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20 सितंबर, 2021

Proceedings

National Group Meeting: Rabi 2021-22  
20 September, 2021

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चारा फसलें एवं उपयोगिता  
(भारतीय कृषि अनुसंधान परिषद)

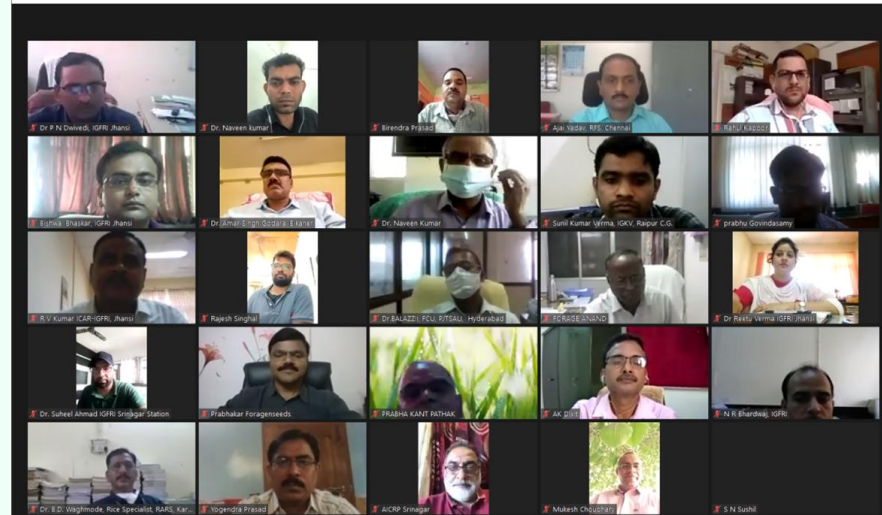


एक कदम स्वच्छता की ओर

All India Coordinated Research Project  
on Forage Crops & Utilization  
(Indian Council of Agricultural Research)

Project Coordinating Unit  
ICAR-IGFRI, Jhansi-284 003 (U.P.)  
<http://www.aicrponforagecrops.res.in>

**All India Coordinated Research Project  
on Forage Crops & Utilization  
(Indian Council of Agricultural Research)**



**Proceedings**

of the

**National Group Meeting: Rabi 2021-22  
20<sup>th</sup> September, 2021 (Online)**

**Project Coordinating Unit  
All India Coordinated Research Project  
on Forage Crops & Utilization  
ICAR-IGFRI, Jhansi-284 003 (U.P.)**

**September, 2021**

**AICRP on Forage Crops and Utilization**

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**Proceedings of the National Group Meeting: Rabi 2021-22  
Held on 20<sup>th</sup> September, 2021 (online)**

This document is meant for official use only for the AICRP (FC&U) Centres, Coordinating Unit, ICAR Headquarters and Forage Scientists.

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September, 2021

## PREFACE

The National Group Meet, *Rabi* 2021-22 of 'All India Coordinated Research Project on Forage Crops and Utilization' was organized with the objectives to review the accomplishments of technical programme executed during *Rabi* 2020-21 at different Coordinating and Cooperating centres, In-house research activities, Breeder Seed Production, Forage Technology Demonstrations (FTDs), Tribal sub-plan (TSPs) and other activities carried out towards development and promotion of forage resources. The formulation and finalisation of technical programme for *Rabi* 2021-22 was successfully done during the meet. The meeting was held online on 20<sup>th</sup> September, 2021.



The meeting was attended by the scientists engaged in forage research and development working under coordinating and collaborating centers located at different SAUs, ICAR institutes and NGOs. Representatives of NDDDB, 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 contributed in the development and refinement of programme and strengthening linkages for future course of action. This compilation contains brief report of National Group Meet, *Rabi* 2021-22 covering highlights on forage crop improvement, forage crop production and forage crop protection technology generated, proceedings of different technical sessions and technical programme for the coming *Rabi* season 2021-22. The finalized technical programme on forage crop improvement, forage crop production and forage crop protection for *Rabi* 2021-22 have been given in annexure.

The successful conductance of the event is attributed to the joint efforts made by the ICAR/IGFRI authorities, participating scientists, Principal Investigators and staff of the Project Coordinating Unit at 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 authorities at ICAR, particularly Dr. T. Mohapatra, Director General, ICAR; Dr. T. R. Sharma, Deputy Director General (Crop Science); Dr. R. K. Singh, Assistant Director General (CC & FFC); Assistant Director General (Seed) and other Officials of ICAR for their constant guidance, support and encouragement as well as financial and administrative approval.

We are thankful to Dr. Amaresh Chandra, Director IGFRI and Heads of Divisions, scientists, administrative and finance personnel of IGFRI, Jhansi for their constant support.

A.K. Roy

Project Coordinator

**AICRP on Forage Crops and Utilization  
National Group Meeting –Rabi 2021-22  
20<sup>th</sup> September 2021**

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## Technologies developed

### Varieties Identified

1. **Berseem entry BM 12:** Developed by PAU, Ludhiana, the entry was identified and recommended for release in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.
2. **Berseem entry JHB 18-1:** Developed by ICAR-IGFRI, Jhansi, the entry was identified and recommended for release in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.
3. **Berseem entry JHB 18-2:** Developed by ICAR-IGFRI, Jhansi, the entry was identified and recommended for release in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.
4. **Fodder Oat (Multicut system) entry HFO-707:** Developed by CCSHAU, Hisar, the entry was identified and recommended for release in the states of Terai part of Uttarakhand, Punjab, Haryana, and Rajasthan under multicut irrigated system in rabi season.
5. **Fodder Oat single cut entry OL 1874-1:** Developed by PAU, Ludhiana, the entry was identified and recommended for release in the states of Telangana, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh under single cut irrigated system in rabi season.
6. **Fodder Oat single cut entry HFO-806:** Developed by CCSHAU, Hisar, the entry was identified and recommended for release in the states of Himachal Pradesh, UT of J&K, Telangana, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh under single cut irrigated system in rabi season.
7. **Multicut summer fodder Bajra entry BAIF Bajra-5:** Developed by BAIF, Uralikanchan, the entry was identified and recommended for release in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.
8. **Multicut summer fodder Bajra entry BAIF Bajra-6:** Developed by BAIF, Uralikanchan, the entry was identified and recommended for release in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.
9. **Multicut summer fodder Bajra entry TSFB-18-1:** Developed by PJTSAU, Hyderabad, the entry was identified and recommended for release in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.

## Fodder Production Technologies

- 1. Organic fodder production system for Haryana:** Application of 20t FYM/ha (15t for sorghum + 5t for berseem) + bio-fertilizers + green manuring is recommended for Haryana state in Sorghum- Berseem cropping system.
- 2. Organic fodder production system for milkshed areas Haryana:** Application of 7.5t Vermi-compost/ha (5t for sorghum + 2.5t for berseem) + bio-fertilizer + green manuring can also be recommended as it recorded comparable yield in Sorghum-Berseem cropping system.
- 3. Bio-fortification of Zinc & Iron in fodder maize for Telangana:** Application of 10 Kg ZnSO<sub>4</sub> + 10 Kg FeSO<sub>4</sub> as a basal + 1.0 % ZnSO<sub>4</sub> + 1.0% FeSO<sub>4</sub> foliar spray at 45 days after sowing is recommended for higher Zn and Fe content in the forage maize.
- 4. Top feed based cropping system for Karnataka, Kerala and Tamil Nadu states:** Cultivation of Agase as top feed planted at 2.0x0.5 m and intercropped with 1 row of BxN Hybrid is recommended as sustainable and economical top feed based cropping system for Karnataka, Kerala and Tamil Nadu states.
- 5. Lucerne seed yield for Rajasthan:** Intercropping of Fennel (*Anethumgraveolens*) with Lucerne is recommended for higher yield of quality seeds in Lucerne in Rajasthan.
- 6. Forage oats in rice fallows under Zero tillage condition for NEH region:** Sowing of Oats (120 Kg seeds/ha) in between the rows of rice stubbles is recommended for Manipur and similar areas of NEH region for rice fallows.
- 7. Variety and cutting management for higher seed yield of Berseem:** In Jharkhand and Uttarakhand state, for higher biomass and quality seed yield berseem variety Wardan and BL-10, respectively, are recommended under 4 cut with last cut by 1<sup>st</sup> week of April then left for seed production.
- 8. Nutrient management in dual purpose Oat for West Bengal, Assam, Manipur, Uttar Pradesh, Madhya Pradesh and Gujarat states:** Application of 75% of RDN (60: 40: 40 Kg N P<sub>2</sub>O<sub>5</sub>& K<sub>2</sub>O) + Vermi-compost @ 2t + PSB application to Soil @ 1.5 Kg along with Seed treatment with *Azotobactor* @ 10 g/Kg seed + ZnSO<sub>4</sub> @ 20 kg/ha (soil application as basal) + Foliar spray of ZnSO<sub>4</sub> (0.5%) just before flowering is recommended for West Bengal, Assam, Manipur, Uttar Pradesh, Madhya Pradesh and Gujarat states.

## Fodder Protection Technologies

- 1. Management of aphid (*Rhopalosiphumpadi*) in oat:** One foliar spray of *L. lecanii* (1X10<sup>8</sup> CFU/g) @ 7.5 g/litre of water when the aphid population reaches economic threshold level can be recommended for biological management of oat aphid in central and northwest zone.
- 2. Management of powdery mildew disease in oat:** Three foliar sprays of *Trichoderma viride* @ 0.5% at 10 days interval starting from disease onset can be recommended for biological management of powdery mildew disease of oat in hill zone.

## **Summarized Major Recommendations**

- AICRP FC&U should keep a track of golden jubilee forage garden established at different universities and institutions so that it should be maintained in an efficient manner for dissemination of information to the target group.
- Pre-breeding activities should be strengthened to broaden the genetic base and break the yield barrier of the existing old forage varieties.
- Focused and multi-centre programmes on biofortified and disease/insect-pest resistant forage varieties should be made.
- Interlinking of AICRP forage programme with other departments and schemes of Govt. having similar mandate should be explored.
- Collaboration with private companies to enhance forage seed production and commercialization should be explored.
- A technology identification committee should be constituted like varietal identification committee to identify and popularize the best technologies to boost fodder production.
- General Survey and surveillance of diseases, insect pest incidence should be done regularly throughout the season in farmer's field for checking the population dynamics of insect pests and pathogens.
- Agro ecosystem based IPM is need of the day and should be taken in to consideration.
- Efforts should be made to fill the vacant posts at the earliest

## Session-I (Opening session)

Session I	Opening Session
Chairman	Dr. T.R. Sharma, DDG (CS), ICAR
Co- Chairman	Dr . R. K. Singh, ADG (CC), ICAR
Rapporteurs	Dr. R K Agrawal and Dr. N. R. Bhardwaj

Dr. Amaresh Chandra, Director, ICAR-IGFRI, welcomed all the delegates and highlighted the major issues to be discussed in the meeting throughout the day.

Dr. A. K. Roy, Project Coordinator, presented the brief introduction of the project, salient achievements during last three year's period and summary of activities carried out during Rabi 2020-21 as well as new initiatives for future programme. He highlighted release of 55 forage varieties, 37 production and 11 protection technologies during the SFC period of 2017-20.

Three publications including AICRP Annual Report Rabi 2020-21, and one farmers' friendly literature in regional language were released. Certificates of appreciation were awarded to centres whose varieties were identified during Kharif-2021 NGM. Certificate was also awarded to superannuating scientist.

Dr. R.K. Singh, Assistant Director General (CC& FFC), ICAR, appreciated the efforts made by AICRP group for contribution to sustainable livestock production.

- He emphasized that efforts should be made to bridge the gap between demand and supply of green, dry fodder and concentrates.
- Quality seed production in forage should be done in PPP mode.
- Interlinking of AICRP forage programme with other departments and schemes of Govt. having similar mandate should be explored.
- An action plan to meet out the targets fixed in EFC should be made.

Dr. Tilak Raj Sharma, Deputy Director General (Crop Sciences), ICAR welcomed all the participants in the meeting.

- He emphasized that Project coordinator should keep a track of 'Golden Jubilee Forage Garden' established at different universities and institutions. It should be maintained in an efficient manner for dissemination of information to the target group.
- There is need to reduce the existing gap between fodder demand and supply in the country through technological use.
- Pre-breeding activities should be strengthened to broaden the genetic base and break the yield barrier of the existing old forage varieties.
- There is a need to fill the vacant posts at different centers at the earliest.
- Focused and multi-centre programmes on biofortified and disease/insect-pest resistant forage varieties should be made.
- Collaboration with private companies to enhance forage seed production and commercialization should be explored.
- An update on inter-AICRP collaboration should be given at the earliest.
- Action taken report should be presented in quantifiable terms.
- A technology identification committee for technology identification and approval should be constituted under ICAR guidance.

Session ended with vote of thanks to the chair.



## Session II Forage Crop Improvement

Chairman	Dr. Bhagmal, Secretary (TAAS) & Ex-Director IGFRI
Co-chairman	Dr. Amaresh Chandra Director, ICAR-IGFRI, Jhansi
Subject Expert	Dr. D. R. Malaviya, FNAAS, Ex- Head, ST Division, IGFRI Dr. A. K. Tyagi, FNAAS, ADG, Animal Nutrition, ICAR
Rapporteurs	Dr. P. Mahadevu & Dr. Gayathri G
<b>Presentation of results</b>	
Pre Breeding activities	Dr. A. K. Roy, Project Coordinator
Plant Breeding	Dr Rahul Kapoor, PAU, Ludhiana
Germplasm and seed issues	Dr Rahul Kapoor, PAU, Ludhiana

At the outset, the Chairman welcomed the delegates and highlighted the need of pre breeding and breeding of forage crops for developing varieties for farmers.

### Pre- breeding

Dr. A. K. Roy, Project Coordinator presented the action taken report on Rabi 2020 recommendations as well as the pre breeding and breeding activities. The trait and activity matrix in different forage crops mainly forage Oat, Berseem, Lucerne, Grasspea, Tall Fescue, White Clover, Red Clover, Rye Grass, BN hybrid and Bajra (Summer and Multicut) was presented. Also, the detailed crop wise activity of each center was presented.

The following new programmes were proposed to be carried out during this season.

- Quality profiling of rabi forage varieties and advanced breeding lines
- Hotspot screening of germplasm and advanced breeding materials in important rabi crops
- Polycross programme in Lucerne

### Plant Breeding

Dr. Rahul Kapoor, Senior Forage Breeder, PAU, Ludhiana presented the highlights of 15 breeding trials conducted during Rabi 2020 on four different forage crops for finalization of the technical programme for Rabi 2021. After detailed discussion, following breeding trials were formulated.

### Annual trials:

#### **Berseem:**

- **IVT Berseem** trial was constituted with five entries contributed by different centers and will be conducted at 20 locations.
- **AVTB-1 Berseem:** Four entries viz., JB-08-17, JHB-20-1, JHB-20-2 and PC 114 were promoted from IVTB to AVTB-1. This trial will be evaluated at 20 locations.
- **AVTB-2 Berseem:** Two entries viz., BM-14 and JB-07-15 were promoted from AVTB-1 to AVTB-2. This trial will be evaluated at 20 locations.
- **AVTB-2 (Seed) Berseem:** Two entries viz., BM-14 and JB-07-15 were promoted from AVTB-1 to AVTB-2 (Seed). This trial will be evaluated at 12 locations.

### **Forage Oats:**

- **IVTO (SC):**IVT forage oat (single cut) trial was constituted with 13 entries contributed by different centers and will be conducted at 28 locations.
- **AVTO (SC)-1:** Eight entries *viz.*, SKO-244, HFO-1003, HFO-1009, HFO-1013, JO-08-37, OL-1977, OL 1980 and JHO-20-1 were promoted from IVTO (SC) to AVTO (SC)-1. This trial will be evaluated at 28 locations.
- **AVTO (SC)-2:** Three entries *viz.*, HFO-906, HFO-904 and JO-07-28 were promoted from AVTO (SC)-1 to AVTO (SC)-2. This trial will be evaluated at 28 locations.
- **AVTO (SC)-2Seed:** Three entries *viz.*, HFO-906, HFO-904 and JO-07-28 were promoted from AVTO (SC)-1 to AVTO (SC)-2 Seed. This trial will be evaluated at 15 locations
- **IVTO (MC):**IVT forage oat (multicut) trial was constituted with 14 entries contributed by different centers and will be conducted at 18 locations.
- **AVTO (MC)-1:** Six entries *viz.*, OL-1949, HFO-915, PLP-27, JO-08-329, JHO-20-3 and UPO-20-2 in multicut system were promoted from IVTO (MC) to AVTO (MC)-1. This trial will be evaluated at 7 locations in Hill zone and North West zone.
- **AVTO (MC)-2:** Two entries *viz.*, PLP-24 and JO-07-310 were promoted from AVTO (MC)-1 to AVTO (MC)-2. This trial will be evaluated at 8 locations in Hill zone and Central zone
- **AVTO (MC)-2Seed:**Two entries *viz.*, PLP-24 and JO-07-310 were promoted from AVTO (MC)-1 to AVTO (MC)-2 seed. This trial will be evaluated at 5 locations in Hill zone and Central zone
- **IVTO (Dual):** IVT fodder oat (Dual) trial was constituted with 11 entries contributed by different centers and will be conducted at 14 locations.
- **AVTO (Dual)-1:** Five entries *viz.*, OL-1931, JO-03-513, HFO-917, HFO-1014 and JHO-20-2 were promoted from IVTO (Dual) to AVTO (Dual)-1. This trial will be evaluated at 9 locations in North East zone and North West zone.

### **Lucerne**

- **AVT-2 Annual Lucerne:** One entry *viz.*, LLC-6 was promoted to AVT-2 from AVT-1 and will be tested at seven locations of North West zone and South zone.
- **AVT-2 Seed Annual Lucerne:** One entry *viz.*, LLC-6 was promoted to AVT-2 Seed from AVT-1 and will be tested in five locations of North West zone and South zone.

### **Lathyrus**

- **Combined IVT & AVT-1 Lathyrus :** Nine newentries and one entry promoted from IVT to AVT-1 during Rabi 2018-19 will be tested in seven locations

### **Summer Bajra**

- **IVT(MC) Summer Bajra:** IVT (multi cut) summer bajra trial was constituted with four entries contributed by different centers and will be conducted at 7 locations in South and Central zones
- **AVT-1 (MC) Summer Bajra:** Two entries *viz.*, 16-ADV175020 and SBH-103 were promoted from IVT(MC) Summer Bajra to AVT-1(MC) Summer Bajra. Trial will be conducted at 7 locations in South and Central zones

### **Perennial trials:**

- **VT Tall Fescue:** New trial in Tall Fescue was formulated with9 entries atsevenlocations in Hill zone

- **VT *Sainfoin*:** New trial in *Sainfoin* was formulated with 7 entries at seven locations of hill zone.
- **VT Orchard grass:** New trial in Orchard grass was formulated with 7 entries at seven locations of hill zone.

