4	427.9	6
Filler-2	593.1	564.8	815.6	443.7	604.3	2	436.3	3
PFM-7	602.3	370.4	593.8	386.9	488.4	7	430.7	5
A-Tall (NC)	625.5	569.4	700.4	573.6	617.2	1	482.6	1
J-1006 (NC)	477.2	453.7	749.7	477.2	539.4	5	438.4	2
Mean	**585.8**	**466.9**	**692.6**	**457.4**	**550.7**		**438.9**	
CD at 5%	60.3	59.7	63.4	56.8				
CV%	5.8	10.2	5.1	7.0				

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

Cont.....

Entries	Hill Zone						North West Zone					
	Palampur	Srinagar	Almora	Average	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Average	Rank	Superiority%
AFM-1	105.9	60.9	102.7	89.8	1	7.2	59.9	60.0	272.9	130.9	5	
AFM-2	78.4	64.7	113.6	85.6	2	2.1	73.4	53.7	321.1	149.4	1	5.6
Filler-1	78.2	62.0	70.8	70.3	7		87.0	47.4	313.8	149.4	1	
Filler-2	84.5	63.0	85.3	77.6	5		56.3	44.1	301.4	133.9	4	
PFM-7	102.5	60.2	75.4	79.4	4		84.3	43.3	212.6	113.4	6	
A-Tall (NC)	80.8	61.0	109.7	83.8	3		51.9	41.6	308.9	134.1	3	
J-1006 (NC)	77.7	64.0	81.3	74.3	6		101.1	52.6	270.9	141.5	2	
Mean	**86.9**	**62.3**	**91.3**	**80.1**			**73.4**	**49.0**	**285.9**	**136.1**		
CD at 5%	14.1	0.5	20.3				6.9	9.03	41.0			
CV%	9.1	0.5	13.0				10.2	10.2	8.1			

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

Cont.....

Entries	North East Zone						Central Zone							
	Faiza.	Bhuba.	Ranchi	Jorhat	Average	Rank	Anand	Raipur	Jabal.	Rahuri	Urili.	Jhansi	Average	Rank
AFM-1	14.7	68.5	138.6	40.2	65.5	5	78.6	112.3	39.2	78.0	139.7	83.2	88.5	6
AFM-2	21.2	63.7	122.8	44.1	63.0	6	76.4	103.3	38.7	75.6	173.9	87.3	92.6	4
Filler-1	4.9	78.3	142.5	37.6	65.8	4	95.4	106.2	42.7	83.9	142.2	70.6	90.2	5
Filler-2	23.7	77.4	160.0	44.3	76.3	1	88.7	93.3	28.7	97.0	138.8	84.2	88.5	6
PFM-7	16.3	78.4	112.2	39.3	61.6	7	115.6	115.5	91.2	57.0	149.8	59.2	98.1	3
A-Tall (NC)	33.9	86.9	133.9	37.7	73.1	2	83.2	127.6	71.9	80.2	152.9	105.9	103.6	1
J-1006 (NC)	7.8	85.5	137.8	34.4	66.4	3	89.5	117.6	60.2	83.5	170.3	84.4	100.9	2
Mean	**17.5**	**77.0**	**135.4**	**39.7**	**67.4**		**89.6**	**110.8**	**53.2**	**79.3**	**152.5**	**82.1**	**94.6**	
CD at 5%	4.8	0.5	26.1	4.2			6.2	11.3	11.3	14.7	24.2	4.9		
CV%	15.6	4.5	10.8	14.1			5.4	5.7	11.9	10.4	10.5	2.7		

Entries	South Zone						All India Average	
	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank	Average	Rank
AFM-1	98.1	99.7	96.0	165.8	114.9	3	95.7	3
AFM-2	77.0	121.1	109.9	155.5	115.9	2	98.8	2
Filler-1	94.2	83.2	145.1	112.4	108.7	6	94.9	4
Filler-2	88.9	119.0	105.1	131.2	111.0	5	95.7	3
PFM-7	92.6	77.2	93.3	116.5	94.9	7	89.6	5
A-Tall (NC)	96.6	116.9	156.8	189.6	140.0	1	106.4	1
J-1006 (NC)	76.2	104.1	113.0	165.1	114.6	4	98.8	2
Mean	**89.1**	**103.0**	**117.0**	**148.0**	**114.3**		**97.1**	
CD at 5%	12.2	15.1	14.6	22.5				
CV%	7.7	11.6	7.0	8.6				

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

Cont.....

Entries	Palampur	Srinagar	Ludhiana	Hisar	Pantnagar	Faizabad	Bhubaneswar	Ranchi	Jorhat	Anand
AFM-1	8.23	2.75	5.35	6.15	10.77	0.60	5.12	8.61	3.33	7.89
AFM-2	8.33	3.10	6.58	5.57	11.62	0.88	4.96	8.89	3.74	8.68
Filler-1	8.11	3.00	6.80	5.20	10.81	0.23	5.62	9.72	3.73	9.13
Filler-2	8.97	2.90	5.03	5.27	10.92	0.83	5.56	10.28	3.97	9.85
PFM-7	10.84	2.90	6.58	5.42	9.06	0.57	5.96	8.61	3.53	14.16
A-Tall (NC)	7.26	2.75	4.05	4.35	12.08	1.42	6.30	9.72	3.17	8.63
J-1006 (NC)	6.05	2.85	7.02	5.36	10.17	0.42	6.21	7.78	2.97	10.64
Mean	**8.26**	**2.89**	**5.92**	**5.33**	**10.78**	**0.71**	**5.68**	**9.09**	**3.49**	**9.85**

Entries	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
AFM-1	5.99	2.26	9.66	13.86	4.54	10.60	8.33	10.2	2.45	6.67	4
AFM-2	5.25	2.26	9.63	14.85	4.32	7.90	9.34	8.0	2.32	6.64	5
Filler-1	5.42	2.43	9.68	13.24	3.59	8.90	6.17	12.6	1.60	6.63	6
Filler-2	4.77	1.68	12.27	13.07	4.29	8.40	10.46	9.8	2.03	6.86	3
PFM-7	6.05	4.95	10.03	14.05	3.75	9.70	6.73	11.0	1.76	7.14	1
A-Tall (NC)	6.47	4.00	11.15	15.45	4.52	9.60	11.39	9.9	2.68	7.10	2
J-1006 (NC)	6.11	3.41	9.38	14.95	4.57	7.00	8.73	10.3	2.28	6.64	5
Mean	**5.72**	**3.00**	**10.26**	**14.21**	**4.23**	**8.87**	**8.74**	**10.24**	**2.16**	**6.81**	

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

Cont.....

Entries	Srinagar	Ludhiana	Hisar	Pantnagar	Faizabad	Bhubaneswar	Ranchi	Jorhat
AFM-1	1.60	0.94	1.21	4.01	0.23	1.09	2.61	0.65
AFM-2	1.76	1.15	1.06	4.79	0.35	1.00	2.44	0.72
Filler-1	1.45	1.36	0.92	4.61	0.7	1.24	2.58	0.61
Filler-2	1.65	0.88	0.91	4.43	0.39	1.19	3.33	0.72
PFM-7	1.40	1.32	0.92	3.13	0.25	1.29	2.38	0.64
A-Tall (NC)	1.40	0.81	0.77	4.54	0.48	1.36	2.27	0.61
J-1006 (NC)	1.70	1.58	1.00	3.98	0.12	1.40	1.75	0.56
Mean	**1.57**	**1.15**	**0.97**	**4.21**	**0.36**	**1.22**	**2.48**	**0.64**

Entries	Anand	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Average	Rank
AFM-1	1.43	1.37	0.52	1.42	2.49	1.10	1.58	1.99	1.51	5
AFM-2	1.44	1.24	0.52	1.40	3.16	1.16	1.22	2.09	1.59	2
Filler-1	1.59	1.28	0.56	1.40	2.45	0.93	1.30	1.46	1.53	4
Filler-2	1.67	1.12	0.37	1.87	2.52	1.12	1.26	2.20	1.60	1
PFM-7	2.27	1.41	1.22	1.14	2.63	0.85	1.49	1.40	1.48	6
A-Tall (NC)	1.32	1.56	0.93	1.29	2.39	1.23	1.48	2.34	1.55	3
J-1006 (NC)	1.63	1.43	0.79	1.41	2.89	1.13	1.12	2.00	1.53	4
Mean	**1.62**	**1.34**	**0.70**	**1.42**	**2.65**	**1.07**	**1.35**	**1.93**	**1.54**	

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

Entries	Palam.	Ludhi.	Faiza.	Bhuba.	Jorhat	Anand	Raipur	Jabal.	Rahuri	Uruli.	Hydera.	Coimba.	Mandya	Karai.	Average	Rank
AFM-1	11.1	4.2	1.1	5.6	3.0	4.5	8.9	2.9	7.0	9.6	10.3	10.6	7.8	17.4	7.4	5
AFM-2	8.2	6.5	1.6	5.4	3.6	4.4	8.3	2.9	6.8	12.5	7.4	15.4	9.4	19.8	8.0	3
Filler-1	8.2	5.9	0.4	6.2	3.5	5.6	8.5	3.2	7.5	9.8	10.4	10.1	12.0	13.8	7.5	4
Filler-2	7.9	4.2	1.8	6.2	3.7	5.1	7.3	2.1	8.4	8.8	9.0	15.1	5.9	16.7	7.3	6
PFM-7	9.6	6.9	1.3	6.1	3.9	6.4	9.3	7.1	5.1	10.2	9.9	9.1	5.3	13.8	7.4	5
A-Tall (NC)	7.5	3.9	2.4	7.2	3.2	4.7	10.9	5.5	6.9	11.8	10.8	14.9	10.3	24.1	8.9	1
J-1006 (NC)	7.5	8.8	0.6	6.8	2.3	5.3	9.7	5.1	7.6	13.6	8.2	13.2	9.7	21.0	8.5	2
Mean	**8.6**	**5.8**	**1.3**	**6.2**	**3.3**	**5.2**	**9.0**	**4.1**	**7.0**	**10.9**	**9.4**	**12.6**	**8.6**	**18.1**	**7.9**	

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

Entries	Palam.	Ludhi.	Faiza.	Bhuba.	Jorhat	Anand	Raipur	Rahuri	Uruli.	Hyder.	Coim.	Mandya	Karai.	Jabal.	Average	Rank
AFM-1	10.5	7.0	7.6	8.1	7.5	5.8	7.9	9.0	6.9	10.5	10.5	8.1	10.5	7.5	8.4	5
AFM-2	10.5	8.8	7.4	8.4	8.3	5.8	8.0	9.1	7.2	9.6	12.7	8.5	12.7	7.5	8.9	1
Filler-1	10.5	6.8	7.6	7.9	9.2	5.9	8.0	9.0	6.9	10.9	12.3	8.3	12.3	7.6	8.8	2
Filler-2	9.3	7.5	7.8	8.0	8.4	5.8	7.8	8.6	6.4	10.1	12.7	5.7	12.7	7.5	8.4	5
PFM-7	9.3	8.2	7.9	7.8	10.0	5.5	8.1	9.0	6.8	10.7	11.8	5.7	11.8	7.9	8.6	4
A-Tall (NC)	9.3	7.5	7.1	8.2	8.6	5.7	8.5	8.6	7.7	11.2	12.7	6.6	12.7	7.7	8.7	3
J-1006 (NC)	9.6	8.8	7.7	8.0	6.8	5.9	8.3	9.1	7.9	10.7	12.7	8.8	12.7	7.6	8.9	1
Mean	**9.9**	**7.8**	**7.6**	**8.1**	**8.4**	**5.8**	**8.1**	**8.9**	**7.1**	**10.5**	**12.2**	**7.4**	**12.2**	**7.6**	**8.7**	

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

Cont.....

Entries	Palampur	Srinagar	Ludhiana	Hisar	Udaipur	Pantnagar	Faizabad	Bhubaneswar	Ranchi	Jorhat	Anand
AFM-1	275.0	177.2	200.0	167.8	237.3	226.7	95.6	184.5	186.0	142.3	207.4
AFM-2	255.0	214.0	201.7	156.3	271.4	239.0	110.5	179.3	184.0	140.7	207.3
Filler-1	245.0	202.5	211.7	170.8	240.9	237.0	107.8	193.5	180.0	139.0	211.7
Filler-2	253.3	220.5	173.3	182.4	284.8	239.0	109.4	197.7	190.0	143.7	217.6
PFM-7	263.3	198.5	210.0	163.5	487.1	230.0	120.5	203.5	184.0	163.7	225.7
A-Tall(NC)	281.7	194.6	205.0	221.4	284.1	252.0	115.1	218.4	184.0	135.7	208.3
J-1006(NC)	245.0	205.7	200.0	160.8	249.3	239.3	100.5	212.3	185.0	127.0	206.2
Mean	**259.8**	**201.9**	**200.2**	**174.7**	**293.6**	**237.6**	**108.5**	**198.5**	**184.7**	**141.7**	**212.0**

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

Entries	Rai.	Jabal.	Rahuri	Urili.	Jhansi	Hydera.	Coimb.	Mandya	Karaik.	Average	Rank
AFM-1	196.2	162.8	186.1	249.3	251.0	179.6	223.7	222.7	109.1	194.0	6
AFM-2	188.7	153.8	220.3	249.0	250.3	192.7	227.3	229.3	113.9	199.2	3
Filler-1	194.0	174.9	196.9	203.7	231.3	179.7	234.0	230.1	98.2	194.1	5
Filler-2	174.3	129.5	217.2	200.2	245.4	192.1	230.0	212.9	106.3	196.0	4
PFM-7	208.7	206.0	197.4	214.1	250.1	176.5	227.0	205.4	86.5	211.1	2
A-Tall (NC)	224.6	200.3	216.8	233.7	304.7	193.0	239.6	244.7	155.8	215.7	1
J-1006 (NC)	211.4	184.5	201.3	204.1	251.8	183.4	241.0	187.1	124.7	196.0	4
Mean	**199.7**	**173.1**	**205.2**	**222.0**	**254.9**	**185.3**	**231.8**	**218.9**	**113.5**	**200.9**	

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

Cont.....

Entries	Palam.	Srina.	Ludhi.	Hisar	Udaip.	Pantn.	Faiza.	Bhuba.	Ranchi
AFM-1	275.0	177.2	200.0	167.8	237.3	226.7	95.6	184.5	186.0
AFM-2	255.0	214.0	201.7	156.3	271.4	239.0	110.5	179.3	184.0
Filler-1	245.0	202.5	211.7	170.8	240.9	237.0	107.8	193.5	180.0
Filler-2	253.3	220.5	173.3	182.4	284.8	239.0	109.4	197.7	190.0
PFM-7	263.3	198.5	210.0	163.5	487.1	230.0	120.5	203.5	184.0
A-Tall (NC)	281.7	194.6	205.0	221.4	284.1	252.0	115.1	218.4	184.0
J-1006 (NC)	245.0	205.7	200.0	160.8	249.3	239.3	100.5	212.3	185.0
Mean	**259.8**	**201.9**	**200.2**	**174.7**	**293.6**	**237.6**	**108.5**	**198.5**	**184.7**

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

Entries	Jorhat	Raipur	Jabalpur	Rahuri	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
AFM-1	0.86	0.62	0.55	0.42	0.36	0.31	0.31	0.27	0.46	5
AFM-2	0.93	0.60	0.44	0.37	0.43	0.32	0.31	0.34	0.46	5
Filler-1	0.88	0.60	0.56	0.51	0.34	0.25	0.37	0.22	0.48	4
Filler-2	0.83	0.58	0.25	0.38	0.37	0.36	0.33	0.32	0.44	6
PFM-7	1.23	0.62	0.76	0.43	0.32	0.27	0.33	0.22	0.51	2
A-Tall (NC)	1.00	0.67	0.72	0.37	0.43	0.42	0.31	0.29	0.52	1
J-1006 (NC)	1.12	0.64	0.62	0.40	0.44	0.26	0.39	0.35	0.49	3
Mean	**0.98**	**0.62**	**0.56**	**0.41**	**0.38**	**0.31**	**0.34**	**0.29**	**0.48**	

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

	ADF (%)		NDF(%)				IVDMD(%)	
Entries	Ludhiana	Rank	Anand	Ludhiana	Average	Rank	Ludhiana	Rank
AFM-1	36.0	5	73.5	57.4	65.4	3	57.2	5
AFM-2	33.4	1	73.8	56.5	65.1	2	59.4	3
Filler-1	36.3	6	74.6	57.6	66.1	5	57.2	5
Filler-2	34.4	4	76.3	56.7	66.5	7	58.1	4
PFM-7	33.8	3	75.7	56.1	65.9	4	59.5	2
A-Tall (NC)	34.4	4	75.9	56.7	66.3	6	58.1	4
J-1006 (NC)	33.6	2	74.3	55.2	64.8	1	59.6	1
Mean	**34.6**		**74.9**	**56.6**	**65.7**		**58.4**	

Table 2.1 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Green Forage Yield (q/ha)

Cont.....

Entries	Hill Zone						North West Zone					
	Palampur	Srinagar	Almora	Average	Rank	Superiority%	Ludhiana	Hisar	Udaipur	Average	Rank	Superiority%
DHM-117	510.6	309.9	541.9	454.1	4		423.6	338.9	437.9	400.1	3	10.5
IHTFM	545.3	385.8	566.4	499.1	1	8.1	508.7	288.9	482.1	426.6	2	17.8
PMH-1	586.1	350.4	500.4	478.9	2	3.7	621.5	241.6	485.8	449.6	1	24.1
PMH-3	466.2	298.4	516.4	427.0	6		520.8	202.8	359.4	361.0	5	
REHF-2011-8	282.8	366.6	300.2	316.6	8		303.8	147.2	318.8	256.6	7	
REHF-2011-9	417.1	268.4	582.4	422.6	7		288.2	136.1	300.4	241.6	8	
African Tall (NC)	482.5	320.4	582.4	461.8	3		343.8	241.6	501.0	362.2	4	
J-1006 (NC)	457.4	375.0	521.7	451.3	5		454.9	222.2	384.0	353.7	6	
Mean	**468.5**	**334.4**	**514.0**	**438.9**			**433.2**	**227.4**	**408.7**	**356.4**		
CD at 5%	48.4	1.8	81.2				22.2	36.3	21.8			
CV%	7.0	0.4	9.0				6.7	8.6	13.2			

Cont.....

Entries	North East Zone							Central Zone								
	Faiza.	Bhuba.	Ranchi	Jorhat	Average	Rank	Sup%	Anand	Raipur	Jabal.	Rahuri	Uruli.	Jhansi	Aurang.	Average	Rank
DHM-117	106.6	420.8	361.1	247.5	284.0	5		586.0	474.0	256.2	534.3	1011.5	338.0	1159.7	622.8	5
IHTFM	114.6	381.2	534.7	235.9	316.6	2	6.1	533.0	413.2	356.2	561.9	1011.5	444.4	1178.5	642.7	2
PMH-1	138.5	396.8	638.9	227.8	350.5	1	17.5	546.0	516.1	347.9	526.0	723.3	435.2	1354.2	635.5	4
PMH-3	78.4	347.9	465.3	215.7	276.8	6		613.0	417.9	304.1	598.9	729.5	421.3	1187.5	610.3	6
REHF-2011-8	100.5	284.3	597.2	185.0	291.8	4		332.0	434.5	131.2	253.6	548.6	194.4	1310.4	457.8	8
REHF-2011-9	112.7	255.2	465.3	196.3	257.4	8		330.0	381.2	220.8	305.2	729.5	273.2	1075.0	473.5	7
African Tall (NC)	48.4	363.5	555.6	225.7	298.3	3		618.0	507.9	418.7	733.2	1048.2	405.1	1284.7	716.6	1
J-1006 (NC)	89.5	326.0	500.0	177.5	273.2	7		560.0	503.1	321.2	519.7	1017.6	349.5	1208.3	639.9	3
Mean	**98.6**	**347.0**	**514.8**	**213.9**	**293.6**			**514.8**	**456.0**	**294.5**	**504.1**	**852.5**	**357.6**	**1219.8**	**599.9**	
CD at 5%	21.7	41.6	135.6	4.4				35.4	35.1	63.3	40.2	26.8	19.8	112.9		
CV%	14.7	4.0	17.8	6.2				6.5	5.2	14.5	5.4	18.2	11.3	6.4		

Table 2.1 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Green Forage Yield (q/ha)

Entries	South Zone				All India Average	
	Hyderabad	Karaikkal	Average	Rank	Average	Rank
DHM-117	583.4	343.8	463.6	6	472.9	5
IHTFM	454.2	388.4	421.3	8	493.9	3
PMH-1	564.9	437.7	501.3	3	507.3	2
PMH-3	563.5	438.1	500.8	4	460.2	6
REHF-2011-8	517.6	327.0	422.3	7	365.0	8
REHF-2011-9	532.9	443.7	488.3	5	384.9	7
African Tall (NC)	657.5	568.0	612.7	1	521.4	1
J-1006 (NC)	596.3	422.6	509.5	2	474.0	4
Mean	**558.8**	**421.2**	**490.0**		**460.0**	
CD at 5%	61.9	112.2				
CV%	6.3	18.3				

Table 2.2 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Dry Matter Yield (q/ha)

Cont.....

Entries	Hill Zone						North West Zone				
	Palampur	Srinagar	Almora	Average	Rank	Superiority%	Ludhiana	Hisar	Average	Rank	Super%
DHM-117	100.6	64.7	102.7	89.4	4		74.1	84.9	79.5	4	11.3
IHTFM	106.3	75.3	127.9	103.2	1	14.0	101.7	66.0	83.9	2	17.5
PMH-1	111.9	70.6	107.7	96.7	2	6.9	139.9	60.3	100.1	1	40.2
PMH-3	88.3	63.2	100.0	83.8	7		117.2	50.1	83.6	3	17.1
REHF-2011-8	54.8	72.0	68.5	65.1	8		60.8	35.0	47.9	7	
REHF-2011-9	80.3	64.2	110.8	85.1	6		57.6	32.6	45.1	8	
African Tall (NC)	96.3	64.5	110.8	90.5	3		77.4	51.5	64.4	6	
J-1006 (NC)	90.4	74.6	98.6	87.9	5		91.0	51.9	71.4	5	
Mean	**91.1**	**68.6**	**103.4**	**87.7**			**90.0**	**54.1**	**72.0**		
CD at 5%	10.5	3.5	22.9				5.5	9.3			
CV%	7.8	3.5	12.7				8.1	11.7			

Table 2.2 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Dry Matter Yield (q/ha)

Cont.....

Entries	North East Zone							Central Zone							
	Faizabad	Bhubaneswar	Jorhat	Ranchi*	Average	Rank	Superiority%	Anand	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank
DHM-117	26.7	90.5	49.4	58.6	55.5	1	13.7	111.4	110.4	60.4	59.4	182.9	92.0	102.8	5
IHTFM	35.5	82.0	46.5	108.1	54.7	2	12.1	90.1	97.2	87.1	83.7	186.5	100.8	107.5	2
PMH-1	38.0	81.6	39.6	126.9	53.0	3	8.6	103.7	121.5	84.8	75.9	125.4	107.8	103.2	4
PMH-3	21.1	79.1	37.3	86.7	45.8	5		108.5	99.3	73.1	81.5	122.5	105.3	98.4	6
REHF-2011-8	30.9	61.1	33.7	109.7	41.9	8		49.1	103.1	29.0	27.6	95.0	41.5	57.5	8
REHF-2011-9	38.3	55.3	35.7	87.5	43.1	7		49.4	89.2	51.5	41.2	130.0	57.2	69.7	7
African Tall (NC)	17.8	81.7	47.1	101.4	48.8	4		95.1	120.3	103.7	80.1	180.4	107.8	114.6	1
J-1006 (NC)	26.3	66.4	36.9	96.1	43.2	6		105.8	117.8	80.2	52.4	182.9	92.2	105.2	3
Mean	**29.3**	**74.7**	**40.8**	**96.9**	**48.3**			**89.1**	**107.3**	**71.2**	**62.7**	**150.7**	**88.1**	**94.9**	
CD at 5%	8.1	7.1	3.5	30.3				35.0	8.5	15.5	5.4	11.8	6.3		
CV%	18.5	3.2	11.2	21.2				6.8	5.4	14.8	5.9	19.0	3.6		

Entries	South Zone				All India Average	
	Hyderabad	Karaikkal	Average	Rank	Average	Rank
DHM-117	88.5	115.2	101.8	4	88.4	3
IHTFM	69.7	120.5	95.1	7	92.3	1
PMH-1	73.8	126.5	100.2	5	91.8	2
PMH-3	79.2	132.9	106.1	2	84.9	4
REHF-2011-8	66.5	102.5	84.5	8	58.2	7
REHF-2011-9	75.5	131.9	103.7	3	68.8	6
African Tall (NC)	89.5	152.7	121.1	1	92.3	1
J-1006 (NC)	88.4	110.5	99.5	6	85.4	5
Mean	**78.9**	**124.1**	**101.5**		**82.8**	
CD at 5%	10.7	20.3				
CV%	7.8	11.8				

* Not included in average as CV $\geq$ 20%

Table 2.3 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Green Forage Yield (q/ha/day)

Cont...

Entries	Palampur	Srinagar	Ludhiana	Hisar	Faizabad	Bhubaneswar	Ranchi	Jorhat	Anand	Raipur
DHM-117	8.07	3.50	6.62	6.45	1.66	6.47	5.83	4.05	9.93	5.57
IHTFM	8.79	3.86	7.95	5.90	1.68	5.78	10.20	3.86	10.06	4.86
PMH-1	9.45	3.70	9.71	4.79	1.97	6.20	11.67	3.73	10.30	6.14
PMH-3	7.40	3.45	8.14	3.72	1.26	5.52	8.89	3.53	11.15	4.92
REHF-2011-8	4.59	3.73	4.75	3.00	1.45	4.59	11.67	3.03	6.51	5.11
REHF-2011-9	7.08	3.51	4.50	2.99	1.68	3.93	9.45	3.21	6.47	4.48
African Tall (NC)	10.09	3.36	5.37	4.52	0.81	5.68	9.17	3.69	9.81	6.04
J-1006 (NC)	9.63	3.88	7.11	4.15	1.42	4.94	8.61	2.90	9.49	5.99
Mean	**8.14**	**3.62**	**6.77**	**4.44**	**1.49**	**5.39**	**9.44**	**3.50**	**9.22**	**5.39**

Entries	Jabalpur	Rahuri	Urulikanchan	Jhansi	Aurangabad	Hyderabad	Karaikkal	Average	Rank
DHM-117	3.41	9.37	17.43	4.39	19.9	8.76	1.80	7.25	5
IHTFM	4.81	7.11	19.82	6.35	21.7	7.25	1.65	7.74	2
PMH-1	4.57	6.66	13.64	5.65	24.9	8.65	1.75	7.85	1
PMH-3	3.95	10.60	13.02	5.47	20.4	7.92	2.09	7.14	6
REHF-2011-8	1.72	4.61	10.16	2.78	23.8	8.01	1.68	5.95	8
REHF-2011-9	2.94	5.87	14.02	3.90	19.8	8.62	2.10	6.15	7
African Tall (NC)	5.43	12.22	16.37	4.71	19.1	8.88	2.06	7.49	3
J-1006 (NC)	4.35	8.96	16.95	4.54	20.7	8.60	1.42	7.27	4
Mean	**3.90**	**8.18**	**15.18**	**4.72**	**21.29**	**8.34**	**1.82**	**7.11**	

Table 2.4 IHTM: Initial Hybrid VarietalTrial in Forage Maize : Dry matter Yield (q/ha/day)

Entries	Srinagar	Ludhiana	Hisar	Faizabad	Bhuba.	Ranchi	Jorhat	Anand	Raipur	Jabalpur	Rahuri	Uruli.	Jhansi	Hydera.	Average	Rank
DHM-117	1.61	1.16	1.62	0.42	1.39	0.83	0.80	1.89	1.30	0.81	1.04	3.15	0.84	1.33	1.30	4
IHTFM	1.92	1.59	1.35	0.52	1.24	1.94	0.76	1.70	1.16	1.17	1.06	3.65	0.69	1.11	1.42	1
PMH-1	1.80	2.19	1.19	0.54	1.27	2.22	0.64	1.96	1.45	1.11	0.96	2.36	0.72	1.13	1.40	2
PMH-3	1.55	1.83	0.92	0.34	1.26	1.67	0.61	1.97	1.17	0.95	1.43	2.19	0.73	1.11	1.27	5
REHF-2011-8	1.86	0.95	0.72	0.44	0.99	2.22	0.55	0.96	1.19	0.38	0.50	1.76	1.70	1.03	1.09	6
REHF-2011-9	1.54	0.90	0.72	0.57	0.85	1.67	0.58	0.97	1.05	0.69	0.79	2.50	1.23	1.22	1.09	6
frican Tall (NC)	1.70	1.21	0.96	0.29	1.28	1.67	0.77	1.51	1.43	1.34	1.34	2.82	0.80	1.21	1.31	3
J-1006 (NC)	1.85	1.42	0.97	0.41	1.01	1.67	0.60	1.79	1.40	1.05	0.90	3.05	0.84	1.28	1.30	4
Mean	**1.73**	**1.41**	**1.06**	**0.44**	**1.16**	**1.74**	**0.66**	**1.59**	**1.27**	**0.94**	**1.00**	**2.69**	**0.94**	**1.18**	**1.27**	

Table 2.5 IHTM: Initial Hybrid VarietalTrial in Forage Maize : Crude Protein Yield (q/ha)

Entries	Palam.	Ludhi.	Faiza.	Bhuba.	Jorhat	Anand	Raipur	Jabalpur	Rahuri	Uruli.	Hyder.	Karai.	Average	Rank
DHM-117	9.7	5.5	2.1	7.2	3.6	6.0	8.6	4.6	5.1	12.8	7.6	10.5	6.9	3
IHTFM	11.9	8.8	2.8	6.5	3.7	5.4	7.1	6.8	7.2	14.3	6.0	10.1	7.5	2
PMH-1	11.7	13.3	2.8	6.5	3.7	6.2	10.1	6.6	6.7	9.8	4.9	8.5	7.6	1
PMH-3	9.3	8.6	1.6	6.4	2.9	6.0	7.3	5.6	6.8	9.4	5.4	10.8	6.7	5
REHF-2011-8	5.3	5.9	2.5	5.1	2.9	3.0	7.4	2.1	2.3	7.3	5.8	12.9	5.2	7
REHF-2011-9	8.3	5.8	2.9	4.5	2.4	2.8	6.4	3.8	3.7	10.2	6.9	12.6	5.9	6
African Tall (NC)	10.1	6.1	1.3	6.9	4.0	5.7	9.7	8.3	6.6	13.1	7.1	12.4	7.6	1
J-1006 (NC)	9.5	6.8	2.1	5.6	2.6	6.0	9.2	6.3	4.7	12.7	7.5	8.4	6.8	4
Mean	**9.5**	**7.6**	**2.3**	**6.1**	**3.2**	**5.1**	**8.2**	**5.5**	**5.4**	**11.2**	**6.4**	**10.8**	**6.8**	

Table 2.6 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Crude Protein (%)

Entries	Palam.	Ludhi.	Faiza.	Bhuba.r	Jorhat	Anand	Raipur	Rahuri	Uruli.	Hydera.	Karai.	Jabal.	Average	Rank
DHM-117	9.6	7.4	8.0	8.0	7.3	5.4	7.8	8.6	7.0	8.6	8.7	7.6	7.8	5
IHTFM	11.2	8.6	8.0	8.0	8.0	6.0	7.3	8.6	7.7	8.6	8.7	7.9	8.2	2
PMH-1	10.5	9.5	7.3	7.9	9.4	6.0	8.3	8.9	7.8	6.6	7.0	7.9	8.1	3
PMH-3	10.5	7.3	7.6	8.1	8.0	5.6	7.4	8.3	7.6	6.8	7.9	7.8	7.7	7
REHF-2011-8	9.6	9.7	8.2	8.3	8.6	6.0	7.3	8.5	7.6	8.8	11.8	7.4	8.5	1
REHF-2011-9	10.3	10.0	7.7	8.2	6.8	5.6	7.2	9.0	7.8	9.2	9.6	7.4	8.2	2
African Tall (NC)	10.5	7.9	7.6	8.4	8.6	5.9	8.1	8.2	7.3	7.9	8.3	8.0	8.1	3
J-1006 (NC)	10.5	7.5	7.9	8.5	7.2	5.6	7.9	8.9	6.9	8.5	7.9	7.8	7.9	4
Mean	**10.3**	**8.5**	**7.8**	**8.2**	**8.0**	**5.8**	**7.6**	**8.6**	**7.5**	**8.1**	**8.7**	**7.7**	**8.1**	

Table 2.7 IHTM: Initial Hybrid Varietal Trial in Forage Maize : Plant Height (cm)

Cont....

Entries	Palampur	Srinagar	Ludhiana	Hisar	Udaipur	Faizabad	Bhubaneswar	Ranchi	Jorhat	Anand
DHM-117	225.0	235.8	177.5	175.8	236.0	120.6	211.6	119.0	151.0	205.2
IHTFM	263.8	251.3	188.8	184.8	413.8	110.5	207.3	143.0	182.0	209.7
PMH-1	247.5	258.5	206.3	193.3	323.9	109.8	204.6	149.0	179.7	214.5
PMH-3	266.0	212.0	210.0	183.9	231.4	108.7	195.4	146.0	152.7	226.6
REHF-2011-8	230.0	241.7	185.0	156.9	241.5	125.6	185.6	122.0	136.0	208.2
REHF-2011-9	219.3	195.8	190.0	167.1	233.2	110.5	183.2	149.0	144.0	215.1
African Tall (NC)	218.0	253.3	193.8	172.5	260.0	122.6	198.7	122.0	136.0	212.9
J-1006 (NC)	254.0	245.8	198.8	209.3	361.7	118.7	190.5	128.0	137.7	212.3
Mean	**240.4**	**236.7**	**193.8**	**180.5**	**287.7**	**115.9**	**197.1**	**134.8**	**152.4**	**213.1**

Entries	Raipur	Jabalpur	Rahuri	Urulikanchan	Jhansi	Aurangabad	Hyderabad	Karaikkal	Average	Rank
DHM-117	192.8	126.6	172.2	186.0	220.2	272.2	194.4	92.3	184.1	5
IHTFM	181.7	180.3	198.4	208.8	216.3	271.8	188.8	110.4	206.2	2
PMH-1	215.7	172.9	196.7	175.8	274.3	289.3	209.9	125.0	208.1	1
PMH-3	183.9	144.9	173.5	212.6	265.0	275.5	201.8	104.9	194.1	4
REHF-2011-8	178.5	107.2	182.3	186.3	195.8	259.6	156.8	121.5	178.9	6
REHF-2011-9	175.7	114.7	180.3	155.9	201.4	252.6	155.3	118.8	175.7	7
African Tall (NC)	204.7	259.4	181.1	204.6	286.8	276.3	182.2	170.5	203.1	3
J-1006 (NC)	200.9	170.7	172.3	199.8	253.4	272.7	187.5	141.9	203.1	3
Mean	**191.7**	**159.6**	**182.1**	**191.2**	**239.2**	**271.3**	**184.6**	**123.1**	**194.2**	

Table 2.8 IHTM: Initial Hybrid VarietalTrial in Forage Maize : Leaf Stem Ratio

Entries	Palam.	Srin.	Ludhi.	Hisar	Faiza.	Bhuba.	Ranchi	Jorhat	Raipur	Jabal.	Rahuri	Jhansi	Aurang.	Hydera.	Karai.	Average	Rank
DHM-117	0.57	0.33	0.60	0.52	0.79	1.24	0.58	0.85	0.59	0.50	0.53	0.35	0.44	0.40	0.20	0.57	1
IHTFM	0.46	0.42	0.55	0.43	0.68	1.08	0.57	0.91	0.57	0.69	0.47	0.30	0.74	0.52	0.21	0.57	1
PMH-1	0.35	0.42	0.48	0.30	0.67	1.19	0.54	0.78	0.63	0.69	0.49	0.22	0.69	0.50	0.32	0.55	2
PMH-3	0.42	0.38	0.50	0.41	0.65	0.99	0.57	0.81	0.58	0.53	0.52	0.23	0.47	0.50	0.24	0.52	5
REHF-2011-8	0.48	0.40	0.66	0.41	0.76	0.84	0.64	0.96	0.57	0.18	0.44	0.29	0.79	0.58	0.32	0.55	2
REHF-2011-9	0.48	0.37	0.66	0.36	0.69	0.81	0.61	0.86	0.53	0.33	0.46	0.23	0.78	0.48	0.29	0.53	4
African Tall (NC)	0.45	0.31	0.60	0.33	0.72	1.03	0.54	0.94	0.62	0.74	0.48	0.14	0.47	0.41	0.27	0.54	3
J-1006 (NC)	0.42	0.37	0.55	0.39	0.75	0.94	0.63	0.79	0.60	0.62	0.53	0.22	0.43	0.39	0.24	0.52	5
Mean	**0.45**	**0.37**	**0.58**	**0.39**	**0.71**	**1.02**	**0.59**	**0.86**	**0.59**	**0.54**	**0.49**	**0.25**	**0.60**	**0.47**	**0.26**	**0.54**	

Table 2.9 IHTM: Initial Hybrid Varietal Trial in Forage Maize : IVDMD (%), ADF(%), NDF(%)

	IVDMD(%)		ADF (%)		NDF (%)			
Entries	Ludhiana	Rank	Ludhiana	Rank	Anand	Ludhiana	Average	Rank
DHM-117	56.8	4	34.2	7	75.9	59.4	67.7	6
IHTFM	56.6	5	33.3	4	72.8	57.3	65.0	3
PMH-1	57.5	3	33.2	3	72.9	57.1	65.0	3
PMH-3	55.6	8	35.1	8	76.1	59.5	67.8	7
REHF-2011-8	58.0	2	31.5	2	73.1	56.2	64.6	2
REHF-2011-9	59.8	1	31.2	1	75.3	53.2	64.2	1
African Tall (NC)	56.4	6	33.6	5	74.2	58.1	66.1	4
J-1006 (NC)	55.7	7	34.0	6	77.0	58.3	67.6	5
Mean	**57.1**		**33.3**		**74.6**	**57.4**	**66.0**	

3. IVTPM: INITIAL VARIETAL TRIAL IN FORAGE PEARL MILLET

An initial varietal trial in forage pearl millet comprising five entries and three national checks namely Raj Bajra Chari-2, Giant Bajra and AVKB-19 was conducted at 17 locations distributed in four zones of the country. Result obtained from different centers revealed that for green forage yield (q/ha) except for entry APFB-09-1 (3.0%) in North East Zone, national check Giant Bajra established its superiority in North West Zone, Central Zone, South Zone and even at national level. Similarly for dry matter yield (q/ha), except for entry APFB-09-1 (15.1%), NDFB-936 (10.3%) and AFB-8 (5.4%) in North East Zone, national check Giant Bajra adjudged best performer in North West Zone, Central Zone, South Zone and at national level.

For fodder production potential (q/ha/day) again national check Giant Bajra ranked first both for green forage and dry matter production potential. For quality parameters, national check Giant Bajra for crude protein yield (q/ha) and Raj Bajra Chari-2 for crude protein content (%) was recorded best performer. For the character plant height, again Giant Bajra (200.0cm) and for leafiness, entry APFB-09-1 (0.40) maintained superiority. For other quality parameters, national check Raj Bajra Chari-2 ranked first for ADF, NDF and IVDMD (%).

(Table Reference: 3.1 to 3.9)

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

In forage pearl millet, two entries namely RBB-2 and AFB-6 along with three national checks i.e Raj Bajra Chari-2, Giant Bajra and AVKB-19 were evaluated in first advanced varietal trial conducted at 18 locations distributed in four zones of the country. Results reported from different centers clearly revealed that none of the test entries performed superiority for green forage yield (q/ha) in any zone of the country and national check Giant Bajra maintained its superiority. Similarly for dry matter yield (q/ha), except for entry AFB-6 (1.0%) in North East Zone, none of the entries were found superior for dry matter yield (q/ha) over best check Giant Bajra. For fodder production potential (q/ha/day), entry AFB-6 for green forage and entries AFB-6 and RBB-2 for dry matter yield proved superiority over best national check.

For evaluation against quality parameters, national check Giant Bajra was adjudged best performer both for crude protein yield (q/ha) and crude protein content (%). Even for growth parameter i.e. plant height and leafiness character, again Giant Bajra ranked first. For evaluation against other quality parameters, national check AVKB-19 for ADF and NDF (%) and entries RBB-2 and AFB-6 for IVDMD (%) were recorded best performer.

(Table Reference: 4.1 to 4.9)

5. AVTPM-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE PEARL MILLET

An advanced varietal trial in forage pearl millet comprising three entries namely PAC-981, RBB-1 and NDFB-904 along with two national checks i.e. Raj Bajra Chari-2 and Giant Bajra was conducted at 17 locations distributed in four zones of the country. Result obtained from different centers revealed that for green forage yield (q/ha), except for entry PAC-981 (2.0%) in Central Zone, none of the entries performed its superiority over best check Giant Bajra in rest of the zone as well as at national level. For the character dry matter yield (q/ha), entries PAC-981 (6.9%) and RBB-1 (6.2%) in North West Zone, and entry PAC-981 (13.5%) in Central Zone exhibited superiority. At national level, entry PAC-981 (5.0%) ranked first for dry matter yield.

For fodder production potential (q/ha/day), check Giant Bajra for green forage and entry RBB-1 for dry matter yield was adjudged best performer. For evaluation against quality parameters, entry PAC-981 for crude protein yield (q/ha) and RBB-1 for crude protein content (%) registered its superiority. For evaluation against growth parameter, check Giant Bajra (202.8cm) ranked first for plant height whereas for leafiness, entry PAC-981 (0.47) established its superiority. For IVDMD and ADF (%) check Giant Bajra and for NDF (%) Raj Bajra Chari-2 recorded superiority.

(Table Reference: 5.1 to 5.9)

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

Result for the advanced varietal trial in forage pearl millet for seed with three entries namely PAC-981, RBB-1 and NDFB-904 along with two national checks i.e. Raj Bajra Chari-2 and Giant Bajra was conducted at 16 locations of four different zones of country. Result obtained from different locations with respect to seed yield (q/ha) clearly revealed that except for entry RBB-1 (2.3%) in Central Zone and PAC-981 (0.8%) in South Zone, national check Raj Bajra Chari-2 in North West Zone and Giant Bajra in North East Zone recorded superiority for seed yield. Coming to the national level, national check Giant Bajra with seed yield of 12.10 q/ha was adjudged best performer.

(Table Reference: 6)

Table 3.1 IVTPM : Initial Varietal Trial in Forage Pearl millet : Green Forage Yield (q/ha)

Cont.....

Entries	North West Zone						North East Zone					
	Ludhi.	Hisar	Bikaner	Jalore	Average	Rank	Faiza.	Bhuba.	Ranchi	Average	Rank	Sup%
AFB-8	657.4	583.4	448.4	441.0	532.6	4	183.8	381.2	500.0	355.0	4	
RBB-3	673.6	592.6	501.7	404.7	543.1	2	103.8	333.3	453.6	296.9	8	
NDFB-936	625.0	523.2	419.1	346.7	478.5	8	316.2	239.6	527.8	361.2	3	
HFP-11-4	763.9	375.0	480.1	349.3	492.1	6	125.0	364.5	481.4	323.6	6	
APFB-09-1	719.9	620.4	323.1	386.0	512.3	5	250.8	427.0	490.6	389.5	1	3.0
Raj Bajra Chari-2 (NC)	719.9	560.2	448.9	417.3	536.6	3	216.5	275.0	453.6	315.0	7	
Giant Bajra (NC)	875.0	805.6	489.4	399.3	642.3	1	165.0	395.8	573.9	378.2	2	
AVKB-19 (NC)	643.5	486.2	471.7	349.0	487.6	7	97.2	302.0	583.3	327.5	5	
Mean	**709.8**	**568.3**	**447.8**	**386.7**	**528.1**		**182.3**	**339.8**	**508.0**	**343.4**		
CD at 5%	22.2	67.8	81.9	45.6			55.0	51.7	74.4			
CV%	3.4	6.7	10.3	6.7			17.3	5.1	8.3			

Cont....

Entries	Central Zone						
	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank
AFB-8	574.0	410.4	378.7	580.0	233.0	435.2	3
RBB-3	529.0	302.0	334.3	547.3	220.0	386.5	5
NDFB-936	497.0	218.7	347.3	547.3	186.0	359.3	8
HFP-11-4	535.0	374.9	382.9	563.7	162.0	403.7	4
APFB-09-1	560.0	431.2	432.0	588.2	280.7	458.4	2
Raj Bajra Chari-2 (NC)	476.0	368.7	322.2	531.0	185.3	376.7	6
Giant Bajra (NC)	770.0	449.9	544.0	661.7	291.7	543.5	1
AVKB-19 (NC)	506.0	279.9	344.9	547.3	171.0	369.8	7
Mean	**555.9**	**354.5**	**385.8**	**570.8**	**216.2**	**416.6**	
CD at 5%	36.7	85.7	63.6	39.7	35.8		
CV%	3.8	13.8	9.4	7.3	9.5		

Table 3.1 IVTPM : Initial Varietal Trial in Forage Pearl millet : Green Forage Yield (q/ha)

Entries	South Zone							All India	
	Hyderabad	Dharwad	Coimbatore	Mandya	Karaikkal	Average	Rank	Average	Rank
AFB-8	370.4	226.9	310.2	159.4	531.8	319.7	4	410.0	3
RBB-3	393.6	231.5	338.0	116.7	375.9	291.1	6	379.5	4
NDFB-936	379.7	222.2	273.2	177.2	390.7	288.6	8	366.9	8
HFP-11-4	426.0	213.0	365.7	106.8	361.0	294.5	5	378.3	5
APFB-09-1	412.1	268.5	388.9	209.2	413.2	338.4	2	423.6	2
Raj Bajra Chari-2 (NC)	365.8	180.6	254.6	189.9	455.3	289.2	7	377.7	6
Giant Bajra (NC)	384.3	259.3	463.0	264.3	498.9	373.9	1	487.7	1
AVKB-19 (NC)	407.4	226.9	324.1	141.9	537.3	327.5	3	377.6	7
Mean	**392.4**	**228.6**	**339.7**	**170.7**	**445.5**	**315.4**		**400.2**	
CD at 5%	26.9	56.3	46.8	26.5	103.8				
CV%	3.9	14.1	11.1	10.0	13.3				

Table 3.2 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha)

Cont.....

Entries	North West Zone					North East Zone					
	Ludhiana	Hisar	Bikaner	Average	Rank	Faizabad	Bhubaneswar	Ranchi	Average	Rank	Superiority%
AFB-8	115.1	85.7	110.1	103.6	3	44.9	85.0	110.6	80.2	3	5.4
RBB-3	117.9	88.9	99.4	102.1	4	27.0	71.5	117.8	72.1	7	
NDFB-936	93.8	90.8	106.4	97.0	6	79.2	47.8	125.0	84.0	2	10.3
HFP-11-4	114.6	55.2	91.6	87.1	8	24.9	77.9	100.6	67.8	8	
APFB-09-1	108.0	113.8	79.9	100.6	5	67.8	94.7	100.3	87.6	1	15.1
Raj Bajra Chari-2 (NC)	126.0	91.5	94.8	104.1	2	60.5	55.8	112.2	76.1	4	
Giant Bajra (NC)	131.3	120.6	104.1	118.6	1	31.0	89.6	103.3	74.6	6	
AVKB-19 (NC)	96.5	76.3	114.2	95.7	7	22.1	64.9	141.1	76.0	5	
Mean	**112.9**	**90.3**	**100.0**	**101.1**		**44.7**	**73.4**	**113.9**	**77.3**		
CD at 5%	3.4	14.2	NS			11.3	11.0	21.9			
CV%	3.3	8.9	17.4			14.5	5.0	11.0			

Table 3.2 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha)

Entries	Central Zone						
	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank
AFB-8	99.8	101.2	78.3	136.2	75.3	98.2	2
RBB-3	90.5	72.7	66.6	126.9	69.3	85.2	6
NDFB-936	77.1	51.0	69.1	133.2	67.0	79.5	8
HFP-11-4	72.7	91.2	73.8	131.0	61.0	85.9	5
APFB-09-1	85.6	107.5	81.1	135.2	80.7	98.0	3
Raj Bajra Chari-2 (NC)	79.6	89.4	67.0	138.7	67.7	88.5	4
Giant Bajra (NC)	124.0	112.7	80.2	160.5	68.3	109.1	1
AVKB-19 (NC)	78.9	65.4	68.7	131.0	63.7	81.5	7
Mean	**88.5**	**86.4**	**73.1**	**136.6**	**69.1**	**90.7**	
CD at 5%	5.8	21.2	11.9	15.1	9.5		
CV%	3.7	14.0	9.3	8.2	7.9		

Table 3.2 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha)

Entries	South Zone							All India	
	Hyderabad	Dharwad	Coimbatore	Mandya	Karaikkal	Average	Rank	Average	Rank
AFB-8	79.5	45.8	62.3	39.0	74.0	60.1	4	83.9	3
RBB-3	81.1	49.2	78.2	27.2	47.8	56.7	5	77.0	5
NDFB-936	71.4	47.4	49.7	41.4	51.9	52.4	7	75.1	6
HFP-11-4	76.6	47.6	67.2	22.3	45.3	51.8	8	72.1	7
APFB-09-1	84.0	56.7	68.2	49.1	55.5	62.7	2	85.5	2
Raj Bajra Chari-2 (NC)	78.1	39.7	55.8	44.6	61.6	55.9	6	78.9	4
Giant Bajra (NC)	81.6	54.5	82.4	71.4	77.5	73.5	1	93.3	1
AVKB-19 (NC)	80.9	52.2	66.8	30.7	79.5	62.0	3	77.0	5
Mean	**79.2**	**49.1**	**66.3**	**40.7**	**61.6**	**59.4**		**80.4**	
CD at 5%	NS	12.6	8.8	5.5	13.0				
CV%	9.2	14.7	10.7	8.7	12.0				

Table 3.3 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Green Forage Yield (q/ha/day)

Cont...

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Bhubaneswar	Ranchi	Anand	Jabalpur
AFB-8	10.11	11.36	7.73	3.01	7.78	9.08	11.96	5.54
RBB-3	10.36	11.70	10.24	1.67	7.25	8.89	11.02	4.25
NDFB-936	9.62	10.39	8.55	5.45	4.99	10.77	10.35	2.95
HFP-11-4	11.75	6.86	8.28	1.84	7.01	10.25	10.09	5.13
APFB-09-1	11.08	11.49	5.57	3.92	8.37	10.67	11.67	5.90
Raj Bajra Chari-2 (NC)	11.08	10.71	9.16	3.23	5.50	9.44	7.93	5.05
Giant Bajra (NC)	13.46	13.73	8.44	2.42	7.20	11.47	16.04	6.24
AVKB-19 (NC)	9.90	8.95	9.63	1.39	6.43	9.11	10.54	3.77
Mean	**10.92**	**10.65**	**8.45**	**2.87**	**6.82**	**9.96**	**11.20**	**4.85**

Entries	Rahuri	Urulikanchan	Jhansi	Hyderabad	Dharwad	Coimbatore	Mandya	Karaikkal	Average	Rank
AFB-8	7.89	10.74	5.29	7.85	3.78	7.75	3.99	1.48	7.21	3
RBB-3	7.77	10.33	5.24	8.50	3.86	8.89	2.92	1.09	7.12	4
NDFB-936	7.89	11.17	4.23	8.14	3.70	7.19	4.43	1.22	6.94	5
HFP-11-4	7.98	11.05	3.18	8.87	3.55	8.51	2.67	0.97	6.75	6
APFB-09-1	7.32	9.19	5.29	8.23	4.48	8.64	4.75	1.24	7.36	2
Raj Bajra Chari-2 (NC)	7.01	10.62	4.31	7.96	3.01	6.37	4.75	1.47	6.72	7
Giant Bajra (NC)	9.22	10.18	5.30	8.21	4.32	8.9	6.01	1.60	8.30	1
AVKB-19 (NC)	7.34	10.53	3.56	8.90	3.78	8.31	3.55	1.73	6.71	8
Mean	**7.80**	**10.48**	**4.55**	**8.33**	**3.81**	**8.07**	**4.13**	**1.35**	**7.14**	

Table 3.4 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha/day)

Cont....

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Bhubaneswar	Ranchi	Anand	Jabalpur
AFB-8	1.77	1.67	1.90	0.74	1.73	2.00	2.08	1.36
RBB-3	1.81	1.75	2.03	0.43	1.55	2.30	1.89	1.02
NDFB-936	1.44	1.80	2.17	1.36	1.00	2.55	1.61	0.69
HFP-11-4	1.76	1.01	1.58	0.37	1.50	2.14	1.37	1.25
APFB-09-1	1.66	2.11	1.38	1.06	1.86	2.16	1.71	1.47
Raj Bajra Chari-2 (NC)	1.94	1.75	1.93	0.90	1.12	2.33	1.33	1.22
Giant Bajra (NC)	2.02	2.06	1.79	0.46	1.63	2.08	2.58	1.56
AVKB-19 (NC)	1.49	1.40	2.33	0.31	1.38	2.19	1.64	0.88
Mean	**1.74**	**1.69**	**1.89**	**0.70**	**1.47**	**2.22**	**1.78**	**1.18**

Entries	Rahuri	Urulikanchan	Jhansi	Hyderabad	Dharwad	Coimbatore	Average	Rank
AFB-8	1.63	2.52	1.71	1.69	0.76	1.56	1.65	2
RBB-3	1.55	2.39	1.65	1.75	0.82	2.06	1.64	3
NDFB-936	1.57	2.72	1.52	1.53	0.79	1.31	1.58	5
HFP-11-4	1.54	2.57	1.20	1.60	0.79	1.56	1.45	7
APFB-09-1	1.38	2.11	1.52	1.69	0.95	1.52	1.61	4
Raj Bajra Chari-2 (NC)	1.46	2.77	1.57	1.70	0.66	1.39	1.58	5
Giant Bajra (NC)	1.36	2.47	1.24	1.74	0.91	1.58	1.68	1
AVKB-19 (NC)	1.46	2.52	1.33	1.77	0.87	1.71	1.52	6
Mean	**1.49**	**2.51**	**1.47**	**1.68**	**0.82**	**1.59**	**1.59**	

Table 3.5 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Crude Protein Yield (q/ha)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Jabal.	Rahuri	Urulik.	Hydera.	Coimb.	Mandya	Karaik.	Average	Rank
AFB-8	8.5	3.8	6.8	9.2	7.9	5.8	11.9	7.2	9.7	3.7	5.2	7.2	4
RBB-3	11.6	1.7	5.6	9.4	5.5	5.4	12.2	8.6	13.2	3.0	5.1	7.4	3
NDFB-936	6.2	6.7	3.6	8.2	3.7	5.6	11.5	7.7	9.1	4.0	5.1	6.5	6
HFP-11-4	11.2	1.5	5.9	7.2	7.1	6.0	12.5	7.6	11.5	2.2	5.8	7.1	5
APFB-09-1	8.1	4.9	6.5	9.9	8.4	6.0	10.7	8.1	10.2	3.7	4.9	7.4	3
Raj Bajra Chari-2 (NC)	12.8	4.7	4.5	8.9	6.9	5.6	12.1	8.5	9.0	5.9	4.3	7.6	2
Giant Bajra (NC)	11.3	1.9	6.8	10.7	8.8	6.5	12.1	8.3	13.0	5.3	8.6	8.5	1
AVKB-19 (NC)	7.5	1.4	5.1	8.2	4.8	5.3	11.9	7.6	10.9	3.2	5.2	6.5	6
Mean	**9.6**	**3.3**	**5.6**	**9.0**	**6.6**	**5.8**	**11.9**	**8.0**	**10.8**	**3.9**	**5.5**	**7.3**	

Table 3.6 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Crude Protein (%)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Jabal.	Rahuri	Urulika.	Hydera.	Coimb.	Mandya	Karaik.	Average	Rank
AFB-8	7.4	8.5	8.0	9.2	7.8	7.4	8.6	9.1	15.5	9.6	7.0	8.9	5
RBB-3	9.8	6.3	7.8	10.4	7.6	8.1	9.6	10.6	16.8	10.9	10.5	9.9	1
NDFB-936	6.6	8.6	7.5	10.6	7.2	8.2	8.6	10.8	18.4	9.6	9.8	9.6	2
HFP-11-4	9.8	6.1	7.6	9.9	7.8	8.2	9.6	9.9	17.1	9.6	7.4	9.4	3
APFB-09-1	7.5	7.3	6.9	11.6	7.8	7.4	7.9	9.6	14.9	7.4	8.3	8.8	6
Raj Bajra Chari-2 (NC)	10.2	7.8	8.1	11.2	7.7	8.3	8.7	10.9	16.2	13.1	7.0	9.9	1
Giant Bajra (NC)	8.6	6.2	7.6	8.7	7.9	8.1	7.5	10.2	15.8	7.4	11.2	9.0	4
AVKB-19 (NC)	7.8	6.4	7.8	10.4	7.4	7.7	9.1	9.4	16.2	10.5	10.9	9.4	3
Mean	**8.5**	**7.1**	**7.7**	**10.2**	**7.6**	**7.9**	**8.7**	**10.1**	**16.4**	**9.8**	**9.0**	**9.4**	

Table 3.7 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Plant Height (cm)

Cont....

Entries	Ludhiana	Hisar	Bikaner	Jalore	Faizabad	Bhubaneswar	Ranchi	Anand
AFB-8	243.3	208.9	199.0	194.0	180.5	241.5	219.0	219.7
RBB-3	256.7	232.9	232.0	202.7	170.6	233.2	206.0	206.8
NDFB-936	213.3	217.9	198.0	185.0	162.3	207.6	213.0	198.8
HFP-11-4	231.7	187.7	208.0	217.3	160.5	235.6	203.0	215.8
APFB-09-1	228.3	211.1	211.3	196.7	180.7	254.4	194.0	213.5
Raj Bajra Chari-2 (NC)	235.0	202.4	213.7	198.3	158.5	215.7	184.0	206.7
Giant Bajra (NC)	243.3	227.7	197.7	191.0	150.7	249.7	208.0	224.4
AVKB-19 (NC)	240.0	210.4	215.0	214.7	158.2	224.8	202.0	208.5
Mean	**236.5**	**212.4**	**209.3**	**200.0**	**165.3**	**232.8**	**203.6**	**211.8**

Entries	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
AFB-8	193.5	155.0	201.3	155.0	183.9	205.3	137.8	181.6	195.0	2
RBB-3	152.4	170.9	186.7	172.5	175.4	214.2	114.7	158.5	192.9	3
NDFB-936	109.5	155.8	174.9	175.0	155.2	176.7	106.1	140.1	174.3	8
HFP-11-4	181.8	177.2	178.1	154.0	184.1	203.7	119.3	168.8	189.2	6
APFB-09-1	211.1	170.2	202.1	125.0	179.6	190.3	149.9	164.2	192.6	4
Raj Bajra Chari-2 (NC)	173.0	176.5	215.4	160.0	190.4	203.4	122.3	154.2	188.1	7
Giant Bajra (NC)	242.1	201.1	189.8	175.0	176.7	192.2	167.2	164.0	200.0	1
AVKB-19 (NC)	143.7	191.9	208.9	170.0	177.0	206.9	119.3	158.5	190.6	5
Mean	**175.9**	**174.8**	**194.7**	**160.8**	**177.8**	**199.1**	**129.6**	**161.2**	**190.3**	

Table 3.8 IVTPM : Initial Varietal Trial in Forage Pearl Millet : Leaf Stem Ratio

Cont.....

