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अखिल भारतीय समन्वयित अनुसंधान परियोजना–
चारा फसलें एवं उपयोगिता
(भारतीय कृषि अनुसंधान परिषद)

# ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS &UTILIZATION

**(Indian Council of Agricultural Research)**


## कार्यवृत्त–राष्ट्रीय समूह बैठक रबी 2017-18
## यूनिवर्सिटी ऑफ़ एग्रीकल्चरल साइंसेज, बैंगलोर, सितम्बर 4-5, 2017

## Proceedings of the National Group Meeting-Rabi-2017-18
**University of Agricultural Sciences, GKVK campus, Bengaluru**
**September, 4-5, 2017**


परियोजना समन्वयन इकाई
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# Proceedings of the National Group Meeting: Rabi 2017-18

(Held at University of Agricultural Sciences, GKVK Campus, Bengaluru during September 4-5, 2017)



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# PREFACE

The National Group Meet, *Rabi* 2017-18 of All India Coordinated Research Project on Forage Crops & Utilization was organized with the objectives to review the accomplishments of programme executed during Rabi 2016-17 at different coordinating and cooperating centers, In-House research activities, Tribal Sub-Plan and Forage Technology Demonstrations (FTDs); and also to formulate technical programme for *Rabi* 2017-18 as well as to discuss future thrust areas for fodder research. The meeting was jointly organized by Indian Council of Agricultural Research, New Delhi and University of Agricultural Sciences, GKVK Campus, Bengaluru, during September, 4-5, 2017.

The meeting was attended by the scientists engaged in forage research working under coordinating and collaborating centers located at different SAUs, ICAR institutes and NGOs. Representatives of NDDB, Regional fodder stations of DAHD&F, Government of India, seed companies, private companies, state Department of Animal Husbandry and other related departments also participated in the programme and being important stakeholders contributed in the development and refinement of programme and strengthening linkages for future course of action. Members of electronic and print media of the region also participated in the meet.

This compilation contains brief report of National Group Meet, Rabi 2017-18 covering highlights on forage crop improvement, forage production and plant protection technology generated, proceedings of different technical sessions and technical programme for the coming *Rabi* season 2017-18. The National Meet Group members discussed and planned future strategies for improving the forage productivity, quality and nutritive value to address the regional and national forage security for the livestock. The finalized technical programme on forage crop improvement, forage crop production and forage crop protection for *Rabi* 2017-18 have been given in annexure(s).

The successful conductance of the event is attributed to the joint efforts made by the ICAR/IGFRI authorities, authorities of UAS, GKVK campus, Bengaluru, participating scientists, Principal Investigator and staff of the Project Coordinating Unit and IGFRI, Jhansi. The team of All India Coordinating Research Project on Forage Crops & Utilization sincerely acknowledges their active involvement, suggestions and cooperation for successful organization of the meeting.

We sincerely thank the authorities at ICAR, New Delhi, particularly Dr. T. Mohapatra, Secretary, DARE and Director General, ICAR; Dr. A. K. Singh, Deputy Director General (Crop Science); Dr. J. S. Sandhu, Ex- Deputy Director General (Crop Science); Dr. I. S. Solanki, Assistant Director General (FFC); Dr. Dinesh Kumar, Principal Scientist (FFC) and other members of Crop Science Division for their guidance, support and encouragement. The authorities and organizing committee of UAS, GKVK campus, Bengaluru, are especially thanked for successful and smooth conductance of the meeting.

A.K. Roy
Project Coordinator

# ALL INDIA COORDINATED RESEARCH PROJECT
# ON FORAGE CROPS & UTILIZATION
# (INDIAN COUNCIL OF AGRICULTURE RESEARCH)

## SUMMARIZED MAJOR RECOMMENDATIONS AND HIGHLIGHTS

**Varieties Identified:** The following varieties were identified by the VIC during National Group Meet (*Rabi* -2017-18) of AICRP (Forage Crops)

- **OL 1760 (Oat Single cut):** Developed by PAU, Ludhiana, the entry was found to be resistant to leaf blight and was superior in terms of dry matter yield, green fodder yield, crude protein yield. The entry was identified for cultivation for the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu under irrigated condition during rabi season.
- **JSBC-1 (Berseem Single cut):** Developed by IGFRI, Jhansi, the entry was identified for cultivation under specific situation of single cut short duration condition for the states of Maharashtra, Rajasthan, Punjab, Haryana, UP and MP under irrigated condition during *Rabi* season.
- **JGCT-2013-3 (*Clitoria ternatea*):** Developed by IGFRI, Jhansi, the entry was identified for cultivation for semi-arid areas for the states of Maharashtra, Rajasthan, Punjab, Haryana, south UP, MP and Gujarat under rainfed condition as perennial crop for rangeland and pasture situation.
- **TNLC-14 (Fodder Lucerne):** Developed by TNAU, Coimbatore, the entry was found to be resistant to rust and aphids in proposed zone. It was found superior for forage and seed yield also. The entry was identified for cultivation in the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu as perennial fodder crop.
- **OL-1769-1 (Oat Single cut):** Developed by PAU, Ludhiana, the entry was identified for cultivation in the states of UP, Maharashtra, Gujarat, Chhattisgarh and MP under irrigated condition during rabi season.
- **OL-1802-1 (Oat Single cut):** Developed by PAU, Ludhiana, the entry was identified for cultivation in the states of Rajasthan, Haryana, Punjab, Uttarakhand and Western UP under irrigated condition during rabi season.
- **SKO-225 (Oat Single cut):** Developed by SKUAST-K, Srinagar, the entry was superior for green fodder yield, dry matter yield, per day productivity for green fodder, leafiness and crude protein content in Hill Zone. The entry was identified for cultivation in the states of J&K, HP and Uttarakhand under irrigated condition during rabi season.
- **OS-424 (Oat Single cut):** Developed by CCS HAU, Hisar, the entry was identified for cultivation for the states of J&K, HP and Uttarakhand under irrigated condition during rabi season.
- **JHO 2012-2 (oat Single cut):** Developed by IGFRI, Jhansi, the entry was superior for green fodder yield, dry matter yield, crude protein yield, per day productivity for green fodder and dry fodder. The entry was identified for cultivation in the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu, under irrigated condition during *Rabi* season.

**Forage Production Technologies**

- For Chhattisgarh, sequential cropping of Maize and rice been in 2:1 row ratio in *Kharif*; multi cut oat in *Rabi* and intercropping of multi cut sorghum with cowpea in 2:1 row ratio during summer is recommended higher green fodder yield (1180 q/ha), dry matter yield (247 q/ha), green fodder per day (4.15 q/ha) and dry fodder per day (0.86 q/ha) as well as higher net return of Rs. 89108 and benefit cost ratio of 1.94.
- For fodder production in sodic soils of Uttar Pradesh during Rabi season, Oat cv. NDO-951 is recommended for higher fodder production (550-600 q/ha green fodder and 120-130q/ha dry matter /ha) and remuneration (Rs. 63417/ ha and BC ratio of 4.10).
- For Haryana, it was recommended that 25% of recommended seed rate of Berseem (6.0 kg /ha) should be mixed with ryegrass (recommended seed rate of 8.0 kg/ha) for higher green fodder yield (1100-1150 q/ha), dry matter yield (170-200 q/ha), crude protein content (21-22%) and crude protein yield (38-40 q/ha).
- Addition of tapioca flour @1% on the fresh weight basis is recommended for quality organic silage preparation from cultivated perennial grasses.

**General Recommendations**

- Breeders were requested to take necessary action and submit the proposals after the completion of trials. All the centers should regularly submit the variety proposals to CVRC after identification of variety in VIC.
- Scientists were advised to properly document the developed breeding material and get the novel germplasm registered with NBPGR.
- Plant Protection scientists should strictly follow the guidelines made during Rabi Forage Group Meet at MPKV, Rahuri.
- All the centers should take utmost care to produce the allocated breeder seed as it is a national commitment. The centers were also advised to communicate the status of excess breeder seed production to the PC, so that steps would be taken up for its disposal.
- All the centers should sensitize various state and central departments Agriculture / Animal husbandry /NSC/SSC/Milk federations etc. about giving breeder seed demand of newly released varieties.
- Fodder conservation techniques should be popularized by Universities and other government/ NGO institutions for availability of fodder during lean period.
- TSP programme was proposed by AAU, Jorhat; OUAT, Bhubaneswar; JNKVV, Jabalpur; BAIF, Urulikanchan; PJTSAU, Hyderabad; HPKVV, Palampur; SKUAST-K, Srinagar; CAU, Imphal; IGKV, Raipur; KAU, Vellayani; GBPUAT, Pantnagar; BAU, Ranchi which was approved.
- The funds release broadly are under three heads i.e. Grant in aid – Capital, Grant in aid – Salaries, Grant in aid – General. These heads should be strictly followed and expenditure should not jump in any head. The money from one head can not be transferred to other head. In Salaries, please strictly follow the number and nature of posts. No retirement benefits should be charged from AICRP fund.
- All the centers are requested to adhere to the timeline for submission of UC and AUC in proper format.

# INAUGURAL SESSION

The National Group Meeting - Rabi, 2017-18 of the All India Coordinated Research Project on Forage Crops and Utilization was inaugurated on 4th September, 2017 at University of Agricultural Sciences, GKVK Campus, Bengaluru, Karnataka. It commenced with ICAR and University song followed by lighting the lamps by dignitaries.

The Inaugural session was chaired by Dr. H. Shivanna, Hon'ble Vice Chancellor, University of Agricultural Sciences, Bengaluru. Dr. I. S. Solanki, Assistant Director General (Food and Fodder Crops), ICAR was the Chief Guest. Dr. P. Kaushal, Jt. Director (R), ICAR-NIBSM, Raipur was Guest of Honour.

Dr. Y. G. Shadakshari, Director Research, UAS (B) welcomed the dignitaries, delegates. He highlighted the achievements of University with special reference to forage crops and livestock scenario in the state.

Dr. A. K. Roy, Project Coordinator, AICRP on Forage Crops and Utilization presented the brief introduction of AICRP Forage project, XII plan achievements, future thrust and summary of activities carried out in Rabi 2016-17.

Dr. P. Kaushal, Joint Director (R), ICAR-NIBSM, Raipur highlighted various issues related to forage crops, livestock and various biotic stresses related to crops, livestock, human interaction. He stressed upon the need of collaboration between various stakeholders to generate technologies.

Dr. I. S. Solanki, ADG (FFC), ICAR presented a scenario of forage crops and livestock in the country and role of fodder crops in nutritional security. He emphasized that dissemination of technologies generated in the NARS system should be accelerated so that farmers can reap the harvest of technologies generated. He appreciated the achievements of XII plan and further exhorted scientists to intensify efforts for doubling the farmer's income.

On this occasion, appreciation certificates were given to AICRP forage centers at CCS HAU, Hisar; HPKV, Palampur; MPKV, Rahuri for their excellent performance.

Dr. H. Shivanna, Vice Chancellor, University of Agricultural Sciences, Bengaluru, highlighted the importance of livestock sector and role of fodder in overall rural development especially in Karnataka. He described the various efforts undertaken by University in solving problems of farmers and called upon the delegates to come out with suitable technologies which can be useful to farmers for increasing income and livelihood options.

Dr. C. R. Ravishankar, Associate Director of Research, UAS (B) ZARS Mandya presented the vote of thanks.

# TECHNOLOGIES GENERATED

## Varieties identified

**OL 1760 (Oat Single cut):** The proposal was submitted by PAU, Ludhiana for identification in South Zone. The entry was found to be resistant to leaf blight in the proposed zone and noted its superiority in terms of dry matter yield, green fodder yield, crude protein yield and per day productivity for both green as well as dry matter yield in comparison to national and zonal checks. The entry was identified for cultivation for the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu under irrigated condition during rabi season. The proposed name is Central fodder oat, OL-1760.

**JSBC-1 (Berseem Single cut):** The proposal was submitted by IGFRI, Jhansi for identification in Central and North West Zones as single cut berseem. It was superior to checks under single cut for green fodder yield, dry matter yield and crude protein yield. The entry was identified for cultivation under specific situation of single cut short duration condition for the states of Maharashtra, Rajasthan, Punjab, Haryana, UP and MP under irrigated condition during *Rabi* season. The proposed name is Central fodder Berseem, JSBC-1.

**JGCT-2013-3 (*Clitoria ternatea*).** The proposal was submitted by IGFRI, Jhansi for identification in Central and North West Zones as perennial crop suitable for rainfed situation. There is no variety in the crop and the species has importance as perennial legume especially for pasture condition. It was best for green fodder yield and dry matter yield. There was no insect-pest damage in the crop. The entry was identified for cultivation for semi-arid areas for the states of Maharashtra, Rajasthan, Punjab, Haryana, south UP, MP and Gujarat under rainfed condition as perennial crop for rangeland and pasture situation. The proposed name is Central fodder *Clitoria,* JGCT-2013-3.

**TNLC-14 (Fodder Lucerne):** The proposal was submitted by TNAU, Coimbatore for identification in South Zone. The entry was found to be resistant to rust and aphids in proposed zone. It was found superior for seed yield also. It was superior in terms of dry matter yield, green fodder yield, seed yield, per day productivity for both green and dry matter yield and crude protein yield in comparison to national checks. The entry was identified for cultivation in the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu as perennial fodder crop. The proposed name is Central fodder Lucerne, TNLC-14.

**OL-1769-1 (Oat Single cut):** The proposal was submitted by PAU, Ludhiana for identification in central zone. It was superior in terms of dry matter yield, green fodder yield, and per day productivity for both green as well as dry matter yield, leafiness, crude protein yield in comparison to national and zonal checks. The entry was identified for cultivation for the states of UP, Maharashtra, Gujarat, Chhattisgarh and MP under irrigated condition during rabi season. The proposed name is Central Fodder Oat, OL-1769-1.

**OL-1802-1 (Oat Single cut):** The proposal was submitted by PAU, Ludhiana for identification in North West zone. It was superior in terms of dry matter yield, green fodder yield and per day productivity for both green as well as dry matter yield, crude protein yield and seed yield in comparison to national and zonal checks. The entry was identified for cultivation for the states of Rajasthan, Haryana, Punjab, Uttarakhand and Western UP under irrigated condition during rabi season. The proposed name is Central fodder Oat, OL-1802-1.

**SKO-225 (Oat Single cut):** The proposal was submitted by SKUAST-K, Srinagar for identification in Hill, North West and Central zones. The entry was superior for green fodder yield, dry matter yield, per day productivity for green fodder, leafiness and crude protein content in Hill Zone. The entry was identified for cultivation for the states of J&K, HP and Uttarakhand under irrigated condition during rabi season. The proposed name is Central fodder Oat, SKO-225.

**OS-424 (Oat Single cut):** The proposal was submitted by CCS HAU, Hisar for identification in the Hill Zone. The entry was superior for green fodder yield, dry matter yield, per day productivity for green fodder and dry fodder in Hill Zone. The entry was identified for cultivation for the states of J&K, HP and Uttarakhand under irrigated condition during rabi season. The proposed name is Central fodder Oat, OS-424.

**JHO 2012-2 (oat Single cut):** The proposal was submitted by IGFRI, Jhansi for identification in the South Zone. The entry was superior for Green fodder yield, dry matter yield, crude protein yield, per day productivity for green fodder and dry fodder in south Zone. The entry was identified for cultivation for the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu, under irrigated condition during *Rabi* season. The proposed name is Central fodder Oat, JHO 2012-2.

**Forage Production Technologies**

- For Chhattisgarh state, growing of perennial BN hybrid with intercropping of berseem in winter and cowpea in summer is recommended for superior green fodder (783.8 q/ha), dry matter (161.8 q/ha) and crude protein (22.8 q/ha) with maximum gross return (Rs 104975), net return (Rs 50468) and benefit cost ratio of (1.55).

- In Chhattisgarh state, Sequential cropping of Maize and rice been in 2:1 row ratio in *Kharif* multi cut oat in *Rabi* and intercropping of multi cut sorghum with cowpea in 2:1 row ratio during summer is recommended higher green fodder yield (1180 q/ha), dry matter yield (247 q/ha), green fodder per day (4.15 q/ha) and dry fodder per day (.86 q/ha) as well as higher net return of Rs. 89108 and benefit cost ratio of 1.94.

- For fodder production in sodic soils of Uttar Pradesh during Rabi season, Oat cv. NDO-951 is recommended for higher fodder production (550-600 q green and 120-130q dry matter /ha) and remuneration (Rs. 63417/ ha and BC ratio of 4.10).

- Under temperate Kashmir conditions the intercropping of vetch with oats during *Rabi* season is recommended for higher productivity (400 q green fodder, 90 q dry matter and 12 q crude protein /ha) and remuneration (Net returns Rs. 83580/ha and B:C ratio of 2.38) .

- In sodic soils of Uttar Pradesh, cultivation of oat cultivar NDO-711 with application of 375 kg phosphogypsum (60kg S/ha) is recommended (in addition to recommended fertilizer dose of 90:40: 40 NPK/ha) for higher productivity of green fodder (60q), dry matter (130), crude protein (10.5 q) and per day productivity (4.81 q green or 1.14q dry matter/ha/day). This also realized gross return (Rs. 78000), net return (Rs. 60000) and B:C Ratio (4.0).