### **Forage Breeder Seed Production**

Dr. Rahul Kapoor, Senior Forage Breeder, PAU, Ludhiana presented the Forage Breeder Seed Production aspects including the action taken report. The production in indented forage crop varieties was 36.52% higher (562.22 q) seed production than indent (411.83q) in Rabi 2020-21 for the crops oat, berseem, lucerne and ryegrass.

### **General remarks:**

- IGFRI should also be included as a centre for analysis and testing in quality profiling programme.
- The yield potential and other parameters like CP% of the best check should be mentioned in the report for the better understanding of the superiority over the best check.
- Visitor's register should be maintained in all the forage gardens to get an idea on how the establishment of the garden has influenced different sectors of the society.
- A technology identification committee should be constituted like varietal identification committee to identify and popularize the best technologies to boost fodder production
- Newer technologies like speed breeding and genome editing may also be undertaken in forage crops to improve productivity and hasten breeding process.
- Number of crops under forage crop trials is very high. Focus should be given on those crops which are really important in terms of productivity.
- Project coordinator should make efforts to increase the number of entries in each trial.

The session ended with vote of thanks to the Chairman.

### SESSION III: Crop Production & Outreach Programme

Chairman	Dr. M. P. Jain, Director Research, RVSKVV, Gwalior
Co-chairman	Dr. A. K. Roy, Project Coordinator
Rapporteurs	Dr. B. G. Shekhara, Dr. S. K. Jha
<b>Presentation of results</b>	
Report of Trials Kharif 2020	Dr. R. K. Agrawal
FTDs, NEH, TSP and SCSP	Dr. R. K. Agrawal
Discussion and technical programme formulation	All participants
Remarks and comments	Dr. M. P. Jain, Director Research, RVSKVV, Gwalior Dr. Amaresh Chandra, Director, IGFRI, Jhansi

After introductory remarks of the chairman, Dr. R. K. Agrawal presented the result of experiments conducted during *Rabi* 2020. During *Rabi* 2020-21, total 20 trials were conducted at 61 locations. These included 9 Coordinated, 7 Location specific and 4 AVT based trials. The 7 trials were concluded and the technology generated out from these presented. In forthcoming *Rabi* season 11 trials (7 Coordinated, 4 Location specific) and 04 AVT-2 trials will be continued.

Two new trials + 4 AVT-2 based trials On Berseem, oat, Lucerne

- Foliar nutrition including Nano urea to improve forage seed yield of grasspea
- Enhancement of berseem seed quality grown under mustard relay cropping in Morena region are proposed

#### Trial results presented for

- Organic nutrient management in cropping systems
- Bio-fortification of annual cereals for enhancing Zinc and Iron content
- Nutrient management in dual purpose oats
- Cutting management in Berseem varieties
- Cutting and Nitrogen management in Oats
- Efficacy of source of Potassic fertilizer in fodder maize
- Planting geometry, cutting and nitrogen management in Moringa
- Efficacy of plant growth regulators and micronutrients in maize oat cropping system
- Precision nitrogen management in fodder maize
- AVT-2: Response of Berseem genotypes to phosphorous levels, single and multi-cut oat genotypes and pearl millet genotypes to nitrogen levels

#### Suggestions/Comments:

Chairman appreciated the presentation made on different crop production technologies, outcomes and recommendations and suggested for strengthening of outreach activities with the help of KVK's and other institutes

It was suggested to constitute a fodder crop technology assessment committee to approve the technologies developed before dissemination and for commercialization. He opined that the KVK'S and other institute should come forward for technology demonstration on fodder crops. He also informed the house to fully utilize budget allotted under TSP, SCSP and NEH for technology demonstrations.

House suggested following points to be taken care while implementation of new technical programme:

- Dose of nano urea is higher so it can be reviewed before the start of new trial and if nano DAP is available in the market it could be included in the new trial.
- Application time of KNO<sub>3</sub> for seed production of Berseem should be reviewed.

### Recommendations – 08 recommendations were approved for technology transfer

1. **Organic fodder production system for Haryana:** Application of 20t FYM/ha (15t for sorghum + 5t for berseem) + bio-fertilizers + green manuring is recommended for Haryana state in Sorghum- Berseem cropping system. The treatment recorded higher GFY (125.3 t/ha), dry matter yield (24.4 t/ha), net monetary returns (66530 Rs./ha) and B:C ratio of 1.55.
2. **Organic fodder production system for milkshed areas Haryana:** Application of 7.5t Vermi-compost/ha (5t for sorghum + 2.5t for berseem) + bio-fertilizer + green manuring recorded comparable yield (Haryana state).The treatment recorded higher GFY (125.4 t/ha), dry matter yield (24 t/ha), net monetary returns (48030 Rs./ha) and B:C ratio of 1.34.
3. **Bio-fortification of Zinc & Iron in fodder maize for Telangana:** Application of 10 Kg ZnSO<sub>4</sub> + 10 Kg FeSO<sub>4</sub> as a basal + 1.0 % ZnSO<sub>4</sub> + 1.0% FeSO<sub>4</sub> foliar spray at 45 days after sowing is recommended for higher Zn and Fe content in the forage maize. The treatment recorded higher green forage (30 t/ha), dry matter (5 t/ha) and crude protein yield (0.25 t/ha). The Zn and Fe content in green fodder increased upto 87.5 & 492.0 ppm over control (Zn-46 and Fe-252 ppm respectively). The same treatment recorded higher net monetary returns (29016 Rs./ha) and B:C ratio of 1.65.
4. **Top feed based cropping system for Karnataka, Kerala and Tamil Nadu states:** Cultivation of Agase as top feed planted at 2.0x0.5 m and intercropped with 1 row of BxN Hybrid is recommended as sustainable and economical top feed based cropping system for Karnataka, Kerala and Tamil Nadu states. The treatment recorded higher green forage yield (98 t/ha), dry matter 26 t/ha and crude protein yield (3.5 t/ha) and net monetary returns (240432 Rs./ha) and B:C ratio of 4.3.
5. **Lucerne seed yield for Rajasthan:** Intercropping of Fennel (*Anethumgraveolens*) with Lucerne is recommended for higher yield of quality seeds in Lucerne in Rajasthan. The treatment recorded higher seed yield of Lucerne (155 Kg seeds/ha) with net returns (62970 Rs./ha) and B:C ratio of 2.41.
6. **Forage oats in rice fallows under Zero tillage condition for NEH region:** Sowing of Oats (120 Kg seeds/ha) in between the rows of rice stubbles is recommended for Manipur and similar areas of NEH region for rice fallows. The treatment recorded higher green forage (25 t/ha), dry matter (5.5 t/ha), crude protein yield (0.46 t/ha) and net monetary returns (Rs. 29529/ha) with B:C ratio of 1.64 under Zero tillage condition.
7. **Variety and cutting management for higher seed yield of Berseem:** In Jharkhand and Uttarakhand state, for higher biomass and quality seed yield berseem variety Wardan and BL-10, respectively, are recommended under 4 cut with last cut by 1<sup>st</sup> week of April then left for seed production. It recorded maximum green fodder (55 t) , dry matter (9 t) and crude protein (1.54 t) yield along with 66 kg seed per hectare. This recorded higher net return (Rs. 138000/ha) and BC ratio (4.16).
8. **Nutrient management in dual purpose Oat for West Bengal, Assam, Manipur, Uttar Pradesh, Madhya Pradesh and Gujarat states:** Application of 75% of RDN (60: 40: 40 Kg N P<sub>2</sub>O<sub>5</sub>& K<sub>2</sub>O) + Vermi-compost @ 2t + PSB application to Soil @ 1.5 Kg along with Seed treatment with *Azotobacter* @ 10 g/Kg seed + ZnSO<sub>4</sub> @ 20 kg/ha (soil application as basal) + Foliar spray of ZnSO<sub>4</sub> (0.5%) just before flowering is recommended for West Bengal, Assam, Manipur, Uttar Pradesh, Madhya Pradesh and Gujarat states. The treatment recorded maximum GFY (22 t/ha), DMY (5.4 t/ha), CPY (0.43 t/ha) as well as highest seed yield (1.7 t/ha). It also recorded Maximum net monetary returns (Rs./ha 60850) and B:C Ratio(2.68).

## I. New proposals for Rabi 2021

SN	Title of the experiment	Location	Duration
1	Foliar nutrition to improve the forage yield, quality and seed yield of dual purpose grass pea ( <i>Lathyrussativus</i> L.)	Kalyani	3 Years
2	Enhancement of berseem seed quality under minimal management practices grown under mustard relay cropping system	Morena (RSKVV, Gwalior)	3 Years

## II. AVT based proposals for Rabi2021 - 04

SN	Title of the experiment	Duration
1	R-21-AST-1: Effect of P levels on forage yield of promising entries of Berseem (AVTB-2-MC)	1 Year
2	R-21-AST-2: Effect of N levels on forage yield of promising entries of single cut oat (AVT-2 SC)	1 Year
3	R-21 AST-3: Effect of N levels on forage yield of promising entries of Multi cut oat (AVT-2 MC)	1 Year
4	R-21-AST-4: Effect of P levels on forage yield of promising entries of Lucerne (AVTLU-2)	1 Year

## III. On Going Experiments for Rabi 2021

SN	Title of the experiment	Location
1	K-19-AST-1: Studies on organic source of nutrients on forage yield and quality of cowpea-fodder maize system under irrigated situation	Mandya, Coimbatore, Vellayani and Hyderabad
2	K-19-AST-2: Studies on organic source of nutrients on forage yield and quality of rice-bean-oat system under irrigated situation	Jorhat, Imphal, Kalyani, Ranchi, Pusa
3	R-19-AST-1: Effect of cutting and splitting of nitrogen doses on growth, yield and quality of fodder oat cultivars	Raipur, Ranchi, Ayodhya and Pantnagar
4	R-19-AST-2: Effect of different potassic fertilizers sources on green fodder production and quality of fodder maize	Anand and Hyderabad
5	RS-19-AST-3: Fodder productivity of moringa( <i>Moringaoleifera</i> ) as influenced by planting geometry, nitrogen nutrition and cutting regimes	Mandya, Dharwad and Ranchi
6	K-20-AST-1C: Efficacy of plant growth regulators on forage yield and quality of maize-oat cropping system	Uralikanchan, Srinagar, Pusa, Raipur, Hisar and Ranchi
7	K-20-AST-6: Precision nitrogen management for enhancing fodder yield and nitrogen use efficiency in forages	Mandya, Srinagar and Dharwad
8	KL-20 AST 5: Evaluation of promising fodder grass varieties under shade conditions	Vellayani
9	K-20-AST-4b: Organic nutrient management for soil health and sustainability of round the year fodder production system	Palampur
10	K-20-AST-4C: Organic nutrient management for soil health and sustainability of round the year fodder production system	Ayodhya
11	K-20-AST-4d: Optimizing production technology for sustainable organic fodder production and soil health	Pantnagar

## Outreach programme

Dr. R. K. Agrawal presented the status of FTD's allotted to AICRP (FC) centres for Rabi 2021-22. A total of 540 FTD's were proposed to be allotted to AICRP centres and co-operating centres during Rabi 2021-22 for the crops viz., Berseem, Lucerne, Oat, Lathyrus, Bajra Napier hybrid, Cowpea, summer Bajra, etc. Out of 540 FTD's, 80 were allocated to Berseem, 20 to Lucerne, 195 to Oat (SC), 145 to oat (MC), 25 to cowpea, 20 to BN Hybrid, 25 to Lathyrus and in small numbers to other crops.

The following decisions were taken after the discussion:

- All the centres should send result of the demonstrations along with beneficiaries' details.
- For effective technology dissemination, new villages/ beneficiaries should be selected every year.
- The data regarding GFY and seed yield etc. should be recorded and analysed before reporting.
- The report along with good photograph should be sent for compilation.

### Crop-wise FTDs to be conducted during Rabi 2021-22

SN	Centre	Berseem	Lucerne	Oat (SC)	Oat (MC)	Other crops	Total
1.	AAU, Jorhat			10		Lathyrus 5	15
2.	OUAT, Bhubaneswar			10			10
3.	BCKV, Kalyani	5		10		Lathyrus 20	35
4.	BAU, Ranchi	25		25			50
5.	NDUAT, Ayodhya			5		BN Hybrid 5	10
6.	JNKVV, Jabalpur	10		5			15
7.	AAU, Anand		10	10			20
8.	BAIF, Urulikanchan	5		10			15
9.	MPKV, Rahuri						0
10.	SKRAU, Bikaner		5	5			10
11.	PAU, Ludhiana			60	40		100
12.	CCS HAU, Hisar	10		20	5		35
13.	GBPUAT, Pantnagar	20		10			30
14.	TNAU, Coimbatore					Cowpea 10 Guinea grass 10	20
15.	PJTSAU, Hyderabad		5	5		Hedge Lucerne 5 Bajra (MC) 5	20
16.	UAS (B), ZARS Mandya			10		Cowpea 10	20
17.	CSKHPKV, Palampur				20	Rye grass 10	30
18.	KAU, Vellayani					BN Hybrid 15 Cowpea 5	20
19.	IGKV, Raipur	5			10		15
20.	CAU, Imphal				30		30
21.	SKUAS&T, Srinagar				30		30
22.	RPCAU, Pusa				10		10
Total		80	20	195	145	100	540

### Tribal Sub Plan

#### Centre wise proposed TSP activities for rabi 2021-22 – Number of beneficiaries

Centre	Trainings/ capacity building	Input distribution*	Others (Demonstration)
Bhubaneswar	500	500	50
Pantnagar	8	250	
Rahuri	30	70	
Palampur	200	200	
Kalyani	55	80	65
Vellayani	50	50	40
Imphal	300	150	
Raipur	25	60	
Mandya	65		
Urulikanchan	50	50	20
<b>Total</b>	<b>1283</b>	<b>1410</b>	<b>175</b>

The following decisions were taken after discussion

- TSP progress report should be submitted every quarter by the centres in the given proforma.
- Funds will be allocated as per availability from the council.

#### Centre wise proposed SCSP activities 2021-22

Centre	Trainings/ capacity building	Input distribution	Others (Demonstrations)
Bhubaneswar	100	100	10
Pantnagar	200		
Jorhat	200	100	
Vellayani	25	25	
	<b>525</b>	<b>225</b>	<b>10</b>

- SCSP progress report should be submitted every quarter by the centres in the given proforma.
- Funds will be allocated as per availability from the council.

### NEH Plan

Proposed activities for Rabi 2021-22 under NEH component

NEH	Trainings/ capacity building	Input distribution	Others (Demonstrations)
Jorhat	250	250	150
<b>Imphal</b>	<b>300</b>	<b>150</b>	
	<b>550</b>	<b>400</b>	<b>150</b>

- NEH progress report should be submitted every quarter by the centres in the given proforma.
- Funds will be allocated as per availability from the council.

The session ended with vote of thanks to the chairman.



## SESSION IV: Forage Crop Protection

<b>Chairman</b>	:	Dr . S.N. Sushil, Principal Scientist, ICAR-IISR, Lucknow
<b>Presentation and finalization of trials</b>	:	Dr. N. R. Bhardwaj
<b>Rapporteurs</b>	:	Drs. Ashlesha and Sandip Landge

Forage Crop Protection session began with introductory remarks of Chairman, Dr. S.N. Sushil, Principal Scientist, ICAR-IISR, Lucknow. Dr. N. R. Bhardwaj, P.I. (crop protection) presented the results of experiments conducted during Rabi 2020-21. He also presented the recommendations made by different centers on forage crop protection for different locations.

Based on the discussions and advices of the Chairman the following points emerged:

- The trials PPT-1, PPT-2, PPT-35 and PPT-36 will continue in *Rabi* 2021-22.
- The trial PPT-31 (Eco-friendly pest management techniques in berseem ecosystem) and PPT-34 (Integrated disease management in Berseem) will be validated on larger area.
- Three trials were concluded

### Output:

#### a.) Pathogenic variability of *Blumeriagraminisf. sp.avenae* in oat:

- Differential set of 11 lines viz., ADG-96, HFO-102, IG-03-213, JPO-40, OL-1847, OG-77, PLP-1, JO-11, OL-1867, UPO-212 and susceptible check HJ-8 was developed to study the pathogenic variability of *B. graminisf. sp. avenae* causing oat powdery mildew.
- 24 isolates of *B. graminisf. sp. avenae* were grouped into 14 pathotypes based on their differential reaction.
- The resistance in oat powdery mildew is controlled by single dominant gene.

### Recommendations:

- b.) **Management of aphid (*Rhopalosiphumpadi*) in oat:** One foliar spray of *L. lecanii* ( $1 \times 10^8$  CFU/g) @ 7.5 g/litre of water when the aphid population reaches economic threshold level can be recommended for biological management of oat aphid in central and northwest zone.
- c.) **Management of powdery mildew disease in oat:** Three foliar sprays of *Trichoderma viride* @ 0.5% at 10 days interval starting from disease onset can be recommended for biological management of powdery mildew disease of oat in hill zone.

Three new trials were formulated and approved for Rabi 2021-22 season:

- a.) Development of *Trichoderma* mediated biocontrol strategy for managing leaf blight (*Drechsleraavenae*) disease in Oat (for Ludhiana, Palampur, Jhansi, Bhubaneswar).
- b.) Germplasm evaluation programme against diseases and insect-pests in Rabi forages (for Ludhiana, Palampur, Jhansi, Bhubaneswar, Coimbatore).
- c.) Biointensive management of defoliator insect pests in Lucerne (for Rahuri and Coimbatore).

### Following specific points were suggested for improvement of the programme

- Efforts must be made to get label claims of bio-pesticides being used in forage crops by submitting data of bio-efficacy to CIBRC.

- New crop grouping based criteria for label claim of pesticide MRL once approved can be used as a reference for use of pesticides in forage crops if there is an absolute need of pesticides to keep the pest incidence under check.
- General Survey and surveillance of diseases, insect pest incidence should be done regularly throughout the season in farmer's field for checking the population dynamics of insect pests and pathogens.
- Agro ecosystem based IPM is need of the day and should be taken in to consideration.
- There is a need for the use, augmentation and conservation of bio-control agents for management of insect pests and diseases in fodder crops.
- Precaution should be taken to avoid effect of one treatment on another under field conditions particularly involving use of different trap crops and pheromone traps for insect-pest management.