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Bhubaneswar	Ranchi	Jabalpur	Rahuri
AFB-8	0.33	0.28	0.24	0.73	1.08	0.41	0.68	0.17
RBB-3	0.29	0.31	0.19	0.74	0.97	0.36	0.53	0.15
NDFB-936	0.33	0.27	0.20	0.68	0.81	0.32	0.38	0.19
HFP-11-4	0.29	0.29	0.21	0.60	1.01	0.48	0.63	0.18
APFB-09-1	0.29	0.31	0.18	0.74	1.24	0.38	0.70	0.35
Raj Bajra Chari-2 (NC)	0.33	0.26	0.25	0.70	0.85	0.38	0.59	0.14
Giant Bajra (NC)	0.29	0.28	0.22	0.58	1.15	0.40	0.73	0.31
AVKB-19 (NC)	0.33	0.26	0.19	0.57	0.91	0.49	0.44	0.18
Mean	**0.31**	**0.28**	**0.21**	**0.67**	**1.00**	**0.40**	**0.59**	**0.21**

Entries	Jhansi	Hyderabad	Coimbatore	Mandya	Karaikkal	Average	Rank
AFB-8	0.19	0.22	0.20	0.22	0.32	0.39	2
RBB-3	0.16	0.21	0.18	0.25	0.28	0.36	3
NDFB-936	0.15	0.19	0.25	0.23	0.26	0.33	6
HFP-11-4	0.19	0.20	0.19	0.21	0.20	0.36	3
APFB-09-1	0.21	0.18	0.21	0.18	0.21	0.40	1
Raj Bajra Chari-2 (NC)	0.19	0.23	0.21	0.21	0.21	0.35	4
Giant Bajra (NC)	0.16	0.24	0.21	0.18	0.27	0.39	2
AVKB-19 (NC)	0.18	0.22	0.22	0.22	0.25	0.34	5
Mean	**0.18**	**0.21**	**0.21**	**0.21**	**0.25**	**0.36**	

Table 3.9 IVTPM : Initial Varietal Trial in Forage Pearl Millet : IVDMD (%), ADF(%), NDF(%)

Entries	IVDMD(%)		ADF (%)		NDF (%)	
	Ludhiana	Rank	Ludhiana	Rank	Ludhiana	Rank
AFB-8	56.2	5	34.4	5	58.6	5
RBB-3	59.2	2	31.2	2	53.7	2
NDFB-936	55.4	6	35.0	6	59.4	6
HFP-11-4	59.2	2	31.2	2	53.7	2
APFB-09-1	56.2	5	34.4	5	58.6	5
Raj Bajra Chari-2 (NC)	60.6	1	31.0	1	50.0	1
Giant Bajra (NC)	58.4	3	32.0	3	54.5	3
AVKB-19 (NC)	57.6	4	32.3	4	55.0	4
Mean	**57.9**		**32.7**		**55.4**	

Table 4.1 AVTPM-1 First advanced varietal trial in Forage Pearl millet : Green Forage Yield (q/ha)

Entries	North West Zone							North East Zone				
	Ludhi.	Hisar	Bikaner	Jalour	Bawal	Average	Rank	Faiza.	Pusa	Bhuba.	Average	Rank
RBB-2	279.2	443.6	543.8	356.8	547.7	434.2	4	99.9	389.0	328.2	272.4	5
AFB-6	350.0	464.4	531.1	510.8	662.2	503.7	2	225.8	351.0	338.7	305.1	3
Raj Bajra-2 (NC)	355.2	391.5	486.0	353.8	556.0	428.5	5	223.0	329.0	359.5	303.8	2
Giant Bajra (NC)	412.5	570.6	463.9	609.3	789.3	569.1	1	172.2	364.0	401.2	312.5	1
AVKB-19 (NC)	364.6	401.9	534.9	382.8	678.9	472.6	3	140.3	372.0	317.8	276.7	4
Mean	**352.3**	**454.4**	**511.9**	**442.7**	**646.8**	**481.6**		**172.2**	**361.0**	**349.1**	**294.1**	
CD at 5%	40.9	43.4	NS	44.0	57.7			25.5	31.7	41.1		
CV%	5.2	6.1	9.7	6.5	5.7			9.6	13.2	3.8		

Entries	Central Zone								South Zone						All India	
	Anand	Raipur	Jabal.	Rahuri	Urulika.	Jhansi	Average	Rank	Hydera.	Dharw.	Coimb.	Mandya	Average	Rank	Average	Rank
RBB-2	499.0	471.1	224.3	390.1	627.9	170.8	397.2	3	337.4	279.2	425.0	183.5	306.3	3	366.5	4
AFB-6	594.0	434.2	210.0	484.4	689.2	179.3	431.8	2	335.3	272.9	412.5	175.7	299.1	4	401.2	2
Raj Bajra-2 (NC)	527.0	343.1	184.5	382.2	545.2	139.0	353.5	5	308.2	300.0	468.7	203.9	320.2	2	358.6	5
Giant Bajra (NC)	748.0	443.4	414.3	565.8	802.5	234.8	534.8	1	310.3	200.0	602.1	285.6	349.5	1	466.1	1
AVKB-19 (NC)	519.0	357.6	273.0	383.0	670.8	147.5	391.8	4	324.9	237.5	406.2	189.8	289.6	5	372.4	3
Mean	**577.4**	**409.9**	**261.2**	**441.1**	**667.1**	**174.3**	**421.8**		**323.2**	**257.9**	**462.9**	**207.7**	**312.9**		**392.9**	
CD at 5%	38.1	31.8	52.1	53.5	25.8	31.4			19.5	33.5	29.4	22.0				
CV%	4.3	5.0	13.0	7.9	13.0	11.7			3.9	8.4	5.8	7.1				

Table 4.2 AVTPM-1 First advanced varietal trial in Forage Pearl millet : Dry matter Yield (q/ha)

	North West Zone					North East Zone					
Entries	**Ludhi.**	**Hisar**	**Bikaner**	**Average**	**Rank**	**Faiza.**	**Pusa**	**Bhuba.**	**Average**	**Rank**	**Superi%**
RBB-2	55.8	69.9	109.8	78.5	2	23.3	87.1	70.9	60.4	5	
AFB-6	61.3	69.7	85.9	72.3	5	53.0	80.0	73.4	68.8	1	1.0
Raj Bajra-2 (NC)	62.2	72.4	95.3	76.6	3	48.4	75.0	77.7	67.0	3	
Giant Bajra (NC)	82.5	82.9	78.2	81.2	1	32.8	82.3	89.1	68.1	2	
AVKB-19 (NC)	63.8	66.3	98.2	76.1	4	31.9	85.6	64.8	60.7	4	
Mean	**65.1**	**72.2**	**93.5**	**76.9**		**37.9**	**82.0**	**75.2**	**65.0**	**3.0**	
CD at 5%	7.7	8.8	16.5			5.0	9.4	8.6			
CV%	5.3	7.8	11.4			8.6	10.6	3.7			

Entries	**Central Zone**								**South Zone**						**All India**	
	Anand	**Raipur**	**Jabal.**	**Rahuri**	**Urulik.**	**Jhansi**	**Average**	**Rank**	**Hydera.**	**Dharwad**	**Coimb.**	**Mandya**	**Average**	**Rank**	**Average**	**Rank**
RBB-2	61.9	106.5	50.7	81.2	126.5	59.3	81.0	4	70.5	72.9	83.4	44.3	67.8	4	73.4	4
AFB-6	80.2	91.7	46.7	91.0	162.2	58.5	88.4	2	73.0	63.8	93.1	40.2	67.5	5	76.5	2
Raj Bajra-2 (NC)	83.3	74.2	40.8	70.6	99.4	35.0	67.2	5	61.2	74.3	105.9	51.4	73.2	1	70.4	5
Giant Bajra (NC)	108.5	99.1	102.0	90.2	179.3	43.3	103.7	1	57.2	46.8	103.0	75.8	70.7	2	84.6	1
AVKB-19 (NC)	65.9	85.4	63.1	75.0	156.4	57.3	83.8	3	71.3	61.1	96.5	49.1	69.5	3	74.5	3
Mean	**80.0**	**91.4**	**60.7**	**81.6**	**144.8**	**50.7**	**84.8**		**66.6**	**63.8**	**96.4**	**52.2**	**69.7**		**75.9**	
CD at 5%	5.3	9.7	11.7	9.8	11.8	8.4			7.0	11.3	7.8	6.4				
CV%	4.5	6.9	12.5	7.8	19.0	10.9			6.8	11.5	7.4	8.2				

Table 4.3 AVTPM-1: First Advanced Varietal Trial in Forage Pearl Millet : Green Forage Yield (q/ha/day)

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Pusa	Bhubaneswar	Anand	Raipur	Jabalpur	Rahuri
RBB-2	4.29	8.29	11.10	1.56	5.98	6.70	10.85	6.04	3.11	9.29
AFB-6	5.38	8.33	10.84	3.47	5.57	7.21	12.91	5.42	2.91	10.31
Raj Bajra-2 (NC)	5.46	7.18	9.92	3.43	5.22	7.99	11.46	4.28	2.52	9.32
Giant Bajra (NC)	6.35	9.55	8.00	2.82	5.60	6.92	12.26	5.68	5.67	9.59
AVKB-19 (NC)	5.61	7.11	10.92	2.23	5.81	6.23	11.28	4.47	3.68	8.91
Mean	**5.42**	**8.09**	**10.16**	**2.70**	**5.64**	**7.01**	**11.75**	**5.18**	**3.58**	**9.48**

Entries	Urulikanchan	Jhansi	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank
RBB-2	13.08	3.71	8.13	4.65	10.37	4.48	6.98	3
AFB-6	12.53	3.81	7.37	4.55	10.85	4.28	7.23	1
Raj Bajra-2 (NC)	10.91	3.09	6.72	5.00	12.02	4.97	6.84	4
Giant Bajra (NC)	12.54	3.79	6.23	3.33	10.15	6.08	7.16	2
AVKB-19 (NC)	12.42	3.35	7.22	3.96	10.16	4.63	6.75	5
Mean	**12.30**	**3.55**	**7.13**	**4.30**	**10.71**	**4.89**	**6.99**	

Table 4.4 AVTPM-1 First advanced varietal trial in Forage Pearl millet : Dry matter Yield (q/ha/day)

Entries	Ludhi.	Hisar	Bikaner	Faiza.	Pusa	Bhuba.	Anand	Raipur	Jabal.	Rahuri	Urulika.	Jhansi	Hydera.	Dharwad	Coimb.	Average	Rank
RBB-2	0.86	1.31	2.24	0.36	1.34	1.45	1.35	1.39	0.70	1.93	2.64	1.29	1.70	1.21	2.03	1.45	2
AFB-6	0.94	1.25	1.75	0.81	1.27	1.56	1.74	1.14	0.65	1.94	2.95	1.24	1.60	1.06	2.45	1.49	1
Raj Bajra-2 (NC)	0.96	1.33	1.94	0.74	1.19	1.73	1.81	0.93	0.56	1.72	1.99	0.77	1.33	1.24	2.71	1.40	4
Giant Bajra (NC)	1.27	1.39	1.35	0.54	1.27	1.54	1.78	1.27	1.39	1.53	2.80	0.77	1.15	0.78	1.87	1.38	5
AVKB-19 (NC)	0.98	1.17	2.00	0.51	1.34	1.27	1.43	1.07	0.85	1.74	2.90	1.30	1.58	1.02	2.41	1.44	3
Mean	**1.00**	**1.29**	**1.86**	**0.59**	**1.28**	**1.51**	**1.62**	**1.16**	**0.83**	**1.77**	**2.66**	**1.07**	**1.47**	**1.06**	**2.29**	**1.43**	

Table 4.5 AVTPM-1 Firt advanced varietal trial in Forage Pearl millet : Crude protein Yield (q/ha)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Raipur	Jabal.	Rahuri	Urulik.	Hydera.	Coimb.	Mandya	Average	Rank
RBB-2	4.2	1.9	5.2	7.3	9.0	3.8	6.8	12.6	7.4	12.4	4.1	6.8	5
AFB-6	5.0	4.1	5.6	9.6	7.5	3.5	7.3	14.9	6.6	15.1	4.0	7.6	2
Raj Bajra-2 (NC)	4.4	4.2	5.9	10.4	5.9	3.0	5.7	10.3	5.9	15.3	5.4	6.9	4
Giant Bajra (NC)	6.2	2.8	6.7	11.9	8.2	8.0	6.5	13.0	7.0	15.3	10.0	8.7	1
AVKB-19 (NC)	5.8	2.4	4.9	7.6	6.9	4.8	5.7	13.9	7.8	13.9	5.8	7.2	3
Mean	**5.1**	**3.1**	**5.7**	**9.3**	**7.5**	**4.6**	**6.4**	**12.9**	**6.9**	**14.4**	**5.9**	**7.4**	

Table 4.6 AVTPM-1 First advanced varietal trial in Forage Pearl millet : Crude protein (%)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Raipur	Rahuri	Urulik.	Hydera.	Coimb.	Mandya	Jabal.	Average	Rank
RBB-2	7.5	8.4	7.3	11.8	8.3	8.3	9.9	10.5	14.9	9.2	7.6	9.4	3
AFB-6	8.2	7,78	7.7	12.0	8.2	8.1	9.2	9.2	16.2	10.1	7.6	9.5	2
Raj Bajra-2 (NC)	7.1	8.8	7.6	12.4	8.0	8.1	10.4	9.6	14.4	10.5	7.3	9.5	2
Giant Bajra (NC)	7.5	8.5	7.5	10.9	8.3	7.2	7.2	12.3	14.9	13.1	7.9	9.6	1
AVKB-19 (NC)	9.1	7.5	7.6	11.6	8.1	7.6	8.9	11.0	14.4	11.8	7.7	9.6	1
Mean	**7.9**	**8.3**	**7.6**	**11.7**	**8.2**	**7.8**	**9.1**	**10.5**	**15.0**	**10.9**	**7.6**	**9.5**	

Table 4.7 AVTPM-1: First advanced Varietal Trial in Forage Pearl Millet : Plant Height (cm)

Cont.....

Entries	Ludhiana	Hisar	Bikaner	Jalour	Bawal	Faizabad	Bhubaneswar	Anand	Raipur
RBB-2	232.5	230.6	249.3	188.0	249.3	210.5	218.2	203.1	220.5
AFB-6	230.0	232.0	233.8	186.0	245.0	205.7	229.3	206.8	210.7
Raj Bajra-2 (NC)	252.5	235.0	237.3	182.0	260.3	203.2	239.6	205.3	200.9
Giant Bajra (NC)	227.5	224.6	220.0	166.0	245.8	200.1	247.6	232.1	212.8
AVKB-19 (NC)	231.3	236.0	227.3	185.8	266.8	199.8	209.4	213.1	208.7
Mean	**234.8**	**231.6**	**233.5**	**181.6**	**253.4**	**203.9**	**228.8**	**212.1**	**210.7**

Table 4.7 AVTPM-1: First advanced Varietal Trial in Forage Pearl Millet : Plant Height (cm)

Entries	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hyderabad	Coimbatore	Mandya	Average	Rank
RBB-2	141.5	176.1	217.8	132.5	175.1	238.6	123.2	200.4	5
AFB-6	137.5	180.7	218.0	177.5	193.5	237.8	138.9	203.9	4
Raj Bajra-2 (NC)	128.7	184.0	216.3	163.8	190.7	239.0	126.7	204.1	3
Giant Bajra (NC)	170.5	205.9	251.9	175.0	189.3	254.3	128.7	209.5	1
AVKB-19 (NC)	159.6	188.5	228.7	165.0	185.5	239.7	133.2	204.9	2
Mean	**147.6**	**187.0**	**226.5**	**162.8**	**186.8**	**241.9**	**130.1**	**204.6**	

Table 4.8 AVTPM-1: First advanced Varietal Trial in Forage Pearl Millet : Leaf Stem Ratio

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Pusa	Bhubaneswar	Raipur	Jabalpur	Rahuri	Jhansi	Hyderabad	Coimbatore	Mandya	Urulikanchan	Average	Rank
RBB-2	0.33	0.31	0.20	0.72	0.98	1.04	0.61	0.50	0.20	0.28	0.20	0.24	0.20	0.64	0.46	2
AFB-6	0.29	0.27	0.27	0.63	0.94	1.16	0.54	0.45	0.22	0.15	0.21	0.26	0.19	0.47	0.43	4
Raj Bajra-2 (NC)	0.33	0.34	0.22	O.70	0.97	1.24	0.47	0.28	0.18	0.22	0.20	0.19	0.21	0.62	0.42	5
Giant Bajra (NC)	0.38	0.32	0.34	0.64	0.94	1.29	0.58	0.70	0.28	0.28	0.22	0.20	0.24	0.48	0.49	1
AVKB-19 (NC)	0.38	0.25	0.21	0.71	0.97	0.97	0.52	0.60	0.25	0.22	0.17	0.21	0.20	0.47	0.44	3
Mean	**0.34**	**0.30**	**0.25**	**0.68**	**0.96**	**1.14**	**0.54**	**0.51**	**0.23**	**0.23**	**0.20**	**0.22**	**0.21**	**0.54**	**0.45**	

Table 4.9 AVTPM-1: First advanced Varietal Trial in Forage Pearl Millet : IVDMD (%), ADF(%), & NDF(%)

	IVDMD(%)		ADF (%)		NDF (%)			
Entries	Ludhiana	Rank	Ludhiana	Rank	Anand	Ludhiana	Average	Rank
RBB-2	58.0	1	35.0	3	74.0	54.8	64.4	5
AFB-6	57.2	2	33.4	2	71.0	54.0	62.5	2
Raj Bajra-2 (NC)	56.3	4	37.3	4	72.0	56.5	64.3	4
Giant Bajra (NC)	57.0	3	35.0	3	71.0	54.2	62.6	3
AVKB-19 (NC)	54.6	5	31.1	1	70.0	53.6	61.8	1
Mean	**56.6**		**34.4**		**71.6**	**54.6**	**63.1**	

Table 5.1 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Green Forage Yield (q/ha)

Entries	North West Zone						North East Zone				
	Ludhiana	Hisar	Bikaner	Jalour	Average	Rank	Faizabad	Pusa	Bhuba.	Average	Rank
PAC-981	862.5	676.8	419.3	683.8	660.6	2	202.2	334.0	392.3	309.5	3
RBB-1	664.6	510.2	535.2	415.5	531.4	3	201.9	342.0	342.3	295.4	4
NDFB-904							218.1	322.0			
Raj bajra Chari-2 (NC)	647.9	437.3	524.0	404.3	503.4	4	176.5	382.0	371.0	309.8	2
Giant Bajra (NC)	864.6	689.3	436.2	727.0	679.3	1	172.5	407.0	422.0	333.8	1
Mean	**759.9**	**578.4**	**478.7**	**557.6**	**593.7**		**194.2**	**357.4**	**381.9**	**312.1**	
CD at 5%	19.8	70.7	65.5	80.1			40.7	26.1	29.0		
CV%	1.1	7.5	8.9	9.0			13.6	11.4	3.1		

Entries	Central Zone								
	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Dhari	Average	Rank	Superiority%
PAC-981	753.0	235.3	524.8	817.8	480.5	82.3	482.3	1	2.0
RBB-1	430.0	301.9	304.9	627.9	315.3	62.3	340.4	3	
NDFB-904		90.6							
Raj bajra Chari-2 (NC)	424.0	145.7	338.6	600.4	347.3	55.3	318.5	4	
Giant Bajra (NC)	638.0	298.8	551.9	824.0	445.5	78.0	472.7	2	
Mean	**561.3**	**214.4**	**430.0**	**717.5**	**397.1**	**69.4**	**403.5**		
CD at 5%	59.6	50.7	77.1	20.0	34.0	21.2			
CV%	7.1	15.4	11.2	15.0	5.4	19.1			

Entries	South Zone						All India	
	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank	Average	Rank
PAC-981	262.4	264.6	595.8	257.0	344.9	2	461.4	2
RBB-1	333.2	241.7	370.8	152.2	274.5	3	361.9	3
NDFB-904		93.8						
Raj bajra Chari-2 (NC)	302.0	187.5	406.2	131.6	256.8	4	346.0	4
Giant Bajra (NC)	322.8	247.9	631.2	290.0	373.0	1	473.3	1
Mean	**305.1**	**207.1**	**501.0**	**207.7**	**312.3**		**410.6**	
CD at 5%	23.2	37.9	44.0	18.0				
CV%	4.8	11.9	5.5	7.0				

NDFB-904 not germinated at most of the locations.

Table 5.2 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha)

Entries	North West Zone						North East Zone				
	Ludhiana	Hisar	Bikaner	Average	Rank	Superiority%	Faizabad	Pusa	Bhubaneswar	Average	Rank
PAC-981	151.0	93.0	87.5	110.5	1	6.9	48.4	78.2	84.4	70.3	3
RBB-1	132.9	81.6	114.8	109.8	2	6.2	50.6	78.7	70.0	66.4	4
NDFB-904							56.4	73.7			
Raj bajra Chari-2 (NC)	113.4	75.4	97.0	95.3	4		44.4	86.7	81.7	70.9	2
Giant Bajra (NC)	129.7	103.2	77.2	103.4	3		41.7	93.2	91.0	75.3	1
Mean	**131.8**	**88.3**	**94.2**	**104.7**			**48.3**	**82.1**	**81.8**	**70.7**	
CD at 5%	6.1	9.5	24.9				9.9	8.3	5.0		
CV%	2.0	6.6	17.1				13.4	10.6	2.5		

Entries	Central Zone									South Zone					
	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Dhari	Average	Rank	Super%	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank
PAC-981	135.5	55.4	94.6	176.3	147.0	21.8	105.1	1	13.5	52.4	68.1	131.2	49.9	75.4	2
RBB-1	77.9	73.8	67.0	129.5	123.5	19.8	81.9	3		71.2	63.5	84.5	39.3	64.6	3
NDFB-904		19.9									21.8				
Raj bajra Chari-2 (NC)	76.7	32.8	62.7	119.9	108.3	20.0	70.1	4		64.8	46.2	80.0	31.6	55.6	4
Giant Bajra (NC)	100.2	72.7	78.5	183.8	101.5	19.3	92.6	2		60.9	57.9	135.5	58.7	78.3	1
Mean	**97.6**	**50.9**	**75.7**	**152.4**	**120.1**	**20.2**	**87.4**			**62.3**	**51.5**	**107.8**	**44.9**	**68.5**	
CD at 5%	9.8	10.4	13.6	11.9	10.7	5.9				8.6	12.0	14.2	4.6		
CV%	6.7	15.8	11.2	19.2	5.6	18.4				8.6	15.1	8.2	8.2		

Entries	All India		
	Average	Rank	Superiority%
PAC-981	92.2	1	5.0
RBB-1	79.9	3	
NDFB-904			
Raj bajra Chari-2 (NC)	71.3	4	
Giant Bajra (NC)	87.8	2	
Mean	**82.8**		
CD at 5%			
CV%			

Table 5.3 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Green Forage Yield (q/ha/day)

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Pusa	Bhubaneswar	Anand	Jabalpur	Rahuri
PAC-981	12.50	11.23	7.23	2.88	5.30	5.69	8.96	3.18	6.56
RBB-1	9.63	9.76	10.92	3.01	5.43	6.85	8.43	3.55	7.26
NDFB-904				3.46	4.95			1.22	
Raj bajra Chari-2 (NC)	9.39	8.17	10.69	2.67	5.97	8.24	8.31	1.97	8.26
Giant Bajra (NC)	12.53	11.94	7.52	2.49	6.17	5.78	10.46	4.09	9.35
Mean	**11.01**	**10.28**	**9.09**	**2.90**	**5.56**	**6.64**	**9.04**	**2.80**	**7.86**

Entries	Urulikanchan	Jhansi	Dhari	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank
PAC-981	9.40	9.81	1.92	4.52	4.41	12.95	4.08	6.91	3
RBB-1	12.82	7.88	1.59	7.63	4.03	9.51	3.71	7.00	2
NDFB-904					1.56				
Raj bajra Chari-2 (NC)	11.77	8.47	1.41	6.53	3.13	9.45	3.13	6.72	4
Giant Bajra (NC)	12.49	8.40	1.61	6.76	4.13	13.15	4.75	7.60	1
Mean	**11.62**	**8.64**	**1.63**	**6.36**	**3.45**	**11.27**	**3.92**	**7.06**	

Table 5.4 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Dry Matter Yield (q/ha/day)

Entries	Ludhiana	Hisar	Bikaner	Faizabad	Pusa	Bhubaneswar	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Hydera.	Dharwad	Coimbatore	Average	Rank
PAC-981	2.19	1.54	1.51	0.69	1.24	1.22	1.61	0.75	1.18	2.03	3.00	0.90	1.13	2.85	1.56	3
RBB-1	1.93	1.56	2.34	0.75	1.25	1.40	1.53	0.87	1.60	2.64	3.09	1.63	1.06	2.17	1.70	1
NDFB-904				0.89	1.13			0.27					0.36			
Raj bajra Chari-2 (NC)	1.64	1.41	1.98	0.67	1.35	1.81	1.50	0.44	1.53	2.35	2.64	1.40	0.77	1.86	1.53	4
Giant Bajra (NC)	1.88	1.79	1.33	0.60	1.41	1.25	1.64	1.00	1.33	2.78	1.91	1.28	0.96	2.82	1.57	2
Mean	**1.91**	**1.58**	**1.79**	**0.72**	**1.28**	**1.42**	**1.57**	**0.66**	**1.41**	**2.45**	**2.66**	**1.30**	**0.86**	**2.43**	**1.59**	

Table 5.5 AVTPM-2 : Second advanced varietal trial in Forage Pearl millet : Crude protein yield (q/ha)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Jabalpur	Rahuri	Uruli.	Hydera.	Coimb.	Mandya	Average	Rank
PAC-981	11.4	3.8	6.4	12.6	4.2	6.8	16.4	5.3	23.6	4.4	9.5	1
RBB-1	9.4	4.1	5.2	7.2	5.7	5.3	13.0	7.4	15.9	5.0	7.8	3
NDFB-904		5.0			1.4							
Raj bajra Chari-2 (NC)	7.8	3.6	6.2	6.3	2.2	5.0	12.3	8.2	12.6	3.1	6.7	4
Giant Bajra (NC)	9.5	3.5	6.9	9.2	5.6	5.4	13.7	6.9	18.9	6.2	8.6	2
Mean	**9.5**	**4.0**	**6.1**	**8.8**	**3.8**	**5.6**	**13.8**	**7.0**	**17.7**	**4.6**	**8.1**	

Table 5.6 AVTPM-2 : Second advanced varietal trial in Forage Pearl millet : Crude protein (%)

Entries	Ludhi.	Faiza.	Bhuba.	Anand	Rahuri	Uruli.	Hydera.	Coim.	Mandya	Average	Rank
PAC-981	7.5	7.9	7.6	9.3	7.2	9.3	10.1	18.0	8.8	9.5	3
RBB-1	7.1	8.2	7.4	9.2	7.9	10.0	10.5	18.8	12.7	10.2	1
NDFB-904		8.8									
Raj bajra Chari-2 (NC)	6.9	8.2	7.6	8.2	7.9	10.2	12.7	15.8	9.6	9.7	2
Giant Bajra (NC)	7.4	8.5	7.5	9.2	6.9	7.4	11.4	14.0	10.5	9.2	4
Mean	**7.2**	**8.3**	**7.5**	**9.0**	**7.5**	**9.2**	**11.2**	**16.6**	**10.4**	**9.6**	

Table 5.7 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Plant Height (cm)

Cont....

Entries	Ludhiana	Hisar	Bikaner	Jalour	Faizabad	Bhubaneswar	Anand	Jabalpur	Rahuri
PAC-981	191.3	146.9	200.5	151.5	185.4	254.5	250.2	141.1	227.0
RBB-1	258.8	229.4	234.8	188.0	187.8	209.3	220.8	190.4	168.0
NDFB-904					205.9			99.6	
Raj bajra Chari-2 (NC)	257.5	242.0	199.5	192.5	195.8	228.3	217.0	123.1	288.0
Giant Bajra (NC)	247.5	208.4	250.5	181.5	180.2	265.3	234.5	182.5	154.0
Mean	**238.8**	**206.6**	**221.3**	**178.4**	**191.0**	**239.3**	**230.6**	**147.3**	**209.3**

Entries	Urulikanchan	Jhansi	Dhari	Hyderabad	Coimbatore	Mandya	Average	Rank
PAC-981	236.8	167.5	97.3	199.7	217.4	170.0	189.1	4
RBB-1	233.9	175.0	90.3	175.1	204.3	120.0	192.4	3
NDFB-904								
Raj bajra Chari-2 (NC)	232.2	202.5	89.8	173.7	250.0	118.3	200.7	2
Giant Bajra (NC)	231.2	180.0	90.8	204.0	261.3	171.2	202.8	1
Mean	**233.5**	**181.3**	**92.0**	**188.1**	**233.3**	**144.8**	**196.3**	

Table 5.8 AVTPM-2 : Second Advanced Varietal Trial in Forage Pearl Millet : Leaf stem ratio

Entries	Ludhi.	Hisar	Bikaner	Faiza.	Pusa	Bhuba.r	Jabal.	Rahuri	Jhansi	Dhari	Hyder.	Coimb.	Mandya	Uruli.	Average	Rank
PAC-981	0.54	0.38	0.26	0.65	0.98	1.12	0.51	0.29	0.31	0.37	0.19	0.19	0.20	0.59	0.47	1
RBB-1	0.33	0.34	0.22	0.75	1.01	0.95	0.68	0.15	0.29	0.41	0.25	0.20	0.19	0.53	0.45	3
NDFB-904				0.78	0.96		0.20									
Raj bajra Chari-2 (NC)	0.43	0.30	0.18	0.64	0.97	1.01	0.43	0.16	0.23	0.37	0.22	0.19	0.20	0.78	0.44	4
Giant Bajra (NC)	0.33	0.31	0.20	0.63	0.96	1.28	0.62	0.39	0.24	0.40	0.17	0.26	0.22	0.47	0.46	2
Mean	**0.41**	**0.33**	**0.22**	**0.69**	**0.98**	**1.09**	**0.49**	**0.25**	**0.26**	**0.39**	**0.21**	**0.21**	**0.20**	**0.59**	**0.45**	

Table 5.9 AVTPM-2 : Second Advanced Varietal Trial In Forage Pearl Millet : ADF(%), NDF(%) & IVDMD (%)

	ADF (%)				NDF (%)					IVDMD (%)			
Entries	Ludhiana	Rahuri	Average	Rank	Anand	Ludhiana	Rahuri	Average	Rank	Rahuri	Ludhiana	Average	Rank
PAC-981	34.4	47.4	40.9	2	78.0	53.6	61.8	64.5	4	59.2	56.4	57.8	3
RBB-1	35.3	49.3	42.3	4	77.0	55.3	59.3	63.9	2	60.4	55.2	57.8	3
NDFB-904													
Raj bajra Chari-2 (NC)	36.3	47.2	41.8	3	75.0	55.6	60.6	63.7	1	62.8	55.2	59.0	2
Giant Bajra (NC)	35.2	43.8	39.5	1	77.0	54.2	61.2	64.1	3	63.6	55.4	59.5	1
Mean	**35.3**	**46.9**	**41.1**		**76.8**	**54.7**	**60.7**	**64.1**		**61.5**	**55.6**		

Table 6 AVTPM-2 (Seed) : Second Advanced Varietal Trial in Forage Pearl Millet (seed): Seed Yield (q/ha)

Entries	North West Zone						North East Zone				
	Ludhi.	Hisar	Bikaner	Jalour*	Average	Rank	Faizabad	Pusa	Bhuba.	Average	Rank
PAC-981	6.30	9.37	5.73	0.00	7.13	4	3.83	6.50	8.13	6.15	4
RBB-1	10.20	11.14	24.46	1.38	15.27	2	7.97	6.10	7.14	7.07	2
NDFB-904							10.11	7.90			
Raj Bajra Chari-2 (NC)	12.40	10.47	23.55	1.41	15.47	1	4.74	6.30	7.45	6.16	3
Giant Bajra (NC)	14.50	7.50	14.29	0.66	12.10	3	3.98	8.60	9.27	7.29	1
Mean	**10.85**	**9.62**	**17.01**	**0.86**	**12.49**		**6.13**	**7.08**	**8.00**	**6.67**	
CD at 5%	4.6	0.9	2.5				1.7	0.8	0.9		
CV%	9.8	5.5	9.6				17.9	11.4	4.9		

Entries	Central Zone							
	Anand	Jabalpur	Rahuri	Urulikanchan	Jhansi	Average	Rank	Superiority%
PAC-981	9.11	15.21	9.18	13.73	19.25	13.30	3	
RBB-1	9.83	21.77	9.13	20.49	16.38	15.52	1	2.3
NDFB-904		15.63						
Raj Bajra Chari-2 (NC)	8.21	10.03	8.85	18.03	15.25	12.07	4	
Giant Bajra (NC)	11.85	12.44	13.08	17.26	21.20	15.17	2	
Mean	**9.75**	**15.02**	**10.06**	**17.38**	**18.02**	**14.01**		
CD at 5%	1.6	3.0	1.2	0.8	3.5			
CV%	9.7	12.5	7.3	14.5	12.1			

Table 6 AVTPM-2 (Seed) : Second Advanced Varietal Trial in Forage Pearl Millet (seed): Seed Yield (q/ha)

Entries	South Zone							All India	
	Hyderabad	Dharwad	Coimbatore	Mandya	Average	Rank	Superiority%	Average	Rank
PAC-981	4.60	5.03	17.50	20.69	11.96	1	0.8	10.28	4
RBB-1	3.20	3.85	12.19	15.91	8.79	4		11.98	2
NDFB-904		4.96							
Raj Bajra Chari-2 (NC)	3.90	3.12	16.46	14.85	9.58	3		10.91	3
Giant Bajra (NC)	6.80	3.90	13.65	23.14	11.87	2		12.10	1
Mean	**4.63**	**4.17**	**14.95**	**18.65**	**10.55**			**11.32**	
CD at 5%	0.9	0.3	0.2	1.6					
CV%	12.4	4.5	8.0	7.1					

Note:- At Dhari- Seed did not set

At Jamnagar- Plant dried

At Jalour-Data is too low hence not taken in average.

Entry (NDFB-904) not germinated at so many locations; therefore it is not included in zonal and all India average

7. IVTC: INITIAL VARIETAL TRIAL IN FORAGE COWPEA

In forage cowpea, five entries along with two national checks namely Bundel Lobia-1 and UPC-5286 and three zonal checks *viz*; UPC-622, BL-2 and UPC-9202 for respective zones were evaluated in initial varietal trial at 21 locations across the five zones in the country. Result received from different testing locations revealed that for the character green forage yield (q/ha), entry MFC-09-5 (4.7%) in Hill Zone, TNFC-0924 (12.7%) in North East Zone, TNFC-0924 (10.2%) and MFC-09-5 (2.5%) in South Zone exhibited superiority over best national/ zonal check. At national level, TNFC-0924 with 1.6 percent superiority was ranked best performer. For the character dry matter yield (q/ha), entry MFC-09-5 (2.8 and 0.2%) in Hill and North West Zone, respectively, TNFC-0924 (12.5%) in North East Zone, TNFC-0924 (14.0%), and MFC-09-5 (8.2%) in South Zone exhibited their superiority with respect to best check. Coming to the national level, entry TNFC-0924 (2.9%) proved superiority over best check UPC-5286 for this character.

For fodder production potential (q/ha/day), entry TNFC-0924 for green forage as well as dry matter yield registered superiority. For evaluation against quality parameters, entry TNFC-0924 (7.7q/ha) for crude protein yield and check UPC-5286 (15.8%) for crude protein content was adjudged best performer. For the character plant height and leafiness, entry TNFC-0924 ranked first. For other quality parameters like ADF, NDF and IVDMD (%) national check BL-2 maintained its superiority. **(Table Reference: 7.1 to 7.9)**

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

In forage cowpea, three entries namely UPC-1101, UPC-1102 and Culture-1 along with national checks namely BL-1 and UPC-5286 and three zonal checks i.e. UPC-622, BL-2 and UPC-9202 for respective zones were evaluated in first advanced varietal trial at 22 locations across the four zones of country. Results obtained from different centres revealed that for green forage yield (q/ha), entries UPC-1102 (4.8%) and UPC-1101 (3.8%) in North West Zone registered superiority whereas none of the entries established their superiority in any other zone. At national level, check UPC-5286 maintained superiority. Similarly for dry matter yield (q/ha), only one entry Culture-1 (1.8%) proved its superiority in North East Zone whereas in other zones as well as at national level either zonal / national check maintained superiority.

For fodder production potential (q/ha/day), again national check UPC-5286 ranked first both for green forage as well as dry matter production potential. For evaluation against quality parameter, again national check UPC-5286 adjudged best performer both for crude protein yield (q/ha) as well as crude protein content (%).

For the character plant height, check BL-1 (143.2cm) and for leafiness, check UPC-5286 (0.71) established superiority. For other quality parameters, UPC-5286 for ADF (%), Culture-1 and UPC-1101 for NDF (%) and UPC-1102 for IVDMD (%) registered their superiority.

(Table Reference: 8.1 to 8.10)

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

An advanced varietal trial in forage cowpea comprising two entries namely MFC-09-1 and RR-3 along with two national checks i.e. BL-1 and UPC-5286 and three zonal checks viz., UPC-622, BL-2 and UPC-9302 for respective zones was conducted at 23 locations in five zones of the country. Result of the trial obtained from different centers clearly revealed that for green forage yield (q/ha), entries MFC-09-1 (7.9%) and RR-3 (6.9%) in Hill Zone and again MFC-09-1 (14.2%) in South Zone registered superiority whereas at national level again entry MFC-09-1 ranked first with 1.4 percent superiority. For dry matter yield (q/ha), RR-3 registered its superiority over best check with 3.7 percent in Hill Zones, 2.5 percent in North West Zone and 0.5 percent in North East Zone whereas entry MFC-09-1 (19.4%) ranked first in South Zone. At national level, entries MFC-09-1 (4.9%) and RR-3 (4.2%) were adjudged best performer.

For fodder production potential (q/ha/day), entry MFC-09-1 was registered best performer both for green forage and dry matter yield production potential. For evaluation against quality parameters, entries MFC-09-1 and RR-3 for crude protein yield (q/ha) and RR-3 and BL-1 for crude protein content (%) were recorded best performer. For evaluation against growth parameter, entry RR-3 (153.6cm) for plant height and for leafiness entries MFC-09-1 (0.72) and RR-3 (0.68) maintained superiority. For ADF, NDF and IVDMD (%), national check BL-1 was adjudged best performer. **(Table Reference: 9.1 to 9.10)**

10. AVTC-2 (SEED): SECOND ADVANCED VARIETAL TRIAL IN FORAGE COWPEA (SEED)

An advanced varietal trial in forage cowpea for seed with two entries namely MFC-09-1 and RR-3 along with two national check i.e. BL-1 and UPC-5286 and three zonal checks viz; UPC-622, BL-2 and UPC-9202 was conducted at 20 locations in four zones of the country. Result obtained from different locations with respect to seed yield (q/ha) clearly revealed that BL-2 in North West Zone, UPC-622 in North East Zone, BL-1 in Central Zone and entry MFC-09-1 (5.6%) in South Zone maintained superiority. Coming to the national level, entries MFC-09-1 (8.36 q/ha) and RR-3 (7.87 q/ha) were adjudged best performer with respect to zonal/ national checks. **(Table Reference: 10)**

Table 7.1 IVTC-Initial Varietal Trial in Forage Cowpea: Green Forage Yield(q/ha) Cont.....

Entries	Hill Zone			North West Zone						
	Srinagar	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Bikaner	Udaipur	Average	Rank
MFC-09-5	152.5	1	4.7	363.4	435.2		223.7	194.4	304.2	2
APFC-10-4	138.4	3		254.6	361.1	111.1	189.4	217.6	226.8	6
UPC-1201	105.3	7		273.1	361.1	158.9	124.0	178.4	219.1	7
TNFC-0924	129.7	4		363.4	375.0	168.9	188.2	215.2	262.1	3
CL-396	103.1	8		317.1	351.9	125.5	186.2	209.3	238.0	4
BL-1 (NC)	125.3	5		294.0	365.8	103.3	191.7	201.8	231.3	5
UPC-5286 (NC)	112.3	6		379.6	472.3	303.3	156.2	209.8	304.2	2
UPC-622 ZC(HZ-NEZ)	145.7	2								
BL-2 ZC(NWZ)				437.5	513.9	236.7	181.6	158.6	305.7	1
UPC-9202 ZC(CZ-SZ)										
Mean	**126.5**			**335.3**	**404.5**	**172.5**	**180.1**	**198.1**	**261.4**	
CD at 5%	3.7			37.3	40.3	28.8	44.2	8.4		
CV%	1.7			12.3	5.6	9.5	13.8	10.4		

Cont...

Entries	North East Zone								Central Zone						
	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Average	Rank	Super%	Anand	Jhansi	Rahuri	Urulikanchan	Kanpur	Average	Rank
MFC-09-5	186.3	231.4	236.6	235.4	216.0	221.1	6		205.0	304.2	317.6	532.3	308.3	333.5	4
APFC-10-4	114.4	314.7	220.9	242.7	141.9	206.9	8		338.0	287.5	180.6	476.8	293.1	315.2	6
UPC-1201	143.0	281.4	225.0	268.7	204.6	224.5	5		259.0	316.7	338.0	486.1	261.1	332.2	5
TNFC-0924	175.7	416.7	234.3	382.2	210.6	283.9	1	12.7	304.0	350.0	271.3	597.1	281.9	360.9	3
CL-396	173.2	286.9	194.9	260.4	214.8	226.0	4		281.0	250.0	182.9	356.4	208.3	255.7	8
BL-1 (NC)	105.4	240.6	227.8	277.0	232.8	216.7	7		267.0	266.7	275.0	458.3	270.8	307.6	7
UPC-5286 (NC)	158.5	342.5	229.2	316.6	155.2	240.4	3		309.0	366.7	341.2	504.6	338.9	372.1	1
UPC-622 ZC(HZ-NEZ)	93.1	398.1	215.8	334.3	218.9	252.0	2								
BL-2 ZC(NWZ)															
UPC-9202 ZC(CZ-SZ)									298.0	308.3	384.3	587.9	279.2	371.5	2
Mean	**143.7**	**314.0**	**223.1**	**289.7**	**199.3**	**234.0**			**282.6**	**306.3**	**286.4**	**499.9**	**280.2**	**331.1**	
CD at 5%	31.4	90.6	10.1	2.6	12.1				46.1	2.5	68.9	34.6	63.1		
CV%	12.5	16.3	3.2	6.1	17.5				9.3	1.2	13.7	14.9	5.8		

Table 7.1 IVTC-Initial Varietal Trial in Forage Cowpea: Green Forage Yield(q/ha)

Entries	South Zone								All India		
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Superiority%	Average	Rank	Superi%
MFC-09-5	185.2	323.3	305.0	191.8	240.7	249.2	2	2.5	269.4	3	
APFC-10-4	192.1	230.0	132.8	228.4	277.8	212.2	7		235.4	6	
UPC-1201	208.3	305.0	208.7	193.2	259.3	234.9	5		245.7	4	
TNFC-0924	277.8	241.7	252.3	258.1	310.2	268.0	1	10.2	285.9	1	1.6
CL-396	213.0	276.7	121.6	106.6	248.2	193.2	8		222.3	7	
BL-1 (NC)	208.3	256.7	174.2	196.9	296.3	226.5	6		239.8	5	
UPC-5286 (NC)	203.7	255.0	275.1	185.3	296.3	243.1	3		281.5	2	
UPC-622 ZC(HZ-NEZ)											
BL-2 ZC(NWZ)											
UPC-9202 ZC(CZ-SZ)	194.4	281.7	221.6	208.5	291.7	239.6	4				
Mean	**210.4**	**271.3**	**211.4**	**196.1**	**277.5**	**233.3**			**254.3**		
CD at 5%	29.0	36.5	25.3	20.5	37.8						
CV%	11.2	7.7	6.9	6.0	7.8						

Table 7.2 IVTC-Initial Varietal Trial in Forage Cowpea: Dry Matter Yield(q/ha)

Cont.....

Entries	Hill Zone			North West Zone						
	Srinagar	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Bikaner	Average	Rank	Super%
MFC-09-5	25.5	1	2.8	54.5	69.7		50.4	58.2	1	0.2
APFC-10-4	23.5	3		44.6	48.1	21.3	45.6	39.9	7	
UPC-1201	15.3	7		47.8	53.1	31.8	25.4	39.5	8	
TNFC-0924	21.3	4		54.5	61.2	40.1	43.4	49.8	4	
CL-396	15.0	8		55.4	58.7	24.1	54.3	48.1	5	
BL-1 (NC)	20.2	5		51.5	54.7	17.7	40.0	41.0	6	
UPC-5286 (NC)	16.3	6		56.9	59.7	62.1	34.9	53.4	3	
UPC-622 ZC(HZ-NEZ)	24.8	2								
BL-2 ZC(NWZ)				76.6	66.6	46.7	42.4	58.1	2	
UPC-9202 ZC(CZ-SZ)										
Mean	**20.3**			**55.2**	**59.0**	**34.8**	**42.0**	**48.5**		
CD at 5%	2.3			6.2	7.6	7.0	14.5			
CV%	6.5			12.4	7.3	11.5	19.4			

Table 7.2 IVTC-Initial Varietal Trial in Forage Cowpea: Dry Matter Yield(q/ha)

Cont.....

Entries	North East Zone								Central Zone						
	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Average	Rank	Superiority%	Anand	Jhansi	Rahuri	Urulikanchan	Kanpur	Average	Rank
MFC-09-5	59.6	35.8	45.8	47.1	42.5	46.2	4		42.6	50.0	32.5	64.1	74.0	52.7	5
APFC-10-4	27.0	42.8	40.5	48.8	25.9	37.0	8		43.7	47.3	26.1	60.1	69.9	49.4	6
UPC-1201	44.9	38.9	42.8	54.0	31.0	42.3	5		53.8	52.0	41.6	65.9	56.0	53.9	4
TNFC-0924	45.8	65.0	43.0	85.1	35.1	54.8	1	12.5	58.3	57.7	37.6	82.0	65.7	60.3	3
CL-396	46.6	33.9	35.8	52.4	38.9	41.5	6		38.3	41.3	28.8	52.9	62.9	44.9	8
BL-1 (NC)	34.3	27.2	42.6	58.2	37.1	39.9	7		32.3	44.1	38.6	56.7	67.1	47.8	7
UPC-5286 (NC)	45.8	51.4	44.3	67.6	28.3	47.5	3		61.9	61.3	44.4	76.3	78.2	64.4	1
UPC-622 ZC(HZ-NEZ)	29.4	58.3	41.0	75.3	39.7	48.7	2								
BL-2 ZC(NWZ)															
UPC-9202 ZC(CZ-SZ)									61.0	51.4	46.2	75.7	67.6	60.4	2
Mean	**41.7**	**44.2**	**42.0**	**61.1**	**34.8**	**44.7**			**49.0**	**50.6**	**37.0**	**66.7**	**67.7**	**54.2**	
CD at 5%	12.8	14.5	5.2	0.5	3.8				8.8	1.5	8.7	12.3	11.7		
CV%	17.6	19.0	8.6	5.9	12.9				10.2	1.9	13.5	16.1	2.2		

Entries	South Zone								All India		
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Superiority%	Average	Rank	Superiority%
MFC-09-5	30.8	44.9	52.2	25.9	51.2	41.0	2	8.2	47.1	3	
APFC-10-4	30.8	32.0	22.9	30.1	60.3	35.2	7		38.5	7	
UPC-1201	32.7	42.4	27.7	24.6	53.5	36.2	6		41.1	4	
TNFC-0924	43.9	33.6	40.1	36.3	62.2	43.2	1	14.0	50.0	1	2.9
CL-396	34.3	38.4	18.7	13.6	49.8	31.0	8		39.2	5	
BL-1 (NC)	32.8	35.6	27.8	24.7	68.0	37.8	4		39.1	6	
UPC-5286 (NC)	31.6	35.2	42.6	24.0	56.1	37.9	3		48.6	2	
UPC-622 ZC(HZ-NEZ)											
BL-2 ZC(NWZ)											
UPC-9202 ZC(CZ-SZ)	29.2	39.1	32.8	27.2	60.3	37.7	5				
Mean	**33.2**	**37.7**	**33.1**	**25.8**	**57.7**	**37.5**			**43.4**		
CD at 5%	4.6	5.1	5.5	3.7	9.7						
CV%	11.0	7.7	9.6	8.2	9.6						

Table 7.3 IVTC-Initial Varietal Trial in Forage Cowpea: Green Forage Yield(q/ha/day)

Cont....

Entries	Srinagar	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Anand
MFC-09-5	1.50	3.60	6.22		3.99	2.69	3.67	2.72	3.99	2.91	2.44
APFC-10-4	1.35	2.52	5.34	1.46	3.38	1.68	5.53	2.54	4.04	1.91	5.20
UPC-1201	1.25	2.70	5.61	2.09	2.21	2.26	4.64	2.59	4.48	2.76	3.08
TNFC-0924	1.30	3.60	5.77	2.22	3.36	2.58	6.50	2.69	6.27	2.84	3.62
CL-396	1.20	3.14	5.36	1.63	3.33	2.51	4.36	2.24	4.20	2.90	4.32
BL-1 (NC)	1.20	2.91	5.84	1.28	3.42	1.41	4.92	2.62	3.65	3.14	4.11
UPC-5286 (NC)	1.34	3.76	6.88	3.30	2.79	2.23	6.08	2.63	4.34	2.09	3.68
UPC-622 ZC(HZ-NEZ)	1.35					1.37	6.53	2.48	4.40	2.95	
BL-2 ZC(NWZ)		4.33	7.41	2.75	3.24						
UPC-9202 ZC(CZ-SZ)											3.55
Mean	**1.31**	**3.32**	**6.05**	**2.10**	**3.22**	**2.09**	**5.28**	**2.56**	**4.42**	**2.69**	**3.75**

Entries	Jhansi	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank
MFC-09-5	4.45	5.38	9.86	4.60	3.19	5.39	4.62	2.94	4.01	4.11	3
APFC-10-4	4.42	3.84	9.35	5.05	3.20	3.83	2.83	4.90	4.63	3.85	5
UPC-1201	4.54	5.73	7.72	4.50	3.36	5.08	3.16	3.06	4.32	3.76	6
TNFC-0924	5.30	4.76	10.12	4.21	4.63	4.03	4.28	4.61	5.17	4.39	1
CL-396	3.54	3.98	7.27	3.86	3.74	4.61	2.53	2.64	3.86	3.56	7
BL-1 (NC)	4.33	5.61	9.75	4.23	3.79	4.28	3.63	4.34	4.94	3.97	4
UPC-5286 (NC)	5.39	6.20	7.88	4.84	3.40	4.26	4.30	2.92	4.94	4.16	2
UPC-622 ZC(HZ-NEZ)											
BL-2 ZC(NWZ)											
UPC-9202 ZC(CZ-SZ)	4.34	6.86	9.48	3.99	3.60	4.70	3.52	3.46	4.86		
Mean	**4.54**	**5.30**	**8.93**	**4.41**	**3.61**	**4.52**	**3.61**	**3.61**	**4.59**	**3.97**	

Table 7.4 IVTC-Initial Varietal Trial in Forage Cowpea: Dry Matter Yield(q/ha/day)

cont.....

Entries	Srinagar	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat
MFC-09-5	0.96	0.54	1.00		0.90	0.86	0.58	0.53	0.80	0.57
APFC-10-4	0.85	0.44	0.71	0.28	0.81	0.39	0.75	0.47	0.81	0.34
UPC-1201	0.65	0.47	0.82	0.42	0.45	0.71	0.64	0.49	0.90	0.41
TNFC-0924	0.75	0.54	0.94	0.53	0.78	0.68	1.00	0.49	1.40	0.47
CL-396	0.65	0.55	0.89	0.31	0.97	0.67	0.50	0.41	0.84	0.52
BL-1 (NC)	0.70	0.51	0.87	0.22	0.71	0.45	0.56	0.49	0.77	0.50
UPC-5286 (NC)	0.66	0.56	0.87	0.68	0.62	0.64	0.89	0.51	0.93	0.38
UPC-622 ZC(HZ-NEZ)	0.92					0.43	0.97	0.47	0.99	0.53
BL-2 ZC(NWZ)		0.76	0.96	0.51	0.76					
UPC-9202 ZC(CZ-SZ)										
Mean	**0.77**	**0.55**	**0.88**	**0.42**	**0.75**	**0.60**	**0.74**	**0.48**	**0.93**	**0.47**

Entries	Anand	Jhansi	Rahuri	Urulikanchan	Kanpur	Coimbatore	Hyderabad	Dharwad	Average	Rank
MFC-09-5	0.51	0.73	0.55	1.19	1.10	0.53	0.40	0.85	0.74	2
APFC-10-4	0.67	0.73	0.55	1.18	1.20	0.51	0.65	1.01	0.69	3
UPC-1201	0.64	0.75	0.70	1.05	0.97	0.53	0.39	0.89	0.66	6
TNFC-0924	0.69	0.87	0.66	1.39	0.98	0.73	0.65	1.04	0.81	1
CL-396	0.59	0.59	0.63	1.08	1.17	0.60	0.34	0.80	0.67	5
BL-1 (NC)	0.50	0.72	0.79	1.21	1.05	0.60	0.54	1.13	0.68	4
UPC-5286 (NC)	0.74	0.90	0.81	1.19	1.12	0.53	0.38	0.93	0.74	2
UPC-622 ZC(HZ-NEZ)										
BL-2 ZC(NWZ)										
UPC-9202 ZC(CZ-SZ)	0.73	0.72	0.83	1.22	0.97	0.54	0.45	1.01		
Mean	**0.63**	**0.75**	**0.69**	**1.19**	**1.07**	**0.57**	**0.48**	**0.96**	**0.71**	

Table 7.5 IVTC-Initial Varietal Trial in Forage Cowpea: Crude Protein Yield (q/ha)

Entries	Ludhiana	Faizabad	Bhubaneswar	Jorhat	Anand	Rahuri	Urulikanchan	Coimbatore	Mandya	Hyderabad	Average	Rank
MFC-09-5	9.1	10.1	7.3	6.0	5.4	4.4	10.2	5.7	8.0	3.2	6.9	3
APFC-10-4	7.8	4.5	7.2	3.2	5.5	3.7	10.2	5.5	3.0	4.3	5.5	7
UPC-1201	7.9	8.0	8.0	4.6	7.1	5.9	10.5	5.4	4.1	4.1	6.6	4
TNFC-0924	8.8	8.2	12.6	5.1	7.2	5.5	13.2	6.3	5.4	4.8	7.7	1
CL-396	8.4	8.5	7.8	5.1	4.6	4.2	9.3	4.4	1.9	2.1	5.6	6
BL-1 (NC)	7.7	5.6	9.0	5.3	4.1	5.4	9.9	6.2	3.3	3.7	6.0	5
UPC-5286 (NC)	10.1	8.2	10.1	3.7	8.1	6.1	12.3	6.3	6.9	3.8	7.5	2
UPC-622 ZC(HZ-NEZ)		4.5	11.1	5.6								
BL-2 ZC(NWZ)	13.8											
UPC-9202 ZC(CZ-SZ)					7.9	6.2	12.2	5.1	4.0	4.3		
Mean	**9.2**	**7.2**	**9.1**	**4.8**	**6.2**	**5.2**	**10.9**	**5.6**	**4.6**	**3.8**	**6.5**	

Table 7.6 IVTC-Initial Varietal Trial in Forage Cowpea: Crude Protein (%)

Entries	Ludhiana	Faizabad	Bhubaneswar	Jorhat	Anand	Rahuri	Urulikanchan	Coimbatore	Mandya	Hyderabad	Average	Rank
MFC-09-5	16.8	16.9	15.5	14.3	12.6	13.5	15.9	18.4	15.3	12.3	15.1	3
APFC-10-4	17.5	16.7	14.8	12.5	12.5	14.1	17.0	17.9	13.1	14.4	15.1	3
UPC-1201	16.5	17.8	14.7	15.2	13.2	14.2	15.9	16.6	14.9	16.6	15.6	2
TNFC-0924	16.1	18.0	14.8	14.8	12.3	14.6	16.1	14.4	13.6	13.1	14.8	4
CL-396	15.2	18.2	14.8	13.3	12.1	14.6	17.6	12.7	10.1	15.8	14.4	5
BL-1 (NC)	15.0	16.3	15.4	14.5	12.6	14.1	17.3	18.8	11.8	14.9	15.1	3
UPC-5286 (NC)	17.7	17.8	14.9	13.5	13.1	13.8	16.1	19.7	16.2	15.8	15.8	1
UPC-622 ZC(HZ-NEZ)		15.5	14.8	14.4								
BL-2 ZC(NWZ)	18.1											
UPC-9202 ZC(CZ-SZ)					12.9	13.4	16.1	17.5	12.3	15.8		
Mean	**16.6**	**17.1**	**15.0**	**14.0**	**12.7**	**14.0**	**16.5**	**17.0**	**13.4**	**14.8**	**15.1**	

Table 7.7 IVTC-Initial Varietal Trial in Forage Cowpea: Plant Height (cm)

Cont....

Entries	Srinagar	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat
MFC-09-5	110.3	212.7	171.0		118.7	161.4	115.0	111.1	265.0	217.7
APFC-10-4	99.0	213.3	159.5	93.3	98.7	165.8	118.0	112.1	271.7	216.7
UPC-1201	100.3	214.7	158.4	96.7	102.0	160.2	121.0	112.6	289.7	214.3
TNFC-0924	96.0	235.0	179.5	145.0	134.0	173.4	125.0	111.7	314.3	265.7
CL-396	112.3	204.0	162.0	133.3	156.0	175.8	118.0	113.5	284.3	234.3
BL-1 (NC)	130.3	228.3	240.7	118.3	101.3	149.5	116.0	112.8	295.7	286.7
UPC-5286 (NC)	125.3	223.3	214.0	166.7	94.7	156.3	118.0	113.8	300.0	213.3
UPC-622 ZC(HZ-NEZ)	112.3					170.2	110.0	112.0	308.7	228.7
BL-2 ZC(NWZ)		218.3	209.4	148.3	130.7					
UPC-9202 ZC(CZ-SZ)										
Mean	**110.8**	**218.7**	**186.8**	**128.8**	**117.0**	**164.1**	**117.6**	**112.5**	**291.2**	**234.7**

Entries	Anand	Jhansi	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Average	Rank
MFC-09-5	91.4	205.0	85.3	138.9	153.2	85.7	84.3	68.8	93.0	138.2	5
APFC-10-4	122.6	187.9	87.1	147.4	145.9	99.3	105.3	50.9	80.5	135.5	6
UPC-1201	85.0	179.3	76.1	201.2	137.2	91.7	99.0	43.5	83.9	135.1	7
TNFC-0924	85.0	252.6	143.4	214.1	164.3	83.6	117.7	63.5	149.5	160.7	1
CL-396	131.3	189.0	93.1	153.3	158.1	95.3	120.0	61.9	82.7	146.2	4
BL-1 (NC)	115.2	234.2	113.1	153.4	187.8	74.0	101.3	60.3	98.0	153.5	2
UPC-5286 (NC)	102.1	203.1	85.5	226.0	130.5	74.3	119.0	57.3	113.2	149.3	3
UPC-622 ZC(HZ-NEZ)											
BL-2 ZC(NWZ)											
UPC-9202 ZC(CZ-SZ)	100.6	218.4	87.7	204.8	184.5	95.3	95.0	57.4	98.9		
Mean	**104.2**	**208.7**	**96.4**	**179.9**	**157.7**	**87.4**	**105.2**	**57.9**	**100.0**	**145.5**	

Table 7.8 IVTC-Initial Varietal Trial in Forage Cowpea: Leaf Stem Ratio

Cont.....