- For Haryana state, it was recommended that 25% of recommended seed rate of Berseem (6.0 kg /ha) should be mixed with ryegrass (recommended seed rate of 8.0 kg/ha for higher green fodder yield (1100-1150 q/ha), dry matter yield (170-200 q/ha), crude protein content (21-22%) and protein yield (38-40 q/ha).

- Both BN hybrid and guinea grass were found to be equally suitable and remunerative for silage preparation. Addition of tapioca flour @1% on the fresh weight basis is recommended for quality organic silage preparation from cultivated perennial grasses.

# TECHNICAL SESSION-I
# INTERACTIVE SESSION WITH STAKEHOLDERS

| | | |
|---|---|---|
| **Chairman** | : | Dr. I. S. Solanki, ADG (FFC), ICAR |
| **Co-Chairman** | : | Dr. A. K. Roy, PC, IGFRI, Jhansi |
| **Rapporteur** | : | Dr. P. Mahadevu |

The session started with welcome address by the Project Coordinator by inviting different stakeholders like farmers, livestock keepers, dairy personal service providers like representatives of Department of Animals Husbandry, Karnataka Milk Federation, National Dairy Development Board and private companies representative involved in feed and fodder development and animal husbandry to discuss on various problems and possible solutions related to fodder production.

**Points raised by Progressive Farmers /Dairy Owners:**

- ✓ Integrated farming involving animal components should be done for better utilization of crop residues & other resources to enhance farm output.
- ✓ There is lack of integration among service products, fodder & animal scientists to effectively formulate technical programme for achieving productivity & profitability.
- ✓ There is a need of constant interaction between scientist & Farmer for identification of effective solutions for the problems faced by them.
- ✓ Dairy is important in earning instant money in the irrigated areas occupied with long duration crops like Sugarcane.
- ✓ The available fodder technologies need to be reached to all farmers & there is a requirement of improving feed conversion by enhancing genetic potential of the animals.
- ✓ Collective involvement of family members for caring and encashing higher returns from the dairying

**Dr. Srinivas, Joint Director (Farms),** Dept. of Animal Husbandry & Veterinary services, Govt. of Karnataka, stressed on filling fodder deficit & demand by enhancing more biomass, protein, carbohydrate contents & promoting those improved varieties for large scale adoption. He stressed upon the following points:

- ✓ Need of multi cut varieties in different fodder crops.
- ✓ Achieving fodder security for the animal by proper exploitation of genetic potential of both crop & animals.
- ✓ Involvement of all field level officers & service providers for effective technical programme formulation.
- ✓ Enhancing the area under the fodder crops by at least 10% of cultivable area through suitable policy intervention.
- ✓ Providing package of practices for all the developed varieties & their dissemination.

**Dr. Anil Kumar Garg, Deputy General Manager, NDDB**, Anand, stressed on enhancing quality green fodder production which is the cheapest source for reducing cost of feed/Fodder. He also emphasized for strengthening extension activities for promotion of available technologies.

**Dr. A. K. Mishra, Head, PAR division ICAR-IGFRI,** Jhansi, suggested different strategies for reducing cost of feeding & also for enhancing profit by value addition through milk processing.

**Dr. U. S. Tiwana, PAU, Ludhiana**, cautioned on promotion of only Napier Bajra hybrid rather than other quality green fodders like Bajra, Sorghum & Legumes from the point of Animal health & security. Further, he stressed on the need of enhancing milk price to promote profitable dairying & financial security of the dairy farmers.

**Dr. Purusotham, Retired Forage Scientist from UAS, Bengaluru,** highlighted the need of optimizing the number of animals in proportion to the availability of fodder resources at farmer's level. He emphasized on the following points:

- ✓ Provide fodder seeds/slips at locally organized network.
- ✓ Establishment of fodder museum at each veterinary hospital for awareness on new varieties & production technologies.
- ✓ Promotion of fodder in waste lands & cultivable fallows.
- ✓ Examine portfolio of fodder Scientist for prioritized research on fodder crops.

**Dr. N. K. S. Gowda, Principal Scientist, NIANP, Bengaluru** suggested the following points:

- ✓ Thrust should be given on developing multicut fodder varieties.
- ✓ Improving seed availability of fodder crops at KVK/Veterinary Hospital.
- ✓ Organizing local workshops involving experts, veterinary doctors & Farmers.
- ✓ Promote integrated farming & Water harvesting conservation measures in rain fed areas for promotion of fodder cultivation.

**Dr. A. K. Roy, Project Coordinator**, emphasized on following points for achieving sustainable fodder production for growth of animal husbandry in the country:

- ✓ Selection of good breeds of Animals & Fodders.
- ✓ Focus on Animal health to increase output, to reduce input cost & increase biomass especially dry matter content.
- ✓ Close cooperation between different stake holders need to be established.
- ✓ Increase in fodder seed supply chain to ensure continues green fodder production.
- ✓ Focus should be on value addition & lean season fodder production & effective utilization of crop residues.

**Dr. I. S. Solanki,** ADG (FFC), ICAR and Chairman of the session, suggested considering all the available fodder technologies to reduce gap between supply & demand in the fodder in the country by effective involvement of Fodder Scientist & extension personnel.
The session ended with vote of thanks to the Chairman.

# TECHNICAL SESSION - II
# BREEDER SEED PRODUCTION

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|---|---|---|
| **Chairman** | **:** | Dr. I. S. Solanki, ADG (FFC), ICAR |
| **BSP Report** | **:** | Dr. Shahid Ahmed, Principal Scientist, IGFRI |
| **Rapporteur** | **:** | Dr. R. K. Agrawal |

At the outset, the Chairman welcomed all the participants. Dr. Shahid Ahmed, Principal Scientist, presented the status of Breeder Seed Production in forage crops for production year *Rabi* 2016-17; indent year Rabi 2017-18.

**Breeder Seed Production for production year *Rabi* 2016-17; indent year Rabi 2017-18**

In *Rabi* 2016-17, the indent for Breeder Seed Production was received from DAC, GOI for 25 varieties in four forage crops *viz.* Oat (12), Berseem (09), Lucerne (03) and Gobhi-Sarson (01). The quantity allocated was 491.15 q which was 20% higher than previous year. Breeder seed production was assigned to eleven Breeder Seed producing centers of the different SAUs/ NGO/ ICAR institutes.

In Berseem, the production was 46.35q (4.62q surplus) against the allocated quantity of 41.73 q. In Oat, the production was 406.16q (38.84 q deficit) against the allocation of 445.0q. In Lucerne, the production was 3.40q against the allocation of 3.40q. In Gobhi Sarson, the production was 0.17q against the allocation of 0.12q (0.05q surplus). The overall breeder seed production was 456.98q against the indent of 491.15q, which created a deficit of 34.17q.

**Allocation for production year 2017-18; Indent year 2018-19**

The breeder seed indent for 32 varieties in 4 fodder crops was received for a total quantity of 695.66 q. It included 4.90 q for Lucerne (4 varieties), 45.14 q for Berseem (11 varieties), 645.60 q for oat (16 varieties) and 0.02 q for Gobhi sasraon (1 variety). The production was assigned to 12 centers. The quantity allocated was 204.51 q or 41.6 % higher in comparison to previous year indent.

Many centers raised the issue of non-lifting of breeder seed by different organizations. It was informed that the now the position has improved.

The session ended with vote of thanks to the chair.

# TECHNICAL SESSION – III

## Discipline wise report

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| **Chairman** | : | Dr. I. S. Solanki ADG (FFC), ICAR |
| **Co-Chairman** | : | Dr. Pankaj Kaushal, Joint Director, NIBSM |
| **Rapporteurs** | : | Dr. D. K. Banyal and Dr. Usha C. Thomas |

**Crop Improvement:** Dr. Shahid Ahmed, Principal Scientist (Plant Breeding) presented the results of Forage Breeding and quality evaluation trials conducted during Rabi 2016-17. Total 19 trials at 34 locations on different annual and perennial crops were conducted. The summary of the trials is as follows:

- In IVT berseem, three entries (B-05-10, JHB-16-1 and HFB-13-10) were proposed for promotion to AVT-1 in NE zone & Central zone.
- In AVT berseem, two entries JB-05-9 and PC-82 were proposed for promotion to AVT-2 in NW zone.
- In AVT -2 berseem, and AVT-2 Berseem (seed), none of the entry was found superior to checks. Trial was completed.
- In IVTO (SC), eight entries, (OL-1861, SKO-229, HFO-607, JO-05-7, OL-1869-1, HFO-525, OL-1862 and UPO-16-4) were proposed for promotion to AVT-1.
- In AVTO (SC)-1, four entries (SKO-227, HFO-427, JO-04-22 and JHO-15-1) were proposed for promotion to AVT-2 for HZ and SZ.
- In IVTO (MC), none of the entries except only HFO-611 in hill zone was superior to the checks.
- In AVTO-1(MC), none of the entries except HFO-514 in central zone was superior to the checks.
- In IVTO-(Dual), five entries (HFO-619, RO-11-1, JO-10-501, OL-1871 and OL-1769) were proposed for promotion to AVT-1 (dual) for NEZ, CZ and SZ.
- In AVTO-1 (Dual), none of the entries was found superior to checks,
- AVTO-SC-1, AVTO-SC-2 (seed) and AVTO (SC)-2 Repeat 2014-15 has been completed and proposals of superior entries were submitted to VIC for identification.
- All 5 entries of IVT Vicia will be advanced to AVT-1 Vicia in coded form.
- Perennial trial, VT-Lucerne (P)-2013 Repeat has been completed and proposals have been submitted.
- In IVT Lolium (Rye grass), PBRG-2, Palam Rye grass-1 and Palam Rye grass-2 were proposed for promotion to AVT-1.
- The trials VT(Lucerne-2016), VT Vicia, VT Red Clover and VT White Clover will continue as such for next season.

**Crop Production**: Dr. R. K. Agrawal, Principal Scientist and PI (Agronomy), presented the detailed report of 27 experiments conducted at 24 locations on different crops and cropping systems including nutrient management, planting geometry, round the year fodder production and resource conservation. The house decided to close the hydroponic trial on sorghum. The results of various experiments were presented and following recommendations were given:

- Under temperate Kashmir conditions, the intercropping of vetch with oats during *Rabi* season is recommended for higher productivity (400 q/ha green fodder, 90 q/ha dry matter and 12 q/ha crude protein yields) and remuneration (Net returns Rs. 83580/ha and B: C ratio of 2.38).
- In sodic soils of Uttar Pradesh, cultivation of oat cultivar NDO-711 with application of 375 kg phosphogypsum (60kg S/ha) is recommended (in addition to recommended fertilizer dose of 90:40: 40 NPK/ha) for higher productivity of green fodder (517.17q/h), dry matter (122.95q/ha), crude protein (10.5 q/ha) and per day productivity (4.81 q green or 1.14q dry matter/ha/day). This also realized gross return (Rs. 78000), net return (Rs. 60000) and B:C Ratio (4.0).
- BN hybrid and guinea grass are equally suitable for silage preparation. For the preparation of organic silage addition of tapioca flour 1% and for inorganic silage 1% urea on fresh weight basis is recommended.

**Crop Protection**: Dr. A.B. Tambe, MPKV, Rahuri, presented the salient achievements of 9 plant protection trials conducted at 6 locations during Rabi 2016-17. The detailed scenario of diseases and insect pests of forage crops was presented. The resistant entries of berseem, oat, and other perennial crops for different diseases and insect pests at different locations were also highlighted. Three trials *i.e.* PPT-19, PPT-22 and PPT-23 have been conducted for three years and best treatment of each trial will be evaluated for one more year at large plots before recommendation.

**General Recommendations**

- In the end Co-Chairman suggested that entries which could not be promoted as varieties, but having important characters for disease resistance, quality/quantity traits must be registered and shared in the varietal improvement programme.

- He also suggested that keeping in view the high biomass of the Napier grass, it should also be tested for silage making.

Meeting ended with vote of thanks to the Chair.

# TECHNICAL SESSION-IV (CONCURRENT)
# FORMULATION OF TECHNICAL PROGRAMME
# FORAGE CROP IMPROVEMENT

**Chairman** : Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi
**Rapporteurs** : Drs. C. Babu and Y. Jindal
**Finalization of trials** : Dr. Shahid Ahmed, IGFRI, Jhansi

At the outset, the chairman welcomed the delegates. Dr. Shahid Ahmed, presented the highlights of 15 breeding trials conducted during *Rabi* 2016-17 on different forage crops *viz*., Berseem, Oats, Lucerne, Lolium, Red Clover, White Clover, Vicia for finalization of the technical programme for *Rabi* 2017-18 and summer, 2018. After thorough discussion, following breeding trials were formulated.

**Berseem**

- A new trial IVTB was constituted.
- AVTB-1 was constituted with three entries *viz*., JB-05-10, JHB-16-1and HFB-13-10 promoted from IVTB for NEZ & CZ.
- AVTB-2 was formulated with two entries *viz*., JB-05-9 and PC 82 promoted from AVTB-1 for NWZ.
- Same two entries will be tested in AVTB-2 (Seeds).

**Oats**

- Three new trials were constituted *viz*., IVTO-SC, IVTO-MC and IVTO-Dual.
- AVTO-SC-1 was constituted with eight entries *viz*., OL-1861, SKO-229, HFO-607, JO-05-7, OL-1869-1, HFO-525, OL-1862 and UPO-16-4 promoted from IVTO-SC.
- AVTO-SC-2 was formulated with four entries *viz*., SKO-227, HFO-427, JO-04-22 and JHO-15-1 promoted from AVTO-SC-1 to be tested in HZ and SZ.
- Same entries will be tested for their seed yield potential in AVTSC-2 (Seeds).

**Lucerne**

- Perennial trial on Lucerne *i.e*, VTL-2016 will be continued in the coded form.

**Lolium (Rye grass)**

- Trial VT *Lolium* will be continued in the coded form.

**Vicia**

- All 5 entries of IVT *Vicia* will be advanced to AVT-1 in the coded form.

**Red clover and White clover**

- Trial on Red clover and White clover will be continued in the coded form.

**Multicut bajra**

- A new trial IVT Bajra (MC) will be conducted with effect from summer, 2018 onwards.

**General suggestions:**

- In IVTB, Jalore, Bikaner and Meerut centres will be removed from the NWZ. Palghar centre will be removed from CZ. BL 180 will be used as zonal check in HZ from *rabi* 2017-18 onwards.
- In AVTB-1, Karzat and Kanpur centres were removed and Palghar centre was added for evaluation.
- In IVTO-SC, zonal check will be RO 11-1 for NEZ and NWZ.
- In AVTO-SC-1, Kanpur centre will be removed from CZ.
- In IVTO-MC, National check Kent will be removed. Rajouri centre was added in the HZ.
- HZ will be dropped from IVTO-Dual from *rabi* 2017-18 onwards.

The session ended with vote of thanks to the chair.

# TECHNICAL SESSION-IV (CONCURRENT)
# FORMULATION OF TECHNICAL PROGRAMME
# FORAGE CROP PRODUCTION

| | | |
|---|---|---|
| **Chairman** | : | Dr. B.K. Ramachandrappa, Chief Scientist Dry land. |
| **Expert** | : | Dr Menhi Lal, Member, Ex Head, CP Division, IGFRI, Jhansi |
| **Convener** | : | Dr. R.K. Agrawal, P.I (PC, unit) Jhansi |
| **Rapporteurs** | : | Dr. S.K. Jha & Dr. R. Joseph Koireng |

Session began with introductory remarks of Chairman. He emphasized on food and fodder security and importance on proper utilization of natural resources. He also encourage growing of short duration fodder crops or legumes. Dr. R.K. Agarwal, emphasized that while reporting the data, replicated data must be sent in the format provided and ensure timely dispatch also. On –going technical programme was discussed in detail. Two Coordinated and Ten Location specific trials have been concluded and fourteen trials will be continued.
In addition to these trials, two coordinated trials have also been formulated.

**A. Concluding trials**

1. Performance of perennial fodder sorghum (Sorghum bicolor cv. COFS-1.29) as influenced by planting geometry and cutting intervals under irrigated conditions.
2. Study of intercropping system of Pigeon pea with different annual fodder crops.
3. Studies on intensive fodder cropping systems for yield maximization.
4. Study of intensive annual fodder crop based cropping system.
5. Screening of genotypes of fodder oat under sodic soil.
6. Yield Potential of Cereals with Forage Legumes under Pure Stand and Mixtures.
7. Response of phosphogypsum to various cultivars of fodder oat in sodic soil.
8. Effect of cutting and nutrient management on growth, yield and quality of oat.
9. Standardization of seed rate of berseem with rye grass under mixed cropping system.
10. Studies on the effect of additives on silage quality of different grasses.
11. Effect of nitrogen levels on forage yield of promising entries of oat (AVTO-2-SC).
12. Effect of P levels on forage yield of promising entries of Berseem (AVTB-2 MC).

**B. New Trials**

**a. Coordinated trials**

1. Standardization of Agro-technique for fodder oat seed production (Raipur and Dharwad).
2. Enhancement of seed set in Lucerne through foliar spray (Coimbatore, Anand, Ludhiana, Hyderabad and Bikaner).