The session ended with vote of thanks to the Chairman.

## Proceedings of Virtual Varietal Identification Committee Meeting

The virtual meeting of the Varietal Identification Committee of AICRP on Forage Crops and Utilization was held under the Chairmanship of Dr T. R. Sharma, Deputy Director General (Crop Science), ICAR, New Delhi on 20-09-2021 at 16:00 hrs.

Following members were present in the meeting.

1	<b>Dr. T. R. Sharma</b> Deputy Director General (Crop Science), ICAR	<b>Chairman</b>
2	<b>Dr. R. K. Singh</b> , Assistant Director General (CC & FFC), ICAR	Member
3	<b>Dr. D. K. Yadava</b> , Assistant Director General (Seed), ICAR	Member
4	<b>Dr. Sanjay Kumar</b> , Director, ICAR-IISS, Mau	Member
5	<b>Dr. B. Singh</b> , Director RFS, Hyderabad, DADH, Govt of India	Member
6	<b>Dr. Bhag Mal</b> , Secretary TAAS, Ex-Director IGFRI	Member
7	<b>Dr. D. R. Malaviya</b> , Ex- PS and Head, CI Division, IISR, Lucknow	Member
8	<b>Dr. A. K. Tyagi</b> , Assistant Director General (Animal Nutrition), ICAR	Member
9	<b>Dr. Digvijay Singh</b> , Sr Manager NDDDB, Anand	Member
10	<b>Dr. Aditya Sharma</b> , UPL Advanta Pvt Ltd, Hyderabad	Member
11	<b>Gopal N Gharde</b> , Crystal Crop Protection Limited	Member
12	<b>Dr M.P. Jain</b> , Director of Research, RSKVV, Gwalior	Member
13	<b>Dr. A. K. Roy</b> Project coordinator AICRP (FC&U)	Member Secretary

**Dr. R K Agarwal**, PI Agronomy, **Dr. N R Bhardwaj**, PI Plant protection, AICRP coordinating unit were present in the meeting to assist the committee.

Ten proposals in three crops were presented before the committee. The VIC examined all the proposals as per the variety identification guidelines, superiority for yield etc. in multi-location, multi-year weighted mean data generated in IVT, AVT-I and AVT-II stage of testing. The various parameters considered were the green fodder, dry matter yield, per day productivity nutritive quality in terms of crude protein content, crude protein yield, fiber content, digestibility, reaction to major insect-pests and disease as generated in field trials and one year trial on seed productivity and agronomic trials for response to major nutrient as compared to checks. Following decisions were taken after deliberations and discussions.

**Berseem entry BM 12:** The proposal was submitted by PAU, Ludhiana for Hill, North West and Central zones. The entry was found to be superior over the checks in all the three zones. The variety was resistant to root rot, moderately resistant to stem rot in the field trials. It was also responsive to phosphate fertilizer. It was **identified and recommended for release** in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.

**Berseem entry JHB 18-1:** The proposal was submitted by ICAR-IGFRI, Jhansi for Hill, North West and Central zones. The entry was found to be superior over the checks in all the three zones. It was resistant to root rot, moderately resistant to stem rot in the field trials. It was also responsive to phosphate fertilizer. It was **identified and recommended for release** in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.

**Berseem entry JHB 18-2:** The proposal was submitted by ICAR-IGFRI, Jhansi for Hill, North West and Central zones. The entry was found to be superior over the checks in all the three zones. The variety was resistant to root rot, moderately resistant to stem rot in the field trials. It was also responsive to phosphate fertilizer. It was **identified and recommended for release** in the states of Terai part of Uttarakhand, Punjab, Haryana, Rajasthan, UT of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Maharashtra under multicut irrigated system in rabi season.

**Fodder Oat (Multicut system) entry HFO-707:** The proposal was submitted by CCSHAU, Hisar for North West Zone. The entry was found to be superior over the checks. It was also responsive to nitrogenous fertilizer doses. It was moderately resistant to leaf blight in the field trials. It was **identified and recommended for release** in the states of Terai part of Uttarakhand, Punjab, Haryana, and Rajasthan under multicut irrigated system in rabi season.

**Fodder Oat single cut entry OL 1874-1:** The proposal was submitted by PAU, Ludhiana for South Zone. The entry was found to be superior over the checks. It was also responsive to nitrogenous fertilizer doses. It was **identified and recommended for release** in the states of Telangana, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh under single cut irrigated system in rabi season.

**Fodder Oat single cut entry HFO-806:** The proposal was submitted by CCSHAU, Hisar for Hill and South Zone. The entry was found to be superior over the checks in both the proposed zones. It was **identified and recommended for release** in the states of Himachal Pradesh, UT of J&K, Telangana, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh under single cut irrigated system in rabi season.

**Multicut summer fodder Bajra entry BAIF Bajra-5:** The proposal was submitted by BAIF, Uralikanchan for central zone. The entry was found to be superior over the checks in the proposed zone. It was **identified and recommended for release** in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.

**Multicut summer fodder Bajra entry BAIF Bajra-6:** The proposal was submitted by BAIF, Uralikanchan for central zone. The entry was found to be superior over the checks in the proposed zone. It was **identified and recommended for release** in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.

**Multicut summer fodder Bajra entry TSFB-18-1:** The proposal was submitted by PJTSAU, Hyderabad for the central zone. The entry was found to be superior over the checks in the proposed zone. It was **identified and recommended for release** in the states of Gujarat, Maharashtra, and Madhya Pradesh under multicut irrigated system during summer.

**Fodder Oat single cut entry OL 1876-1:** The proposal was submitted by PAU, Ludhiana for South Zone. In the proposed zone the entry was not superior to the best check hence it was not **identified and not recommended for release**.

## Session V: Plenary session

<b>Chairman</b>	Dr. T.R. Sharma, DDG (CS), ICAR
<b>Co- Chairman</b>	Dr . R. K. Singh, ADG (CC), ICAR
<b>Rapporteurs</b>	Dr. R K Agrawal and Dr. N. R. Bhardwaj
<b>Welcome &amp; Remarks</b>	Dr. Amaresh Chandra Director, ICAR-IGFRI, Jhansi
<b>Recommendations and way forward</b>	Dr. A. K. Roy, Project Coordinator
<b>Remarks by Co-Chairman</b>	Dr . R. K. Singh, ADG (CC), ICAR
<b>Remarks by Chairman</b>	Dr. T.R.Sharma, DDG (CS), ICAR
<b>Vote of Thanks</b>	Dr. R K Agrawal, PI Agronomy AICRP

Project coordinator presented the recommendations made during various technical sessions. He also presented way forward along on the following points:

### **Forage Crop Improvement**

- Need to accelerate varietal development especially in Berseem, Lucerne, perennial range grasses and legumes for arid, semi-arid and hill regions
- Pre breeding in cultivated crops to broaden the genetic base and varieties with better quality and tolerance to abiotic stress
- Biofortified lines in important dual purpose crops like oat, Maize, Pearl millet etc
- Multicut, dual purpose lines to fit in specific cropping sequences.

### **Forage Crop Production:**

- The research on **Nano technology** including **nano fertilizers** and **nano micronutrients** need to be strengthened to economize on cost, improve the use efficiency and minimize the efforts on its application, handling and storage.
- The **crop modelling component** need to be incorporated to predict and rationalize the input particularly nitrogen and water as well as its real-time applicability.
- The research on production technology, quality improvement and sustainability of production of **non-traditional fodder sources** viz., Azolla, fodder cactus, moringa and other fodder shrubs and fodder beet, Chicory is needed.
- There is great need to tailor and perfect the **climate smart production technology** with inherent provisioning of **contingent toolto overcome the weather adversities** under different growing conditions.

### **Forage Crop Protection:**

- To develop forage crops varieties resistant to emerging biotic stresses by extensive germplasm evaluation for identification of potential donor lines and their inclusion in the forage breeding programme.
  - Maydis leaf blight, Turcicum leaf blight & fall armyworm in forage Maize;
  - Blast in forage Pearl millet,
  - defoliators & root rot in forage cowpea,
  - powdery mildew & leaf blight in oats,
  - stem rot in berseem;
  - Weevil and downy mildew in Lucerne
- To develop eco-friendly forage crop protection technologies by knowledge-based selection of different biocontrol agents, plant defence elicitors and organic inputs for sustainable disease and insect-pest management in forages.
- To develop and incorporate disease forecasting models into the disease management programme for precise implementation and application of management strategies.

### **Outreach programme**

- Enhanced resources for effective outreach programme

### **Seed production**

- Effective seed production chain
- Sensitization of state government departments for increasing indent of breeder seed

Co-chairman emphasized on the following points:

- Speed breeding and genome editing should be done at the IGFRRI and product should be disseminated to other centres.
- Pre-breeding activities in forage crops should be strengthened.
- Climate resilient varieties should be developed in forage crops.

Chairman emphasized on the following points:

- Silage potential varieties in Maize and high protein varieties in cowpea should be developed.
- Intercropping of forage crops with other major crops should be explored.
- Role of biotechnologists in forage crop improvement programme should be enhanced.
- Application of apomixis research in forage crop improvement should be oriented towards development of an end product.
- IGFRRI should accelerate Fodder plan for the remaining states by involving State Agricultural Universities.

**AICRP on Forage Crops and Utilization  
Technical Programme Crop Improvement  
Rabi 2021-22**

**Annexure A**

**1. IVTB: Forage Berseem (New)**

Entries	: 5 + 1 (NC) + 1 (ZC)
Entries	: <b>PC 115, BM 13</b> (PAU, Ludhiana); <b>HFB-18-3, HFB-18-9</b> (CCS HAU, Hisar); <b>JB-08-19</b> (JNKVV, Jabalpur)
Checks	: Wardan (NC), BL-22 (HZ), Bundel Berseem-2 (CZ ), BL 44 (NWZ and NEZ)
Design	: RBD with 3 replications
Plot size	: 3 m x 3 m accommodating 3m long 10 rows at 30 cm
Seed rate	: 25 Kg/ha (23 g per plot)
Fertilizers	: N-20 Kg, P <sub>2</sub> O <sub>5</sub> 80 Kg/ha
Seed	: 1.5 Kg/entry & NC; BL-22 (HZ)- 0.5 kg; BB-2 (CZ )-0.5 kg; BL-44 (PC 91)-1.0 kg
Locations (20)	: <b>HZ-</b> Palampur, Srinagar, Rajouri; <b>NWZ-</b> Pantnagar, Bikaner, Hisar, Ludhiana, Udaipur, Meerut <b>NEZ-</b> Kalyani, Ranchi, Ayodhya, Bhubaneswar, Pusa, Sabour <b>CZ-</b> Jhansi, Rahuri, Jabalpur, Urulikanchan, Raipur

**2. Combined AVTB-1 and AVTB-2: Forage Berseem (HZ, NWZ,CZ and NEZ)**

Entries	: 4 of AVTB-1 + 2 OF AVTB-2 + 1 (NC) +1 (ZC) = 6+1+1 =8
Entries	: <b>AVTB-1 : JB-08-17</b> (JNKVV, Jabalpur); <b>JHB-20-1, JHB-20-2</b> (IGFRI, Jhansi), <b>PC 114</b> (PAU, Ludhiana) <b>AVTB-2 -BM-14</b> (PAU, Ludhiana); <b>JB-07-15</b> (JNKVV, Jabalpur)
Checks	: Wardan (NC), BL-22 (HZ), BB-2 (NWZ,CZ), BB-3 (NEZ)
Design	: RBD with 3 replications
Plot size	: 4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	: 25 Kg/ha (30 g per plot)
Fertilizers	: N-20 Kg, P <sub>2</sub> O <sub>5</sub> 80 Kg/ha
Seed	: <b>2.0</b> Kg/entry & NC; BL-22 (0.5 kg), BB-2 (NWZ, CZ) -1.5 kg, BB-3 (NEZ)- (0.70 kg)
Locations (20)	: <b>HZ-</b> Palampur, Srinagar, Rajouri, Almora <b>NWZ-</b> Pantnagar, Bikaner, Hisar, Ludhiana, Udaipur, Meerut <b>NEZ-</b> Kalyani, Ranchi, Ayodhya, Bhubaneswar, Pusa <b>CZ-</b> Jhansi, Rahuri, Jabalpur, Uralikanchan, Raipur

**3. AVTB-2: Forage Berseem seed (HZ, NWZ, CZ and NEZ)**

Entries	: 2 + 1 (NC) +1 (ZC)
Entries	: <b>BM-14</b> (PAU, Ludhiana); <b>JB-07-15</b> (JNKVV, Jabalpur)
Checks	: Wardan (NC), BL- 22 (HZ), BB-2 (NWZ and CZ), BB3 (NEZ)
Design	: RBD with 5 replications
Plot size	: 4 m x 3 m accommodating 4m long 10 rows at 30 cm
Seed rate	: 25 Kg/ha (30 g per plot)
Fertilizers	: N-20 Kg, P <sub>2</sub> O <sub>5</sub> 80 Kg/ha
Seed	: 2.0 Kg/entry & NC; BL-22 (HZ)- 0.5 Kg; BB-2 (NWZ and CZ)- 1.5 kg , BB-3 – 0.5 kg
Locations (12)	: <b>HZ-</b> Palampur, Srinagar; <b>NWZ-</b> Pantnagar, Hisar, Ludhiana; <b>CZ-</b> Jhansi, Rahuri, Jabalpur, Raipur; <b>NEZ-</b> Kalyani, Ranchi, Pusa

**4. IVTO: Forage Oat (single cut) (New)**

Entries	:	13+1(NC) + 1 (ZC)
Entries	:	<b>OL 1988, OL 1931-1, OL 1967</b> (PAU, Ludhiana); <b>HFO 1101, HFO 1113</b> (CCS HAU, Hisar); <b>JO-08-41</b> (JNKVV, Jabalpur); <b>JHO 21-1, JHO 21-2</b> (IGFRI, Jhansi); <b>BAUO-102, BAUO-105</b> (BAU, Ranchi); <b>NDO 1925</b> (ANDUAT, Ayodhya); <b>SKO 245</b> (SKUAST, Srinagar), <b>UPO-21-1</b> (GBPUAT, Pantnagar)
Checks	:	OS-6 (NC), OL 1896(NEZ, NWZ, CZ, SZ),SKO-225 (HZ),
Design	:	RBD with 3 replications
Plot size	:	3 m x 3 m accommodating 3 m long 10 rows at 30 cm
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N- 80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	8.50 Kg/entry & NC; SKO-225 (1.0 kg), OL 1861 (7.5 kg)
Locations (28)	:	<b>HZ</b> -Palampur, Srinagar, Rajouri; <b>NWZ</b> -Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut; <b>NEZ</b> -Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Ayodhya, Imphal; <b>CZ</b> -Jhansi, Rahuri, Urulikanchan, Karjat, Anand, Jabalpur, Raipur, Dhari; <b>SZ</b> -Hyderabad, Mandya, Coimbatore (Ooty), Ambalavayal

**5. Combined AVTO-1 (single cut) and AVTO-2 (SC): Forage Oat (HZ, NWZ, NEZ, CZ& SZ)**

Entries	:	<b>8 of AVTO-1 + 3 of AVTO SC-2 + 2 (NC) + 1 (ZC) = 14 +1 ZC for Hill for AVT -2</b>
Entries	:	<b>AVTO-1 (SC) -- SKO-244</b> (SKUAST-K, Srinagar), <b>HFO-1003, HFO-1009, HFO-1013</b> (CCSHAU, Hisar), <b>JO-08-37</b> (JNKVV, Jabalpur), <b>OL-1977, OL 1980</b> (PAU, Ludhiana), <b>JHO-20-1</b> (IGFRI) <b>AVTO-2 SC - HFO-906, HFO-904</b> (CCSHAU, Hisar); <b>JO-07-28</b> (JNKVV)
Checks	:	Kent, OS-6 (NC), OS-403 (NWZ, NEZ, SZ), SKO-225 (HZ), RO-11-1 (CZ) , SKO-96 (HZ), for AVTO-2
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Seed rate	:	100 Kg/ha (120 g per plot)
Fertilizers	:	N- 80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	12 Kg/entry & NC; SKO-96 (1.5Kg), RO-11-1 (3.0Kg), OS-403 (7.0Kg) , SKO-96- 1.5 kg
Locations (28)	:	<b>HZ</b> -Palampur, Srinagar, Rajouri; <b>NWZ</b> -Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut; <b>NEZ</b> -Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Ayodhya, Imphal; <b>CZ</b> -Jhansi, Rahuri, Urulikanchan, Karjat, Anand, Jabalpur, Raipur, Dhari; <b>SZ</b> -Hyderabad, Mandya, Coimbatore (Ooty), Mattupetty

**6. AVTO-2: (single cut) (Seed):Forage Oat (HZ, NWZ, NEZ, CZ and SZ)**

Entries	:	3 + 2 (NC) + 1 (ZC)
Entries	:	<b>HFO-906, HFO-904</b> (CCS HAU, Hisar); <b>JO-07-28</b> (JNKVV, Jabalpur)
Checks	:	Kent, OS-6 (NC); SKO-96 (HZ), RO-11-1(CZ), OS-403 (NWZ, NEZ, SZ)
Design	:	RBD with 4 replications
Plot size	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Seed rate	:	100 Kg/ha (120 g per plot)
Fertilizers	:	N- 80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	14.0 Kg/entry & NC; SKO-96 (1.5 Kg), RO-11-1 (4.0 Kg), OS-403 (8.5 Kg)
Locations (28)	:	<b>HZ</b> -Palampur, Srinagar, Rajouri; <b>NWZ</b> -Bikaner, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut; <b>NEZ</b> -Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Ayodhya, Imphal; <b>CZ</b> -Jhansi, Rahuri, Urulikanchan, karjat, Anand, Jabalpur, Raipur, Dhari; <b>SZ</b> -Hyderabad, Mandya, Coimbatore (Ooty), Mattupetty