Entries	Srinagar	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat
MFC-09-5	0.56	0.30	0.55		0.71	0.65	0.63	0.90	0.88	1.02
APFC-10-4	0.52	0.38	0.34	0.74	0.90	0.69	0.57	0.80	0.95	1.21
UPC-1201	0.35	0.54	0.42	0.59	0.88	0.71	0.66	0.90	1.08	1.09
TNFC-0924	0.43	0.60	0.39	0.52	0.96	0.72	0.38	0.80	1.39	1.38
CL-396	0.34	0.33	0.47	0.49	0.63	0.75	0.73	0.80	0.99	1.14
BL-1 (NC)	0.42	0.33	0.45	0.50	1.03	0.69	0.74	0.80	1.19	1.23
UPC-5286 (NC)	0.38	0.54	0.48	0.44	0.87	0.68	0.55	0.73	1.24	1.23
UPC-622 ZC(HZ-NEZ)	0.54					0.63	0.57	0.90	1.31	0.86
BL-2 ZC(NWZ)		0.60	0.36	0.43	0.85					
UPC-9202 ZC(CZ-SZ)										
Mean	**0.44**	**0.45**	**0.43**	**0.53**	**0.85**	**0.69**	**0.60**	**0.83**	**1.13**	**1.15**

Entries	Jhansi	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Average	Rank
MFC-09-5	0.63	0.53	0.74	0.71	0.41	0.77	0.78	0.80	0.68	3
APFC-10-4	0.61	0.48	1.03	0.70	0.33	0.74	0.71	0.42	0.67	4
UPC-1201	0.58	0.50	0.84	0.67	0.30	0.85	0.50	0.49	0.66	5
TNFC-0924	0.63	0.67	1.00	0.60	0.37	0.67	0.55	0.62	0.70	1
CL-396	0.56	0.65	0.96	0.53	0.43	0.68	0.74	0.35	0.64	6
BL-1 (NC)	0.60	0.39	0.99	0.66	0.43	0.83	0.61	0.40	0.68	3
UPC-5286 (NC)	0.65	0.64	0.96	0.66	0.34	0.74	0.62	0.74	0.69	2
UPC-622 ZC(HZ-NEZ)										
BL-2 ZC(NWZ)										
UPC-9202 ZC(CZ-SZ)	0.67	0.67	0.64	0.54	0.43	0.75	0.71	0.39		
Mean	**0.62**	**0.57**	**0.90**	**0.63**	**0.38**	**0.75**	**0.65**	**0.53**	**0.68**	

Table 7.9 IVTC-Initial Varietal Trial in Forage Cowpea: ADF(%) , NDF% & IVDMD (%)

Entries	ADF (%)		NDF (%)		IVDMD (%)	
	Ludhiana	Rank	Ludhiana	Rank	Ludhiana	Rank
MFC-09-5	36.7	4	43.8	5	62.0	4
APFC-10-4	36.5	3	43.4	3	63.0	3
UPC-1201	36.8	5	44.3	6	61.4	5
TNFC-0924	37.1	6	44.4	7	61.0	6
CL-396	38.3	7	46.5	8	58.6	7
BL-1 (NC)	38.6	8	43.5	4	57.8	8
UPC-5286 (NC)	36.4	2	41.3	2	63.4	2
UPC-622 ZC(HZ-NEZ)						
BL-2 ZC(NWZ)	34.6	1	41.0	1	63.6	1
UPC-9202 ZC(CZ-SZ)						
Mean	**36.9**		**43.5**		**61.4**	

Table 8.1 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Green Forage Yield (q/ha)

Cont.....

Entries	North West Zone							North East Zone								
	Ludhiana	Hisar	Pantnagar	Bikaner	Average	Rank	Superi%	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa	Shillong*	Average	Rank
UPC-1101	368.8	324.9	385.9	218.1	324.4	2	3.8	90.1	122.4	175.0	244.9	171.7	292.0	71.3	182.7	6
UPC-1102	397.9	366.5	339.9	204.9	327.3	1	4.8	71.7	203.1	172.1	262.1	191.2	273.0	61.5	195.5	5
Culture-1	295.8	295.7	301.6	186.9	270.0	5		104.5	158.9	184.0	307.9	192.5	329.0	68.3	212.8	3
BL-1 (NC)	274.0	316.5	140.8	191.2	230.6	6		148.6	138.0	187.9	222.0	225.5	287.0	80.3	201.5	4
UPC-5286 (NC)	381.3	320.7	369.0	178.4	312.4	3		146.4	156.3	196.5	319.4	179.1	313.0	77.5	218.4	2
UPC-622 ZC (HZ-NEZ)								91.3	195.5	196.7	286.0	208.9	341.0	68.1	219.9	1
BL-2 ZC (NWZ)	397.9	293.6	205.8	193.6	272.7	4										
UPC-9202 ZC (CZ-SZ)																
Mean	**352.6**	**319.7**	**290.5**	**195.5**	**289.6**			**108.8**	**162.4**	**185.4**	**273.7**	**194.8**	**305.8**	**71.2**	**205.1**	
CD at 5%	24.9	32.1	38.6	NS				19.8	36.3	20.5	31.0	7.7	29.3	NS		
CV%	3.3	6.6	7.3	14.5				12.1	14.8	8.9	3.8	15.0	8.7	25.0		

Cont.....

Entries	Central Zone							
	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Average	Rank
UPC-1101	236.0	262.5	259.2	307.6	458.3	416.7	323.4	3
UPC-1102	244.0	325.0	229.0	269.9	410.4	443.3	320.3	4
Culture-1	274.0	335.4	105.1	263.9	433.3	424.2	306.0	5
BL-1 (NC)	191.0	312.5	74.9	267.6	404.1	453.3	283.9	6
UPC-5286 (NC)	244.0	295.8	202.9	316.7	487.4	483.3	338.4	1
UPC-622 ZC (HZ-NEZ)								
BL-2 ZC (NWZ)								
UPC-9202 ZC (CZ-SZ)	245.0	320.8	161.3	331.7	447.9	465.8	328.8	2
Mean	**239.0**	**308.7**	**172.1**	**292.9**	**440.2**	**447.8**	**316.8**	
CD at 5%	20.2	4.6	42.1	47.9	27.8	41.4		
CV%	5.6	9.8	16.2	10.8	7.1	4.5		

Table 8.1 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Green Forage Yield (q/ha)

Entries	South Zone							All India	
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Average	Rank
UPC-1101	168.7	247.8	231.9	164.5	172.9	197.2	5	253.3	3
UPC-1102	204.2	293.8	227.7	149.9	200.0	215.1	2	260.9	2
Culture-1	177.1	306.3	209.8	137.4	189.6	204.0	3	248.2	4
BL-1 (NC)	120.8	270.0	180.5	191.6	170.8	186.8	6	227.1	5
UPC-5286 (NC)	200.0	253.8	264.3	154.1	208.3	216.1	1	270.0	1
UPC-622 ZC (HZ-NEZ)									
BL-2 ZC (NWZ)									
UPC-9202 ZC (CZ-SZ)	200.0	252.5	217.9	152.0	175.0	199.5	4		
Mean	**178.5**	**270.7**	**222.0**	**158.3**	**186.1**	**203.1**		**251.9**	
CD at 5%	21.6	25.4	17.4	19.3	NS				
CV%	11.4	6.3	5.2	8.1	18.3				

Table 8.2 : AVTC-1 : First Advanced varietal trial in Forage Cowpea : Dry matter Yield (q/ha)

Cont.....

Entries	North West Zone						North East Zone									
	Ludhi.	Hisar	Pantn.	Bikaner	Average	Rank	Faiza.	Ranchi	Kalyani	Bhuba.	Jorhat	Pusa	Shillong*	Average	Rank	Super%
UPC-1101	55.3	43.8	74.9	42.8	54.2	3	28.8	39.2	22.9	49.4	30.0	64.2	16.9	39.1	5	
UPC-1102	69.7	47.6	60.0	42.8	55.0	2	25.1	32.6	26.2	52.8	30.3	61.4	14.2	38.1	6	
Culture-1	44.4	39.9	60.0	43.3	46.9	4	38.9	26.7	28.3	68.8	31.7	72.4	14.1	44.5	1	1.8
BL-1 (NC)	47.9	45.9	25.8	43.4	40.7	6	46.7	24.0	28.7	44.5	39.8	62.6	12.8	41.1	4	
UPC-5286 (NC)	57.2	48.0	75.6	39.4	55.1	1	40.1	23.3	31.5	68.2	30.5	68.5	18.4	43.7	2	
UPC-622 ZC (HZ-NEZ)							32.2	25.9	34.7	56.8	35.1	76.4	13.6	43.5	3	
BL-2 ZC (NWZ)	59.7	40.4	40.0	44.5	46.1	5										
UPC-9202 ZC (CZ-SZ)																
Mean	**55.7**	**44.3**	**56.0**	**42.7**	**49.7**		**35.3**	**28.6**	**28.7**	**56.7**	**32.9**	**67.6**	**15.0**	**41.6**		
CD at 5%	7.4	5.1	9.3	NS			24.7	5.8	3.9	6.5	2.8	7.3	NS			
CV%	6.1	7.6	9.1	17.8			14.7	13.2	10.6	3.8	13.2	9.1	27.8			

***not included in zonal and all India average due to CV is >= 20**

Table 8.2 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Dry Matter Yield (q/ha)

Entries	Central Zone							
	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Average	Rank
UPC-1101	44.1	41.3	51.0	35.8	58.2	84.2	52.4	4
UPC-1102	36.1	60.0	44.7	37.3	51.4	103.3	55.5	3
Culture-1	37.5	62.2	19.3	39.2	58.7	80.0	49.5	5
BL-1 (NC)	24.1	54.7	12.8	32.2	51.2	93.3	44.7	6
UPC-5286 (NC)	33.5	51.6	38.9	34.4	75.3	104.2	56.3	2
UPC-622 ZC (HZ-NEZ)								
BL-2 ZC (NWZ)								
UPC-9202 ZC (CZ-SZ)	42.6	57.3	30.1	40.4	64.8	113.3	58.1	1
Mean	**36.3**	**54.5**	**32.8**	**36.5**	**59.9**	**96.4**	**52.7**	
CD at 5%	3.0	1.5	8.0	6.3	7.2	14.0		
CV%	5.5	1.8	16.1	11.4	15.1	3.3		

Entries	South Zone							All India	
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Average	Rank
UPC-1101	28.2	34.4	43.6	22.3	35.6	32.8	4	44.3	3
UPC-1102	35.4	40.8	42.8	22.3	42.9	36.8	2	46.0	2
Culture-1	27.0	42.6	33.3	19.1	41.0	32.6	5	43.5	4
BL-1 (NC)	15.5	37.5	38.8	26.8	32.5	30.2	6	39.5	5
UPC-5286 (NC)	33.4	35.2	54.2	21.5	46.7	38.2	1	48.2	1
UPC-622 ZC (HZ-NEZ)									
BL-2 ZC (NWZ)									
UPC-9202 ZC (CZ-SZ)	33.5	35.1	40.1	20.8	36.1	33.1	3		
Mean	**28.8**	**37.6**	**42.1**	**22.1**	**39.1**	**34.0**		**44.3**	
CD at 5%	3.6	3.5	5.0	3.6	(NS)				
CV%	11.7	5.3	7.9	10.8	19.6				

Table 8.3 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Green Forage Yield (q/ha/day)

Cont....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa	Shillong
UPC-1101	3.84	4.87	4.29	3.89	1.28	2.10	1.84	3.92	2.28	5.10	0.92
UPC-1102	4.14	5.27	3.78	3.66	1,00	3.63	1.81	4.26	2.54	4.82	0.82
Culture-1	3.08	4.38	3.39	3.34	1.53	2.30	1.94	4.89	2.56	5.63	0.91
BL-1 (NC)	2.85	4.67	2.07	3.41	2.15	2.71	1.98	3.39	3.00	5.13	1.04
UPC-5286 (NC)	3.97	4.57	4.10	3.19	2.03	2.65	2.07	4.91	2.38	5.52	1.03
UPC-622 ZC (HZ-NEZ)					1.30	3.17	2.07	4.59	2.78	5.86	0.91
BL-2 ZC (NWZ)	4.14	4.35	2.29	3.46							
UPC-9202 ZC (CZ-SZ)											
Mean	**3.67**	**4.68**	**3.32**	**3.49**	**1.66**	**2.76**	**1.95**	**4.33**	**2.59**	**5.34**	**0.94**

Entries	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank
UPC-1101	2.81	3.51	3.81	4.88	7.05	4.41	2.91	4.12	3.57	2.61	2.88	3.49	4
UPC-1102	2.90	4.72	3.41	4.35	6.41	6.16	3.14	4.90	3.30	2.54	3.33	3.80	1
Culture-1	3.15	4.81	1.50	4.40	6.28	6.33	3.11	5.10	2.91	2.55	3.16	3.51	3
BL-1 (NC)	3.41	4.76	1.08	5.15	7.77	7.08	2.01	4.50	3.54	3.70	2.85	3.56	2
UPC-5286 (NC)	3.25	3.86	2.94	5.19	8.26	6.28	3.33	4.22	3.78	2.61	3.47	3.80	1
UPC-622 ZC (HZ-NEZ)													
BL-2 ZC (NWZ)													
UPC-9202 ZC (CZ-SZ)	2.92	4.41	2.37	5.18	6.31	6.85	3.45	4.02	3.35	2.63	2.92		
Mean	**3.07**	**4.35**	**2.52**	**4.86**	**7.01**	**6.19**	**2.99**	**4.48**	**3.41**	**2.77**	**3.10**	**3.63**	

Table 8.4 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Dry Matter Yield (q/ha/day)

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa
UPC-1101	0.58	0.66	0.83	0.76	0.41	0.68	0.24	0.79	0.39	1.13
UPC-1102	0.73	0.69	0.67	0.76	0.35	0.58	0.28	0.86	0.40	1.08
Culture-1	0.46	0.59	0.67	0.77	0.57	0.42	0.30	1.09	0.42	1.23
BL-1 (NC)	0.50	0.68	0.38	0.77	0.67	0.47	0.30	0.68	0.53	1.12
UPC-5286 (NC)	0.60	0.68	0.84	0.70	0.55	0.40	0.33	1.05	0.40	1.20
UPC-622 ZC (HZ-NEZ)					0.46	0.51	0.37	0.91	0.46	1.29
BL-2 ZC (NWZ)	0.62	0.60	0.44	0.79						
UPC-9202 ZC (CZ-SZ)										
Mean	**0.58**	**0.65**	**0.64**	**0.76**	**0.50**	**0.51**	**0.30**	**0.90**	**0.43**	**1.18**

Entries	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Hyderabad	Dharwad	Average	Rank
UPC-1101	0.53	0.55	0.75	0.57	0.89	1.09	0.49	0.35	0.59	0.65	3
UPC-1102	0.43	0.87	0.67	0.60	0.80	1.44	0.54	0.38	0.71	0.68	2
Culture-1	0.43	0.89	0.28	0.65	0.85	1.19	0.47	0.35	0.68	0.65	3
BL-1 (NC)	0.43	0.83	0.19	0.62	0.98	1.46	0.26	0.52	0.54	0.63	4
UPC-5286 (NC)	0.45	0.67	0.56	0.56	1.28	1.35	0.56	0.36	0.78	0.70	1
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	0.51	0.79	0.44	0.63	0.91	1.67	0.58	0.36	0.60		
Mean	**0.46**	**0.77**	**0.48**	**0.61**	**0.95**	**1.37**	**0.48**	**0.39**	**0.65**	**0.66**	

Table 8.5 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Crude Protein Yield (q/ha)

Entries	Ludhiana	Faizabad	Kalyani	Bhubaneswar	Jorhat	Anand	Jabalpur	Rahuri	Urulikanchan	Coimbatore	Mandya	Hyderabad	Average	Rank
UPC-1101	9.7	4.4	2.6	7.5	3.9	5.2	6.5	5.1	9.1	5.6	7.8	3.9	5.9	3
UPC-1102	13.2	4.0	3.5	8.1	3.8	4.4	5.7	5.3	8.4	6.9	6.2	3.9	6.1	2
Culture-1	7.8	6.3	4.5	10.4	3.6	4.7	2.4	5.7	10.2	5.7	5.8	3.2	5.8	4
BL-1 (NC)	8.5	7.7	5.0	6.8	4.8	3.0	1.5	4.6	8.5	3.1	7.3	4.4	5.4	5
UPC-5286 (NC)	10.6	6.7	4.8	10.2	4.1	4.1	5.0	4.8	12.2	6.9	9.4	3.7	6.9	1
UPC-622 ZC (HZ-NEZ)		5.4	3.8	8.6	5.3									
BL-2 ZC (NWZ)	10.3													
UPC-9202 ZC (CZ-SZ)						5.2	3.8	5.3	10.6	6.4	6.1	3.4		
Mean	**10.0**	**5.7**	**4.0**	**8.6**	**4.2**	**4.4**	**4.1**	**5.1**	**9.8**	**5.7**	**7.1**	**3.8**	**6.0**	

Table 8.6 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Crude protein (%)

Entries	Ludhiana	Pantnagar	Faizabad	Bhubaneswar	Jorhat	Anand	Rahuri	Urulikanchan	Coimbatore	Mandya	Hyderabad	Jabalpur	Average	Rank
UPC-1101	17.6	18.4	15.4	15.3	13.4	11.8	14.3	15.6	19.7	18.0	17.5	12.9	15.8	3
UPC-1102	19.0	19.3	15.8	15.4	12.8	12.3	14.1	16.3	19.3	15.3	17.5	12.8	15.8	3
Culture-1	17.5	20.1	16.2	15.1	11.4	12.4	14.5	17.4	21.0	18.8	16.9	12.2	16.1	1
BL-1 (NC)	17.8	20.1	16.4	15.4	12.1	12.4	14.3	16.5	20.1	18.8	16.4	12.0	16.0	2
UPC-5286 (NC)	18.6	17.5	16.8	14.9	13.8	12.4	14.0	16.1	20.6	18.8	17.1	12.8	16.1	1
UPC-622 ZC (HZ-NEZ)			16.8	15.2	13.0									
BL-2 ZC (NWZ)	17.2	19.3												
UPC-9202 ZC (CZ-SZ)						12.2	13.2	16.3	19.3	15.3	16.2	12.5	16.0	
Mean	**18.0**	**19.1**	**16.2**	**15.2**	**12.8**	**12.2**	**14.1**	**16.4**	**20.0**	**17.5**	**16.9**	**12.5**		

Table 8.7 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Plant Height (cm)

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Shillong	Anand
UPC-1101	192.5	220.8	185.0	56.3	153.2	116.0	113.3	261.5	72.8	38.6	112.3
UPC-1102	235.5	180.7	168.3	51.5	145.8	119.0	118.4	274.5	95.0	30.4	99.7
Culture-1	199.3	178.1	156.7	63.0	146.4	119.0	119.4	289.5	122.3	29.2	95.0
BL-1 (NC)	246.8	166.2	170.0	56.8	150.7	112.0	117.2	257.0	201.9	41.4	128.2
UPC-5286 (NC)	145.5	172.1	178.3	54.0	160.2	110.0	112.0	298.8	85.8	52.6	128.8
UPC-622 ZC (HZ-NEZ)					149.5	111.0	119.9	276.3	103.5	60.4	
BL-2 ZC (NWZ)	176.3	181.1	133.3	79.8							
UPC-9202 ZC (CZ-SZ)											101.3
Mean	**199.3**	**183.2**	**165.3**	**60.2**	**151.0**	**114.5**	**116.7**	**276.3**	**113.5**	**42.1**	**110.9**

Entries	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Average	Rank
UPC-1101	218.0	176.4	97.8	199.8	198.1	83.3	134.5	46.9	106.0	139.1	3
UPC-1102	218.6	170.9	118.6	217.1	216.6	75.0	157.0	54.0	85.5	141.6	2
Culture-1	210.1	118.7	73.3	185.7	192.5	80.3	159.0	44.3	74.8	132.8	4
L-1 (NC)	207.7	85.5	122.9	181.4	208.4	75.0	142.5	89.2	104.0	143.2	1
UPC-5286 (NC)	211.9	159.6	90.0	135.3	149.9	74.6	141.0	62.9	83.3	130.3	5
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	203.4	144.6	97.1	188.1	159.4	90.0	130.5	46.2	85.5		
Mean	**211.6**	**142.6**	**99.9**	**184.6**	**187.5**	**79.7**	**144.1**	**57.2**	**89.9**	**137.4**	

Table 8.8 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : Leaf stem ratio

Cont....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Pusa	Shillong
UPC-1101	0.88	0.23	0.44	0.89	0.69	0.58	0.60	0.98	0.97	0.57
UPC-1102	0.75	0.22	0.40	1.01	0.61	0.50	0.60	1.04	0.97	0.37
Culture-1	0.85	0.53	0.43	1.04	0.64	0.51	0.65	1.28	0.93	0.26
BL-1 (NC)	0.90	0.57	0.51	1.02	0.75	0.52	0.93	0.81	0.96	0.61
UPC-5286 (NC)	1.20	0.30	0.47	1.00	0.71	0.71	0.72	1.39	0.93	0.59
UPC-622 ZC (HZ-NEZ)					0.67	0.46	0.88	1.14	0.90	0.49
BL-2 ZC (NWZ)	0.88	0.24	0.33	1.07						
UPC-9202 ZC (CZ-SZ)										
Mean	**0.91**	**0.34**	**0.43**	**1.01**	**0.68**	**0.55**	**0.73**	**1.11**	**0.94**	**0.48**

Entries	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Average	Rank
UPC-1101	0.62	0.73	0.77	1.04	0.55	0.45	0.78	0.41	0.84	0.69	3
UPC-1102	0.62	0.66	0.75	1.07	0.57	0.42	0.75	0.52	0.87	0.67	4
Culture-1	0.62	0.48	0.73	1.13	0.63	0.41	0.87	0.44	0.78	0.70	2
BL-1 (NC)	0.50	0.31	0.49	0.89	0.56	0.46	0.79	0.59	0.64	0.67	4
UPC-5286 (NC)	0.50	0.56	0.72	0.73	0.54	0.46	0.76	0.41	0.78	0.71	1
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	0.61	0.54	0.67	1.11	0.59	0.38	0.77	0.58	0.75		
Mean	**0.58**	**0.55**	**0.69**	**1.00**	**0.57**	**0.43**	**0.79**	**0.49**	**0.78**	**0.69**	

Table 8.9 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea : IVDMD%

Entries	Ludhiana	Hisar	Rahuri	Average	Rank
UPC-1101	60.3	52.2	52.2	54.9	5
UPC-1102	63.4	58.0	58.0	59.8	1
Culture-1	60.0	58.5	58.5	59.0	3
BL-1 (NC)	61.4	52.7	52.7	55.6	4
UPC-5286 (NC)	62.4	57.9	57.9	59.4	2
UPC-622 ZC (HZ-NEZ)					
BL-2 ZC (NWZ)	59.6	56.8			
UPC-9202 ZC (CZ-SZ)					
Mean	**61.2**	**56.0**	**55.9**	**57.7**	

Table 8.10 : AVTC-1 : First Advanced Varietal Trial in Forage Cowpea :ADF (%) & NDF (%)

Entries	ADF (%)					NDF (%)						
	Ludhiana	Rahuri	Pantnagar	Average	Rank	Ludhiana	Hisar	Pantnagar	Anand	Rahuri	Average	Rank
UPC-1101	30.3	48.5	48.2	42.3	4	48.2	61.1	57.4	58.0	61.1	57.2	2
UPC-1102	26.7	46.0	50.2	41.0	2	43.1	61.6	61.8	62.0	61.6	58.0	3
Culture-1	28.0	44.0	52.0	41.3	3	47.2	59.1	58.2	57.0	59.1	56.1	1
BL-1 (NC)	30.2	45.6	51.8	42.5	5	48.0	61.3	60.4	60.0	61.3	58.2	4
UPC-5286 (NC)	26.8	45.8	48.6	40.4	1	47.1	60.1	59.4	65.0	60.1	58.3	5
UPC-622 ZC (HZ-NEZ)												
BL-2 ZC (NWZ)	30.9		48.6			51.1	60.4	62.2				
UPC-9202 ZC (CZ-SZ)		49.1							59.0	60.4		
Mean	**28.8**	**46.5**	**49.9**	**41.5**	**3.0**	**47.5**	**60.6**	**59.9**	**60.2**	**60.6**	**57.6**	

Table 9.1 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Green Forage Yield(q/ha)

Cont.....

Entries	Hill Zone			North West Zone					
	Almora	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Bikaner	Average	Rank
MFC-09-1	172.0	1	7.9	399.0	262.4	260.7	203.9	281.5	3
RR-3	170.5	2	6.9	380.2	281.1	259.9	190.1	277.8	4
BL-1 (NC)	127.2	5		341.7	266.6	130.0	213.9	238.0	5
UPC-5286 (NC)	129.7	4		405.2	247.8	314.0	168.6	283.9	1
UPC-622 ZC (HZ-NEZ)	159.4	3							
BL-2 ZC (NWZ)				399.0	266.6	266.6	197.2	282.3	2
UPC-9202 ZC (CZ-SZ)									
Mean	**151.7**			**385.0**	**264.9**	**246.2**	**194.7**	**272.7**	
CD at 5%	19.2			38.9	5.3	70.2		NS	
CV%	8.2			4.6	4.0	15.2		14.6	

Entries	North East Zone								
	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa	Shillong	Average	Rank
MFC-09-1	95.0	218.8	208.1	291.8	108.5	321.0	77.1	188.6	2
RR-3	112.1	171.9	193.5	244.9	200.0	293.0	74.6	184.3	3
BL-1 (NC)	92.2	156.3	229.3	192.8	230.7	369.0	62.5	190.4	1
UPC-5286 (NC)	65.9	138.0	215.2	263.1	162.2	324.0	82.8	178.7	4
UPC-622 ZC (HZ-NEZ)	118.0	179.7	200.2	208.4	120.5	299.0	98.5	174.9	5
BL-2 ZC (NWZ)									
UPC-9202 ZC (CZ-SZ)									
Mean	**96.6**	**172.9**	**209.3**	**240.2**	**164.4**	**321.2**	**79.1**	**183.4**	
CD at 5%	14.9	50.3	12.8	30.8	6.9	21.7	21.7		
CV%	10.0	18.7	4.2	4.2	9.2	8.3	9.8		

Table 9.1 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Green Forage Yield(q/ha)

Cont.....

Entries	Central Zone							
	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Average	Rank
MFC-09-1	144.0	295.8	232.1	335.3	435.4	427.7	311.7	3
RR-3	169.0	295.8	226.9	220.3	483.3	458.5	309.0	4
BL-1 (NC)	144.0	241.7	168.6	343.4	531.2	276.3	284.2	5
UPC-5286 (NC)	224.0	289.6	150.9	363.4	504.1	549.4	346.9	1
UPC-622 ZC (HZ-NEZ)								
BL-2 ZC (NWZ)								
UPC-9202 ZC (CZ-SZ)	138.0	297.9	219.6	237.4	499.9	580.4	328.9	2
Mean	**163.8**	**284.2**	**199.6**	**300.0**	**490.8**	**458.5**	**316.1**	
CD at 5%	16.2	3.6	37.5	56.8	22.8	48.1		
CV%	6.4	8.3	12.2	12.3	6.9	5.0		

Entries	South Zone								All India		
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Superiority%	Average	Rank	Superiority%
MFC-09-1	252.1	290.0	271.6	204.1	216.7	246.9	1	14.2	248.8	1	1.4
RR-3	210.4	253.8	239.2	183.3	185.4	214.4	3		239.0	3	
BL-1 (NC)	229.2	270.0	192.8	137.4	181.3	202.1	5		222.9	4	
UPC-5286 (NC)	216.7	275.0	226.6	162.4	164.6	209.0	4		245.3	2	
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	231.2	255.0	226.3	202.0	166.7	216.2	2				
Mean	**227.9**	**268.8**	**231.3**	**177.8**	**182.9**	**217.7**			**239.0**		
CD at 5%	14.4	21.8	21.6	28.3	30.6						
CV%	5.8	5.3	6.3	10.3	10.9						

Table 9.2 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)

Cont.....

Entries	Hill Zone			North West Zone						
	Almora	Rank	Superiority%	Ludhiana	Hisar	Pantnagar	Bikaner	Average	Rank	Superiority%
MFC-09-1	26.6	5		59.9	36.6	43.2	41.5	45.3	4	
RR-3	33.3	1	3.7	66.6	44.9	44.1	41.5	49.3	1	2.5
BL-1 (NC)	29.2	3		59.8	44.7	24.5	46.3	43.8	5	
UPC-5286 (NC)	27.0	4		70.9	35.9	48.7	37.1	48.1	2	
UPC-622 ZC (HZ-NEZ)	32.1	2								
BL-2 ZC (NWZ)				59.8	39.2	42.9	43.9	46.5	3	
UPC-9202 ZC (CZ-SZ)										
Mean	**29.6**			**63.4**	**40.3**	**40.7**	**42.1**	**46.6**		
CD at 5%	8.2			11.8	1.2	9.5	NS			
CV%	18.0			8.4	6.0	12.4	16.5			

Entries	North East Zone									
	Faizabad	Shillong	Kalyani	Bhubaneswar	Jorhat	Pusa	Ranchi*	Average	Rank	Superiority%
MFC-09-1	25.4	23.1	37.8	58.6	22.8	71.9	49.5	39.9	2	
RR-3	34.3	26.3	33.6	49.1	33.0	64.1	33.7	40.1	1	0.5
BL-1 (NC)	26.3	13.1	40.2	38.8	40.6	80.4	33.7	39.9	2	
UPC-5286 (NC)	17.2	14.4	38.2	52.7	28.0	71.3	25.8	37.0	4	
UPC-622 ZC (HZ-NEZ)	36.8	25.4	35.5	41.8	26.3	68.7	31.5	39.1	3	
BL-2 ZC (NWZ)										
UPC-9202 ZC (CZ-SZ)										
Mean	**28.0**	**20.5**	**37.0**	**48.2**	**30.1**	**71.3**	**34.8**	**39.2**		
CD at 5%	5.6	9.2	2.8	6.3	2.3	6.4	11.2			
CV%	13.0	16.2	5.1	4.2	12.4	8.7	20.9			

***not included in zonal and all india average due to CV>=20**

Table 9.2 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha)

Cont.....

Entries	Central Zone							
	Anand	Jhansi	Jabalpur	Rahuri	Urulikanchan	Kanpur	Average	Rank
MFC-09-1	30.0	48.6	45.2	40.2	70.0	102.5	56.1	4
RR-3	33.9	49.1	44.3	28.6	72.8	114.2	57.1	2
BL-1 (NC)	19.9	40.3	32.2	43.2	67.3	88.3	48.5	5
UPC-5286 (NC)	28.4	49.5	28.3	56.6	66.5	111.7	56.8	3
UPC-622 ZC (HZ-NEZ)								
BL-2 ZC (NWZ)								
UPC-9202 ZC (CZ-SZ)	28.0	49.7	42.5	26.7	76.3	134.2	59.6	1
Mean	**28.0**	**47.4**	**38.5**	**39.1**	**70.6**	**110.2**	**55.6**	
CD at 5%	2.9	1.0	6.2	7.4	11.6	16.1		
CV%	6.8	1.4	10.5	12.3	7.8	3.4		

Entries	South Zone								All India		
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Superiority%	Average	Rank	Superiority%
MFC-09-1	46.1	41.4	52.1	24.6	48.2	42.5	1	19.4	45.3	1	4.9
RR-3	31.8	36.3	45.2	24.4	38.7	35.3	3		45.0	2	4.2
BL-1 (NC)	38.2	38.6	44.2	17.6	35.2	34.8	4		41.3	4	
UPC-5286 (NC)	34.9	39.3	39.3	19.9	34.7	33.6	5		43.2	3	
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	40.3	36.4	39.5	27.4	34.6	35.6	2	2.3			
Mean	**38.3**	**38.4**	**44.1**	**22.8**	**38.3**	**36.4**			**43.7**		
CD at 5%	3.5	3.1	4.4	5.0	7.4						
CV%	8.5	5.3	6.7	14.3	12.6						

Table 9.3 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Green Forage Yield (q/ha/day)

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa	Shillong
MFC-09-1	4.07	3.89	2.90	3.64	1.39	11.00	2.29	4.42	1.98	5.50	1.02
RR-3	3.88	4.21	2.89	3.39	1.72	8.19	2.13	3.65	2.94	5.10	0.99
BL-1 (NC)	3.49	4.01	1.91	3.82	1.28	8.03	2.41	2.92	3.39	6.50	0.83
UPC-5286 (NC)	4.13	3.57	3.49	3.01	0.94	6.14	2.27	4.11	2.38	5.70	1.10
UPC-622 ZC (HZ-NEZ)					1.84	8.28	2.20	3.42	2.36	5.30	1.31
BL-2 ZC (NWZ)	4.07	3.78	2.96	3.52							
UPC-9202 ZC (CZ-SZ)											
Mean	**3.93**	**3.89**	**2.83**	**3.48**	**1.43**	**8.33**	**2.26**	**3.70**	**2.61**	**5.62**	**1.05**

Entries	Anand	Jabal.	Rahuri	Uruli.	Kanpur	Coimb.	Vellayani	Mandya	Hydera.	Jhansi	Average	Rank
MFC-09-1	1.69	3.36	5.59	5.96	6.82	4.35	4.83	4.18	3.07	4.29	4.11	1
RR-3	1.99	3.24	3.50	6.44	5.88	3.45	4.23	3.47	2.77	4.29	3.73	4
BL-1 (NC)	2.53	2.40	6.48	10.21	4.32	3.88	4.50	3.78	2.40	3.59	3.94	2
UPC-5286 (NC)	2.95	2.21	5.96	7.75	8.08	3.55	4.57	3.24	2.74	4.22	3.91	3
UPC-622 ZC (HZ-NEZ)												
BL-2 ZC (NWZ)												
UPC-9202 ZC (CZ-SZ)	1.62	3.22	3.89	7.93	7.26	3.61	4.25	3.14	3.40	4.32		
Mean	**2.16**	**2.89**	**5.08**	**7.66**	**6.47**	**3.77**	**4.48**	**3.56**	**2.88**	**4.14**	**4.15**	

Table 9.4 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Pusa
MFC-09-1	0.61	0.54	0.48	0.74	0.37	2.50	0.40	0.89	0.33	1.24
RR-3	0.68	0.67	0.49	0.74	0.52	1.61	0.35	0.73	0.48	1.12
BL-1 (NC)	0.61	0.67	0.36	0.83	0.36	1.61	0.42	0.59	0.59	1.41
UPC-5286 (NC)	0.72	0.52	0.54	0.66	0.24	1.17	0.40	0.82	0.41	1.30
UPC-622 ZC (HZ-NEZ)					0.57	1.44	0.37	0.68	0.38	1.23
BL-2 ZC (NWZ)	0.61	0.56	0.48	0.78						
UPC-9202 ZC (CZ-SZ)										
Mean	**0.65**	**0.59**	**0.47**	**0.75**	**0.41**	**1.67**	**0.39**	**0.74**	**0.44**	**1.26**

Table 9.4 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Dry Matter Yield (q/ha/day)

Entries	Anand	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Hyderabad	Jhansi	Average	Rank
MFC-09-1	0.35	0.65	0.67	0.96	1.46	0.79	0.37	0.70	0.78	1
RR-3	0.40	0.64	0.45	0.97	1.46	0.52	0.37	0.71	0.72	3
BL-1 (NC)	0.35	0.46	0.81	1.29	1.38	0.65	0.31	0.60	0.74	2
UPC-5286 (NC)	0.37	0.42	0.93	1.02	1.64	0.57	0.34	0.72	0.71	4
UPC-622 ZC (HZ-NEZ)										
BL-2 ZC (NWZ)										
UPC-9202 ZC (CZ-SZ)	0.33	0.62	0.44	1.21	1.68	0.63	0.46	0.72		
Mean	**0.36**	**0.56**	**0.66**	**1.09**	**1.52**	**0.63**	**0.37**	**0.69**	**0.84**	

Table 9.5 AVTC-2 : Second advanced varietal trial in forage cowpea: Crude protein yield (q/ha)

Entries	Ludhi.	Faiza.	Kalyani	Bhuba.	Jorhat	Anand	Jabal.	Rahuri	Uruli.	Coimb.	Mandya	Hydera.	Average	Rank
MFC-09-1	9.8	4.1	5.9	8.7	3.0	3.6	5.8	5.6	11.0	6.1	10.7	4.2	6.5	1
RR-3	11.2	6.1	4.9	7.4	4.2	3.9	5.7	4.0	11.0	5.4	9.9	4.3	6.5	1
BL-1 (NC)	11.4	4.2	5.0	6.0	4.9	2.5	4.0	6.2	11.4	7.5	8.5	2.8	6.2	3
UPC-5286 (NC)	12.3	2.5	6.6	8.0	3.8	3.7	3.5	8.2	11.4	6.3	8.3	2.2	6.4	2
UPC-622 ZC (HZ-NEZ)		6.7	4.0	6.2	3.0									
BL-2 ZC (NWZ)	11.0													
UPC-9202 ZC (CZ-SZ)						3.3	5.4	3.6	12.8	6.4	8.2	4.7		
Mean	**11.1**	**4.7**	**5.3**	**7.2**	**3.8**	**3.4**	**4.9**	**5.5**	**11.5**	**6.3**	**9.1**	**3.6**	**6.4**	

Table 9.6 AVTC-2 : Second Advanced Varietal Trial in Forage cowpea: Crude protein (%)

Entries	Ludhiana	Pantnagar	Faizabad	Bhubaneswar	Jorhat	Anand	Rahuri	Urulikanchan	Jabalpur	Coimbatore	Mandya	Hyderabad	Average	Rank
MFC-09-1	16.4	18.4	16.3	14.9	13.4	12.1	14.0	15.6	12.8	13.1	20.6	17.1	15.4	3
RR-3	16.9	20.1	17.9	15.0	13.1	11.5	13.9	15.2	12.8	17.1	21.9	17.5	16.1	1
BL-1 (NC)	19.1	19.3	15.8	15.6	12.1	12.8	14.4	16.9	12.6	19.7	19.3	15.8	16.1	1
UPC-5286 (NC)	17.3	19.3	14.7	15.1	13.8	12.9	14.5	17.2	12.3	18.0	21.0	11.1	15.6	2
UPC-622 ZC (HZ-NEZ)				18.2	14.8	11.7								
BL-2 ZC (NWZ)	18.4	19.3												
UPC-9202 ZC (CZ-SZ)						11.8	13.4	16.7	12.7	15.8	20.6	17.1		
Mean	**17.6**	**19.2**	**16.6**	**15.1**	**12.8**	**12.2**	**14.0**	**16.3**	**12.6**	**16.7**	**20.7**	**15.7**	**15.8**	

Table 9.7 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Plant Height (cm)

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Kalyani	Bhubaneswar	Jorhat	Shillong
MFC-09-1	191.3	177.8	131.7	52.8	145.2	92.0	112.9	287.5	108.5	67.4
RR-3	189.5	197.2	183.3	51.5	157.4	87.0	114.2	270.0	161.3	57.2
BL-1 (NC)	205.8	169.2	148.3	50.3	161.2	93.0	109.6	255.5	187.8	79.5
UPC-5286 (NC)	172.0	159.8	173.0	60.5	142.8	90.0	91.2	279.3	141.5	81.7
UPC-622 ZC (HZ-NEZ)					159.5	87.0	115.5	264.5	120.5	106.2
BL-2 ZC (NWZ)	194.5	164.6	123.3	62.0						
UPC-9202 ZC (CZ-SZ)										
Mean	**190.6**	**173.7**	**151.9**	**55.4**	**153.2**	**89.8**	**108.7**	**271.4**	**143.9**	**78.4**

Entries	Anand	Jhansi	Jabalpur	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Average	Rank
MFC-09-1	118.9	189.3	171.4	228.9	198.6	82.2	130.5	60.9	50.2	136.7	4
RR-3	126.6	237.3	167.1	285.5	250.4	98.3	137.8	47.6	99.5	153.6	1
BL-1 (NC)	121.6	225.4	136.2	169.3	241.4	105.0	117.5	86.3	76.0	144.1	2
UPC-5286 (NC)	123.0	232.4	121.6	200.6	197.7	90.6	130.3	50.5	85.1	138.1	3
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	123.6	215.0	154.3	204.4	202.9	97.6	131.3	52.4	84.0		
Mean	**122.7**	**219.9**	**150.1**	**217.7**	**218.2**	**94.7**	**129.5**	**59.5**	**79.0**	**122.2**	

Table 9.8 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: Leaf Stem Ratio

Cont.....

Entries	Ludhiana	Hisar	Pantnagar	Bikaner	Faizabad	Ranchi	Bhubaneswar	Jorhat	Pusa	Shillong	Jhansi
MFC-09-1	0.43	0.33	0.53	0.88	0.61	0.91	1.39	1.03	0.93	0.44	0.61
RR-3	0.82	0.23	0.59	1.01	0.68	0.66	1.09	1.21	0.95	0.33	0.64
BL-1 (NC)	0.43	0.18	0.60	0.68	0.70	0.56	0.84	0.97	0.93	0.20	0.57
UPC-5286 (NC)	1.00	0.44	0.49	0.81	0.60	0.54	1.25	1.08	0.91	0.10	0.68
UPC-622 ZC (HZ-NEZ)					0.63	0.56	0.98	0.97	0.89	0.16	
BL-2 ZC (NWZ)	0.82	0.24	0.53	1.07							
UPC-9202 ZC (CZ-SZ)											0.57
Mean	**0.70**	**0.28**	**0.55**	**0.89**	**0.64**	**0.65**	**1.11**	**1.05**	**0.92**	**0.25**	**0.61**

Entries	Jabalpur	Rahuri	Urulikanchan	Kanpur	Coimbatore	Vellayani	Mandya	Hyderabad	Kalyani	Average	Rank
MFC-09-1	0.71	0.73	0.62	0.64	0.41	0.77	0.43	1.22	0.70	0.72	1
RR-3	0.67	0.71	0.54	0.44	0.37	0.67	0.34	1.13	0.62	0.68	2
BL-1 (NC)	0.51	0.53	0.51	0.46	0.38	0.81	0.58	1.01	0.71	0.61	4
UPC-5286 (NC)	0.44	0.60	0.68	0.47	0.36	0.69	0.35	1.06	0.80	0.67	3
UPC-622 ZC (HZ-NEZ)									0.80		
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	0.61	0.61	0.67	0.52	0.37	0.73	0.30	1.01			
Mean	**0.59**	**0.64**	**0.60**	**0.50**	**0.38**	**0.73**	**0.40**	**1.09**	**0.73**	**0.76**	

Table 9.9 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: NDF (%) & ADF (%)

Entries	ADF (%)					NDF (%)					
	Ludhiana	Rahuri	Pantnagar	Average	Rank	Anand	Ludhiana	Rahuri	Pantnagar	Average	Rank
MFC-09-1	36.1	48.5	50.6	45.1	4	55.0	52.0	64.2	60.2	57.9	4
RR-3	34.6	49.0	49.4	44.3	3	58.0	49.6	62.4	59.8	57.5	3
BL-1 (NC)	26.5	45.2	47.8	39.8	1	55.0	44.6	59.8	57.2	54.2	1
UPC-5286 (NC)	31.5	47.0	50.0	42.8	2	61.0	47.7	60.0	58.2	56.7	2
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)	30.3		51.8				45.3		52.8		
UPC-9202 ZC (CZ-SZ)		47.1				61.0		62.9			
Mean	**31.8**	**47.4**	**49.9**	**43.0**		**58.0**	**47.8**	**61.9**	**57.6**	**56.5**	

Table 9.10 AVTC-2 : Second Advanced Varietal Trial in Forage Cowpea: IVDMD (%)

Entries	Rahuri	Ludhiana	Average	Rank
MFC-09-1	56.3	58.7	57.5	3
RR-3	53.7	59.6	56.7	4
BL-1 (NC)	58.5	62.2	60.4	1
UPC-5286 (NC)	55.8	60.6	58.2	2
UPC-622 ZC (HZ-NEZ)				
BL-2 ZC (NWZ)				
UPC-9202 ZC (CZ-SZ)	52.4	61.0		
Mean	**55.3**	**60.4**	**58.2**	

Table 10 AVTC-2 (seed) : Second Advanced Varietal Trial in Forage Cowpea (seed) : Seed Yield (q/ha)

Cont.....

Entries	North West Zone					North East Zone							
	Ludhi.	Hisar	Pantn.	Average	Rank	Faiza.	Ranchi	Kalyani	Bhuba.	Jorhat	Pusa	Average	Rank
MFC-09-1	1.35	8.41	11.91	7.22	2	1.06	2.81	17.28	14.48	8.25	4.83	8.12	4
RR-3	2.19	6.87	7.50	5.52	5	1.12	3.85	17.70	13.75	8.25	5.66	8.39	2
BL-1 (NC)	1.77	7.93	8.58	6.09	3	0.67	4.06	16.87	10.94	10.58	5.53	8.11	5
UPC-5286 (NC)	1.67	7.50	7.50	5.56	4	0.53	4.58	17.49	11.98	9.25	5.48	8.22	3
UPC-622 ZC (HZ-NEZ)						0.84	5.52	17.60	12.61	9.15	4.98	8.45	1
BL-2 ZC (NWZ)	2.08	9.95	9.75	7.26	1								
UPC-9202 ZC (CZ-SZ)													
Mean	**1.81**	**8.13**	**9.05**	**6.33**		**0.84**	**4.16**	**17.39**	**12.75**	**9.10**	**5.30**	**8.26**	
CD at 5%	0.3	0.6	1.4			0.2	1.0	0.7	1.2	0.8	0.4		
CV%	8.6	4.6	8.1			11.5	16.2	3.1	3.2	13.5	7.3		

Cont.....

Entries	Central Zone							
	Anand	Jhansi	Jablapur	Rahuri	Urulikanchan	Kanpur	Average	Rank
MFC-09-1	8.58	6.40	6.21	14.66	15.31	14.37	10.92	2
RR-3	7.54	7.92	6.52	9.16	16.68	13.33	10.19	3
BL-1 (NC)	7.56	6.54	3.94	9.64	20.48	17.50	10.94	1
UPC-5286 (NC)	7.69	5.66	3.12	13.85	12.81	9.69	8.80	5
UPC-622 ZC (HZ-NEZ)								
BL-2 ZC (NWZ)								
UPC-9202 ZC (CZ-SZ)	6.74	5.99	5.12	8.43	14.58	14.79	9.28	4
Mean	**7.62**	**6.50**	**4.98**	**11.15**	**15.97**	**13.94**	**10.03**	
CD at 5%	NS	1.9	0.8	1.5	1.5	4.4		
CV%	6.4	1.9	10.3	8.9	16.9	2.7		

Table 10 AVTC-2 (seed) : Second Advanced Varietal Trial in Forage Cowpea (seed) : Seed Yield (q/ha)

Entries	South Zone								All India		
	Coimbatore	Vellayani	Mandya	Hyderabad	Dharwad	Average	Rank	Superiority%	Average	Rank	Superiority%
MFC-09-1	3.33	2.43	10.54	7.00	7.93	6.25	1	5.6	8.36	1	6.5
RR-3	6.15	2.35	8.11	5.50	7.28	5.88	3		7.87	2	0.3
BL-1 (NC)	4.42	2.45	9.09	3.50	4.88	4.87	4		7.85	3	
UPC-5286 (NC)	3.96	2.80	7.76	4.40	5.01	4.79	5		7.14	4	
UPC-622 ZC (HZ-NEZ)											
BL-2 ZC (NWZ)											
UPC-9202 ZC (CZ-SZ)	6.87	2.70	7.33	5.00	7.69	5.92	2				
Mean	**4.95**	**2.55**	**8.57**	**5.08**	**6.56**	**5.54**			**7.80**		
CD at 5%	0.5	0.2	1.4	1.2	0.5						
CV%	10.1	6.3	10.9	15.2	4.4						

11. IVTR: INITIAL VARIETAL TRIAL IN RICEBEAN

An initial varietal trial in forage rice bean with four entries namely JRBJ-06-2, JRB-17, KRB-26 and BFRB-17 along with three national checks i.e. Bidhan-1, Bidhan-2 and RBL-6 was conducted at 14 locations across the country. Result obtained from different centers clearly revealed that for green forage yield (q/ha), entries KRB-26 (4.7%), JRBJ-06-2 (1.0%) and JRB-17 (0.7%) established their superiority over best national check whereas for dry matter yield (q/ha), national check Bidhan-1 maintained superiority. For fodder production potential (q/ha/day), entries KRB-26, JRBJ-06-2 and JRB-17 for green forage yield whereas check Bidhan-1 for dry matter yield were registered good performer.

For evaluation against quality parameters, entry KRB-26 for crude protein yield (q/ha) and check Bidhan-1 for crude protein content (%) registered its superiority. For the character plant height, entry JRB-17 (148.2cm) and for leafiness, entry JRB-17 (0.80) ranked first.

(Table Reference: 11.1 to 11.8)

12. AVTR-2: SECOND ADVANCED VARIETAL TRIAL IN FORAGE RICEBEAN

In forage Rice bean, two entries namely BFRB-15 and JRBJ-05-4 along with national check Bidhan-1 were evaluated at eight locations across the country. Results obtained from different centers clearly revealed that both for green forage as well as dry matter yield (q/ha), none of the entries proved its superiority over check. For fodder production potential (q/ha/day), entry BFRB-15 ranked first both for green forage and dry matter production potential. Even for quality parameter like crude protein yield (q/ha) and crude protein content (%), again entry BFRB-15 exhibited its superiority. For evaluation against growth parameter i.e. plant height, entry BFRB-15 (124.7cm) and for leafiness again entry BFRB-15 (0.83) was adjudged best performer.

(Table Reference: 12.1 to 12.7)

13. AVTR-2 (SEED): SECOND ADVANCED VARIETAL TRIAL IN FORAGE RICEBEAN (SEED)

An advanced varietal trial in forage Ricebean for seed with two entries namely BFRB-15 and JRBJ-05-4 and one national check Bidhan-1 was conducted at eight locations of the country. Seed set didn't take place at Ranchi, Jabalpur and Shillong location hence result has been obtained from five locations. Result thus obtained with respect to seed yield (q/ha) clearly revealed that entry JRBJ-05-4 (8.84 q/ha) ranked first followed by entry BFRB-15 (8.32q/ha) and national check Bidhan-1 (7.81 q/ha). In terms of percent superiority, entry JRBJ-05-4 established 13.2 percent superiority whereas BFRB-15 established 6.5 percent superiority for seed yield over national check Bidhan-1.

(Table Reference: 13)

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

Entries	Kaly.	Ranchi	Pusa	Jorhat	Imphal	Bhuba.	Shillong	Jabal.	Raipur	Palghar.	Vellay.	Average	Rank	Supe%
JRBJ-06-2	265.0	375.0	374.0	237.7	273.8	261.4	91.0	362.4	307.7	280.6	252.5	280.1	2	1.0
JRB-17	285.4	368.1	253.0	382.9	321.0	271.2	91.8	274.9	284.8	270.9	267.5	279.2	3	0.7
KRB-26	255.9	444.4	279.0	328.2	345.5	250.0	58.3	445.7	294.3	257.4	232.5	290.1	1	4.7
BFRB-17	235.4	333.3	299.0	348.6	227.5	237.9	84.4	247.8	274.8	265.7	208.8	251.2	7	
K-1 (Bidhan-1) (NC)	233.7	423.6	357.0	258.1	325.3	229.3	81.3	345.7	287.0	248.7	182.5	270.2	5	
Bidhan-2 (NC)	243.1	312.5	341.0	240.2	277.0	284.3	76.8	416.6	302.5	276.4	278.8	277.2	4	
RBL-6 (NC)	225.7	402.8	312.0	275.5	282.1	218.7	73.9	252.0	323.9	255.3	301.3	265.7	6	
Mean	**249.2**	**380.0**	**316.4**	**295.9**	**293.2**	**250.4**	**79.6**	**335.0**	**296.4**	**265.0**	**246.3**	**273.4**		
CD at 5%	8.4	79.4	21.3	7.2	42.5	1.4	26.9	53.1	22.1	30.3	28.5			
CV%	3.2	14.0	10.4	8.9	8.5	6.6	13.8	10.7	5.0	6.9	7.8			

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

Entries	Kalyani	Ranchi	Pusa	Jorhat	Bhubaneswar	Imphal	Jabalpur	Raipur	Palghar(Dapoli)	Vellayani	Shillong*	Average	Rank
JRBJ-06-2	45.7	71.1	76.7	46.7	52.7	56.6	70.0	64.4	55.0	50.5	8.1	58.9	4
JRB-17	48.2	100.6	53.1	65.8	54.6	53.8	57.5	56.3	53.1	53.5	12.9	59.6	3
KRB-26	44.5	70.8	58.6	54.9	50.5	64.0	88.5	58.5	50.5	46.5	2.9	58.7	5
BFRB-17	41.8	104.4	63.9	55.0	47.7	46.8	45.8	54.2	52.1	41.8	14.4	55.3	7
K-1 (Bidhan-1) (NC)	40.9	134.4	74.6	42.9	46.3	60.1	66.0	57.2	48.8	36.5	9.0	60.8	1
Bidhan-2 (NC)	42.6	89.4	72.9	37.5	57.2	52.8	82.1	61.9	54.2	55.8	8.6	60.6	2
RBL-6 (NC)	41.7	100.8	65.1	50.0	44.0	42.2	46.5	70.3	50.1	60.3	13.2	57.1	6
Mean	**43.6**	**96.0**	**66.4**	**50.4**	**50.4**	**53.8**	**65.2**	**60.4**	**52.0**	**49.3**	**9.9**	**58.7**	
CD at 5%	2.9	21.9	7.3	3.0	0.3	13.1	10.3	6.0	7.2	5.7	6.7		
CV%	5.4	15.3	11.3	9.0	6.6	14.2	10.8	6.7	7.3	7.8	27.6		

***not included in all India average due to cv>=20**

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

Entries	Kalyani	Ranchi	Pusa	Jorhat	Bhuba.	Vella.	Jabal.	Shillo.	Raipur	Palgh.	Average	Rank
JRBJ-06-2	2.76	6.58	4.45	3.04	2.54	3.71	3.94	1.07	2.98	4.52	3.56	2
JRB-17	2.97	6.22	3.04	4.90	2.56	3.93	2.95	1.14	2.71	4.36	3.48	3
KRB-26	2.67	8.22	3.32	4.20	2.34	3.42	4.79	0.69	2.85	4.15	3.67	1
BFRB-17	2.45	3.28	3.52	4.46	2.22	3.07	2.52	0.99	2.69	4.28	2.95	7
K-1 (Bidhan-1) (NC)	2.43	6.83	4.25	3.30	2.27	2.69	3.67	0.95	2.75	4.01	3.32	6
Bidhan-2 (NC)	2.53	5.69	4.01	3.07	2.61	4.10	4.43	0.90	2.92	4.45	3.47	4
RBL-6 (NC)	2.35	6.39	3.71	3.53	2.28	4.43	2.65	0.87	3.07	4.11	3.34	5
Mean	**2.59**	**6.17**	**3.76**	**3.79**	**2.40**	**3.62**	**3.56**	**0.94**	**2.85**	**4.27**	**3.40**	

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

Entries	Kalyani	Ranchi	Pusa	Jorhat	Bhubaneswar	Jabalpur	Raipur	Palghar	Average	Rank
JRBJ-06-2	0.48	1.25	0.90	0.59	0.51	0.76	0.62	0.57	0.71	4
JRB-17	0.50	1.72	0.64	0.84	0.51	0.55	0.54	0.55	0.73	3
KRB-26	0.46	1.33	0.69	0.70	0.47	0.95	0.56	0.53	0.71	4
BFRB-17	0.44	1.64	0.75	0.70	0.45	0.47	0.52	0.54	0.69	6
K-1 (Bidhan-1) (NC)	0.43	2.17	0.89	0.55	0.46	0.70	0.55	0.51	0.78	1
Bidhan-2 (NC)	0.44	1.64	0.86	0.48	0.52	0.87	0.60	0.57	0.75	2
RBL-6 (NC)	0.43	1.61	0.76	0.64	0.46	0.49	0.68	0.52	0.70	5
Mean	**0.45**	**1.62**	**0.78**	**0.64**	**0.48**	**0.69**	**0.58**	**0.54**	**0.72**	

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

Entries	Jorhat	Bhubaneswar	Jabalpur	Imphal	Raipur	Average	Rank
JRBJ-06-2	8.4	8.0	10.2	6.6	9.1	8.5	2
JRB-17	12.3	8.1	7.3	6.3	7.8	8.4	3
KRB-26	8.9	7.6	13.1	6.7	8.2	8.9	1
BFRB-17	10.0	7.1	6.3	4.8	7.6	7.1	6
K-1 (Bidhan-1) (NC)	8.2	6.9	9.5	6.7	8.0	7.9	5
Bidhan-2 (NC)	6.5	8.5	12.1	5.3	8.7	8.2	4
RBL-6 (NC)	8.4	6.8	6.4	3.8	10.1	7.1	6
Mean	**8.9**	**7.6**	**9.3**	**5.7**	**8.5**	**8.0**	

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

Entries	Bhubaneswar	Jorhat	Imphal	Raipur	Jabalpur	Average	Rank
JRBJ-06-2	15.2	18.1	11.5	14.2	14.6	14.7	2
JRB-17	14.9	18.8	11.7	13.9	14.2	14.7	2
KRB-26	15.1	16.3	10.3	14.0	14.8	14.1	5
BFRB-17	15.0	18.3	10.2	13.9	13.7	14.2	4
K-1 (Bidhan-1) (NC)	15.0	19.3	11.1	14.0	14.4	14.8	1
Bidhan-2 (NC)	15.0	17.7	10.0	14.1	14.7	14.3	3
RBL-6 (NC)	15.5	17.1	9.0	14.4	13.7	13.9	6
Mean	**15.1**	**17.9**	**10.6**	**14.1**	**14.3**	**14.4**	

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

Entries	Kalyani	Ranchi	Bhubaneswar	Jorhat	Vellayani	Jabalpur	Shillong	Imphal	Raipur	Palghar	Average	Rank
JRBJ-06-2	111.4	103.3	169.7	149.0	205.0	113.2	70.2	172.5	206.5	160.3	146.1	2
JRB-17	108.3	97.5	171.3	183.0	192.5	109.3	63.5	213.0	195.0	148.7	148.2	1
KRB-26	113.7	96.0	164.3	165.7	170.0	125.4	55.8	189.9	203.3	130.2	141.4	4
BFRB-17	109.1	102.5	158.3	150.7	160.0	103.3	45.0	160.9	190.1	151.1	133.1	7
K-1 (Bidhan-1) (NC)	108.6	98.3	151.3	144.7	184.8	113.4	58.6	210.4	200.1	133.9	140.4	5
Bidhan-2 (NC)	111.5	104.0	174.5	152.7	170.0	113.9	67.5	157.7	205.7	159.9	141.7	3
RBL-6 (NC)	108.9	101.3	147.3	146.4	197.5	99.6	69.3	136.4	216.1	149.6	137.2	6
Mean	**110.2**	**100.4**	**162.4**	**156.0**	**182.8**	**111.2**	**61.4**	**177.2**	**202.4**	**147.7**	**141.2**	

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

Entries	Bhubaneswar	Ranchi	Pusa	Jorhat	Vellayani	Jabalpur	Shillong	Imphal	Raipur	Palghar	Kalyani	Average	Rank
JRBJ-06-2	1.01	0.28	1.03	1.06	0.83	0.74	0.19	0.45	0.67	0.92	1.00	0.74	3
JRB-17	1.07	0.85	0.96	1.20	1.00	0.65	0.27	0.61	0.58	0.83	0.78	0.80	1
KRB-26	0.95	0.36	0.97	0.92	0.79	0.83	0.44	0.38	0.62	0.51	0.73	0.68	6
BFRB-17	0.91	0.73	0.94	1.02	0.73	0.54	0.24	0.72	0.54	0.84	0.94	0.74	3
K-1 (Bidhan-1) (NC)	0.83	0.63	0.93	1.25	0.78	0.74	0.27	0.38	0.61	0.55	0.80	0.71	5
Bidhan-2 (NC)	1.14	0.58	0.96	1.09	0.98	0.79	0.29	0.39	0.64	0.90	0.64	0.76	2
RBL-6 (NC)	0.81	0.57	1.03	0.91	0.98	0.58	0.29	0.55	0.70	0.86	0.73	0.73	4
Mean	**0.96**	**0.57**	**0.97**	**1.06**	**0.87**	**0.70**	**0.28**	**0.50**	**0.62**	**0.77**	**0.80**	**0.74**	

Table 12.1 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Green Forage Yield(q/ha)

Entries	Kalyani	Ranchi	Pusa	Jorhat	Bhubaneswar	Shillong	Jabalpur	Vellayani	Average	Rank
BFRB-15	280.6	180.0	368.0	217.6	280.3	61.9	306.0	258.6	244.1	2
JRBJ-05-4	288.7	135.4	336.0	192.0	213.6	97.5	384.1	301.4	243.6	3
K-1 (Bidhan-1) (NC)	328.7	183.6	343.0	209.1	220.9	84.9	333.1	277.7	247.6	1
Mean	**299.3**	**166.4**	**349.0**	**206.2**	**238.3**	**81.4**	**341.1**	**279.2**	**245.1**	
CD at 5%	0.8	32.9	26.3	4.3	19.9	2.9	49.3	18.3		
CV%	3.2	17.5	12.4	15.0	7.2	0.9	12.4	5.6		

Table 12.2 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Dry Matter Yield(q/ha)

Entries	Kalyani	Ranchi	Pusa	Jorhat	Bhubaneswar	Jabalpur	Vellayani	Shillong*	Average	Rank
BFRB-15	46.3	8.1	76.9	38.0	59.7	57.7	50.6	18.7	48.2	2
JRBJ-05-4	46.2	5.1	72.2	34.0	42.6	74.6	60.3	21.7	47.9	3
K-1 (Bidhan-1) (NC)	59.2	5.9	73.9	37.3	44.3	63.8	54.3	16.9	48.4	1
Mean	**50.6**	**6.4**	**74.3**	**36.4**	**48.8**	**65.4**	**55.1**	**19.1**	**48.2**	
CD at 5%	1.6	6.8	NS	2.2	4.1	9.3	5.0	NS		
CV%	3.2	12.8	9.7	17.9	7.2	12.1	7.8	27.9		

*** Not included in all India average due to cv>=20**

Table 12.3 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Green Forage Yield (q/ha/day)

Entries	Kalyani	Ranchi	Pusa	Jorhat	Vellayani	Jabalpur	Shillong	Bhubaneswar	Average	Rank
BFRB-15	2.92	3.06	4.38	2.62	3.86	3.22	0.73	2.50	2.87	1
JRBJ-05-4	3.01	2.07	4.05	2.31	4.43	4.26	1.14	2.07	2.82	3
K-1 (Bidhan-1) (NC)	3.42	2.73	4.13	2.51	4.08	3.58	0.99	2.05	2.84	2
Mean	**3.12**	**2.62**	**4.19**	**2.48**	**4.12**	**3.69**	**0.95**	**2.21**	**2.84**	

Table 12.4 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Dry Matter Yield (q/ha/day)

Entries	Kalyani	Ranchi	Pusa	Jorhat	Jabalpur	Bhubaneswar	Average	Rank
BFRB-15	0.48	0.96	0.92	0.45	0.63	0.53	0.66	1
JRBJ-05-4	0.48	0.56	0.87	0.41	0.83	0.41	0.59	3
K-1 (Bidhan-1) (NC)	0.62	0.71	0.89	0.44	0.69	0.41	0.63	2
Mean	**0.53**	**0.74**	**0.89**	**0.43**	**0.71**	**0.45**	**0.63**	

Table 12.5 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Crude Protein Yield (q/ha) &Crude Protein (%)

	Crude Protein Yield (q/ha)						Crude Protein (%)			
Entries	**Kalyani**	**Jorhat**	**Jabal.**	**Bhuba.**	**Average**	**Rank**	**Jorhat**	**Bhuba.**	**Average**	**Rank**
BFRB-15	4.7	6.8	8.3	9.3	7.3	1	18.1	15.6	16.9	1
JRBJ-05-4	5.5	5.9	10.8	6.2	7.1	2	17.6	14.6	16.1	3
K-1 (Bidhan-1) (NC)	5.9	6.7	9.2	6.6	7.1	2	18.2	14.8	16.5	2
Mean	**5.4**	**6.5**	**9.4**	**7.4**	**7.2**		**18.0**	**15.0**	**16.5**	

Table 12.6 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Plant Height (cm)

Entries	Kalyani	Ranchi	Jorhat	Vellayani	Jabalpur	Bhubaneswar	Shillong	Average	Rank
BFRB-15	108.2	94.9	220.0	146.7	102.2	165.0	80.5	124.7	1
JRBJ-05-4	107.2	101.1	207.7	144.7	123.8	143.0	73.8	121.9	2
K-1 (Bidhan-1) (NC)	113.3	84.7	202.0	144.6	109.2	154.0	83.4	121.8	3
Mean	**109.6**	**93.6**	**209.9**	**145.3**	**111.7**	**154.0**	**79.2**	**122.8**	

Table 12.7 AVT-2 (R.bean) : Second Advanced Varietal Trial in Rice bean: Leaf Stem Ratio

Entries	Kalyani	Ranchi	Pusa	Jorhat	Vellayani	Jabalpur	Shillong	Bhubaneswar	Average	Rank
BFRB-15	0.70	0.78	0.99	0.94	0.76	0.80	0.30	1.09	0.83	1
JRBJ-05-4	0.90	0.70	0.90	0.88	0.93	0.92	0.20	0.84	0.79	3
K-1 (Bidhan-1) (NC)	1.10	0.71	0.92	0.80	0.81	0.87	0.33	0.91	0.82	2
Mean	**0.90**	**0.73**	**0.94**	**0.87**	**0.83**	**0.86**	**0.28**	**0.95**	**0.81**	

Table 13 AVTR-2 (R.bean) (seed) : Second Advanced Varietal Trial in Rice bean (seed) : Seed Yield (q/ha)

Entries	Kalyani	Pusa	Jorhat	Bhubaneswar	Vellayani	Average	Rank	Superiority%
BFRB-15	15.52	5.19	4.98	13.67	2.24	8.32	2	6.5
JRBJ-05-4	19.98	5.69	5.20	10.94	2.41	8.84	1	13.2
K-1 (Bidhan-1) (NC)	17.81	5.01	4.60	9.07	2.54	7.81	3	
Mean	**17.77**	**5.30**	**4.93**	**11.23**	**2.40**	**8.32**		
CD at 5%	0.4	0.5	0.6	0.6	0.2			
CV%	2.5	12.7	13.0	4.2	6.6			

Note- Seed did not set at Ranchi,Jabalpur and Shillong

14. AVT SOYBEAN-2 (SEED): SECOND ADVANCED VARIETAL TRIAL IN SOYBEAN (SEED)

In forage soybean, four entries namely JS-07-21-7, JS-07-24-13, JS-07-24-1 and JS-07-24-8 were evaluated at seven locations across the country in second advanced varietal trial for seed. As there is no established check for forage soybean, performance of entries has been compared over general mean for seed production potential.