**b. AVT based trials**

a. Advance Varietal Trials on Berseem (AVTB-2).
b. Advance Varietal Trials on Single cut Oat (AVTO-SC-2).

The following recommendation emerged from concluded trials:

- ✓ In Chhattisgarh state, growing of perennial BN hybrid with intercropping of berseem in winter and cowpea in summer is recommended for superior green fodder (783.8 q/ha), dry matter (161.8 q/ha) and crude protein (22.8 q/ha) with maximum gross return (Rs. 104975), net return (Rs. 50468) and benefit cost ratio of (1.55).

- ✓ In Chhattisgarh state, Sequential cropping of Maize and rice been in 2:1 row ratio in *Kharif* multi cut oat in *Rabi* and intercropping of multi cut sorghum with cowpea in 2:1 row ratio during summer is recommended higher green fodder yield (1180 q/ha), dry matter yield (247 q/ha), green fodder per day (4.15 q/ha) and dry fodder per day (0.86 q/ha) as well as higher net return of Rs. 89108 and benefit cost ratio of 1.94.

- ✓ For fodder production in Sodic soils of Uttar Pradesh during Rabi season, Oat Cv. NDO-951 is recommended for higher fodder production (550-600 q green and 120-130q dry matter /ha) and remuneration (Rs. 63417/ ha and BC ratio of 4.10).

- ✓ Under temperate Kashmir conditions the intercropping of vetch with oats during *Rabi* season is recommended for higher productivity (400 q green fodder, 90 q dry matter and 12 q crude protein /ha) and remuneration (Net returns Rs. 83580/ha and B:C ratio of 2.38).

- ✓ In sodic soils of Uttar Pradesh, cultivation of oat cultivar NDO-711 with application of 375 kg phosphogypsum (60kg S/ha) is recommended (in addition to recommended fertilizer dose of 90:40: 40 NPK/ha) for higher productivity of green fodder (60q), dry matter (130), crude protein (10.5 q) and per day productivity (4.81 q green or 1.14q dry matter/ha/day). This also realized gross return (Rs. 78000), net return (Rs. 60000) and B:C Ratio (4.0).

- ✓ For Haryana state, it was recommended that 25% of recommended seed rate of Berseem (6.0 kg /ha) should be mixed with ryegrass (recommended seed rate of 8.0 kg/ha for higher green fodder yield (1100-1150 q/ha), dry matter yield (170-200 q/ha), crude protein content (21-22%) in forage and protein yield (38-40 q/ha).

- ✓ It has been proved that both BN hybrid and guinea grass are equally suitable and remunerative for silage preparation.

- ✓ Addition of tapioca flour @1% on the fresh weight basis is recommended for quality organic silage preparation from cultivated perennial grasses.

Meeting ended with vote of thanks to the Chair.

# TECHNICAL SESSION-IV (CONCURRENT)
# FORMULATION OF TECHNICAL PROGRAMME
# FORAGE CROP PROTECTION

**Chairman** : Dr. A.R.V. Kumar, Head, Department of Entomology, GKVK
**Rapporteurs** : Dr. Pravasini Behera and Dr. A.B. Tambe
**Finalization of trials** : Dr. A. B. Tambe

Crop Protection Scientists of the Forage group discussed in detail the results of the last *Rabi*season along with the ongoing technical programme. Scientists appraised the Chairman, regarding the results of last *Rabi* season along with the technical programme. The Chairman appreciated the work done and gave valuable suggestions for its improvement. Based on the discussion and suggestions made by the Chairman, the following recommendations emerged:

1. The trials PPT-1 and PPT-2 (A & B) will continue as they are of continuous nature.

2. PPT-17, PPT-20, PPT-21 and PPT-26 will also continue in the *Rabi* 2017-18.

3. Three trials namely,PPT-19 (Validation of best treatment of trial entitled "Management of soil borne diseases in clover seed crop from Ludhiana centre), PPT-22 (Validation of best treatments of trial entitled " Studies on biological management of *S. litura* in relation with different time of applications on lucerne under field condition) and PPT-23 (Validation of best treatments of trial entitled " Biologicalcontrol of *H. armigera*on Lucerne/Berseem seed crop) were concluded and will be validated on large plots as new trial PPT-27, PPT-28 and PPT-29.

4. Two new location specific trials were formulated i.e., PPT-30 (**Biological management of powdery mildew of oats caused by *Blumeria graminisf.* sp. *avenae*)**from Palampur centre and PPT-31 (**Eco-friendly Pest Management Techniques in Berseem Ecosystem**) from Ludhiana centre.

The meeting ended with vote of thanks to the Chair.

# TECHNICAL SESSION V
# REVIEW OF CENTRE WISE ACTIVITIES

| | | |
|---|---|---|
| **Chairman** | **:** | Dr. I.S. Solanki, ADG (FFC), ICAR |
| **Convener** | **:** | Dr. A. K. Roy, Project coordinator (FC) |
| **Rapporteurs** | **:** | Dr. Naveen Kumar and Dr.M.Shanti |

The session started with the introductory remark by the chairman. 21 centers from different zones presented their activities.

**Hill Zone**

- Palampur centre has conducted good breeding work in oats and temperate grasses.
- Srinagar centre has good breeding work in oats.

  Both the centres have made explorations for germplasm collection of temperate spp.

**North West Zone**

- Ludhiana centre highlighted the in house breeding programme on oats. Good numbers of varieties were released by the centre. The Chairman urged to submit the details of all new released varieties of oats from the centre to PC unit.
- Hisar centre is maintaining large number of germplasm accessions in berseem and oats and work is concentrated in mutation breeding in berseem. Centre was advised to improve oat breeding programme.
- Pantnagar centre has been instructed to register all the genetic stock with NBPGR.
- Bikaner centre is maintaining large accessions of arid grasses.

**North East Zone**

- Faizabad, Ranchi and Bhubaneswar centres are advised to initiate breeding programme.
- Kalyani centre has good germplasm collection of rice bean but needs more emphasis on breeding activities.
- Jorhat has initiated mutation breeding in Lathyrus and Imphal centre has been working on breeding programme in rice bean. The Chairman emphasized on increasing number of crosses at the centre.

**Central Zone**

- Anand centre has good collection of lucerne and were advised to increase the number of crosses in Lucerne.
- Jabalpur centre has good germplasm collections of oats and berseem.
- IGFRI, Jhansi centre has carried out germplasm exploration in Uttarakhand and Jharkhand. Dr.Pankaj Kaushal advised Jhansi centre to study the cell wall degradation in different germplasm lines of berseem.
- Rahuri centre has highlighted the inhouse breeding programme on Lucerne. Work on sorghum x sudan grass hybridization has been initiated.
- BAIF, Urulikanchan is having good breeding programme in Lucerne and maize.
- Raipur center is focusing on oats and *Lathyrus* breeding programme.

**South Zone**

- Hyderabad centre has breeding programme in maize, cowpea, pearl millet, BN hybrid.
- Mandya centre has hybridization programme in cowpea, horse gram, oats and maize.
- Coimbatore centre presented the programme on Lucerne and Desmanthus.
- Vellayani has initiated mutation breeding in Guinea grass.

The general suggestions to all the centres were as follows:

- All the centres were urged to submit good proposals under RKVY programme.
- Emphasis on inclusion of biotechnological approaches and identification of markers for different desirable traits.
- All centres to document success stories and submit them to PC unit.

The session ended with vote of thanks to the Chair.

# TECHNICAL SESSION VI
# FTD & TSP FORMULATION

**Chairman** : Dr. I. S. Solanki (ADG- FFC, ICAR)
**Convener** : Dr. A. K. Roy
**Rapporteurs** : Dr. R. K. Agrawal

At the outset, the chairman welcomed all the participants. Dr. R. K .Agrawal presented the status of FTD's allotted to AICRP (FC) centres for *Rabi* 2017-18. A total of 448 FTD's were allotted to 21 AICRP centres for Rabi crops. It included 80 FTDs to berseem, 40 to lucerne, 155 to oat (Single cut), 100 to oat (Multicut), 15 to cowpea, 58 to other crops viz., laythrus, rye grass etc,

The following decisions were taken after the discussion:

- All the centres should send results of the demonstrations along with beneficiaries details (farmers).
- Farmers should not be repeated for the same crop and variety in subsequent years.
- As far as possible every year, the target villages and beneficiaries should be changed.
- The data regarding GFY and seed yield etc. should be recorded and analyzed before reporting. The report along with good photograph should be sent for compilation.

**Crop-wise FTDs to be conducted during Rabi 2017-18**

| SN | Centre name | Berseem | Lucerne | Oat (SC) | Oat (MC) | Cowpea | Other crops | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | AAU, Jorhat | | | | 20 | | | 20 |
| 2. | OUAT, Bhubaneswar | | | 20 | | | | 20 |
| 3. | BCKV, Kalyani | 5 | | 10 | | | Lathyrus-10 | 25 |
| 4. | BAU, Ranchi | 30 | | | 20 | | | 50 |
| 5. | NDUA&T, Faizabad | | | 10 | | | | 10 |
| 6. | JNKVV, Jabalpur | 15 | | 5 | | | | 20 |
| 7. | AAU, Anand | | 10 | 5 | | | | 15 |
| 8. | BAIF Urulikanchan | 5 | | 15 | | | | 20 |
| 9. | MPKV, Rahuri | | | 15 | | | | 15 |
| 10. | SKRAU, Bikaner | | 10 | 15 | | | | 25 |
| 11. | PAU, Ludhiana | | | | 20 | | Rye grass-20 | 40 |
| 12. | CCS HAU, Hisar | 10 | | 15 | | | | 25 |
| 13. | GBPUA&T, Pantnagar | 15 | | | 10 | | | 25 |
| 14. | TNAU, Coimbatore | | 5 | | | 5 | Guinea -5 | 15 |
| 15. | PJTSAU, Hyderabad | | 10 | 10 | | | | 20 |
| 16. | UAS, ZRS Mandya | | 5 | 5 | | 10 | | 20 |
| 17. | CSK HPKVV, Palampur | | | | 10 | Tall fescue-5, White clover -3 | | 18 |
| 18. | KAU, Vellayani | | | | | | BNH-15 | 15 |
| 19. | IGKV, Raipur | | | | 10 | | | 10 |
| 20. | CAU, Imphal | | | 10 | 10 | | | 20 |
| 21. | SKUAST-K, Srinagar | | | 20 | | | | 20 |
| **Total** | | 80 | 40 | 155 | 100 | 15 | | 448 |

**Tribal Sub Plan**

A total demand for Rs. 12 lakhs under TSP was made by different centers for the remaining period of the financial year. PC commented that it will be finalized as per the budget availability under the head.

The session ended with vote of thanks to the chair.

# Proceedings of Varietal Identification Committee Meeting

The meeting of Varietal identification Committee of AICRP on Forage Crops and Utilization was held under the chairmanship of Dr. I. S. Solanki, Assistant Director General, (FFC), ICAR on 4th September, 2017 at UAS, Bengaluru, GKVK Campus, Bengaluru.

The following ten proposals were put up before the committee. The committee deliberated in detail and following decisions were taken.

**OL 1760 {Fodder Oat (Single cut)}:** The proposal was submitted by PAU, Ludhiana for identification in South Zone. The previous VIC committee recommended for generation of the disease data. The entry was found to be resistant to leaf blight in the proposed zone. The committee noted its superiority in terms of dry matter yield, green fodder yield, crude protein yield and per day productivity for both green as well as dry matter yield in comparison to national and zonal checks. The committee identified the entry for cultivation for the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu under irrigated condition during rabi season. The proposed name is Central fodder oat, OL-1760.

**JSBC-1 {Berseem (Single cut)}:** The proposal was submitted by IGFRI, Jhansi for identification in Central and North West Zones as single cut berseem for specific situation. The committee observed that the entry has specific niche as short duration crop at the start of rabi season. It can fit in specific cropping situation. It was superior to checks under single cut for green fodder yield, dry matter yield and crude protein yield. The committee identified the entry for cultivation under specific situation of single cut short duration condition for the states of Maharashtra, Rajasthan, Punjab, Haryana, UP and MP under irrigated condition during *Rabi* season. The proposed name is Central fodder Berseem, JSBC-1.

**JGCT-2013-3 (*Clitoria ternatea*):**The proposal was submitted by IGFRI, Jhansi for identification in Central and North West Zones as perennial crop suitable for rainfed situation. The committee observed that there is no variety in the crop and the species has importance as perennial legume especially for pasture condition. Out of all the entries, JGCT-2013-3 was best for green fodder yield and dry matter yield. There was no insect-pest damage in the crop. The committee identified the entry for cultivation for semi-arid areas for the states of Maharashtra, Rajasthan, Punjab, Haryana, south UP, MP and Gujarat under rainfed condition as perennial crop for rangeland and pasture situation. The proposed name is Central fodder *Clitoria,* JGCT-2013-3.

**TNLC-14 (Fodder Lucerne):** The proposal was submitted by TNAU, Coimbatore for identification in South Zone. The previous VIC committee recommended to generate data on disease, pest and seed yield. The entry was found to be resistant to rust and aphids in proposed zone. It was found superior for seed yield also. The committee noted its superiority in terms of dry matter yield, green fodder yield, seed yield. per day productivity for both green and dry matter yield and crude protein yield in comparison to national checks. The committee identified the entry for cultivation in the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu as perennial fodder crop. The proposed name is Central fodder Lucerne, TNLC-14.

**OL-1769-1 {Fodder Oat (Single cut)}:** The proposal was submitted by PAU, Ludhiana for identification in central zone. The committee noted its superiority in terms of dry matter yield, green fodder yield, and per day productivity for both green as well as dry matter yield, leafiness, crude protein yield in comparison to national and zonal checks. The committee identified the entry for cultivation for the states of UP, Maharastra, Gujarat, Chhatishgarh and MP under irrigated condition during rabi season. The proposed name is Central Fodder Oat, OL-1769-1.

**OL-1802-1 {Fodder Oat (Single cut)}:** The proposal was submitted by PAU, Ludhiana for identification in North West zone. The committee noted its superiority in terms of dry matter yield, green fodder yield and per day productivity for both green as well as dry matter yield, crude protein yield and seed yield in comparison to national and zonal checks. The committee identified the entry for cultivation for the states of Rajasthan, Haryana, Punjab, Uttarakhand and Western UP under irrigated condition during rabi season. The proposed name is Central fodder Oat, OL-1802-1.

**SKO-225 {Fodder Oat (Single cut)}:** The proposal was submitted by SKUAST-K, Srinagar for identification in Hill, North West and Central zones. Committee observed that the entry is superior for green fodder yield, dry matter yield, per day productivity for green fodder, leafiness and crude protein content in Hill Zone. In other zones, it was not superior to qualifying entries. The committee identified the entry for cultivation for the states of J&K, HP and Uttarakhand under irrigated condition during rabi season. The proposed name is Central fodder Oat, SKO-225.

**OS-424 {Fodder Oat (Single cut)}:** The proposal was submitted by CCS HAU, Hisar for identification in the Hill Zone. Committee observed that the entry is superior for green fodder yield, dry matter yield, per day productivity for green fodder and dry fodder in Hill Zone. The committee identified the entry for cultivation for the states of J&K, HP and Uttarakhand under irrigated condition during rabi season. The proposed name is Central fodder Oat, OS-424.

**JHO 2012-2 {Fodder oat (Single cut)}:** The proposal was submitted by IGFRI, Jhansi for identification in the South Zone. Committee observed that the entry is superior for Green fodder yield, dry matter yield, crude protein yield, per day productivity for green fodder and dry fodder in South Zone. The committee identified the entry for cultivation for the states of Telengana, Andhra Pradesh, Karnataka and Tamil Nadu, under irrigated condition during *Rabi* season. The proposed name is Central fodder Oat, JHO 2012-2.

**SKO-188 {Fodder Oat (Single cut)}:** The proposal was submitted by SKUAST-K, Srinagar for identification in the Hill Zone. Committee observed that although the variety is superior but the data is very old, hence did not consider it for identification.

# TECHNICAL SESSION VII

# PGR/BREEDING/PRODUCTION/PROTECTION ISSUES

**Chairman** : Dr. I.S.Solanki, ADG(FFC), ICAR
**Co-Chairman** : Dr. A. K. Roy, PC, AICRP on Forage Crops & Utilisation
**Rapporteurs** : Drs. Santosh Jha & P. S. Takawale

In this session, following three presentations were made

- **Forage Pearl millet Breeding-** Dr. S. K. Gupta, ICRISAT, Patancheru, Hyderabad
- **Plant Genetic Resources Management-** Dr. Anjali Kak, ICAR-NBPGR, New Delhi
- **Forage crops and Collaborative Research between AICRP Dryland Agriculture & AICRP Forage crops** Dr. Gopinath, Principal Scientist, AICRPDA and others .

In the first presentation, objectives of forage pearl millet breeding, work done by ICRISAT since 1975 on pearl millet, performance of forage pearl millet hybrids and OPVs at station and different institutions was given in brief. After the presentation, scope on conducting the trials on multicut forage pearl millet, sharing of elite germplasm lines and segregating material, organization of field days for scientists etc. was discussed.

The status on Plant Genetic Resources on forage crops and explorations by NBPGR was given in second lecture. The detailed information regarding online germplasm registration was also given.