**7. IVTO (Multi cut): Forage Oat (New)**

Entries	:	14 + 2 (NC)
Entries	:	<b>OL 1975, OL 1931-2 and OL 1969</b> (PAU, Ludhiana); <b>HFO 1121, HFO 1123</b> (CCS HAU, Hisar); <b>JO-08-335</b> (JNKVV, Jabalpur); <b>JHO 21-3, JHO 21-4</b> (IGFRI, Jhansi); <b>BAUO-104, BAUO-103</b> (BAU, Ranchi); <b>PLP 29</b> (CSKHPKV, Palampur), <b>UPO-21-2</b> (GBPUAT, Pantnagar), <b>FO-21-1, FO-21-2</b> (Foragen Seeds)
Checks	:	National checks: UPO-212 and RO-19
Design	:	RBD with 3 replications
Plot size	:	3 m x 3 m accommodating 3 m long 12 rows at 25 cm
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> 40 Kg/ha
Seed	:	6.0 Kg/entry & national check
Locations (18)	:	<b>HZ:</b> Palampur, Srinagar, Almora; <b>NWZ:</b> Pantnagar, Hisar, Jalore, Ludhiana <b>NEZ:</b> Ranchi, Pusa, Ayodhya, Jorhat, Bhubaneswar, Imphal, <b>CZ:</b> Jhansi, Anand, Jabalpur, Rahuri, Uralikanchan

**8. AVTO-1 (Multi cut): Forage Oat (HZ and NWZ)**

Entries	:	6 + 2 (NC)
Entries	:	<b>OL-1949</b> (PAU, Ludhiana); <b>HFO-915</b> (CCS HAU, Hisar); <b>PLP-27</b> (CSK HPKV, Palampur); <b>JO-08-329</b> (JNKVV, Jabalpur), <b>JHO-20-3</b> (IGFRI, Jhansi), <b>UPO-20-2</b> (GBPUAT, Pantnagar)
Checks	:	National checks: UPO-212 and RO-19
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	2.00 Kg/entry & national check
Locations (7)	:	<b>HZ:</b> Palampur, Srinagar, Almora; <b>NWZ:</b> Pantnagar, Hisar, Jalore, Ludhiana

**9. AVTO-2 (Multi cut): Forage Oat (HZ, CZ)**

Entries	:	2 + 2 (NC)
Entries	:	<b>PLP-24</b> (CSKHPKV, Palampur); <b>JO-07-310</b> (JNKVV, Jabalpur)
Checks	:	National Check: UPO-212 and RO-19
Design	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Plot size	:	RBD with 5 replications
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	4.0 Kg/entry & national check
Locations (8)	:	<b>HZ:</b> Palampur, Srinagar, Almora; <b>CZ:</b> Jhansi, Anand, Jabalpur, Rahuri, Uralikanchan

**10. AVTO-2 (Multi cut) (Seed): Forage Oat (HZ, CZ)**

Entries	:	2 + 2 (NC)
Entries	:	<b>PLP-24</b> (CSKHPKV, Palampur); <b>JO-07-310</b> (JNKVV, Jabalpur)
Checks	:	National Check: UPO-212 and RO-19
Design	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Plot size	:	RBD with 5 replications
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	4.0 Kg/entry & national check
Locations (8)	:	<b>HZ:</b> Palampur, Srinagar, Almora <b>CZ:</b> Jhansi, Anand, Jabalpur, Rahuri, Uralikanchan

**11. IVTO (Dual): Forage Oat (New)**

Entries	:	9 + 2 (NC)
Entries	:	<b>OL 1967-1, OL 1874-2, OL 1982-2</b> (PAU, Ludhiana); <b>JO-13-518</b> (JNKVV, Jabalpur); <b>HFO 1108, HFO 1119</b> (CCS HAU, Hisar); <b>JHO 21-5, JHO 21-6</b> (IGFRI, Jhansi); <b>UPO-21-3</b> (GBPUAT, Pantnagar)
Checks	:	National Check: UPO-212 and JHO-822
Design	:	3 m x 3 m accommodating 3 m long 12 rows at 25 cm
Plot size	:	RBD with 3 replications
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	5.0 Kg/entry & national check
Locations (14)	:	<b>NWZ-</b> Bikaner, Hisar, Ludhiana, Pantnagar; <b>NEZ-</b> Jorhat, Bhubaneswar, Ranchi, Ayodhya, Pusa; <b>CZ-</b> Jhansi, Rahuri, Anand, Jabalpur, Raipur

**12. AVTO- 1 (Dual): Forage Oat (NEZ, NWZ)**

Entries	:	5 + 2 (NC)
Entries	:	<b>OL-1931</b> (PAU, Ludhiana); <b>JO-03-513</b> (JNKVV, Jabalpur); <b>HFO-917, HFO-1014</b> (CCS HAU, Hisar); <b>JHO-20-2</b> (IGFRI, Jhansi)
Checks	:	National Check: UPO-212 and JHO-822
Design	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
Plot size	:	RBD with 3 replications
Seed rate	:	100 Kg/ha (90 g per plot)
Fertilizers	:	N-80 Kg, P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
Seed	:	2.5 Kg/entry & national check
Locations (9)	:	<b>NWZ-</b> Bikaner, Hisar, Ludhiana, Pantnagar; <b>NEZ-</b> Jorhat, Bhubaneswar, Ranchi, Ayodhya, Pusa;

**13. AVT Lucerne-2: Annual Lucerne (NWZ and SZ)**

Entries	:	1 + 2 NC
Entries	:	<b>LLC-6</b> (PAU, Ludhiana)
Checks	:	Anand-2, RL-88
Design	:	RBD with 7 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	25 kg/ha (30.0 g per plot)
Fertilizers	:	N-20kg, P <sub>2</sub> O <sub>5</sub> -80 kg/ha
Seed	:	1.20 kg/entry & national check
Locations (6)	:	<b>NWZ-</b> Ludhiana, Bikaner; <b>SZ-</b> Hyderabad, Coimbatore, Mandya, Dharwad

**14. AVT Lucerne-2: Annual Lucerne seed (NWZ and SZ)**

Entries	:	1+2 NC
Entries	:	<b>LLC-6</b> (PAU, Ludhiana)
Checks	:	Anand-2, RL-88
Design	:	RBD with 7 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	25 kg/ha (30.0 g per plot)
Fertilizers	:	N-20kg, P <sub>2</sub> O <sub>5</sub> -80 kg/ha
Seed	:	1.00 kg/entry & national check
Locations (5)	:	<b>NWZ-</b> Ludhiana, Bikaner; <b>SZ-</b> Hyderabad, Coimbatore, Mandya,

**15. Combined IVT & AVT-1 Lathyrus: (New)**

Entries	:	9 +1+ 2 NC
Entries name	:	<b>IVT - BL-1, BL-3, BL-5</b> (BAU, Ranchi) <b>JCL-21-1, JCL-21-2, JCL-21-3</b> (AAU, Jorhat); <b>IPLa 2021-01, IPLa 2021-02, IPLa 2021-03</b> (IIPR, Kanpur RRS Bhopal); <b>AVT-1 - KL 5</b> (BCKV, Kalyani)
Checks	:	National Check: Mahateora, Prateek
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	40 kg/ha (50.0 g per plot)
Fertilizers	:	N-20kg, P <sub>2</sub> O <sub>5</sub> -40 kg/ha)
Seed	:	1.2 kg/entry & national check
Locations (7)	:	Jorhat, Kalyani, Ranchi, Pusa, Jhansi, Jabalpur, Raipur

**16. VT Tall Fescue Grass: (New) (HZ)**

Entries	:	10 + 2 NC
Entries name	:	<b>Hima 18, Hima 19</b> (HPKV Palampur), <b>IC-0615893, IC-0615894, IC-622336, IC-622341, IC-622347, IC-622355, IC622360, IC-622367</b> (IGFRI, RRS, Srinagar)
Checks	:	Hima-4 and EC 178182
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	16 kg per hectare (15g per plot)
Fertilizers	:	N=100 kg, P <sub>2</sub> O <sub>5</sub> =60 kg & K <sub>2</sub> O=40 kg
Seed	:	400 g per entry and check
Locations (8)	:	<b>HZ:</b> DARS Budgam (AICRP centre, SKUAST-K); KVK, Pombay, Kulgam district; Palampur; IVRI, Mukteshwar; Mountain livestock research institute (MLRI) Manasbal, SKUAST-K; VPKAS, Almora, HAREC, Bajaura

**17. VT Sainfoin: (New) (HZ)**

Crop	:	Sainfoin
Entries	:	7 entries
Entries name	:	<b>IC-0615825, IC-0615827, IC-0615828, IC-622409, IC-622418, IC-636011, IC-636015</b> (IGFRI, RRS, Srinagar)
Checks	:	General mean
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	60 kg per hectare (50g per plot)
Fertilizers	:	N=20 kg, P <sub>2</sub> O <sub>5</sub> =80 kg & K <sub>2</sub> O=40 kg
Seed	:	1.250 Kg per entry
Locations (8)	:	<b>HZ:</b> DARS Budgam (AICRP centre, SKUAST-K); KVK, Pombay, Kulgam district; Palampur; IVRI, Mukteshwar; Mountain Livestock Research Institute (MLRI) Manasbal, SKUAST-K; VPKAS, Almora; HAREC, Bajaura

**18. VT Orchard Grass: (New) (HZ)**

Crop	:	Orchard grass
Entries No.	:	7 entries
Entries name	:	<b>IC-0615906, IC-0615916, IC-0615924, IC-0622333, IC-622337, IC-622339, IC622351</b> (IGFRI, RRS, Srinagar)
Checks	:	General mean
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	12 kg per hectare (10g per plot)
Fertilizers	:	N=100 kg, P <sub>2</sub> O <sub>5</sub> =60 kg & K <sub>2</sub> O=40 kg
Seed	:	300 g per entry
Locations (8)	:	<b>HZ:</b> DARS Budgam (AICRP centre, SKUAST-K); KVK, Pombay, Kulgam district; Palampur; IVRI, Mukteshwar; Mountain livestock research institute (MLRI) Manasbal, SKUAST-K; VPKAS, Almora; HAREC, Bajaura

**19. IVT Summer Bajra: (New)**

Entries	:	4 + 3 (NC)
Entries	:	<b>AFB - 45, AFB-54</b> (AAU, Anand); <b>BAIF bajra 9</b> (BAIF, Uralikanchan); <b>SBH104, SBH 105</b> (Rasi Seed), <b>ADV2184</b> (Advanta Seeds), <b>Alamdardar-12</b> (Alamdardar Seeds), <b>HTBH 4904</b> (Hytech seed)
Checks	:	National Check: Giant bajra, Moti bajra, BAIF Bajra 1
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	12 Kg/ha (9 g per plot)
Fertilizers	:	N-40 Kg, P <sub>2</sub> O <sub>5</sub> -20 Kg/ha
Seed	:	300g/entry and 300 g for each national check
Locations (7)	:	<b>CZ-</b> Rahuri, Uralikanchan, Anand, Jabalpur; <b>SZ-</b> Hyderabad, Bangalore, Vellayani

**20. AVT-1 Summer Bajra: (CZ and SZ)**

Entries	:	2 + 3 (NC)
Entries	:	<b>16-ADV175020</b> (Advanta seed), <b>SBH-103</b> (RASI seed)
Checks	:	National Check: Giant Bajra, Moti Bajra, BAIF Bajra 1
Design	:	RBD with 4 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	12 Kg/ha (15 g per plot)
Fertilizers	:	N-40 Kg, P <sub>2</sub> O <sub>5</sub> -20 Kg/ha
Seed	:	500g/entry and 500 g for each national check
Locations (7)	:	<b>CZ-</b> Rahuri, Uralikanchan, Anand, Jabalpur; <b>SZ-</b> Hyderabad, Bangalore, Vellayani

## Agronomy trials AVT-2

### AVTB-2 AGRONOMY: Berseem (HZ, NWZ, NEZ, CZ)

<b>Entries (Main plot)</b>	:	2 + 1 (NC) + 1 (ZC)
<b>Entries</b>	:	BM-14 (PAU, Ludhiana); JB-07-15 (JNKVV, Jabalpur)
<b>Checks</b>	:	Wardan (NC), BL- 22 (HZ), BB-2 (NWZ and CZ), BB-3 (NEZ)
<b>P<sub>2</sub>O<sub>5</sub> (Subplot)</b>	:	Level-3 60, 80, 100 kg/ha
<b>Design</b>	:	Split plot with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4m long 10 rows at 30 cm
<b>Seed rate</b>	:	25 Kg/ha (30 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> 80 Kg/ha
<b>Seed req.</b>	:	Entry + NC(Wardan) -2.50 kg; ZC -BL- 22-540g ZC - BB-3 -540g; ZC(2) - BB-2 -1.35 kg
<b>Locations (9)</b>	:	<b>HZ-</b> Palampur, Srinagar, <b>NWZ-</b> Pantnagar, Hisar, Ludhiana, <b>CZ-</b> Jabalpur, Raipur <b>NEZ-</b> Kalyani, Pusa

### AVTO-2 (SC) AGRONOMY: Forage Oat (All 5 zones)

<b>Entries (Main plot)</b>	:	3 + 2 (NC) + 1 (ZC)
<b>Entries</b>	:	HFO-906, HFO-904 (CCS HAU, Hisar); JO-07-28 (JNKVV, Jabalpur)
<b>Checks</b>	:	Kent, OS-6 (NC); SKO-96 (HZ), RO-11-1(CZ), OS-403 (NWZ, NEZ, SZ)
<b>N Level(Subplot)</b>	:	40, 80, 120 kg/ha
<b>Design</b>	:	Split plot with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
<b>Seed rate</b>	:	100 Kg/ha (120 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
<b>Seed</b>	:	11.8 Kg/entry & NC; SKO-96 (2.15 Kg), RO-11-1 (2.16 Kg), OS-403 (5.4 Kg)
<b>Locations (11)</b>	:	<b>HZ-</b> Palampur, Srinagar, <b>NWZ-</b> Ludhiana, Pantnagar, <b>NEZ-</b> Pusa, Imphal; <b>CZ-</b> Urulikanchan, Raipur, <b>SZ-</b> Hyderabad, Mandya, Coimbatore (Ooty)

### AVTO-2 (MC) : Forage Oat (HZ, CZ)

<b>Entries</b>	:	2 + 2 (NC)
<b>Entries</b>	:	PLP-24 (CSKHPKV, Palampur); JO-07-310 (JNKVV, Jabalpur)
<b>Checks</b>	:	National Check: UPO-212 and RO-19
<b>N Level-4</b>	:	80, 100, 120, 140 kg/ha
<b>Design</b>	:	Split plot with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
<b>Seed rate</b>	:	80 Kg/ha (96 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
<b>Seed</b>	:	5.5 Kg/entry & national check
<b>Locations (5)</b>	:	<b>HZ:</b> Palampur, Srinagar, <b>CZ:</b> Anand, Jabalpur, Rahuri,

### AVT- 2 : Annual Lucerne (NWZ & SZ)

<b>Entries</b>	:	1 + 2 NC
<b>Entries</b>	:	LLC-6 (PAU, Ludhiana)
<b>Checks</b>	:	Anand-2, RL-88
<b>P<sub>2</sub>O<sub>5</sub> Level</b>	:	60, 80, 100 kg/ha
<b>Design</b>	:	RBD with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
<b>Seed rate</b>	:	25 kg/ha (30.0 g per plot)
<b>Fertilizers</b>	:	N-20kg, P <sub>2</sub> O <sub>5</sub> -80 kg/ha)
<b>Seed</b>	:	1.35 kg/entry & national check
<b>Locations (5)</b>	:	<b>NWZ-</b> Ludhiana, Bikaner <b>SZ-</b> Hyderabad, Coimbatore, Mandya

### Seed Requirement of the Check Varieties and entries for Rabi 2021-22 trials

S.N.	Crop & Variety	Quantity Required (in Kg)	Seed Source
1.	<b>Berseem</b>		
	Wardan	1.5 (IVT) + 2.0 (AVT-1+AVT-2) +2.0 (AVT-2 seed) + 2.50 kg for agronomy = <b>8 Kg</b>	Dr. Vijay Yadav, IGFR
	Bundel Berseem-2	0.5 (IVT) +1.5 (AVT-1+AVT-2)+ 1.5 (AVT-2 seed) + 1.5 kg for agronomy = <b>5.0 kg</b>	
	Bundel Berseem-3	0.70 (AVT-1&2 combined) + 0.5 (AVT-2 seed) + 0.6 Agronomy = <b>1.8 kg</b>	
	BL-22	0.5 (IVT) + 0.5 (AVT-1+ AVT-2) + 0.5 (AVT-2 Seed) + 0.6 (agron) = <b>2.1 kg</b>	Dr. Rahul Kapoor, PAU
	BL -44	1.0 (IVT)	
	IVT entries	<b>1.5kg</b>	Respective breeders
	AVT-1 entries	<b>2.0 kg</b>	Respective breeders
AVT-2 entries	2.0 (breeding) + 2.0 (seed) + 2.5 (agronomy) = <b>6.5 Kg</b>	Respective breeders	
2.	<b>Oat</b>		
	Kent	11.0 (AVT SC-1 + AVT-SC-2) + 7.0 (AVT-SC-2 seed) +12.0 (agron) = <b>30.0 kg</b>	Dr. Vijay Yadav, IGFR
	JHO-822	4.0 (IVTO-D) = <b>4.0 kg</b>	
	OS-6	8.5 (IVTO SC) + 11.0 (AVT SC-1 + AVT-SC-2) + 7.0 (AVT2-SC-2 seed) +12.0 (agron) = <b>38.5 kg</b>	Dr. Satywan Arya, CCSHAU
	OS-403	7.0 (AVT SC-1 + AVT-SC-2) + 4.0 (AVTOSC-2 seed) + 5.5 (agron) = <b>16.5 kg</b>	
	HFO-427	1.5 (IVTOSC)	
	SKO-96	1.5 (AVT SC-1 + AVT-SC-2) + 1.5 (AVTO SC-2-seed)+ 2.5 (agron) = <b>5.5 kg</b>	Dr. Salim Khuroo, SKUAST- K
	SKO-225	1.0 (IVTOSC) + 1.5 (AVT SC-1 + AVT-SC-2)= <b>2.5 Kg</b>	
	OL-1861	7.5 (IVTOSC)	Dr. Rahul Kapoor, PAU
	UPO-212	5.5 (IVT MC) + 2.2 (AVT-1 MC) + 4.0 (AVT-2 MC) + 3.0 (AVT-2 MC seed) + 5.5 (agron) + 4.0 (IVTO-D) + 3.0 (AVTO-1 D) = <b>27.2 kg</b>	Dr. Birendra Prasad GBPUA&T
	RO-19	5.5 (IVT MC) + 2.2 (AVT-1 MC) + 4.0 (AVT-2 MC) + 3.0 (AVT-2 MC seed) + 5.5 (agron) = <b>20.2 kg</b>	Dr. P.P. Surana, MPKV
	RO-11-1	3.0 (AVT SC-1 + AVT-SC-2) + 2.0 (AVTO SC-2-seed) + 2.5 (agron) = <b>5.5 kg</b>	
	IVT SC entries	<b>8.5 kg</b>	Respective breeders
	AVT-1 SC entries	<b>11.0 kg (breeding)</b>	Respective breeders
	AVT-2 SC entries	11.0 (breeding) + 7.0 (seed) + 12.0 (agronomy) = <b>30.0 Kg</b>	Respective breeders
	IVT MC entries	<b>5.5 Kg</b>	Respective breeders
	AVT-1 MC entries	<b>2.2 Kg</b>	Respective breeders
	AVT-2 MC entries	4.0 (breeding) + 3.0 (seed) + 5.5 (agronomy) = <b>12.5 Kg</b>	Respective breeders
	IVT entries - Dual	<b>4.0Kg</b>	Respective breeders
	AVT-1 entries - Dual	<b>3.0 kg</b>	Respective breeders
3.	<b>Lucerne</b>		
	Anand-2	1.4 (AVTL-2 Lu) + 1.2 AVT-2 Lu (seed) + 1.4 (Agron) = <b>4.0 kg</b>	Dr. D. P. Gohil, AAU, Anand
	RL-88	1.4 (AVTL-2 Lu) + 1.2 AVT-2 Lu (seed) + (Agron) = <b>4.0 kg</b>	Dr PP Surana, MPKV