Results obtained from different locations clearly revealed that entry JS-07-24-8 (92.15 q/ha) with was (12.40%) superiority adjudged highest seed producer with respect to other three-test entries. Next to JS 07-24-8 were JS 07-21-7 (81.18 q/ha), JS 07-24-1 (78.76 q/ha)

(Table Reference: 14)

Table 14 AVT-2 (Soy) (seed) : Second Advanced Varietal Trial in Forage Soybean : Seed Yield (q/ha)

Entries	Ranchi	Pusa	Imphal	Hisar	Jaba.	Jhansi	Rahuri	Average	Rank	Super%
JS 07-21-7	13.33	7.71	4.95	9.23	13.54	5.91	26.51	11.60	2	
JS 07-24-13	9.79	7.59	5.06	6.23	13.01	5.12	29.07	10.84	4	
JS 07-24-1	8.98	8.18	5.42	4.63	20.26	5.65	25.64	11.25	3	
JS 07-24-8	13.79	8.29	5.83	9.86	16.77	8.25	29.35	13.16	1	12.4
Mean	**11.47**	**7.94**	**5.32**	**7.49**	**15.90**	**6.23**	**27.64**	**11.71**		
CD at 5%	2.8	0.5	0.8	0.4	2.6	1.6	3.3			
CV%	18.1	10.7	8.5	3.5	11.9	5.4	8.7			

***Superiority% calculated from general mean**

15. VT SEWAN-2010 (3rd YEAR): VARIETAL TRIAL IN SEWAN (*Lasiurus sindicus*) (PERENNIAL)

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 did not germinate/poorly germinate at all the centers; hence data of this entry has not been reported by any centre. This was the third year of evaluation and data has been reported from four locations. Result obtained from different locations revealed that entries IVTS-2 and IVTS-3 registered superiority both for green forage and dry matter yield (q/ha). For fodder production potential (q/ha/day), again entry IVTS-2 ranked first both for green forage as well as dry matter production potential. For the character plant height, entry IVTS-2 (108.8cm) and for leaf stem ratio, entry IVTS-7 (1.86) was adjudged best performer.

(Table Reference: 15.1 to 15.3)

Table 15.1 VT Sewan-2010(3rd Year): Varietal Trial in Sewan Grass (*Lasiurus sindicus*): Green Forage Yield (q/ha) &Dry Matter Yield (q/ha)

	Green Forage Yield (q/ha)						Dry Matter Yield (q/ha)					
Entries	**Bikaner**	**Jodh.**	**Jaisal.**	**Fateh.Shek.**	**Average**	**Rank**	**Bikaner**	**Jodh.**	**Jaisal.**	**Fateh.Shek.**	**Average**	**Rank**
IVTS-1	208.9	69.3	46.0	195.6	129.9	4	112.2	21.4	15.9	62.2	52.9	4
IVTS-2	306.4	65.4	46.6	187.8	151.6	1	165.5	20.7	18.8	58.7	65.9	1
IVTS-3	266.5	70.3	47.9	196.0	145.2	2	142.5	22.6	17.5	62.0	61.1	2
IVTS-4												
IVTS-5	189.4	66.9	51.8	211.1	129.8	5	96.4	21.5	17.7	63.6	49.8	6
IVTS-6	190.3	82.2	50.8		107.7	6	110.7	27.2	20.7		52.8	5
IVTS-7	248.5	78.4	43.5	206.9	144.3	3	131.3	24.3	17.7	62.9	59.0	3
Mean	**235.0**	**72.1**	**47.8**	**199.5**	**134.8**		**126.4**	**22.9**	**18.1**	**61.9**	**56.9**	
CD at 5%	58.8	NS	NS	3.7			29.5	NS	1.8	1.1		
CV%	13.8	20.2	6.9	3.0			12.8	17.4	5.1	2.7		

Table 15.2 VT Sewan-2010(3rd Year): Varietal Trial in Sewan Grass (*Lasiurus sindicus*): Green Forage Yield (q/ha/day) &Dry Matter Yield (q/ha/day)

	Green Forage Yield (q/ha/day)						Dry Matter Yield (q/ha/day)					
Entries	**Bikaner**	**Jodh.**	**Jaisa.**	**Fateh.Shek.**	**Average**	**Rank**	**Bikaner**	**Jodh.**	**Jaisal.**	**Fateh.Shek.**	**Average**	**Rank**
IVTS-1	2.86	0.92	0.91	4.50	2.30	3	1.54	0.28	0.31	1.50	0.91	4
IVTS-2	4.20	0.87	0.89	4.00	2.49	1	2.27	0.28	0.36	1.30	1.05	1
IVTS-3	3.65	0.94	0.88	4.30	2.44	2	1.95	0.3	0.32	1.30	0.97	3
IVTS-4												
IVTS-5	2.59	0.89	0.80	4.90	2.30	3	1.32	0.29	0.27	1.50	0.85	5
IVTS-6	2.61	1.1	0.90		1.54	4	1.52	0.36	0.37		0.75	6
IVTS-7	3.40	1.05	0.71	4.80	2.49	1	1.80	0.32	0.29	1.50	0.98	2
Mean	**3.22**	**0.96**	**0.85**	**4.50**	**2.26**		**1.73**	**0.31**	**0.32**	**1.42**	**0.92**	

Table 15.3 VT Sewan-2010(3rd Year): Varietal Trial in Sewan Grass (*Lasiurus sindicus*): Plant Height (cm) &Leaf Stem Ratio

Entries	Plant Height (cm)						Leaf Stem ratio			
	Bikaner	Jodh.	Jaisal.	Fateh.Shekh.	Average	Rank	Bikaner	Jodh.	Average	Rank
IVTS-1	124.0	97.2	88.6	122.0	108.0	2	0.64	2.70	1.67	4
IVTS-2	117.0	99.0	94.3	125.0	108.8	1	0.42	2.12	1.27	5
IVTS-3	115.0	96.8	91.5	121.0	106.1	4	0.77	1.75	1.26	6
IVTS-4										
IVTS-5	107.0	82.1	102.1	130.0	105.3	5	0.74	2.85	1.80	2
IVTS-6	115.0	100.1	96.6		103.9	6	0.59	2.97	1.78	3
IVTS-7	110.0	95.6	89.4	131.0	106.5	3	0.65	3.07	1.86	1
Mean	**114.7**	**95.1**	**93.8**	**125.8**	**106.4**		**0.64**	**2.58**	**1.61**	

16. VTCS-2010 (3rd YEAR): VARIETAL TRIAL IN *Cenchrus setigerus* (PERENNIAL)

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. This is the third year of evaluation and data has been reported from eight 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 centers clearly revealed that for green forage as well as dry matter yield entry VTCS-10-4 followed by VTCS-10-5 established their superiority. For fodder production potential, entry VTCS-10-3 ranked first both for green forage as well as dry matter production potential (q/ha/day). For evaluation against quality parameter, entry VTCS-10-7 was adjudged best performer both for crude protein yield (q/ha) as well as crude protein content (%). For plant height, entry VTCS-10-4 (79.9 cm) and for leaf stem ratio entry VTCS-10-6 (1.82) exhibited superiority. For other quality parameter, entry VTCS-10-1 for ADF (%) and VTCS-10-4 for NDF (%) was ranked first.

(Table Reference: 16.1 to 16.6)

Table 16.1 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: Green Forage Yield (q/ha)

Entries	Jodhpur	Bikaner	Jhansi	Rahuri	Dhari	Anand	Coimbatore	Average	Rank
VTCS-10-1	78.9	84.8	111.5	41.8	23.3	141.0	968.0	207.0	6
VTCS-10-2	93.6	244.8	47.5	47.4	19.3	152.0	852.7	208.2	4
VTCS-10-3	62.5	289.9	55.7	34.5	18.0	184.0	830.5	210.7	3
VTCS-10-4	50.8	141.0	98.7	68.6	18.7	176.0	1599.9	307.7	1
VTCS-10-5	90.6	175.6	82.1	47.8	26.3	163.0	1366.6	278.9	2
VTCS-10-6	67.7	150.9	98.1	31.1	19.7	181.0	904.1	207.5	5
VTCS-10-7	81.8	93.4	92.3	43.8	25.0	181.0	847.2	194.9	8
VTCS-10-8	74.3	183.0	72.7	49.9	24.7	186.0	822.2	201.8	7
Mean	**75.0**	**170.4**	**82.3**	**45.6**	**21.9**	**170.5**	**1023.9**	**227.1**	
CD at 5%	NS	43.3	9.8	13.7	NS	22.1	112.5		
CV%	27.7	14.5	5.6	17.1	27.2	7.4	8.9		

Table 16.2 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: Dry Matter Yield (q/ha)

Entries	Jalore	Jodhpur	Bikaner	Jhansi	Rahuri	Dhari	Anand	Coimbatore	Average	Rank
VTCS-10-1	28.7	18.1	40.5	57.51	9.6	13.7	39.8	140.4	43.6	7
VTCS-10-2	25.9	21.9	130.4	26.41	13.4	11.3	41.7	126.2	49.7	4
VTCS-10-3	26.8	14.7	152.2	24.21	12.3	11.0	51.5	126.4	52.4	3
VTCS-10-4	27.8	14.2	68.1	72.58	18.9	11.3	52.2	248.3	64.2	1
VTCS-10-5	33.4	21.5	84.0	31.72	12.5	14.0	45.2	209.2	56.4	2
VTCS-10-6	30.8	16.0	76.1	42.38	7.8	10.7	47.5	133.1	45.6	5
VTCS-10-7	31.3	20.1	46.9	42.60	9.4	12.0	51.0	124.4	42.2	8
VTCS-10-8	25.2	17.0	89.8	24.00	15.3	13.7	51.3	122.2	44.8	6
Mean	**28.7**	**17.9**	**86.0**	**40.2**	**12.4**	**12.2**	**47.5**	**153.8**	**49.8**	
CD at 5%	6.8	NS	21.2	4.7	3.6	NS	5.6	18.0		
CV%	13.5	29.5	14.1	2.7	16.7	20.9	6.7	9.4		

Table 16.3 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: Green Forage Yield (q/ha/day) & Dry Matter Yield (q/ha/day)

Entries	Green Forage Yield (q/ha/day)						Dry Matter Yield (q/ha/day)				
	Jodh.	Bikaner	Dhari	Anand	Average	Rank	Jodh.	Bikaner	Anand	Average	Rank
VTCS-10-1	1.18	1.16	0.40	0.41	0.79	8	0.27	0.56	0.12	0.32	8
VTCS-10-2	1.44	3.35	0.40	0.44	1.41	2	0.34	1.79	0.12	0.75	2
VTCS-10-3	0.96	3.97	0.40	0.53	1.47	1	0.23	2.09	0.15	0.82	1
VTCS-10-4	0.64	1.93	0.40	0.51	0.87	7	0.18	0.93	0.15	0.42	6
VTCS-10-5	1.39	2.40	0.50	0.47	1.19	3	0.33	1.15	0.13	0.54	4
VTCS-10-6	1.04	2.07	0.40	0.52	1.01	5	0.25	1.04	0.14	0.48	5
VTCS-10-7	1.24	1.28	0.50	0.52	0.89	6	0.30	0.64	0.15	0.36	7
VTCS-10-8	1.11	2.51	0.50	0.54	1.17	4	0.26	1.23	0.15	0.55	3
Mean	**1.13**	**2.33**	**0.44**	**0.49**	**1.10**		**0.27**	**1.18**	**0.14**	**0.53**	

Table 16.4 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: 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	0.7	2.3	1.5	5	7.3	5.8	6.5	2
VTCS-10-2	1.0	2.4	1.7	3	7.2	5.7	6.5	2
VTCS-10-3	0.8	2.6	1.7	3	6.8	5.0	5.9	5
VTCS-10-4	1.3	2.6	1.9	2	6.7	5.1	5.9	5
VTCS-10-5	0.9	2.6	1.7	3	7.4	5.5	6.4	3
VTCS-10-6	0.5	2.7	1.6	4	6.6	5.6	6.1	4
VTCS-10-7	0.7	3.4	2.0	1	7.0	6.5	6.7	1
VTCS-10-8	1.1	3.0	2.0	1	6.9	5.9	6.4	3
Mean	**0.9**	**2.7**	**1.8**		**7.0**	**5.6**	**6.3**	

Table 16.5 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: Plant Height (cm) & Leaf Stem Ratio

Entries	Plant Height (cm)								Leaf Stem Ratio					
	Jodh.	Bikaner	Jhansi	Rahuri	Dhari	Anand	Average	Rank	Jodh.	Bikaner	Rahuri	Dhari	Average	Rank
VTCS-10-1	81.2	82.0	93.22	35.8	76.0	100.0	78.0	2	2.88	1.07	0.92	0.91	1.45	5
VTCS-10-2	79.9	56.0	98.11	28.0	70.3	98.2	71.8	6	2.50	0.37	1.13	0.83	1.21	8
VTCS-10-3	77.1	62.0	94.78	26.3	61.3	100.6	70.4	7	3.96	0.55	1.22	0.95	1.67	3
VTCS-10-4	71.9	80.0	110.56	47.3	57.0	112.7	79.9	1	2.43	1.29	1.00	0.93	1.41	6
VTCS-10-5	90.7	58.0	103.89	32.1	69.7	105.2	76.6	3	3.92	0.94	1.17	0.84	1.72	2
VTCS-10-6	75.9	69.0	94.11	28.9	57.3	96.7	70.3	8	4.30	0.97	1.13	0.86	1.82	1
VTCS-10-7	80.4	68.0	93.56	32.0	65.0	97.7	72.8	5	3.83	0.8	1.08	0.89	1.65	4
VTCS-10-8	72.5	80.0	92.78	32.8	66.7	105.5	75.0	4	3.25	0.55	0.82	0.85	1.37	7
Mean	**78.7**	**69.4**	**97.6**	**32.9**	**65.4**	**102.1**	**74.3**		**3.38**	**0.82**	**1.06**	**0.88**	**1.54**	

Table 16.6 Cenchrus setigerus-2010 (3rd Yr): Varietal Trial in C.setigerus: NDF (%) & ADF%

Entries	NDF%		ADF%	
	Rahuri	Rank	Rahuri	Rank
VTCS-10-1	61.2	2	50.2	1
VTCS-10-2	63.2	4	53.2	5
VTCS-10-3	64.8	5	51.8	2
VTCS-10-4	60.8	1	52.5	4
VTCS-10-5	62.2	3	53.7	6
VTCS-10-6	65.6	6	51.9	3
VTCS-10-7	63.2	4	54.7	7
VTCS-10-8	64.8	5	51.8	2
Mean	**63.2**		**52.5**	

17. VTGG-2009 (4th YEAR): VARIETAL TRIAL IN GUINEA GRASS (PERENNIAL)

In guinea grass, a varietal evaluation trial comprising four entries namely TNGG-06-02, JHGG-09-01, JHGG-09-02 and RSDGG-1 along with three national check namely Riversdale, PGG-616 and Bundle Guinea-1 was established during Kharif-2009. This is being the fourth and final year of evaluation hence all the entries are decoded. The results obtained from all the 10 testing location clearly revealed that for green forage yield (q/ha) entries TNGG-06-02 (33.9%) and RSDGG-1 (32.1%) and for dry matter yield (q/ha) against entries TNGG-06-02 (38.0%), RSDGG-1 (32.4%) and JHGG-09-01 (4.4%) established their superiority with respect to best national check. For the character fodder production potential (q/ha/day), entries TNGG-06-02, RSDGG-1 for green forage and entries TNGG-06-02, RSDGG-1 JHGG-09-01 and JHGG-09-02 for dry matter production potential exhibited its superiority over best national check. For evaluation against quality parameter, entries TNGG-06-02 and RSDGG-1 for crude yield (q/ha) and check Bundel Guinea-1 for plant height and TNGG-06-02 and RSDGG-1 for leafiness was adjudged good performer. After compiling the data over year (2010-12), result clearly revealed that entries TNGG-06-02 (38.2%), RSDGG-1 (33.8%) and JHGG-09-1 (1.5%) for green forage yield (q/ha) and entries TNGG-06-02 (35.6%), RSDGG-1 (30.3%) and JHGG-09-1 (5.7%) for dry matter yield (q/ha) performed their superiority with respect to best national check Even for crude protein yield (q/ha), these entries established their superiority.

(Table Reference: 17.1 to 17.10)

Table 17.1 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Green Forage Yield (q/ha)

Entries	Faizabad	Bhubaneswar	Ranchi	Anand	Urulikanchan	Mandya	Coimbatore	Dharwad	Hyderabad	Vellayani	Average	Rank	Super%
TNGG-06-02	292.9	1255.9	529.1	2136.0	1390.9	159.4	2530.5	266.7	991.3	1515.0	1106.8	1	33.9
JHGG-09-01	249.0	1402.5	470.9	1240.0	1390.9	116.7	1166.6	147.2	762.2	1128.3	807.4	4	
JHGG-09-02	370.5	1240.7	450.0	848.0	1130.2	177.2	1669.4	166.7	618.5	1025.0	769.6	5	
RSDGG-1	240.0	1370.5	495.9	1794.0	1408.8	189.9	2704.1	272.2	974.6	1466.7	1091.7	2	32.1
Riversdale (NC)	293.8	1293.5	454.1	864.0	1095.2	264.3	1905.5	147.2	664.3	1285.0	826.7	3	
PGG-616 (NC)	335.2	1398.7	425.0	574.0	1210.6	141.9	1013.9	148.6	641.4	988.3	687.8	7	
Bundel Guinea-1 (NC)	302.9	1195.0	412.5	1090.0	1258.8	106.8	827.7	163.9		980.0	704.2	6	
Mean	**297.7**	**1308.1**	**462.5**	**1220.9**	**1269.3**	**165.2**	**1688.2**	**187.5**	**775.4**	**1198.3**	**856.3**		
CD at 5%	72.0	43.8	62.5	109.3	61.7	24.6	159.5	33.2	41.2	108.67			
CV %	13.6	1.9	7.59	5.0	10.0	8.4	7.5	9.9	3.5	5.1			

Bundel Guinea-1 did not establish at Hyderabad Centre

Table 17.2 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Dry Matter Yield (q/ha)

Entries	Faizabad	Bhubaneswar	Ranchi	Anand	Urulikanchan	Mandya	Coimbatore	Dharwad	Hyderabad	Vellayani	Average	Rank	Super%
TNGG-06-02	56.4	298.9	213.4	604.1	427.2	35.3	390.3	53.6	203.2	316.8	259.9	1	38.0
JHGG-09-01	50.0	314.7	186.8	341.6	453.6	23.7	170.9	31.6	161.7	230.2	196.5	3	4.4
JHGG-09-02	79.5	302.0	194.0	242.8	333.7	37.5	254.3	36.9	132.7	209.1	182.2	6	
RSDGG-1	52.4	314.0	152.9	533.6	423.4	41.4	420.0	61.3	194.8	299.3	249.3	2	32.4
Riversdale (NC)	62.9	295.0	158.9	249.8	333.0	67.9	281.2	31.1	141.1	262.3	188.3	4	
PGG-616 (NC)	80.2	317.5	166.1	163.7	421.8	32.5	148.5	31.5	139.4	201.7	170.3	7	
Bundel Guinea-1 (NC)	71.0	278.9	120.9	327.9	454.8	26.4	125.8	35.3		200.0	182.3	5	
Mean	**64.6**	**303.0**	**170.4**	**351.9**	**406.8**	**37.8**	**255.9**	**40.2**	**162.2**	**245.6**	**204.1**		
CD at 5%	11.5	25.0	30.5	33.9	29.4	7.5	26.3	10.6	8.1	23.2			
CV %	10.0	4.5	10.0	5.4	12.5	11.1	8.2	14.8	3.3	5.3			

Table 17.3 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Green Forage Yield (q/ha/day)

Entries	Faizabad	Mandya	Dharwad	Anand	Ranchi	Hyderabad	Average	Rank
TNGG-06-02	1.07	1.88	4.23	6.76	1.45	6.61	3.67	1
JHGG-09-01	0.91	1.37	2.34	3.92	1.29	5.08	2.49	3
JHGG-09-02	1.35	2.08	2.65	2.68	1.23	4.12	2.35	4
RSDGG-1	0.87	2.23	4.32	5.68	1.36	6.50	3.49	2
Riversdale (NC)	1.07	3.11	2.34	2.73	1.24	4.43	2.49	3
PGG-616 (NC)	1.22	1.67	2.36	1.82	1.17	4.28	2.09	5
Bundel Guinea-1 (NC)	1.10	1.26	2.60	3.45	1.13		1.91	6
Mean	**1.08**	**1.94**	**2.98**	**3.86**	**1.27**	**5.17**	**2.64**	

Table 17.4 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Dry Matter Yield (q/ha/day)

Entries	Faizabad	Dharwad	Anand	Ranchi	Hyderabad	Average	Rank
TNGG-06-02	0.20	0.85	1.91	0.58	1.35	0.98	1
JHGG-09-01	0.18	0.50	1.08	0.51	1.08	0.67	3
JHGG-09-02	0.29	0.59	0.77	0.53	0.88	0.61	4
RSDGG-1	0.19	0.97	1.69	0.42	1.30	0.91	2
Riversdale (NC)	0.23	0.49	0.79	0.43	0.94	0.58	5
PGG-616 (NC)	0.29	0.50	0.52	0.45	0.93	0.54	7
Bundel Guinea-1 (NC)	0.26	0.56	1.04	0.33		0.55	6
Mean	**0.23**	**0.64**	**1.11**	**0.46**	**1.08**	**0.69**	

Table 17.5 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Crude Protein Yield (q/ha)

Entries	Faizabad	Bhubaneswar	Urulikanchan	Mandya	Anand	Hyderabad	Average	Rank
TNGG-06-02	3.9	31.0	31.1	2.6	85.4	13.9	28.0	1
JHGG-09-01	3.1	31.4	33.3	1.6	48.0	10.1	21.2	4
JHGG-09-02	5.2	31.3	24.2	2.5	25.6	9.4	16.4	7
RSDGG-1	3.0	29.5	31.6	3.4	63.6	12.7	24.0	2
Riversdale (NC)	4.3	28.8	23.9	5.5	29.1	9.5	16.9	5
PGG-616 (NC)	5.7	29.0	32.1	2.7	19.7	9.7	16.5	6
Bundel Guinea-1 (NC)	5.1	27.3	32.8	1.9	40.6		21.5	3
Mean	**4.3**	**29.8**	**29.9**	**2.9**	**44.6**	**10.9**	**20.6**	

Table 17.6 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Crude Protein (%)

Entries	Faizabad	Urulikanchan	Mandya	Anand	Hyderabad	Average	Rank
TNGG-06-02	6.9	7.3	7.2	10.5	6.9	7.8	4
JHGG-09-01	6.1	7.3	6.8	11.1	6.2	7.5	6
JHGG-09-02	6.5	7.2	6.8	9.4	7.1	7.4	7
RSDGG-1	5.8	7.5	8.1	10.8	6.5	7.7	5
Riversdale (NC)	6.8	7.2	8.1	10.6	6.8	7.9	3
PGG-616 (NC)	7.2	7.6	8.3	9.9	7.0	8.0	2
Bundel Guinea-1 (NC)	7.3	7.2	7.0	11.0		8.1	1
Mean	**6.6**	**7.3**	**7.5**	**10.5**	**6.8**	**7.8**	

Table 17.7 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Plant Height (cm)

Entries	Faizabad	Urulikanchan	Mandya	Anand	Ranchi	Vellayani	Average	Rank
TNGG-06-02	110.5	101.4	244.7	137.2	78.2	148.3	136.7	3
JHGG-09-01	70.8	156.9	187.1	138.5	73.0	124.3	125.1	6
JHGG-09-02	104.3	162.8	222.7	134.2	75.0	124.7	137.3	2
RSDGG-1	95.5	116.3	229.3	130.8	77.0	141.7	131.8	5
Riversdale (NC)	88.8	147.9	230.1	120.6	70.9	134.7	132.2	4
PGG-616 (NC)	124.4	130.9	212.9	125.7	78.6	120.7	132.2	4
Bundel Guinea-1 (NC)	118.7	148.3	205.4	142.8	66.2	144.7	137.7	1
Mean	**101.8**	**137.8**	**218.9**	**132.8**	**74.1**	**134.2**	**133.3**	

Table 17.8 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Leaf Stem Ratio

Entries	Faizabad	Urulikanchan	Mandya	Ranchi	Vellayani	Average	Rank
TNGG-06-02	1.24	1.74	0.51	0.40	1.00	0.98	1
JHGG-09-01	1.15	0.59	0.37	0.37	0.72	0.64	6
JHGG-09-02	1.05	0.73	0.56	0.51	0.90	0.75	4
RSDGG-1	1.14	1.45	0.53	0.42	1.08	0.92	2
Riversdale (NC)	1.20	0.90	0.54	0.53	0.89	0.81	3
PGG-616 (NC)	1.21	0.76	0.48	0.55	0.67	0.73	5
Bundel Guinea-1 (NC)	1.18	0.84	0.43	0.51	0.79	0.75	4
Mean	**1.17**	**1.00**	**0.49**	**0.47**	**0.86**	**0.80**	

Table 17.9 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Pooled Green Forage Yield (q/ha) over the years 2009-12

Entries	2009*	2010	2011	2012	Average	Rank	Superiority%
TNGG-06-02	503.3	1046.9	1093.6	1106.8	1082.4	1	37.5
JHGG-09-01	42.2	745.2	839.1	807.4	797.2	3	1.3
JHGG-09-02	309.8	650.2	773.6	769.6	731.1	5	
RSDGG-1	459.0	1004.1	1066.3	1091.7	1054.0	2	33.9
Riversdale (NC)	355.0	763.3	771.5	826.7	787.2	4	
PGG-616 (NC)	364.2	661.0	640.2	687.8	663.0	7	
Bundel Guinea-1 (NC)	195.6	620.8	718.6	704.2	681.2	6	
Mean	**361.3**	**784.5**	**843.3**	**856.3**	**828.0**		

Table 17.10 VTGG-2009 (4th Yr): Varietal Trial in Guinea Grass (Perennial) : Pooled Dry Matter Yield (q/ha) &Crude protein Yield (q/ha) over the years 2009-12

	Dry Matter Yield (q/ha)							Crude Protein Yield (q/ha)						
Entries	**2009***	**2010**	**2011**	**2012**	**Average**	**Rank**	**Sup%**	**2009***	**2010**	**2011**	**2012**	**Average**	**Rank**	**Sup%**
TNGG-06-02	98.9	202.7	225.3	259.9	229.3	1	35.2	7.8	15.4	18.2	28.0	20.5	1	26.5
JHGG-09-01	72.6	159.1	181.1	196.5	178.9	3	5.5	7.5	13.6	16.3	21.2	17.0	3	4.9
JHGG-09-02	62.7	139.5	164.2	182.2	162.0	5		5.6	12.3	14.9	16.4	14.5	6	
RSDGG-1	88.8	197.9	216.8	249.3	221.3	2	30.5	7.0	14.6	17.1	24.0	18.6	2	14.8
Riversdale (NC)	71.5	158.9	161.6	188.3	169.6	4		7.0	13.3	14.0	16.9	14.7	5	
PGG-616 (NC)	81.5	144.7	143.5	170.3	152.8	7		8.6	12.5	13.9	16.5	14.3	7	
Bundel Guinea-1 (NC)	42.9	127.7	158.3	182.3	156.1	6		4.1	11.6	15.6	21.5	16.2	4	
Mean	**74.1**	**161.5**	**178.7**	**204.1**	**181.4**			**6.8**	**13.3**	**15.7**	**20.6**	**16.6**		

CHAPTER-2

FORAGE CROP PRODUCTION

Forage Production Technology

The forage crop production programme was executed at 23 locations in five zones. In total 22 experiments were conducted, out of which 11 in network (8 coordinated and 3 AVT based) and 11 in location specific mode were undertaken with the aim to generate region specific forage production technology. The main emphasis of natural resource management under forage crops was to enhance and sustain the overall system productivity with optimal use of natural resources.

A. 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)**
- **AST-1.2:** 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-1.3:** 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 rain fed 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 17 locations to study the effect of resource conservation technologies (RCT) on forage yield, physico-chemical properties of soil and economics of the system. The second year results of the experiment have been reported in Rabi 2011-12.The results of the third year experimentation would be reported in annual report of Rabi 2012-13

AST-2: Optimization of nitrogen for sorghum in different cropping systems

Location: Ludhiana and Pantnagar

The experiment was conducted to find out the nitrogen requirement of sorghum in different cropping systems. This was the third year (final year) of the experimentation and data has been reported in Tables 2(a) to 2(b).

At Ludhiana, planting of sorghum under berseem – sorghum cropping sequence being at par with oat – bajra – sorghum (588.0 q/ha GFY and 156.6 q/ha DMY), recorded significantly higher GFY (591.7 q/ha) and DMY (156.4 q/ha) over rest of the treatments. The percent increase for GFY in berseem – sorghum cropping sequence over wheat – cowpea – sorghum, wheat – bajra – sorghum, oat – cowpea – sorghum and oat – bajra – sorghum cropping sequences was 14.11, 25.55, 6.76, 19.34 and 0.63, respectively. Sorghum fodder equivalent yield was recorded significantly highest in berseem – sorghum cropping system (3062.8 q/ha) followed by wheat – cowpea – sorghum and wheat – fallow – sorghum. In berseem – sorghum cropping sequence plant height and tillers/m row length was recorded highest as compared to rest of the treatments. The net monetary returns and benefit cost ratio were also recorded significantly highest in berseem – sorghum cropping system and registered percent increase of 30.19, 51.63, 63.08, 57.97 and 68.16 for net returns over wheat – fallow – sorghum, wheat – cowpea – sorghum, wheat – bajra – sorghum, oat – cowpea – sorghum and oat – bajra – sorghum cropping sequences, respectively. Application of 125% recommended dose of nitrogen to sorghum in different cropping sequences being at par with 100% RDN for DMY (150.6 q/ha) recorded significantly highest GFY (592.3 q/ha) and DMY (156.3 q/ha) as compared to its lower levels (Tables 2(a)). Similarly to DMY, 125% RDN to sorghum recorded significantly highest sorghum fodder equivalent yield (2562.6 q/ha), taller plants (177.3 cm) and tillers/m row length over its lower levels (50 and 75% of RDN). Application of 125% of RDN to sorghum registered percent increase of 7.73, 4.45 and 2.14 for sorghum fodder equivalent yield over 50% of RDN, 75% of RDN and 100% of RDN, respectively. Similarly, the highest level of nitrogen (125% of RDN) fetched highest net monetary returns (Rs.65605/ha) and benefit cost ratio (1.75). No significant interaction of cropping systems with nitrogen level was recorded for any parameter.

At Pantnagar, the fodder yield, plant height and economics of sorghum cultivation under different cropping sequences were not influenced significantly. However the highest GFY (493.8 q/ha), DMY (127.4 q/ha), CPY (9.38 q/ha) and net monetary returns were recorded under sorghum – wheat – maize cropping sequence closely followed by sorghum – berseem system (Table-2 (b)). The application of highest dose of nitrogen (125% of RDN) to sorghum under different cropping sequences recorded significantly highest GFY (528.6 q/ha), DMY (142.7 q/ha), CPY (11.27 q/ha), net monetary returns (₹ 20498/ha) and benefit cost ratio (1.24) as compared to rest of the treatments. The percent increase in GFY of sorghum with application of 125% of RDN over 50% of RDN, 75% of RDN and 100% of RDN were 27.71, 13.97 and 6.83, respectively.

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

Treatment	GFY (q/ha)	DMY (qha)	Sorghum fodder equivalent yield (q/ha)	Plant height (cm)	Tillers/m row length	Cost of cultivation (Rs./ha)	Net monetary return (Rs./ha)	Benefit cost ratio
A. Cropping systems								
Wheat – fallow – sorghum	518.5	138.7	2439.1	161.3	21.0	31051	67730	2.18
Wheat – cowpea - sorghum	471.3	126.0	2504.2	156.7	21.4	43268	58153	1.35
Wheat – bajra - sorghum	554.2	148.1	2387.3	163.8	21.8	42614	54071	1.27
Berseem - sorghum	591.7	156.4	3062.8	168.6	22.3	35963	88180	2.46
Oat – cowpea - sorghum	495.8	132.5	2280.9	159.2	20.9	36555	55819	1.53
Oat - bajra - sorghum	588.0	156.6	2181.2	164.2	21.6	35902	52437	1.46
SEm±	9.6	2.6	30.2	3.3	0.8	786	1296	0.03
CD at 5%	30.1	8.1	94.9	10.5	2.5	2478	3998	0.10
B. Nitrogen level (% of RDN)								
50% of RDN	466.0	125.4	2378.7	143.1	18.2	36904	59432	1.65
75% of RDN	521.9	139.6	2453.4	158.1	21.1	37328	62035	1.70
100% of RDN	566.1	150.6	2508.9	170.7	22.7	37756	63855	1.73
125% of RDN	592.3	156.3	2562.6	177.3	23.8	38181	65605	1.75
SEm±	7.8	2.1	24.6	2.7	0.7	720	1085	0.03
CD at 5%	22.2	5.9	69.6	7.7	1.8	NS	3069	0.08
C. Interaction Cropping system X Nitrogen level								
SEm±	19.1	5.1	60.3	6.6	1.6	1764	2658	0.07
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS
CV%	7.1	6.8	6.1	7.1	8.8	8.1	7.3	6.9

Table-2 (b): Yield, growth and economics 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)	Plant population/ m row length	Leaf stem ratio	Net monetary return (Rs./ha)	Benefit cost ratio
A. Cropping systems								
Sorghum – Wheat	489.2	126.3	9.30	292.5	16.3	0.41	18491	1.17
Sorghum – Wheat – Maize	493.8	127.4	9.38	307.1	14.3	0.46	18818	1.19
Sorghum – Wheat – Cowpea	449.6	116.1	8.56	302.0	16.7	0.42	15721	0.99
Sorghum – Berseem	490.3	126.7	9.36	286.2	18.3	0.44	18568	1.17
Sorghum – Oat – Maize	457.2	118.0	8.68	286.5	15.1	0.42	16255	1.03
Sorghum – Oat – Cowpea	471.6	121.7	8.95	290.7	15.2	0.44	17261	1.09
SEm±	17.1	4.4	0.33	5.4	0.9	0.01	1200	0.08
CD at 5%	NS	NS	NS	NS	NS	0.04	NS	NS
B. Nitrogen level (% of RDN)								
50% of RDN	413.9	103.5	6.63	282.6	12.6	0.39	13975	0.93
75% of RDN	463.8	116.0	8.35	288.8	14.8	0.42	16966	1.10
100% of RDN	494.8	128.7	9.91	296.0	17.0	0.42	18638	1.16
125% of RDN	528.6	142.7	11.27	309.3	19.6	0.48	20498	1.24
SEm±	4.8	1.3	0.10	1.8	0.5	0.01	338	0.02
CD at 5%	13.8	3.6	0.28	5.2	1.5	0.03	968	0.06
C. Interaction Cropping system X Nitrogen level								
SEm±	16.7	4.3	0.33	6.3	1.9	0.04	1170	0.07
CD at 5%	NS	NS	NS	12.8	NS	NS	NS	NS

AST-3: Forage production potential of sorghum hybrid with forage legumes under varying seed rates of intercrop.

Location: 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 experiment was started in kharif, 2010 and data of third (final) year has been reported in Tables 3(a) to 3 (g).

At Ludhiana, GFY of sorghum with forage legumes (cowpea and guar) was significantly higher (352.1 to 482.2 q/ha) in first cutting than sole crop of sorghum (338.9 q/ha). Sole sorghum GFY remained at par with sorghum + 25% of guar SR (352.1 q/ha). In the first cutting, GFY and DMY increased with increase in SR of forage legumes up to 100% SR. In the second cutting, GFY and DMY was highest in sorghum + 25% guar SR (422.9 q/ha) followed by sole sorghum (419.9 q/ha) and decreased with increase in SR of legumes. Sorghum + 75% cowpea SR intercropping system recorded significantly highest GFY (828.1 q/ha) over sole sorghum and sorghum + guar, however it remained at par with rest of the systems (Sorghum + 25/ 50/ 100% cowpea SR). Sorghum + 100% cowpea SR recorded highest DMY (102.8 q/ha) in the first cutting, whereas, in second cutting, sole sorghum recorded highest DMY (95.9 q/ha) followed by sorghum + 25% guar SR and decreased with increase in seed rates of intercrops. Sorghum + 75% cowpea SR intercropping system yielded significantly highest DMY (182.4 q/ha) over sole sorghum and sorghum + guar intercropping systems and remained at par with sorghum + 25/ 50/ 100% cowpea SR intercropping systems. The crude protein content, crude protein yield, IVDMD content and IVDMD yield were higher in sorghum + cowpea than sorghum + guar intercropping systems. Crude protein content was higher in first cutting than second cutting whereas, IVDMD was almost similar under both the cuttings. In the first cutting, the CP content ranged between 8.5 to 13.5 % and IVDMD ranged between 51.3 to 58.9%. The lowest CP content (8.6%) and IVDMD content (51.3%) were observed in sole sorghum (Table 3b).

At Palampur, GFY of sorghum with forage legumes (at 50 to 100% rice bean SR and at 75% cowpea SR) was significantly higher (473.03 to 541.33 q/ha) than sole crop of sorghum (438.71 q/ha), sorghum + 25% cowpea SR (406.8 q/ha), sorghum + 25% rice bean SR (445.64 q/ha), sorghum + 50% cowpea SR (452.84 q/ha) and sorghum + 100% cowpea SR (457.33 q/ha). Among all treatments, sorghum + 75% rice bean SR (541.33 q/ha and 111.8 q/ha, GFY and DMY, respectively) intercropping system recorded significantly highest GFY and DMY (at par with sorghum + 75% cowpea SR for DMY). Fodder yield increased with increase in seed rate of forage legumes up to 75% SR. Crude protein content of fodder increased with increase in seed rates of forage legumes to 100% (14.6% with cowpea and 15.1% with rice bean). In sole rice bean the crude protein content was 18.1% as compared to 17.4% in sole cowpea (Table 3c). Sorghum + 75% rice bean SR intercropping system also recorded significantly highest crude protein yield (16.29 q/ha). However, it remained at par with sorghum 100% rice bean SR (16.24 q/ha) and sorghum + 75% cowpea SR (16.00 q/ha). The net monetary returns (ranging between Rs.42542 to 59431/ha) in sorghum with forage legumes were significantly higher than sole sorghum (Rs.39268/ha), sole cowpea (Rs.5094/ha) and sole rice bean (Rs. 7856/ha).

Similarly to net returns, sorghum + 75% rice bean SR intercropping system registered significantly highest benefit cost ratio (5.43) followed by sorghum + 75% cowpea SR (5.02) and lowest being with sole cowpea (0.47). The land equivalent ratio (LER) was highest with sorghum + 75% rice bean SR (1.78) followed by sorghum + 75% cowpea (1.63) and lowest being with sorghum + 25% cowpea SR intercropping system (0.99) (Table 3d).

At Bikaner, in the first cutting, sorghum + 75% cowpea SR and sorghum + 100% cowpea SR intercropping systems recorded significantly higher green fodder yield (269.68 and 263.65 q/ha, respectively) over rest of the treatments and lowest being with sorghum + 100% guar SR (148.49 q/ha). In second cutting, planting of sorghum + 25% cowpea SR intercropping system being at par with sorghum + 25% guar SR (43.3 q/ha) and sole sorghum (43.3 q/ha), recorded significantly highest GFY (45.53 q/ha) over rest of the treatments. Under third cutting, green fodder yield of sorghum recorded significantly highest in sole sorghum (52.59 q/ha) as compared to rest of the treatments. The planting of sorghum + 75% cowpea SR intercropping system being at par with sorghum + 100% cowpea SR (263.65 q/ha) recorded significantly highest total green fodder yield (269.68 q/ha) over rest of the treatments. Similarly to GFY, the same treatment sorghum + 75% cowpea SR intercropping system recorded highest DMY (66.57 q/ha) (Table 3e).

At Pantnagar, planting of sorghum + 75% cowpea SR intercropping system recorded significantly higher green fodder yield (620.7 q/ha) as compared to sorghum + 25% cowpea SR (564.3 q/ha) and remained at par with rest of the treatments. The fodder yield increased with increase in seed rate of forage legumes up to 75% cowpea SR and up to 100% rice bean SR. Similarly to GFY, sorghum + 75% cowpea SR recorded highest crude protein yield (15.96 q/ha), net monetary returns (Rs.27447/ha) and benefit cost ratio (1.72) and lowest CP yield was recorded under sole sorghum (11.41 q/ha). Whereas, lowest net monetary returns (₹ 23503/ha) and benefit cost ratio (1.47) were realized under sorghum + 25% cowpea SR intercropping system (Table 3g).

Table-3 (a): Fodder yield and plant characteristics as influenced with 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		Leaf: stem ratio	
	1st cut	2nd cut	Total	1st cut	2nd cut	Total	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut
Sorghum+ 25 % cowpea	406.3	397.9	804.2	88.2	90.3	178.5	187.3	181.9	15.2	15.9	0.69	0.71
Sorghum+ 50 % cowpea	431.2	391.2	822.4	92.3	89.8	182.1	188.3	179.1	14.8	15.6	0.67	0.73
Sorghum+ 75 % cowpea	462.9	365.2	828.1	100.2	82.2	182.4	189.2	175.1	14.2	15.2	0.69	0.74
Sorghum+ 100 % cowpea	482.2	340.7	822.9	102.8	78.8	181.6	190.0	173.3	13.8	14.9	0.68	0.76
Sorghum+ 25 % guar	352.1	422.9	775.0	76.1	95.2	171.3	188.0	178.2	15.6	16.4	0.69	0.72
Sorghum+ 50 % guar	377.2	403.9	781.1	81.0	92.1	173.1	188.7	173.0	15.4	16.0	0.68	0.73
Sorghum+ 75 % guar	405.6	373.6	779.2	87.8	84.4	172.2	189.3	170.1	15.0	15.6	0.67	0.75
Sorghum+ 100 % guar	421.1	353.1	774.2	92.3	78.2	170.5	189.7	167.5	14.6	15.2	0.67	0.76
Sorghum pure	338.9	419.9	758.8	73.6	95.9	159.5	186.3	183.9	16.0	16.7	0.70	0.74
Cowpea pure	218.9	-	218.9	36.1	-	36.1	124.3	-	14.0	-	0.95	-
Guar pure	216.4	-	216.4	45.2	-	45.2	118.2	-	13.5	-	0.80	-
SEm±	10.37	9.89	9.92	2.26	2.24	2.20	2.53	3.37	1.18	0.53	0.03	0.03
C D at 5 %	30.4	29.0	29.1	6.62	6.57	6.46	7.41	9.87	NS	1.55	0.09	0.09
CV %	5.25	5.61	5.43	5.53	5.61	5.17	5.24	4.12	8.41	7.22	6.54	7.23

Table-3 (b): Crude protein and IVDMD as influenced with forage legumes under varying seed rates of intercrop at Ludhiana

Treatments	CP content (%)		Crude protein yield (q/ha)		IVDMD content (%)		IVDMD yield (q/ha)	
	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut
Sorghum+ 25 % cowpea	8.6	6.89	7.62	6.22	52.2	52.2	45.95	47.08
Sorghum+ 50 % cowpea	11.8	6.96	10.88	6.20	53.5	52.5	49.33	46.80
Sorghum+ 75 % cowpea	12.6	6.98	12.66	5.74	54.3	53.2	54.45	43.70
Sorghum+ 100 % cowpea	13.5	6.89	13.28	5.48	55.4	55.5	54.65	44.14
Sorghum+ 25 % guar	8.6	6.98	5.72	6.64	52.2	51.9	34.48	49.33
Sorghum+ 50 % guar	9.8	6.94	6.95	6.38	52.6	53.2	37.33	48.96
Sorghum+ 75 % guar	11.5	6.98	8.92	5.89	53.2	54.1	41.39	45.61
Sorghum+ 100 % guar	12.6	6.92	9.76	5.41	54.3	55.0	41.97	43.00
Sorghum pure	8.5	6.98	5.38	5.99	51.3	52.2	32.58	44.75
Cowpea pure	17.8	-	6.42	-	58.9	-	21.23	-
Guar pure	16.9	-	6.26	-	57.2	-	25.85	-
SEm±	0.31	0.20	0.30	0.21	1.82	1.47	1.41	1.59
C D at 5 %	0.90	0.60	0.87	0.62	5.34	4.32	4.14	4.67
CV %	4.56	5.03	6.03	5.97	4.32	4.79	6.12	6.01

Table-3(c): Fodder yields and plant characteristics as influenced with forage legumes under varying seed rates of intercrop at Palampur

Treatments	Total GFY sorghum (q/ha)	Total DMY sorghum (q/ha)	GFY cowpea (q/ha)	DMY cowpea (q/ha)	GFY ricebean (q/ha)	DMY ricebean (q/ha)	Total GFY sorghum + intercrop (q/ha)	Total DMY sorghum + intercrop (q/ha)	Crude protein yield (q/ha)	Crude protein (%)
Sorghum+ 100% SR of cowpea	386.27	90.88	71.07	11.37	-	-	457.33	102.25	14.99	14.6
Sorghum+ 75% SR of cowpea	426.27	98.11	80.07	13.69	-	-	506.34	111.80	16.00	14.3
Sorghum+ 50% SR of cowpea	413.77	94.80	39.07	6.25	-	-	452.84	101.05	12.01	11.9
Sorghum+ 25% SR of cowpea	396.73	92.48	10.07	1.61	-	-	406.80	94.09	8.91	9.5
Sorghum+ 100% SR of rice bean	396.64	91.37	-	-	101.47	16.24	498.12	107.61	16.24	15.1
Sorghum+ 75% SR of rice bean	424.17	96.92	-	-	117.16	18.75	541.33	115.67	16.29	14.1
Sorghum+ 50% SR of rice bean	414.54	94.59	-	-	58.49	9.36	473.03	103.95	11.12	10.7
Sorghum+ 25% SR of rice bean	412.49	94.30	-	-	33.16	5.31	445.64	99.61	9.32	9.4
Sole Sorghum	438.71	102.13	-	-	-	-	438.71	102.13	8.75	8.6
Sole Cowpea	-	-	121.81	19.49	-	-	121.81	19.49	3.40	17.4
Sole Rice bean	-	-	-	-	143.61	22.98	143.61	22.98	4.16	18.1
SEm±	6.76	1.58	3.51	0.81	4.65	0.75	8.46	1.87	0.28	0.23
C D at 5 %	20.25	4.69	11.45	2.65	15.17	2.42	24.95	5.51	0.84	0.67
CV %	6.84	4.58	9.45	13.45	8.89	8.90	6.34	7.64	6.52	3.63

Table-3 (d): Economics and plant characteristics of forage crops as influenced with forage legumes seed rates at Palampur

Treatments	Plant height (cm)			Tillers/m	Plant number/ m		Net return (Rs/ha)	Benefit cost ratio	Land equivalent ratio
	Sorghum	Cowpea	Ricebean	Sorghum	Cowpea	Ricebean			
Sorghum+ 100% SR of cowpea	162.1	65.6	-	37.0	12.0	-	48211	4.29	1.46
Sorghum+ 75% SR of cowpea	180.7	56.9	-	37.3	9.3	-	54882	5.02	1.63
Sorghum+ 50% SR of cowpea	169.5	57.1	-	41.0	8.3	-	48227	4.53	1.27
Sorghum+ 25% SR of cowpea	156.3	55.7	-	44.3	6.7	-	42542	4.11	0.99
Sorghum+ 100% SR of ricebean	186.8	-	68.3	34.7	-	14.3	53513	4.76	1.61
Sorghum+ 75% SR of ricebean	158.4	-	68.0	36.7	--	11.7	59431	5.43	1.78
Sorghum+ 50% SR of ricebean	179.7	-	69.1	37.0	-	9.0	50851	4.78	1.35
Sorghum+ 25% SR of ricebean	179.1	-	68.2	37.7	-	8.0	47592	4.60	1.17
Sole Sorghum	167.9	-	-	42.3	-	-	39268	4.03	-
Sole Cowpea	-	63.9	-	-	12.7	14.7	5094	0.47	-
Sole Ricebean	-	-	71.3	-	-	-	7856	0.72	-
SEm±	4.70	1.40	0.98	1.76	0.38	0.36	1100	0.10	0.03
C D at 5 %	14.12	4.57	NS	5.29	1.23	1.16	3245	0.31	0.09
CV %	4.77	4.06	2.94	7.92	6.72	5.37	8.58	4.63	3.84

Table-3 (e): Production potential of multicut sorghum with forage legumes under varying seed rate of intercrop (legumes) (Sorghum- COFS-29, Guar- BG-1, Cowpea-BL-2) at Bikaner

Treatment	Green fodder yield (q/ha)					Total GFY (Q/ha)	Dry fodder yield Sorghum/guar/ Cowpea (q/ha)		Total dry matter yield (q/ha)
	Sorghum			Guar/Cowpea					
	I cut	II cut	III cut	I cut	II cut		I cut	II cut	
Sole sorghum	60.87	42.51	52.59	-	-	155.97	24.33	22.69	47.02
Sorghum+guar 25% SR	46.22	43.30	44.72	39.69	-	173.93	31.68	25.81	60.49
Sorghum+guar 50% SR	44.70	38.98	41.80	48.15	-	173.63	33.33	22.54	55.87
Sorghum+guar 75% SR	38.71	38.12	43.44	42.27	-	162.54	29.23	18.87	48.10
Sorghum-guar 100% SR	33.08	33.74	43.40	38.27	-	148.49	26.83	16.04	42.87
Sorghum+cowpea25% SR	37.57	45.53	41.50	40.42	28.55	193.57	24.55	29.22	53.77
Sorghum+ cowpea 50% SR	36.78	35.91	36.33	45.68	59.38	214.08	25.41	32.48	57.89
Sorghum+ cowpea 75% SR	35.90	34.44	35.77	56.07	107.50	269.68	26.54	40.03	66.57
Sorghum+ cowpea100% SR	34.27	33.71	35.00	50.27	110.40	263.65	25.42	38.07	63.49
SEm+_	2.14	1.71	1.93	3.60	-	4.01	0.87	1.22	
C D at 5 %	6.16	4.92	5.55	10.33	-	11.53	2.52	3.51	
CV %	9.1	7.7	8.4	13.8	-	4.5	5.5	7.8	

Table-3 (f): Growth parameters of multicut sorghum under forage legumes intercrop (Sorghum- COFS-29, Guar- BG-1, Cowpea-BL-2) at Bikaner

Treatment	Plant height (cm)			Sorghum No. of shoots /M^2	L: S ratio	
	Sorghum		Guar/ Cowpea		Sorghum	
	I cut	II cut			I cut	II cut
Sole sorghum	111.33	117.67	-	137.33	0.24	0.29
Sorghum+guar 25% SR	124.67	141.33	73.00	137.33	0.31	0.33
Sorghum+guar 50% SR	120.67	129.33	76.00	151.33	0.28	0.31
Sorghum+guar 75% SR	105.00	122.00	87.33	142.67	0.29	0.34
Sorghum-guar 100% SR	106.33	110.67	66.00	156.00	0.28	0.33
Sorghum+cowpea25% SR	120.00	123.67	92.67	134.67	0.28	0.32
Sorghum+ cowpea 50% SR	112.00	137.67	88.00	162.00	0.26	0.27
Sorghum+ cowpea 75% SR	100.67	121.00	87.33	141.33	0.24	0.38
Sorghum+ cowpea100% SR	108.67	121.67	78.00	134.00	0.24	0.34
SE m+_	6.054	6.07	3.80	8.20	0.02	0.02
C D at 5 %	17.37	17.42	10.91	23.55	0.06	0.05
CV %	9.35	8.41	8.12	9.87	14.33	10.54

Table-3 (g): Fodder yield, growth parameter and economics of multicut sorghum as influenced with forage legumes at Pantnagar

Treatments		GFY (q/ha)	DMY (q/ha)	CPY (q/ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B: C
T_1	Sole Sorghum	586.0	152.4	11.41	41020	25020	1.56
T_2	Sorghum + Cowpea 25%	564.3	143.3	14.68	39503	23503	1.47
T_3	Sorghum + Cowpea 50%	594.0	150.7	15.61	41580	25580	1.60
T_4	Sorghum + Cowpea 75%	620.7	157.7	15.96	43447	27447	1.72
T_5	Sorghum + Cowpea 100%	571.7	145.1	15.42	40017	24017	1.50
T_6	Sorghum + Rice bean 25%	597.3	145.6	14.36	41813	25813	1.61
T_7	Sorghum + Rice bean 50%	593.3	144.4	14.34	41533	25533	1.60
T_8	Sorghum + Rice bean 75%	617.3	149.6	15.12	43213	27213	1.70
T_9	Sorghum + Rice bean 100%	619.3	148.4	15.64	43353	27353	1.71
	SEm±	17.7	4.5	0.38	1239	1239	0.08
	CD at 5%	52.57	NS	1.13	NS	3680	NS

AST-4: Performance of forage crops raised through wastewater under varied nutrient levels Location: Coimbatore, Hyderabad

This experiment was started in Kharif 2010 at two locations to access the production, quality and economics of various forage crops raised through wastewater under varied nutrient level. Twenty treatments consisted of combinations of forage crops (4) and nutrient levels (5) laid out in split plot design. The data of second year has been reported in Annual report of Rabi 2011-12 and data of third year will be reported in annual report of Rabi 2012-13.