In last presentation, collaborative research between AICRPDA and AICRPFCU and its future scope was highlighted. At present the work is initiated with six centers for technical guidance and observations.

After presentation and subsequent discussion following suggestions were given:

- After identification of varieties, proposal should be submitted to CVRC within two months after getting the IC number from NBPGR and finger printing of variety.
- Submit seed material of fresh collected germplasm to NBPGR with passport data.
- Focused effort on germplasm exploration jointly by IGFRI and AICRP centers in respective zones should be there.
- Need to organize field day at IGFRI, Jhansi.
- Initiate national crop improvement programme for multicut Oat and Berseem.

Dr. P. Kaushal, NIBSM, Raipur offered to utilize the facilities of the institute for shuttle breeding programme/offseason nursery/ seed production/advancement of population in forage crops.

The session ended with vote of thanks to the Chairman and Co-Chairman.

# TECHNICAL SESSION VIII
# ADMINISTRATIVE AND SCIENTIFIC ISSUES

**Chairman** : Dr. I. S. Solanki, ADG(FFC), ICAR
**Convener** : Dr. A. K. Roy, PC, AICRP on Forage Crops & Utilisation
**Rapporteurs** : Prof. A.H. Sonone

- Dr. A. K. Roy informed the house that approved budget has already been communicated. There will not be any change or increase in budget allocation. Hence, suitable measures should be taken to limit expenditure within the allocated budget. The details with month wise pay, sanctioned posts should be communicated to PC (FCU).

- Dr. I. S. Solanki, Chairman, ADG(FFC), ICAR informed that AICRP system is now being reorganized and there will be mergers of the projects, curtailment in the sanctioned posts and non-performing centres.

- It was informed that the OIC's of all centres should adhere to the following points:

    1. The AUC should be submitted by all the centres before end of September, 2017.
    2. Pay of contractual posts should be drawn from the head recurring contingencies only.
    3. The vacant posts should not be filled until the EFC memo is approved.

The session ended with vote of thanks to the chairman.

**Annexure A**

# AICRP ON FORAGE CROPS & UTILIZATION
# FINALIZED TECHNICAL PROGRAMME
# FORAGE BREEDING TRIALS - RABI 2017-18

**Abbreviations: HZ**-Hill zone, **NWZ**-North-west zone, **NEZ**-North-east zone, **CZ**-Central zone, **SZ**-South zone; **NC**- National check, **ZC**- Zonal check

**1. IVT Berseem: Initial Varietal Trial in Berseem**

| | |
|---|---|
| **Number of entries** | 6 + 1 (NC) + 1 (ZC) |
| **Contributors** | JNKVV (1), PAU (1), IGFRI (2 ), HAU (2 ) |
| **National checks** | Wardan |
| **Zonal checks** | BL-180 (HZ), Bundel Berseem-2 (CZ & NWZ), Bundel Berseem-3 (NEZ) |
| **Design** | RBD with 3 replications |
| **Plot size** | 3.0 x 3.0 m |
| **Spacing** | Row to row-30 cm (each plot accommodating 10 rows of 3 m length) |
| **Seed rate** | 22 g per plot (approx. 25 Kg/ha) |
| **Seed requirement** | 2.0 Kg/entry and checks & 0.75 Kg for each zonal check |
| **Fertilizer** | N-20 Kg, $P_2O_5$ 80 Kg/ha |
| **Locations (18)** | **HZ-** Palampur, Srinagar, Rajouri<br>**NWZ**-Pantnagar, Bikaner, Hisar, Ludhiana, Udaipur,<br>**NEZ-**Kalyani, Ranchi, Faizabad, Bhubaneswar, Pusa<br>**CZ**- Jhansi, Rahuri, Jabalpur, Urulikanchan, Raipur |

**2. AVT-1 Berseem: First Advance Varietal Trial in Berseem**

| | |
|---|---|
| **Number of entries** | 3 + 2 (NC) + 1 (ZC) |
| **Entries name** | JB-05-10, JHB-16-01, HFB-13-10 |
| **National checks** | Wardan & Mescavi (2) |
| **Zonal checks** | Bundel Berseem-3 (NEZ); Bundel Berseem-2 (CZ) |
| **Design** | RBD with 4 replications |
| **Plot size** | 3.0 x 4.0 m |
| **Spacing** | Row to row-30 cm (each plot accommodating 10 rows of 3 m length) |
| **Seed rate** | 30 g per plot (approx. 25 Kg/ha) |
| **Seed requirement** | 1.5 Kg/entry & NC & each ZC |
| **Fertilizer** | N-20 Kg, $P_2O_5$ 80 Kg/ha |
| **Locations (10)** | **NEZ-**Kalyani, Ranchi, Faizabad, Bhubaneswar, Pusa<br>**CZ**- Jhansi, Rahuri, Jabalpur, Urulikanchan, Raipur |

**3. AVT-2 Berseem: Second Advance Varietal Trial in Berseem**

| | |
|---|---|
| **Number of entries** | 2 + 2 (NC) + 1 (ZC) |
| **Entries name** | JB-05-9, PC-82 |
| **National checks** | Wardan & Mescavi (2) |
| **Zonal checks** | Bundel Berseem-2 (NWZ), |
| **Design** | RBD with 4 replications |
| **Plot size** | 3.0 x 4.0 m |
| **Spacing** | Row to row-30 cm (each plot accommodating 10 rows of 3 m length) |
| **Seed rate** | 30 g per plot (approx. 25 Kg/ha) |
| **Seed requirement** | 1.0 Kg/entry from each contributor & NC & ZC |
| **Fertilizer** | N-20 Kg, $P_2O_5$ 80 Kg/ha |
| **Locations (6)** | **NWZ-**Bikaner, Hisar, Ludhiana, Jalore, Pantnagar, & Udaipur |

**4. AVT-2 Berseem (seed) Second Advance Varietal Trial in Berseem (seed)**

| | |
|---|---|
| **Number of entries** | 2 + 2 (NC) + 1 (ZC) |
| **Entries name** | JB-05-9, PC-82 |
| **National checks** | Wardan & Mescavi (2) |
| **Zonal checks** | Bundel Berseem-2 (NWZ), |
| **Design** | RBD with 4 replications |
| **Plot size** | 3.0 x 4.0 m |
| **Spacing** | Row to row-30 cm (each plot accommodating 10 rows of 3 m length) |
| **Seed rate** | 30 g per plot (approx. 25 Kg/ha) |
| **Seed requirement** | 0.6 Kg/entry from each contributor & NC & ZC |
| **Fertilizer** | N-20 Kg, $P_2O_5$ 80 Kg/ha |
| **Locations (4)** | **NWZ**-Bikaner, Hisar, Ludhiana, Pantnagar |

**4A. AVT-2 Berseem (agronomy) Second Advance Varietal Trial in Berseem Agronomy**

| | |
|---|---|
| **Number of entries** | 2 + 2 (NC) + 1 (ZC) |
| **Entries name** | JB-05-9, PC-82 |
| **National checks** | Wardan & Mescavi (2) |
| **Zonal checks** | Bundel Berseem-2 (NWZ), |
| **Design** | RBD - 3 replications total 5x3x3 = 45 plots **3 levels of $P_2O_5$ (60, 80 & 100 kg/ha)** |
| **Plot size** | 4 x 3 m |
| **Spacing** | Row to row-30 cm (each plot accommodating 10 rows of 4 m length) |
| **Seed rate** | 30 g per plot (approx. 25 Kg/ha) |
| **Seed requirement** | 1.0 kg / entry |
| **Fertilizer** | N- 20 kg/ha as basal 3 levels of $P_2O_5$ (60, 80 & 100 kg/ha) |
| **Locations (3)** | **NWZ-**Pantnagar Hisar, Ludhiana |

**5. IVT Oat (SC) Initial Varietal Trial in Oat (Single cut)**

| | |
|---|---|
| **Number of entries** | 11 + 2 (NC) +1 (ZC) |
| **Contributors** | JNKVV(1), PAU (2), HAU (2), NDUAT (1), GBPUAT (2), IGFRI (2), SKUAT-K (1) |
| **National checks** | Kent & OS-6 |
| **Zonal check** | SKO-96 (HZ), RO-11-1 (NWZ), RO-11-1 (NEZ), JHO-2009-1 (CZ), JHO-2010-1 (SZ) |
| **Design** | RBD with 3 replications |
| **Plot size** | 3.0 x 3.0 m |
| **Spacing** | Row to row 25 cm (each plot accommodating 12 rows of 3 m length) |
| **Seed rate** | 90 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 9.0 Kg/entry from each contributor & NC 2.5 Kg for each zonal check |
| **Fertilizer** | N- 80 Kg, $P_2O_5$ -40 Kg/ha |
| **Locations (27)** | **HZ**-Palampur, Srinagar, Rajouri<br>**NWZ**-Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur,<br>**NEZ**-Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, Imphal<br>**CZ**-Jhansi, Rahuri, Urulikanchan, Palgarh, Anand, Jabalpur, Raipur<br>**SZ**-Hyderabad, Tirupati/ Guntur, Mandya, Coimbatore (Ooty), Mattupetty |

**6. AVT Oat (SC)-1 First Advanced Varietal Trial in Oat (Single cut)**

| | |
|---|---|
| **Number of entries** | 8 + 2 (NC) +1 (ZC) |
| **Entries name** | OL-1861, SKO-229, HFO-607, JO-05-7, OL-1869-1 , HFO-525 , OL-1862, UPO-16-4 |
| **National checks** | Kent and OS-6 |
| **Zonal checks** | SKO-90 (HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-2000-4 (SZ), JHO-822 (CZ), |
| **Design** | RBD with 3 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row-25 cm (each plot accommodating 12 rows of 4 m length) |
| **Seed rate** | 120 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 12.0 Kg/entry from each contributor & NC & 3.0 Kg for each zonal check |
| **Fertilizer** | N- 80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (27)** | **HZ**-Palampur, Srinagar, Rajouri<br>**NWZ**-Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur,<br>**NEZ**-Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, Imphal<br>**CZ**-Jhansi, Rahuri, Urulikanchan, Palgarh, Anand, Jabalpur, Raipur<br>**SZ**-Hyderabad, Tirupati/ Guntur, Mandya, Coimbatore (Ooty), Mattupetty |

**7. AVT Oat (SC)-2 Second Advanced Varietal Trial in Oats (Single cut)**

| | |
|---|---|
| **Number of entries** | 4+ 2 (NC) +1 (ZC) |
| **Entries name** | SKO-227, HFO-427, JO-04-22, JHO-15-1 |
| **National checks** | Kent & OS-6 |
| **Zonal check** | SKO-90 (HZ), JHO-2000-4 (SZ) |
| **Design** | RBD with 3 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row-25 cm (each plot accommodating 12 rows of 4 m length) |
| **Seed rate** | 120 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 4.0 Kg/entry from each contributor & NC &2.5 Kg for each zonal check |
| **Fertilizer** | N-80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (8)** | **HZ:** Palampur, Srinagar, Rajouri,<br>**SZ**-Hyderabad, Mandya, Coimbatore (Ooty), Karaikal, Mattupetty |

**8. AVT Oat (SC)-2 (Seed) Second Advanced Varietal Trial in Oats (SC) for Seed**

| | |
|---|---|
| **Number of entries** | 4 + 2 (NC) +1 (ZC) |
| **Entries name** | SKO-227, HFO-427, JO-04-22, JHO-15-1 |
| **National checks** | Kent and OS-6 |
| **Zonal check** | SKO-90 (HZ), JHO-2000-4 (SZ) |
| **Design** | RBD with 3 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row-25 cm (each plot accommodating 12 rows of 4 m length) |
| **Seed rate** | 100 g per plot (approx. 80 Kg/ha) |
| **Seed requirement** | 1.5 Kg/entry from each contributor & NC & 1.0 Kg for each zonal check |
| **Fertilizer** | N-80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (4)** | **HZ:** Palampur, Srinagar, **SZ**-Hyderabad, Mandya |

**8A. AVT Oat (SC)-2 Agronomy Second Advance Varietal Trial in Oat (SC) Agronomy**

| | |
|---|---|
| **Number of entries** | 4+ 2 (NC) +1 (ZC) |
| **Entries name** | SKO-227, HFO-427, JO-04-22, JHO-15-1 |
| **National checks** | Kent and OS-6 |
| **Zonal check** | SKO-90 (HZ), JHO-2000-4 (SZ) |
| **Design** | Split plot with 3 replications total plots = 7x3x3 = 63<br>**with 3 N levels (40, 80, 120 kg N/ha) split dose** |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row-25 cm (each plot accommodating 12 rows of 4 m length) |
| **Seed rate** | 100 g per plot (approx. 80 Kg/ha) |
| **Seed requirement** | 12.0 Kg/entry from each contributor & 4.0 Kg for each zonal check |
| **Fertilizer** | $P_2O_5$-40 Kg/ha basal with 3 N levels (40,80,120 kg N/ha) split dose |
| **Locations (4)** | **HZ** Palampur, Srinagar<br>**SZ**-Hyderabad, Mandya, |

**9. IVTO (MC) Initial Varietal Trial in Oat (Multi cut)**

| | |
|---|---|
| **Number of entries** | 7 + 2 (NC) |
| **Contributors** | JNKVV (1), PAU (2), HPKVV (1), HAU (2), IGFRI (1) |
| **National checks** | UPO-212 and RO-19 |
| **Design** | RBD with 3 replications |
| **Plot size** | 3.0 x 3.0 m |
| **Spacing** | Row to row-25 cm (each plot having 12 rows of 3.0 m length) |
| **Seed rate** | 90 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 6.5 Kg/entry from each contributor & 6.5 Kg for each national check |
| **Fertilizer** | N-80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (18)** | **HZ** Palampur, Srinagar, Almora, Rajouri<br>**NWZ** Pantnagar, Hisar, Ludhiana<br>**NEZ** Ranchi, Pusa, Faizabad, Jorhat, Bhubaneswar, Imphal<br>**CZ** Jhansi, Anand, Jabalpur, Rahuri, Uralikanchan |

**10. IVT Oat (Dual) Initial Varietal Trial in Oat (Dual)**

| | |
|---|---|
| **Number of entries** | 7 + 2 (NC) |
| **Entries name** | JNKVV (1), PAU (2), HAU (2), IGFRI (2) |
| **National checks** | UPO-212 and JHO-822 |
| **Design** | RBD with 3 replications |
| **Plot size** | 3.0 x 3.0 m |
| **Spacing** | Row to row 25 cm (each plot accommodating 12 rows of 3 m length) |
| **Seed rate** | 90 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 5.0 Kg/entry from each contributor & 5.0 Kg for each national check |
| **Fertilizer** | N-80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (15)** | **NWZ**-Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur<br>**NEZ**-Jorhat, Bhubaneswar, Ranchi, Faizabad<br>**CZ**-Jhansi, Rahuri, Uralikanchan, Anand, Jabalpur, Raipur |

**11. AVT-1 Oat (Dual) Advanced Varietal Trial in Oat (Dual)**

| | |
|---|---|
| **Number of entries** | 4 + 3 (NC) |
| **Entries name** | HFO-619, JO-10-501, OL-1871, OL-1769 |
| **National checks** | RO-19, UPO-212 and JHO-822 |
| **Design** | RBD with 3 replications |
| **Plot size** | 3.0 x 4.0 m |
| **Spacing** | Row to row 25 cm (each plot accommodating 12 rows of 3 m length) |
| **Seed rate** | 120 g per plot (approx. 100 Kg/ha) |
| **Seed requirement** | 4.5 Kg/entry from each contributor & 4.5 Kg for each national check |
| **Fertilizer** | N-80 Kg, $P_2O_5$-40 Kg/ha |
| **Locations (10)** | **NEZ**-Jorhat, Bhubaneswar, Ranchi, Faizabad<br>**CZ**-Jhansi, Rahuri, Uralikanchan, Anand, Jabalpur, Raipur |

**12. VT Lucerne (P)-2016 Varietal Trial in Lucerne (Perennial)-1st year – To be continued**

| | |
|---|---|
| **Number of entries** | 10 + 2 (NC) |
| **Contributors** | BAIF (1), TNAU (1), Anand (2), SKRAU (1), MPKV (1), PJTSAU (1), IGFRI (1), Alamdar (2) |
| **National checks** | Anand-2, RL-88 |
| **Design** | RBD with 3 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row 30 cm (each plot accommodating 10 rows of 4.0 m length) |
| **Seed rate** | 30.0 g per plot (Approx. 25 kg/ha) |
| **Seed requirement** | 1.75 kg/entry from each contributor<br>1.75 kg for each national check |
| **Fertilizer** | N-20kg, $P_2O_5$-80 kg/ha |
| **Locations (13)** | **NWZ**- Ludhiana, Bikaner, Jalore, Udaipur **CZ**- Rahuri, Urulikanchan, Anand, Raipur **SZ**- Hyderabad, Coimbatore, Mandya, Tirupati, Dharwad |