	AVT-2 entries	1.4 (AVTL-2 Lu) + 1.2 AVT-2 Lu (seed) + (Agron) = <b>4.0 kg</b>	Respective breeders
<b>4.</b>	<b>Lathyrus</b>		
	Mahateora	1.2 (IVT & AVT-1) = <b>1.2 Kg</b>	Dr S K Jha, IGKV
	Prateek	1.2 (IVT & AVT-1) = <b>1.2 Kg</b>	
	IVT entries	1.2 (IVT & AVT-1) = <b>1.2 Kg</b>	Respective breeder
AVT-1 entries	1.2 (IVT & AVT-1) = <b>1.2 Kg</b>	Respective breeder	
<b>5</b>	<b>Tall Fescue grass</b>		
	Hima-4	<b>0.4 kg</b>	Dr. V K Sood, CSKHPKV, Palampur
	EV 178182	<b>0.4 kg</b>	
	Entries	<b>0.4 kg</b>	Respective breeders
<b>6</b>	<b>Sainfoin</b>		
	Entries	<b>1.25 kg</b>	Respective breeders
<b>7</b>	<b>Orchard grass</b>		
	Entries	<b>0.3 kg</b>	Respective breeders
<b>8</b>	<b>Summer Bajra It should be sent in the month of December 2021</b>		
	Giant bajra	0.3 (IVT)+ 0.5 (AVT-1) = <b>0.8 Kg</b>	Dr P PSurana, MPKV
	Moti bajra	0.3 (IVT)+ 0.5 (AVT-1) = <b>0.8 Kg</b>	Dr T. Shashikala, PJ TSAU
	BAIF Bajra-1	0.3 (IVT)+ 0.5 (AVT-1) = <b>0.8 Kg</b>	Dr P Takawale, BAIF
	IVT entries	<b>0.3 Kg</b>	
	AVT-1 entries	<b>0.5 Kg</b>	

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

**AICRP on Forage Crops and Utilization  
Technical Programme Crop Production  
Rabi 2021-22**

**K-19-AST-1: Studies on organic source of nutrient on green forage yield and quality of Cowpea- Fodder maize under irrigated situation.**

<b>Locations (4):</b> Mandya, Coimbatore, Vellayani, Karaikal	<b>Data reporting:</b> Kharif
<b>Year of Start:</b> Kharif 2019	<b>Concluding Year:</b> Kharif 2022

**Objectives**

1. Study the effect of organic nutrient sources on green forage yield and quality.
2. Study the physico-chemical and biological properties of soil.
3. To compare the economics of organic with inorganic sources.

**Experimental details**

<b>Crop</b>	: Cowpea- Fodder maize (winter)	<b>Design</b>	: RBD
<b>Variety</b>	: BL-2, African tall	<b>Fertilizers</b>	: As per treatments
<b>Plot size</b>	: 4 m x 5 m	<b>Replication</b>	: 3
<b>Spacing</b>	: 30 X 10 cm	<b>Year of start</b>	: Kharif-2019
<b>Treatments</b>	: 12	<b>Duration</b>	: 4 years

**Treatment details**

T <sub>1</sub>	100% RDN through inorganic fertilizers
T <sub>2</sub>	100% RDN through FYM
T <sub>3</sub>	75% RDN through FYM+ 25% RDN through vermicompost
T <sub>4</sub>	75% N through FYM+ 25% RDN through Bio-compost
T <sub>5</sub>	50% RDN through FYM+ 50% RDN through vermicompost
T <sub>6</sub>	50% RDN through FYM+ 50% RDN through Bio-compost
T <sub>7</sub>	75% of T <sub>2</sub> (both sources)
T <sub>8</sub>	75% of T <sub>3</sub> (both sources)
T <sub>9</sub>	75% of T <sub>4</sub> (both sources)
T <sub>10</sub>	75% of T <sub>5</sub> (both sources)
T <sub>11</sub>	75% of T <sub>6</sub> (both sources)
T <sub>12</sub>	50% N through FYM+ 25% RDN through vermicompost + 25% RDN through Poultry manure.

**Note**

- Organic manure to be applied based on N equivalent
- Before applying organic manure N content to be analyzed.
- Nutrient requirement- Maize 90:60:40 kg NPK/ha, Cowpea 20:60 kg NP/ha
- Calculate both requirement; apply organic nutrients equivalent to 55 kg N at Kharif and equivalent to 55 kg N at Rabi sowing allowing sufficient tie for decomposition
- Apply nutrient through inorganic source as pre doses given per crop
- 50% of system total requirement in equal dose in each season in treatment T12

**Observations to be recorded:**

**A. Growth and yield parameters:**

• Plant height (cm)	• Leaf stem ratio	• Ash, carbohydrates and fibre content
• GFY(q/ha)	• DMY (q/ha)	• CPY(q/ha)

**B. Soil properties**

OC (%), EC, NPK, Micronutrients & Microbial biomass @ initial and after harvest of the crop.

**C. Economics**

- Gross returns (Rs/ha)
- Net returns (Rs/ha)
- B:C ratio



**K-19-AST-2: Studies on organic source of nutrient on green forage yield and quality of Rice bean-oat under irrigated situation.**

<b>Locations (5):</b> AAU, Jorhat. CAU, Imphal, BCKV, Kalyani; BAU, Ranchi, RPCAU, Pusa	<b>Data reporting:</b> Kharif
<b>Year of Start:</b> Kharif 2019	<b>Concluding Year:</b> Kharif 2022

**Objectives**

1. Study the effect of organic nutrient sources on green forage yield and quality.
2. Study the physico-chemical and biological properties of soil.
3. To compare the economics of organic with inorganic sources.

**Experimental details:**

<b>Crop</b>	:	Rice bean - Oat	<b>Design</b>	:	RBD
<b>Variety</b>	:	Bidhan Rice bean 2 & JHO-822	<b>Fertilizers</b>	:	As per treatments
<b>Plot size</b>	:	4 m x 5 m	<b>replication</b>	:	3
<b>Spacing</b>	:	30 X 10 cm	<b>Year of start</b>	:	Kharif-2019
<b>Treatments</b>	:	12	<b>Duration</b>	:	4 years

**Treatment details:**

T <sub>1</sub>	100% RDN through inorganic fertilizers
T <sub>2</sub>	100% RDN through FYM
T <sub>3</sub>	75% RDN through FYM+ 25% RDN through vermicompost
T <sub>4</sub>	75% N through FYM+ 25% RDN through Bio-compost
T <sub>5</sub>	50% RDN through FYM+ 50% RDN through vermicompost
T <sub>6</sub>	50% RDN through FYM+ 50% RDN through Bio-compost
T <sub>7</sub>	75% of T <sub>2</sub> (both sources)
T <sub>8</sub>	75% of T <sub>3</sub> (both sources)
T <sub>9</sub>	75% of T <sub>4</sub> (both sources)
T <sub>10</sub>	75% of T <sub>5</sub> (both sources)
T <sub>11</sub>	75% of T <sub>6</sub> (both sources)
T <sub>12</sub>	50% N through FYM+ 25% RDN through vermicompost + 25% RDN through Poultry manure as top dress at 30 DAS.

**Note**

- Organic manure to be applied based on N equivalent
- Before applying organic manure N content to be analyzed.
- Nutrient requirement- Oat 90:60:40 kg NPK/ha, Rice bean 20:60 kg NP/ha
- Calculate both requirement; apply organic nutrients equivalent to 55 kg N at Kharif and equivalent to 55 kg N at Rabi sowing allowing sufficient tie for decomposition
- Apply nutrient through inorganic source as pre doses given per crop
- 50% of system total requirement in equal dose in each season in treatment T12

**Observations to be recorded**

**A. Growth and yield parameters:**

- Plant height (cm)
- Leaf stem ratio
- Ash, carbohydrates and fibre content
- GFY(q/ha)
- DMY (q/ha)
- CPY(q/ha)

**B. Soil properties**

OC (%), EC, NPK, Micronutrients & Microbial biomass @ initial and after harvest of the crop.

**C. Economics**

- Gross returns (Rs/ha)
- Net returns (Rs/ha)
- B:C ratio

**R-19 AST 1: Effect of cutting and splitting of nitrogen doses on growth, yield and quality of fodder oat cultivars**

**Locations (4): Raipur, Ranchi, Pantnagar and Ayodhya**

**Year of Start:** Rabi 2019-20

**Concluding Year:** Rabi 21-22

**Technical program**

**Treatment details:**

<b>Main plot: Variety -3</b>	<b>Sub plot: Cutting management &amp; Splitting of nitrogen doses -4</b>
V <sub>1</sub> : RO-19 V <sub>2</sub> : JHO-851 V <sub>3</sub> : UPO-212	<ul style="list-style-type: none"> <li>▪ Two cut + 60% Basal+40% at 1<sup>st</sup> cut</li> <li>▪ Two cut + 50% Basal+50% at 1<sup>st</sup> cut</li> <li>▪ Three cut + 50% Basal+25% at 1<sup>st</sup> cut+25% at 2nd cut</li> <li>▪ Three cut + 40% Basal+30% at 1<sup>st</sup> cut+30% at 2nd cut</li> </ul>

<b>Season</b>	:	Rabi
<b>Design</b>	:	Split plot
<b>Treatment</b>	:	12
<b>No. of factors</b>	:	2
<b>Replications</b>	:	3
<b>Gross plot size</b>	:	4x3m
<b>Total no. of plots</b>	:	36
<b>Fertilizer Details</b>	:	140 N: 60 P <sub>2</sub> O <sub>5</sub> and 40 K <sub>2</sub> O kg ha <sup>-1</sup>
<b>Cutting (Stubble) height</b>	:	10 cm from ground level

**Observations to be recorded:**

**Crop studies-**

- Plant height at each cut
- Number of shoots (tiller) before cutting (per m row length)
- No. of leaves before cutting (per m row length)
- Days to 50% flowering
- Leaf: stem ratio at each cut

**Yield study**

- Green fodder yield at each cut & total -q/ha
- Dry matter yield at each cut & total -q/ha
- Crude protein yield at each cut & total -q/ha
- Dry matter content at each cut & total -q/ha
- Crude protein content at each cut & total -q/ha
- Per day productivity (Green & Dry fodder-q/ha)

**Economics**

- Cost of cultivation (Rs. ha<sup>-1</sup>)
- Gross monetary return (Rs. ha<sup>-1</sup>)
- Net monetary returns (Rs. ha<sup>-1</sup>)
- B:C ratio (Rs./Re)

## R-19 AST 2: Effect of different potassic fertilizer sources on green fodder production and quality of fodder maize

<b>Locations (2):</b> Anand and Hyderabad	<b>Data reporting:</b> <i>Rabi</i>
<b>Year of Start and duration:</b> <i>Rabi</i> 2019-20- 3 year	<b>Concluding Year:</b> 2022

### Objective

- To study the effect of *schoenite* as potassic fertilizer on GFY and quality of fodder maize

### Treatments

<b>T<sub>1</sub></b>	Control (Only N and P applied)
<b>T<sub>2</sub></b>	1% <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>3</sub></b>	100 % RDK through KCL
<b>T<sub>4</sub></b>	100 % RDK through KCL + 1 % <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>5</sub></b>	75 % RDK through KCL + 1 % <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>6</sub></b>	100 % RDK through K <sub>2</sub> SO <sub>4</sub>
<b>T<sub>7</sub></b>	100 % RDK through K <sub>2</sub> SO <sub>4</sub> +1 % <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>8</sub></b>	75 % RDK through K <sub>2</sub> SO <sub>4</sub> +1 % <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>9</sub></b>	100 % RDK through potassium <i>schoenite</i>
<b>T<sub>10</sub></b>	100 % RDK through potassium <i>schoenite</i> +1% <i>schoenite</i> foliar spray (at 30 and 45 DAS)
<b>T<sub>11</sub></b>	75 % RDK through potassium <i>schoenite</i> + 1 % <i>schoenite</i> foliar spray (at 30 and 45 DAS)

### Note:

- Foliar application: 100g *schoenite*/ dissolved in 10 l of water applied at 30 and 45 DAS.
- Soil application: 124.0 kg *schoenite* per ha.
- Remaining nutrients except potassium will be applied as per recommendation

### Experimental details:

<b>Recommended Fertilizers dose</b>	90:40:40 kg NPK /ha
<b>Plot size</b>	4.20 m X 6.00 m
<b>Spacing</b>	30 cm X 10 cm
<b>Seed rate</b>	75 kg ha <sup>-1</sup>
<b>Replication</b>	4
<b>Design</b>	RBD
<b>Crop and variety</b>	Maize <i>African tall</i>

### Observations to be recorded:

- Growth and yield parameters:** Plant population in meter row length, Periodical plant height (at 30, 45 DAS and at harvest), No of leaves per plant (at 30, 45 DAS and at harvest), Green fodder yield (q/ha), CP, CF and DM in plant at harvest, K content and uptake in plant at harvest
- Soil properties:** Organic carbon, EC, available N, P, K, microbial biomass carbon content in soil at initial and after harvest.
- Economics:** Cost of cultivation, Net monetary returns, B:C ratio

**R-19 AST 3: Fodder productivity of Moringa (*Moringa oleifera*) as influenced by planting geometry, nitrogen nutrition and cutting regimes**

<b>Locations (5):</b> Ranchi, Hyderabad, Mandya and Dharwad	<b>Data reporting:</b> <i>Rabi</i>
<b>Year of Start and duration:</b> <i>Rabi</i> 2019-20, Three years	<b>Concluding Year:</b> 2021-22

**Objective:**

To identify ideal planting geometry, nutrient management and cutting frequency

**Treatment details:**

<b>Planting geometry</b>	<b>Nitrogen doses</b>	<b>Cutting regimes</b>
<b>i.</b> 22.5 cm x 15 cm	<b>i.</b> 100 kg N/ha/annum	<b>i.</b> 45 days interval
<b>ii.</b> 30 cm x 30 cm	<b>ii.</b> 150 kg/ha/annum	<b>ii.</b> 60 days interval
<b>iii.</b> 45 cm x 30 cm		<b>iii.</b> 75 days interval

**Experimental details:**

**Design:** Factorial RBD

**Plot size:** 4 m x 3.6 m

**Total no. plots:** 54 plots

**Notes:**

- Raise saplings in the polythene packets and 1 month old saplings may be transplanted as per the geometry in the experimental field
- An uniform dose of 10 t/ha of FYM to be given to the experimental field along with final land preparation before layout
- A basal dose of 20% N as per doses and 100% phosphorus (75 kg P<sub>2</sub>O<sub>5</sub>)+100 potassium (50 kg K<sub>2</sub>O) may be applied at the time of transplanting
- A general cut in all the geometries to be given at 45 days after transplanting for uniformity at 60 cm height and thereafter the cutting regimes to be followed at 60 cm height
- The remaining dose of 80% N as per the doses may be given in equal splits after each cut in all the cutting regimes

**Observations to be recorded:**

- **Growth and yield parameters:** Height of the fresh grown plant above 60 cm (uniform basal cut height), Green fodder yield (q/ha), CP, CF and DM in plant at harvest, K content and uptake in plant at harvest
- **Soil properties:** Initial status of organic carbon content, available N, P and K in soil Status of organic carbon content, available N, P and K after each year in soil.
- **Economics:** Cost of cultivation, Net monetary returns, B:C ratio

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

**Locations (1):** Vellayani

**Year of Start:** Kharif 2020

**Concluding Year:** 2023

**Objectives**

- To assess the influence of different shade levels on the growth, quality and yield of promising fodder grass varieties

## Treatments

### Main plot: Shade levels (3)

S<sub>1</sub>- 0% (Open)

S<sub>2</sub>- 25% shade

S<sub>3</sub>- 50% shade

### Subplot: Varieties (5)

V<sub>1</sub>-Suguna (BN hybrid)

V<sub>2</sub>-Susthira (BN hybrid)

V<sub>3</sub>- CO-3 (BN hybrid)

V<sub>4</sub>- CO-5 (BN hybrid)

V<sub>5</sub>- CO GG-3 (guinea grass)

*\*25 and 50 % shade will be established used shade nets.*

<b>Design</b>	:	Split plot	<b>Replication</b>	:	5
<b>Treatments</b>	:	15	<b>Spacing</b>	:	60 cm x 60 cm
<b>Plot size</b>	:	3 m x 3 m			

### Observations:

**Growth and Yield attributes:** Plant height, leaf area, number of tillers, leaf : stem ratio, leaf chlorophyll content at each harvest , Light intensity at the top, middle and bottom of the canopy at harvest, Green fodder and dry matter yield

**Quality characters:** Crude protein content, crude fibre content, oxalate content

**Soil analysis-** pH, EC, OC, available N, P and K before and after the experiment (in 2020 and 2023)

**Economics:** Cost of cultivation, Net monetary returns, B:C ratio

## **K-20-AST-4b: Organic nutrient management for soil health and sustainability of round the year fodder production system**

**Locations (1):** Palampur

**Year of Start:** Kharif 2020

**Concluding Year:** 2025

### **Objectives**

- To study the effect of organic systems of nutrition on forage yield and quality constituents.
- To study the effect of treatments on soil properties and economics of production

### **Cropping system**

Sorghum hybrid + Pearl millet hybrid - Annual rye grass (with two rows of Setaria grass on both side of field boundaries)

### **Treatments:**

#### **Organic nutrient sources**

T<sub>1</sub> - FYM @10 t/ha

T<sub>2</sub>- Natural farming with mulch

T<sub>3</sub>- Natural farming without mulch

T<sub>4</sub> - FYM @ 5 t/ha basal + natural farming (T<sub>2</sub>)

T<sub>5</sub>- FYM @ 5 t/ha basal + natural farming (T<sub>3</sub>)

T<sub>6</sub>- FYM @ 5 t/ha + foliar application of compost tea

T<sub>7</sub> – Control

**Natural farming:** *Beejamrit* (seed treatment with *beejamrit*); basal application of *Ghana jeevamrit* @500 kg/ha; mulching @10 t/ha; Foliar application of 10% *Jeevamrit* 4 weeks after sowing and after each cut i.e. 10 days after cut in Kharif and 15 days after cut in rabi crops.