AST-5: Effect of tillage and nutrient management on productivity of rice-oat cropping system Location: Bhubaneshwar, Ranchi, Kalyani, Jorhat, Raipur

The experiment was conducted in third year (kharif 2012) at five locations (second 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 third (final) year experimentation would be reported in annual report of Rabi 2012-13.

AST-6: Effect of growing environment and nitrogen levels on production and quality of BN hybrid Location: Palampur, Ludhiana, Anand, Rahuri, Hyderabad

A field experiment was started in Kharif 2011 (as establishment year) at five locations to assess the effect of growing environment and N levels on yield, quality and anti-nutritional components. The treatment consisted of two growing environments (shaded and unshaded) and five levels of nitrogen (Control, 50, 75,100 and 125% of recommended N) laid out in RBD and replicated three times. The data of first year experimentation has been presented in Table 6(a) to 6(f).

On mean basis growing of bajra napier hybrid under unshaded environment recorded higher GFY (773.93 q/ha), DMY (154.94 q/ha), and CPY (16.76 q/ha) over shaded environment (621.72, 113.07 and 13.41q/ha, respectively). The magnitude of increase for GFY, DMY and CPY was 24.48, 37.03 and 24.98%. In general the highest yield was record at Anand and lowest at Palampur. Location wise, at all the locations (except Rahuri) growing of BN hybrid under unshaded condition recorded remarkably higher yield, whereas, on mean basis as well as location wise (except Hyderabad) under shaded condition, BN hybrid recorded higher crude protein content over unshaded condition. GFY, DMY, CPY and crude protein content increased consistently with increasing levels of nitrogen up to 125% of recommended N. The magnitude of increase for GFY on location mean basis was 54.02, 26.47, 12.70 and 5.61% over control, 50, 75, and 100% of recommended N, respectively.

Unshaded environment produced taller plants with more number of tillers of BN hybrid over shaded environment on mean basis (Table 6d). Whereas, plant height and number of tiller / plant increased gradually with higher levels of recommended N up to 125% of RDN. Maximum plant height was recorded at Hyderabad and lowest at Ludhiana. The growing of BN hybrid under unshaded environment fetched net return and benefit cost ratio at Palampur and Ludhiana over shaded environment. Net monetary return and B: C ratio increased consistently with increasing levels of nitrogen up to 125% of recommended N on mean basis (Table-6e).

Anti-quality components of BN hybrid differed under different growing environment and nitrogen levels. On mean basis, higher values of NDF (%), ADF (%) and oxalic acid (%) were recorded under unshaded condition over shaded condition. In general higher NDF (%) and ADF (%) in BN hybrid were recorded at Anand and lowest being with Ludhiana. Whereas, higher nitrate content (ppm) were recorded under shaded condition (1111.95 ppm) over unshaded condition (941.63 ppm). At Palampur, growing of BN hybrid under unshaded condition observed higher nitrate content over shaded condition. Location wise highest values of nitrate content were recorded at Palampur and lowest being at Rahuri.

On mean basis, growing of BN hybrid without nitrogen (Control) observed highest values of NDF (%) over its higher levels. Whereas, reverse trend was observed for acid detergent fibre (Table 6g). Similarly to NDF, the application of highest level of nitrogen 125% of recommended N recorded highest values of nitrate content (1163.27ppm) over its lower levels on mean basis. However, application of 100% recommended N to BN hybrid observed highest oxalic acid content in two fodder over its lower as well as higher level.

At Hyderabad, available N and K in the soil remained unaffected under shaded and unshaded growing environment and among nitrogen levels. Whereas unshaded environment recorded higher status of available phosphorus in the soil over shaded condition after one year of experimentation (Table 6(e)). At Palampur, soil fertility status in terms of available N, P and K and organic carbon was toward higher side under shaded growing environment over unshaded condition after one year of experimentation. Application of graded levels of nitrogen to the BN hybrid recorded consistent increase in available N in the soil after crop season, However remarkable variation in soil available P, K and OC% was not observed by application of different levels of nitrogen (Table 6k).

Table- 6(a): Effect of growing environment and nitrogen levels on green fodder yield of BN hybrid

Treatment	Green fodder yield (q/ha)					
	Palampur (2 cuts)	Ludhiana	Anand (8 cuts)	Rahuri (3 cuts)	Hyderabad (3 cuts)	Mean
A. Growing environment						
Shaded	198.59	965.6	1123	550.13	271.30	621.72
Unshaded	298.01	1171.8	1612	469.84	318.00	773.93
SEm±	3.14	20.51	29.71	2.14		
CD at 5%	9.33	60.90	180.82	13.01	13.50	
B. Nitrogen levels						
Control	145.89	794.8	1096	351.55	262.20	530.09
50% of recommended N	216.45	991.9	1279	485.25	255.00	645.52
75% of recommended N	256.82	1121.5	1393	539.56	311.50	724.48
100% of recommended N	297.41	1185.4	1487	568.89	326.50	773.04
125% of recommended N	324.93	1250.5	1584	604.69	318.00	816.42
SEm±	4.97	21.45	25.09	15.04		
CD at 5%	14.76	63.70	75.25	45.10	21.30	
C. Interaction: G X N						
SEm±	7.03	30.34	35.50	21.27		
CD at 5%	20.88	90.10	NS	NS	30.10	
CV%	7.42	7.61	4.50	7.23	12.51	

Table-6 (b): Effect of growing environment and nitrogen levels on dry matter yield of BN hybrid

Treatment	Dry matter yield (q/ha)					
	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean
A. Growing environment						
Shaded	46.67	158.2	182.0	109.17	69.30	113.07
Unshaded	70.60	200.4	321.9	96.28	85.50	154.94
SEm±	0.74	3.06	5.55	0.18		
CD at 5%	2.21	9.09	33.79	1.09	3.50	
B. Nitrogen levels						
Control	34.79	138.2	194.8	73.77	67.30	101.77
50% of recommended N	50.42	167.7	232.4	99.45	66.70	123.33
75% of recommended N	59.48	187.8	256.2	108.71	82.80	139.00
100% of recommended N	71.47	196.5	277.2	112.83	85.20	148.64
125% of recommended N	77.03	206.3	299.3	118.88	85.00	157.30
SEm±	1.18	3.62	4.38	3.04		
CD at 5%	3.49	10.77	13.15	9.10	5.50	
C. Interaction: G X N						
SEm±	1.67	5.13	6.20	4.29		
CD at 5%	4.95	15.23	NS	NS	7.80	
CV%	6.92	6.68	4.26	7.24	12.37	

Table- 6 (c): Effect of growing environment and nitrogen levels on crude protein yield and protein content of bajra napier hybrid

Treatment	Crude protein yield (q/ha)					Crude protein (%)					
	Palampur	Anand	Rahuri	Ludhiana	Mean	Palampur	Anand	Rahuri	Hyderabad	Ludhiana	Mean
A. Growing environment											
Shaded	4.45	23.07	9.53	16.60	13.41	9.47	13.02	8.58	10.64	10.57	10.46
Unshaded	6.67	32.52	7.99	19.87	16.76	9.38	10.61	8.20	10.71	9.83	9.75
SEm±	0.07	0.64	0.02	0.30		0.07	-	0.01		0.14	
CD at 5%	0.21	3.92	0.13	0.88		NS	-	0.07	0.25	0.41	
B. Nitrogen levels											
Control	3.10	19.21	5.78	12.93	10.26	8.94	10.82	7.75	10.19	9.40	9.42
50% of recommended N	4.64	24.74	8.31	16.31	13.50	9.23	11.47	8.27	11.17	9.75	9.98
75% of recommended N	5.73	28.19	9.32	18.54	15.45	9.64	11.75	8.52	10.71	10.19	10.16
100% of recommended N	6.87	31.50	9.77	20.61	17.19	9.62	12.28	8.60	10.74	10.54	10.36
125% of recommended N	7.46	35.35	10.63	22.81	19.06	9.69	12.78	8.83	10.56	11.13	10.60
SEm±	0.11	0.46	0.28	0.32		0.12	-	0.08		0.16	
CD at 5%	0.34	1.39	0.84	0.95		0.35	-	0.25	0.39	0.47	
C. Interaction: G X N											
SEm±	0.16	0.66	0.39	0.54		0.17	-	0.12		0.31	
CD at 5%	0.49	NS	NS	NS		NS	-	NS	0.56	NS	
CV%	5.07	4.08	7.86	6.873		3.07	-	2.45	6.37	7.17	

Table- 6(d): Effect of growing environment and nitrogen levels on plant height and number of tillers/plant of bajra napier hybrid

Treatment	Plant height (cm)						Number of tillers / plant				
	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean	Anand	Rahuri	Hyderabad	Ludhiana	Mean
A. Growing environment											
Shaded	120.25	48.5	131.93	114.10	144.6	111.88	29.01	23.68	18.27	18.30	22.32
Unshaded	124.65	67.8	138.39	105.42	143.5	115.95	39.88	19.32	20.09	16.80	24.02
SEm±		1.09	-	2.17	2.0		-	0.25	0.55	0.27	
CD at 5%		3.24	-	13.20	NS		-	1.51	1.625	0.81	
B. Nitrogen levels											
Control	84.60	52.6	124.12	86.43	136.3	96.81	30.02	15.53	18.33	16.4	20.07
50% of recommended N	120.00	55.4	130.91	105.65	140.3	110.45	32.52	20.73	18.89	16.9	22.26
75% of recommended N	131.65	59.3	135.74	116.48	147.1	118.05	34.68	21.73	19.06	17.7	23.29
100% of recommended N	136.65	60.8	140.16	117.92	145.5	120.21	36.45	23.28	19.72	18.2	24.41
125% of recommended N	139.61	62.9	144.88	122.31	151.1	124.16	38.55	26.23	19.89	18.8	25.87
SEm±		1.25	-	2.36	3.2		-	0.62	0.86	0.29	
CD at 5%		3.72	-	7.06	9.5		-	1.85	NS	0.86	
C. Interaction: G X N											
SEm±		1.84	-	3.33	4.5		-	0.87	1.22	0.43	
CD at 5%		5.48	-	NS	NS		-	NS	NS	NS	
CV%		7.18	-	5.26	5.5		-	7.01	11.05	6.27	

Table- 6(e): Effect of growing environment and nitrogen levels on leaf stem ratio, net return and benefit cost ratio of bajra napier hybrid

Treatment	Leaf stem ratio				Net monetary return (Rs/ha)			Benefit cost ratio		
	Anand	Rahuri	Hyderabad	Mean	Palampur	Ludhiana	Mean	Palampur	Ludhiana	Mean
A. Growing environment										
Shaded	1.95	0.68	0.57	1.07	12904	36424	24664	1.36	0.91	1.14
Unshaded	1.77	0.61	0.68	1.02	23797	53459	38628	2.26	1.31	1.79
SEm±	-	0.02	0.013		376	977		0.04	0.02	
CD at 5%	-	0.12	0.038		1116	2903		0.11	0.06	
B. Nitrogen levels										
Control	1.27	0.53	0.60	0.80	3275	29035	16155	0.21	0.87	0.54
50% of recommended N	1.53	0.61	0.61	0.92	13387	37253	25320	1.05	0.99	1.02
75% of recommended N	1.73	0.68	0.62	1.01	18598	48273	33436	1.51	1.21	1.36
100% of recommended N	2.06	0.69	0.64	1.13	25564	53954	39759	2.50	1.27	1.89
125% of recommended N	2.71	0.73	0.64	1.36	30928	56193	43561	3.78	1.24	2.51
SEm±	-	0.02	0.02		594	1082		0.06	0.02	
CD at 5%	-	0.06	NS		1766	4508		0.18	0.07	
C. Interaction: G X N										
SEm±	-	0.03	0.03		840.0	1652		0.09	0.35	
CD at 5%	-	NS	NS		2496.0	4906		0.26	NS	
CV%	-	7.52	7.9		7.94	10.12		8.25	8.34	

Table- 6(f): Neutral Detergent Fibre (%) as influenced by growing environment and nitrogen Levels in BN hybrid

Treatment	Neutral Detergent Fibre (%)				
	Palampur	Ludhiana	Anand	Rahuri	Mean
A. Growing environment					
Shaded	72.08	54.7	80.54	65.72	68.26
Unshaded	74.44	55.5	81.10	67.29	69.58
SEm±	-	0.76	0.102	0.17	
CD at 5%	-	NS	NS	1.06	
B. Nitrogen levels					
Control	73.30	56.7	80.98	71.68	70.67
50% of recommended N	72.90	55.6	81.04	68.23	69.44
75% of recommended N	73.80	54.8	81.81	66.62	69.26
100% of recommended N	73.40	54.5	79.01	64.33	67.81
125% of recommended N	72.90	54.1	81.27	61.65	67.48
SEm±	-	1.01	0.142	0.72	
CD at 5%	-	NS	0.426	2.17	
C. Interaction: G X N					
SEm±		1.63	0.201	1.02	
CD at 5%		NS	0.602	NS	
CV%		6.28	0.43	2.66	

Table- 6(g): Acid Detergent Fibre (%) as influenced by growing environment and nitrogen Levels in BN hybrid

Treatment	Acid Detergent Fibre (%)					IVDMD (%)
	Palampur	Ludhiana	Anand	Rahuri	Mean	Rahuri
A. Growing environment						
Shaded	53.32	34.7	55.05	46.90	47.49	70.06
Unshaded	55.68	35.6	54.20	52.66	49.54	66.84
SEm±	-	0.51	0.346	0.89		0.20
CD at 5%	-	NS	NS	5.41		1.19
B. Nitrogen levels						
Control	56.00	36.3	51.63	52.72	49.16	66.06
50% of recommended N	54.60	37.8	56.88	50.11	49.85	67.95
75% of recommended N	54.30	35.0	52.50	49.47	47.82	68.68
100% of recommended N	54.90	34.4	56.63	48.65	48.65	69.49
125% of recommended N	52.70	34.1	55.50	47.95	47.56	70.09
SEm±	-	0.59	0.295	0.85		0.67
CD at 5%	-	1.75	0.885	2.54		2.02
C. Interaction: G X N						
SEm±		0.89	0.418	1.19		0.95
CD at 5%		NS	1.252	NS		NS
CV%		7.04	1.32	4.17		2.41

Table 6(h): Nitrate content (%) as influenced by growing environment and nitrogen levels in BN hybrid

Treatment	Nitrate content (%)					
	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean
A. Growing environment						
Shaded	2770	461	2100	51	177.77	1111.95
Unshaded	2970	419	1100	47	172.13	941.63
SEm±		5.86	40	0.69		
CD at 5%		17.4	250	3.58		
B. Nitrogen levels						
Control	2700	133	1800	24	153.87	962.17
50% of recommended N	2780	210	1900	37	168.23	1019.05
75% of recommended N	2850	359	1500	45	173.37	985.47
100% of recommended N	2960	596	1400	60	184.97	1040.19
125% of recommended N	3040	903	1600	79	194.33	1163.27
SEm±		7.16	30	2.96		
CD at 5%		21.2	100	8.89		
C. Interaction: G X N						
SEm±		11.94	50	4.19		
CD at 5%		NS	140	NS		
CV%		6.66	4.95	14.75		

Table- 6(i): Oxalic acid (%) as influenced by growing environment and nitrogen levels in BN hybrid

Treatment	Oxalic acid (%)					
	Palampur	Ludhiana	Anand	Rahuri	Hyderabad	Mean
A. Growing environment						
Shaded	1.9	3.31	1.78	1.93	2.73	2.33
Unshaded	2.3	2.97	1.65	1.95	3.00	2.37
SEm±	-	0.04	0.026	0.01	0.09	
CD at 5%	-	0.11	NS	NS	0.27	
B. Nitrogen levels						
Control	2.1	2.43	1.55	1.85	2.49	2.08
50% of recommended N	2.1	2.85	1.73	1.93	2.83	2.29
75% of recommended N	2.3	3.22	1.84	1.95	2.83	2.43
100% of recommended N	2.5	3.50	1.66	1.98	3.11	2.55
125% of recommended N	1.6	3.71	1.79	2.01	3.07	2.44
SEm±	-	0.05	0.015	0.01	0.14	
CD at 5%	-	0.16	0.044	0.03	0.42	
C. Interaction: G X N						
SEm±		0.83	0.021	0.02	0.20	
CD at 5%		NS	0.063	NS	NS	
CV%		6.59	2.11	1.35		

Table- 6(j): Soil properties influenced by growing environment and nitrogen levels in BN hybrid at Hyderabad

Treatments	Soil properties		
	N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Growing environment			
Shaded	197.9	36.1	459.1
Unshaded	199.6	39.6	404.1
SEm±	3.2	0.70	20.2
CD at 5%	NS	2.09	NS
B. Nitrogen levels			
Control	200.3	37.3	455.3
50% of recommended N	198.3	38.3	437.3
75% of recommended N	199.3	37.3	451.7
100% of recommended N	195.7	38.0	384.0
125% of recommended N	200.0	38.3	429.7
SEm±	5.0	1.11	31.9
CD at 5%	NS	NS	NS
C. Interaction: G X N			
SEm±	7.1	1.58	45.1
CD at 5%	NS	NS	NS
C.V (%)			

Table- 6(k): Soil properties as influenced by growing environment and nitrogen levels in BN hybrid at Palampur

Treatments	Soil properties				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	OC %	pH
Growing environment					
Shaded	247	14	341	0.81	5.6
Unshaded	234	13	334	0.69	5.5
Nitrogen levels					
Control	213	14	335	0.75	5.6
50% of recommended N	228	14	344	0.75	5.6
75% of recommended N	249	14	335	0.78	5.5
100% of recommended N	255	15	335	0.73	5.6
125% of recommended N	258	14	342	0.75	5.6
Initial					
Unshaded	215	11	324	0.69	5.5
Shaded	236	13	336	0.79	5.4

AST-7 (NT): Performance of dual-purpose pearl millet as influenced by different cutting management practices and nitrogen levels (Table Ref. 7a-7d)

Location: Anand Urulikanchan, Bikaner, Mandya, Hyderabad and Dharwad

A field experiment was started during *Kharif* 2012 at six locations to study the effect of cutting management, nitrogen levels and varieties on the performance of dual-purpose pearlmillet. The treatment consisted of three varieties (BAIF Bajra-1, AVKB-19 and GFB-1), three cutting management practices (no cutting, first cut at 50 Das and left for grain, and first cut at 50 DAS & 2nd cut at 40 days after 1st cut and left for grain) and two levels of nitrogen (100% and 150% of recommended dose) laid out in factorial RBD and replicated three times. The trial was harvested in Feb 2013 at Hyderabad and data will be reported in next NGM.

On mean basis planting of pearl millet variety BAIF Bajra-1 recorded highest GFY (296.64 q/ha), DMY (51.54 q/ha) and CPY (4.64 q/ha) and lowest being with AVKB-19. At Anand, GFB-1 recorded significantly higher GFY over AVKB-19 but it remained at par with BAIF Bajra-1, whereas, at Bikaner AVKB-19 being at par with GFB-1, recorded significantly higher GFY over BAIF Bajra-1. At the same place, significantly highest DMY was recorded under GFB-1 (85.4q/ha) and lowest with BAIF Bajra-1. At Mandya and Dharwad, BAIF bajra-1 recorded significantly highest GFY and DMY. On mean basis cutting of pearl millet at 50 days after sowing and 2nd cut at 40 days after 1st cut and leaved for grain recorded significantly higher GFY (396.95 q/ha), DMY (72.30 q/ha) and CPY (5.80 q/ha mean of Dharwad and Anand) over first cut at 50 DAS and leave for grain. With respect to nitrogen levels, on mean basis, application of 150% recommended dose of nitrogen recorded higher GFY (294.37q/ha), DMY (50.48q/ha) and CPY (4.60 q/ha mean of Dharwad and Anand) over 100% of RDN. The magnitude of increase for GFY, DMY and CPY was 12.31, 9.57 and 11.38 percent more over 100% RDN. (Tables 7a to 7e).

On mean basis BAIF Bajra-1 recorded highest grain yield (7.06 q/ha) and stover yield (113.82 q/ha) and lowest being with AVKB-19. At Anand GFB-1 variety being at par with BAIF Bajra-1 recorded significantly highest grain yield (5.58q/ha) over AVKB-19 (4.33 q/ha), whereas, BAIF Bajra-1 observed significantly highest stover yield (110.92 q/ha) over AVKB-19 and GFB-1. At Urulikanchan grain yield did not differ significantly due to varieties. However, BAIF Bajra-1 recorded significantly highest stover yield (185.26 q/ha) and maize fodder equivalent yield (169.92q/ha) over rest of the varieties. At Mandya, GFB-1 recorded highest grain yield (7.27 q/ha), whereas, BAIF Bajra-1 recorded significantly highest grain and stover yield over rest of the varieties at Dharwad (Table 7b).

On mean basis, no cutting of pearl millet varieties recorded highest grain yield (11.2 q/ha) followed by first cut at 50 DAS and left for grain (5.95 q/ha) and lowest being with cutting at 50 DAS & 2nd cut at 40 days after 1st cut and left for grain (2.57q/ha), whereas no cutting recorded highest stover yield (130.04q/ha). On mean as well as location basis, application of 150% of RDN recorded highest grain, stover and maize fodder equivalent yield (at Urulikanchan) over 100% RDN (Table 7b). BAIF Bajra-1 fetched highest net monetary return (Rs.19861/ha) and benefit cost ratio (1.57) on mean basis. With respect to cutting management practices, on mean basis cutting of dual purpose pearlmillet varieties at 50 DAS & 2nd cut at 40 days after 1st cut and left for grain fetched highest net monetary return (Rs 22117/ha). On mean basis as well as location wise application of 150% RDN of nitrogen fetched highest net monetary return (Rs. 19226/ha) and benefit cost ratio (1.51) over 100% RDN (Table 7e).

Table-7 (a): Effect of varieties, cutting management and nitrogen levels on yield of dual purpose pearlmillet

Treatment	Green fodder yield (q/ha)						Dry matter yield (q/ha)				
	Anand	Urulikanchan	Bikaner*	Mandya	Dharwad	Mean	Mandya	Dharwad	Anand	Bikaner*	Mean
A. Entry											
BAIF Bajra-1	218.0	509.60	219.4	327.46	208.72	296.64	62.21	43.34	31.5	69.1	51.54
AVKB-19	193.0	480.61	275.6	225.85	171.68	269.35	42.91	35.06	35.2	71.3	46.12
GFB-1	220.0	475.30	265.9	253.07	146.99	272.25	48.08	31.51	38.9	85.4	50.97
SEm±	7.21	24.37	9.09	7.53	3.83		1.43	0.63	1.3	2.51	
CD at 5%	20.74	NS	26.10	21.66	11.02		4.11	1.80	3.74	7.21	
B. Cutting management											
No cutting	-	-	251.6	-	0.00	-	-	-	-	60.2	-
First cut at 50 DAS & leave for grain	258.0	348.44	261.6	380.82	217.59	293.29	72.35	46.97	45.2	80.6	61.28
First cut at 50 DAS & 2nd cut at 40 days after 1st cut and leave for grain	373.0	628.56	247.8	425.57	309.80	396.95	80.85	62.93	60.4	85.0	72.30
SEm±	7.21.0	24.37	9.09	7.53	3.83		1.43	0.63	1.3	2.51	
CD at 5%	20.74	94.07	26.10	21.66	11.02		4.11	1.80	3.74	7.21	
C. Nitrogen levels											
100% of RDN	200.0	470.67	214.6	256.19	168.98	262.09	48.67	35.90	33.9	65.8	46.07
150% of RDN	221.0	506.33	280.5	281.40	182.61	294.37	53.46	37.37	36.5	74.6	50.48
SEm±	5.88	24.67	7.4	6.15	3.13		1.16	0.51	1.06	2.1	
CD at 5%	16.93	NS	21.31	17.68	9.00		3.36	1.47	NS	5.89	
D. Interaction Entry X Nitrogen levels											
SEm±											
CD at 5%	NS	NS							NS		
CV%	14.55								15.67	27.95	

*Bikaner centre provided combined yield data of GFY & stover yield and DMY under no cutting treatment; therefore it is not included in mean

Table-7 (b): Effect of varieties, cutting management and nitrogen levels on grain and stover yield of dual purpose pearlmillet

Treatment	Grain yield (q/ha)					Stover yield (q/ha)				Maize fodder equivalent yield (q/ha)
	Ana-nd	Uruli kanchan	Man-dya	Dhar-wad	Mean	Dhar-wad	Ana-nd	Uruli-kanchan	Mean	Urulika-nchan
A. Entry										
BAIF Bajra-1	5.10	10.58	6.88	5.67	7.06	45.29	110.92	185.26	113.82	169.92
AVKB-19	4.33	8.61	5.23	5.37	5.89	36.01	73.92	89.83	66.59	105.22
GFB-1	5.58	9.22	7.27	4.99	6.77	37.41	99.19	94.65	77.08	109.66
SEm±	0.19	0.75	0.13	0.10		0.44	2.76	7.79		12.12
CD at 5%	0.54	NS	0.40	0.29		1.26	7.95	30.07		46.78
B. Cutting management										
No cutting	10.32	16.09	9.72	8.66	11.2	66.43	162.92	160.78	130.04	32.21
First cut at 50 DAS & leave for grain	3.82	9.48	5.75	4.74	5.95	35.04	70.87	122.41	76.11	124.24
First cut at 50 DAS & 2nd cut at 40 days after 1st cut and leave for grain	0.87	2.84	3.92	2.63	2.57	17.24	50.23	86.56	51.34	228.36
SEm±	0.19	0.75	0.13	0.10		0.44	2.76	7.79		12.12
CD at 5%	0.54	2.89	0.40	0.29		1.26	7.95	30.07		46.78
C. Nitrogen levels										
100% of RDN	4.53	9.18	5.62	5.21	6.14	38.85	89.71	116.44	81.67	113.28
150% of RDN	5.48	9.76	7.31	5.47	7.01	40.29	99.64	130.06	90.00	143.26
SEm±	0.15	-	0.11	0.08		0.36	2.25	1.47		
CD at 5%	0.44	NS	0.32	0.23		1.03	6.49	5.67		NS
D. Interaction Entry X Nitrogen levels										
SEm±								-		-
CD at 5%		NS						NS		NS
CV%	15.81						12.39			

Table-7(c): Growth parameters of dual purpose pearl millet as influenced by different cutting management practices and nitrogen levels

Treatment	Plant height (cm)					Number of tillers/ m row length			
	Anand	Bikaner	Mandya	Dharwad	Mean	Anand	Bikaner	Dharwad	Mean
A. Entry									
BAIF Bajra-1	183.8	156.1	220.00	1.82	140.43	19.6	31.9	22.11	24.54
AVKB-19	171.2	233.4	172.14	1.57	144.58	19.6	38.5	22.00	26.70
GFB-1	180.3	205.4	169.18	1.67	139.14	21.4	41.4	24.89	29.23
SEm±	1.96	5.15	2.54	0.02		-	1.62	0.50	
CD at 5%	5.64	14.78	7.30	0.05		-	4.65	1.45	
B. Cutting management									
No cutting	191.9	191.4	180.71	2.16	141.54	20.6	32.5	28.50	27.20
First cut at 50 DAS & leave for grain	185.3	197.6	190.63	1.57	143.78	19.8	39.8	23.00	27.53
First cut at 50 DAS & 2nd cut at 40 days after 1st cut and leave for grain	158.0	205.8	189.98	1.34	138.78	20.3	39.6	17.50	25.80
SEm±	1.96	5.15	2.54	0.02		-	1.62	0.50	
CD at 5%	5.64	14.78	NS	0.05		-	4.65	1.45	
C. Nitrogen levels									
100% of RDN	175.5	191.4	177.32	1.63	136.46	19.1	33.2	21.59	24.63
150% of RDN	181.3	198.0	196.89	1.74	144.48	21.3	37.2	24.41	27.64
SEm±	1.60	4.20	2.07	0.01		-	1.32	0.41	
CD at 5%	4.61	12.07	5.96	0.04		-	3.80	1.18	
D. Interaction Entry X Nitrogen levels									
SEm±									
CD at 5%	NS								
CV%	4.66	11.02					18.44		

Table-7 (d): Growth parameters of dual purpose pearl millet as influenced by different cutting management practices and nitrogen levels

Treatment	Crude protein yield (q/ha)			Leaf stem ratio				Crude protein (%)
	Anand	Dharwad	Mean	Dharwad	Bikaner	Mandya	Mean	Dharwad
A. Entry								
BAIF Bajra-1	3.16	6.11	4.64	0.44	1.7	0.25	0.80	6.89
AVKB-19	3.84	4.61	4.23	0.42	0.5	0.19	0.37	6.25
GFB-1	3.97	4.47	4.22	0.39	0.9	0.21	0.50	6.26
SEm±	0.14	0.05		0.01	0.04	0.00		0.01
CD at 5%	0.39	0.15		0.03	0.11	0.01		0.04
B. Cutting management								
No cutting	-	4.55	-	0.47	1.1	0.13	0.57	6.84
First cut at 50 DAS & leave for grain	4.64	5.40	5.02	0.42	1.1	0.29	0.60	6.48
First cut at 50 DAS & 2nd cut at 40 days after 1st cut and leave for grain	6.34	5.25	5.80	0.36	1.0	0.23	0.53	6.09
SEm±	0.14	0.05		0.01	0.04	0.00		0.01
CD at 5%	0.39	0.15		0.03	0.11	0.01		0.04
C. Nitrogen levels								
100% of RDN	3.31	4.94	4.13	0.39	1.1	0.20	0.56	6.44
150% of RDN	4.01	5.19	4.60	0.44	1.1	0.23	0.59	6.50
SEm±	0.11	0.04		0.01	0.03	0.00		0.01
CD at 5%	0.33	0.12		0.03	NS	0.01		0.03
D. Interaction Entry X Nitrogen levels								
SEm±								
CD at 5%								
CV%	16.04				15.99			

Table-7 (e): Economics of dual purpose pearl millet as influenced by different cutting management practices and nitrogen levels

Treatment	Net monetary return (Rs./ha)					Benefit cost ratio				
	Anand	Urulikanchan	Bikaner	Dharwad	Mean	Anand	Urulikanchan	Bikaner	Dharwad	Mean
A. Entry										
BAIF Bajra-1	16676	30586	8940	23242	19861	0.83	1.58	0.69	3.17	1.57
AVKB-19	10602	18940	14560	19030	15783	0.53	1.33	1.12	2.59	1.39
GFB-1	16838	19738	13590	16998	16791	0.84	1.34	1.05	2.33	1.39
B. Cutting management										!
No cutting	9508	5798	12160	20620	12022	0.56	1.18	0.94	3.10	1.45
First cut at 50 DAS & leave for grain	16096	22362	11960	20377	17699	0.80	1.42	0.84	2.75	1.45
First cut at 50 DAS & 2nd cut at 40 days after 1st cut and leave for grain	18512	41104	10580	18273	22117	0.79	1.65	0.75	2.24	1.36
C. Nitrogen levels										
100% of RDN	12946	20389	8460	19161	15239	0.65	1.37	0.65	2.69	1.34
150% of RDN	16465	25786	14300	20352	19226	0.80	1.47	1.04	2.71	1.51

AST-8 (NT): Effect of nutrient management on productivity of perennial grasses under lowland condition **Location:** Bhubaneswar, Jorhat, Kalyani, Ranchi and Jabalpur

New field experiment was started in kharif 2012 to evaluate the performance of lowland perennial grasses in relation to crop establishment and forage productivity at five locations. This year is considered as establishment year and result of the experiment will be reported in annual report of Kharif-2013.

B. LOCATION SPECIFIC TRIALS

AST-9: Optimization of nitrogen for maize in different forage based cropping systems
Location: Shillong

Field experiment started in kharif 2011, Data of 2012-13 will be reported in Rabi-2012-13.

AST-10: Effect of soil amendments on productivity of rice-berseem and changes in soil properties of sodic soils **Location: Faizabad**

Fourth year of experimentation results will be reported in Rabi 2012-13.

AST-11: Banana based fodder intercropping in the homesteads of Kerala
Location: Vellayani

This was the third year of experimentation (started in *Kharif* 2010) at Vellayani. The data of the experiment will be reported in annual report of Rabi 2012-13.

AST-12: Chemical control of *Acrachne racemosa* weeds in fodder sorghum
Location: Ludhiana **(Ref Table 12).**

A field experiment was conducted to evaluate the herbicides for the control of *Acrachne racemosa* weed in fodder sorghum. This was the third (final) year of experimentation. *Acrachne racemosa* weed was effectively controlled (efficiency 51.7 to 82.7%) with all the herbicide treatments as compared to control. The population of *Acrachne racemosa* weed in sorghum fodder was 4.9 to 13.1 weeds/m^2 in herbicide treatments as compared to 38.6 weeds/m^2 in control (weedy check). The dry weight of weeds decreased significantly with herbicides (1.62 to 4.51 q/ha) than control (9.34 q/ha). Among herbicides, the combinations of atrazine + stomp / treflan/ lasso were more effective than application of single herbicide (except lasso) in controlling weeds in fodder sorghum.

Pre-emergence application of atrazine @ 0.75 kg/ha + stomp @ 2.5 l/ha in fodder sorghum being at par with atrazine 1 kg/ha PE, stomp 2.5 l/ha PE, treflan 2.5 l/ha PE, atrazine 0.75 + treflan 2.5 l/ha PE, atrazine 1.0 + stomp 2.5 l/ha PE and Atrazine 1.0 + treflan 2.5 l/ha PE recorded significantly highest GFY (598.5 q/ha), DMY (141.8 q/ha) and crude protein yield (12.95 q/ha) over rest of the treatments (Table 12). 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 of the crop and recorded lower GFY, DMY and CPY of fodder sorghum as compared to control also. The crude protein content increased with the application of herbicides (8.30 to 9.13%) as compared to control (7.84%).

Table 12: Effect of herbicides on sorghum and weed of *Acrachne* racemosa

Treatments	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Plant height (cm)	Tillers/m row length	Leaf stem ratio	CP yield (q/ha)	CP (%)	Weed intensity/m^2 (no)	Weeds dry wt. (q/ha)	WCE (%)
Control	497.7	120.9	237.9	11.7	0.74	9.48	7.84	38.6	9.34	0
Atrazine 1kg/ha PE	568.3	135.3	241.3	12.0	0.81	12.34	9.12	12.2	4.51	51.7
Stomp 2.5 l/ha PE	566.3	135.3	244.2	11.0	0.75	11.88	8.78	6.5	3.24	65.3
Treflan 2.5 l/ha PE	545.2	131.4	246.3	10.7	0.70	11.09	8.43	5.8	4.48	52.0
Lasso 2.5 l/ha PE	463.3	112.2	237.4	6.7	0.65	8.77	7.82	5.9	2.73	70.8
Atrazine 0.75 + Stomp 2.5 l/ha PE	598.5	141.8	251.0	12.3	0.79	12.95	9.13	6.9	4.32	53.7
Atrazine 0.75 + Treflan 2.5 l/ha PE	564.2	136.0	249.9	11.3	0.76	12.42	9.13	5.6	1.82	80.5
Atrazine 0.75 + Lasso 2.5 l/ha PE	411.2	99.5	232.8	6.3	0.65	8.26	8.30	13.1	1.84	80.2
Atrazine 1.0 + Stomp 2.5 l/ha PE	569.2	135.5	250.5	12.0	0.80	12.21	9.01	6.2	2.16	76.9
Atrazine 1.0 + Treflan 2.5 l/ha PE	561.2	134.7	241.7	11.7	0.73	11.85	8.80	5.9	1.62	82.7
Atrazine 1.0 + Lasso 2.5 l/ha PE	440.2	109.7	229.7	6.3	0.66	9.14	8.33	4.9	2.34	74.9
S Em±	21.61	5.18	8.55	0.53	0.03	0.47	0.28	0.36	0.12	-
C D at 5 %	63.4	15.2	NS	1.56	0.09	1.39	0.82	1.06	0.35	-
CV %	6.94	6.49	6.10	8.88	7.14	7.03	5.58	6.22	5.98	-

AST -13: Effect of levels of nitrogen on productivity of perennial grass with and without tree shade **Location:** Jorhat

Treatment combinations comprising of shade levels (tree shade of *Machillus bombycini* and under open condition); two perennial grasses Setaria (*Setaria anceps*) and Congo signal (*Brachiaria brizantha*) and three nitrogen levels in split plot design replicated thrice. The grasses were planted during the month of August 2011. The treatment in the main plots comprised of tree shade and open condition. In the sub plot six treatment combinations consisting of two perennial grasses (Setaria and Congo signal) and three levels of nitrogen (<25% RDNF, RDNF and >25% RDNF). RDNF stands for recommended dose of nitrogenous fertilizer along with common recommended fertilizer dose for phosphorus and potash to all the treatments. First year data is presented in Tables 13a to 13b.

Perennial grasses recorded significantly higher GFY, DMY, CPY and net monetary returns under open condition than under shade. The green forage, DMY, CPY and net monetary returns of Setaria and Congo-signal grass did not differ significantly with respect to each other. Crude protein yield was highest in treatment receiving 25% > RDNF, significantly superior over 25% < RDNF and at par with RDNF. Similarl to CPY, application of >25% RDNF to grasses being at par with RDNF, recorded significantly higher GFY (1007.8 q/ha), DMY (173.5 q/ha) and net monetary return (Rs.93582/ha) over < 25 % RDNF.

The soil fertility status after crop season for soil N, P and K under open and shaded condition decreased over its initial levels (before start of experiment) and reverse trend was observed for soil pH and OC %. Remarkable variations for soil fertility status were not observed under both the conditions. Application of highest level of 25 % > RDNF to the grasses recorded higher fertility status over its lower levels under tree shade and open conditions (Table 13 b).

Table-13 (a): Effect of levels of nitrogen on productivity of perennial grasses with and without tree shade at Jorhat

Treatment	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Net monetary return (Rs/ha)
A. Growing condition				
Under tree shade	446.67	83.49	578.72	38061
Open condition	1259.27	157.01	994.11	88939
SEm±	42.37	8.27	64.90	1127
CD at 5%	142.61	27.86	218.44	3793
B. Grasses				
Setaria anceps	874.80	106.81	680.86	65012
Brachiaria brizantha	831.12	133.69	891.97	61988
SEm±	42.37	8.27	64.90	1127
CD at 5%	NS	NS	NS	NS
C. Nitrogen levels				
25%< RDNF	695.00	124.17	772.85	62825
RDNF	856.11	141.52	938.19	78562
25%> RDNF	1007.78	173.57	1145.26	93582
SEm±	48.92	9.55	74.94	1301
CD at 5%	164.67	32.17	252.24	4380
D. Interaction				
S X P				
SEm±	59.92	11.70	91.78	1594
CD at 5%	201.68	39.40	665.43	5635
S X N				
SEm±	84.74	16.55	129.80	2254
CD at 5%	285.22	55.72	436.89	7587
CV%	13.24	16.93	14.45	19.18

Table-13 (b): Effect of levels of nitrogen and perennial grasses with and without tree shade on chemical properties of soil

Treatments	Under tree					Open Condition				
	Soil pH	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Soil pH	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)
Perennial Grass										
Setaria	5.72	0.78	242.15	12.62	96.89	5.78	0.79	244.17	12.74	96.76
Congosignal	5.74	0.76	245.95	12.68	97.34	5.82	0.77	247.03	12.66	97.33
S.Ed(±)	0.007	0.004	0.117	0.142	0.131	0.005	0.002	0.097	0.094	0.195
C.D at 5 %	0.016	0.009	0.255	0.309	0.286	NS	0.005	0.211	0.206	0.427
Nitrogen levels										
25%< RDNF	5.64	0.74	233.47	12.45	96.07	5.65	0.74	233.99	12.00	96.28
RDNF	5.71	0.77	243.95	12.53	96.56	5.79	0.78	245.87	12.38	96.74
25%> RDNF	5.78	0.80	247.94	12.77	97.62	5.86	0.82	249.02	13.07	97.17
S.Ed(±)	0.014	0.084	0.234	0.283	0.262	0.011	0.004	0.193	0.190	0.391
C.D at 5 %	0.032	0.017	0.511	0.617	0.571	NS	0.015	0.571	0.570	1.154
PxN										
S.Ed(±)	0.028	0.015	0.469	0.566	0.524	0.022	0.084	0.387	0.379	0.785
C.D at 5 %	NS	0.034	1.021	NS	NS	NS	0.243	1.154	NS	NS
C.V (%)	17.0	14.0	10.6	12.8	11.8	15.0	12.0	18.7	18.6	17.7
Initial fertility	5.40	0.71	271	16.56	107.74	5.30	0.69	269	15.44	102.54

AST – 14: Effect of time of sowing and seed rate on performance of fodder maize (*Zea mays*) under rainfed condition **Location:** Imphal

A new field experiment was initiated in *kharif* 2012 at Imphal to study the effect of time of sowing and seed rate on performance of fodder maize (*Zea mays*) under rainfed condition.. The experiment was laid out in FRBD with three replications and nine treatments. The treatments consisted of three different date of sowing (26th May, 4th June and 14th June) and seed rate (40 kg/ha, 60 kg/ha and 80 kg/ha); and the combination of both. The data of first year experimentation is presented in Table 14(a) and 14(a-1).

The results revealed that there was significant effect of time of sowing on green fodder yield, dry matter yield, crude protein yield and plant height. However, no significant effect of seed rate was observed on dry matter yield (q/ha), crude protein yield (q/ha), crude protein content (%) and leaf stem ratio. Among different date of sowing, maize sown on 4th June produced highest green fodder yield (434.00 q/ha) and crude protein content (6.88%). Whereas, highest dry matter yield (118.58 q/ha), crude protein yield (8.01 q/ha), plant height (219.26 cm) and maximum net return of Rs. 55,280/ha and benefit cost ratio (1:3.29) was found at maize sown on 26th May. Maize sown at seed rate of 40 kg/ha recorded maximum green fodder yield (480.22 q/ha), dry matter yield (138.06 q/ha), crude protein yield (9.18 q/ha) and crude protein content (6.93%). However, highest plant height (197.44 cm), net return (Rs.48, 347/ha) and benefit cost ratio (1:2.87) was found at maize sown with a seed rate of 60 kg/ha.

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

Table-14 (a): Effect of time of sowing and seed rate on fodder maize under rainfed condition at Imphal

Treatment	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Crude protein (%)	Plant height (cm)	Leaf stem ratio	Net return (Rs./ha)	Benefit cost ratio
A. Date of sowing								
26th May	394.89	118.58	8.01	6.46	219.26	0.49	55280	3.29
4th June	434.00	111.80	7.31	6.88	177.67	0.57	52613	3.14
14th June	385.56	103.75	7.10	6.81	83.22	0.64	23763	1.41
SEm±	4.97	6.12	0.56	0.23	15.77	0.06	744	0.04
CD at 5%	14.89	18.34	1.67	NS	47.27	NS	2232	0.13
B. Seed rate (kg/ha)								
40	480.22	138.06	9.18	6.93	136.67	0.65	42979	2.66
60	463.55	112.41	7.54	6.40	197.44	0.56	48347	2.87
80	270.67	83.65	5.70	6.82	146.04	0.50	40330	2.30
SEm±	4.97	6.12	0.56	0.23	15.77	0.06	744	0.04
CD at 5%	14.89	NS	NS	NS	47.27	NS	2232	0.13
C. Interaction: D X S								
SEm±	8.60	10.60	0.97	0.40	27.31	0.11	1289	0.08
CD at 5%	25.78	NS	NS	NS	NS	NS	3867	0.22

Table-14 (a-1): Interaction of effect of time of sowing with seed rate on green fodder yield and net return of fodder maize Under rainfed condition at Imphal

Treatment	Green fodder yield (q/ha)				Net return (Rs./ha)			
	S_1	S_2	S_3	Mean	S_1	S_2	S_3	Mean
D_1	466.33	497.33	221.00	394.89	53779.80	57764.00	54297.20	55280.33
D_2	495.67	460.00	346.33	434.00	58179.80	52164.00	47497.20	52613.67
D_3	478.67	433.33	244.67	385.56	16979.80	35114.00	19197.20	23763.67
Mean	**480.22**	**463.55**	**270.67**		**42979.80**	**48347.33**	**40330.53**	
	Date of sowing	**Seed rate**	**Date of sowing x Seed rate**		**Date of sowing**	**Seed rate**	**Date of sowing x Seed rate**	
SEm±	4.97	4.97	8.60		744.77	744.77	1289.97	
CD at 5%	14.89	14.89	25.78		2232.80	2232.80	3867.32	

AST – 15: Performance of fodder rice bean [*Vigna umbellate]* as influenced by dates of sowing and spacing **Location:** Imphal

A new field experiment was initiated in *kharif* 2012 at Central Agricultural University, Imphal to study the performance of fodder rice bean [*Vigna umbellate* (Thumb) Ohwi and Ohashi] as influenced by dates of sowing and spacing. The study was undertaken with nine treatments and three replications. The experiment was laid out in FRBD with two factors *viz.* date of sowing (26th May, 4th June, and 14th June,) and spacing (25 cm, 35 cm and 45 cm row to row). The results of first year have been presented in Table15.

There was significant effect of date of sowing and spacing on green fodder yield (q/ha), dry matter yield (q/ha), crude protein yield (q/ha), plant height (cm) and economics of fodder rice bean. Crude protein content (%) was found to be non-significant in both the factors under study. The performance of fodder rice bean was found to be best for all the characters under study with a net return of Rs. 26,574/ha and benefit cost ratio of 1:1.73 when sown on 26th May. Among the different row to row spacing 35 cm was observed to produce highest green fodder yield (283.45 q/ha), dry matter yield (55.00 q/ha), crude protein yield (6.23 q/ha), plant height (113.11 cm) and maximum net return (Rs. 27,124/ha) and benefit cost ratio (1.76).

The interaction effect of date of sowing and spacing was found non significant on green fodder yield (q/ha), crude protein content (%), leaf stem ratio and economics of fodder rice bean. However, significant influence was found on dry matter yield (q/ha), crude protein yield (q/ha) and plant height (cm).

Table-15 (a): Performance of fodder rice bean [*Vigna umbellate* (Thumb) Ohwi and Ohashi] as influenced by dates of sowing and spacing at Imphal

Treatment	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Crude protein (%)	Plant height (cm)	Leaf stem ratio	Net return (Rs./ha)	Benefit cost ratio
A. Date of sowing								
26th May	279.78	56.40	6.71	11.90	143.78	0.56	26574	1.73
4th June	243.00	49.64	5.56	11.27	82.00	0.60	21058	1.37
14th June	187.78	40.89	4.55	11.17	61.78	0.75	12774	0.83
SEm±	7.57	2.60	0.26	0.31	5.45	0.04	1135	0.07
CD at 5%	22.69	7.80	0.77	NS	16.33	0.12	3404	0.22
B. Spacing (row to row)								
25 cm	235.67	41.78	4.89	11.71	76.33	0.66	19958	1.29
35 cm	283.45	55.00	6.23	11.40	113.11	0.65	27124	1.76
45 cm	191.44	50.15	5.70	11.22	98.11	0.61	13324	0.87
SEm±	7.57	2.60	0.26	0.31	5.45	0.04	1135	0.07
CD at 5%	22.69	7.80	0.77	NS	16.33	NS	3404	0.22
C. Interaction: D X S								
SEm±	13.11	4.51	0.45	0.53	9.43	0.07	1967	0.13
CD at 5%	NS	13.52	1.33	NS	28.28	NS	NS	NS

AST-16 (NT): Enhancing the production potential of various forage crops in coconut gardens through nutrient management **Location:** Mandya

A new experiment was initiated during *Kharif* 2012 to study the performance of different forage crops in coconut gardens under different nutrient levels. Since *Kharif* 2012 is considered as establishment year, data of the first year experimentation would be reported in *Kharif* 2013.

AST-17 (NT): Cropping system studies in fodder maize with legume intercropping
Location: Srinagar
The experiment was conducted to evaluate the forage production potential of maize and legume intercropping in terms of total dry matter production and maize forage quality. The nine treatments consisted of sole maize (30 cm spacing), sole cowpea (30 cm spacing), sole soybean (30 cm spacing), maize + cowpea (1: 1), maize + cowpea (2: 1), maize + soybean (1:1), maize + soybean (2:1), maize + cowpea mixed cropping and maize + soybean mixed cropping laid out in RBD with three replications. This was the first year of the experiment and data has been reported in the Table 17.

The results revealed that GFY (q/ha) and DMY (q/ha) of sole maize (520.00 q/ha) was significantly higher than both sole legumes as well as different intercropping ratios. However, it (sole maize) remained at par with mixed intercropping of both cowpea and soybean. It was also observed that sole maize had maximum Crude Protein Yield (13.22 q/ha) than rest of the treatments and the minimum was found in Maize + soybean (1:1) intercropping system.

Table-17: Yield, growth and quality of forage crops as influenced with fodder maize and different legume intercropping systems at Srinagar

Treatment	GFY (q/ha)	DMY (q/ha)	CPY (q/ha)	Plant height (cm)	Crude protein (%)	Maize fodder equivalent yield (q/ha)
Sole maize (30 cm spacing)	520.00	152.32	13.22	260.10	8.7	520.00
Sole cowpea (30 cm spacing)	213.65	34.52	5.85	85.34	17.2	319.00
Sole soybean (30 cm spacing)	185.40	37.60	5.03	73.15	13.6	277.00
Maize + cowpea (1:1)	338.20	74.50	7.99	256.60	10.8	388.00
Maize + cowpea (2:1)	428.35	102.50	9.79	252.54	9.6	457.00
Maize + soybean (1:1)	317.50	76.48	7.75	256.90	10.2	355.00
Maize + soybean (2:1)	403.90	96.82	8.80	253.38	9.2	424.00
Maize + cowpea mixed cropping	486.12	112.50	12.76	262.70	11.4	544.00
Maize + soybean mixed cropping	502.32	118.56	12.98	261.70	11.0	533.00
SEm ±	14.84	3.36	0.46	3.78		13.19
CD at 5%	42.3	9.6	1.33	10.80		37.60

AST–18 (NT): Effect of varying seed rate of forage legumes on productivity of fodder maize **Location:** Srinagar

A new field experiment was initiated in *kharif* 2012 at Srinagar to study the effect of varying seed rate of forage legumes on productivity of fodder maize. The nine treatments consisted of sole maize (30 cm spacing), sole cowpea (30 cm spacing), sole soybean (30 cm spacing), maize + cowpea @20 kg/ha, maize + cowpea@ 40 kg/ha, maize + cowpea @60 kg/ha, maize + soybean @ 40 kg/ha, maize + soybean @ 60 kg/ha and maize + soybean @ 80 kg/ha laid out in RBD with three replications. The recommended seed rate of maize was 80 kg/ha and seed rate of maize was adjusted as per the row proportion (replacement series).

Planting of sole maize at 30 cm spacing recorded significantly highest GFY (512.46 q/ha) and DMY (153.61 q/ha) over rest of the intercropping systems including sole cowpea and sole soybean. Maize + cowpea @ 60 kg/ha being at par with maize + cowpea @ 40 kg/ha, recorded significantly highest green fodder yield (368.45 q/ha) among intercropping systems. Whereas, sole cowpea recorded significantly highest crude protein yield (16.4 q/ha) over rest of the treatments. (Table Ref. 18)

Table-(18): Yield, growth and quality as influenced with fodder maize and forage legume under varying seed rates of intercrops at Srinagar

Treatment	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Plant height (cm)	Crude protein (%)	Plant population at harvest/m^2
Sole maize (30cm spacing)	512.46	153.61	8.20	268.13	8.2	32.0
Sole cowpea (30cm spacing)	198.62	33.40	16.40	81.56	16.4	36.50
Sole soybean (30cm spacing)	176.32	36.96	14.20	76.32	14.2	36.33
Maize + cowpea @ 20kg/ha	315.20	59.30	8.80	262.64	8.8	28.66
Maize + cowpea @ 40kg/ha	355.90	67.40	9.30	263.50	9.3	38.00
Maize + cowpea @ 60kg/ha	368.45	69.80	9.50	266.58	9.5	40.33
Maize + soybean @ 40kg/ha	301.20	66.20	8.50	264.10	8.5	30.66
Maize + soybean @ 60kg/ha	324.80	77.60	9.60	263.65	9.6	40.33
Maize + soybean @ 80kg/ha	330.52	82.50	9.80	262.30	9.8	44.00
SEm ±	6.98	2.32	0.41	4.21	-	1.91
CD at 5%	20.40	6.80	1.2	12.3	-	5.6

AST-19 (NT): Performance of Bajra Napier hybrid grass as influenced by micronutrients under irrigated conditions **Location:** Coimbatore

This trial was initiated during kharif 2012 with a objective to study the conjoint application of organic manure, inorganic fertilizers and micronutrients on forage yield, economics of production and soil properties. The kharif 2012 is considered as establishment year and data will be reported in annual report of Rabi 2012-13.

B. AVT BASED TRIALS

AST-20: Effect of phosphorus levels on forage yield of promising entries of cowpea (AVT-2)

This trial could not be conducted due to non-availability of seed from concerned breeders.

AST–21: Effect of nitrogen levels on forage yield of promising entries of pearlmillet (AVT-2)

Location: Ludhiana, Hisar, Bikaner, Faizabad, Bhubaneswar, Coimbatore, Mandya, Dharwad, Hyderabad, Anand, Jabalpur, Rahuri and Urulikanchan

Response of promising AVT-2 based entries of pearlmillet to graded doses of nitrogen was studied at 13 locations with five entries (including two national checks). And four levels of nitrogen (0, 30, 60 and 90 kg N ha^{-1}) in factorial randomised block design. In North-West zone (Hisar, Ludhiana and Bikaner) on mean basis none of the testing entry surpassed the national check Giant Bajra in terms of GFY, DMY and CPY. In general the yields were higher at Ludhiana than Hisar and Bikaner. The response of nitrogen increased gradually with increasing levels of nitrogen up to the highest tested dose of 90 kg N/ha. On mean basis, application of 90 kg N/ha produced 40.74, 18.19 and 7.37 % more green fodder and 39.69, 26.07 and 9.78 % more dry matter yield over control, 30 and 60 kg N/ha, respectively. The interaction of entries with nitrogen was significant at Hisar.

Under North East zone at Bhubaneswar, none of the testing entry surpassed the national check Giant Bajra in terms of GFY, DMY and CPY. The response of nitrogen increased gradually with increasing levels of nitrogen up to highest tested dose of 90 kg N/ha for GFY, DMY and CPY. The magnitude of increase for green fodder was 81.24, 40.62 and 14.75 % more over control, 30 and 60 kg N/ha.

In Central zone, on location mean basis entry PAC-981 produced highest green fodder (658.79 q/ha), dry matter (149.03 q/ha) and crude protein yield (13.04 q/ha). The performance of all the entries was better at Urulikanchan. At Anand and Rahuri test entry PAC-981 produced significantly highest GFY over rest of the entries. Whereas, at Urulikanchan national check Raj Bajra Chari recorded significantly highest GFY. At Jabalpur test entry RBB-1 recorded highest GFY (348.0 q/ha) but it remained at par with national check Raj Bajra Chari. The herbage yield increased consistently with increasing levels of nitrogen up to 90 kg N/ha. The magnitude of increase for green fodder on location mean basis was 41.81, 21.83 and 8.50 % over control, 30 and 60 kg N/ha

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On location mean basis in South zone none of the test entry surpassed the national check Giant Bajra chari. At Mandya, entry PAC-981 produced significantly highest green fodder yield over rest of the entries including national checks. At Dharwad, test entry RBB-1 recorded better GFY over rest of the entries. Whereas at Coimbatore and Hyderabad, none of the entry surpassed the national checks. On location mean basis the forage yield increased consistently with increasing levels of nitrogen up to the highest tested dose of 90 kg N/ha. The interaction effect of entries with N levels was significant at Coimbatore, Mandya and Dharwad.

On all India mean basis, none of the test entry surpassed the national check Giant Bajra for GFY, DFY and CPY. The forage yield increased consistently with increasing levels of nitrogen up to 90 kg N/ha (Tables 21(a) to 21(i)).