**13. AVT-1 – Vicia Advanced Varietal trial in Vicia**

| | |
|---|---|
| **Number of entries** | 5 |
| **Contributors** | JNKVV (5) |
| **National checks** | General mean |
| **Design** | RBD with 4 replications |
| **Plot size** | 3.0 x 3.0 m |
| **Spacing** | Row to row 30 cm (each plot accommodating 10 rows of 3.0 m length) |
| **Seed rate** | 36.0 g per plot (Approx. 40 Kg/ha) |
| **Seed requirement** | 0.75 Kg/entry |
| **Fertilizer** | N-20Kg, $P_2O_5$-40 Kg/ha |
| **Locations (4)** | Jhansi, Jabalpur, Rahuri & Raipur |

**14. VT Lolium -2016 Varietal trial in Rye grass – annual**

| | |
|---|---|
| **Number of entries** | 3 + 1(NC) |
| **Contributors** | PBRG-2, Palam rye grass -1., Palam rye grass-2 |
| **National checks** | PBRG-1 |
| **Design** | RBD with 5 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row 30 cm (each plot accommodating 10 rows of 4.0 m length) |
| **Seed rate** | 10 kg/ha (12g/plot) |
| **Seed requirement** | 400 g for each entry and check |
| **Fertilizer** | N-90 Kg/ha, $P_2O_5$-60 Kg/ha (45 Kg N at the time of sowing and remaining in equal splits after each cut) |
| **Locations (5)** | Palampur, Srinagar, Almora, Bajaura (Kullu), Ludhiana |

**15. VT Red Clover -2016 Varietal trial in Red clover – Perennial -1st year – to be continued**

| | |
|---|---|
| **Number of entries** | 6 + 1 (NC) |
| **Contributors** | IGFRI (6) |
| **National checks** | PRC-3 |
| **Design** | RBD with 4 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row 30 cm (each plot accommodating 10 rows of 4.0 m length) |
| **Seed rate** | 10-12kg/ha (15g/plot) |
| **Seed requirement** | 300 g per entry and check |
| **Fertilizer** | N-40 Kg/ha, $P_2O_5$-40 Kg/ha |
| **Locations (4)** | HZ-Palampur, Srinagar, Bajaura (Kullu), Almora |

**16. VT White Clover -2016 Varietal trial in White clover – Perennial -1st year – to be continued**

| | |
|---|---|
| **Number of entries** | 5+1 (Check) |
| **Contributors** | Palampur -2, IGFRI (3) |
| **National checks** | Palampur Composite |
| **Design** | RBD with 4 replications |
| **Plot size** | 4.0 x 3.0 m |
| **Spacing** | Row to row 30 cm (each plot accommodating 10 rows of 4.0 m length) |
| **Seed rate** | 5 kg/ha (7.5 g/plot) |
| **Seed requirement** | 150 g |
| **Fertilizer** | N-40 Kg/ha, $P_2O_5$-40 Kg/ha |
| **Locations (4)** | HZ-Palampur, Srinagar, Bajaura (Kullu), Almora |

**17. IVT Bajra (Multicut): Initial Varietal Trial in fodder bajra (multicut) in summer**

| | |
|---|---|
| **Number of entries** | **6 + 2 Checks** |
| **Name of entries** | Anand (1), PJTSAU (2), BAIF (1), Advanta (1), UAS Bangalore (1) |
| **National checks** | Giant bajra, Moti bajra (state release) |
| **Design** | RBD with 3 replications |
| **Plot size** | 4.0 x 1.8 m |
| **Spacing** | Row to row: 30 cm (each plot accommodating 6 rows of 4 m length) |
| **Seed rate** | 10 g per plot (approx. 12 Kg/ha) |
| **Seed requirement** | 200g/entry from each contributor and 200 g for each national check |
| **Fertilizer** | N-40 Kg, $P_2O_5$-20 Kg/ha |
| **Sowing time** | 1st Feb - 15th Feb. 2018 |
| **Harvesting schedule** | Ist cut : 50 DAS irrespective of flowering<br>2nd cut : 30 Days after 1st cut<br>3rd cut : 30 Days after 2nd cut |
| **Locations (6)** | **CZ**- Rahuri, Urulikanchan, Anand<br>**SZ-**Hyderabad, Banglore, Vellayani |

**Annexure B**

# AICRP ON FORAGE CROPS
# FINALIZED TECHNICAL PROGRAMME
# FORAGE CROP PRODUCTION TRIALS - RABI 2017-18

**New trials**
**A. Coordinated trials:**

**R-16-AST-1: Enhancing seed productivity of fodder oat in different regions of India under irrigated condition.**

| | |
|---|---|
| **Locations:** IGFRI, Dharwad, PJTSAU, Hyderabad, IGKV, Raipur and JNKVV, Jabalpur | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2017-18 | **Concluding Year:** Rabi 2018-2019 |

**Objectives**

- To study the seed production potential of fodder oat varieties under varying crop geometry and nitrogen doses
- To study effect of crop geometry and nitrogen doses on seed quality of fodder oat varieties
- To study economics of seed production in fodder oat varieties under varying crop geometry and nitrogen doses

**Technical programme**

**Treatments:**

| Factor (A): Varieties | Factor (B): Crop geometry | Factor (C): Nitrogen doses |
|---|---|---|
| JHO -822 | 30 cm row spacing | 80 kg N/ha |
| RO – 19 | 45 cm row spacing | 100 kg N/ha |
| | | 120 kg N/ha |

**Design:** Factorial RBD **Replication:** Three
**Cutting:** 1st cut after 45 DAS than crop left for seed production
**Nitrogen management:** 50% at basal + 50 % after 1st cut
**Number of Treatments combination:** 12 (2x2x3)
**Duration of trial:** 2 years **Seed rate:** 80 kg/ha
**Observations to be recorded:**
**Experimental Details**

| | | | | | |
|---|---|---|---|---|---|
| **Crop** | : | Oats | **Replications** | : | 3 |
| **Duration** | : | 2 Years | **Season** | : | Rabi-2017-18 |
| **Design** | : | Split Plot | | | |
| **Treatments** | : | 12 | | | |

**Observations to be recorded**

- Plant height(cm): at 45 DAS (at first cut) and harvest
- No. of tillers/meter row length: at 45 DAS (at first cut) and harvest
- GFY and DFY (kg/m row length and t/ha) at 45 DAS (at first cut) and harvest
- Panicle length, No of Panicle/$m^2$, Grains / panicle
- Seed yield (kg/ha), Straw yield (t/ha), HI(%)
- Seed quality: 1000 seed wt.(g),Germination (%).
- Stover quality**:** Crude protein.
- Economics: Gross return, net return, B:C ratio

## R-16-AST-2: Enhancement of seed setting in Lucerne through foliar spray

| | |
|---|---|
| **Locations:** Coimbatore, Anand, Ludhiana, Hyderabad, Bikaner and BAIF, Urulikanchan | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2017-18 | **Concluding Year:** Rabi 2018-2019 |

**Objectives**

- To identify the combination of suitable foliar spray for improving seed set in Lucerne
- To study the impact of foliar spray on seed yield and economics of Lucerne.

**Experimental Details**

**Treatments**

**Foliar spray**

$T_1$**:** $ZnSO_4$ 0.25 %
$T_2$ : $K_2SO_4$ 1.0 %
$T_3$ : MAP 1.0 %
$T_4$ : Salicylic acid 100 ppm
$T_5$ : Mepiquat chloride 500 ppm
$T_6$ : TNAU Pulse wonder 1.0 %
$T_7$ : Brasinolide 1.0 ppm
$T_8$ : Control (No foliar spray)

**Replication: 3** **Plot size 4X 5 Sq m**

**Data format**

| Treatments | No. of days taken for maturity | Fertility ratio (%) | No. of pods per plant | No. of seeds per pod | 1000 seed weight (g) | Seed yield (kg/ha) | Seed vigour index | Economics | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Cost of Cultivation (Rs./ha) | Gross return (Rs./ha) | Net Return (Rs./ha) | B:C Ratio |
| **Foliar spray** | | | | | | | | | | | |
| $T_1$**:** $ZnSO_4$ 0.25 % | | | | | | | | | | | |
| $T_2$ : $K_2SO_4$ 1.0 % | | | | | | | | | | | |
| $T_3$ : MAP 1.0 % | | | | | | | | | | | |
| $T_4$ : Salicylic acid 100 ppm | | | | | | | | | | | |
| $T_5$ : Mepiquat chloride 500 ppm | | | | | | | | | | | |
| $T_6$ : TNAU Pulse wonder 1.0 % | | | | | | | | | | | |
| $T_7$ : Brasinolide 1.0 ppm | | | | | | | | | | | |
| $T_8$ : Control (No foliar spray) | | | | | | | | | | | |
| SEm± | | | | | | | | | | | |
| CD (P=0.05) | | | | | | | | | | | |

**Formula**

$$\text{Fertility ratio (\%)} = \frac{\text{No. of filled grains/pod}}{\text{No. of unfilled grains/Pod}} \times 100$$

Seed vigour index = Germination percentage (%) X seedling length (cm)

**NOTE: Chemical arrangements**

Chemicals *viz.,*Salicylic acid, Mepiquat chloride, Brasinolide, TNAU Pulse wonder may be procured on payment basis from TNAU, Coimbatore, centre

## B. Location Specific Trials

### R-17-AST -3: Evaluation of fodder productivity and quality in dual purpose wheat and berseem (single cut) inter cropping system

| | |
|---|---|
| **Location (1):** PAU, Ludhiana | **Data reporting:** Rabi |
| **Year of start:** 2 years (Starting from Rabi 2017-18) | Concluding year: 2018-19 |

**Objective:** To study the fodder productivity, feasibility and economics of dual purpose wheat and single cut berseem intercropping system

**No. of Treatments**: 12

**Design**: factorial RBD **Replications**: 3 Plot size: 6 x 5 $m^2$

**Duration of the experiment**: 2 years (Starting from Rabi 2017-18)

**Main plot- Seed rate of wheat and berseem**

| | |
|---|---|
| S1. Wheat no cut for fodder (only seed) | S2. Wheat pure two cuts |
| S3. Berseem pure | S4. Wheat + berseem recommended seed |
| S5. Wheat + berseem 75 % recommended seed rate | S6. Wheat + berseem 50 % recommended seed rate |

**Subplot- Days to cutting**

**C1-** 60 days after sowing **C2-** 70 days after sowing

Wheat (cv VL829), recommended seed rate 100 kg

Berseem (cv JBSC-1) recommended seed rate 20kg

**Observations to be recorded:**

- Growth and yield attributes and yield of wheat and berseem
- Grain quality of wheat
- Net monetary returns, benefit cost ratio

### R-17-AST-4: Productivity of different forage crops in rice fallow as influenced by integrated nutrient management.

| | |
|---|---|
| **Locations (4):** Ranchi | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2017-18 | **Concluding year:** Rabi 2018-19 |

**Objectives**

- To assess the productivity of food-forage intercropping system on rice fallows
- To study the profitability of food-forage intercropping system influenced by INM

**Treatment details**

**A. Intercropping system (*Rabi* season) (Main plot)**

$T_1$ = Berseem (single cut) $T_2$ = Lathyrus $T_3$ = Rice bean

**B. Integrated Nutrient Management (sub plot)**

$F_1$ = RDF (inorganic) $F_2$ = 50% N of RDF + 50% N through FYM

$F_3$ = 50 % N of RDF + 50% N through Vermicompost

**Year of start**: Rabi 2017-18 **Design** : Split Plot Design (SPD)

**No of replications**: 3 **Total treatments**: 9

**Seeds will be treated with Rhizobium and PSB culture in all the treatments.**

**Observations**

**Soil physico- chemical properties:** Before sowing and after harvest of crop

**Growth and yield attributes:** Plant height and plant population

**Yield of Rice and fodder crops:** Stover yield, Green Forage and Dry Matter Yield

**Quality Parameters:** Crude protein content and crude protein yield

**Economic analysis:** Gross return, Net return and B: C ratio

## C. AVT Based trials

### R-17-AST -5: Effect of N levels on forage yield of promising entries of oat (AVT-2 SC)

**Objective: To study the effect of nitrogen levels and promising entries on yield and quality of oat**

| | | | |
|---|---|---|---|
| **Year** | : Rabi 2017-18 | **Design** | : Split plot |
| **Replications** | : Three | **Plot size** | : 4 m x 3 m |
| **Seed rate** | : 100 g/plot (80 kg/ha) | **Spacing** | : R x R-25 cm |
| **Treatments** | : Combinations:7 x 3=21 | **Total plots** | : 7x3x3=63 |
| **Fertilizer** | **:** $P_2O_5$-40 Kg/ha basal | | |
| **Seed requirement** | **:** 4.0 Kg/entry from each contributor, 4.0 Kg/NC & 2.0 Kg for each zonal check | | |

**Treatment details:**
**Main plot:**
**(A) Entries** : 4+2+1 (Entries-4, NC (2) and ZC (1)
**Entries (4**) : SKO-227, HFO-427, JO-04-22, JHO-15-1
**National checks:** (2): Kent, OS-6
**Zonal checks** (1): SKO-90 (HZ), JHO-2000-4 (SZ)

**Sub-plot: (B) N- levels**: 3 (40, 80, and 120 kg N /ha) (Split application of nitrogen)
**Observations to be recorded:**

- Tiller number /m row length at harvest
- Growth parameters (Plant height (cm) and leaf: stem ratio)
- Green fodder, dry fodder yields (q/ha)
- Crude protein content (%) and CP yield (q/ha)
- Per day productivity (Green fodder, dry fodder)

**Seed requirement**: Testing entry/national check: **4.0kg,** Zonal check**: 2.0 kg**

**Locations (4): HZ-** Palampur, Srinagar **SZ-** Hyderabad, Mandya,

## R-17-AST -6: Effect of P levels on forage yield of promising entries of Berseem (AVTB2-MC)

**Objective:** To assess the effect of phosphorus levels and promising entries on yield and quality of berseem

**Year**: Rabi 2017-18 **Design**: Split plot **Replications**: Three
**Plot size**: 4 m x 3 m **Seed rate**: 30 g per plot (approx. 25 Kg/ha)
**Treatments: Combinations: 5x 3=15** **Total plots: 5x3x3=45** **Fertilizer**: 20 Kg N/ha as basal
**Spacing**: Row to row-30 cm (each plot accommodating 10 rows of 4 m length)

**Treatment Programme:**

**Main plot:**

| | | | |
|---|---|---|---|
| **(A) Entries (5)**: | 2+2+1 (Entries-2, NC (2) and ZC (1) | Entries (2) | : JB-05-9, PC-82 |
| | **National checks: (2)**: Wardan & Mescavi | | |
| | **Zonal checks (1):** Bundel Berseem-2 (NWZ), | | |

**(B) $P_2O_5$-levels (3):** 60, 80 and 100 Kg /ha

**Observations to be recorded**

- Plant population/ m row length
- Growth parameters (Plant height and Leaf: stem ratio)
- Green fodder, dry matter and crude protein yield (q/ha)
- Dry matter content
- Per day productivity (Green fodder, dry fodder)

**Note:** 1st Cut has to be taken at 60 Days after sowings

**Seed requirement**: Testing entry/national check/ Zonal check: **900g,**

**Locations (3) : NWZ**-Pantngar, Hisar, Ludhiana,

**ONGOING TRIALS**

## PS-14-AST-4: Studies on the effect of planting geometry of tall fescue grass and seed rates of white clover in wet temperate conditions

| | |
|---|---|
| **Location (2):** Palampur and Srinagar | **Data reporting:** Rabi |
| **Year of start:** Rabi 2014-15 (1st year establishment) | **Concluding year:** Rabi 2019 |

**Objectives:**

- To evaluate the productivity, quality and compatibility of tall fescue grass + white clover mixture
- To estimate soil NPK and soil organic carbon (SOC) storage under different treatments

**Technical details:**

**Design**: Randomized block design **Year of start**: Rabi 2014-15 **Duration**: Three years
**Replications**: Three **Plot size**: 3.60 m x 3.60 m

**Treatments** (11 including sole stand of tall fescue and white clover):

**(A) Spacing of tall fescue grass -3***

(a) 20 cm x 30 cm (b) 30 cm x 30 cm (c) 40 cm x 40 cm

**(B) White clover seed rate (Kg/ha)-3****

(a) 1.0 (b) 2.0 (c) 3.0

All possible combination of A and B plus sole stand of Tall fescue grass at 30 cm x 30 cm spacing, and white clover @ 6 kg/ha sowing by broadcast.

**Note**: (*Tall fescue seedling will be established through transplanting; ** Seed of white clover will be over sown by broadcast after transplanting of tall fescue grass)

**Observations to be recorded**:

- Plant height (cm); L/S ratio; Per cent proportion of each species (on dry weight basis)
- GFY, DMY, CPY (q/ha) CP Content
- Competition functions, net returns (Rs/ha) and benefit cost ratio
- Soil NPK, pH, total soil organic carbon storage (Tonnes carbon/ha) before start of the experiment and after completion of the experiment

## R-14-AST-1-: Studies on the production potential feasibility of annual rye grass with berseem in hill zone

| | |
|---|---|
| **Locations (2):** Palampur and Srinagar | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2014 | **Concluding year:** Rabi 2017 |

**Objectives:**

- To explore the possibilities of rye grass cultivation with or without berseem in the hill region.
- To evaluate the effect of different seeding ratio of rye grass with berseem on productivity and quality of forage
- To estimate the effect on soil NPK and soil organic carbon (SOC) storage under different treatments.