Foliar application of compost tea 4 weeks after sowing and after each cut i.e. 10 days after cut in Kharif and 15 days after cut in rabi crops.

All the treatments will be imposed during both seasons

### **Observations:**

- **Soil studies:** Soil pH, organic carbon, available NPK, microbial population before and after completion of the experiment (each year)
- **Crop studies:** Emergence count at 15 DAS, plant height at each cut and green and dry fodder yields
- **Quality:** Crude protein content and yield; ADF and NDF content
- **Economics**
- **Sustainability analyses**

**Note:** Trial should be conducted in organic block. It is a fixed plot study.

## **K-20-AST-4C: Organic nutrient management for soil health and sustainability of round the year fodder production system**

**Locations (1):** Ayodhya

**Year of Start:** Kharif 2020

**Concluding Year:** 2025

### **Objectives**

- To study the effect of organic systems of nutrition on forage yield and quality constituents.
- To study the effect of treatments on soil properties and economics of production.

**Cropping system:** Sorghum-oat

### **Treatments:**

#### **Organic nutrient sources**

- T<sub>1</sub>- FYM @10 t/ha
  - T<sub>2</sub>- Natural farming with mulch
  - T<sub>3</sub>- Natural farming without mulch
  - T<sub>4</sub>- FYM @ 5 t/ha basal + natural farming (T<sub>2</sub>)
  - T<sub>5</sub>- FYM @ 5 t/ha basal + natural farming (T<sub>3</sub>)
  - T<sub>6</sub>- FYM @ 5 t/ha + foliar application of compost tea
  - T<sub>7</sub>- Control
- 
- **Natural farming:** *Beejamrit* (seed treatment with *beejamrit*); basal application of *Ghana jeevamrit* @500 kg/ha; mulching @10 t/ha; Foliar application of 10% *Jeevamrit* 4 weeks after sowing and after each cut i.e. 10 days after cut in Kharif and 15 days after cut in rabi crops.
  - Foliar application of compost tea 4 weeks after sowing and after each cut i.e. 10 days after cut in Kharif and 15 days after cut in rabi crops.
  - All the treatments will be imposed during both seasons

### **Observations:**

**Soil studies:** Soil pH, organic carbon, available NPK, microbial population before and after completion of the experiment (each year)

**Crop studies:** Emergence count at 15 DAS, plant height at each cut and green and dry fodder yields

**Quality:** Crude protein content and yield; ADF and NDF content

### **Economics**

#### **Sustainability analyses**

**Note:** Trial should be conducted in organic block. It is a fixed plot study.

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

**Locations (3):** Dharwad, Srinagar and Mandya

**Year of Start:** Kharif 2020

**Concluding Year:** 2022

### Objectives

- To estimate the effect of applied nitrogen using precision tools on crop growth and fodder
- To develop basis for fertilizer recommendation using the precision tools
- To work out the economics of different nitrogen management treatments

### Treatments

T <sub>1</sub>	No N
T <sub>2</sub>	50 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40
T <sub>3</sub>	50 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50
T <sub>4</sub>	50 kg N/ha (40% N basal) + remaining based on LCC 4
T <sub>5</sub>	50 kg N/ha (40% N basal) + remaining based on LCC 5
T <sub>6</sub>	100 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40
T <sub>7</sub>	100 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50
T <sub>8</sub>	100 kg N/ha (40% N basal) + remaining based on LCC 4
T <sub>9</sub>	100 kg N/ha (40% N basal) + remaining based on LCC 5
T <sub>10</sub>	150 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 40
T <sub>11</sub>	150 kg N/ha (40% N basal) + remaining based on SPAD meter critical value of 50
T <sub>12</sub>	150 kg N/ha (40% N basal) + remaining based on LCC 4
T <sub>13</sub>	150 kg N/ha (40% N basal) + remaining based on LCC 5
T <sub>14</sub>	As per recommended package of practices (50% N as basal, remaining 50% at 30 days after sowing)

### Note

- P & K are common for all treatment as per recommendation.
- In SPAD and LCC, the nitrogen will be applied after taking SPAD reading or matching with leaf colour chart at 30 & 60 DAS
- SPAD meter or LCC reading to be taken before 9.00 AM on healthy on flag leaf (topmost fully open leaf) free from insect /disease
- At each application 30 kg N to be applied

### Crop:

- **Srinagar: Kharif Maize**
- **Dharwad and Mandya: Rabi Maize**

<b>Design</b>	:	Randomized block design	<b>Replications</b>	:	Three
<b>Plot size</b>	:	4 m x 3.6 m	<b>Spacing</b>	:	30 cm x 10 cm

### Observations

**Growth and yield:** Plant height (cm), number of leaves / plant, Leaf: stem ratio, fresh & dry weight of plant at cut; green fodder and dry matter yield

**Quality:** Nitrogen content in plant; nitrogen uptake; crude protein content and yield; nitrogen use efficiency; Soil available nitrogen after harvest,

**Economics:** net returns and B:C ratio



**K-20-AST-1C: Efficacy of plant growth regulators on forage yield and quality of maize-oat cropping system**

**Location: Urulikanchan, Srinagar, Pusa, Raipur, Hisar and Ranchi**

**Year of start: 2020-21**

**Concluding year Rabi 2022-2023**

**Objectives**

- **To find out effect of different plant growth regulators on forage yield and quality of maize and oat**
- **To assess the economic feasibility of plant growth regulators**

**Treatments**

- T<sub>1</sub>: Triacantanol @ 10 ppm
- T<sub>2</sub>: Triacantanol @ 20 ppm
- T<sub>3</sub>: Mepiquat chloride @ 200 ppm
- T<sub>4</sub>: Mepiquat chloride @ 300 ppm
- T<sub>5</sub>: Salicylic acid 100 ppm
- T<sub>6</sub>: Salicylic acid 200 ppm
- T<sub>7</sub>: NAA @ 20 ppm
- T<sub>8</sub>: Whip Super 4 g a.i./ha
- T<sub>9</sub> - GA<sub>3</sub> 200 ppm
- T<sub>10</sub> - GA<sub>3</sub> 400 ppm
- T<sub>11</sub>: Control- spray of water

**Note: The spray of growth promoter be made at 30 DAS**

**Cropping System : Maize–Oat**

**Replications : Three**

**Design : Randomized Block Design**

**Gross plot : 4 m x 3 m**

**Fertilizer Dose : Recommended dose**

**Observation:**

- Plant height, number of leaves and L:S ratio at 30 DAS and at harvest
- Green fodder yield, Dry matter, crude protein content and yield
- NDF, ADF content
- Economics

**Note**

- The crops should be grown under standard package of practice. The RDF should be adjusted as per soil test values.
- The treatments T1-T11 will be applied to both the crops
- This study to be conducted in a cropping system mode. Results to be reported in Rabi report
- **It is a fixed plot study**

## K-20-AST-4d: Optimizing production technology for sustainable organic fodder production and soil health

Location: Pantnagar

Year of start: Kharif 2021

Concluding Year: 2025

### Objectives:

- To find out the effect of different components of organic cultivation on forage yield and quality.
- To assess the economic feasibility and sustainability of different organic farming systems.

### Treatments

Cropping systems (3)	
C <sub>1</sub>	Sorghum – berseem - maize+ cowpea
C <sub>2</sub>	B N hybrid + (cowpea - berseem –ricebean)
C <sub>3</sub>	Maize (sweet corn) – berseem + mustard – maize (sweet corn)
Organic production systems (4)	
OP <sub>1</sub>	Organic farming: Vermicompost @ 5 t/ha
OP <sub>2</sub>	Zero budget natural farming : ‘Bijamruta’ (seed treatment) ‘Jivamruta’ (soil treatment) and foliar spray
OP <sub>3</sub>	Panchgavya Krishi: Bio enhancer i.e. ‘Panchgavya’ @ 4% foliar spray
OP <sub>4</sub>	Rishi krishi: ‘Amritpani’ and ‘virgin soil’

### Note:

The experiment shall be carried out at organic block at Crop Research Centre, Pantnagar

**OP<sub>1</sub>: Organic farming:** NPK through vermicompost (2.2%N, 1.2% P<sub>2</sub>O<sub>5</sub> and 0.6% K<sub>2</sub>O) shall be used @ 5 t/ha for sorghum and maize and 1.5 t/ha for berseem. Vermicompost shall be applied to meet out the N requirement of the crop.

**OP<sub>2</sub>: Zero budget Natural farming:** ‘Bijamruta’ (seed treatment) ‘Jivamruta’ (soil treatment as basal and foliar spray

@ 10% at 30 DAS in seasonal crops and after each cut in BN hybrid)

**OP<sub>3</sub>: Panchgavya Krishi:** Use of bio enhancer i.e. ‘Panchgavya @ 4% foliar spray

**OP<sub>4</sub>: Rishi krishi:** ‘Amritpani’ and ‘virgin soil’ (37.5 kg of virgin rhizosperic soil collected from beneath of Banyan tree

(*Ficus benghalensis*) should be spread over one hectare and the soil is enriched with 500 lit Amritpani. 200 lit Amritpani is prepared by mixing 250 g ghee with 10 kg of cow dung followed by 500 g honey and diluted with 200 lit of water)

### Observations:

**Soil studies:** Soil pH, organic carbon, available NPK, microbial population before and after completion of the experiment

**Growth attributes:** Plant stand at 20 DAS and at harvest; plant height at pre-flowering stage for single cut and before harvest of each cut for multicut crop; number of plants / shoots/m row length; L:S ratio

**Fodder yield:** Green and dry matter yield

**Quality studies:** Crude protein content and yield

**Economics:** Cost of cultivation, gross returns, net returns and B: C ratio

## New research proposals

### R-21-AST -1: Foliar nutrition to improve the forage yield, quality and seed yield of dual purpose grass pea (*Lathyrussativus*L.)

<b>Locations :</b> Kalyani	<b>Data reporting:</b> Rabi
<b>Year of Start and duration:</b> Rabi 2021-22 (Three years)	<b>Concluding Year:</b> 2023-24

#### Objectives:

- To find out the effect of foliar nutrition on green forage yield, quality and seed yield of grass pea
- To study the effect of foliar nutrition on physico-chemical properties of soil after harvesting
- To study the production economics of dual purpose grass pea

#### Treatment

- F<sub>1</sub>: Panchagavya @ 3% (30g per litre of water)
- F<sub>2</sub>: DAP @ 2% (20g per litre of water)
- F<sub>3</sub>: Urea @ 2% (20g per litre of water)
- F<sub>4</sub>: KNO<sub>3</sub> @ 0.5% (5g per litre of water)
- F<sub>5</sub>: NPK (19:19:19) @ 1% (10g per litre of water)
- F<sub>6</sub>: Zinc (ZnSO<sub>4</sub>.7H<sub>2</sub>O) @ 0.5% (5g per litre of water + 2.5 g CaCO<sub>3</sub>)
- F<sub>7</sub>: Vermi-wash spray @ 10 % (100 ml per litre of water)
- F<sub>8</sub>: Boron (Borax) @ 0.2% (2g per litre of water)
- F<sub>9</sub>: Multi-nutrient spray 1% (10g per litre of water)
- F<sub>10</sub>: Nano urea @ 1% (20g per litre of water)
- F<sub>11</sub>: water spray
- F<sub>12</sub>: No foliar nutrition (Rec. NPK)

#### Experimental Details

<b>Crop</b>	:	Grass pea (dual purpose)	<b>Replications</b>	:	3
<b>Spacing</b>	:	20 cm X 10 cm	<b>Seed rate</b>	:	60 kg/ha
<b>Duration</b>	:	3 years	<b>Season</b>	:	Rabi-2021-22
<b>Design</b>	:	RBD	<b>Variety</b>	:	Prateek

#### Note:

**Recommended fertilizer dose (RDF): N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O @ 20, 40, 40 kg ha<sup>-1</sup>**

**Sowing time: Middle of November**

**1<sup>st</sup> foliar spray at 40 DAS, 2<sup>nd</sup> spray at 65 DAS (after cutting) and 3<sup>rd</sup> spray at 50% flowering stages, respectively.**

**First cut for fodder at 65 DAS leaving 15 cm stubble, then leave for seed**

#### Observations to be recorded:

1. Plant height (cm): 65 DAS (first cut) and at seed harvest
2. Green forage yield (kg/ha) and dry matter yield (kg/ha) at first cut (65 DAS)
3. Pod length, no. of pods/plant, no. of seeds /pod, 100-seed weight in g
4. Seed yield (kg/ha), Straw yield (kg/ha), Harvest Index (HI %) and Protein content (%) (seed)
5. Green forage quality: Crude protein content (%) and Crude protein yield (q/ha)
6. Stover quality: Crude protein content (%) and Crude protein yield (q/ha)
7. Economics: Gross return, net return, B:C ratio
8. Initial nutrient status of soil and Final nutrient status of soil after harvesting

**[Panchagavya Preparation:** Mixing of 1 kg raw cowdung with 3 litre cow urine, 2 litre cow milk, 2 litre curd, 1 kg desi ghee, 3 litre sugarcane juice, 12 bananas; are mixed properly and put in an airtight pot for 7 days and finally this 20 litre mixture again mixed with 650 litre water for application on 1 acre land and Ready-made panchagavya product is also available in the local market.]

## **R-21-AST -2: Enhancement of berseem seed quality under minimal management practices grown under mustard relay cropping system**

**Location:** Morena (RSKVV, Gwalior)

### **Objectives**

- To study the impact of technological interventions on berseem seed yield and quality
- To work out the economics of existing and intervened cultivation practices

### **Treatments**

- T1: Existing practice (sowing of berseem in standing mustard crop at pod filling with no cuts)
- T2: Berseem sowing on 25<sup>th</sup> December in standing mustard + KNO<sub>3</sub> (2%) at 50% flowering
- T3: Berseem sowing on 10<sup>th</sup> January in standing mustard + KNO<sub>3</sub> (2%) at 50% flowering
- T4: Berseem sowing on 25<sup>th</sup> January in standing mustard + KNO<sub>3</sub> (2%) at 50% flowering
- T5: Berseem sowing on 25<sup>th</sup> December in standing mustard + Borax (0.2%) at 50% flowering
- T6: Berseem sowing on 10<sup>th</sup> January in standing mustard + Borax (0.2%) at 50% flowering
- T7: Berseem sowing on 25<sup>th</sup> January in standing mustard + Borax (0.2%) at 50% flowering
- T8: sowing of sole berseem on 25<sup>th</sup> December in 25 cm apart rows with one cut
- T9: sowing of sole berseem on 10<sup>th</sup> January in 25 cm apart rows with no cuts
- T10: sowing of sole berseem on 25<sup>th</sup> January in 25 cm apart rows with no cuts

**Design:** RCBD

**Replications:** Three

**Variety:** Bundel Berseem -3

**Weed control:** Spraying of Imazethapyr @ 0.1 kg a.i. ha<sup>-1</sup> at 20 DAS

**Nutrients:** N: P: K 20:80:40 (all basal)

### **Observations**

#### **Yield parameters**

Seed yield

Biomass yield

Harvest index

#### **Seed related**

Test weight

Seed index

Seed volume

Germination percentage

Seed vigour

Seedling dry weight

Seedling root length and dry weight

## AVT trials

### R-21 AST-3: Effect of P levels on forage yield of promising entries of Berseem (AVTB2-MC)

<b>Entries (Main plot)</b>	:	2 + 1 (NC) +1 (ZC)
<b>Entries</b>	:	BM-14 (PAU, Ludhiana); JB-07-15 (JNKVV, Jabalpur)
<b>Checks</b>	:	Wardan (NC), BL- 22 (HZ), BB-2 (NWZ and CZ), BB-3 (NEZ)
<b>P<sub>2</sub>O<sub>5</sub> Level-3 (Subplot)</b>	:	60, 80, 100 kg/ha
<b>Design</b>	:	Split plot with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4m long 10 rows at 30 cm
<b>Seed rate</b>	:	25 Kg/ha (30 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> 80 Kg/ha
<b>Seed req.</b>	:	Entry + NC(Wardan) -2.50 kgZC -BL- 22-540g ZC - BB-3 -540gZC(2) - BB-2 -1.35 kg
<b>Locations (9)</b>	:	HZ- Palampur, Srinagar, NWZ- Pantnagar, Hisar, Ludhiana, CZ- Jabalpur, RaipurNEZ- Kalyani, Pusa

**Note:** 1st Cut has to be taken at 60 Days after sowings subsequent cut at 30 days interval

#### Observations

**Growth:** Plant height, Plant population/ m row length, and Leaf: stem ratio,

**Yield and quality:** Green fodder yield, Per day productivity (Green fodder, dry fodder), dry matter yield, crude protein content and crude protein yield

### R-21-AST-4: Effect of N levels on forage yield of promising entries of single cut oat (AVT-2 SC)

<b>Entries (Main plot)</b>	:	3 + 2 (NC) + 1 (ZC)
<b>Entries</b>	:	HFO-906, HFO-904 (CCS HAU, Hisar); JO-07-28 (JNKVV, Jabalpur)
<b>Checks</b>	:	Kent, OS-6 (NC); SKO-96 (HZ), RO-11-1(CZ), OS-403 (NWZ, NEZ, SZ)
<b>N Level (Subplot)</b>	:	40, 80, 120 kg/ha
<b>Design</b>	:	Split plot with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
<b>Seed rate</b>	:	100 Kg/ha (120 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> -40 Kg/ha
<b>Seed</b>	:	11.8 Kg/entry & NC; SKO-96 (2.15 Kg), RO-11-1 (2.16 Kg), OS-403 (5.4 Kg)
<b>Locations (11)</b>	:	HZ-Palampur, Srinagar, NWZ- Ludhiana, Pantnagar, NEZ- Pusa, Imphal; CZ-Urulikanchan, Raipur, SZ-Hyderabad, Mandya, Coimbatore (Ooty),