Table-21 (a): Effect of promising entries and nitrogen levels on green fodder yield of Pearl millet (AVT-2)

Treatment	Green fodder yield (q/ha)					
	North West Zone				North East Zone	
	Hisar	Ludhiana	Bikaner	Mean	Faizabad*	Bhubaneswar
A. Entry						
RBB-1	344.8	473.6	318.6	379.0	106.7	206.49
NDFB-904	-	-	-	-	110.2	-
PAC-981	297.5	633.4	285.0	405.3	150.6	210.52
Raj Bajra Chari (NC)	315.7	470.5	343.3	376.5	141.4	198.63
Giant Bajra (NC)	383.3	658.3	286.1	442.6	162.5	220.99
SEm±		13.0	8.2		8.6	4.78
CD at 5%	18.8	45.1	23.8		25.5	13.80
B. Nitrogen levels (kg/ha)						
0	266.4	460.4	253.1	326.6	105.8	147.28
30	329.7	541.0	296.1	388.9	120.6	189.80
60	358.0	596.5	329.8	428.1	131.2	232.62
90	387.2	637.8	354.0	459.7	135.3	266.94
SEm±		7.5	11.7		3.2	4.78
CD at 5%	18.8	21.9	33.6		9.6	13.80
C. Interaction Entry X Nitrogen levels						
SEm±		15.0			5.3	9.56
CD at 5%	37.6	NS			15.8	NS
CV%		5.7	11.4		10.2	7.91

*Data not included in mean

Table-21 (a-1): Interaction effect of promising entries and nitrogen levels on green fodder yield of Pearl millet

Entry/ N levels	Hisar					Coimbatore				
	0	**30**	**60**	**90**	**Mean**	**0**	**30**	**60**	**90**	**Mean**
RBB-1	282.5	334.3	372.7	389.6	344.8	219.47	250.00	269.47	336.10	268.76
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	247.7	286.5	316.8	340.1	297.5	255.53	288.90	344.43	341.67	307.63
Raj Bajra Chari (NC)	255.1	295.3	331.6	378.8	315.7	225.00	230.53	252.77	344.43	263.18
Giant Bajra (NC)	279.0	399.8	410.9	439.0	383.3	347.23	377.77	383.33	422.23	382.64
Mean	**266.4**	**329.7**	**358.0**	**387.2**		**261.81**	**286.80**	**312.50**	**361.11**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±						4.57	4.57	9.14		
CD at 5%	18.8	18.8	37.6			13.21	13.21	26.42		
CV%								6.73		

Table-21 (b): Effect of promising entries and nitrogen levels on green fodder yield of Pearl millet (AVT-2)

Treatment	Green fodder yield (q/ha)										Over all mean
	Central Zone					South Zone				Mean	
	Jabalpur	Urulikanchan	Anand	Rahuri	Mean	Coimbatore	Mandya	Hyderabad	Dharwad		
A. Entry											
RBB-1	348.00	438.96	406	336.37	382.33	268.76	268.02	281.80	298.96	279.39	332.53
NDFB-904	-	-	-	-	-	-	-	-	-	-	-
PAC-981	284.10	940.20	810	600.86	658.79	307.63	384.33	331.51	223.38	311.71	442.37
Raj Bajra Chari (NC)	323.90	505.31	426	383.60	409.70	263.18	226.43	250.40	264.17	251.05	330.93
Giant Bajra (NC)	304.60	964.69	694	541.13	626.11	382.64	366.77	510.93	278.75	384.77	466.02
SEm±	11.36	3.85	12.2	8.73		4.57	5.69	9.10	2.09		
CD at 5%	33.60	10.85	35.0	24.99		13.21	16.43	26.26	6.04		
B. Nitrogen levels (kg/ha)											
0	232.80	581.88	428	361.00	400.92	261.81	200.18	248.40	245.09	238.87	307.20
30	288.15	688.04	449	441.58	466.69	286.80	310.33	336.10	258.67	297.98	367.94
60	353.20	756.44	473	513.46	524.03	312.50	348.04	370.20	274.75	326.37	409.88
90	386.50	822.81	519	545.87	568.55	361.11	386.99	419.90	286.75	363.69	447.91
SEm±	8.23	3.85	10.9	7.81		4.57	5.69	9.10	2.09		
CD at 5%	24.36	10.85	31.3	22.35		13.21	16.43	26.26	6.04		
C. Interaction Entry X Nitrogen levels											
SEm±	9.41	7.71	24.4	17.46		9.14	11.38	18.2			
CD at 5%	27.36	21.74	70.6	49.98		26.42	32.85	58.18			
CV%	10.12		9.06	8.12		6.73	6.33	9.17			

Table-21 (b-1): Interaction effect of promising entries and nitrogen levels on green fodder yield of Pearl millet

Entry/ N levels	Green Fodder Yield (q/ha)									
	Jabalpur					Urulikanchan				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	260.90	309.50	390.00	431.60	348.00	343.00	420.58	469.58	522.67	438.96
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	204.00	267.80	315.00	349.70	284.10	730.92	926.92	1016.77	1086.20	940.20
Raj Bajra Chari (NC)	244.30	288.00	365.00	398.30	323.90	412.42	481.83	551.25	575.75	505.31
Giant Bajra (NC)	222.00	287.30	342.80	366.40	304.60	841.17	922.83	988.17	1106.60	964.69
Mean	232.80	288.15	353.20	386.50		581.88	688.04	756.44	822.81	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	11.36	8.23	9.41			3.85	3.85	7.71		
CD at 5%	33.60	24.36	27.36			10.85	10.85	21.74		
CV%			10.12							

Table-21 (b-2): Interaction effect of promising entries and nitrogen levels on green fodder yield of Pearl millet

Entry/ N levels	Green Fodder Yield (q/ha)									
	Anand					Rahuri				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	379	390	408	446	406	238.45	317.16	381.98	407.90	336.37
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	769	804	822	843	810	490.78	574.12	650.98	687.56	600.86
Raj Bajra Chari (NC)	326	373	430	577	426	298.17	368.09	412.07	456.06	383.60
Giant Bajra (NC)	647	676	706	726	694	416.70	506.99	608.85	632.00	541.13
Mean	**428**	**449**	**473**	**519**		**361.00**	**441.58**	**513.46**	**545.87**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	12.2	10.9	24.4			8.73	7.81	17.46		
CD at 5%	35.0	31.3	70.6			24.99	22.35	49.98		
CV%			9.06							

Table-21 (b-3): Interaction effect of promising entries and nitrogen levels on green fodder yield of Pearl millet

Entry/ N levels	Green Fodder Yield (q/ha)									
	Mandya					Hyderabad				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	192.03	272.36	288.83	318.84	268.02	235.20	263.20	277.60	351.20	281.80
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	243.15	378.82	434.60	480.72	384.33	245.50	289.30	347.20	444.00	331.51
Raj Bajra Chari (NC)	140.97	215.22	255.79	293.74	226.43	181.60	265.60	273.60	280.80	250.40
Giant Bajra (NC)	224.58	374.91	412.95	454.65	366.77	331.20	526.40	582.40	603.7	510.93
Mean	**200.18**	**310.33**	**348.04**	**386.99**	**311.39**	**248.40**	**336.10**	**370.20**	**419.90**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	5.69	5.69	11.38			9.10	9.10	18.2		
CD at 5%	16.43	16.43	32.85			26.26	26.26	58.18		
CV%			6.33					9.17		

Table-21(c): Effect of promising entries and nitrogen levels on dry matter yield of Pearl millet (AVT-2)

Treatment	Dry matter yield (q/ha)					
	North West Zone				North East Zone	
	Hisar	Ludhiana	Bikaner	Mean	Faizabad*	Bhubaneswar
A. Entry						
RBB-1	69.3	102.2	88.9	86.8	21.5	43.06
NDFB-904	-	-	-	-	25.7	-
PAC-981	60.1	136.4	111.8	102.8	22.5	43.36
Raj Bajra Chari (NC)	64.5	101.5	93.9	86.6	28.6	41.61
Giant Bajra (NC)	74.4	142.1	106.0	107.5	34.7	46.44
SEm±		2.8	4.1		2.5	1.02
CD at 5%	4.4	9.7	11.8		7.4	2.94
B. Nitrogen levels (kg/ha)						
0	52.8	99.3	88.7	80.3	18.6	31.10
30	65.5	117.4	83.9	88.9	22.8	39.12
60	70.3	128.4	108.7	102.5	25.4	48.77
90	79.7	137.3	119.4	112.1	26.9	55.48
SEm±		1.6	5.8		1.8	1.02
CD at 5%	4.4	4.7	16.6		5.3	2.94
C. Interaction Entry X Nitrogen levels						
SEm±		3.2			3.6	2.03
CD at 5%	8.8	NS			10.7	NS
CV%		5.1	17.4		11.3	8.07

*Data not included in mean

Table-21 (d): Effect of entries and nitrogen levels on dry matter yield of Pearl millet (AVT-2)

Treatment	Dry matter yield (q/ha)										Over all mean
	Central Zone					South Zone				Mean	
	Jabalpur	Urulikanchan	Anand	Rahuri	Mean	Coimbatore	Mandya	Hyderabad	Dharwad		
A. Entry											
RBB-1	85.08	115.96	76.2	63.84	85.27	56.02	60.63	57.30	77.17	62.78	74.64
NDFB-904	-	-	-	-	-	-	-	-	-	-	-
PAC-981	68.11	227.50	174.9	125.59	149.03	53.21	91.53	62.48	63.05	67.57	101.50
Raj Bajra Chari (NC)	78.45	127.50	86.7	73.37	91.51	52.20	47.68	53.80	65.18	54.72	73.87
Giant Bajra (NC)	73.42	201.40	113.7	107.99	124.13	74.13	86.10	76.41	71.59	77.06	97.81
SEm±	2.82	1.99	2.39	2.44		1.35	2.47	1.10	0.52		
CD at 5%	6.23	5.61	6.86	6.98		3.92	7.13	3.17	1.51		
B. Nitrogen levels (kg/ha)											
0	53.89	137.32	77.0	70.58	84.70	43.16	36.30	43.65	64.20	46.83	66.50
30	68.77	163.86	89.4	87.21	102.31	51.11	67.36	55.57	68.00	60.51	79.77
60	86.57	171.87	94.1	102.65	113.80	64.49	82.88	61.40	70.50	69.82	90.89
90	95.38	199.32	100.8	110.35	126.46	76.79	99.40	73.49	74.28	80.99	101.81
SEm±	2.41	1.99	2.14	2.18		1.35	2.47	1.10	0.52		
CD at 5%	6.10	5.61	6.13	6.25		3.92	7.13	3.17	1.51		
C. Interaction Entry X Nitrogen levels											
SEm±	3.65	3.99	4.79	4.88		2.71	4.94	2.20	1.05		
CD at 5%	9.54	11.25	13.72	13.97		NS	14.26	7.02	3.03		
CV%	8.24		9.19	11.39		10.12	11.96	6.09			

Table- 21(d-1): Interaction effect of promising entries and nitrogen levels on dry matter yield of Pearl millet

Entry/ N levels	Dry matter Yield (q/ha)									
	Jabalpur					Urulikanchan				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	60.51	74.67	96.46	108.68	85.08	91.26	109.47	114.57	148.53	115.96
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	46.91	63.29	76.47	85.77	68.11	176.23	234.60	238.23	260.93	227.50
Raj Bajra Chari (NC)	56.63	68.84	89.52	98.82	78.45	107.00	124.13	117.20	161.67	127.50
Giant Bajra (NC)	51.49	68.29	83.83	90.08	73.42	174.77	187.23	217.47	226.13	201.40
Mean	**53.89**	**68.77**	**86.57**	**95.38**		**137.32**	**163.86**	**171.87**	**199.32**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	2.82	2.41	3.65			1.99	1.99	3.99		
CD at 5%	6.23	6.10	9.54			5.61	5.61	11.25		
CV%			8.24							

Table- 21(d-2): Interaction effect of promising entries and nitrogen levels on dry matter yield of Pearl millet

Entry/ N levels	Dry matter Yield (q/ha)									
	Anand					Rahuri				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	73.6	72.5	74.3	84.4	76.2	44.78	59.66	73.05	77.90	63.84
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	152.3	182.5	172.6	192.2	174.9	102.69	119.52	135.15	144.99	125.59
Raj Bajra Chari (NC)	52.8	78.3	95.0	120.6	86.7	53.96	69.09	80.38	90.05	73.37
Giant Bajra (NC)	106.1	113.5	128.5	106.7	113.7	80.89	100.58	122.01	128.48	107.99
Mean	**77.0**	**89.4**	**94.1**	**100.8**		**70.58**	**87.21**	**102.65**	**110.35**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	2.39	2.14	4.79			2.44	2.18	4.88		
CD at 5%	6.86	6.13	13.72			6.98	6.25	13.97		
CV%			9.19					11.39		

Table- 21 (d-3) Interaction effects of promising entries and nitrogen levels on dry matter yield of Pearl millet

Entry/ N levels	Dry matter Yield (q/ha)									
	Mandya					Hyderabad				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	32.71	58.99	71.23	79.60	60.63	44.40	55.20	59.20	70.40	57.30
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	45.50	84.83	105.64	130.17	91.53	44.67	58.87	61.20	85.20	62.48
Raj Bajra Chari (NC)	24.40	43.12	53.77	69.41	47.68	38.40	51.20	59.60	66.00	53.80
Giant Bajra (NC)	42.60	82.51	100.88	118.41	86.10	62.00	75.80	82.00	85.87	76.41
Mean	**36.30**	**67.36**	**82.88**	**99.40**	**71.49**	**47.37**	**60.27**	**65.50**	**76.87**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±	2.47	2.47	4.94			1.10	1.10	2.20		
CD at 5%	7.13	7.13	14.26			3.17	3.17	7.02		
CV%			11.96					6.09		

Table- 21 (d-4) Interaction effects of promising entries and nitrogen levels on dry matter yield of Pearl millet

Entry/ N levels	Dry matter Yield (q/ha)									
	Hisar					Dharwad				
	0	30	60	90	Mean	0	30	60	90	Mean
RBB-1	54.9	66.8	71.9	81.7	69.3	71.17	73.97	78.97	84.57	77.17
NDFB-904	-	-	-	-	-	-	-	-	-	-
PAC-981	49.3	56.5	63.6	71.0	60.1	59.83	62.73	63.37	66.27	63.05
Raj Bajra Chari (NC)	51.2	67.3	70.1	79.4	64.5	60.60	64.53	66.27	69.30	65.18
Giant Bajra (NC)	56.1	71.6	75.6	94.3	73.4	65.20	70.77	73.40	77.00	71.59
Mean	**52.8**	**65.5**	**70.3**	**80.6**		**64.20**	**68.00**	**70.50**	**74.28**	
	Entry	**N levels**	**Entry X N level**			**Entry**	**N levels**	**Entry X N level**		
SEm±						0.52	0.52	1.05		
CD at 5%	4.4	4.4	8.8			1.51	1.51	3.03		
CV%										

Table-21 (e): Effect of promising entries and nitrogen levels on crude protein yield of Pearl millet (AVT-2)

Treatment	Crude protein yield (q/ha)			Crude protein (%)		
	NWZ	North East Zone		NWZ	North East Zone	
	Ludhiana	Faizabad*	Bhubaneswar	Ludhiana	Faizabad*	Bhubaneswar
A. Entry						
RBB-1	10.29	2.25	3.38	10.00	7.90	7.98
NDFB-904	-	2.42	-	-	7.95	
PAC-981	13.37	2.70	3.49	9.77	7.98	8.12
Raj Bajra Chari (NC)	10.31	2.95	3.28	9.95	7.10	7.98
Giant Bajra (NC)	14.00	3.10	3.67	9.80	8.15	7.99
SEm±	0.21	0.98	0.08	0.16	0.85	0.03
CD at 5%	0.60	2.94	0.23	0.46	2.55	0.09
B. Nitrogen levels (kg/ha)						
0	9.24	2.12	2.71	9.18	7.40	8.72
30	11.40	2.58	3.16	9.72	7.80	8.07
60	13.00	2.68	3.87	10.17	7.90	7.93
90	14.33	2.96	4.07	10.46	8.12	7.34
SEm±	0.21	0.78	0.08	0.16	0.56	0.03
CD at 5%	0.60	2.34	0.23	0.46	1.68	0.09
C. Interaction Entry X Nitrogen levels						
SEm±	0.42	2.15	0.16	0.33	0.84	0.06
CD at 5%	1.21	6.45	NS	NS	NS	0.17
CV%	6.04	13.45	8.10	5.73	9.95	1.28

*Data not included in mean

Table-21 (f): Effect of promising entries and nitrogen levels on crude protein yield of Pearl millet (AVT-2)

Treatment	Crude protein yield (q/ha)										
	Central Zone					South Zone					Over all mean
	Anand	Jabalpur	Urulikanchan	Rahuri	Mean	Coimbatore	Mandya	Hyderabad	Dharwad	Mean	
A. Entry											
RBB-1	6.97	4.59	9.65	5.11	6.58	7.11	5.04	5.51	4.32	5.50	6.20
NDFB-904	-	-	-	-	-	-	-	-	-	-	-
PAC-981	15.42	5.09	21.70	9.94	13.04	7.39	5.77	5.42	3.74	5.58	9.13
Raj Bajra Chari (NC)	8.71	5.97	10.28	5.97	7.73	6.58	3.99	5.28	3.84	4.92	6.42
Giant Bajra (NC)	9.81	5.54	18.32	8.73	10.60	9.79	6.18	7.74	4.22	6.98	8.80
SEm±	0.23	0.41	0.21	0.23		0.23	0.25	0.35	0.03		
CD at 5%	0.65	1.10	0.59	0.65		0.68	0.71	1.02	0.09		
B. Nitrogen levels (kg/ha)											
0	7.54	3.89	12.55	5.31	7.32	6.09	2.30	4.58	3.56	4.13	5.78
30	9.69	5.12	14.69	6.91	9.10	7.22	4.26	5.05	3.86	5.10	7.14
60	10.85	6.65	15.26	8.40	10.29	8.06	6.16	6.12	4.22	6.14	8.26
90	12.86	7.47	17.44	9.11	11.72	9.51	8.27	7.75	4.48	7.50	9.53
SEm±	0.20	0.06	0.21	0.20		0.23	0.25	0.35	0.03		
CD at 5%	0.58	0.18	0.59	0.58		0.68	0.71	1.02	0.09		
C. Interaction Entry X Nitrogen levels											
SEm±	0.45	0.12	0.42	0.45		0.66	0.49	0.70			
CD at 5%	1.30	0.69	1.18	1.29		NS	1.41	NS			
CV%	9.59	3.21		13.13		13.33	16.15	20.85			

Table-21 (g): Effect of promising entries and nitrogen levels on crude protein content of Pearl millet (AVT-2)

Treatment	Crude protein (%)						
	Central Zone	South Zone					Over all mean
	Rahuri	Coimbatore	Mandya	Hyderabad	Dharwad	Mean	
A. Entry							
RBB-1	7.93	13.01	8.07	9.00	5.57	8.91	8.79
NDFB-904	-	-	-	-	-	-	-
PAC-981	7.88	14.55	6.13	8.52	5.92	8.78	8.70
Raj Bajra Chari (NC)	8.02	12.58	8.31	9.60	5.89	9.10	8.90
Giant Bajra (NC)	8.04	13.34	6.78	10.04	5.89	9.01	8.84
SEm±	0.08	0.26	0.14	0.17	0.03		
CD at 5%	NS	0.75	0.40	0.50	0.09		
B. Nitrogen levels (kg/ha)							
0	7.49	14.33	6.60	8.10	5.56	8.65	8.57
30	7.91	14.22	6.50	8.73	5.70	8.79	8.69
60	8.20	12.47	7.74	9.61	5.98	8.95	8.87
90	8.28	12.47	8.43	10.74	6.04	9.42	9.11
SEm±	0.07	0.26	0.14	0.17	0.03		
CD at 5%	0.21	0.75	0.40	0.50	0.09		
C. Interaction Entry X Nitrogen levels							
SEm±	0.16	0.73	0.28	0.35			
CD at 5%	NS	1.49	0.80	NS			
CV%	4.39	7.2	6.57	6.47			

Table-21 (h): Effect of promising entries and nitrogen levels on plant population/ m^2 of Pearl millet (AVT-2)

Treatment	Plant population/m^2							
	NWZ	NEZ	Central Zone	South Zone				Over all mean
	Bikaner	Bhubaneswar	Rahuri	Coimbatore	Mandya	Dharwad	Mean	
A. Entry								
RBB-1	30.58	50.85	30.83	32.42	30.50	31.67	31.53	34.48
NDFB-904	-	-	-	-	-	-	-	-
PAC-981	31.08	50.52	28.75	32.75	31.00	28.42	30.72	33.75
Raj Bajra Chari (NC)	31.42	51.95	30.25	32.50	30.92	29.25	30.89	34.38
Giant Bajra (NC)	29.75	50.13	30.83	32.58	31.08	32.17	31.94	34.42
SEm±	0.28	0.34	0.31	0.14	0.31	0.39		
CD at 5%	0.81	0.99	0.91	NS	NS	1.14		
B. Nitrogen levels (kg/ha)								
0	29.42	50.03	30.09	33.00	31.42	24.83	29.75	33.13
30	30.42	50.90	30.00	32.67	30.58	28.25	30.50	33.80
60	32.00	51.43	30.08	32.58	30.42	32.58	31.86	34.85
90	31.00	51.08	30.50	32.00	31.08	35.83	32.97	35.25
SEm±	0.39	0.34	0.28	0.14	0.31	0.39		
CD at 5%	1.14	0.99	NS	0.40	NS	1.14		
C. Interaction Entry X Nitrogen levels								
SEm±		0.69	0.63	0.39	0.63			
CD at 5%		NS	NS	NS	NS			
CV%	3.9	2.33	4.55	1.98	3.51			

Table-21 (i): Effect of promising entries and nitrogen levels on plant height of Pearl millet (AVT-2)

Treatment	Plant height (cm)					
	North West Zone				North East Zone	
	Hisar	Ludhiana	Bikaner	Mean	Faizabad*	Bhubaneswar
A. Entry						
RBB-1	186.1	140.7	222.4	183.07	135.6	188.37
NDFB-904	-	-	-	-	154.7	-
PAC-981	165.8	175.2	184.6	175.20	160.6	187.71
Raj Bajra Chari (NC)	173.3	165.1	262.8	200.40	170.5	174.96
Giant Bajra (NC)	198.1	194.4	194.1	195.53	154.8	194.36
SEm±		3.7	5.53		8.74	4.49
CD at 5%	11.9	12.7	15.90		26.22	12.97
B. Nitrogen levels (kg/ha)						
0	126.3	142.5	225.3	164.70	148.5	139.49
30	149.5	160.0	208.3	172.60	165.3	174.48
60	160.8	179.8	218.8	186.47	164.7	204.87
90	187.4	193.1	211.4	197.30	176.5	226.56
SEm±		3.2	7.83		7.4	4.49
CD at 5%	11.9	9.4	22.4		22.3	12.97
C. Interaction Entry X Nitrogen levels						
SEm±		6.5			12.67	8.98
CD at 5%		NS			38.02	NS
CV%		6.6	10.9		13.50	8.35

*Data not included in mean

Table-21 (j): Effect of promising entries and nitrogen levels on plant height of Pearl millet (AVT-2)

Treatment	Plant height (cm)										
	Central Zone					South Zone					Over all mean
	Anand	Jabalpur	Urulikanchan	Rahuri	Mean	Coimbatore	Mandya	Hyderabad	Dharwad	Mean	
A. Entry											
RBB-1	185.00	174.90	192.88	152.85	176.41	161.34	159.20	140.51	187.71	162.19	174.33
NDFB-904	-	-	-	-	-	-	-	-	-	-	-
PAC-981	238.50	152.60	262.19	199.00	213.07	168.36	187.91	128.83	164.27	162.34	184.58
Raj Bajra Chari (NC)	186.30	163.30	199.11	173.78	180.62	168.00	162.64	138.21	171.83	160.17	178.28
Giant Bajra (NC)	189.80	159.50	243.08	168.88	190.32	172.08	170.43	145.80	181.18	167.37	184.31
SEm±	2.54	2.54	0.54	2.39		1.40	2.59	4.70	1.28		
CD at 5%	7.28	6.24	1.52	6.83		4.05	7.47	NS	3.69		
B. Nitrogen levels (kg/ha)											
0	154.30	139.78	205.58	157.16	164.21	158.65	142.43	121.80	168.24	147.78	156.79
30	159.90	154.75	217.30	172.74	176.17	165.62	162.66	128.10	173.58	157.49	168.91
60	161.30	173.35	233.63	181.11	187.35	170.19	181.46	143.60	178.50	168.44	182.28
90	164.20	182.53	240.75	183.51	192.75	175.32	193.62	159.80	184.67	178.35	191.91
SEm±	2.27	3.21	0.54	2.13		1.40	2.59	4.70	1.28		
CD at 5%	6.51	9.35	1.52	6.11		4.05	7.47	13.70	3.69		
C. Interaction Entry X Nitrogen levels											
SEm±	5.08	2.58	1.09	4.77		2.81	5.17	9.50			
CD at 5%	NS	6.51	3.07	NS		NS	14.93	NS			
CV%	5.51	3.25		5.95		4.48	5.27	11.88			

Table-21 (k): Effect of promising entries and nitrogen levels on leaf stem ratio of Pearl millet (AVT-2)

Treatment	Leaf stem ratio					
	North West Zone				North East Zone	
	Hisar	Ludhiana	Bikaner	Mean	Faizabad*	Bhubaneswar
A. Entry						
RBB-1	0.64	0.60	0.42	0.55	0.62	0.65
NDFB-904	-	-	-	-	0.58	-
PAC-981	0.66	0.68	1.06	0.80	0.63	0.65
Raj Bajra Chari (NC)	0.63	0.61	0.54	0.59	0.64	0.67
Giant Bajra (NC)	0.67	0.70	0.88	0.75	0.70	0.67
SEm±		0.01	0.03			0.01
CD at 5%	NS	0.05	0.07			NS
B. Nitrogen levels (kg/ha)						
0	0.60	0.67	0.71	0.66	0.52	0.49
30	0.63	0.66	0.65	0.65	0.65	0.58
60	0.66	0.63	0.73	0.67	0.67	0.71
90	0.67	0.62	0.81	0.70	0.68	0.86
SEm±		0.01	0.03			0.01
CD at 5%	NS	0.03	0.10			0.02
C. Interaction Entry X Nitrogen levels						
SEm±		0.02				0.02
CD at 5%		NS				NS
CV%		6.23	14.2			4.09

* Data not included in mean

Table-21 (I): Effect of promising entries and nitrogen levels on leaf stem ratio of Pearl millet (AVT-2)

Treatment	Leaf stem ratio										
	Central Zone					South Zone					Over all mean
	Anand	Jabalpur	Urulikanchan	Rahuri	Mean	Coimbatore	Mandya	Hyderabad	Dharwad	Mean	
A. Entry											
RBB-1	0.73	0.59	0.49	0.30	0.53	0.20	0.19	0.30	0.34	0.26	0.45
NDFB-904	-	-	-	-	-	-	-	-	-	-	-
PAC-981	0.62	0.48	0.63	0.46	0.55	0.19	0.24	0.33	0.29	0.26	0.52
Raj Bajra Chari (NC)	0.70	0.56	0.47	0.27	0.50	0.16	0.21	0.33	0.30	0.25	0.45
Giant Bajra (NC)	0.75	0.51	0.54	0.37	0.54	0.19	0.23	0.35	0.35	0.28	0.52
SEm±		0.02	0.01	0.01		0.007	0.004	0.02	0.006		
CD at 5%		0.06	0.03	0.03		0.01	0.012	NS	0.018		
B. Nitrogen levels (kg/ha)											
0	0.63	0.38	0.51	0.30	0.46	0.17	0.16	0.28	0.28	0.22	0.43
30	0.58	0.46	0.51	0.34	0.47	0.17	0.20	0.29	0.31	0.24	0.45
60	0.52	0.61	0.56	0.38	0.52	0.19	0.25	0.37	0.34	0.29	0.50
90	0.51	0.70	0.55	0.39	0.54	0.21	0.27	0.42	0.35	0.31	0.53
SEm±		0.01	0.01	0.01		0.007	0.004	0.02	0.006		
CD at 5%		0.03	0.03	0.02		0.01	0.012	0.05	0.018		
C. Interaction Entry X Nitrogen levels											
SEm±		0.02	0.01	0.02		0.007	0.008	0.04			
CD at 5%		0.06	0.03	0.05		NS	0.024	NS			
CV%		2.10		11.04		8.13	6.7	18.25			

AST-22: Effect of phosphorus level on forage yield of promising entries of ricebean (AVT-2)

Location: Ranchi, Kalyani, Bhubaneswar, Jorhat, Shillong, Jabalpur and Vellayani

A field trial on ricebean (AVT-2) entries was conducted to find out the effect of phosphorus levels on growth and yield of ricebean at seven locations in three zones of the country. The treatment consisted of two entries and four levels of phosphorus (0, 30, 60 and 90 kg P_2O_5/ha) laid out in factorial randomized block design. The data of the trial has been given in Tables 22(a) to 22(g). The results revealed that in North-East zone on mean basis the testing entry JRBJ-05-4 remained at par with national check Bidhan Ricebean-1 in terms of green fodder, dry matter and crude protein yields. In general the yields were higher at Kalyani and lowest being at Shillong. The response of phosphorus increased gradually with increasing levels of phosphorus up to highest tested dose of 90 kg P_2O_5/ha. On location mean basis in the zone, application of 90 kg P_2O_5/ha produced 19.32, 7.18 and 4.20 % more GFY and 33.53, 18.12 and 7.74 % more DMY over control, 30 and 60 kg P_2O_5/ ha, respectively.

In Central zone, testing entry JRBJ-05-4 recorded significantly higher green fodder yield (362.50 q/ha), dry matter yield (69.98 q/ha) over national check Bidhan Ricebean-1 (338.3 q/ha and 64.84 q/ha, respectively). The application of 90 kg P_2O_5/ha to ricebean recorded significantly highest GFY, DMY and CPY over its lower levels. The magnitude of increase for green fodder was 54.69, 34.01 and 9.50 % more over control, 30 and 60 kg P_2O_5/ ha, respectively. In South zone (at Vellayani) the testing entry JRBJ-05-4 recorded significantly lower GFY over national check Bidhan Ricebean-1. The response of phosphorus increased significantly up to 30 kg P_2O_5/ ha only. The interaction of entries and nitrogen levels was significant at Vellayani.

On over all mean basis (mean of three zones) testing entry JRBJ-05-4 recorded numerically higher GFY (261.38 q/ha), DMY (53.39 q/ha) and CPY (7.25 q/ha) over national check Bidhan Ricebean-1 (256.42 q/ha GFY, 52.85 q/ha DMY and 7.25 q/ha CPY). The forage yield increased consistently with increasing levels of phosphorus up to 90 kg P_2O_5/ha (Tables 22(a) to 22(g)).

Table-22 (a): Effect of phosphorus levels on green fodder yield of promising entries of Ricebean (AVT-2)

Treatment	Green fodder yield (q/ha)								
	North East Zone						Central Zone	South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Shillong	Mean	Jabalpur	Vellayani	
A. Entries									
JRBJ-05-4	246.00	367.20	285.88	282.11	63.50	248.94	362.50	222.50	261.38
Bidhan Ricebean-1 (NC)	234.30	362.20	274.76	291.95	64.42	245.53	338.30	229.00	256.42
SEm±	1.18	3.07	3.23	7.77	1.23		3.40	1.46	
CD at 5%	3.58	NS	10.90	NS	NS		9.60	4.43	
B. Phosphorus levels	**(P_2O_5 kg/ha)**								
0	217.80	333.50	254.90	241.25	63.33	222.16	274.10	217.80	228.95
30	234.70	382.70	278.98	280.25	60.00	247.33	316.40	225.40	254.06
60	246.00	357.30	285.38	318.07	64.83	254.32	387.20	228.05	269.55
90	262.00	385.20	302.02	308.55	67.67	265.09	424.00	231.90	283.05
SEm±	1.67	4.343	3.23	10.98	1.74		3.60	2.06	
CD at 5%	5.06	13.38	10.90	33.32	5.29		11.50	6.26	
C. Interaction: Entry X Phosphorus level									
SEm±	2.36	6.143	6.47	15.53	2.46		4.60	2.92	
CD at 5%	NS	18.92	NS	NS	7.47		12.10	8.86	
CV%	1.67	2.92	17.10	9.38	6.67		6.50	1.29	

Table-22 (a-1): Interaction effect of entries and phosphorus levels on GFY and DMY of ricebean at Jabalpur

Entry/ P levels	Green Fodder Yield (q/ha)					Dry matter yield (q/ha)				
	0	30	60	90	Mean	0	30	60	90	Mean
JRBJ-05-4	285.90	330.30	401.10	433.00	362.50	52.32	61.76	79.53	86.33	69.98
Bidhan Ricebean-1 (NC)	262.30	302.60	373.30	415.00	338.30	47.60	56.21	73.28	82.30	64.84
Mean	274.10	316.40	387.20	424.00		49.96	58.98	76.40	84.31	
	Entry	**P levels**	**Entry X P level**			**Entry**	**P levels**	**Entry X P level**		
SEm±	3.36	3.56	4.56			2.56	1.23	1.26		
CD at 5%	9.60	11.47	12.08			6.54	3.57	4.57		
CV%			6.5					3.69		

Table-22 (b): Effect of phosphorus levels on dry matter yield of promising entries of Ricebean (AVT-2)

Treatment	Dry matter yield (q/ha)							
	North East Zone					Central Zone	South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Mean	Jabalpur	Vellayani	
A. Entries								
JRBJ-05-4	55.82	49.60	54.66	46.07	51.54	69.98	44.20	53.39
Bidhan Ricebean-1 (NC)	58.42	47.65	52.49	47.62	51.55	64.84	46.06	52.85
SEm±	0.75	1.30	0.53	1.29		2.56	0.67	
CD at 5%	2.27	NS	1.80	NS		6.54	NS	
B. Phosphorus levels (P_2O_5 kg/ha)								
0	50.00	43.93	48.41	36.08	44.61	49.96	42.56	45.16
30	53.94	51.54	53.18	44.88	50.89	58.98	43.80	51.05
60	56.54	48.84	54.77	53.94	53.52	76.40	45.30	55.97
90	68.00	50.19	57.93	52.47	57.15	84.31	48.90	60.30
SEm±	1.06	1.83	0.53	1.82		1.23	0.95	
CD at 5%	3.22	5.66	1.80	5.53		3.57	2.91	
C. Interaction: Entry X Phosphorus level								
SEm±	1.50	2.60	1.07	2.58		1.26	1.35	
CD at 5%	NS	8.01	NS	NS		4.57	4.11	
CV%	4.53	9.26	19.30	9.54		3.69	2.98	

Table-22 (c): Effect of phosphorus levels on crude protein yield of promising entries of Ricebean (AVT-2)

Treatment	Crude protein yield (q/ha)							
	North East Zone					Central Zone	South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Mean	Jabalpur	Vellayani	
A. Entries								
JRBJ-05-4	7.18	5.59	6.68	7.00	6.61	10.03	7.00	7.25
Bidhan Ricebean-1 (NC)	7.66	4.60	6.36	7.18	6.45	9.25	7.10	7.03
SEm±	0.11	0.17	0.08	0.20		0.45	0.18	
CD at 5%	0.35	0.52	0.28	NS		NS	NS	
B. Phosphorus levels (P_2O_5 kg/ha)								
0	6.30	3.61	5.65	5.36	5.23	7.05	6.20	5.70
30	6.96	5.12	6.34	6.81	6.31	8.36	6.70	6.72
60	7.44	5.25	6.85	8.21	6.94	10.91	7.30	7.66
90	9.00	6.49	7.22	7.97	7.67	12.26	8.10	8.51
SEm±	0.16	0.24	0.08	0.27		0.23	0.26	
CD at 5%	0.49	0.74	0.28	0.84		0.63	0.80	
C. Interaction: Entry X Phosphorus level								
SEm±	0.23	0.34	0.16	0.39		0.14	0.37	
CD at 5%	NS	1.05	NS	NS		0.29	1.13	
CV%	5.40	11.57	11.20	9.58		2.56	5.19	

Table-22 (d): Effect of phosphorus levels on crude protein content of promising entries of Ricebean (AVT-2)

Treatment	Crude protein (%)						
	North East Zone					South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Mean	Vellayani	
A. Entries							
JRBJ-05-4	12.81	11.27	12.29	15.17	12.89	16.0	13.51
Bidhan Ricebean-1 (NC)	13.11	9.66	12.10	15.06	12.48	15.6	13.11
SEm±	0.05	-	0.07	0.05		0.2	
CD at 5%	0.14	-	0.25	NS		NS	
B. Phosphorus levels (P_2O_5 kg/ha)							
0	12.60	8.22	11.68	14.87	11.84	14.7	12.41
30	12.84	9.94	11.93	15.17	12.47	15.5	13.08
60	13.16	10.75	12.52	15.22	12.91	16.4	13.61
90	13.24	12.94	12.65	15.20	13.51	16.7	14.15
SEm±	0.06	-	0.07	0.07		0.3	
CD at 5%	0.19	-	0.25	0.21		0.9	
C. Interaction: Entry X Phosphorus level							
SEm±	0.09	-	0.15	0.10		0.4	
CD at 5%	0.27	-	NS	NS		1.3	
CV%	1.37	-	18.32	1.14		2.6	

Table-22 (e): Effect of phosphorus levels on plant population of promising entries of Ricebean (AVT-2)

Treatment	Plant population/ m^2						
	North East Zone					South Zone	
	Ranchi	Kalyani	Bhubaneswar	Shillong	Mean	Vellayani	Over all Mean
A. Entries							
JRBJ-05-4	35.16	31.30	28.11	23.58	29.54	28.26	29.28
Bidhan Ricebean-1 (NC)	35.33	30.00	28.37	22.00	28.93	28.01	28.74
SEm±	0.67	0.25	0.49	0.89		0.24	
CD at 5%	NS	0.75	NS	NS		NS	
B. Phosphorus levels (P_2O_5 kg/ha)							
0	35.16	29.30	25.92	21.33	27.93	28.8	28.10
30	34.0	30.80	29.32	22.83	29.24	28.0	28.99
60	35.66	31.20	29.28	23.83	29.99	27.8	29.55
90	36.16	31.30	28.43	23.17	29.77	27.7	29.35
SEm±	0.95	0.35	0.69	1.26		0.35	
CD at 5%	NS	1.06	2.10	NS		1.06	
C. Interaction: Entry X Phosphorus level							
SEm±	1.34	0.49	0.98	1.79		0.49	
CD at 5%	NS	1.51	NS	NS		NS	
CV%	6.57	2.77	6.01	13.60		1.74	

Table-22 (f): Effect of phosphorus levels on plant height of promising entries of Ricebean (AVT-2)

Treatment	Plant height (cm)								
	North East Zone						Central Zone	South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Shillong	Mean	Jabalpur	Vellayani	
A. Entries									
JRBJ-05-4	119.0	96.70	143.08	162.08	43.39	112.85	112.7	122.0	114.14
Bidhan Ricebean-1 (NC)	112.1	90.95	151.17	179.28	46.40	115.98	109.5	133.9	117.61
SEm±	0.71	1.08	1.34	4.88	1.20		0.56	2.0	
CD at 5%	2.1	3.34	4.50	14.81	NS		1.54	6.1	
B. Phosphorus levels (P_2O_5 kg/ha)									
0	102.3	87.33	135.00	145.28	36.33	101.25	101.3	117.1	103.52
30	108.7	95.47	147.00	181.18	43.72	115.21	105.5	124.9	115.21
60	118.3	92.47	153.83	186.02	48.72	119.87	115.3	135.7	121.48
90	132.9	100.03	152.67	170.23	50.81	121.33	122.4	134.1	123.31
SEm±	1.0	1.53	1.34	6.910	1.70		0.89	2.8	
CD at 5%	3.08	4.72	4.50	20.95	5.15		2.45	8.6	
C. Interaction: Entry X Phosphorus level									
SEm±	1.44	2.17	2.67	9.77	2.40		0.56	4.0	
CD at 5%	NS	6.68	NS	NS	7.28		2.35	12.2	
CV%	2.33	4.01	23.33	9.92	9.26		2.58	3.1	

Table-22 (g): Effect of phosphorus levels on leaf stem ratio of promising entries of Ricebean (AVT-2)

Treatment	Leaf stem ratio							
	North East Zone						South Zone	Over all Mean
	Ranchi	Kalyani	Jorhat	Bhubaneswar	Shillong	Mean	Vellayani	
A. Entries								
JRBJ-05-4	0.71	0.89	0.87	0.69	0.66	0.76	0.70	0.75
Bidhan Ricebean-1 (NC)	0.57	0.81	0.84	0.70	0.72	0.73	0.80	0.74
SEm±	0.01	-	0.04	0.04	0.02		0.02	
CD at 5%	0.03	-	NS	NS	0.05		0.06	
B. Phosphorus levels (P_2O_5 kg/ha)								
0	0.54	0.63	0.81	0.52	0.62	0.62	0.70	0.64
30	0.63	0.75	0.79	0.68	0.67	0.70	0.80	0.72
60	0.66	0.76	1.01	0.78	0.73	0.79	0.80	0.79
90	0.73	0.81	0.81	0.81	0.74	0.78	0.85	0.79
SEm±		-	0.04	0.05	0.02		0.03	
CD at 5%	0.04	-	0.13	0.16	0.07		0.09	
C. Interaction: Entry X Phosphorus level								
SEm±	0.01	-	0.08	0.07	0.03		4.27	
CD at 5%	0.06	-	NS	NS	NS		0.12	
CV%	3.45	-	19.7	-	8.01		5.19	

AST-23: Effect of phosphorus levels on forage yield of promising entries of soybean (AVT-2)

Location: Hisar, Ranchi, Shillong, Imphal, Jabalpur and Rahuri

A field trial on soybean (AVT-2) entries was conducted to find out the response of phosphorus levels on growth and yield of the soybean at six locations in three zones of the country. The treatment consisted of four entries and four levels of phosphorus (0, 30, 60 and 90 kg P_2O_5/ha) laid out in FRBD.

The results indicated that JS 07-24-13 out yielded on mean basis in terms of green fodder yield and was closely followed by JS 07-21-7. Whereas, JS 07-21-7 recorded highest DMY on mean basis. Location wise, performance of entries was variable (Table-23(a) to (b)). The response of phosphorus was gradual with increasing level up to 90 kg P_2O_5/ha. Interaction of entries with P levels was evident at Jabalpur and Imphal. Crude protein yield (4.64 q/ha) was highest with JS 07-24-13 closely followed by JS 07-24-1 (4.55 q/ha) on location mean basis, however no remarkable variation was observed among entries for CPY. The crude protein yield increased consistently with increasing levels of phosphorus on location mean basis. On mean basis application of 90 kg P_2 O_5/ha to soyabean registered percent increase of 25.72, 11.14 and 3.23 for GFY, 24.21, 11.54 and 4.26 for DMY and 21.14, 12.47 and 4.96 for CPY over control, 30 kg P_2 O_5/ha and 60 kg P_2 O_5/ha, respectively.

Table-23 (a): Effect of phosphorus levels on green fodder yield of promising entries of soybean (AVT-2)

Treatment	Green fodder yield (q/ha)								
	North East Zone				Central Zone			NWZ	Over all Mean
	Ranchi	Shillong	Imphal	Mean	Rahuri	Jabalpur	Mean	Hisar	
A. Entries									
JS 07–24–13	144.8	59.75	168.92	124.49	223.98	212.60	218.29	66.70	146.13
JS 07–24–1	160.3	57.33	161.92	126.52	199.55	202.90	201.23	74.40	142.73
JS 07–24–8	157.2	56.38	162.08	125.22	205.92	187.00	196.46	63.80	138.73
JS 07–21–7	161.1	54.67	166.00	127.26	208.35	196.70	202.53	85.50	145.39
SEm±	6.01	1.10	7.22		3.22	5.40			
CD at 5%	NS	3.18	NS		9.31	15.60		7.20	
B. Phosphorus levels (P_2O_5 kg/ha)									
0	123.1	45.05	158.33	108.83	192.26	165.50	178.88	61.70	124.32
30	154.2	55.00	170.17	126.46	203.83	191.10	197.47	69.50	140.63
60	166.3	61.92	169.75	132.66	219.35	215.10	217.23	78.00	151.74
90	179.8	66.17	160.67	135.55	222.36	227.60	224.98	81.20	156.30
SEm±	6.01	1.10	7.22		3.22	5.40			
CD at 5%	17.30	3.18	NS		9.31	15.60		7.20	
C. Interaction: Entry X Phosphorus level									
SEm±	12.03	2.20	14.44		6.44	3.60			
CD at 5%	NS	NS	NS		NS	9.10		NS	
CV%	13.44	6.68			5.33	8.12			

Table-23 (a-1): Interaction effect of entries and phosphorus levels on green fodder and dry matter yields of soybean at Jabalpur

Entry/ P levels	Jabalpur									
	Green Fodder Yield (q/ha)					Dry matter yield (q/ha)				
	0	30	60	90	Mean	0	30	60	90	Mean
JS 07–24–13	183.20	205.40	224.80	237.30	212.60	34.42	39.42	43.86	46.50	41.05
JS 07–24–1	168.00	190.10	213.70	240.10	202.90	31.09	36.36	41.36	47.33	39.03
JS 07–24–8	145.70	187.30	205.40	209.60	187.00	26.37	35.67	39.55	40.25	35.46
JS 07–21–7	165.10	181.80	216.50	223.50	196.70	29.98	33.31	42.05	43.30	38.05
Mean	165.50	191.10	215.10	227.60		23.71	36.19	41.70	44.34	
	Entry	**P levels**	**Entry X P level**			**Entry**	**P levels**	**Entry X P level**		
SEm±	5.40	5.40	3.56			2.36	2.36	3.56		
CD at 5%	15.60	15.60	9.08			6.70	6.70	7.08		
CV%			8.12					6.08		

Table-23 (b): Effect of phosphorus levels on dry matter yield of promising entries of soybean (AVT-2)

Treatment	Dry matter yield (q/ha)							
	North East Zone			Central Zone			NWZ	Over all Mean
	Ranchi	Imphal	Mean	Rahuri	Jabalpur	Mean	Hisar	
A. Entries								
JS 07–24–13	32.52	33.33	32.93	39.75	41.10	40.43	11.50	31.64
JS 07–24–1	32.00	35.26	33.63	37.44	39.00	38.22	13.10	31.36
JS 07–24–8	31.07	29.76	30.42	39.82	35.50	37.66	11.20	29.47
JS 07–21–7	31.41	35.22	33.32	38.97	38.10	38.54	15.80	31.90
SEm±	0.45	1.57		0.93	2.40			
CD at 5%	NS	4.54		NS	6.70		1.60	
B. Phosphorus levels (P_2O_5 kg/ha)								
0	27.31	38.55	32.93	34.89	23.70	29.30	10.60	27.01
30	31.18	33.00	32.09	37.71	36.20	36.96	12.30	30.08
60	33.51	30.32	31.92	41.15	41.70	41.43	14.20	32.18
90	35.01	31.70	33.36	42.24	44.30	43.27	14.50	33.55
SEm±	0.45	1.57		0.93	2.40			
CD at 5%	1.30	4.54		2.70	6.70		1.60	
C. Interaction: Entry X Phosphorus level								
SEm±	0.90	3.14		1.87	3.60			
CD at 5%	NS	9.08		NS	7.10		NS	
CV%	4.93			8.29	6.10			

Table -23(c): Effect of phosphorus levels on crude protein yield of promising entries of soybean (AVT-2)

Treatment	Crude protein yield (q/ha)						
	North East Zone			Central Zone			Over all Mean
	Ranchi	Imphal	Mean	Rahuri	Jabalpur	Mean	
A. Entries							
JS 07–24–13	4.14	3.81	3.98	5.10	5.50	5.30	4.64
JS 07–24–1	4.09	4.08	4.09	4.82	5.20	5.01	4.55
JS 07–24–8	3.91	3.25	3.58	5.01	4.70	4.86	4.22
JS 07–21–7	3.98	3.83	3.91	4.98	5.00	4.99	4.45
SEm±	0.05	0.22		0.13	0.84		
CD at 5%	0.16	NS		NS	2.12		
B. Phosphorus levels (P_2O_5 kg/ha)							
0	3.37	4.38	3.88	4.33	4.00	4.17	4.02
30	3.96	3.76	3.86	4.80	4.80	4.80	4.33
60	4.27	3.35	3.81	5.32	5.60	5.46	4.64
90	4.51	3.49	4.00	5.47	6.00	5.74	4.87
SEm±	0.05	0.22		0.13	0.84		
CD at 5%	0.16	0.63		0.36	2.12		
C. Interaction: Entry X Phosphorus level							
SEm±	0.11	0.44		0.25	0.63		
CD at 5%	NS	1.26		NS	1.84		
CV%	5.0			8.70	2.36		

Table -23(d): Effect of phosphorus levels on crude protein content and plant population/ m^2 of promising entries of soybean (AVT-2)

Treatment	Crude protein (%)					Plant population/ m^2					
	North East Zone			Central Zone	Over all Mean	North East Zone			Central Zone	NWZ	Over all Mean
	Ranchi	Imphal	Mean	Rahuri		Ranchi	Shillong	Mean	Rahuri	Hisar	
A. Entries											
JS 07–24–13	12.70	11.41	12.06	12.82	12.31	35.60	22.50	29.05	25.83	32.60	29.13
JS 07–24–1	12.78	11.44	12.11	12.85	12.36	34.50	22.58	28.54	26.25	30.80	28.53
JS 07–24–8	12.57	10.94	11.76	12.56	12.02	35.50	21.58	28.54	23.58	32.10	28.19
JS 07–21–7	12.65	10.91	11.78	12.77	12.11	33.90	21.00	27.45	22.75	33.70	27.84
SEm±	0.04	0.30		0.06		0.55	0.82		0.35		
CD at 5%	0.13	NS		0.19		NS	NS		1.00	NS	
B. Phosphorus levels (P_2O_5 kg/ha)											
0	12.34	11.24	11.79	12.40	11.99	35.50	20.92	28.21	24.33	30.10	27.71
30	12.71	11.32	12.02	12.74	12.26	34.80	21.17	27.99	24.50	32.80	28.32
60	12.76	11.04	11.90	12.92	12.24	34.30	22.92	28.61	24.83	31.80	28.46
90	12.89	11.10	12.00	12.94	12.31	34.90	22.67	28.79	24.75	34.50	29.21
SEm±	0.04	0.30		0.06		0.55	0.82		0.35		
CD at 5%	0.13	NS		0.19		NS	NS		NS	NS	
C. Interaction: Entry X Phosphorus level											
SEm±	0.09	0.59		0.13		1.11	1.63		0.69		
CD at 5%	0.26	NS		NS		NS	NS		NS	NS	
CV%	1.40			1.74		5.63	12.88		4.89		

Table -23(e): Effect of phosphorus levels on plant height of promising entries of soybean (AVT-2)

Treatment	Plant height (cm)								
	North East Zone				Central Zone			NWZ	Over all Mean
	Ranchi	Shillong	Imphal	Mean	Rahuri	Jabalpur	Mean	Hisar	
A. Entries									
JS 07–24–13	73.50	60.32	67.83	67.22	56.48	103.70	80.09	65.30	71.19
JS 07–24–1	70.90	51.78	73.75	65.48	55.38	104.00	79.69	70.10	70.99
JS 07–24–8	68.80	53.88	72.67	65.12	63.57	96.60	80.09	64.80	70.05
JS 07–21–7	74.10	58.52	73.83	68.82	67.11	99.30	83.21	73.60	74.41
SEm±	0.80	0.74	1.15		1.26	3.40			
CD at 5%	2.31	2.15	3.32		3.64	9.70		6.60	
B. Phosphorus levels (P_2O_5 kg/ha)									
0	62.70	51.02	76.25	63.32	55.07	88.40	71.74	59.80	65.54
30	69.41	53.93	71.83	65.06	59.16	96.80	77.98	65.40	69.42
60	74.10	58.57	69.75	67.47	63.36	107.10	85.23	73.10	74.33
90	81.08	60.99	70.25	70.77	64.95	111.40	88.18	75.80	77.41
SEm±	0.80	0.74	1.15		1.26	3.40			
CD at 5%	2.31	2.15	3.32		3.64	9.70		6.60	
C. Interaction: Entry X Phosphorus level									
SEm±	1.60	1.49	2.30		2.52	4.60			
CD at 5%	4.63	4.29	6.65		NS	10.10		NS	
CV%	3.86	4.59			7.20	9.10			

Table -23(f): Effect of phosphorus levels on leaf stem ratio of promising entries of soybean (AVT-2)

Treatment	Leaf stem ratio								
	North East Zone				Central Zone			NWZ	Over all Mean
	Ranchi	Shillong	Imphal	Mean	Rahuri	Jabalpur	Mean	Hisar	
A. Entries									
JS 07–24–13	0.64	1.25	0.57	0.82	0.85	0.65	0.75	0.48	0.74
JS 07–24–1	0.66	0.72	0.63	0.67	0.98	0.65	0.82	0.52	0.69
JS 07–24–8	0.72	0.56	0.54	0.61	0.80	0.58	0.69	0.50	0.62
JS 07–21–7	0.71	0.59	0.53	0.61	0.69	0.61	0.65	0.47	0.60
SEm±	0.01	0.02	0.03		0.03	0.02			
CD at 5%	0.02	0.05	NS		0.09	0.06		NS	
B. Phosphorus levels (P_2O_5 kg/ha)									
0	0.60	0.68	0.61	0.63	0.75	0.50	0.63	0.46	0.60
30	0.66	0.74	0.57	0.66	0.79	0.59	0.69	0.49	0.64
60	0.73	0.88	0.56	0.72	0.87	0.68	0.78	0.48	0.70
90	0.75	0.83	0.53	0.70	0.92	0.72	0.82	0.50	0.71
SEm±	0.01	0.02	0.03		0.03	0.02			
CD at 5%	0.02	0.05	0.08		0.09	0.06		NS	
C. Interaction: Entry X Phosphorus level									
SEm±	0.014	0.03	0.06		0.06	0.02			
CD at 5%	0.041	0.09	0.16		NS	0.06		NS	
CV%	4.23	7.10			12.55	2.5			

CHAPTER-3

FORAGE CROP PROTECTION

Plant Protection

Forage crop protection trials in major *kharif* forages included pest occurrence, evaluation of varietal resistance in improved breeding materials to disease resistance and pest management. These were conducted at Anand, Bhubaneswar, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri centres. 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 COWPEA, MAIZE, PEARLMILLET AND SORGHUM ECOSYSTEM

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

Four cultivated forage crops *viz.*, sorghum, pearl millet, maize and cowpea were screened with objectives 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:

1.1 Sorghum

Diseases: At Jhansi, zonate leaf spot (*Gleocercospora sorghi*), anthracnose (*Colletotrichum graminicola*), gray leaf spot (*Cercospora sorghi*), sooty stripe (*Ramulispora sorghi*) and leaf blight (*Helminthosporium turcicum*) were predominating diseases on sorghum *var* MP Chari. The disease development and spread was favoured by mean temperature around 30°C and humidity 80%. Minor incidences of leaf blight and Aschochyta leaf spot were also occurred in the same variety. At Palampur, leaf blight incidence by *Helminthosporium turcicum* was initiated in the mid of July (5%) and progressed (25%) up to 3rd week of August. At Ludhiana, zonate and gray leaf spot has been observed in severity. Zonate and gray leaf spot appeared on sorghum *var* SL-44. The incidence of disease was noticed in the first week of September but disease progression started from third week of September. The disease showed steady and steep progression during this period with maximum disease severity of 49.1%. Disease was favoured by mean temperature range of 24-27°C and mean RH of 70-75%. Maximum disease was observed in October with pinkish fungal growth (sporodochia) and sporulation under the lesions due to high humidity of 90% during morning hours. Grey leaf spot appeared in the second week of August 2012 in the crop sown during first week of June 2012. The disease progressed rapidly up to mid September 2012 due to occurrence of rains. The Relative humidity (80-90%) and temperature was 30°C at this stage. Thereafter also disease further progressed steadily due to scanty rains till 1st week of November. At the maturity of crop, the disease development slowed down with maximum disease severity of 68.3%. At Bhubaneswar, Incidence of leaf spot and leaf blight started from first week of August and progressed up to first week of September (2.0).

***Insect fauna*:** At Bhubaneswar, leaf defoliators started from 2nd week of August. At the time of harvesting in last week of September infestation of leaf defoliators was (2.6 / 10 plants). At Rahuri, the incidence of shoot fly was moderate to high on sorghum crop sown during 3rd week of July. The maximum percentage of dead hearts was noticed during the 2nd week of August (46.5%). The incidence of stem borer was negligible on sorghum. Low incidence of aphid (*Rhopalosiphum maidis*) population in leaf whorl was noticed in the 2nd week of September (8.20 aphids/plant). The population of predatory lady bird beetles (1 adult & 1.2 grubs/ plant) and *Chrysoperla carnea* (1.0 to 2.0/plant) was observed low to moderate on sorghum crop.

At Jhansi, shoot fly infestation was maximum (16%) in sorghum *var*. MP Chari at the four-leaf stage of the crop. At the time of ear head emergence, infestation of defoliators especially grasshoppers and stem borers was also recorded.

1.2 Pearl millet

Diseases: At Bhubaneswar, leaf spot and blight (*Helmithosporium* sp.) incidences were 1.0-1.8 on 1-5 scale during the crop season. At Jhansi, leaf spot (*Pyricularia grisea*) and rust (*Puccinia pennesiti*) were severe (10-40%) in different genotypes. At Ludhiana, leaf spot disease (*Pyricularia* spp.) started appearing in the mid August and progressed steadily from last week of August to last week of September with favourable temperature range of 28-30°C and 80-90% RH. Maximum disease severity of 35.0% was observed. Maximum ergot and smut severity was 45.75 and 55.0 per cent. At Palampur, leaf blight (*Helminthosporium* sp) appeared in third week of July (5%) and progressed up to end of August (25%).

***Insect fauna*:** At Bhubaneswar, infestation of insect pest starts from 3rd week of August. Pest load was low in pearl millet (foliage feeder = 1.6 /10 plants).

1.3 Maize

Diseases: At Bhubaneswar, leaf blight incidence started from first week of August and progressed up to first week of September (2.8) on 1-5 scale. At Ludhiana, severity of maydis leaf blight was observed in the second week of August 2012 on *var* J 1006 and progressed rapidly up to mid September 2012 at max RH above 80-90% and mean temperature was 30°C. Thereafter, with physiological maturity and no rain after mid September, disease progressed slowly with max disease severity of 41.3%. At Palampur, leaf blight (*H. maydis* and *H. turcecium*) appeared in the second week of July and continued to increase the severity (20%) up to end of August. Banded leaf and sheath blight (*Rhizoctonia* sp.) were also observed in mild form. The incidence of stem borer on maize was observed negligible, whereas, *Helminthosporium* leaf blight disease was observed in severe form in maize seed production plot throughout the crop period at Rahuri. At Jhansi, minor incidences of maydis leaf blight (<10%) were recorded in different breeding materials.

***Insect fauna*:** Infestation of foliage feeders started from 2nd week of August and progressed up to first week of September till the time of harvesting (2.2 /10 plants) at Bhubaneswar. The stem borer was also observed in August at Palampur.

1.4 Cowpea

Diseases: At Bhubaneswar, Yellow mosaic and leaf spot diseases occurred through out the crop season with 3.2 and 2.2 grades in 1-5 scale. Root rot occurred late in the season starting from third week (5%) and continued to increase (42.5%) up to end of August. At Jhansi, root rot (*Rhizoctonia solani* and *R. bataticola*) incidences were as high as (30%) in the *var*. UPC-5286. Anthracnose (*Colletotrichum lindemuthianum*) and cowpea mosaic virus incidences were also recorded. At Hyderabad, maximum mosaic incidence (24%) occurred in the third week of September. At Palampur, wilt / root rot (*Fusarium* and *Rhizoctonia* sp) were severe (25-47%) 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 (30%) up to the third week of August. *Phytophthora* blight appeared in the third week of July and increased up to second week of August (5-30%). Anthracnose (*C. lindemuthianum*) and mosaic diseases appeared late in the season and continued to increase (5-18%) upto third week of August. At Rahuri, yellow mosaic virus was found moderate to high throughout the crop period.

***Insect fauna*:** At Bhubaneswar, cowpea aphid (18-92/leaf with 10 cm petiole) and flea beetle (8.2-90.8 holes/plant) were recorded during the crop season. Leaf defoliators were mild 1-2.4/ 10 plants. At Hyderabad, flea beetle appeared in the second week of August (4%) with maximum infestation (70%) in the end of September. Aphid population remained associated with the crop through out the season (10-60 aphid/plant). At Jhansi, semilooper and flea beetle infestation were as high as (60-70%) at the 50% flowering stage of the crop.

At Palampur, pod borer infestation was 5-7% during month of August. At Rahuri, low to moderate infestation of aphids and jassids was noticed during the 1st (25.40 aphids/plant) and 2nd week (18.00 aphids/plant) of August. Increasing trend of aphid was noticed in seed crop of cowpea during 3rd (45.8 aphids/plant) to 4th week (53.8 aphids/plant) of August 2012. The range of jassid population was 2.8 to 7.60 per leaf on cowpea crop during the crop period.

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 and insect-pests. In IVT, entry BL-1 showed least infestations of aphids at Hyderabad whereas at Bhubaneswar and Rahuri, entries did not differ in aphid infestation. Jassid defoliator infestation was also least in BL-1 at Rahuri and Bhubaneswar (table PPT 2.1.1). The entries BL-1, UPC-9202 and MFC-09-5 showed minimum root rot disease at Bhubaneswar and Jhansi (table PPT 2.1.2).