**Technical details:**

**Design**: Randomized block design **Replications**: Three **Year of start**: Rabi 2014-15
**Plot size**: 3.0 m x 3.0 m **Duration**: Three years

**Treatment (13)**

**(a) Rye grass genotypes * (3)**

(i) Punjab Rye grass-1 (ii) Kashmir collection (iii) Seed from 'ATMA' (HP)

**(b) Seed rate of ratio of rye grass: Berseem**

(i) 100:0 (ii) 75:25 (iii) 50:50 (iv) 25:75

All possible combination of A and B plus sole stand of berseem sown by broadcast.
*(*Crops will be sown by broadcast)*

**Observations**:

- Plant height (cm); L:S ratio; Per cent proportion of each species (on dry weight basis)
- GFY, DMY and CPY (q/ha) and CP content (%)
- Competition functions (Sole berseem and Punjab Rye grass will be considered as standard check for computation of competition functions)
- Net returns (Rs/ha) and benefit cost ratio
- Soil NPK , pH, Total soil organic carbon storage (Tonnes carbon /ha) before start of the experiment and after completion of the experiment in each season

**K-15-AST-9 C: Development of climate resilient production technologies on productivity and economics of food - fodder based cropping systems**

| | |
|---|---|
| **Locations:** (4) Pantnagar, Ranchi, Kalyani, Jabalpur | **Data Reporting:** Rabi |
| **Year of Start:** 2015 | **Concluding year:** Rabi 2020 |

**Objectives**

- To study the effect of climate change on productivity and profitability of food– fodder based cropping systems.
- To find out the suitable climate resilient production technology for higher profitability of grain – fodder based cropping systems.

**Experimental detail:**

**Duration of the experiment** : 03 years **Replication** : 04
**Design** : Split Plot Design **Plot Size** : 3m x 5 m

| | |
|---|---|
| **Main plot: (Climate Resilient technology): 04** | |
| 1. | Zero tillage- (All the crops) |
| 2. | Minimum tillage single pass of cultivator + sowing with seed drill. |
| 3. | Conventional tillage |
| 4. | Zero tillage- minimum tillage- Zero tillage. |
| **Sub plot (Cropping systems): 04** | |
| 1. | Rice (upland) – Berseem - Maize + Cowpea |
| 2. | Maize (Baby corn) – Berseem – Sorghum (Fodder) |
| 3. | Maize (Baby corn) – Wheat – Rice bean (Fodder) |
| 4. | Sorghum (Fodder) – Berseem – Maize (Baby Corn) |

**Observation to be recorded:**

a. Growth attributes of all crops of the system
b. Green forage yield
c. Dry Forage yield
d. Economic yield,
e. Quality parameters (CP content and yield, NDF and ADF)
f. Residual soil fertility status of the systems at beginning and end of each crop cycle.
g. Forage equivalent yield of the systems,
h. Economics of the systems.

## K-15-AST-11 C: Studies on carbon sequestration in perennial grass based cropping systems

| | |
|---|---|
| **Locations:** Hyderabad, Coimbatore, Vellayani, Ranchi, Jabalpur & Anand | **Data Reporting:** Rabi |
| **Year of Start:** 2015 | **Concluding year:** Rabi 2019 |

**Objectives:**

- To study the effect of cropping system on carbon sequestration
- To study the effect of cropping system on Fodder yield, quality, Soil fertility & economics

**Experimental Details:**

**Design** : RBD **Replications**: 3 **Period** : Three years

**Treatments**

| | |
|---|---|
| $T_1$ | BN hybrid at recommended spacing |
| *$T_2$ | Guinea grass at recommended spacing |
| $T_3$ | BN hybrid in paired rows (60/120 cm) + Fodder cowpea (Kharif) - Lucerne (Rabi) |
| $T_4$ | BN hybrid in paired rows (60/120 cm) + *Desmanthus* (Perennial) |
| $T_5$ | BN hybrid in paired rows (60/120 cm) + *Sesbania grandiflora* |
| *$T_6$ | Guinea grass in paired rows (60/120 cm) + Fodder cowpea (Kharif) - Lucerne (Rabi) |
| $T_7$ | Guinea grass in paired rows (60/120 cm) + *Desmanthus* (Perennial) |
| $T_8$ | Guinea grass in paired rows (60/120 cm) + *Sesbania grandiflora* |

*T2 and T6 cowpea included instead of lucerne at Kerala (Vellayani)

**Observations to be recorded**

**Soil**

- Pre sowing analysis – EC, pH, OC, NPK
- Post harvest analysis – EC, pH, OC, NPK

**Growth parameters**

- Plant height, No. of tillers/ $m^2$, Leaf length, Leaf breadth, Leaf stem ratio

**Yield parameters**

- Green fodder yield, Dry matter yield
- Root weight, Root volume (After the end of three years)

**Quality parameters**

- Crude protein, Crude protein yield, Crude fibre

**Economics**

- Net return, B:C ratio

## K-15-AST-12 C: Studies on the productivity and carbon sequestration of silvipastoral systems in hills of north western Himalayas

| | |
|---|---|
| **Locations (3):** Palampur and Srinagar | **Data Reporting:** Rabi |
| **Year of Start:** Establishment Year | **Concluding year:** Rabi 2019 |

**Objectives:**

- To study the system productivity and organic matter input to soil through silvipastoral system

**Experimental Details:**

- **Design:** Spilt plot **Replications:** 3 **Period:** Three years
- **Replications:** Three

**Treatments:**

**Main plot treatments: Trees species**

- Salix (3 m x 3m)
- Morus (3m x 3m)

**Sub plot Treatments: Range species**

- Setaria grass (var. S-18) (30cm x 30 cm)
- Fescue grass (var. Hima-14) (30 cm x 30 cm)
- White clover (var. Palampur Composite) (Broadcast)
- Fescue grass + White clover (Fescue grass at 30 cm x 30 cm spacing and with broadcasting of white clover)
- Local system (Natural grasses cover)

**Note: Salix and Morus will be planted at 3 m x 3m spacing, White clover seed rate in sole stand 6 kg/ha and in mixed stand 3 kg/ha**

**Observations:**

**Soil**

Pre sowing analysis – EC, pH, OC, NPK

Post harvest analysis – EC, pH, OC, NPK

Monthly OM content in 0-30 cm soil surface

**Quality parameters**

Crude protein and crude fibre contents (%)

Crude protein and crude fibre yield (q/ha)

**Growth and yield parameters**

Fresh and dry weight ($g/m^2$)

Green and dry fodder yield (q/ha)

Root weight (after the end of five years)

Root volume (after the end of five years)

**Economics**

Net return

B:C ratio

**R-15-AST-1**: **Productivity of oat - lathyrus intercropping system as influenced by integrated nutrient management.**

| | |
|---|---|
| **Locations (4):** Kalyani, Ranchi, Imphal, Bhubaneswar | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2015 | **Concluding year:** Rabi 2018 |

**Objectives**

- To assess the productivity of food-forage intercropping system on rice fallows
- To study the profitability of food-forage intercropping system influenced by INM

**Treatment details**

**A. Intercropping system (*Rabi* season) (Main plot)**

**$T_1$ =** Sole oat **$T_2$ =** Lathyrus **$T_3$ =** Oat + Lathyrus (3:2) **$T_4$ =** Oat + Lathyrus (3:3)

**B. Integrated Nutrient Management (sub plot)**

**$F_1$ =** RDF (inorganic) **$F_2$ =** 50% N of RDF + 50% N through FYM
**$F_3$ =** 50 % N of RDF + 50% N through Vermicompost

**Year of start**: Rabi 2015-16
**Design**: Split Plot Design (SPD)
**No of replications**: 3
**Total treatment**: 12

**Seeds will be treated with Rhizobium and PSB culture in all the treatments.**

**Observations to be recorded**

**Soil physico- chemical properties**

before sowing and after harvest of crop

**Growth and yield attributes and yield of oat**

Plant height and plant population

Green forage and dry matter yield

**Productivity of cropping system**

Land Equivalent Ratio (LER)

Green Forage Equivalent Yield

Harvest Index

**Growth and yield attributes and yield of legume**

Plant height and plant population

Stover yield, Green Forage and Dry Matter Yield

**Quality Parameters**

Crude protein content

crude protein yield

**Economic analysis**

Gross return

Net return

and B: C ratio

**B. Location Specific Trials**

## K-15-AST-1 L: Studies on different models for year round green fodder production under irrigated condition

| | |
|---|---|
| **Location (1):** Mandya | **Data Reporting:** Rabi |
| **Year of Start:** Kharif 2015 | **Concluding year:** Rabi 2019 |

**Objectives:**

- To identify the sustainable cropping system with respect to soil fertility and crop productivity.
- To study the different combinations of perennial and seasonal fodder crops for productivity.
- To study economics of different models.

**Experimental Details:**

| | |
|---|---|
| **Duration:** Three years | **Design:** RBD |
| **Replications:** 4 | **Plot size :** Gross : 4.80 x 5.00 m |
| **No. of treatments:** 6 | **Year of Start:** Kharif 2015 |

| Treatments | Kharif | Rabi | Summer |
|---|---|---|---|
| $T_1$ | Fodder Maize + Cowpea (3:1) | Fodder Oat + Lucerne (3:1) | Pearl millet + Cowpea (3:1) |
| $T_2$ | Fodder Sorghum + Cowpea (3:1) | Fodder Maize +Cowpea (3:1) | Pearl millet + Cowpea (3:1) |
| $T_3$ | B N hybrid +Cowpea (2:8) | B N hybrid +Cowpea (2:8) | B N hybrid + Cowpea (2:8) |
| $T_4$ | B N hybrid + Lucerne (2:8) | Year round | |
| $T_5$ | B N hybrid + Desmanthus (2:8) | Year round | |
| $T_6$ | B N hybrid + *Sesbania sps.*(2:8) | Year round | |

**Note: B N hybrid will be raised in the paired row method (between pair 2.4 m & with in pair 0.6 m)**

**Observations to be recorded:**

a. Plant height (cm) at the time of harvest
b. Green forage yield (q/ha)
c. Dry matter yield (q/ha)
d. Crude protein content (%) and yield (q/ha)
e. Economics of the system (net returns, B:C ratio)
f. Soil N, P, K, OC, PH and EC before sowing and after completion of the sequence.

## K-15-AST-2 L: Performance of Napier bajra hybrids as influenced by nature of vegetative propagules

| | |
|---|---|
| **Location (1):** IGFRI, RRS, Dharwad | **Data Reporting:** Rabi |
| **Year of Start:** 2015 | **Concluding year:** Rabi 2018 |

**Objectives:**

- To study the establishment pattern in napier bajra hybrids through different vegetative propagules.
- To study the influence of vegetative propagules on fodder productivity.
- To work out the economics of vegetative propagules in napier bajra hybrids.

**Experimental Details:**

| | |
|---|---|
| **Design**: Split-Plot design | **Sub plots:** Vegetative propagules |
| **Main plots:** NB Hybrid varieties | **Plot size**: 4 m x 3.6 m |
| **Replications**: Three | **Spacing**: 60 cm x 60 cm |

**Treatments**

| **I. NB Hybrid varieties: 3** | **II. Planting material: 4** |
|---|---|
| 1. DHN 6 (Sampoorna) | 1. Rooted slip 1 eyed |
| 2. Co (BN)- 5 | 2. Rooted slip 2 eyed |
| 3. IGFRI 7 | 3. Stem cutting 1 eyed |
| | 4. Stem cutting 2 eyed |

**Observations to be recorded:**

**Growth**

- No. of established plants at 30, 45, 60, 75 DAT
- No. of tillers at 60, 75, 90 DAT
- Height of tillers at 60, 75, 90 DAT
- Dry matter/hill (g) at 60, 75, 90 DAT
- Days to flowering
- No. of cuts (at 50% flowering) /annum

**Yield**

- GFY & DFY (t/ha/annum)
- Volume (cubic meter) & weight (kg) of planting material/ha

**Quality**

- Crude protein content (%) and yield (t/ha) at each cut

## K-15-AST-3 L: Studies on Integrated nutrient management in Fodder Rice bean

| | |
|---|---|
| **Location (1):** Imphal | **Data Reporting :**Rabi |
| **Year of Start:** 2015 | **Concluding year:** Rabi 2018 |

**Objectives:**

- To assess effect of chemical fertilizer and poultry manure on productivity of fodder rice bean and soil health.
- To work out the economics.

**Experimental Details:**

**Design :** RBD
**Plot Size :** 4X3
**Seed rate :** 35 kg/ha
**Replications:** 3
**Spacing :** 30 cm (R-R)
**Duration:** 03 years

| **Treatments** | | | |
|---|---|---|---|
| $T_1$ | 100% RDF | $T_2$ | 75% RDF for phosphorus + 1 tonne Poultry manure |
| $T_3$ | 75% RDF for phosphorus + 2 tonne Poultry manure | $T_4$ | 50% RDF for phosphorus + 1 tonne Poultry manure |
| $T_5$ | 50% RDF for phosphorus + 2 tonne Poultry manure | $T_6$ | 25% RDF for phosphorus + 1tonne Poultry manure |
| $T_7$ | 25% RDF for phosphorus + 2 tonne Poultry manure | | |

**Observation to be recorded:**

| **I. Growth and yield parameters** | **III. Economics** |
|---|---|
| Plant height | • Cost of cultivation |
| Leaf Stem ratio | • Net return |
| Green forage yield (q/ha), Dry matter yield (q/ha) | • BC ratio |
| **II. Quality** | **IV. Soil health** |
| Crude protein content (%) | Available NPK content inbeing and of each year |
| Crude protein yield (kg/ha) | |

## R-15-AST-2: Productivity of oat - pea intercropping system as influenced by integrated nutrient management.

| | |
|---|---|
| **Location:** Jorhat | **Data Reporting:** Rabi |
| **Year of Start:** Rabi 2015 | **Concluding year:** Rabi 2018 |

**Objectives**

- To assess the productivity of food-forage intercropping system on rice fallows
- To study the profitability of food-forage intercropping system influenced by INM

**TECHNICAL DETAILS**

**A. Intercropping system (*Rabi* season) (Main plot)**

**$T_1$**= Sole oat **$T_2$**= Sole pea **$T_3$** = Oat + pea (3:2) **$T_4$** = Oat + pea (3:3)

**B. Integrated Nutrient Management (sub plot)**

**$F_1$=** RDF (inorganic) **$F_2$=** 50% N of RDF+50%N through FYM **$F_3$=** 50% N of RDF+50%N through Vermicompost

**Year of start**: Rabi 2015-16 **Design**: Split Plot Design (SPD)

**No of replications**: 3 **Total treatment**: 12

Seeds will be treated with *Rhizobium* and PSB culture in all the treatments.

**Observations to be recorded**

**Soil physico- chemical properties**

- Before sowing and after harvest of crop

**Growth and yield attributes and yield of oat**

- Plant height and plant population
- Green forage and dry matter yield

**Growth and yield attributes and yield of pea**

- Plant height and plant population
- Stover yield, Green Forage and Dry Matter Yield

**Productivity of cropping system**

- Land Equivalent Ratio (LER)
- Green Forage Equivalent Yield
- Harvest Index

**Quality Parameters**

- Crude protein content
- Crude protein yield

**Economic analysis**

- Gross return
- Net return
- B: C ratio

## R-15-AST-4: Study on lucerne + oats /sarson fodder production system at variable seed rates of mixed crop under irrigated condition

| | |
|---|---|
| **Location:** Bikaner | **Data reporting:** Rabi |
| **Year of Start:** Rabi 2015 | **Concluding year:** Rabi 2018 |

**Objectives**

- To find out optimum seed rate of oats/ sarson mixed cropping for long term stable green fodder.
- To work out the economics of different treatments.

**Treatment**

| | | | |
|---|---|---|---|
| $T_1$ | 100 % Seed rate lucerne (20kg/ha) | $T_6$ | T1+40 kg/ha oats |
| $T_2$ | 100 % Seed rate oats (100 kg/ha) | $T_7$ | T1+0.625 kg/ha Sarson |
| $T_3$ | T1+10 kg/ha oats | $T_8$ | T1+1.250 kg/ha Sarson |
| $T_4$ | T1+20 kg/ha oats | $T_9$ | T1+1.880 kg/ha Sarson |
| $T_5$ | T1+30 kg/ha oats | $T_{10}$ | T1+2.50kg/ha Sarson |

**Design** : RBD **Replications** : Three **Plot size**: 5.0m x 3.5 m, Net 4.0 m x 2.5 m

**Varieties** : Oats- Kent/UPO-212, Lucerne- T-9/Anand Lucerne-2,

**Fertilizer:**

- 20 kg N, 40kg $P_2O_5$, 20 kg $K_2O$, 12.5 kg $ZnSO_4$ as basal, and
- 20 kg N in two equal splits at 30 DAS and after first cut for GF
- Foliar sprays of 0.5% $ZnSO_4$ 10 days after first cut and 10 days thereafter.