**Note:** Cut has to be taken at 50% flowering

#### Observations

**Growth:** Plant height, Plant population/ m row length, and Leaf: stem ratio,

**Yield and quality:** Green fodder yield, Per day productivity (Green fodder, dry fodder), dry matter yield, crude protein content and crude protein yield

**R-21-AST 5: Effect of N levels on forage yield of promising entries of Multi cut oat (AVT-2 MC)**

<b>Entries</b>	:	2 + 2 (NC)
<b>Entries</b>	:	PLP-24 (CSKHPKV, Palampur); JO-07-310 (JNKVV, Jabalpur)
<b>Checks</b>	:	National Check: UPO-212 and RO-19
<b>N Level-4</b>	:	80, 100, 120, 140 kg/ha
<b>Design</b>	:	Split plot with 3replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 12 rows at 25 cm
<b>Seed rate</b>	:	80 Kg/ha (96 g per plot)
<b>Fertilizers</b>	:	P <sub>2</sub> O <sub>5</sub> 40 Kg/ha
<b>Seed</b>	:	5.5 Kg/entry & national check
<b>Locations (5)</b>	:	HZ: Palampur, Srinagar, CZ: Anand, Jabalpur, Rahuri,

**Note:** 1st Cut has to be taken at 60 Days after sowings II<sup>nd</sup> cut at 50% flowering

**Observations**

**Growth:** Plant height, Plant population/ m row length, and Leaf: stem ratio,

**Yield and quality:** Green fodder yield, Per day productivity (Green fodder, dry fodder), dry matter yield, crude protein content and crude protein yield

**R-21 AST-6: Effect of P levels on forage yield of promising entries of annual Lucerne (AVTL2-MC)(NWZ & SZ)**

<b>Entries</b>	:	1 + 2 NC
<b>Entries</b>	:	LLC-6 (PAU, Ludhiana)
<b>Checks</b>	:	Anand-2, RL-88
<b>P2O5 Level</b>	:	60, 80, 100 kg/ha
<b>Design</b>	:	RBD with 3 replications
<b>Plot size</b>	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
<b>Seed rate</b>	:	25 kg/ha (30.0 g per plot)
<b>Fertilizers</b>	:	N-20kg, P <sub>2</sub> O <sub>5</sub> -80 kg/ha)
<b>Seed</b>	:	1.35 kg/entry & national check
<b>Locations (5)</b>	:	NWZ- Ludhiana, Bikaner SZ- Hyderabad, Coimbatore, Mandya

**Note:** 1st Cut has to be taken at 60 Days after sowings subsequent cut at 30 days interval

**Observations**

**Growth:** Plant height, Plant population/ m row length, and Leaf: stem ratio,

**Yield and quality:** Green fodder yield, Per day productivity (Green fodder, dry fodder), dry matter yield, crude protein content and crude protein yield

**AICRP on Forage Crops and Utilization  
Technical Programme Crop Protection  
Rabi 2021-22**

**PPT-1: Monitoring of diseases and insect pests in *Rabi* forage crops**

**Locations:** Bhubaneswar, Jhansi, Palampur, Rahuri, Coimbatore and Ludhiana

Location	Crops to be evaluated
Ludhiana	Oat, Berseem, Lucerne, perennial grasses
Palampur	Oat, Berseem, Lucerne
Jhansi	Oat, Berseem, Lucerne
Rahuri	Oat, Berseem, Lucerne, perennial grasses
Bhubaneswar	Oat, Berseem
Coimbatore	Oat, Lucerne, Perennial grasses

**Plot size:** 4x4 m<sup>2</sup> per crop  
crop

**Replication:** 4 per

**Methodology**

Disease/insect-pest progression on Rabi forages starting from date of appearance till crop maturity at weekly interval on 10 randomly selected plants/replication/crop using standard rating scale and calculation of disease severity/incidence/insect damage. Observation should be recorded in each plot and mean value should be provided.

**PPT-2: Evaluation of Rabi forage crops breeding materials for prevalent diseases and insect pests under natural conditions**

**Locations:** Bhubaneswar, Palampur, Rahuri, Jhansi, Coimbatore and Ludhiana

**Crops:** Oat, Berseem, Lucerne and perennial grasses

**Methodology**

In this trial, screening of various contributed entries along with national and zonal checks for their reaction to diseases and insect pests under natural conditions using standard disease/insect-pest rating scales will be done. Data must be recorded from breeding trials planted at different locations. Details of the crops and diseases/insect-pest to be evaluated in a particular crop at each centre is given below:

Location	Disease and insect-pests to be evaluated in different crops			
	Oat	Berseem	Lucerne	Perennial grasses
Ludhiana	leaf blight	Stem rot	Downy mildew, Weevil	Leaf spots and blight
Palampur	Leaf blight, Powdery mildew	Root rot, Leaf blight	Leaf spot	Leaf spot, blight, powdery mildew
Bhubaneswar	Leaf blight, Root rot	Root rot, Leaf blight	-	Leaf spot and blight
Rahuri	Leaf blight, Aphids	Aphids, Defoliators	Aphids, Rust, Weevil, Lepidopteran defoliators	leaf spot and blight
Jhansi	Leaf blight	Stem rot	Rust, weevil, Lepidopteran defoliators	leaf spot and blight
Coimbatore	Leaf blight	-	Aphids, Rust, Weevil, Lepidopteran defoliators	leaf spot and blight

## **PPT-31: Validation of best treatments of the trial “Eco-friendly pest management techniques in berseem ecosystem”**

**Location:** Ludhiana

**Design:** Paired plot **Replication:** 7 **Plot size:** 10x10 m<sup>2</sup>

**Treatments:**

<b>T1:</b>	Soil application of <i>Trichoderma viride</i> @ 1kg/25kg FYM/acre + foliar spray of NSKE @ 5%
<b>T2:</b>	Soil application of <i>Trichoderma viride</i> @ 1kg/25kg FYM/acre + foliar spray of NSKE @ 5%+ Chickpea as trap crop on border row + Bird perches
<b>T3:</b>	Control

**Observations:**

- Number of larvae (*H. armigera* or other lepidopteran larvae) per meter row length on berseem crop.
- Number of larvae/ plant on trap crop.
- Activity of natural enemies on trap as well as berseem crop.
- Disease incidence.
- Green fodder yield and seed yield.
- Economics.

## **PPT-34: Validation of best treatment of trial entitled “Integrated disease management in berseem”**

**Location:** Ludhiana, Bhubaneswar, Palampur, Jhansi

**Design:** Paired plot **Replication:** 7 **Plot size:** 10x10 m<sup>2</sup>

**Treatments:**

**Ludhiana**

**T1:** Seed treatment with Chitosan @ 0.05 % + foliar spray of Chitosan @ 0.05%

**T2:** Seed treatment with carbendazim @ 0.2 % + foliar spray of Chitosan @ 0.05 %

**T3:** Control

**Palampur**

**T1:** Seed treatment with carbendazim @ 0.2 % + foliar spray of carbendazim @ 0.1 %

**T2:** Seed treatment with carbendazim @ 0.2 % + foliar spray of Chitosan @ 0.05 %

**T3:** Control

**Jhansi**

**T1:** Seed treatment with *Trichoderma* @ 0.5% + foliar spray of Chitosan @ 0.05 %

**T2:** Seed treatment with carbendazim @ 0.2 % + foliar spray of carbendazim @ 0.1 %

**T3:** Control

**Bhubaneswar**

**T1:** Seed treatment with Chitosan @ 0.05 % + carbendazim @ 0.1%

**T2:** Seed treatment with carbendazim @ 0.2 % + foliar spray of carbendazim @ 0.1 %

**T3:** Control

**Target disease:** root rot, stem rot, leaf blight

**Observations:**

- Severity/incidence of diseases.
- Green fodder yield and seed yield.
- Economics



## **PPT-35: Non chemical management of stem rot of berseem caused by *Sclerotiniatrifoliorum***

**Location:** Ludhiana

**Duration:** 4 years

### **Objective:**

To find out antifungal botanicals and organic inputs against *Sclerotiniatrifoliorum* in vitro and their validation under field conditions

**Botanicals to be tested:** *Ocimumtenuiflorum*, *Ricinuscommunis*, *Curcuma longa*, *Nicotianatabacum*, *Murrayakoenigii*, *Melia azedarach*, *Azadirachtaindica*, *Calotropis gigantean*, *Aegle marmelos*, *Cymbopogon citrates* and *Datura stramonium*

**Organic inputs to be tested:** Panchgavya, compost tea, NSKE

### **Methodology:**

- Collection, isolation, identification and maintenance of stem rot pathogen (*Sclerotiniatrifoliorum*)
- Collection, preservation and preparation of aqueous extracts of botanicals and organic inputs
- Screening of plant extracts and organic inputs against stem rot pathogen under *in vitro* conditions
- Evaluation of antifungal extracts and organic inputs against test pathogens in pot experiments
- Field evaluation of most effective antagonistic plant extracts and organic inputs against stem rot disease

### **Work plan for Year 2021-22:**

#### **Evaluation of antifungal extracts and organic inputs against test pathogens in pot experiments:**

The plant extracts and organic inputs which showed strong antifungal activities against the test pathogens under in vitro will be screened under greenhouse in pot experiments.

## PPT-36: Assessment of yield losses due to insect-pests and diseases in Lucerne

**Objective:** To assess the yield losses inflicted by major diseases and insect-pests in Lucerne

**Target Diseases:** Crown rot, Rust, Downy mildew

**Target insect-pest:** Aphids, Weevil, *Spodopteralitura*, *Helicoverpaarmigera*

**Location:** Rahuri, Jhansi, Ludhiana

**Treatments:** 10

**Replications:** 3

**Design:** RBD

**Duration:** 2 years **Plot size:** 4x3 m<sup>2</sup> **Variety:** RL-88

Treatments	Details
T1	Seed treatment with thiram @ 1g/kg of seed
T2	T1+ spray at 30, 55, 85, 115, 145 days after emergence (DAE)
T3	T1+ spray at 55, 85, 115, 145 DAE
T4	T1+ spray at 30, 85, 115, 145 DAE
T5	T1+ spray at 30, 55, 115, 145 DAE
T6	T1+ spray at 30, 55, 85, 145 DAE
T7	T1+ spray at 30, 55, 85, 115 DAE
T8	T1+ spray at 30, 55, 85 DAE
T9	Spray at 30, 55, 85, 115, 145 DAE
T10	Control

### Treatment information:

- Seed treatment with thiram @1gm/kg seed for management of crown rot
- Spray at 30 DAE of imidacloprid 17.8 SL @ 0.3ml/lit of water for management of aphids
- Spray at 55 DAE of Propiconazole @ 1g /lit of water + Ridomil MZ @ 2.5 g/lit of water for management of rust and downy mildew
- Spray at 85 DAE of Quinalphos 25 EC @ 2 ml /lit of water for management of weevil
- Spray at 115 DAE of *SINPV* 500 LE, 1000 million POBs/ml @1 ml / lit. of water for management of *Spodopteralitura*
- Spray at 145 DAE of *HaNPV* 500 LE, 1000 million POBs/ml @1 ml / lit. of water for management of *Helicoverpaarmigera*

### Observations:

- **Crown rot:** Disease incidence in 10 randomly selected plants/replication at weekly interval.
- **Aphids:** No. of aphids per tiller on 10 randomly selected tillers starting from pest emergence till pest presence on weekly interval.
- **Weevil:** No. of grubs and adult weevils per tiller on 10 randomly selected tillers starting from pest emergence till pest presence on weekly interval.
- **Diseases (Rust and downy mildew):** Disease severity in 10 randomly selected plants/replication at weekly interval starting from disease appearance till its presence.
- **Defoliators (*Helicoverpaarmigera*, *Spodopteralitura*):** No. of larvae per tiller on 10 randomly selected tillers starting from pest emergence till pest presence on weekly interval.
- Green fodder yield (q/ha) in different treatments.
- Percent Yield loss in different treatments due to different diseases and insect-pests.

## New approved trials

### PPT-3: Development of *Trichoderma* mediated biocontrol strategy for managing leaf blight (*Drechsleraavenae*) disease in Oat

**Location:** Ludhiana, Jhansi, Palampur, Bhubaneswar

**Duration:** 4 years

#### **Aim:**

To find out suitable *Trichoderma* isolate against *Drechsleraavenae* *in vitro* and their validation under field conditions

#### **Objectives:**

1. Collection, isolation, identification and maintenance of leaf blight pathogen (*Drechsleraavenae*) from Ludhiana, Jhansi, Palampur and Bhubaneswar (1<sup>st</sup> year).
2. Isolation and characterization of *Trichoderma* isolates from rhizospheric soil of Oat collected from different oat growing areas (Punjab, Maharashtra, Himachal Pradesh, Odisha, and Uttar Pradesh) of India (1<sup>st</sup> year).
3. Screening of different *Trichoderma* isolates against leaf blight pathogen under *in vitro* conditions (1<sup>st</sup> + 2<sup>nd</sup> year).
4. Evaluation of promising *Trichoderma* isolates against leaf blight disease in pot experiments (2<sup>nd</sup> Year).
5. Field evaluation of most effective antagonistic *Trichoderma* isolate against leaf blight disease (3<sup>rd</sup> and 4<sup>th</sup> Year).

#### **Methodology:**

- Plant Pathologists from Ludhiana, Palampur and Bhubaneswar will isolate and characterize the leaf blotch pathogen from their location and should send the culture for further studies to the PC-unit.
- Each centre should send 5 soil samples (100-200g soil/sample) collected from oat rhizosphere from different locations (atleast 10 km apart) to the PC-Unit.
- Screening of different *Trichoderma* isolates against leaf blotch pathogen under *in vitro* conditions will be done at IGFRI, Jhansi.
- Evaluation of promising *Trichoderma* isolates (overall best antagonistic isolate from all the locations and best isolate from a particular location; total 2 isolates will be tested at each location) against leaf blotch disease in pot experiments and further field evaluation of 1 most effective antagonistic *Trichoderma* isolate against leaf blight disease will be done at Ludhiana, Jhansi, Palampur and Bhubaneswar.
- Evaluation method in pot experiment will be seed treatment, foliar spray and seed +foliar spray with *Trichoderma* spore suspension @  $1 \times 10^8$  CFU/ml
- In field experiment, evaluation method will be seed treatment, foliar spray and seed +foliar spray with *Trichoderma* spore suspension @  $1 \times 10^8$  CFU/ml.

#### **Pot experiment (2<sup>nd</sup> year)**

**Location:** Ludhiana, Bhubaneswar, Palampur, Jhansi

**Variety:** Kent

**Replications:** 3

#### **Treatments**

T1: Seed treatment with TR1 spore suspension @  $1 \times 10^8$  CFU/ml

T2: Seed treatment with TR2 spore suspension @  $1 \times 10^8$  CFU/ml

T3: Foliar spray of TR1 spore suspension @  $1 \times 10^8$  CFU/ml

T4: Foliar spray of TR2 spore suspension @  $1 \times 10^8$  CFU/ml

T5: Seed treatment +foliar spray of TR1 spore suspension @  $1 \times 10^8$  CFU/ml

T6: Seed treatment +foliar spray of TR2 spore suspension @  $1 \times 10^8$  CFU/ml

T7: Control

**Note:**

- TR1: Best antagonistic isolate among all the locations *in vitro*
- TR2: Best antagonistic isolate from a particular location *in vitro*
- At a particular location, best isolate from that location and best isolate from all the locations will only be tested. There will be no cross testing.
- Pathogen inoculation will be done as foliar spray at 20 days after emergence in pot trials.
- Foliar spray of *Trichoderma* will be done at 25 days of emergence.
- Harvesting will be done at 55 DAE.

**Observations:**

- Disease severity in different treatments from 30 DAE at 5 days interval till 55 DAE.
- AUDPC and rate of infection in different treatments.
- Green fodder yield in different treatments.

**Field experiment (3<sup>rd</sup> and 4<sup>th</sup> year)**

**Location:** Ludhiana, Bhubaneswar, Palampur, Jhansi

**Design:** RBD

**Replication:** 3 **Plot size:** 4x3 m<sup>2</sup>

**Variety:** Kent

**Treatments**

T1: Seed treatment with TR1 or TR2 spore suspension @ 1 x 10<sup>8</sup> CFU/ml

T2: Seed treatment with carbendazim @ 0.2 %

T3: Foliar spray of TR1 or TR2 spore suspension @ 1 x 10<sup>8</sup> CFU/ml

T4: Foliar spray of carbendazim @ 0.1 %

T5: Seed treatment +foliar spray of TR1 or TR2 spore suspension @ 1 x 10<sup>8</sup> CFU/ml

T6: Seed treatment with carbendazim @ 0.2 % +foliar spray of carbendazim @ 0.1 %

T7: Seed treatment with carbendazim @ 0.2 % + foliar spray of propiconazole @ 0.1 %  
(recommended technology)

T7: Control

**Note:**

- TR1 or TR2: Best antagonistic isolate at a particular location in pot studies.
- At a particular location, best isolate will only be tested. There will be no cross testing.
- Foliar spray of *Trichoderma* will be done at 25 days of emergence.
- Harvesting will be done at 55 DAE.

**Observations:**

- Disease severity in different treatments from 15 DAE at 5 days interval till 55 DAE.
- AUDPC and rate of infection in different treatments.
- Green fodder yield in different treatments.

## **PPT-5: Bio-intensive management of defoliator insect pests in Lucerne**

**Objective:** To develop bio-based strategy for managing defoliators (*S. litura* and *H. armigera*) in Lucerne

**Locations:** Rahuri, Coimbatore

**Treatments:** 9

**Replications:** 3

**Design:**

RBD

**Plot size:** 4x4 m<sup>2</sup> **Variety:** RL-88

### **Treatments:**

**T<sub>1</sub>:** Spray of NSKE 3000 ppm @ 2ml/ litre of water

**T<sub>2</sub>:** Spray of *Metarhizium (Nomuraea) rileyi* (1 x10<sup>8</sup> CFU/g) 1.15 WP @ 5 g/lit of water

**T<sub>3</sub>:** Spray of *Metarhiziumanisopliae* (1 x10<sup>8</sup> CFU/g) 1.15 WP @ 5 g/lit of water

**T<sub>4</sub>:** Transplanting of marigold seedling 50 cm apart around and on ridges of field one month after sowing

**T<sub>5</sub>:** Installation of 'T' shaped perches for birds @ 2 m distance.

**T<sub>6</sub>:** Installation of pheromone traps @ 10-12 traps/ha for *S.litura* and *H. armigera*.

**T<sub>7</sub>:** Spray of *HaNPV* and *SINPV* 1000 million POBs/ml @ 1 ml/ litre of water

**T<sub>8</sub>:** Spray of chlorpyrifos 20EC @ 2 ml/liter of water

**T<sub>9</sub>:** Untreated Control

**Note:** Foliar spray will be given just after the first appearance of the pest in the pheromone traps.

### **Observations:**

- No. of larvae per tiller at 5 randomly selected spots in one running meter starting from pest emergence till pest presence at weekly interval.
- No. of larvae per tiller at 5 randomly selected spots in one running meter before and after 5, 10 and 14 days after spray in different treatments.
- Population of natural enemies (also identify the natural enemies) in different treatments before and after 5, 10 and 14 days after spray.
- Green fodder yield (q/ha) in different treatments.