Table PPT 2.1.1. Screening for pest resistance in Cowpea- Initial Varietal Trial

Entries	Aphid infestation			Flea Beetle	Leaf defoliators	Jassids/ leaf	Stem and Leaf blight
	Bhubaneswar	Rahuri	Hyderabad	Bhubaneswar		Rahuri	Palampur
BL-1	22.6	4.67	5	22.5	1.5	0.67	63.3
UPC-5286	25.3	4.89	70	20.9	1.8	1.33	42.3
UPC-622	28.0	-	62	24.0	2.0	-	46.0
B LOBIA-2	-	-	58	-	-	-	53.0
UPC-9202	-	8.22	32	-	-	1.55	72.0
MFC-09-5	24.5	4.22	104	22.8	1.6	2.11	65.7
APFC-10-4	26.6	3.00	356	18.0	1.8	0.89	82.3
UPC-1201	24.0	9.00	94	16.4	1.6	1.78	84.0
TNFC-0924	30.4	3.33	-	18.0	1.4	1.11	63.3
CL-396	22.0	8.44	-	20.6	1.6	3.56	42.3

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

Entries	Root rot (%)			Yellow mosaic virus				
	Bhuban-eswar	Jhansi	Ludh-iana	Ludh-iana	Bhuban-eswar	Rahuri	Hisar	Hydera bad
BL-1	10.0	12.2	0.00	7.84	0.8	1.00	1	3.0
UPC-5286	12.5	22.3	0.28	8.54	1.0	1.67	1	6.0
UPC-622	15.0	14.3	-	-	1.8	-	-	-
B LOBIA-2	-	9.4	0.00	7.28	-	-	1	-
UPC-9202	-	9.2	-	-	-	2.00		6.0
MFC-09-5	10.0	11.5	0.00	7.14	1.2	2.67	1	8.0
APFC-10-4	24.0	18.0	0.00	7.28	1.0	2.67	1	5.0
UPC-1201	35.0	21.3	0.14	7.14	0.8	3.00	1	2.0
TNFC-0924	12.0	14.2	0.00	7.42	1.0	1.33	1	3.0
CL-396	35.0	24.4	0.42	6.16	1.0	4.00	1	5.0

In AVT 1, entries BL-1, B LOBIA-2, MFC-09-5, APFC-10-4 and TNFC-0924 were free from root rot at Ludhiana. At Rahuri, Hisar, Bhubaneswar, Ludhiana and Hyderabad, all the entries did not differ in the incidences of yellow mosaic virus disease. The aphid and flea beetle population was least (13.0/leaf and 15.8) in entry culture-1 at Rahuri and Bhubaneswar. Jassids (1.92/leaf) was also recorded in UPC-9202 at Rahuri. All the AVT entries of cowpea were resistant for YMV and root rot at Ludhiana (tables PPT 2.1.3 & 2.1.4).

Table PPT 2.1.3. Screening for disease resistance in Cowpea- Advance Varietal Trial-1

Entries	Root rot			Yellow mosaic virus			
	Ludhiana	Jhansi	Bhubaneswar	Bhubaneswar	Ludhiana	Hyderabad	Hisar
BL-1	0.42	8.6	20.0	1.2	5.78	1.5	1
UPC-5286	0.21	12.3	5.0	0.2	6.50	4.0	1
UPC-1101	0.21	9.2	2.0	0.0	7.25	3.5	1
UPC-1102	0.11	11.3	3.0	0.0	6.51	1.5	1
Culture-1	0.21	12.2	2.5	0.0	5.24	2.0	1
UPC-622	-	8.4	15.0	0.0	-	-	1
BL-2	0.11	9.3	-	-	6.81	-	-
UPC-9202	-	12.4	-	-	-	2.0	1

Table PPT 2.1.4 Screening for pest resistance in Cowpea- Advance Varietal Trial 1

Entries	Aphid/leaf		Jassids/leaf		Flea Beetle	
	Jhansi	Rahuri	Rahuri	Jhansi	Bhubaneswar	Hyderabad
BL-1	0	28.83	3.92	0	12.6	80.25
UPC-5286	0	22.42	5.08	0	18.0	76.75
UPC-1101	0	15.50	2.83	0	16.4	85.25
UPC-1102	0	22.84	1.58	0	15.8	79.5
Culture-1	0	13.09	4.92	0	10.1	80.75
UPC-622	0	-	-	0	17.5	73.25
BL-2	0	-	-	0	-	-
UPC-9202	0	21.59	1.92	0	-	-

In AVT 2, at Rahuri, Hisar, Bhubaneswar, Ludhiana and Hyderabad, all 7 entries did not differ in the incidences of yellow mosaic virus disease. All the entries were either disease free or resistant in case of root rot at Ludhiana. UPC-622, RR-3 and BL-1 was found resistant to root rot at Jhansi (tables PPT 2.1.5. & 2.1.6).

Table PPT 2.1.5. Screening for pest resistance in Cowpea- Advance Varietal Trial 2

Entries	Aphid/leaf			Flea Beetle	
	Jhansi	Rahuri	Hyderabad	Bhubaneswar	Hyderabad
BL-1	0	-	40	8.2	36
UPC-5286	0	-	45	12.6	68
MFC-09-1	0	-	-	14.8	73
RR-3	0	-	-	18.6	65
UPC-622	0	-	30	15.4	58
BL-2	0	-	90	-	84
UPC-9202	0	-	60	-	64

Table PPT 2.1.6. Screening for disease resistance in Cowpea- Advance Varietal Trial-2

Entries	Root rot		Yellow mosaic virus (1-5 scale)				
	Jhansi	Ludhiana	Bhubaneswar	Rahuri	Ludhiana	HYD	Hisar
BL-1	9.2	0.14	0.5	-	R	5.2	R
UPC-5286	15.3	0.00	0.0	-	R	4.2	R
MFC-09-1	12.2	0.00	0.0	-	R	3.0	R
RR-3	8.2	0.28	0.25	-	R	2.5	R
UPC-622	7.3	-	0.0	-	-	1.4	-
BL-2	10.2	0.00	-	-	R	4.2	R
UPC-9202	12.4	-	-	-	-	2.5	-

2.2. Pearl Millet

In IVT, all the entries were found resistant to leaf spot at Bhubaneswar, however at Jhansi, AVKB-19, NDFB-926 and APFB-09-1 showed moderately resistant reactions against leaf spot (table PPT 2.2.1).

In AVT-1, all the entries were resistant and moderately resistant to leaf spot at Bhubaneswar and Hisar, respectively. The population of leaf defoliator was also less at Bhubaneswar (Table PPT 2.2.2 & 2.2.3).

In AVT-2, all the entries showed resistance to downy mildew at Ludhiana. Entries Raj Bajra-2 and PAC-981 were found moderately resistant to leaf spot at Ludhiana, NDFB-904 and RBB-1 were resistant to leaf spot at Jhansi however all the entries were resistance to moderately resistance to leaf spot at Hisar. (Table PPT 2.2.3).

In AVT- 2 (seed), variety PAC-981 did not show downy mildew symptom throughout the season. Rests of the varieties were also resistant at Ludhiana. PAC-981 and NDFB-904 were found resistance to moderately resistance for ergot and smut severity at Ludhiana.

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

Entries	Leaf spot (1-5 scale)			Leaf Defoliators (No./ 10 plants)
	Hisar	Jhansi	Bhubaneswar	Bhubaneswar
AFB-8	3	2.0	1.0	0.8
RBB-3	3	2.2	1.4	1.2
NDFB-936	3	1.8	1.0	1.0
Raj Bajra-2	2.3	2.8	1.4	1.0
Giant Bajra	1.6	3.0	1.6	0.8
AVKB-19	3	1.4	1.2	1.2
HFP-11-4	3	2.0	1.4	1.4
APFB-09-1	3.6	1.6	1.2	1.0

Table PPT 2.2.2. Screening for disease and pest resistance in Pearl Millet- AVT- 1

Entries	Leaf Defoliators (No./ 10 plants)	Leaf spot & blight (*Helminthosporium* sp.) (1-5 scale)	
	Bhubaneswar	Bhubaneswar	Hisar
Raj Bajra-2	0.8	1.5	3
Giant Bajra	1.0	1.2	3
AVKB-19	1.0	1.0	3
RBB-2	0.8	1.4	3
AFB-6	1.2	1.2	3

Table PPT 2.2.3. Screening for diseases and pest resistance in Pearl Millet – AVT -2

Entries	Shoot Fly %	Leaf Spot (1-5 scale)				Leaf Defoliators (No./ 10 plants)	Downy mildew
	Jhansi	Jhansi	Ludhiana (%)	Hisar	Bhubaneswar	Bhubaneswar	Ludhiana
Raj Bajra-2	6.2	3.0	23.0	3	1.4	1.2	0.0
Gaint Bajra	7,3	2.8	33.5	3	1.0	1.0	0.1
PAC-981	9.2	2.2	15.5	1.5	1.2	1.2	0.0
RBB-1	6.4	1.8	33.0	3	1.0	0.8	0.0
NDFB-904	8.6	1.6	33.3	-	No germination	No germination	0.0

Table PPT 2.2.4. Screening for diseases and pest resistance in Pearl Millet - AVT-2 (Seed)

Entries	Ergot severity	Smut severity	Downy mildew incidence (%)	Leaf spot intensity (1-5 scale)			Leaf Defoliators (No./10 plants)
	Ludhiana		Ludhiana		Hisar	Bhubaneswar	Bhubaneswar
Raj Bajra-2	5.00	35.00	1.68	31.50	3	1.2	1.0
Gaint Bajra	11.25	55.00	0.95	27.00	3	1.0	0.8
PAC-981	3.75	17.50	0.00	28.50	1	0.8	1.0
RBB-1	43.75	18.75	1.37	16.00	3.5	1.0	1.2
NDFB-904	15.00	17.50	0.21	20.50	-	No germination	No germination

2.3 Maize

In IVT, All the entries were found susceptible to moderately susceptible for maydis leaf spot at Ludhiana. All the entries were found resistant to moderately resistant for leaf blight at Hisar, Palampur and Bhubaneswar. All the entries showed resistance for mosaic virus and the population of leaf defoliators ranges 1.0 -1.6 / 10 plants at Bhubaneswar (table PPT 2.3.1). Stem borers were also recorded at Rahuri centre in varietal as well as hybrid maize.

In hybrid trials, all the entries were found moderately resistance except African Tall and REHF-2011-9, which were moderately susceptible at Ludhiana for maydis leaf spot (Table PPT 2.3.2). Entries, African Tall, J 1006, DHM-117, REHF-2011-8 and REHF-2011-9 were found resistance for leaf blight at Hisar and Bhubaneswar while all the entries were moderately resistance except DHM-117 which was susceptible for leaf blight at Palampur.

Table PPT 2.3.1. Screening for diseases and pest resistance in Initial Varietal Trial on Maize

Entries	Maydis leaf spot (%)	Maize leaf blight (*T. turcicum*) (1-5 scale)			Maize mosaic (Virus) (1-5 scale)		Leaf defoliators (No./10 plants)	Stem borer
	Ludhiana	Hisar	Palampur	Bhubaneswar	Bhubaneswar	Jhansi	Bhubaneswar	Rahuri
African Tall	50.67	1.6	3	1.2	0.50	1.6	1.5	2.3
J 1006	38.00	1.6	3	1.0	1.2	1.2	1.2	2.0
AFM-1	32.33	1	3	1.0	1.0	1.8	1.4	1.3
AFM-2	41.33	1.6	3	1.8	0.75	2.0	1.6	1.9
Filler-1	34.67	1	3	1.6	0.50	1.6	1.4	1.0
Filler-2	30.33	2.3	3	1.2	1.0	1.2	1.2	2.2
PFM-7	41.00	1	2	1.4	0.75	1.0	1.0	0.8

Table PPT 2.3.2. Screening for diseases and pest resistance in Initial Hybrid Trial on Maize

Entries	Maydis leaf spot (%)	Maize leaf blight (*T. turcicum*) (1-5 scale)			Maize mosaic (Virus) (1-5 scale)		Leaf defoliators (No./10 plants)	Stem borer
	Ludhiana	Hisar	Palampur	Bhubaneswar	Bhubaneswar	Jhansi	Bhubaneswar	Rahuri
African Tall	35.75	1	3	1.0	1.0	1.6	1.6	2.1
J 1006	14.75	1	3	1.2	1.4	1.4	1.4	4.3
DHM-117	14.00	1	4	0.8	1.6	2.0-	1.5	2.3
IHTFM	19.75	2	3	1.4	1.0	1.3	1.2	3.9
PMH-1	13.50	3	3	1.0	1.2	1.2	1.6	5.9
PMH-3	13.00	2	3	1.2	1.5	1.6	1.0	2.6
REHF-2011-8	16.75	1	3	1.0	1.4	1.2	0.8	7.3
REHF-2011-9	27.75	1	3	1.4	1.6	1.4	1.4	6.3

2.4 Soybean

In AVT 2 for seed all the entries showed less than 10% incidences of YMV at Hisar. Leaf blight and mosaic incidences did not occurred at Jhansi (Table 2.4.1).

Table PPT. 2.4.1. Screening for pest resistance in Soybean- Advance Varietal Trial-2 (Seed)

Entries	Hisar	Jhansi			
	YMV	Girdle beetle % Severity	YMV	*Meloidogyne* spp.	
				RKI	Reaction
JS07-21-7	1	0	0	-	-
JS07-24-13	1.8	0	0	-	-
JS07-24-1	1	0	0	-	-
JS07-24-8	1.4	0	0	-	-

2.5 Ricebean

In IVT and AVT, all entries were found resistant to leaf blight at Bhubaneswar. Least flea beetles (9.5 /plant) were recorded in KRB 26 at Bhubaneswar (Tables PPT 2.5.1 & 2.5.2). Infestation of Flea beetle was maximum in entry RR-3 (16.1 holes/plant) at Bhubaneswar.

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

Entries	Leaf blight		Flea beetle (No. of holes/plant)
	Bhubaneswar	Jhansi	Bhubaneswar
JRBJ-06-2	0.25	0	20.5
JRB-17	0.50	0	11.3
KRB 26	0.25	0	9.5
K-1 (Bidhan-1)	0.12	0	14.8
Bidhan-2	0.75	0	17.2
RBL-6	0.50	0	23.4
BFRB-17	0.12	0	15.6

Table PPT. 2.5.2. Screening for pest resistance in Rice bean – AVT-2 and AVT -2 Seed

Entries	AVT -2			AVT -2 Seed		
	Leaf blight (1-5)		Flea beetle (No. of holes/plant)	Leaf blight (1-5)		Flea beetle (No. of holes/plant)
	Bhubaneswar	Jhansi	Bhubaneswar	Bhubaneswar	Jhansi	Bhubaneswar
BFRB-15	0.25	0	12.0	0.25	0	12.5
JRBJ-05-4	0.50	0	10.5	0.50	0	14.0
K-1 (Bidhan-1)	0.25	0	18.2	0.25	0	20.5

PPT.7A. Validation of effective treatment for the management of diseases in fodder maize

Locations: (Ludhiana and Palampur)

The trial was conducted in paired plot design consisting of 2 treatments *viz.*, T1: Seed treatment with Vitavax powder (2 g/kg) seed followed by two sprays of mancozeb (0.25 %) and T2: Untreated control at Palampur and Ludhiana.

Protected treatment showed least leaf blight severity (7 & 22.4 %) as compared to control (29.7 & 36.6%) at both the locations. Palampur provided superior control of the brown spot (4.8%) and banded leaf blight (1.2%). Similarly the above treatment also showed higher GFY (316 and 307.69 q/ha) as compared to control. At Jhansi, the results revealed that high degree control of all diseases was achieved in protected treatment. There was considerable increase in GFY at both the locations (table PPT-7.1).

Table PPT. 7.1 Per cent disease severity (%) and Green fodder yield (q/ha)

Treatment	Leaf Blight		Brown Spot	Banded Leaf Blight	Green fodder yield	
	Ludhiana	Palampur	Palampur	Palampur	Palampur	Ludhiana
T1	22.4	7.0	4.8	1.2	316.8	307.7
T2	36.6	29.7	28.0	5.3	299.6	256.4

PPT. 9A: Validation of effective treatment for the management of shoots fly in forage sorghum
Locations: (Anand, Hyderabad, Jhansi and Rahuri)

The trial was conducted in paired plot design consisting of 2 treatments viz., T1: Seed treatment with Thiomethoxam (2g/kg); T_2: Untreated control.

Seed treatment with thiomethoxam significantly reduced the shoot fly incidence and increase the forage yield. Maximum reduction was obtained at Rahuri (8.7%) followed by Hyderabad (10.4%) and Jhansi (14.4%) in T_1 against 43.6, 36.8 and respectively in untreated control. The same treatment yielded maximum GFY and DMY at all the centers.

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

Treatment	Shoot fly (% infestation)			GFY (q/h)			DMY (q/h)		
	Jha-nsi	Hydera-bad	Rah-uri	Jha-nsi	Hydera-bad	Rah-uri	Jha-nsi	Hydera-bad	Rah-uri
T_1: ST + Thiamethoxam	14.4	10.4	8.8	335	251.9	498.5	79.4	57.9	109.6
T_2: Untreated	22.2	36.8	43.7	300	185.2	436.5	68.6	41.6	96.0

PPT. 10. Management of root rot disease in cowpea
Location: (Bhubaneswar)

The experiment was conducted in second year with seven different treatments viz., T_1 = Seed treatment (ST) with Trichoderma viride (5g/kg) seed + FYM (2 tons/ha), T_2 =Seed treatment (ST) with *Pseudomonas fluorescens* (5g/kg) seed+ FYM (2 tons/ha), T_3 = Seed treatment with Neem Seed kernel powder (50 g/kg) seed, T_4 = Seed soaking in solution of gum of Asafoetida (0.4 %) for 4 hours, T_5 = Seed treatment (ST) with Carbendazim (2 g/Kg) seed, T_6 = Soil drenching with 3 % pitcher compost at the time of sowing and T_7 = Untreated control. All the treatments were significantly effective for reducing root rot disease incidence and increase in green forage yield, dry matter yield and net monetary return as compared to untreated control plot. However, among different treatments, Seed treatment (ST) with Trichoderma viride (5g/kg) seed + FYM (2 tons/ha) and Seed treatment with Carbendazim (2 g/Kg) seed were found to be superior in respect to lowest root rot incidence (37.5 & 36.3%), with maximum green forage yield (128.6 &128.3 q/ha), dry matter yield (94.1 & 93.7 q/ha) and net monitory return (7458 & 7183 Rs/ha/yr) as compared to the untreated control (Rs.3794 Rs/ha/yr.).

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

Treatments	Percent disease incidence	GFY (q/ha)	DFY (q/ha)	Net monitory return (Rs/ha/year)
T_1: Seed treatment (ST) with *Trichoderma viride* + FYM	37.5	128.6	94.1	7458
T_2: ST with *Pseudomonas fluorescens* + FYM	40.63	116.2	84.1	6507
T_3: Seed treatment with Neem Seed kernel powder	43.13	110.5	80.8	5747
T_4: Seed soaking in solution of gum of Asafoetida (0.4 %) for 4 hours	46.25	100.5	73.3	5126
T_5: ST with Carbendazim	36.25	128.3	93.7	7183
T_6: Soil drenching with 3 % pitcher compost	42.5	114.9	83.6	6320
T_7: Untreated control	54.38	77.43	56.7	3794
CD (5%)	6.54	19.66	15.15	1051

PPT.13. Effect of foliar diseases and insect pests on quality parameters of forage cowpea
Locations: (Anand, Hyderabad, Ludhiana, Palampur and Rahuri)

Qualitative losses due to the pest incidences in forage cowpea was evaluated in trial consisting of two treatments *viz.*, protected and unprotected. The protection of the crop was done by applying seed treatment with imidacloprid 70WS (5g /kg) + carbendazim (2g /kg) 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. At all the locations there was increase in the quality parameters and decrease in the anti-quality factors in cowpea fodder (Table PPT.13.1).

Anand: Root rot, bacterial leaf blight, Anthracnose and mosaic incidence was also less in protected as compared to unprotected treatment at harvest. Jassids, white fly, Holiothis, Semilooper and leaf minor were also less as compared to unprotected (table PPT-13.1). Quality of healthy and mosaic infected plants was tested before harvest. In healthy plants crude protein, IVDMD, Ca, K and CHO was more whereas ADF and NDF were high in diseased plants. Chla, Chlb and total chlorophyll mg/g tissue was more in healthy than in mosaic infected plants (Table PPT-13.2).

Table PPT.13.1. Foliar diseases and Insect/pests on forage cowpea at harvest

Diseases	**Protected**		**Unprotected**	
	At 30 DAS	**50 % flowering stage/ at harvest**	**At 30 DAS**	**50 % flowering stage/ at harvest**
Root rot (%)	1.75	2.28	5.25	11.76
Bacterial leaf blight (%)	0	2.75	2.35	7.15
Anthracnose (%)	0	3.78	3.86	12.36
Yellow mosaic virus (%)	0	1.10	2.71	7.50
Insect/ Pests	Insect population/10 plants			
	Protected		Unprotected	
	At 30 DAS	50 % flowering stage/ at harvest	At 30 DAS	50 % flowering stage/ at harvest
Jassid	28	18	36	25
White fly	20	12	25	21
Holiothis	10	14	23	17
Semi looper	08	07	16	12
Leaf minor	03	08	05	10

Table PPT. 13.2. Quality parameters of forage cowpea

Treatment	**DM (%)**	**CP (%)**	**NDF (%)**	**ADF (%)**	**Hemicell (%)**	**Chl a. Mg/g**	**Chl b.**	**Total Chl**
T1:Protected	16.3	13.27	57.7	47.5	10.2	2.87	2.74	6.1
T2: Un-protected	15.1	12.3	61.0	49.9	11.1	2.75	2.35	5.3

Treatment	**IVDMD (%)**	**CP (%)**	**K %**	**Ash**	**T. Phenol**	**Ca%**	**CHO (g/100g)**	**Yield in q/ha GFY**	**DMY**
T1 :Protected	61.67	6.74	1.71	8.11	0.52	1.03	6.90	372	60.64
T2: Un-protected	58.20	5.43	1.57	9.22	0.66	0.99	5.92	348	52.55

Ludhiana: Root rot incidence was not observed in protected treatment and the sucking pests per leaf, mosaic incidence was also less. Quality of healthy and mosaic infected plants was tested before harvest. In healthy plants crude protein, IVDMD, Total phenols and ash was more whereas ADF and NDF were high in diseased plants. Chla, Chlb and total chlorophyll mg/g tissue was more in healthy than in mosaic infected plants (Table PPT-13.4).

Table PPT.13.3. Foliar diseases, Insect/pests, GFY and DFY on forage cowpea at harvest

Treatments	No. of sucking pests/leaf	Mosaic incidence (%)	Root rot incidence (%)	GFY (q/ha)	DMY (q/ha)
T1: Protected	0.67	5.99	0.00	239.56	50.00
T2: Un-protected	1.33	6.61	0.52	201.06	46.67

Table PPT. 13.4. Quality parameters of forage cowpea

Treatments	Crude Protein	IVD MD	ADF	NDF	ASH	Total Phenol	Chl a Content (mg/g tissue)	Chl b Content (mg/g tissue)	Total Chl (mg/g tissue)
T1:Protected	18.02	59.2	32.3	43.0	7.4	0.40	9.7	12.3	22.65
T2: Un-protected	16.80	58.4	33.2	45.6	6.6	0.52	3.4	2.70	6.88

Hyderabad & Rahuri: The incidence of YMV was minimum in protected plots. The population of Aphids, Jassids and flea beetles were very low in protected plots as compared to unprotected at Hyderabad and Rahuri GFY and DFY were increased at both the centers (Table PPT-13.5). In healthy plants crude protein, Ca, K and total phenol was more whereas ADF and NDF were high in diseased plants. Chl a, Chlb and total chlorophyll (mg/g tissue) was more in healthy than in mosaic infected plants.

Table PPT.13.5. Foliar diseases, Insect/pests, GFY and DFY on forage cowpea at harvest

Treatments	Aphids (insects/plant)		Jassids (/leaf)	YMV	Flea beetle (holes/plant)	GFY (t/ha)		DMY (t/ha)	
	Hyderabad	Rahuri	Rahuri		HYD	HYD	Rahuri		Hyderabad
T1:Protected	5	0.0	0.48	1.7	17	4.96	2.85	0.48	0.66
T2: Un-protected	181	20.1	2.9	4.5	87	3.02	1.80	0.32	0.38

HYD = Hyderabad

Table PPT. 13.6. Quality parameters of forage cowpea

Treatments	Crude Protein (%)	Ca (%)	K (%)	ADF (%)	NDF (%)	ASH (%)	Total Phenol	Hemicel lulose (%)	Chl a Content (mg/g tissue)	Chl b Content (mg/g tissue)
T1: Protected	18.4	2.2	1.0	25.2	32.2	8.8	175.2	7	2.0	0.56
T2: Unprotected	16.6	2.1	0.7	23.6	32.0	8.2	150.6	8.4	1.0	0.27

Palampur: Root rot, bacterial leaf blight, mosaic incidence and number of sucking pests was very less in protected as compared to unprotected treatment at harvest (table PPT-13.7). Quality of healthy and mosaic infected plants was tested before harvest. In healthy plants crude protein (18.95%), IVDMD (62.46%), Ca (18.9%), K (146.8%), Ash (4%) and CHO (4.3%) was more whereas ADF, total phenol and NDF were high in diseased plants. Chla, Chlb and total chlorophyll (mg/g tissue) was more in healthy than in mosaic infected plants. Total yield was high (60.3 q/ha) in protected plots Table PPT-13.8).

Table PPT.13.7. Foliar diseases and Insect/pests on forage cowpea at harvest

Diseases	Protected		Unprotected	
	At 30 DAS	50 % flowering stage/ at harvest	At 30 DAS	50 % flowering stage/ at harvest
Wilt root rot incidence (%)	10.6	16.8	21.4	41.7
Bacterial leaf blight (%)	6.9	20.1	19.6	46.0
Yellow mosaic virus (%)	1.1	3.0	2.8	9.8
No of sucking pests /leaf	0.3	2.1	0.7	4.6

Table PPT. 13.8. Quality parameters of forage cowpea

Treatment	DM (%)	CP (%)	NDF (%)	ADF (%)	Hemicell (%)	Chl a. (mg/g)	Chl b.	Total Chl
T_1: Protected	39.22	18.95	62.46	53.86	8.6	0.426	0.294	0.720
T_2 Un-protected	37.98	15.74	63.53	56.13	7.4	0.437	0.366	0.804

Treatment	IVDMD (%)	CP (%)	K %	Ash	T. Phenol	Ca %	CHO (g/100g)	Yield in q/ha
T_1 Protected	62.46	6.41	146.8	4.0	0.56	239.2	4.3	60.3
T_2 Un-protected	61.46	6.99	131.8	3.9	0.64	206.0	3.6	49.9

PPT: 14 Management of foliar diseases of forage sorghum.
Location: Palampur, Ludhiana, Bhubaneswar and Jhansi

In first year, 10 treatments were applied for management of foliar diseases of sorghum namely, T_1 = Seed treatment with Carbendazim (2 g/kg) seed, T_2 = Seed treatment with *T. viride* (5g/kg) seed, T_3 = Two foliar sprays of *T. viride* (0.5%), T_4= Two foliar sprays of propiconazole (0.1%), T_5 = Two foliar sprays of Copper oxychloride (0.3 %), T_6 = Seed treatment with Carbendazim (2 g/kg) seed + Two foliar sprays of Propiconazole (0.1), T_7 = Seed treatment with *T. viride* (5g/kg) seed + Two foliar sprays of Propiconazole (0.1 %), T_8 = Seed treatment with Carbendazim (2 g/kg) seed + Two foliar sprays of Copper oxychloride (0.3%), T_9 = Seed treatment with *T. viride* (5g/kg) seed + Two foliar sprays of Copper-oxychloride (0.3 %) , T_{10} = Untreated control.

Bhubaneswar: All the treatments were significantly effective to reduce disease incidence and severity and to increase the green forage yield compared to untreated/ control plot. However, among different treatments lowest disease incidence as well as highest forage yield were recorded in T_6 Seed treatment with Carbendazim (2 g/kg) seed + Two foliar sprays of Propiconazole (0.1%), T_7 Seed treatment with *T. viride* (5g/kg) seed + Two foliar sprays of Propiconazole (0.1 %) and T_8 Seed treatment with Carbendazim (2 g/kg) seed + Two foliar sprays of Copper oxychloride (0.3%).

Jhansi: All the treatments were found effective in reduction of disease incidences and increase in GFY (Table PPT-14.1). The most effective treatment was T_6 Seed treatment with Carbendazim (2 g/kg) seed + two foliar sprays of Propiconazole (0.1%), which reduced the disease incidence to 1.6 against 3.6 in untreated control. However, maximum GFY (332.5q/ha) was obtained in T-3 against untreated control (240.0q/ha).

Ludhiana and Palampur: Seed treatment with Carbendazim + two foliar sprays of Propiconazole 0.1% showed the least blight severity (20.1 and 17.7%) followed by two foliar spray of Propiconazole (23.3 and 21.7%), respectively. The green fodder yield was also more in these treatments as compared to control.

Table PPT 14.1. Efficacy of foliar spray on foliar diseases and green fodder yield of forage sorghum Ludhiana and Palampur

Treatments	Leaf blight severity	Leaf blight incidence		GFY (q/ha)	
	Bhubaneswar	Bhubaneswar	Jhansi (1-5 Scale)	Jhansi	Bhubaneswar
T1	8.36	41.66	2.6	250.0	260.83
T2	9.36	48.33	2.3	315.0	249.16
T3	7.70	38.33	3.0	332.5	264.16
T4	4.63	28.33	2.3	325.0	294.16
T5	5.53	36.66	3.3	282.5	274.16
T6	2.63	16.66	1.6	307.5	312.91
T7	3.36	20.00	2.3	315.0	303.33
T8	4.76	25.00	2.6	290.0	298.33
T9	5.23	30.00	3.3	282.5	279.16
T10	17.50	65.00	3.6	240.0	221.66
CD (p=0.05)	2.8198	7.1682	0.8216	9.2146	15.143

Table PPT 14.2. Efficacy of foliar spray on foliar diseases and green fodder yield of sorghum

Treatments	Leaf blight severity (%)		Green Fodder Yield (q/ha)	
	Ludhiana	Palampur	Ludhiana	Palampur
T1	34.17	35.0	591	268.3
T2	57.72	41.7	550	251.7
T3	50.32	40.0	547	244.7
T4	23.32	21.7	641	292.0
T5	50.14	68.3	528	234.0
T6	20.21	17.7	633	303.0
T7	20.32	23.3	628	301.7
T8	51.06	71.7	514	240.3
T9	52.54	63.3	520	235.0
T10	64.39	80.0	595	230.3
CD (p=0.05)	**6.15**	**3.49**	**NS**	**12.6**

T1: Seed treatment with carbendazim 2g/kg seed, **T2:** Seed treatment with *T.viride* 5g/kg seed
T3: Two foliar sprays of *T. viride* 0.5%, **T4:** Two foliar sprays of propiconazole 0.1%
T5: Two foliar sprays of copper oxy chloride 0.3%, **T6:** T1 + two foliar sprays of propiconazole 0.1%
T7: T2 + two foliar sprays of propiconazole 0.1% , **T8:** T1 + two foliar sprays of copper oxy chloride 0.3%
T9: T2 + two foliar sprays of copper oxy chloride 0.3%, **T10:** Control

CHAPTER-4

BREEDER SEED PRODUCTION

BREEDER SEED PRODUCTION IN FORAGE CROPS (KHARIF-2012)
(Table Reference: BSP1 & BSP2)

In Kharif-2012, the indent for Breeder Seed Production was received from DAC, GOI for 31 varieties in six forage crops *viz*., Maize, Cowpea, Pearl Millet, Sorghum, Guar and Ricebean. The total indent for breeder seed production was 221.55 q however; the actual allocation of 177.75 q was made to thirteen SAUs/ICAR/NGO institutes. Among quantity allocated for different forage crops, the maximum was for Maize (99.38q) followed by Sorghum (32.85q), Cowpea (28.95q), Guar (8.40q), Pearl Millet (5.47 q) and minimum was for Ricebean (2.70q) which indicates, substantial demand for Maize, Sorghum and Cowpea at national perspective.

The final Breeder Seed Production Report (BSP-IV) received from different seed producing centers revealed that in crops such as Maize, Sorgum and Pearl Millet, the overall breeder seed production was higher with respect to allocated quantity whereas in crops like Cowpea, Guar and Ricebean, the breeder seed production was less than the allocated quantity. Coming to the crop wise scenerio, as compared to allocation in Maize, the production was 109.25q (9.87 q surplus), in Sorghum production was 73.64 q (40.79 q surplus) and in Pearl Millet the production was 9.22q (3.75q surplus). However in Cowpea, the production was 13.72q (15.23q deficit) against the allocation of 28.95q. Silmilarly in Guar, there was 3.00q deficit in production with respect to 8.40-q allocation and in Ricebean; against the allocation of 2.70q the actual production was 2.25q (0.45q deficit). The overall breeder seed production was 213.48q against the allocation of 177.75q, which was 35.73q surplus or 20.10 percent higher than the quantity allocated.

The allocation and production of Sorghum Variety Punjab Sudex Chari-1 could not take place due to hybrid nature of variety and in other Sorghum variety, *i.e.* Pusa Chari-23 the indent was 55.80q but the producing institute was ready for taking allocation to only 15.00 q. Some of the reason for less production of breeder seed in certain varieties was due to damage of crop, poor seed setting, due to pollen wash, damage by bird etc.

Table BSP1: Centre –wise Breeder Seed Production (q)

Sl. No.	Name of Producing Centre/State	Name of Variety	Crop	DAC Indent	Actual allocation	Actual production	Production Surplus (+) /Deficit (-)
1.	BAIF, Urilikanchan, Maharashtra	African Tall	Maize	25.20	25.20	26.40	(+) 1.20
2.	MPKV, Rahuri, Maharashtra	African Tall	Maize	37.85	37.85	37.85	-
3.	PAU, Ludhiana, Punjab	J-1006	Maize	31.33	31.33	40.00	(+) 8.67
		Punjab Sudex Chari-1*	Sorghum	3.00	Nil	Nil	-
		CL-367	Cowpea	1.90	1.90	0.12**	(-) 1.78
		FBC-16	Pearl millet	2.60	2.60	4.00	(+) 1.40
		PCB-164	Pearl millet	1.25	1.25	1.50	(+) 0.25
		Guara-80	Guar	0.20	0.20	0.20	-
		Ageta Guara-112	Guar	0.20	0.20	0.20	-
4.	GBPUAT, Pantnagar, Uttrakhand	UPC-625	Cowpea	3.80	3.80	2.00	(-) 1.80
		UPC-628	Cowpea	4.50	4.50	1.50	(-) 3.00
		UPC-5287	Cowpea	6.00	6.00	3.00	(-) 3.00
		Pant Chari-6	Sorghum	3.45	3.45	4.00	(+) 0.55
		Pant Chari-5	Sorghum	1.50	1.50	3.00	(+) 1.50
5.	IGFRI, Jhansi, Uttar Pradesh	EC-4216	Cowpea	9.15	9.15	5.00***	(-) 4.15
		Bundel Lobia-2	Cowpea	2.10	2.10	0.60***	(-) 1.50
		Bundel Guar-1	Guar	3.00	3.00	3.00***	-
		MP Chari	Sorghum	5.00	5.00	55.00***	(+) 50.00
6.	IARI RRS, Karnal, Haryana	Pusa Chari-23	Sorghum	55.80	15.00	2.52****	(-) 12.48
		Pusa Chari-6	Sorghum	1.80	1.80	2.60	(+) 0.80
		Pusa Chari-615	Sorghum	1.00	1.00	0.92	(-) 0.08
7.	RAU, Bikaner, Rajsthan	RBC-2	Pearl millet	0.20	0.20	2.00	(+) 1.80
8.	IGFRI, RRS, Avikanagar, Rajsthan	Avika Bajra Charti-19	Pearl millet	0.20	0.20	0.50	(+) 0.30
9.	MPUAT, Udaipur, Rajsthan	Pratap Makka Chari-6	Maize	5.00	5.00	5.00	-
		Pratap Chari 1080	Sorghum	3.00	3.00	3.00	-
10.	GAU, Anand, Gujarat	Gujarat Fodder Sorghum-5	Sorghum	1.10	1.10	1.10	-
11.	CCS HAU, Hisar, Haryana	HL-88 (CS-88)	Cowpea	1.50	1.50	1.50	-
		HC-20	Pearl millet	1.22	1.22	1.22	-
		HC-308	Sorghum	1.00	1.00	1.50	(+) 0.50
12.	ARS, Durgapura, Rajsthan	Guar Kranti	Guar	5.00	5.00	2.00	(-) 3.00
13.	BCKV, Kalyani	Bidhan-1	Ricebean	2.00	2.00	2.00	-
		Bidhan-2	Ricebean	0.70	0.70	0.25	(-) 0.45
		Total		**221.55**	**177.75**	**213.48**	

Remarks- *- Being a hybrid, breeder seed production is not possible, not taken for actual allocation **- crop damaged * - approx. pre-processing quantity ****- poor seed setting due to pollen wash, followed by bird damage**

Table BSP2: Variety -wise Breeder Seed Production (q)

Sl. No.	Varieties	Year of Notification	Actual allocation	Actual Production	Production Surplus (+)/ Deficit (-)
1.	**Maize** African Tall	1983	63.05	64.25	(+) 1.20
	J-1006	1992	31.33	40.00	(+) 8.67
	Pratap Makka Chari-6	2009	5.00	5.00	-
	Total		**99.38**	**109.25**	**(+9.87)**
2.	**Cowpea** CL-367	2006	1.90	0.12	(-) 1.78
	Haryana Lobia-88 (CS-88)	1997	1.50	1.50	-
	EC-4216	1978	9.15	5.00	(-) 4.15
	UPC-628	2010	4.50	1.50	(-) 3.00
	UPC-5287	1986	6.00	3.00	(-) 3.00
	UPC-625	2009	3.80	2.00	(-) 1.80
	Bundel Lobia-2	1994	2.10	0.60	(-) 1.50
	Total		**28.95**	**13.72**	**(-) 15.23**
3.	**Pearl Millet -** FBC-16	2007	2.60	4.00	(+) 1.40
	Raj Bajra Chari-2	1990	0.20	2.00	(+) 1.80
	PCB-164	2007	1.25	1.50	(+) 0.25
	Avika Bajra Chari-19		0.20	0.50	(+) 0.30
	HC-20	2002	1.22	1.22	-
	Total		**5.47**	**9.22**	**(+) 3.75**
4.	**Sorghum -** Pant Chari-6	2006	3.45	4.00	(+) 0.55
	Pant Chari-5	1999	1.50	3.00	(+) 1.50
	Pusa Chari-23	1985	15.00	2.52	(-) 12.48
	Pusa Chari-6	1980	1.80	2.60	(+) 0.80
	Pusa Chari-615	2006	1.00	0.92	(-) 0.08
	MP Chari	1978	5.00	55.00	(+) 50.00
	Punjab Sudex Chari-1*	1995	3.00	Nil (Hybrid)	-
	HC-308	1996	1.00	1.50	(+) 0.50
	Gujarat Fodder Sorghum-5	2005	1.10	1.10	-
	Pratap Chari-1080		3.00	3.00	-
	Total		**32.85**	**73.64**	**(+) 40.79**
5.	**Guar:** Ageti Guara-112	1983	0.20	0.20	-
	Guara-80	1983	0.20	0.20	-
	Bundel Guar-1	1993	3.00	3.00	-
	Guar Kranti	2003	5.00	2.00	(-) 3.00
	Total		**8.40**	**5.40**	**(-) 3.00**
6.	**Ricebean :** **Bidhan-1**	2001	2.00	2.00	-
	Bidhan-2	2001	0.70	0.25	(-) 0.45
	Total		**2.70**	**2.25**	**(-) 0.45**
Grand Total			**177.75**	**213.48**	**(+) 35.73**

***- Being hybrid, not included in allocation**

APPENDICES

APPENDIX –I: WEATHER REPORT FOR KHARIF-2012

The Weather parameters from 26th Standard Meteorological Week (June 25- July 01, 2012) to 44th Standard Meteorological Week (October 29- Nov. 04, 2012) were taken into consideration, which covers the *Kharif* 2012 season for all the testing locations for trial conduction [Table MET- 1.1 (a) to 1.4 (o)]. During the reporting period, weather variations are clearly visible in maximum and minimum temperature, rainfall, rainy days and sunshine hours in different zones, which have wide impact on growth parameters, yield and quality of different forage crops and their varieties. The weather parameters have also shown close correlation with the incidence and surveillance of insect-pest and diseases. Weather parameters influenced the establishment, growth and performance of different annual and perennial forage crops and their varieties.

Temperature: In Hill Zone, Srinagar remained the coolest location recording 1.0^{0}C during 44th SMW. Maximum temperature was recorded at Almora i.e. 34.9^{0}C during 26th SMW. The average minimum temperature over the season was recorded lowest at Srinagar. In North-West Zone, Hisar and Pantnagar recorded lowest minimum temperature (12.0^{0}C) during 44th SMW, whereas, maximum temperature was recorded at Bikaner (43.1^{0}C) during 27th SMW followed by Jaisalmer (42.5^{0}C) during 26th and 27th SMW. In North-East zone, Ranchi recorded the lowest minimum temperature (11.4^{0}C) during 44th SMW and maximum temperature was recorded at Faizabad (41.2 ^{0}C) during 26th SMW followed by Kalyani (35.8^{0}C) during 38th and 39th SMW. In Central Zone, Jhansi recorded the lowest minimum temperature (11.4^{0}C) during 44th SMW followed by Kanpur (11.9^{0}C) during the same week. The maximum temperature was recorded at Kanpur (42.5^{0}C) during 25th SMW followed by Jhansi (41.7^{0}C) during same week. The minimum fluctuation in maximum temperature over the season was at Urulikanchan and Rahuri locations. Urulikanchan recorded lowest minimum temperature over the season In South zone, the lowest minimum temperature was recorded at Dharwad (15.3^{0}C) during 43rd SMW followed by Hyderabad (16.7^{0}C) during 41st and 42nd SMW. The maximum temperature was recorded at Coimbatore (33.3^{0}C) during 38th and 39th SMW followed by Hyderabad (33.1^{0}C) during 26th SMW. Coimbatore experienced higher maximum temperature over the crop season as compared to other locations in the Zone.

Rainfall: About 80-90 percent rainfall in the country is mostly contributed through South-West Monsoon. This phenomenon is reflected in the data of rainfall and rainy days as in most of the locations, rains were received during this period. In Hill Zone, Palampur received highest rainfall (2014.2 mm) followed by Almora (723.2 mm), whereas, Srinagar received minimum rainfall (230.1mm). In North-West Zone, Pantnagar received highest rainfall (885.6 mm) in 37 rainy days followed by Jodhpur (435.1mm). Jaisalmer received lowest rainfall (110.5 mm) in just 14 rainy days followed by Bikaner (174.8 mm in 10 rainy days). In North East Zone, Jorhat received highest rainfall (983.2 mm) followed by Bhubaneswar (957.7mm) and lowest being with Faizabad (622.3 mm). Similarly the maximum number of rainy days was also recorded at Jorhat (79 days) followed by Bhubaneswar (70 rainy days) and lowest being with Faizabad (39 rainy days).

In Central Zone, maximum rainfall (1405 mm) was received at Raipur followed by Jabalpur (1143.5 mm) and lowest being with Urulikanchan (237.2 mm). Maximum number of rainy days was observed at Raipur (47 RD) followed by Jhansi (42 RD) and lowest being with Urulikanchan (18 RD). In South Zone, Hyderabad received maximum rainfall (703.7 mm) in 39 rainy days followed by Vellayani (488.8 mm in 39 RD) and lowest total rainfall was with Mandya (288 mm in 18 RD). In the same zone the well distribution of rainfall was observed at Hyderabad, Vellayani and Dharwad (evident from rainy days).

Relative Humidity: In hill Zone, the morning RH was highest at Almora (98.7% in 31st SMW and 97.8% in 40thSMW) followed by Palampur (97.6% and 97.0% in 31st and 34thSMW, respectively). Similar to morning RH, the lowest afternoon RH was also recorded at Almora (28.9%) during 44th SMW. In North-West Zone, RH ranged from 46.0 to 97.0% in morning hours and between 18.0 to 80.0% in afternoon. The lowest RH during morning hours was at Bikaner (46.0%) during 41stSMW, whereas, highest morning RH was recorded at Hisar (97.0%) during 34th SMW. In the same zone the maximum afternoon RH was recorded at Ludhiana and Hisar (80.0%) during 34th SMW.

In North-East Zone, maximum RH of 97.4% and 84.9% was recorded at Kalyani during morning and afternoon hours in 35th SMW and 31st SMW, respectively, whereas the minimum RH during morning and afternoon hours was recorded at Faizabad (66.8% and 30.2%) during 26th SMW. However, the average RH was recorded highest at Bhubaneswar (91.0%) during 31st SMW. In Central Zone, minimum RH (44.0%) was recorded at Jhansi during 26th SMW and maximum RH (100.0%) was observed at Urulikanchan centre during 36th and 40thSMW. At Urulikanchan RH in morning hours ranged between 87.9% to 100.0%. In South Zone, the maximum RH (94.7%) was recorded in the morning hours at Vellayani during 35thSMW. The minimum fluctuation in the morning RH was recorded at Mandya.

Sunshine hours: In Hill Zone, sunshine hours were recorded maximum at Palampur (9.9 and 9.6 h during 40th and 41st SMW, respectively) followed by Srinagar (9.5 h during 27th SMW). In the same zone, over the season the maximum sunshine were recorded highest at Srinagar followed by Palampur and lowest being at Almora. In North-West Zone, sunshine hours were recorded highest at Ludhiana (11.1 h) followed by Bikaner (10.3h). On mean basis Bikaner recorded maximum sunshine hours (7.7h) followed by Ludhiana (7.4h) and lowest being with Pantnagar (5.9 h). In North-East Zone, Imphal recorded maximum sunshine hours (9.5 h) followed by Ranchi (9.4 h). Maximum average sunshine hours were recorded at Ranchi (6.5 h) followed by Kalyani (5.6 h) and Faizabad (5.2 h) and lowest being with Bhubaneswar (4.1 h). In Central Zone, the maximum sunshine hours were recorded at Jhansi (10.2 and 10.1 h) followed by Anand (9.7 h). On mean basis the maximum sunshine hours was recorded at Jhansi (5.9 h) followed by Kanpur (5.3 h) and lowest being with Raipur (4.4 h). In South Zone maximum sunshine hours was recorded at Coimbatore (9.7 and 9.2 h) followed by Hyderabad (8.8 h). Whereas, on mean basis Mandya recorded maximum sunshine hours (6.3 h) followed by Coimbatore (5.5h) and lowest being with Hyderabad (4.7 h).

Table MET -1.1 (a): Temperature (^{0}C) during crop growth period, Kharif 2012

Met. Week	Hill Zone						North West Zone											
	Palampur		Almora		Srinagar		Ludhiana		Bikaner		Jodhpur		Jaisalmer		Hisar		Pantnagar	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	32.4	20.3	34.9	20.4	28.4	15.2	39.4	27.8	40.8	29.0	39.4	28.8	42.5	26.3	41.3	28.8	39.9	26.8
27	28.6	20.7	27.8	21.4	32.4	15.9	36.9	28.6	43.1	31.3	41.2	30.3	42.5	28.0	41.9	29.2	31.8	26.3
28	27.8	19.7	28.6	20.9	31.2	17.3	35.0	27.6	38.8	28.2	34.9	27.3	41.6	28.2	35.4	27.1	34.1	26.3
29	28.2	20.0	30.1	21.2	28.6	15.5	36.4	27.6	39.6	29.3	37.9	28.9	40.5	27.6	37.8	27.1	34.5	26.9
30	27.1	19.9	27.6	21.4	31.1	17.0	35.0	28.0	40.8	29.4	37.6	27.5	40.9	26.9	37.2	28.6	31.7	26.0
31	23.8	19.5	25.6	20.4	33.7	15.7	33.8	27.2	38.2	28.3	34.8	27.2	38.5	26.6	37.1	28.0	31.0	25.2
32	26.8	19.8	29.2	20.4	28.9	16.3	34.0	27.1	36.1	25.4	33.7	25.2	41.0	25.5	34.1	25.6	32.8	26.0
33	29.9	19.9	29.8	20.6	26.7	18.0	33.8	26.8	33.2	24.9	30.3	24.4	34.3	25.1	33.5	26.1	33.1	26.0
34	23.2	19.0	27.8	20.4	33.2	19.5	31.5	25.9	35.7	26.0	32.7	26.2	38.0	27.3	31.6	25.3	30.9	24.8
35	26.4	18.5	29.8	20.9	30.4	16.9	33.0	26.0	35.3	26.0	34.0	25.9	37.9	25.6	32.1	26.1	31.6	25.3
36	26.9	18.9	29.8	20.4	29.8	17.3	33.0	26.2	33.2	25.7	33.1	26.2	35.1	24.9	32.5	25.9	33.3	24.8
37	26.3	19.3	28.5	20.4	23.8	16.5	33.9	24.5	34.5	25.8	32.4	25.4	35.9	25.6	34.9	25.9	31.3	25.1
38	25.1	15.9	28.0	18.2	25.3	13.4	30.9	22.5	34.9	23.3	33.6	24.6	37.5	22.4	32.6	22.4	30.0	23.1
39	27.1	15.4	30.5	16.8	27.0	9.1	33.0	20.7	35.8	21.5	34.6	22.0	37.2	21.4	33.9	19.8	33.0	22.2
40	27.6	14.9	29.6	15.4	26.4	7.8	34.0	19.8	37.6	19.2	37.5	21.2	40.1	18.5	35.4	16.8	32.6	21.0
41	26.3	13.2	27.9	10.9	24.1	4.8	33.4	17.4	36.6	17.9	36.4	18.1	38.7	15.7	34.3	16.2	31.7	17.8
42	25.3	11.7	26.9	8.3	16.1	3.4	30.9	15.9	33.0	16.3	35.4	20.6	37.0	18.7	32.3	16.4	31.1	15.3
43	22.6	9.5	25.0	6.3	19.5	5.9	29.1	12.7	31.9	14.3	34.3	17.7	36.5	13.8	29.2	12.5	29.4	12.4
44	23.9	10.3	26.4	3.7	20.8	1.0	29.6	13.6	32.9	13.1	33.0	15.1			29.2	12.0	29.7	12.0

Table MET -1.1 (b): Temperature (^{0}C) during crop growth period, Kharif 2012

Met. Week	North East Zone											
	Faizabad		Imphal		Bhubaneswar		Kalyani		Jorhat		Ranchi	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	41.2	29.2	30.8	22.0	34.2	25.3	34.2	27.2			33.0	18.7
27	34.5	27.7	33.8	23.0	32.9	25.1	32.6	26.8	33.1	25.4	33.2	19.6
28	33.0	26.6	31.4	22.7	33.2	25.9	33.2	26.8	33.2	25.7	30.2	20.5
29	32.5	25.8	31.8	22.8	31.8	25.2	32.3	26.2	32.4	26.0	29.0	20.4
30	32.6	26.0	31.6	22.8	31.5	25.3	32.2	26.8	32.5	25.4	28.2	20.2
31	32.8	25.6	31.9	22.1	28.9	24.4	31.3	26.2	32.4	25.5	30.0	21.0
32	31.7	26.0	32.3	22.7	32.1	24.8	31.9	26.0	33.8	25.5	27.8	20.1
33	32.8	26.4	33.7	22.7	32.4	25.2	31.9	26.3	33.6	26.1	28.5	20.2
34	32.0	26.2	28.9	20.0	32.9	25.3	32.3	26.7	31.1	25.3	30.2	20.8
35	31.6	27.2	31.3	22.6	33.0	25.7	33.7	26.8	32.6	25.9	31.4	21.1
36	31.4	25.5	28.2	21.3	30.6	25.5	32.0	25.9	32.1	24.5	28.6	20.0
37	31.7	25.5	29.1	21.6	31.6	25.4	32.6	26.3	29.9	24.2	30.9	21.8
38	29.0	24.4	30.1	22.1	33.3	25.6	35.8	29.8	28.6	24.1	30.2	21.0
39	33.8	23.5	31.4	22.0	33.6	24.9	35.8	29.8	29.2	24.0	30.0	19.4
40	32.3	21.8	28.4	20.9	32.4	24.5	34.3	26.2	29.4	23.1	31.2	19.6
41	33.0	19.4	28.3	20.0	31.2	24.4	33.4	24.7	30.4	20.5	28.5	18.9
42	32.8	18.1	30.7	17.6	32.0	22.0	33.7	22.2	29.8	19.0	28.4	15.1
43	31.9	14.9	29.7	14.0	33.1	20.9	33.0	20.1	29.5	16.5	29.1	17.9
44	30.4	12.7	29.4	13.3	30.7	20.5	31.8	19.3			26.1	11.4

Table MET -1.1 (c): Temperature (^{0}C) during crop growth period, Kharif 2012

Met. Week	Central Zone													
	Kanpur		Urulikanchan		Anand		Rahuri		Raipur		Jabalpur		Jhansi	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	42.5	27.8	31.9	22.8	37.5	27.6	34.8	23.4	37.0	26.3	37.7	27.0	41.7	31.1
27	33.9	24.8	29.0	22.7	34.6	27.0	31.4	23.4	30.3	25.0	34.5	24.4	37.6	27.5
28	33.8	24.0	31.4	22.9	32.8	25.8	32.7	23.3	31.7	25.5	31.3	23.9	33.6	25.8
29	34.7	23.6	29.3	22.7	33.5	27.1	31.5	23.6	29.9	24.5	32.3	24.1	34.8	26.2
30	32.2	25.6	27.8	22.8	32.0	26.7	29.8	23.1	27.6	24.1	28.2	22.8	32.1	25.8
31	31.6	25.9	27.1	21.4	31.6	26.3	29.6	22.4	25.8	23.2	26.3	22.0	30.0	25.1
32	32.8	25.8	27.8	21.8	31.7	25.9	30.6	22.6	28.8	24.8	27.7	22.7	31.1	25.1
33	33.1	25.5	28.8	21.1	29.9	24.7	31.6	21.5	30.2	25.3	28.2	23.0	30.8	24.7
34	31.3	26.5	30.1	21.0	31.8	24.8	32.5	21.9	29.6	24.5	30.2	22.9	31.2	25.2
35	34.1	25.9	29.7	22.1	32.6	25.9	30.2	22.7	31.1	25.8	31.9	24.2	33.0	25.9
36	32.9	24.8	27.7	21.5	31.9	25.4	29.6	22.6	30.3	25.1	30.8	23.9	31.9	25.1
37	31.7	24.8	28.4	20.9	29.8	25.1	30.1	22.1	30.4	24.7	30.7	23.4	32.9	25.0
38	31.7	23.4	30.7	20.6	32.3	24.6	30.4	21.4	31.4	24.6	30.8	23.1	32.7	24.1
39	33.9	22.4	32.2	19.6	32.3	24.0	31.6	20.2	32.2	24.4	31.9	22.6	34.7	21.1
40	34.9	20.6	29.8	21.6	36.3	24.7	31.4	21.7	31.9	23.9	33.4	21.9	36.0	19.3
41	33.5	18.2	32.3	19.5	35.8	21.5	32.1	19.7	31.0	20.2	32.4	18.5	35.1	16.8
42	33.5	17.0	31.3	16.6	36.1	19.6	32.2	16.9	31.9	19.5	32.5	18.6	35.0	15.9
43	30.3	14.3	30.8	19.3	35.6	19.1	31.4	19.5	31.6	18.4	31.6	15.2	32.7	14.1
44	30.3	11.9	29.9	16.4	33.5	16.2	30.0	15.6	28.9	18.4	27.9	15.6	30.9	11.4

Table MET -1.1 (d): Temperature (^{0}C) at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	South Zone									
	Vellayani		Mandya		Coimbatore		Hyderabad		Dharwad	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
26	29.8	23.8	30.7	19.5	32.5	22.9	33.1	24.9	27.6	20.7
27	29.5	23.9	30.8	19.5	31.5	23.2	30.6	23.7	26.6	20.7
28	29.6	24.0	30.4	19.2	32.2	22.9	31.5	22.9	28.8	20.8
29	29.9	24.6	30.2	19.3	30.9	24.4	28.3	22.2	26.6	20.9
30	30.0	24.5	31.0	19.5	31.3	23.7	29.9	23.4	27.0	21.0
31	30.2	24.6	31.1	20.4	31.7	24.1	29.4	22.3	26.7	20.4
32	30.3	23.7	31.0	20.4	30.2	23.0	30.9	22.5	22.6	17.8
33	29.7	23.5	29.8	20.7	31.5	22.7	30.6	23.0	24.1	17.3
34	29.8	23.9	30.2	20.2	32.8	22.5	30.5	22.7	28.3	20.6
35	28.9	23.5	30.1	20.2	29.7	23.1	29.2	21.9	26.3	20.3
36	29.8	23.8	31.4	19.5	31.3	23.3	29.3	22.3	26.9	20.6
37	29.7	24.1	30.7	20.8	32.1	22.7	29.2	22.0	27.5	20.2
38	30.7	24.2	31.0	21.7	33.3	21.5	30.6	23.2	28.6	18.8
39	30.7	24.3	31.7	21.1	33.3	22.6	31.6	21.3	30.7	19.0
40	31.2	23.5	30.9	20.4	33.0	21.6	29.2	21.9	27.3	20.5
41	31.4	24.1	31.2	20.6	32.6	23.1	31.7	16.7	30.5	18.4
42	29.4	23.4	31.4	20.5	29.4	22.4	30.7	16.7	31.2	17.0
43	30.1	23.9	31.6	20.4	28.0	22.5	29.9	19.5	25.5	15.3
44	29.8	23.3	31.4	20.1	28.5	21.5	27.5	18.5	27.6	17.8

Table MET -1.2 (e): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	Hill Zone				North West Zone										
	Palampur	Almora		Srinagar	Ludhiana		Bikaner		Jodhpur		Jaisalmer		Hisar	Pantnagar	
	RF	RF	RD	RF	RF	RD	RF	RD	RF	RD	RF	RD	RF	RF	RD
26	31.4	0.0	-	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
27	156.8	51.5	5	1.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	2
28	99.6	115.5	5	0.0	10.6	0.0	0.0	0.0	11.2	1	0.0	0.0	26.6	52.0	3
29	71.8	47.0	3	20.8	1.6	0.0	0.0	0.0	0.0	0.0	7.5	2	50.0	13.4	3
30	317.8	75.0	6	8.2	44.8	2	0.0	0.0	0.5	0.0	0.0	0.0	0.0	177.8	4
31	376.0	111.5	7	2.2	11.4	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	202.8	4
32	104.6	18.5	5	29.0	24.3	3	37.8	2	83.5	4	16.0	2	98.3	64.8	3
33	107.7	116.0	4	28.4	56.4	4	44.0	2	138.4	4	42.0	4	12.3	7.4	1
34	326.8	26.2	5	1.8	40.2	3	7.0	1	40.4	2	0.0	0.0	171.9	110.0	5
35	33.0	20.5	5	1.0	40.7	5	17.0	1	67.5	3	16.0	2	0.0	67.8	3
36	114.8	15.0	1	67.4	18.8	2	69.0	4	53.6	2	26.0	4	8.6	15.0	3
37	110.3	85.0	4	42.0	93.4	4	0.0	0.0	40.3	2	0.0	0.0	17.0	87.4	4
38	134.0	35.5	2	17.0	27.1	2	0.0	0.0	0.2	0.0	3.0	0.0	7.3	66.6	2
39	7.4	3.5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	4.2	2.5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0
43	14.6	0.0	0.0	8.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0
44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0