**Cutting management: first** cut at 50-55DAS and next cut 35-40 days' intervals.

**Observations to be recorded**

**Growth and yield attributes**

- Plant height and plant population
- Green forage and dry matter yield

**Quality Parameters**

- Crude protein content
- Crude protein yield

**Economic analysis**

- Gross return
- Net return
- B: C ratio

## R-15-AST-5: Effect of Zinc and Boron on seed production potentiality of oat under red and lateritic soil of West Bengal

| | |
|---|---|
| **Location:** Visva-Bharati, Sriniketan, West Bengal | **Data reporting:** Rabi |
| **Year of Start:** Rabi 2015 | **Concluding year:** Rabi 2018 |

**Objectives**

- To study the seed production potentiality of oats as influenced by Zn and B application
- To study the seed quality of oats as influenced by Zn and B
- To study economics of oats seed production as influenced by Zn and B application

**Technical Details**

**Treatments**

$T_1$- Control (No Zn and No B)
$T_2$- $ZnSO_4$@ 15 kg/ha
$T_3$- $ZnSO_4$@ 20 kg/ha
$T_4$- $ZnSO_4$@ 25 kg/ha
$T_5$- Borax@5 kg/ha
$T_6$- Borax@10 kg/ha
$T_7$- Borax@15 kg/ha
$T_8$- $ZnSO_4$@ 15 kg/ha + Borax@5 kg/ha
$T_9$- $ZnSO_4$@ 15 kg/ha+ Borax @10 kg/ha
$T_{10}$- $ZnSO_4$@ 15 kg/ha + Borax @15 kg/ha
$T_{11}$- $ZnSO_4$@ 20 kg/ha+ Borax @5 kg/ha
$T_{12}$- ZnSO4 @20 kg/ha + Borax @ 10 kg/ha
$T_{13}$- ZnSO4 @ 20 kg/ha + Borax @ 15 kg/ha
$T_{14}$- ZnSO4 @ 25 kg/ha + Borax @ 5 kg/ha
$T_{15}$- ZnSO4 @ 25 kg/ha + Borax @ 10 kg/ha
$T_{16}$- ZnSO4 @ 25 kg/ha + Borax @ 15 kg/ha

**Oats variety**: JHO-822 **Year**: Rabi 2015-16 **Design**: RBD
**Replications**: Three **Plot size**: 4.0 m x 3.0 m **Duration**: Three years

**Observations to be recorded**

Plant height (cm) Plant population/m length Leaf: stem ratio
Seed yield (t/ha) Straw yield (t/ha)
Seed quality: Test wt., seed viability, L: S ratio, seed germination, crude protein % and crude protein yield.
Economics: Gross return, net return, B:C ratio

## R-15-AST-6: Evaluation of sowing window suitable for forage oats cultivation in the coastal region of Pudducherry

| | |
|---|---|
| **Location:** Puducherry | **Data reporting:** Rabi |
| **Year of Start:** Rabi 2015 | **Concluding year:** Rabi 2018 |

**Objectives**

- To explore the feasibility of introducing a new forage crop during *Rabi* season in the coastal region of Puducherry
- To find out the sowing window suitable for forage oats cultivation during *Rabi* season in the coastal region of Puducherry

**Treatment Combinations (8)**

1. Sowing of Kent on October Second Fortnight
2. Sowing of Kent on November First Fortnight
3. Sowing of Kent on November Second Fortnight
4. Sowing of Kent on December First Fortnight
5. Sowing of JHO- 2000-4 on October Second Fortnight
6. Sowing of JHO- 2000-4 on November First Fortnight
7. Sowing of JHO- 2000-4 on November Second Fortnight
8. Sowing of JHO- 2000-4 on December First Fortnight

**Design:** RBD **Replications:** 3

**Observations**

| | |
|---|---|
| Plant height (cm) | Dry fodder yield (q/ha) |
| Leaf stem ratio | Green fodder yield (q/ha) |
| Days to harvesting | Per day productivity (q/ha/day) |

## K-16-AST-1: Feasibility of Hydroponics fodder production system - A Quantitative and Qualitative study.

| | |
|---|---|
| **Locations (4):** Vellayani, Mandya and Ludhiana | **Data Reporting:** Rabi |
| **Year of Start:** 2017 for three years | **Concluding year:** Rabi 2019 |

**Objectives:**

- ✓ To evaluate the suitability of different crops for growing under Hydroponics system
- ✓ To find out ideal seed rate and cutting interval for quality biomass production
- ✓ To quantify the fodder quality in Hydroponics terms of proximate factors in various crops at different stages of harvest
- ✓ To study the economics of the system

**Treatments**

- **Crops: (3)** Maize, Sorghum and Cowpea
- **Seed rate: (3)** 200g, 300g and 400g per square feet
- **Time interval for harvest (4):** 9 days, 11days, 13 days and 15 days
- **Design & Replications** : CRD & Three

**Observations to be recorded**

1. Seed to GFY multiplication ratio in terms of GFY according to crop wise intervals of harvest, crop wise
2. GFY at different harvest intervals
3. Yields at different seed rates and managerial/handling issues if any
4. Quality viz., Dry matter percent, crude protein, ADF, NDF, EE, ash content and enzymes present at different stages of harvest
5. Diseases or pest noted if any.
6. Economics of the system

## K-16-AST-1 A: Evaluation of seasonal variations and different nutrient media on Performance of Hydroponics fodder production

| | |
|---|---|
| **Locations (4):** Hyderabad | **Data Reporting:** Rabi |
| **Year of Start:** 2017 for one years | **Concluding year:** 2018 |

**Objectives:**

- ✓ To evaluate the performance of hydroponics fodder production of maize in the three seasons viz., *Kharif, Rabi* and summer.
- ✓ To study the effect of various nutrient media on performance of hydroponics fodder
- ✓ To find out ideal nutrient composition for optimum growth of Hydroponics
- ✓ To identify the ideal harvesting interval in different seasons and nutrient media
- ✓ To quantify the fodder quality in Hydroponics terms of proximate factors in various seasons and nutrient media.
- ✓ To study the economics of the system

**Main Treatments:** 3 seasons' viz., *Kharif, Rabi* and summer
**Sub treatments:** nutrient media: 3 or 4 media solutions
**Sub-sub treatment:** Time interval for harvest: 7 days, 9 days, 11days
**Crop:** Maize **Seed rate:** 200g per square feet
**Design & Replications :** Factorial RBD & Three

**Observations to be recorded**

- Seed multiplication ratio in terms of GFY according to seasons and growth media
- Ideal Harvest interval with season and growth media
- Quality viz., Dry matter percent, crude protein, ADF, NDF, EE, ash content and enzymes present at different seasons and growth media
- Economics of the system

**K-16-AST-6 : Organic nutrient management in sorghum-berseem cropping sequence for sustainable fodder production**

| | |
|---|---|
| **Location (1):** CCS, HAU, Hisar | **Data Reporting:** Rabi |
| **Year of Start:**2016 | **Concluding Year:** Rabi 2021 |

**Objectives:**

- To study the effect of organic sources of nutrients on yield and quality of forage in sorghum- Berseem cropping system.
- To study the influence of organic sources of nutrients on soil fertility.
- To work out the economics

**Experimental Details:**

**Design :** RBD **Replication(s):** Three **Variety:** Sorghum HJ 541 and Berseem HB 1
**Crop sequence:** sorghum (single cut) – Berseem **Plot size:** 12x8 = 96 sq
**Duration:** 5 years **No of Treatments :** 9

**Treatment details:**

**$T_1$:** Recommended dose of fertilizers through inorganic source (75 kg N + 15 kg P2O5/ha:N in two splits i.e. 50 kg at sowing an 25 kg after one month, full dose of phosphorus as basal dose, Berseem : 25 kg N + 70 kg P2O5/ha both at the time of sowing
**$T_2$:** 20 t FYM/ha (15 t in sorghum and 5 t/ha in berseem)
**$T_3$:** 20 t FYM/ha (15 t in sorghum + 5 t in berseem) + biofertilizer
**$T_4$:** 20 t FYM/ha (15 t in sorghum + 5 t in berseem) + Green manuring
**$T_5$:** 20 t FYM/ha (15 t in sorghum + 5 t in berseem) + biofertilizer + Green manuring
**$T_6$:** 7.5 t vermicompost/ha (5 t in sorghum + 2.5 t in berseem)
**$T_7$:** 7.5 t vermicompost/ha (5 t in sorghum + 2.5 t in berseem) + biofertilizer
**$T_8$:** 7.5 t vermicompost/ha (5 t in sorghum + 2.5 t in berseem) + Green manuring
**$T_9$:** 7.5 t vermicompost/ha (5 t in sorghum + 2.5 t in berseem) + biofertilizer + Green manuring

**Observations to be recorded:**

**Growth:**

- Plant height (cm)
- No. of tillers per hill
- Leaf stem ratio
- Days to 50% Flowering

**Yield and quality:**

- Green fodder yield (q/ha)
- Dry matter yield (q/ha)
- Crude protein yield (q/ha)
- Dry matter (%)
- Crude protein (%)

**Quality studies:** Crude protein, Crude fibre and IVDMD
**Economics:** Net monetary returns & benefit cost ratio
**Soil studies:** physico-chemical properties of soil before sowing and after harvest, microbial population before starting and after completion of trial

## K-16-AST-8: Resource management in rice- oat cropping system under sodic soil.

| | |
|---|---|
| **Location:** NDUAT, Faizabad | **Data Reporting:** Rabi |
| **Year of Start:** Kharif 2016 | **Concluding Year:** Rabi 2019 |

**Objectives:**

- To study the effect of organic sources of nutrients on yield and quality of forage in Rice- Oat cropping system.
- To study the influence of integrated resource management on soil fertility.
- To work out the economics

**Experimental Details:**

**Design:** RCBD **Replication(s):** Three **Crop sequence:** Rice-Oat
**Plot size:** 4 x 3 M **Duration:** 4 years **No of Treatments:** 8

**Treatment details:**

**$T_1$:** Control
**$T_2$:** RDF 120 Kg N: 60Kg $P_2O_5$:40Kg$K_2O$:25 Kg $ZnSO_4$/ha
**$T_3$:** 75 % RDF+25%N substitution through bio: compost (press mud)
**$T_4$:** 75 % RDF+ 25%N substitution through green manuring (dhaincha)
**$T_5$:** 75 % RDF+ 25%N substitution through crop residue
**$T_6$:** 50% RDF+ 50%N substitution through bio: compost (press mud)
**$T_7$:**50% RDF+ 50%N substitution through green manuring (dhaincha)
**$T_8$:**50% RDF+ 50%N substitution through crop residue

**Note: All the treatments will be applied in rice and oat crop will be grown with recommended fertilizer dose.**

**Observations to be recorded:**

**Growth:**

- Plant height (cm)
- No. of tillers per hill/m row length
- Leaf stem ratio
- Days to 50% Flowering

**Yield and quality:**

- Green fodder yield (q/ha)
- Dry matter yield (q/ha)
- Crude protein yield (q/ha)
- Dry matter (%)
- Crude protein (%)
- Grain Yield (q/ha)
- Straw Yield (q/ha)
- Harvest Index (%)

**Economics:** Net monetary returns & benefit cost ratio
**Soil Properties:** OC %, EC, $p^H$, Exchangeable Na% available NPK (Kg/ha)

## R-16-AST-3: Effect of Nitrogen Levels and seed rate on fodder Productivity of Rye Grass *(Lolium multiflorum)* under rice fallows.

**Center:** AAU, Jorhat and OUAT, Bhubaneswar

**Objectives:**

1) To study the effect of Nitrogen (N) levels on fodder productivity and quality of Rye grass.
2) To find out the optimum seed rate for higher productivity and quality.

**Experimental Details**

| | | | | | |
|---|---|---|---|---|---|
| **Crop** | : | Rye grass | **Replications** | : | 3 |
| **Season** | : | Rabi-2016-17 | **Design** | : | Split Plot |
| **Treatments** | : | 12 | **Variety** | : | PRG-1 |
| **Duration** | | 3 Years | Concluding | | Rabi-2018-19 |
| **Gross Plot Size** | | 4.0 x 3.0 m | | | |

**A) Main Plot (Seed rate-3)**

- Seed rate of 10 kg/ha
- Seed rate of 15 kg/ha
- Seed rate of 20 kg/ha

**B) Sub Plot (Nitrogen Levels-4)**

- 0 kg N/ha
- 30 Kg N/ha
- 60 Kg N/ha
- 90kg/ha

**Observations to be recorded:**

**A. Soil Physico- Chemical properties at sowing and at harvest of the crop**

**B. Growth and yield attributes**

1) Plant height (cm)
2) Number of tillers/$m^2$
3) Green forage yield
4) Dry Matter Yield

**C. Quality parameters**

1) Crude protein Content
2) Crude protein Yield

**D. Economic analysis**

1) Cost of cultivation
2) Gross returns
3) Net returns
4) B:C ratio

## B. Location specific

### R-16-AST-4: Effect of stubble management and planting density on establishment and productivity of forage lathyrus under zero tillage condition in rice fallows.

**Center:** CAU, Imphal

**Objectives:**

1) To study the effect of stubble management practices on fodder productivity and quality of Lathyrus.
2) To find out the optimum seed rate for higher productivity and quality.

**Experimental Details:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Crop** | : | Lathyrus | **Replications** | : | 3 | **Duration** | : | 3 Years |
| **Season** | : | Rabi-2016-17 | **Design** | : | Split Plot | **Gross Plot Size** | : | 4.0 x 3.0 m |

**Treatments:** 12

**A) Main Plot (Stubble Management-4)**

- Rice stubble at 10 cm above ground level
- Rice stubble at 25 cm above ground level
- Rice stubble at 40 cm above ground level
- Bending of rice stubbles (without cutting)

**B) Sub Plot (Seed rate-3)**

- 40 Kg N/ha
- 50 Kg N/ha
- 60 kg/ha

**Observations to be recorded:**

**Soil Physico- Chemical properties**

sowing and at harvest of the crop

**Growth and yield attributes**

Plant height (cm)

Number of tillers/$m^2$

Green forage yield

Dry Matter Yield

**Quality parameters**

Crude protein Yield

Crude protein Content

**Economic analysis**

Cost of cultivation

Net returns

Gross returns

B: C ratio

**R-16-AST-5: Seed yield maximization in Oat *cv.* RO-19 (Phule Harita).**

**Objectives:**

1. To study the effect of different levels of calcium silicate on lodging and seed yield of oat.
2. To study the effect of different levels of cutting on lodging and seed yield of oat.
3. To study the combined effect of different levels of calcium silicate and cutting on lodging and seed yield of oat.
4. To study the economics of different treatments.
5.

**Experimental Details**

**Crop** : Oat RO-19 (Phule Harita)
**Duration** : 3 Years
**Design** : FRBD
**Treatments** : 12
**Seed rate** : 100 Kg $ha^{-1}$
**Spacing** : 30 cm apart
**Fertilizer dose** : 120:50:40 Kg N; $P_2O_5$ : $K_2O$ $ha^{-1}$

**Treatment details:**

**A) Levels of Calcium silicate (Kg $ha^{-1}$)**
**B) Cutting management (DAS)**

$S_1$- 0 (Control)
$C_1$- No cutting
$S_2$- 200
$C_2$- 45
$S_3$- 300
$C_3$ - 55
$S_4$- 400

**Note:**

1. FYM will be applied @ 3 ton FYM Kg $ha^{-1}$ before sowing of crop.
2. Calcium silicate will be applied as a basal dose.
3. Nitrogen will be applied in two equal splits for no cutting management treatment ($C_1$) *i.e.* at basal & 30 DAS and in case of cutting after 45 DAS ($C_2$) and 55 DAS ($C_3$) in three equal splits *i.e.* at basal, 30 DAS & after 1st cut.
4. Total quantity of $P_2O_5$ &$K_2O$ will be applied in all the treatments as a basal dose only.

**Replications** : 3
**Season** : Rabi-2016-17
**Plot size : Gross:** 4x 3m : **Net :** 3.40 x 2.40 m

**Observations to be recorded:**

1. Initial plant count and
2. Plant height at 50 % flowering.
3. Panicle length.
4. Lodging (%) at harvest
5. Seed yield (q $ha^{-1}$)
6. Seed germination (%)
7. Lignin content (%) in straw.
8. Soil analysis at initial & after harvest of crop for available N,P,K, pH, EC and OC content.

**Location:** MPKV, Rahuri

# AICRP on Forage Crops and Utilization
# Technical Programme
# FORAGE CROP PROTECTION
# Rabi 2017-18

**Annexure C**

**PPT1: Monitoring of pathogens and insect-pests associated with berseem, lucerne and oat ecosystem**

**Locations:** Jhansi, Ludhiana, Bhubaneswar, Rahuri, Hyderabad, Palampur, Dharwadand Hissar

**Observation:** Occurrence of pathogens and insect pests should be recorded at weekly intervals after the appearance of the pests. The data on disease and insect pest incidence/severity should be correlated with the weather parameters.

**PPT 2(A): Field screening of *rabi* breeding trials for resistance to diseases and insect-pests**

**Locations:** Jhansi, Ludhiana, Bhubaneswar, Rahuri, Hyderabad, Palampur, Dharwad and Hisar

**PPT 2(B): Evaluation of berseem entries for resistance to root and stem rot disease under sick plot**

**Locations:** Jhansi and Ludhiana

**PPT 17: To study the pathogenic variability of *Bulmeria graminis f. sp. avenae* on oat**

**Location:** Palampur

(i) Characterization of pathogenic virulence.