**AICRP on Forage Crops and Utilization  
Technical Programme New Initiative Projects  
Rabi 2021-22**

**PPT-4: Germplasm evaluation programme against diseases and insect-pests in Rabi forages**

**Objective:** To identify potential resistance donors for their further use in forage breeding programme.

**Details of crop, disease/insect-pest and place of screening**

Crop	Contributing centres (approx. 25 lines each)	Disease /insect-pest	Place of screening
Berseem	PAU, CCSHAU, JNKVV, IGFRI	Stem rot	Ludhiana
		Leaf blight	Bhubaneswar
		Root rot	Palampur, Bhubaneswar
Lucerne	BAIF, PAU, MPKV, AAU, TNAU, IGFRI	Downy mildew	Ludhiana
		Rust, Aphids, Defoliators	Rahuri, Coimbatore
		Weevil	Ludhiana, Jhansi
Oat	PAU, GBPUAT, CCSHAU, MPKV, SKUAST-K, CSKHPKV, IGFRI	Leaf blight	Ludhiana, Bhubaneswar, Jhansi
		Powdery mildew	Palampur
		Aphids	Rahuri

**Design:** Augmented design

**Crop: Berseem**

- **Number of entries/lines:** Approx. 125
- **Paired rows for each germplasm in 3 m rows.**
- **30 cm row to row.**
- **Released varieties to be placed 3-4 times as checks**
- **Fertilizers:** N-20 Kg, P<sub>2</sub>O<sub>5</sub> 80 Kg/ha
- **Seed:** 20 g/entry
- **Contributing centres:** Ludhiana, Hisar, Jabalpur, IGFRI (30 germplasm each). Released varieties should also be screened and provided by respective centers.

**Crop: Lucerne**

- **Number of entries/lines:** Approx. 125
- **Paired rows for each germplasm in 3 m rows.**
- **30 cm row to row.**
- **Released varieties should be placed 3-4 times as checks**
- **Fertilizers:** N-20 Kg, P<sub>2</sub>O<sub>5</sub> 80 Kg/ha
- **Seed:** 20 g/entry
- **Contributing centres:** Ludhiana, Rahuri, Anand, Coimbatore, BAIF, IGFRI (25 promising germplasm each). Released varieties should also be screened and provided by respective centers.

**Crop: Oat**

- **Number of entries/lines:** Approx. 125
- **paired rows for each germplasm in 3 m rows.**
- **30 cm row to row and 10 cm plant to plant distance.**

- **Released varieties should be placed 3-4 times as checks**
- **Fertilizers: N-80 Kg, P<sub>2</sub>O<sub>5</sub>- 40 Kg/ha**
- **Seed: 60 g/entry**
- **Contributing centres: Ludhiana, Pantnagar, Hisar, Rahuri, Srinagar, IGFRI, Palampur (25 promising germplasm each). Released varieties should also be screened and provided by respective centers.**

**Observations:**

- Disease severity/pest damage reaction in 5 randomly selected plants per entry at seedling (4-5 leaf stage) and 50% flowering stage as per attached rating scales.
- Both disease/pest rating score as well as percent severity/damage along with reaction should be reported.

## Quality profiling of forage varieties and advanced breeding lines

### Objective:

- Identifying parent materials for future crosses to introgress quality traits. .
- To identify the range of quality parameters for developing biofortified lines
- Identifying biofortified varieties/ introgression of quality traits into released varieties.

**Materials:** Released varieties, advanced breeding lines from different centers. 25-30 lines in each crop.

Crop	Forage	Grain	Sp trait	Contributing centres	Testing Centers	Analysis center
Berseem	CP, NDF, ADF, Hemicellulose, ADL, Ash, <b>Macro-minerals</b> (Ca, K, Na, P, S, Mg), <b>Micro-minerals</b> (Cu, Fe, Mn, Zn, B)	CP, CF, Total carbohydrate <b>Macro-minerals</b> (Ca, K, Na, P, S, Mg), <b>Micro-minerals</b> (Cu, Fe, Mn, Zn, B)		JNKVV Jabalpur; IGFRI, Jhansi; HAU, Hisar;; PAU, Ludhiana	PAU, Ludhiana HAU, Hisar IGFRI, Jhansi	PAU, Ludhiana AAU, Anand IGFRI, Jhansi
			Beta-glucan	CSKHPKV, Palampur; SKUAST, Srinagar; PAU, Ludhiana; HAU, Hisar; MPKV, Rahuri; JNKVV, Jabalpur; IGFRI, Jhansi	PAU, Ludhiana AAU, Anand CSKHPKV Palampur IGFRI, Jhansi	CSKHPKV Palampur PAU, Ludhiana IGFRI, Jhansi
Lucerne				MPKV, Rahuri; BAIF, Urulikanchan; AAU, Anand; SKRAU, Bikaner; IGFRI, Jhansi	AAU Anand, TNAU, Coimbatore IGFRI, Jhansi	AAU Anand, TNAU, Coimbatore IGFRI, Jhansi

### Berseem:

- All released varieties + 5 advanced breeding lines each from contributing centers
- Quantity of seed: 50g/ entry
- Crop will be grown at Ludhiana, Jhansi and Hisar in augmented design in three rows of 4 m at 50 cm apart. Harvesting of one line will be done at 50% flowering, 1 lines at maturity for collection of seed.
- Nutrient data analysis will be done at 50% flowering biomass.

### Oat:

- All released varieties + 5 advanced breeding lines each from contributing centers
- Quantity of seed: 250g/ entry



- Crop will be grown at Jhansi, Ludhiana, Anand and Palampur in augmented design in three rows of 4 m at 50 cm apart Harvesting of one line will be done at 50% flowering, 1 lines at maturity.
- Nutrient data analysis will be done from both 50% flowering biomass and from seed.

**Lucerne:**

- All released varieties + 5 advanced breeding lines from centers
- Quantity of seed: 50g/ entry
- Crop will be grown at Anand, Coimbatore and Jhansi in augmented design in three rows of 4 m at 50 cm apart Harvesting of one line will be done at 50% flowering, 1 lines at maturity for collection of seed.
- Nutrient data analysis will be done from 50% flowering biomass.

**ICAR- AICRP ON FORAGE CROPS & UTILIZATION  
(ICAR-IGFRI, Jhansi)  
VIRTUAL NATIONAL GROUP MEET: *Rabi-2021-22***

**Date: 20<sup>th</sup> September, 2021**

**Venue: On line platform**

**TENTATIVE PROGRAMME**

<b>10:00-10:55</b>	<b>Session I</b>	<b>Opening Session</b>
	Chairman	Dr. T.R. Sharma, DDG (CS), ICAR
	Co- Chairman	Dr . R. K. Singh, ADG (CC), ICAR
	Rapporteurs	Dr. R. K. Agrawal and Dr. N. R. Bhardwaj
10:00-10:05	Welcome Address	Dr. Amaresh Chandra Director, ICAR-IGFRI, Jhansi
10:05-10:20	Project Coordinator's Report	Dr. A. K. Roy, Project Coordinator
10:20-10:25	Address by Co-Chairman	Dr . R. K. Singh, ADG (CC), ICAR
10:25-10:35	<ul style="list-style-type: none"> <li>• Release of publications</li> <li>• Felicitation of retiring scientists &amp; Awards for achievements</li> </ul>	
10:35-10:50	Address by Chairman	Dr. T.R.Sharma, DDG (CS), ICAR
10:50-10:55	Vote of Thanks	Dr. R K Agrawal, PI Agronomy AICRP
10:55-11:00	Break	

<b>11: 00-13:00</b>	<b>Session II</b>	<b>Crop Improvement</b>
	Chairman	Dr. Bhagmal, Secretary ( <i>TAAS</i> ) & Ex Director IGFRI
	Co-chairman	Dr. Amaresh Chandra Director, ICAR-IGFRI, Jhansi
	Subject Expert	Dr. D. R. Malaviya, FNAAS, Ex- Head, Seed Tech Division, IGFRI Dr. A. K. Tyagi, FNAAS, ADG, Animal Nutrition, ICAR
	Rapporteurs	Dr. P. Mahadevu & Dr. Gayathri G
	<b>Presentation of results</b>	
	Pre Breeding activities	Dr. A. K. Roy, Project Coordinator
	Plant Breeding	Dr Rahul Kapoor, PAU, Ludhiana
	Germplasm and seed issues	Dr Rahul Kapoor, PAU, Ludhiana
	Discussion and technical programme formulation	All participants
	Remarks and comments	Dr. D. R. Malaviya, FNAAS, Ex- Head, Seed Tech Division, IGFRI Dr. A. K. Tyagi, FNAAS, ADG, Animal Nutrition, ICAR Dr. Bhagmal, Secretary ( <i>TAAS</i> ) & Ex Director IGFRI

**13:00 – 13:30 – Lunch**

<b>13:30 -15:00</b>	<b>Session III</b>	<b>Crop Production &amp; FTD, TSP</b>
	Chairman	Dr. M.P. Jain, Director (Research) RVSKVV, Gwalior
	Co-chairman	Dr . A. K. Roy, Proeject Coordinator
	Rapporteurs	Dr. B G Shekhara, Dr S K Jha
	<b>Presentation of results</b>	
	Report of Trials Rabi 2020-21	Dr. R. K. Agrawal
	FTDs , NEH, TSP and SCSP	Dr. R. K. Agrawal
	Discussion and technical programme formulation	All participants
	Remarks and comments	Dr M. P. Jain, Director Research, RVSKVV, Gwalior Dr. Amaresh Chandra, Director, IGFRI ,Jhansi

<b>15:00- 16:00</b>	<b>Session IV</b>	<b>Crop Protection</b>
	Chairman	Dr . S.N. Sushil, Principal Scientist, ICAR-IISR, Lucknow
	Rapporteurs	Dr. AshleshaAtri, Dr. SandipLangde
	<b>Presentation of results</b>	
	Report of Trials Rabi 2020-21	Dr. N. R. Bhardwaj
	Discussion and technical programme formulation	All participants
	Remarks and comments	Dr . S.N. Sushil, Principal Scientist, ICAR-IISR, Lucknow

<b>16:00- 17:00</b>	<b>Varietal Identification Committee meeting -Restricted to invited members only</b>	
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<b>17:00-18:00</b>	<b>Session V</b>	<b>Plenary session</b>
	Chairman	Dr. T.R. Sharma, DDG (CS), ICAR
	Co- Chairman	Dr . R. K. Singh, ADG (CC), ICAR
	Rapporteurs	Dr. R K Agrawal and Dr. N. R. Bhardwaj
17:00-17:05	Welcome & Remarks	Dr. Amaresh Chandra Director, ICAR-IGFRI, Jhansi
17:05-17:35	Recommendations and way forward	Dr. A. K. Roy, Project Coordinator
17:35-17:40	Remarks by Co-Chairman	Dr . R. K. Singh, ADG (CC), ICAR
17:40-17:55	Remarks by Chairman	Dr. T.R.Sharma, DDG (CS), ICAR
17:55-18:00	Vote of Thanks	Dr. R K Agrawal, PI Agronomy AICRP

### **Progress Review and Monitoring Committee (PMRC)**

- 1. Dr.BhagMal** ,Ex Director IGFRI and coordinator Biodiversity International coordinator for SE Asia.
- 2. Dr. A. K. Tyagi** ,Asstt. Director General, Animal Nutrition, ICAR, New Delhi
- 3. Dr.Jagdish Kumar**, Joint Director, ICAR- NIBSM, Raipur
- 4. Dr. D. R. Malaviya**, Ex- Principal Scientist and Head, CI Division
- 5. Dr. M. P. Jain**, Director (Research), RVSKVV, Gwalior

<b>ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS AND UTILIZATION (INDIAN COUNCIL OF AGRICULTURAL RESEARCH)</b>	
<b>NATIONAL GROUP MEET- Rabi 2021-22</b>	
<b>Date: 20<sup>th</sup> September, 2021</b>	<b>Venue: On line video conference</b>
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3	Dr. D. K. Yadava, ADG (Seeds), I.C.A.R.
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<b>G. Private companies/ NGO</b>	
87	Dr. Aditya Sharma, Advanta India Limited, Unicorn House, Plot No.-3, Balaji Enclave, Secunderabad 500 009 (Telengana)
88	DrBhuvanParihar, JK Agri. Genetics Limited 1-10-117, 4 <sup>th</sup> Floor, Varun Towers, Begumpet, Hyderabad 500 016 (Telengana)
89	DrRajan Gupta, Rasi Seeds Pvt. Ltd, Bengaluru
90	Ch. Mahanand, Kanchan Ganga Seeds,
91	Dr ASN Reddy, SIRA Seeds, Krithika Layout opp. Image garden, Bengaluru
92	Dr. Ravindrababu, Principal Breeder-Maize, Nuziveedu Seeds Ltd, Kandlakoya, Hyderabad
93	M/S Alamdar Seed Company, Kutchh, Gujarat
94	Dr. Sukhpal Singh, Head- R&D, Foragen Seeds Pvt. Ltd
95	DrPrabhakarBabu, G. CEO, Foragen Seeds Pvt. Ltd, Hyderabad-500 034.
<b>H. Forage Experts</b>	
96	<b>Dr.Bhag Mal</b> , Ex Director IGFRI, <i>Trust for Advancement of Agricultural Sciences (TAAS)</i>
97	<b>Dr. D. R. Malaviya</b> , Principal Scientist and Head, CI Division, IISR, Lucknow.
98	<b>Dr. A. K. Tyagi</b> , Asstt. Director General, Animal Nutrition, ICAR, New Delhi
99	<b>Dr S. N. Sushil</b> , Principal Scientist, IISR, Lucknow
100	<b>Dr M. P. Jain</b> , Director Research, RVSKVV, Gwalior

<b>I. ICAR- Indian Grassland and Fodder Research Institute, Jhansi 284003 (U.P.)</b>	
101	Dr, A. Chandra Director, IGFRI, Jhansi
102	Dr. V. K. Yadav, Head Seed Technology Division
103	Dr. R V Kumar Head, Grassland and Silvi-pasture Management Division
104	Dr S. Ahmad Head, Crop Improvement Division
105	Dr K K Singh Head, Plant Animal Relationship Division
106	Dr Sunil Kumar Head, Crop Production Division
107-136	+ 30 other Participants from IGFRI, Jhansi, Avikanagar, Dharwad, and Srinagar
<b>AICRP on Forage Crops &amp; Utilization, Project Coordinating Unit, IGFRI, Jhansi</b>	
137	Dr. A. K. Roy, Project Coordinator
138	Dr. R. K. Agrawal, Principal Scientist (Agronomy)
139	Dr. Nitish Rattan Bhardwaj, Scientist (Pl. Pathology)
140	Dr. Subhash Chand, Scientist (Plant Breeding)

## Glimpses of Media Coverage

The screenshot displays the ICAR website with the following content:

**भारतीय कृषि अनुसंधान परिषद**  
**Indian Council of Agricultural Research**  
 (Ministry of Agriculture and Farmers Welfare)

Navigation menu: Home, COVID-19, Bulletin Board, Publications, E-Office, Webmail, KM Portal, Media Coverage, Contact us

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**ICAR at a Glance**

- About us
- Vision Documents
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- Institutes
- Dare Monthly Achievements
- Agricultural Technology Application Research Institutes
- Krishi Vigyan Kendras
- Technologies & Products for Commercialization
- ICAR Awardees
- AICRPs & Network Projects
- Consortium for e-Resources in Agriculture
- ICAR Awards 2020

**Divisions and Units**

- Crop Science
- Horticultural Science
- Natural Resource Management
- Agricultural Engineering
- Animal Science
- Fisheries Science
- Agricultural Education
- Agricultural Extension
- Knowledge Management

**Virtual National Group Meeting of ICAR-AICRP on Forage Crops and Utilization organized**

20<sup>th</sup> September, 2021, Jhansi

The All India Coordinated Research Project on Forage Crops and Utilization, ICAR-Indian Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh organized its "Virtual National Group Meeting on Rabi-2021-22" today.

In his address, Dr. Tilak Raj Sharma, Deputy Director General (Crop Science), ICAR stressed on the need for reducing the existing gap between the fodder demand and supply in the country through technological use. The need for strengthening the pre-breeding activities for broadening the genetic base and breaking the yield barrier of the existing old forage varieties was also emphasized in Dr. Sharma's address.

Dr. A.K. Roy, Project Coordinator briefed about the Project, salient achievements during 2017-21, summary of activities carried out during the Rabi 2020-21 and the new initiatives for future programmes. He highlighted the release of 51 Forage varieties, 37 Production and 11 Protection Technologies during the SFC Period of 2017-21.

A total of 9 new varieties including 3 each in Berseem, Multi-cut Fodder Summer Bajra and Fodder Oats under the different cutting management for the different zones were identified for release in the Varietal Identification Committee Meeting held during the occasion.

More than 150 participants including the Senior Officials from ICAR; Ministry of Animal Husbandry & Dairying; National Dairy Development Board; Directors and Project Coordinators of ICAR, Representatives of Private Sectors, Scientists of ICAR-AICRP Centers and other ICAR Institutes participated in the Meeting.

(Source: All India Coordinated Research Project on Forage Crops and Utilization, ICAR-Indian Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh)

**News**

- National Webinar on "Scientific Goat Farming: From the Livelihood to Financial Security for the..."
- National Campaign on "Advances in Animal Health" @Bharat Ka Amrut Mahotsav
- National Webinar on "Entomophagy for livelihood security and ecological engineering for innovative..."
- Webinar on "National Campaign on System

**Knowledge Initiatives**

- KVK Portal
- MobileApp
- Agricultural Education Portal
- ICAR-e courses
- CanHelio
- Compendiums
- Consortium for e-Resources in Agriculture (CeRA)
- Foreign Vialt Management System of DARE-ICAR
- Human Resource Management System
- KRISHI Portal
- Knowledge Innovation Repository of Agriculture in the North East
- National Innovations on Climate Resilient Agriculture (NICRA)
- Other Knowledge Initiatives