Table MET -1.2 (f): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	North East Zone									
	Faizabad		Imphal	Bhubaneswar		Kalyani		Jorhat		Ranchi
	RF	RD	RF	RF	RD	RF	RD	RF	RD	RF
26	0.0	0.0	51.1	39.0	3	36.3	3			5.6
27	40.1	3	33.6	103.4	6	39.8	5	184.1	6	43.8
28	61.2	4	28.7	39.0	4	27.3	6	47.4	6	25.4
29	118.4	4	50.4	162.8	4	91.1	4	75.6	5	89.2
30	5.5	2	88.9	56.0	5	51.7	6	64.8	6	61.3
31	29.2	4	45.5	38.3	5	77.4	5	43.5	7	105.7
32	23.4	4	16.1	70.9	6	92.1	7	140.1	6	108.6
33	29.1	2	0.0	106.0	4	44.4	6	13.2	4	169.2
34	90.2	3	26.6	26.9	4	35.4	4	99.5	6	4.5
35	22.2	2	46.2	49.7	4	8.1	3	41.2	4	4.2
36	34.8	3	10.5	37.8	7	87.6	6	59.1	3	92.1
37	120.6	5	147.7	27.6	4	19.2	5	100.8	7	62.9
38	47.6	3	18.9	23.8	3	50.1	3	29.5	7	75.1
39	0.0	0.0	2.1	4.4	1	50.1	3	54.5	7	0.0
40	0.0	0.0	19.6	45.2	3	2.3	0.0	29.7	5	0.0
41	0.0	0.0	133.0	16.4	4	26.7	3	0.0	0.0	14.3
42	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0
43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	0.0	0.0	0.0	110.5	3	3.0	1			10.3

Table MET -1.2 (g): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	Central Zone													
	Kanpur		Urulikanchan		Anand		Rahuri		Raipur		Jabalpur		Jhansi	
	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD
26	3.5	0	38.0	1	2.6	0.0	2.2	0.0	21.8	2	0.0	0.0	0.0	0.0
27	273.8	4	0.0	0.0	76.8	2	43.4	4	72.9	4	296.8	3	34.4	2
28	34.3	4	0.0	0.0	131.4	5	4.8	1	73.6	2	116.0	4	48.4	2
29	19.4	2	2.4	0.0	46.3	1	3.6	1	341.4	6	117.5	3	117.8	4
30	52.6	5	0.0	0.0	2.2	0.0	1.0	0.0	60.3	3	119.9	5	100.8	5
31	66.4	4	35.2	3	5.2	1	23.6	2	271.1	7	32.4	4	92.4	4
32	38.7	3	8.8	3	15.1	2	0.8	0.0	106.8	3	145.8	5	124.4	6
33	31.1	2	0.0	0.0	255.2	4	0.0	0.0	33.2	1	101.8	5	31.2	2
34	11.1	1	6.3	1	30.6	4	0.0	0.0	127.6	3	84.4	4	40.4	4
35	4.8	1	29.2	2	68.9	2	31.4	2	55.6	3	3.0	0.0	20.8	4
36	23.8	2	16.0	4	160.2	5	60.2	2	74.4	3	52.2	3	41.4	5
37	87.1	4	2.0	0.0	54.3	4	15.0	2	42.6	3	87.4	2	42.4	3
38	2.0	0.0	0.0	0.0	0.0	0.0	69.0	2	84.4	3	11.0	1	14.0	1
39	0.0	0.0	33.4	2	29.8	1	0.0	0.0	2.8	1	0.0	0.0	0.0	0.0
40	0.0	0.0	65.9	3	0.0	0.0	118.6	5	9.2	1	2.3	0.0	0.0	0.0
41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	0.0	0.0	0.0	0.0	0.0	0.0	18.6	1	0.0	0.0	0.0	0.0	0.0	0.0
44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.3	2	0.0	0.0	0.0	0.0

Table MET -1.2 (h): Rainfall (RF, mm) and Rainy days (RD, No.) at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	South Zone									
	Vellayani		Mandya		Coimbatore		Hyderabad		Dharwad	
	RF	RD	RF	RD	RF	RD	RF	RD	RF	RD
26	30.0	2	2.2	0.0	0.2	0	36.0	3	13.2	2
27	37.0	2	0.2	0.0	2.1	0	24.7	1	29.2	3
28	31.5	3	2.2	0.0	3.5	1	36.0	3	8.0	1
29	16.0	1	7.0	2	21.7	2	186.2	5	48.4	4
30	11.5	1	1.5	0.0	0.0	0	14.7	2	24.8	2
31	0.0	0.0	0.0	0.0	0.5	0	7.2	2	19.6	2
32	3.0	1	2.8	0.0	6.8	1	17.9	3	40.2	3
33	85.0	5	0.4	0.0	0.1	0	4.0	0.0	14.4	1
34	2.5	0.0	29.8	2	13.4	1	56.6	2	7.6	2
35	98.0	6	4.3	0.0	6.6	2	13.7	2	15.8	4
36	28.5	3	10.6	4	0.6	0	43.1	3	26.0	4
37	14.0	3	0.0	0.0	0.4	0	27.2	2	4.8	1
38	9.0	1	2.4	0.0	0.0	0	13.6	2	1.2	0.0
39	0.0	0.0	103.0	3	5.1	1	29.0	2	51.8	3
40	0.0	0.0	0.0	0.0	0.0	0	45.3	4	43.2	2
41	19.3	3	46.5	2	74.6	2	0.0	0.0	37.6	1
42	53.5	2	24.3	3	83.8	2	13.6	1	0.0	0.0
43	37.5	4	0.0	0.0	5.8	0	0.0	0.0	8.4	1
44	12.5	1	50.8	2	13.0	1	47.0	2	34.5	1

Table MET- 1.3 (i): Relative humidity (M = Morning, AN = Afternoon, AV = Average; %) at AICRP-FC trial locations during Crop growth Period, Kharif 2012

Met. Week	Hill Zone								
	Palampur			Almora			Srinagar		
	M	AN	AV	M	AN	AV	M	AN	AV
26	61.0	49.6	55.3	73.4	53.0	63.2	74.0	49.7	61.9
27	81.0	82.3	81.7	90.9	79.4	85.2	77.6	39.4	58.5
28	88.6	80.9	84.8	91.4	73.3	82.4	76.9	52.3	64.6
29	85.9	76.4	81.2	92.1	70.4	81.3	80.4	55.0	67.7
30	94.4	86.9	90.7	93.5	80.8	87.2	86.7	49.7	68.2
31	97.6	94.3	96.0	98.7	88.7	93.7	81.0	42.1	61.6
32	95.4	82.9	89.2	91.6	72.6	82.1	83.7	57.0	70.4
33	96.0	88.7	92.4	93.6	70.9	82.3	87.6	62.9	75.2
34	97.0	93.7	95.4	96.7	74.4	85.6	81.6	48.9	65.2
35	96.4	86.1	91.3	92.9	61.0	77.0	79.6	49.3	64.4
36	95.9	79.4	87.7	89.9	63.9	76.9	82.9	53.6	68.2
37	94.3	88.1	91.2	93.4	67.7	80.6	94.3	78.6	86.4
38	93.0	81.1	87.1	94.0	66.7	80.4	90.3	71.4	80.9
39	82.6	66.6	74.6	94.8	46.7	70.8	90.0	54.3	72.1
40	74.6	60.9	67.8	97.8	57.4	77.6	86.1	50.3	68.2
41	62.7	48.0	55.4	8.4	41.1	24.8	87.9	42.3	65.1
42	65.4	49.1	57.3	95.3	35.4	65.4	88.1	67.3	77.7
43	75.3	49.7	62.5	89.3	35.2	62.3	85.9	59.7	72.8
44	69.9	52.9	61.4	91.9	28.9	60.4	89.0	48.6	68.8

Table MET- 1.3 (j): Relative humidity (M = Morning, AN = Afternoon, AV = Average;%) at AICRP-FC trial locations during Crop growth Period, Kharif 2012

Met. Week	North West Zone																	
	Ludhiana			Bikaner			Jodhpur			Jaisalmer			Hisar			Pantnagar		
	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV
26	63.0	39.0	51.0	64.0	24.0	44.0	63.0	31.0	47.0	71.3	39.4	55.4	57.0	30.0	43.5	72.0	37.0	54.5
27	70.0	53.0	61.5	50.0	26.0	38.0	61.0	33.0	47.0	71.6	38.6	55.1	73.0	42.0	57.5	84.0	71.0	77.5
28	79.0	56.0	67.5	65.0	37.0	51.0	77.0	56.0	66.5	74.1	45.6	59.9	83.0	60.0	71.5	86.0	61.0	73.5
29	73.0	52.0	62.5	61.0	30.0	45.5	67.0	38.0	52.5	70.0	50.1	60.1	75.0	52.0	63.5	85.0	61.0	73.0
30	82.0	67.0	74.5	59.0	29.0	44.0	70.0	42.0	56.0	69.6	37.9	53.8	80.0	52.0	66.0	88.0	75.0	81.5
31	80.0	67.0	73.5	62.0	34.0	48.0	69.0	45.0	57.0	63.4	36.6	50.0	73.0	48.0	60.5	90.0	75.0	82.5
32	88.0	72.0	80.0	77.0	49.0	63.0	86.0	66.0	76.0	66.7	41.0	53.9	89.0	75.0	82.0	90.0	70.0	80.0
33	86.0	72.0	79.0	88.0	61.0	74.5	91.0	70.0	80.5	64.4	41.1	52.8	90.0	66.0	78.0	87.0	70.0	78.5
34	89.0	80.0	84.5	75.0	50.0	62.5	82.0	60.0	71.0	67.3	53.6	60.5	97.0	80.0	88.5	91.0	78.0	84.5
35	91.0	69.0	80.0	88.0	50.0	69.0	89.0	67.0	78.0	73.4	40.0	56.7	93.0	71.0	82.0	89.0	71.0	80.0
36	81.0	69.0	75.0	88.0	67.0	77.5	85.0	65.0	75.0	61.0	42.3	51.7	87.0	66.0	76.5	83.0	62.0	72.5
37	89.0	63.0	76.0	84.0	56.0	70.0	90.0	69.0	79.5	83.6	50.7	67.2	88.0	65.0	76.5	92.0	74.0	83.0
38	93.0	68.0	80.5	72.0	37.0	54.5	83.0	49.0	66.0	72.1	53.7	62.9	89.0	55.0	72.0	93.0	74.0	83.5
39	94.0	48.0	71.0	68.0	31.0	49.5	76.0	35.0	55.5	83.7	43.0	63.4	82.0	41.0	61.5	89.0	62.0	75.5
40	90.0	44.0	67.0	48.0	18.0	33.0	65.0	25.0	45.0	72.7	37.0	54.9	78.0	29.0	53.5	88.0	57.0	72.5
41	91.0	41.0	66.0	46.0	18.0	32.0	70.0	21.0	45.5	75.1	39.0	57.1	81.0	29.0	55.0	85.0	50.0	67.5
42	90.0	44.0	67.0	69.0	29.0	49.0	62.0	28.0	45.0	63.6	42.4	53.0	86.0	46.0	66.0	87.0	39.0	63.0
43	90.0	45.0	67.5	58.0	24.0	41.0	58.0	18.0	38.0	77.1	54.7	65.9	92.0	40.0	66.0	91.0	35.0	63.0
44	92.0	42.0	67.0	53.0	28.0	40.5	57.0	18.0	37.5				94.0	39.0	66.5	88.0	35.0	61.5

Table MET- 1.3 (k): Relative humidity (M = Morning, AN = Afternoon, AV = Average;%) at AICRP-FC trial locations during Crop growth Period, Kharif 2012

Met. Week	North East Zone																	
	Faizabad			Imphal			Bhubaneswar			Kalyani			Jorhat			Ranchi		
	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV
26	66.8	30.2	48.5	87.4	73.6	80.5	92.0	77.0	84.5	92.3	73.3	82.8				83.7	57.9	70.8
27	83.0	67.5	75.3	86.9	66.0	76.5	95.0	81.0	88.0	92.9	80.1	86.5	91.6	70.7	81.1	82.1	54.6	68.4
28	91.2	78.3	84.8	89.4	71.3	80.4	95.0	81.0	88.0	95.6	79.6	87.6	93.1	75.4	84.3	84.9	69.0	76.9
29	87.8	71.8	79.8	88.9	67.6	78.3	93.0	83.0	88.0	95.1	83.1	89.1	94.1	77.4	85.8	83.6	68.1	75.9
30	91.4	69.7	80.6	90.0	78.9	84.5	94.0	80.0	87.0	95.6	80.4	88.0	94.4	75.4	84.9	82.1	71.7	76.9
31	90.5	72.7	81.6	91.0	78.6	84.8	94.0	88.0	91.0	97.0	84.9	90.9	92.0	74.6	83.3	81.3	71.9	76.6
32	82.4	73.0	77.7	88.3	68.9	78.6	96.0	81.0	88.5	97.3	83.6	90.4	94.3	71.3	82.8	81.1	71.1	76.1
33	92.5	70.7	81.6	81.1	64.7	72.9	93.0	80.0	86.5	96.9	80.0	88.4	91.3	72.1	81.7	83.3	72.0	77.6
34	94.7	76.7	85.7	85.1	77.9	81.5	94.0	82.0	88.0	96.3	79.6	87.9	94.4	82.7	88.6	82.1	71.3	76.7
35	91.0	76.1	83.6	88.6	66.6	77.6	93.0	79.0	86.0	94.7	72.9	83.8	94.3	76.7	85.5	82.1	71.4	76.8
36	88.2	78.8	83.5	87.3	69.6	78.5	96.0	88.0	92.0	97.4	83.9	90.6	92.3	72.7	82.5	82.3	71.6	76.9
37	90.2	75.8	83.0	89.6	75.7	82.7	94.0	84.0	89.0	97.3	78.1	87.7	96.3	88.1	92.2	82.4	72.1	77.3
38	92.8	74.2	83.5	90.7	74.1	82.4	95.0	75.0	85.0	94.3	64.6	79.4	94.3	84.7	89.5	82.9	71.7	77.3
39	85.1	59.7	72.4	85.9	64.4	75.2	90.0	67.0	78.5	94.3	64.6	79.4	94.7	87.1	90.9	82.7	73.3	78.0
40	87.1	54.2	70.7	90.6	80.1	85.4	93.0	82.0	87.5	94.4	69.1	81.8	93.4	81.3	87.4	83.1	69.3	76.2
41	86.5	56.0	71.3	88.7	81.6	85.2	84.0	84.0	84.0	95.0	69.9	82.4	89.6	67.3	78.4	83.7	70.0	76.9
42	89.7	48.4	69.1	87.4	64.0	75.7	90.0	54.0	72.0	93.1	55.4	74.3	92.0	63.7	77.9	81.3	71.4	76.4
43	87.5	56.8	72.2	83.4	54.9	69.2	92.0	59.0	75.5	90.3	48.9	69.6	92.9	61.0	76.9	82.9	71.9	77.4
44	83.4	37.4	60.4	88.3	63.1	75.7	90.0	72.0	81.0	90.7	58.7	74.7				83.9	72.0	77.9

Table MET- 1.3 (l): Relative humidity (M = Morning, AN = Afternoon, AV = Average;%) at AICRP-FC trial locations during Crop growth Period, Kharif 2012

Met. Week	Central Zone																	
	Urulikanchan			Anand			Rahuri			Raipur			Jabalpur			Jhansi		
	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV
26	92.7	47.9	70.3	83.1	44.9	64.0	67.0	39.0	53.0	78.0	49.0	63.5	64.0	42.0	53.0	44.0	33.0	38.5
27	94.3	57.6	75.9	88.9	66.7	77.8	74.0	56.0	65.0	91.0	81.0	86.0	85.0	62.0	73.5	74.0	62.0	68.0
28	87.9	49.1	68.5	93.9	75.0	84.5	71.0	53.0	62.0	91.0	69.0	80.0	88.0	77.0	82.5	87.0	68.0	77.5
29	94.3	62.4	78.4	94.9	66.4	80.7	75.0	58.0	66.5	93.0	83.0	88.0	90.0	76.0	83.0	89.0	79.0	84.0
30	93.1	64.3	78.7	90.6	70.7	80.7	71.0	56.0	63.5	92.0	88.0	90.0	95.0	88.0	91.5	95.0	83.0	89.0
31	99.1	72.1	85.6	88.7	73.9	81.3	77.0	69.0	73.0	95.0	91.0	93.0	94.0	87.0	90.5	94.0	85.0	89.5
32	99.4	70.4	84.9	92.4	74.0	83.2	79.0	55.0	67.0	93.0	79.0	86.0	96.0	88.0	92.0	96.0	85.0	90.5
33	97.0	59.9	78.4	95.4	85.6	90.5	75.0	57.0	66.0	90.0	78.0	84.0	89.0	81.0	85.0	95.0	84.0	89.5
34	97.4	55.7	76.6	96.1	70.6	83.4	73.0	48.0	60.5	93.0	78.0	85.5	92.0	77.0	84.5	93.0	82.0	87.5
35	98.7	62.7	80.7	96.7	79.4	88.1	79.0	62.0	70.5	92.0	74.0	83.0	92.0	69.0	80.5	92.0	77.0	84.5
36	100.0	71.6	85.8	98.7	83.7	91.2	81.0	64.0	72.5	93.0	75.0	84.0	93.0	79.0	86.0	95.0	82.0	88.5
37	98.0	64.0	81.0	99.1	85.0	92.1	76.0	62.0	69.0	93.0	74.0	83.5	91.0	79.0	85.0	94.0	77.0	85.5
38	95.9	48.7	72.3	95.4	70.1	82.8	86.0	57.0	71.5	95.0	73.0	84.0	89.0	69.0	79.0	91.0	64.0	77.5
39	99.0	39.9	69.4	93.9	64.3	79.1	81.0	48.0	64.5	90.0	54.0	72.0	88.0	51.0	69.5	85.0	46.0	65.5
40	100.0	57.1	78.6	90.1	55.0	72.6	88.0	62.0	75.0	91.0	56.0	73.5	91.0	44.0	67.5	85.0	38.0	61.5
41	99.9	31.7	65.8	93.1	43.3	68.2	79.0	41.0	60.0	89.0	45.0	67.0	83.0	35.0	59.0	86.0	35.0	60.5
42	96.3	29.1	62.7	90.3	39.9	65.1	74.0	32.0	53.0	88.0	37.0	62.5	79.0	32.0	55.5	85.0	36.0	60.5
43	96.7	42.0	69.4	89.6	32.6	61.1	76.0	46.0	61.0	85.0	38.0	61.5	82.0	35.0	58.5	83.0	36.0	59.5
44	95.4	33.7	64.6	73.7	30.4	52.1	63.0	40.0	51.5	92.0	59.0	75.5	91.0	51.0	71.0	87.0	35.0	61.0

Table MET- 1.3 (m): Relative humidity (M = Morning, AN = Afternoon, AV = Average;%) at AICRP-FC trial locations during Crop growth Period, Kharif 2012

Met. Week	South Zone											
	Vellayani			Mandya			Hyderabad			Dharwad		
	M	AN	AV	M	AN	AV	M	AN	AV	M	AN	AV
26	87.0	74.0	80.5	90.4	46.1	68.3	83.6	60.3	72.0	85.7	80.1	82.9
27	90.0	71.0	80.5	91.0	47.1	69.1	81.9	59.6	70.8	88.4	82.3	85.4
28	88.9	72.9	80.9	91.0	46.9	68.9	78.9	62.3	70.6	85.6	77.6	81.6
29	92.3	76.4	84.4	91.0	47.0	69.0	92.0	81.9	87.0	89.6	87.0	88.3
30	94.4	74.7	84.6	89.7	46.7	68.2	85.4	66.3	75.9	89.4	81.0	85.2
31	94.0	75.0	84.5	91.0	51.0	71.0	89.3	67.4	78.4	87.6	78.8	83.2
32	87.7	72.9	80.3	91.0	55.9	73.4	85.9	62.9	74.4	79.4	74.0	76.7
33	91.3	73.3	82.3	91.0	53.1	72.1	84.3	62.4	73.4	72.3	65.1	68.7
34	92.6	75.0	83.8	91.0	50.1	70.6	86.7	68.0	77.4	87.9	76.0	82.0
35	94.7	85.3	90.0	91.0	55.1	73.1	87.1	72.4	79.8	91.7	86.7	89.2
36	89.9	74.9	82.4	91.0	57.1	74.1	87.7	70.1	78.9	91.6	89.3	90.5
37	94.4	76.1	85.3	91.0	57.6	74.3	89.0	70.0	79.5	88.3	81.3	84.8
38	87.9	69.3	78.6	91.0	43.1	67.1	91.0	62.0	76.5	77.4	73.7	75.6
39	87.1	70.1	78.6	91.0	46.9	68.9	87.0	61.0	74.0	81.3	71.6	76.5
40	89.6	66.6	78.1	91.0	48.6	69.8	94.0	69.0	81.5	89.0	84.0	86.5
41	90.3	72.9	81.6	91.0	53.3	72.1	84.0	40.0	62.0	71.1	58.9	65.0
42	94.4	79.6	87.0	91.0	51.4	71.2	84.0	43.0	63.5	57.6	36.1	46.9
43	94.6	76.9	85.8	91.0	44.7	67.8	87.0	52.0	69.5	66.6	46.9	56.8
44	91.9	73.4	82.7	91.0	42.4	66.7	85.0	65.0	75.0	77.1	60.1	68.6

Table MET -1.4 (n): Sunshine at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	Hill Zone			North West Zone					North East Zone					
	Palam-pur	Alm-ora	Sri-nagar	Ludh-iana	Bika-ner	Jodh-pur	His-ar	Pant-nagar	Faiza-bad	Imp-hal	Bhuban-eswar	Kaly-ani	Jor-hat	Ran-chi
26	8.4	8.0	8.1	8.7	8.0	9.8	6.0	6.9	4.1	3.9	1.5	3.8		5.6
27	4.1	5.9	9.5	10.2	9.8	9.4	5.0	2.3	2.2	5.1	0.5	4.6	5.5	6.1
28	6.0	4.6	7.0	6.2	6.6	4.2	6.0	7.0	2.9	4.0	4.4	4.7	4.1	6.7
29	6.9	5.2	7.3	9.3	9.2	8.7	8.5	4.2	3.7	2.7	2.2	3.0	3.0	4.4
30	3.6	1.9	8.2	4.9	7.4	6.3	6.9	2.8	3.8	2.1	2.9	4.1	3.1	4.1
31	1.2	0.4	8.3	4.7	6.0	3.6	4.2	1.0	4.1	2.6	0.2	3.7	6.4	5.8
32	3.4	5.3	6.0	3.9	4.5	2.9	3.4	5.8	4.7	5.9	4.0	4.4	7.4	3.6
33	3.1	5.7	3.0	5.9	4.5	3.1	8.3	5.1	6.2	6.9	2.7	5.5	6.7	3.7
34	1.0	2.2	8.4	3.3	4.7	4.2	1.4	1.9	2.8	4.4	5.3	3.5	7.4	6.8
35	3.9	4.8	5.4	4.1	7.8	5.8	5.2	4.9	6.4	6.5	6.1	7.5	4.1	8.3
36	3.7	6.1	5.9	6.5	5.4	5.3	7.7	9.4	5.2	5.0	1.8	4.3	6.0	4.7
37	3.1	3.8	2.7	7.1	8.2	5.7	7.5	3.2	2.8	2.2	2.0	5.1	0.7	5.2
38	5.5	5.8	6.3	11.1	7.2	7.1	7.3	5.1	4.3	3.5	4.7	7.7	2.2	7.2
39	9.1	7.5	8.3	10.2	10.1	9.7	9.7	8.8	8.3	4.0	6.9	7.7	1.3	8.2
40	9.9	7.2	7.9	9.9	10.3	9.8	10.1	7.9	7.9	2.7	5.5	5.8	4.2	9.4
41	9.6	7.9	7.3	9.2	9.7	9.8	9.3	9.1	7.7	3.9	3.9	5.7	8.7	8.6
42	8.9	8.6	4.8	8.8	8.7	9.5	7.7	8.7	8.0	8.0	8.6	8.6	8.8	8.8
43	9.2	8.8	4.9	8.7	9.2	9.6	8.0	8.7	7.1	9.5	8.1	9.2	9.3	8.5
44	9.6	9.3	7.8	7.0	9.5	9.3	6.0	8.6	7.4	7.5	6.3	7.0		7.4

Table MET -1.4 (o): Sunshine at AICRP-FC trial locations during crop growth period, Kharif 2012

Met. Week	Central Zone					South Zone		
	Kanpur	Anand	Raipur	Jabalpur	Jhansi	Mandya	Coimbatore	Hyderabad
26	5.1	9.2	7.7	6.4	9.7	6.2	4.0	1.5
27	3.0	2.9	2.3	5.6	5.2	8.2	7.3	2.6
28	3.7	5.3	4.0	4.7	5.0	7.2	6.2	6.1
29	4.8	4.9	1.1	3.1	5.1	7.2	3.0	0.4
30	4.7	1.4	0.7	3.0	3.4	6.8	4.4	2.7
31	3.0	1.1	0.0	0.0	1.1	5.6	6.8	3.0
32	5.3	1.8	1.3	1.2	1.9	5.2	2.6	5.6
33	5.7	1.9	3.5	0.8	3.0	6.3	4.6	8.1
34	2.1	3.6	3.1	4.9	3.7	5.5	8.4	4.0
35	3.0	3.0	4.7	4.8	4.0	6.7	2.5	4.0
36	4.3	2.3	2.5	2.8	4.2	7.4	4.5	4.9
37	4.5	1.9	4.0	2.8	4.3	5.7	6.7	4.2
38	5.5	5.3	4.3	4.6	5.5	6.1	9.2	5.3
39	8.3	6.5	8.3	8.7	10.2	7.3	7.6	5.6
40	8.4	8.5	7.6	7.3	10.1	8.0	9.7	3.0
41	8.2	8.5	8.0	9.0	9.6	5.5	5.1	8.8
42	8.1	9.6	8.6	9.4	8.9	5.1	4.4	7.7
43	7.3	9.7	6.9	8.4	9.1	7.4	4.0	7.0
44	4.9	8.8	4.9	6.7	7.7	3.1	4.3	4.4

APPENDIX - II: Forage Crops Breeding Trials at a Glance: (Kharif: 2012-13)

Cont…

Name of Location	Maize		Pearl millet				Cowpea			
	IVTM	IHTM	IVTPM	AVTPM-1	AVTPM-2	AVTPM-2 (seed)	IVTC	AVTC-1	AVTC-2	AVTC-2 (seed)
HZ	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Palampur	DR	DR	-	-	-	-	DR	-	-	
2. Srinagar	DR	DR	-	-	-	-	DR	-	-	
3. Almora	DR	DR	-	-	-	-	-	-	DR	DR
NWZ										
4. Ludhiana	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
5. Hisar	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
6. Bikaner	-	-	DR	DR	DR	DR	DR	DR	DR	DR
7. Jalour	-	-	DR	DR	DR	DR	-	-	-	-
8. Pantnagar	DR	-	-	-	-	-	DR	DR	DR	DR
9. Udaipur	DR	DR	-	-	-	-	DR	-	-	
10. Bawal	-	-	-	DR	-	-	-	-	-	
11. Pali										
12. Jodhpur										
13. Fatehpur Sekhawati										
NEZ										
14. Faizabad	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
15. Ranchi	DR	DR	DR	-	-	-	DR	DR	DR	DR
16. Kalyani	-	-	-	-	-	-	DR	DR	DR	DR
17. Bhubaneswar	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
18. Jorhat	DR	DR	-	-	-	-	DR	DR	DR	DR
19. Imphal	-	-	-	-	-	-	-	-	-	-
20. Pusa	-	-	DR	DR	DR	DR	-	DR	DR	DR
21. Shillong	-	-	-	-	-	-	-	DR	DR	DNR
CZ										
22. Anand	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
23. Raipur	DR	DR	-	DR	-	-	-	-	-	-
24. Jabalpur	DR	DR	DR	DR	DR	DR	-	DR	DR	DR
25. Rahuri	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
26. Urulikanchan	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
27. Jhansi	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
28. Aurangabad	-	DR	-	-	-	-	-	-	-	-
29. Jamnagar	-	-	DR	DR	DR	DR	-	-	-	-
30. Dhari	-	-	-	-	DR	DR	-	-	-	-
31. Kanpur	-	-	-	-	-	-	DR	DR	DR	DR
32. Palghar (Dapoli)	-	-	-	-	-	-	-	-	-	-
SZ										
33. Hyderabad	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
34. Coimbatore	DR	-	DR	DR	DR	DR	DR	DR	DR	DR
35. Mandya	DR	-	DR	DR	DR	DR	DR	DR	DR	DR
36. Karaikkal	DR	DR	DR	-	-	-	DNR	DNR	-	-
37. Dharwad	-	-	DR	DR	DR	DR	DR	DR	DR	DR
38. Vellayani	-	-	-	-	-	-	DR	DR	DR	DR
Total	**21/21**	**19/19**	**19/19**	**19/19**	**18/18**	**18/18**	**22/23**	**22/23**	**23/23**	**22/23**

Name of Location	Rice bean			Soybean	Sewan	C.S.	Guinea grass	Total
	IVT (R.bean)	AVT-2 (R.bean)	AVT-2 (R.bean) (seed)	AVT-2 (Soy) (seed)	VT Sewan-2010 (3rd Yr)	VTCS-2012 (3rd yr)	VTGG-2009 (4th yr)	
HZ	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
1. Palampur	-	-	-	-	-	-	-	**3**
2. Srinagar	-	-	-	-	-	-	-	**3**
3. Almora	-	-	-	-	-	-	-	**4**
NWZ								
4. Ludhiana	-	-	-	-	-	-	-	**10**
5. Hisar	-	-	-	-	-	-	-	**10**
6. Bikaner	-	-	-	DR	DR	DR	-	**11**
7. Jalour	-	-	-	-	DNR	DR	-	**5**
8. Pantnagar	-	-	-	-	-	-	-	**5**
9. Udaipur	-	-	-	-	-	-	-	**3**
10. Bawal	-	-	-	-	-	-	-	**1**
11. Pali					-	DNR	-	
12. Jodhpur					DR	DR		**2**
13. Fatehpur Sekhawati					DR			**1**
NEZ								
14. Faizabad	-	-	-	-	-	-	DR	**11**
15. Ranchi	DR	DR	DNR	DR	-	-	DR	**11**
16. Kalyani	DR	DR	DR	-	-	-	-	**7**
17. Bhubaneswar	DR	DR	DR	-	-	-	DR	**14**
18. Jorhat	DR	DR	DR	-	-	-	-	**9**
19. Imphal	DR	-	-	DR	-	-	-	**2**
20. Pusa	DR	DR	DR	DR	-	-	-	**11**
21. Shilong	DR	DR	DNR	-	-	-	-	**4**
CZ								
22. Anand	-	-	-	-	-	DR	DR	**12**
23. Raipur	DR	-	-	-	-	-	-	**4**
24. Jabalpur	DR	DR	DNR	DR	-	-	-	**12**
25. Rahuri	-	-	-	DR	-	DR	-	**12**
26. Urulikanchan	-	-	-	-	-	-	DR	**11**
27. Jhansi	-	-	-	DR	-	DR	DNR	**12**
28. Aurangabad	-	-	-	-	-	-	-	**1**
29. Jamnagar	-	-	-	-	-	-	-	**4**
30. Dhari	-	-	-	-	-	DR	-	**3**
31. Kanpur		-	-	-		-	-	**4**
32. Dapoli	DR	-	-	-	-	-	-	**1**
SZ								
33. Hyderabad	-	-	-	-	-	-	DR	**11**
34. Coimbatore	-	-	-	-	-	DR	DR	**11**
35. Mandya	-	-	-	-	-	-	DR	**10**
36. Karaikkal	-	-	-	-	-	-	-	**3**
37. Dharwad	-	-	-	-	-	-	DR	**9**
38. Vellayani	DR	DR	DR	-	-	-	DR	**8**
Total	**11/11**	**8/8**	**5/8**	**7/7**	**3/4**	**8/9**	**10/11**	**255/263**

DR – Data Reported
DNR – Data Not Reported
Data Reporting(%)= 96.96

B-1 A

APPENDIX -III: FORAGE CROP PRODUCTION TRIALS AT A GLANCE: (Kharif: 2012-13)

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	AST -14	AST -15	AST -16	AST -17	AST -18	AST -19	AST -20*	AST -21	AST -22	AST -23
HILL ZONE																							
Palampur	TC		DR			DR																	
Srinagar																	DR	DR					
NORTH WEST ZONE																							
Hisar	TC	TNC																		TNC	DR		DR
Pantnagar	TC	DR	DR																	TNC			
Bikaner			DR				DR													TNC	DR		
Ludhiana	TC	DR	DR			DR						DR								TNC	DR		
NORTH EAST ZONE																							
Faizabad	TC									TC										TNC	DR		
Ranchi	TC				TC			TC												TNC		DR	DR
Kalyani	TC				TC			TC												TNC		DR	
Bhubaneswar	TC				TC			TC												TNC	DR	DR	
Jorhat	TC				TC			TC					DR							TNC		DR	
Imphal														DR	DR								DR
Shillong									TC											TNC		DR	DR
Raipur					TC																		
CENTRAL ZONE																							
Jabalpur	TC				TC			TC												TNC	DR	DR	DR
Rahuri	TC					DR														TNC	DR		DR
Urulikanchan	TC						DR													TNC	DR		
Anand	TC					DR	DR													TNC	DR		
Jhansi																				TNC			
SOUTH ZONE																							
Hyderabad	TC			TC		DR	TC													TNC	DR		
Mandya	TC						DR									TC				TNC	DR		
Coimbatore	TC			TC															TC	TNC	DR		
Vellayani											TC									TNC		DR	
Dharwad							DR													TNC	DR		
Total (DR&TC)	16/ 16	2/3	4/4	2/2	6/6	5/5	6/6	5/5	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	20	13/ 13	7/7	6/6

Abbreviations: DR = Data reported, TC = Trial continued and data to be reported after completion of the sequence, TNC = Trial not conducted
*Due to non-availability of seed trial could not be conducted
Success index (%) for TC/DR = 84/85 = 98.8%
Success index (%) for DR = 48/49 = 97.9%

APPENDIX -IV: Forage Crop Protection Trial at a Glance (Kharif: 2012-13)

Locations /Trial	PPT-1	PPT-2	PPT-7A	PPT-9A	PPT-10	PPT-13	PPT-14	Total	Success index (%)
Anand	A TNC	–	–	A TNC	–	A DR	–	1/3	33.3
Bhubaneswar	A DR	A DR	–	–	A DR	–	A DR	4/4	100
Hisar	–	A DR	–	–	–	–	–	1/1	100
Hyderabad	A DR	A DR	–	A DR	–	A DR	–	4/4	100
Jhansi	A DR	A DR	–	A DR	–	–	A DR	4/4	100
Ludhiana	A DR	A DR	A DR	–	–	A DR	DR	5/5	100
Palampur	A DR	A DR	A DR	–	–	A DR	A DR	5/5	100
Rahuri	A DR	A DR	–	A DR	–	A DR	–	4/4	100

Abbreviations: A = Trial allotted; DR = Trial conducted and data reported; TNC= Trial not conducted

APPENDIX –V: FORAGE BREEDING ACTIVITIES AT AICRP-FC - KHARIF-2012

A. HILL ZONE

A1. PALAMPUR, CSKHPKV

Germplasm addition – from Distt. Kangra (HP)

Crop	No. Of collections
Black spear grass (*Heteropogon contortus*)	**7**
Golden beard grass (*Chrysopogon gryllus*)	**6**

Promising Germplasm of Setaria

Crop	Entries
Low oxalates	S-6, S-7, S-10, S-13, S-17, S-30, S-33, S-18 and S-20
Frost Tolerance	S-13 and S-20

Breeding work

Setaria grass

- Based on the evaluation of polycross progenies, six genotypes viz., PS-3, PS-4, PS-5, PS-8, PS-10 and S-92 were good general combiners for fodder yield and quality traits and suitable for development of synthetic varieties for increased fodder yield and quality in Setaria grass.
- Clonal selections S-13 and S-20 have shown superiority for fodder yields, quality traits and frost tolerance
- Thirty-one clonal selections of Setaria have been planted for evaluation in RBD during Kharif 2012.
- Four new clonal selections were also made.

Maize

- Twenty land races/populations of maize were maintained. Land races PMG 41, PMG 95 and composites PMG 52-1 and PMG 93-1 gave numerically higher fodder yield but were statistically at par with African tall for fodder yield.

Bajra Napier hybrid programme

- Evaluation of sixteen hybrids revealed superiority of three hybrids, namely, Co 7 x FD 464, NDFB 7 x FD 464 and CO 7 x FD 464 for fodder yields.

B. NORTH WEST ZONE

B1. LUDHIANA, PAU

Bajra:

a) 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.
b) Forty-three hybrids (top cross and single cross) synthesised during Kharif 2010 were evaluated in four fodder trials under multicut system (RBD, three replications). Perusal of the data revealed that fifty-seven hybrids (top cross and single cross) were promising for GFY than the check hybrid PHBF 1.
c) Five early maturing high forage populations and eighteen restorers were procured from ICRISAT, Hyderabad and were evaluated and used in crossing programme.

Napier Bajra Hybrid:

a) 52 new B x N crosses received from Coimbatore were evaluated for consecutive second year in augmented design. This trial will be continued for three consecutive years.

b) Two new local Napier bajra hybrid trials have been established (RBD, 3 replications) consisting of fifteen entries each. Entries were selected using clonal selection method from the germplasm nursery and the material received from Coimbatore.

Guara:

a) One fodder trial (RBD, three replications) was conducted consisting of eighteen entries.

b) Maintenance breeding was carried out.

Cowpea:

a) New crosses were synthesised using superior fodder type cowpea lines.

b) Progenies were screened/advanced following standard breeding procedures and methods.

c) Maintenance breeding was carried out.

Guinea grass: Maintenance breeding was taken up.

B2. HISAR, CCSHAU

New crosses attempted

Cowpea: Five

- CS 88 x IC 201098
- EC 3941-1 x CS 88
- EC 249141 x CS 88
- EC 4216 x CS 88
- EC 3941-1 x Bundel Lobia 2

Forage Pearl millet: Four

- Bajri Bawal x GFB-1
- Raj Bajra Chari-2 x Giant Bajra
- MRB-8 x GFB-1
- BAIF Bajra x Giant Bajra

Screening and evaluation of breeding material in different generations

Cowpea:

- F_1: 6
- F_2: 7/14
- F_3: 7/14

Forage Pearl millet:

- F_1: 5
- F_2: 7/15
- F_3: 7/18

Evaluation of station varietal trials

- Cowpea: 1
- **Forage Pearl millet**: 1

Germplasm evaluation

- Cowpea: 30 and Forage pearl millet: 25 germplasm lines were evaluated for fodder yield traits.

Seed Multiplication

- i) Nucleus seed produced: Five kg N seed of cowpea variety CS 88 has been produced
- ii) Twenty-five kg N seed of teosinte variety improved has been produced.
- iii) Five entries in cowpea and seven entries in Forage Pearl millet were grown for seed multiplication.

B3. PANTNAGAR, GBPUAT

Cowpea Germplasm Evaluated: 450 accession including indigenous and exotic material

Genetic Donors Identified: The following genetic donors identified earlier based on evaluation of germplasm lines were utilized in crossing nursery

Sl.	Genotypes	Features
1.	V-618	High leafy biomass and resistance to diseases and pests
2.	V- 622	High leafy biomass and resistance to diseases and pests
3.	EC101980	Indeterminate, profuse growth, high biomass
4.	EC 394- 1	Leafy biomass, long pods, high protein and DMD
5.	V – 92 – 2	Dual purpose, medium late, stay green biomass
6.	V – 628	Better quality fodder, high biomass
7.	TVu 3531- 1 – 5	Dual purpose, better forage and seed yield
8.	V 5287	Leafy profuse biomass and better seeds
9.	H – 115 – 2	Tall, profuse growth and high biomass
10.	EC – 101958	High foliage and biomass
11.	CK – 93 – 2	High foliage and biomass
12.	CK – 93 – 3	Luxuriant lush green growth and better podding ability
13.	H 140 – 2	Luxuriant lush green growth and better podding ability
14.	TVu 2050	Luxuriant lush green growth and better podding ability
15.	V- 87 – 5	Long pods, dual purpose and high biomass
16.	V – 62 – 5	White seeded, better pods and leafy biomass

Cowpea Progeny Evaluation: A total of 56 F_4 progenies and 146 F_5 progenies were evaluated.

The 56 F_4 progenies derived from the following crosses were evaluated:

- TVu 3531 – 1- 5 X Co- 5
- EC 394 – 1 X V 92 – 2
- C – 88 X Co – 5
- C – 88 –X COFC – 8
- COFC – 8 X C – 88

The 146 F_5 progenies derived from the following crosses evaluated:

- IT82E – 60 X UPC 8705
- IT82E – 60 X UPC 9202
- CL – 370 X UPC 607
- V 5716 / V3A – 1 // UPC 4200
- UPC 2201 / IT82D – 875 // UPC 287
- TVu6 / PLL- 149 – 2 // TVu6
- UPC 5286 / UPC 916 – 20 – 7 // UPC 618
- UPC 5286 / VP – 916 // UPC 5286
- UPC 5286 / H 27 – 4 // UPC 9202
- V – 3017 – 2 / V 6342 // V 622
- No. 478 / UPC 4200 – 9 – 4 // V 9202
- P 95 – 9 X UPC 9202
- V 5716 / V 879 // UPC 618

A total of 117 advanced generation cowpea progenies including 38 F_6, 39 F_8 and 40 F_9 progenies were evaluated during the season.

B4. BIKANER, SKRAU

A. GERMPLASM MAINTENANCE, EVALUATION AND COLLECTION

S. No.	Range grass/ fodder crop	No. Of accessions
1	*Lasiurus sindicus*	340
2	*Cenchrus ciliaris*	50
3	*Cenchrus setigerus*	90
4	*Cymbopogon jwarancusa*	50
5	Pearl millet	30

BREEDING WORK

PASTURE GRASSES: Some promising entries of the three range grasses were evaluated in RBD. Entries were 10 for *Lasiurus sindicus*, six for *Cenchrus ciliaris* and 12 for *Cenchrus setigerus*. 10 promising entries of *Cenchrus ciliaris* were evaluated in large plots of 100-m2 sizes. At this time three entries of *Cenchrus setigerus* and six entries of *Lasiurus sindicus* are being tested at national level in coordinated trials, which have been contributed from Bikaner centre. Testing of the entries at national has been completed for three years.

OTHER FODDER CROPS: Besides the work for range grasses, three entries of pearl millet were tested in coordinated trials at national level during Kharif-2012. One entry was in AVT-2, one in AVT-1 and one in IVT.

Since the year 2012-13, in addition to range grasses, pearl millet and cluster bean have also been added in mandate of Bikaner centre for Kharif season to generate new breeding material. So, this year, 30 available germplasm entries of pearl millet were grown and various observations were taken for them. Some selections from available pearl millet entries were done to constitute a better composite of the crop for fodder purpose.

C. NORTH EAST ZONE

C1. FAIZABAD, NDUAT

Germplasm collection, evaluation & maintenance:

Crop	Existing acc.	New Collection	Total acc.	Source
Forage Bajra	72	15	87	Farmer's field of Barabanki, Lucknow and Ghajipur distts.
Forage cowpea	24	8	32	Farmer's field of Barabanki & Ghazipur distts.
B x N hybrid	20	0	20	-
Range grasses	7	2	9	Local areas of Faizabad district

Forage Bajra: Crosses made during Kharif 2012:

S.N.	Cross combinations	S.N.	Cross combinations
1	NDFB 911 x NDFB 936	9	NDFB 939 x NDFB 3
2	NDFB 921 x NDFB 912	10	NDFB 2 x RBC-2
3	NDFB 922 x NDFB 936	11	NDFB 2 x NDFB 1152
4	NDFB 939 x NDFB 904	12	NDFB 2 x NDFB 936
5	NDFB 938 x NDBF 911	13	NDFB 2 x NDFB 938
6	NDFB 3 x NDFB 1152	14	NDFB 2 x NDFB939
7	NDFB 3 x NDFB 904	15	NDFB 2 xNDFB904
8	NDFB 939 x NDFB 911		

Segregating generations:

- F_1 = 07; F2 = 06; F_3 = 08; Advance lines = 11

C2. RANCHI, BAU

Forage Cowpea: F_3 generation seeds of 9 crosses were grown for further advancement of generation.
Germplasm collection, evaluation & maintenance:

Crop	New collection	Source
Dinanath grass	3	Farmer's field
Cowpea	4	Farmer's field
Lathyrus	5	Farmer's field
Field Pea	5	Farmer's field

Bajra Napier hybrid program: 50 Bajra Napier hybrid was raised for evaluation and selection

C3. KALYANI, BCKV

Rice bean:

Selection of superior genotypes from breeding programmes: Four selections have been made out of the crosses made on the basis of forage yield. The best one will be shared for IVT under AICRP trials in 2013 *KHARIF*. However, all the four selected materials will also be inter-crossed this year.

Hybridization among the materials supplied by five different centres: Each of the five centres viz. Jorhat, Kalyani, Jabalpur, Bhubaneswar and Vellayani supplied two genotypes and a 10 x 10 diallele-crossing programme was taken up. Seeds of one genotype supplied by Jorhat Centre did not germinate satisfactorily. Also, since the date of flowering did not match for all the genotypes, the programme could not be completed satisfactorily. However, crossing in more than 23 different combinations could be made. The progeny of F_4 generation revealed one superior genotype for sharing material in 2014 Kharif.

Mutation breeding programme: Different concentrations of aqua solutions of EMS like 0.25%. 0.5%, 0.75% and 1.0% were prepared and seed materials of two genotypes with good GFY among the collected genotypes were treated. However, no superior mutant could be isolated from 2012 M_4 population. Treatment with colchicines solutions of different concentrations failed due to some unknown reasons.

Trials: Trials with already developed lines have been done and the seed materials will be shared for multi-location trial this year.

C4. JORHAT, AAU

Germplasm Collection: Following germplasm were collected from Karbi Anglong District Assam.

Crop	Total no. Collected	Collected from
Ricebean	4	Karbi Anglong, Assam
Maize	4	Karbi Anglong, Assam

Evaluation of Ricebean Germplasm: 45 ricebean lines including checks were evaluated for their earliness, productivity and disease resistance. Promising entries were selected.

Characters	Entries
Earliness	JHR-08-12, JHR-08-33, JCR-08-17, JCR-08-24, JCR-08-46, JCR-50
Plant height	JCR-08-22, JCR-50, JCR-08-40, JCR-08-14, JCR-08-30, JCR-08-32
High GFY	JCR-08-22, JCR-50, JCR-08-40, JCR-08-14, JCR-08-30, JCR-08-32, JCR-08-47

Hybridization programme on Ricebean: As per decision of Special Breeder's Meeting held at IGFRI 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 selected $F_{3's}$ were evaluated during *kharif* 2012. New crosses were also attempted taking the same 10 parents. F_3 progenies developed by Kalayni centre were also evaluated.

D. CENTRAL ZONE

D1. ANAND, AAU

Germplasm holding

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

Breeding work:

Forage *Bajra*: Twenty-five fresh crosses were made and their seed obtained

1.	BAIF Bajra-1	x	Bajra Bawal
2.	BAIF Bajra-1	x	GFB-1
3.	BAIF Bajra-1	x	AFB-5
4.	BAIF Bajra-1	x	Giant Bajra
5.	GFB-1	x	BAIF
6.	GFB-1	x	Giant Bajra
7.	Bajra Bawal	x	GFB-1
8.	Bajra Bawal	x	AFB-5
9.	Bajra Bawal	x	Giant Bajra
10.	Bajra Bawal	x	BAIF
11.	B.B.Sel-1	x	BAIF
12.	B.B.Sel-2	x	BAIF
13.	AFB-5	x	Giant Bajra
14.	AFB-5	x	GFB-1
15.	Giant Bajra	x	BAIF
16.	MJC-2	x	BAIF Bajra
17.	MRB-8	x	Baif Bajra

As per suggestion given by Dr. J.A.Patel, (*Kharif* monitoring team) we have made 8 crosses.

1.	MJC-2	x	Advanta (PAC-981)
2.	MRB-8	x	Advanta (PAC-981)
3.	BAIF	x	Advanta (PAC-981)
4.	Bajra Bawal	x	Advanta (PAC-981)
5.	Bajra B-sel-1	x	Advanta (PAC-981)
6.	Bajra B-sel-2	x	Advanta (PAC-981)
7.	Giant Bajra	x	Advanta (PAC-981)
8.	GFB-1	x	Advanta (PAC-981)

Segregating materials:

- 41 F_1 plant progenies were raised and their self-seed obtained for next generation. Six F_3 progenies were grown and 11 superior plants were selected for next generation
- 22 F_2 plant progenies were raised and 26 superior plants were selected for next generation.
- 12 F_6 progenies were grown and 21 plants were selected.

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_1 (African Tall)
(2)	Anand	:	G_2 (J-1006)
(3)	Rahuri	:	G_1 (African Tall)
(4)	Rahuri	:	G_2 (J-1006)
(5)	Urulikanchan	:	G_1 (African Tall)
(6)	Urulikanchan	:	G_2 (J-1006)

- Two populations were grown and after selecting superior plants allowed them to intermating.
- Seventy-**Four** F_3 progenies were raised and 39 superior plants were selected on the basis of morpholocal characters for next generation.
- Ten F_2 were sown and 15 superior plants were selected.

D2. JABALPUR, JNKVV

Crop	existing accession	new collection	total accession	source & area of collection
Soybean	61	6	67	NRC Indore & Sehore
Rice bean	28	4	32	NBPGR.,New Delhi

Generation of materials/entries/crosses made during – Kharif 2012.

S.No.	Crop	Cross made	Cross advanced	Selection made
1	Soybean	5	$4F_1$	-
			$6F_2$	24
			$5F_3$	18
			$7F_4$	07
			$8F_5$	04

Crosses made

- JS 04-133 x Kalitur
- GP 851 x BR 7
- W T 49 x BR 7
- JS 94-66 x MAUS 16-1
- NRC 43 x JS 11-01

F_1 generation

- BR 7 x Kalitur
- MAUS 61-2 x JS11-1
- EC 389159 x WT-49
- JS 04-133 xHimso1559

F_2 generation

- Kalitur x GP1559
- JS 16-1 x EC 389189
- EC 389189 x BR -7
- Himso 1521 x JS 80-21
- MAUS 16-1 x JS 90-41
- JS 76-205 x JS 11-1

F_3 generation

- Kalitur x S16-1
- JS 16-1 x BR 7
- Kalitur x NRC37
- JS 80-21 x Kalitur
- GP1559 x MAUS 7

F_4 generation

- EC 389189 x S11-1
- Kalitur x JS 16-1
- NRC 37 x Kalitur
- JS 80-21 x JS 62-1
- MAUS 7 x Kalitur
- MAUS 61-2 x GP 1559
- JS 16-1 x S 11-1

F_5 generation

- JS(IS) 90-5-12-2 x Kalitur
- BR7 x NRC 608
- Kalitur x JS(IS) 90-5-12-2
- Kalitur x NRC 37
- Kalitur x EC 393280
- Himso1521 x Kalitur
- GP 1559 x Kalitur
- Kalitur x GP 1559

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

Rice bean

- Four new accessions were obtained by NBPGR, New Delhi
- Selections were made for different fodder traits in the mutation derived M_6 populations of 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.

D3. RAHURI, MPKV

Generation of breeding material:

MAIZE POPULATION IMPROVEMENT PROGRAMME:

Season	Activity
Rabi 2011-12	• Initial Crossing Programme Female parent: 1. African Tall Male Parents: **1.** Pratap Makka Chari-6 **2.** GWL-15 **3.** BAIF-245 **4.** 3-2-5 (F_5) **5.** 1-66-1 (F_5)
Kharif 2012	• Equal no. Of F1 seed of above crosses was included in C1. Bulk for random mating in isolation • Stratified bulk harvesting
Kharif 2013	• Sowing of bulk seed produced during Kharif-2012 in large plot • IPS and development of full sibs • Harvest full sibs in bulk
Summer 2014	• Sowing of bulk seed of full sibs in isolation for random mating • Harvest in bulk (C_2).
Kharif 2014	• Sowing of C_2 bulk • IPS and development of full sibs • Harvest full sibs in bulk
Summer 2015	• Sowing of bulk seed of full sibs in isolation for random mating • Harvest in bulk (C_3).

PEARLMILLET POPULATION IMPROVEMENT PROGRAMME

Kharif 2012	• **Sowing of C1 bulk seed** • **IPS and Selfing** • **Harvest in bulk**
Summer 2013	• Sowing of bulk seed (in isolation) • Random mating • Harvest in bulk C_2

Germplasm maintained:

Sr. No.	Crop	No. Of germplasm collected
1	Maize	06
2	Bajra	12
3	Sorghum	9
4	Sudan grass	54
5	Napier (*Pennisetum purpereum*)	34
6	Guinea grass (*Panicum maximum*)	11
7	Stylo (Stylosanthes spp.)	44 (34- *S. sebrana*, 8 -*S. scabra*, 2-*S. hamata)*
8	Marvel (*Dichanthium spp.)*	20
9	Madras Anjan (Cenchrus *spp.)*	39
10	Dongari *(Crysopogon fulvus)*	13
11	Rhodes grass (Choris *gayana*)	7
12	Pawana (*Sehima nurvosum*)	7
13	Ber *(Ischiemum aristatum)*	3
14	Moshi *(Iseilema wighttii)*	3

New Collections during 2012:

Crop	No. of germplasm	Source
Marvel (*Dichanthium spp.)*	17	Kagal,Gadhinglaj and Radhanagari areas of Kolhapur district.

D4. URULIKANCHAN, BAIF

Mandatory crops: Maize, Pearl millet, Lucerne, Hy. Napier, *Cenchrus* and *Stylosanthes*
During the season, following breeding work on Maize, Pearl Millet and Hybrid Napier was taken up
Maize

1. Special breeding programme (cycle 1): Under the population improvement programme, F_4 progeny of bulked seed of 21 IPS selected from F_3 population of G-I lot (crosses with A. T. developed at Urulikanchan) was grown in isolation. Ninety five Individual plant selections (IPS) of desirable characters such as tallness, green thick stem with broad leaves and tasseling at 50-55 days were made and seed from seventeen IPS were collected for progeny cultivation in F_5.

Pearl millet

1. Germplasm evaluation & pure line development: Twelve landraces of Pearl millet collected from farmer's field during *kharif*- 2011 were grown for evaluation. Since the material was open pollinated, lot of variation within and among the landraces was observed. Efforts were made to identify the promising and phenotypically similar plants within the landrace. These individual plants were selfed for further pure line development programme.
2. Population improvement programme: From the base population of BAIF Bajra-1, six individual plant selections were made for improved characters during *kharif*-2011. The progeny of the six IPS was grown separately. Out of those six, progenies of three IPS were continued for further improvement programme.

B x N hybrid:

1. Evaluation of B x N hybrids: Crossed seed of following three crosses were sown for evaluation.
   - ✓ BAIF Bajra-1 x BRN 01
   - ✓ BAIF Bajra-1 x FD 444
   - ✓ Bajra Landrace-3 x BRN 01

   Based on the phenotypic characters, the promising individual clumps from each cross were identified and will be confirmed after 5-6 cuttings for fodder. The progeny of each selected clump will be assessed in larger plots for yield and quality parameters.

E. SOUTH ZONE

E1.MANDYA, UAS

COWPEA

Kharif	Segregating material advanced/handled and selections made	
	F_1s advanced to F_2	14
	Advanced Breeding Lines (F_5)	24
Rabi	Cowpea entries sown for crossing programme	15

MAIZE (*Kharif*)

Inbred development (F_5)	490
New crosses generated	60
No. of composites developed	6

E2. COIMBATORE, TNAU

The following National breeding programme on Bajra Napier Hybrid was initiated at Coimbatore as lead centre under AICRP on Forage Crops.

I. National crossing programme in Bajra Napier hybrid
The B x N hybrid seeds of 52 crosses synthesized under this programme as furnished below has been dispatched to PC unit for further distribution to the designated centres on 27.06.2012.

II. Poly cross breeding programme in Lucerne
The poly-crossed seeds obtained from Anand, Rahuri, BAIF Pune have been sown on 16.11.2012 along with that of Coimbatore centre as per the plan finalized during the *rabi* 2012 workshop for further studies.

III. Advanced entries in Fodder Cowpea
Large-scale multiplication of advanced fodder cowpea culture TNFC 0924 (CO 5 x Bundel lobia 2) has been taken up and the same will be proposed for inclusion in the ensuing AICRP trials of *kharif* 2013.

E3. VELLAYANI, KAU

Germplasm Holding

SL.No	Crop	Germplasm collected during Kharif 2011	Total germplasm
1	Guinea grass	2	211
2	Cowpea	4	138
3	Rice bean	2	99
4	Bajra	-	119
6	Minor forage crops	--	35

Rice bean

Two accessions collected during Kharif 2011 were evaluated along with 5 selected accessions in the germplasm. Two accessions with high green fodder yield, leaf/stem ratio, branch number and tolerance to pests and diseases were selected.

Cowpea: Germplasm collection and evaluation

- F_2 evaluation of two selected crosses was done and 8 superior plants were selected based on green fodder yield, leaf/stem ratio, branch number per plant and tolerance to pests and diseases.
- Four accessions collected during Kharif 2012 were evaluated with five selected accessions from Kharif 2011. Four accessions with high leaf/stem ratio; green fodder yield and dry matter yield were selected for hybridisation. Hybridisation will be done between the selected four accessions and three popular varieties in Line X Tester pattern during summer 2013.

National Breeding Programmes

- Special Programme for Varietal Improvement in Fodder Rice bean

Collection and evaluation of germplasm
One accession with high leaf area, leaf density and having more number of branches and green fodder yield selected during Kharif 2011 was evaluated against Bidhan-1and Bidhan 2 during Kharif 2012. Flowering and seed set was very low in all the three accessions and so evaluation will be repeated during summer 2013.

Intervarietal hybridisation
Using the 10 selected germplasm lines received on exchange basis from 5 AICRP Centres, intervarietal hybridisation was attempted. Hybridisation could not be completed in all the 10 lines simultaneously because of very low flowering and very heavy rainfall during the flowering period. Hybridization will be repeated during Kharif 2013

Thirteen promising intervarietal crosses of rice bean received from BCKV, Kalyani were evaluated during Kharif 2011and 2012. Three crosses with superior fodder attributes were selected for further evaluation and selection.

Evaluation of bajra-napier hybrids and development of hybrid varieties suited to Kerala
Fifty-one bajra-napier hybrids developed at the Department of Forage Crops, TNAU, and Coimbatore

S.NO	Crop	Number of Collections	Source
1.	Fodder Cowpea	35	1. NBPGR, Regional Station, Hyderabad 2. RARS, ANGRAU, Tirupathi
2.	Fodder Maize	30	Maize Research centre, ANGRAU, Hyderabad.
3.	Fodder Bajra	20	ICRISAT, Hyderabad.
4.	Napier Lines	10	TNAU, Coimbatore.

during Kharif 2009 were evaluated during Kharif 2010. Only few hybrid seeds have germinated. Out of the 51 hybrids sown, 20 hybrids have germinated and they are being multiplied. F_2 evaluation of 20 hybrids was done. Five hybrids with superior fodder attributes were selected for yield trials.

E4. HYDERABAD, ANGRAU

Fodder Cowpea:

- The progeny rows of 24 single plant selections made from F3 segregating populationof 8 crosseswere taken up during *Kharif-2012*for their further evaluation and selection.
- Seed multiplication of APFC 10-1,a promisingculture developed by selection in local collection TPTC-1 was taken up for proposing in minikit trials of the state.

Fodder Maize:

- F3 population of G1 group (African tall) and G2 group (J1006) were sown during *Kharif-2012*.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.

Fodder Bajra:

- An half –sib population of APFB2 was developed by random mating with Gaint Bajra and BAIF Bajra in isolation
- The F2 segregating population was grown during Kharif 2011and desirable plants having tall plant nature, vigorous growth, heavy tillering ability, long and broad leaves were selected and harvested in bulk.
- The bulked seed was sown in *Kharif -2012*, selected desirable plants and allowed for random mating and harvested in bulk. Further cycles of selection and random mating will be takenup until the desired level of uniformity.

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