**PPT 20: Management of soil bonre and powdery mildew diseases inred clover seed crop**

**Location:** Palampur

**Design:** RBD **Replication:** 3 **Plot size:** 2 x 2 $m^2$

**Treatments:**

**$T_1$:** Seed treatment with *Trichoderma* @ 5g/kg seed
**$T_2$ :** Seed treatment with Carbendazim@ 2 g/kg seed
**$T_3$:** $T_1$ + Three foliar spray of *Trichoderma* @ 0.5%
**$T_4$:** $T_2$ + Three foliar spray of *Trichoderma* @ 0.5%
**$T_5$:** $T_1$ + Three foliar spray of Wettable sulphur@ 0.3%
**$T_6$ :** $T_2$ + Three foliar spray of Wettable sulphur@ 0.3%
**$T_7$ :** $T_1$ + Three foliar spray of Hexaconazole @ 0.1 %
**$T_8$:** $T_2$ + Three foliar spray of Hexaconazole @ 0.1 %
**$T_9$ :** $T_1$ + One spray each of *Trichoderma,* wettable sulphur and hexaconazole
**$T_{10}$ :** $T_2$ + One spray each of *Trichoderma,* wettable sulphur and hexaconazole
**$T_{11}$:** Control

**Observations:**

1. Disease severity of powdery mildew.
2. Disease incidence of soil bone diseases.
3. Seed yield (q/ha).

**PPT 21: Management of foliar diseases of oat.**

**Locations:** Ludhiana and Bhubaneswar

**Design:** RBD **Replication:** 3 **Treatment:** 7

**Treatments:**

**T1:** Seed Treatment with Carbendazim 50 WP @ 2.0 g /kg of seed
**T2:** Seed Treatment with *Trichoderma viride* (CFU $10^6$ / gm of formulation) *5 g* /kg of seed
**T3:** Seed Treatment with *T. viride* (CFU $10^6$ / gm of formulation) *5 g* /kg of seed + foliar sprays of *T. viride* @ 0.5% at 21 DAS
**T4:** $T_1$ + Foliar application of Carbendazim 12 % + Mancozeb 63 % WP @ 1 g / lit after 21 DAS
**T5:** $T_2$ + Foliar application of Carbendazim 12 % + Mancozeb 63 % WP @ 1 g / lit after 21 DAS
**T6:** $T_1$ + Foliar application of Propiconazole 25 EC @ 1 ml / lit after 21 DAS
**T7:** $T_2$ + Foliar application of Propiconazole 25 EC @ 1 ml / lit after 21 DAS
**T8:** Untreated

**Observations:**

1. Incidence and severity of diseases will be recorded.
2. Yield at 50 % flowering.

**PPT 26: Biological management of Oat aphid *Rhopalosiphum padi* on Oat**

**Locations:** Rahuri, Ludhiana, Dharwad
**Plot size:** 3 x 4 $m^2$ **Replication:** 03 **Design:** RBD
**Treatments:**

**T1:** Foliar application of *L.lecani* @ $1X10^8$ CFU/g (5 g/lit)
**T2:** Foliar application of *L. lecani* @ $1X10^8$ CFU/g (7.5 g/lit)
**T3:**Foliar application of *M. anisopliae* @ $1X10^8$ CFU/g (5 g/lit)
**T4:**Foliar application of *M. anisopliae* @ $1X10^8$ CFU/g (7.5 g/lit)
**T5:**Commercial neem product (Azadirachtin – 10000 ppm) @ 2ml/lt
**T6:**NSE @ 5%
**T7:**Untreated control

**Observations:**

1. Precount and post treatment count of larvae will be taken at 5 and 7 DAS.
2. Natural enemy count.
3. Green fodder yield(q/ha).
4. Economics.

*Bioagents will be supplied by Rahuri centre and the seeds of oat variety Kent will be supplied by Ludhiana centre.

**PPT 27: Validation of best treatment of trial entitled "Management of soil borne diseases in clover seed crop"**

**Locations:** Ludhiana
**Design:** Paired plot Design **Replication:** 7 **Treatment:** 2
**Treatments:**

**T1:** Foliar application of Carbendazim @ 1.0 kg/ha
**T2:**Untreated control

**PPT 28: Validation of best treatments of trial entitled "Studies on biological management of *Spodoptera litura* in relation with different time of application on lucerne under field condition"**

**Locations:** Rahuri
**Design:** RBD **Replication:** 7 **Treatment:** 3
**Treatments:**

**T1:** Foliar application of *SlNPV* @ 1ml/lit + *B. bassiana* @ $1X10^8$ CFU/g (5 g/lit) at 8 pm
**T2:** Foliar application of *SlNPV* @ 1ml/lit + *N. releyi* @ $1X10^8$ CFU/g (5 g/lit) at 8 pm
**T3:** Untreated control

**Observations:**

1. Precount and post treatment count of *S.litura* larvae at 5 and 7 DAS.
2. GFY and DMY (q/ha).
3. Economics.

**PPT 29: Validation of best treatments of trial entitled "Biological control of *Helicoverpa armigera* on lucerne/ berseem seed crop"**

**Locations:** Rahuri, Ludhiana and Dharwad
**Crop:** Lucerne **Variety:** RL-88 **Plot size:** 100 $m^2$ each treatment
**Treatments:** 03 **Replication:** 07 **Design:** RBD
**Treatments:**

**T1:** Foliar application of *HaNPV* @ 1ml/lit + *N. rileyi* @ $1X10^8$ CFU/g (5 g/lit)
**T2:** Foliar application of *HaNPV* @ 1ml/lit + *B. bassiana* @ $1X10^8$ CFU/g (5 g/lit)
**T3:** Untreated control

**Observations:**

1. Precount and post treatment count of larvae will be taken at 5 and 7 DAS.
2. Honey bee activitieswill be monitored 12 hrs after treatment.
3. Seed yield (q/ha).
4. Economics.

***Bioagents will be supplied by Rahuri centre.**

**PPT 30: Biological management of powdery mildew of oats caused by *Blumeria graminis f.* sp. *avenae***
**Location: Palampur**
**Treatments:** 10 **Replications:** 3 **Design:** RBD
**Plot size:** 3x2 $m^2$

**T1:** Three foliar spray of *Trichoderma viride* @ 0.5%
**T2:** Three foliar spray of *Trichoderma harzianum* @ 0.5%
**T3:** Three foliar spray of *Psuedomonas flourescens* @ 0.5%
**T4:** Three foliar spray of extract of *Eupatorium adenophorum* @ 10%
**T5:** Three foliar spray of Azadirachtin 3000 ppm @ 0.3%
**T6:** Three foliar spray of NSE 5%
**T7:** Three foliar spray of Eucalyptus @ 10%
**T8:** Three foliar spray of Vitex @ 0.1%
**T9:** Three foliar spray of hexaconazole @0.1% (Chemical control)
**T10**: Control

**Observations:**

1. Powdery mildew severity (%)
2. Seed yield (q/h)

**PPT 31: Eco-friendly Pest Management Techniques in Berseem Ecosystem**

**Location: Ludhiana**
**Design:** RBD **Replication:** 3 **Plot size:** 5x5 $m^2$

**Treatments:**

- **T1:** Soil application of *Trichoderma viride* @ 5 g/l + foliar spray of NSKE @ 5%
- **T2:** Soil application of *Trichoderma viride* @ 5 g/l + foliar spray of carbendazim@ 2g/l as and when required
- **T3:**Chickpea as trap crop on border row + Bird perches +spray of NSKE @ 3ml/lit of water
- **T4:** Sunfloweras trap crop on border row + Bird perches+ Spray of NSKE @ 3ml/lit of water on trap crop
- **T5:**T3+ T4
- **T6:** Farmer's Practice (Spray of Bavistan on fodder as well as seed crop +Malathion on fodder crop and Chlorantraniliprole 18.5 SCon seed crop)
- **T7:** Control

**Target Pests and Diseases:**

1. Stem rot (*Sclerotinia trifoliorum*)
2. Lepidopteran pests (*H. armigera, Spodpotera sp* and *Trichoplusia sp*)

**Observations:**

1. Per cent incidence of stem rot.
2. Number of larvae (*H. armigera* or other lepidopteran larvae) per meter row length on berseem crop.
3. Number of larvae/ plant on trap crop.
4. Activity of natural enemies on trap as well as berseem crop.
5. Green fodder yield and seed yield.

**ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS & UTILIZATION**
**(Indian Council of Agricultural Research)**
**NATIONAL GROUP MEET: *Rabi 2017-18***

**Date: 4-5 September, 2017** **Venue:** UAS, GKVK campus, Bengaluru, Karnataka

**TENTATIVE PROGRAMME**

**September 4, 2017**

| | |
|---|---|
| **08:00-10:00** | **REGISTRATION** |

| | |
|---|---|
| **10:00-11:00** | **INAUGURATION** |
| Chief Guest | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Chairman | Dr. H. Shivanna, Vice Chancellor, UAS, Bengaluru |
| Guest of Honour | Dr. P. Kaushal, Joint Director, ICAR- NIBSM, Raipur |
| Welcome | Dr. Y G Shadakshari, Director Research, UAS, Bengaluru |
| Project Coordinator's Report | Dr. A. K. Roy, Project Coordinator |
| Remarks Guest of honour | Dr. P. Kaushal, Joint Director, ICAR- NIBSM, Raipur |
| Remarks Chief Guest | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Chairman's Address | Dr. H. Shivanna, Vice Chancellor, UAS, Bengaluru |
| Vote of Thanks | Dr. C. R. Ravishankar, Associate Director of Research, UAS (B) ZARS Mandya |
| **11:00-11:15** | **High Tea** |

| | |
|---|---|
| **11:15-12:45 TECHNICAL SESSION-I: INTERACTIVE SESSION WITH STAKEHOLDERS** | |
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| The session will be held with 2-3 lectures on technical aspects and ready to share technologies by SAU/ICAR. It will also showcase advances made by certain centers at farmer's field. Different stakeholders like Animal husbandry group, livestock keepers, dairy personnel, fodder growers, forage seed growers will present their expectations and problems in the interaction meeting. | |
| Rapporteurs | Dr. P. Mahadevu |

| | |
|---|---|
| **12:45-13:30 TECHNICAL SESSION-II: BREEDER SEED PRODUCTION** | |
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| BSP Report & Allocation | Dr. Shahid Ahmed |
| Rapporteurs | Dr. R. K. Agrawal |
| **13:30-14:00** | **LUNCH** |

| | |
|---|---|
| **14:00-16:00 TECHNICAL SESSION-III: DISCIPLINE WISE REPORT** | |
| Chairman | Dr. I. S. Solanki (ADG, FFC ICAR) |
| Forage crop Improvement | Dr. Shahid Ahmed |
| Forage crop Production | Dr. R. K. Agrawal |
| Forage crop Protection | Dr. A. B. Tambe |
| Rapporteurs | Dr. D. K. Banyal & Dr. Usha Thomas |
| 16:00-16:10 | Tea |

| | |
|---|---|
| **16:00-18:00 TECHNICAL SESSION-IV (concurrent sessions) FORMULATION OF TECHNICAL PROGRAMME** | |
| **TECHNICAL SESSION-IV (Concurrent)–FORAGE CROP IMPROVEMENT** | |
| Chairman | Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi |
| Rapporteurs | Dr. C. Babu & Dr. Y. Jindal |
| Finalization of varietal trials | Dr. Shahid Ahmed |
| **TECHNICAL SESSION-IV (Concurrent)–FORAGE CROP PRODUCTION** | |
| Chairman | Dr. B.K. Ramachandrappa, Chief Scientist Dry land. |
| Co-Chairman | Dr. Menhi Lal |
| Rapporteurs | Dr. S. K. Jha& Dr. Joseph Koering |
| Finalization of trials | Dr. R. K. Agarwal |
| **TECHNICAL SESSION-IV (Concurrent)–FORAGE CROP PROTECTION** | |
| Chairman | Dr. A.R.V. Kumar, Head, Crop Protection Division, UAS, Bangalore |
| Rapporteurs | Dr. Pravisini Behera& Dr. A. B. Tambe |
| Finalization of trials | Dr. A.B. Tambe |
| **18:00 - 19:00** | **VARIETAL IDENTIFICATION COMMITTEE MEETING** |

**September 5, 2017**

| **09:00-12:30** | **TECHNICAL SESSION V: REVIEW OF CENTRE-WISE ACTIVITIES** |
|---|---|
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Convener | Dr. A. K. Roy, Project Coordinator (FCU) |
| Rapporteurs | Dr. Naveen Kumar & Dr. M. Shanti |
| Hill Zone | CSK HPKV Palampur ; SKUAST (K) Srinagar; VPKAS Almora |
| North West Zone | PAU Ludhiana, CCS HAU Hisar, GBPUAT Pantnagar, SKRAU, Bikaner, IGFRI-RRS Avikanagar, CAZRI Jodhpur, SKRAU-RRS Jalore, MPUAT Udaipur, IIW&BR (dual purpose barley) Karnal |
| North East Zone | NDUAT, Faizabad ; BAU Ranchi ; BCKV Kalyani; OUAT Bhubaneswar ; AAU Jorhat ; CAU Imphal ; RAU Pusa |
| Central Zone | AAU Anand ; JNKVV Jabalpur ; IGFRI Jhansi ; MPKV Rahuri ; BAIF Urulikanchan ; IGKV Raipur ; CSAUAT Kanpur ; Dhari/Dapoli |
| South Zone | PJTSAU Hyderabad ; UAS (B) ZRC Mandya ; TNAU Coimbatore ; KAU Vellayani ; IGFRI-RRS; Dharwad |

| **12:30-13:30** | **TECHNICAL SESSION-VI: FTD & TSP FORMULATION** |
|---|---|
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Convener | Dr. A. K. Roy, Project Coordinator |
| Rapporteurs | Dr. R. K. Agrawal |
| **10:30-10:45** | Tea |

| **13:30-14:30** | **Lunch** |
|---|---|

| **14:30-15:45** | **TECHNICAL SESSION VII:PGR/breeding/production/protection issues** |
|---|---|
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Co-Chairman | Dr. A. K. Roy, PC |
| Rapporteurs | Dr. Santosh Jha & Dr P Takawale |
| 2-3 lectures on various aspects; Future programme/thrust areas/identification | |

| **15:45-16:30** | **TECHNICAL SESSION-VIII:** Scientific, Administrative and financial issues |
|---|---|
| Chairman | Dr. I. S. Solanki, ADG (FFC), ICAR |
| Convener | Dr. A. K. Roy, Project Coordinator (FCU) |
| Rapporteur | Dr. A. Sonone |

| **17:00-18:00** | **PLENARY SESSION** |
|---|---|
| Chairman | Dr. I. S. Solanki, ADG FFC, ICAR |
| Convener | Dr. A. K. Roy, PC |
| Rapporteurs | Dr. R. K. Agrawal & Dr. P. Mahadevu |
| **Presentation of the recommendations by respective rapporteurs** | |
| Technical session – I Interactive session with stakeholders | Dr. P. Mahadevu |
| Technical session – II Breeder Seed Production | Dr. R. K. Agarwal |
| Technical session – III Discipline-wise presentation | Dr. D. K. Banyal |
| Technical session - IV Forage Crop Improvement | Dr. C. Babu |
| Technical session - IV Forage Crop Production | Dr. S. K. Jha |
| Technical session – IV Forage Crop Protection | Dr. Pravasini Behera |
| Technical session – V Centre wise activities | Dr. M. Shanti |
| Technical session – VI FTD & TSP formulation | Dr. R. K. Agrawal |
| Technical session-VII PGR/breeding/production/protection issues | Dr. P. Takawale |
| Technical session – VIII – Scientific/ administration/ financial issues | Dr. A. Sonone |
| Varietal Identification Committee Meeting Report | Dr. A. K. Roy |
| Co chairman's remarks | |
| Chairman's Remarks | Dr. I. S. Solanki |
| Vote of Thanks | Dr. B.G. Shekara & Dr. A. K Roy |

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# Glimpses of Media Coverage

**Annexure F**


ಹೊಸ ದಿಗಂತ

ಐಸಿಎಆರ್‌ನ ಸಹಾಯಕ ನಿರ್ದೇಶಕ ಡಾ.ವಿ.ಎಸ್.ಸೋಲಂಕಿ

## ಮೇವು ಸಂಶೋಧಕರ ಸಂಖ್ಯೆ ಕಡಿಮೆ




ಈನಾಡು ಮಂಗಳವಾರం సెప్టెంబరు 5, 2017



ಪಶುಗ್ರಾಸಂಪೈ ಸಮಾಚಾರ ದೀಪಿಕ


ಉದಯವಾಣಿ

ಮೇವಿನ ಬೆಳೆಗಳು ಮತ್ತು ಉಪಯೋಗಗಳು ಕುರಿತಾದರಿಲ್ಲಿ ರಾಯ್ ಕಲೆ

## 'ಮೇವು ಬೆಳೆವ ಪ್ರದೇಶ, ಉತ್ಪಾದನೆ ಹೆಚ್ಚಾಗಲಿ'