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Proceedings

National Group Meeting-Kharif-2017

CSK HPKV, Palampur

April 18-19, 2017

ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS & UTILIZATION

(Indian Council of Agricultural Research)

कार्यवृत्त

राष्ट्रीय समूह बैठक खरीफ-2017

सी. एस. के. एच. पी. के. वो. पालमपुर

अप्रैल 18-19, 2017

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Project Coordinating Unit

All India Coordinated Research Project on Forage Crops & Utilization

ICAR-IGFRI, Jhansi-284 003 (U.P.)

<http://www.aicrponforagecrops.res.in>



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**ALL INDIA COORDINATED RESEARCH PROJECT
ON
FORAGE CROPS & UTILIZATION
(Indian Council of Agricultural Research)**

Proceedings of the National Group Meeting Kharif-2017

held at
CSK HPKV, Palampur
(April 18-19, 2017)

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

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AICRP ON FORAGE CROPS AND UTILIZATION

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**Proceedings of the National Group Meeting: Kharif-2017
(Held at CSK HPKV, Palampur during May April 18-19, 2017)**

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

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April, 2017

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PREFACE

The National Group Meet, *Kharif* 2017 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 *Kharif* 2016 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 *Kharif* 2017 was successfully done during the meet. The meeting was jointly organized by Indian Council of Agricultural Research (ICAR) and CSK HPKV, Palampur, Himachal Pradesh during 18-19 April, 2017 at Palampur.

The meeting was attended by the scientists and officials engaged in forage research and development working at Coordinating and Collaborating centres located at different SAUs, CAU, ICAR institutes, NGOs and other institutions. All the important stakeholders contributed in the development and refinement of programme, linkages and collaborations and deciding future course of action in view of the changing agricultural needs of the farmers, livestock keepers and other stakeholders. The local participants included livestock keepers, research managers, scientists and staff members from CSK HPKV, Palampur and electronic and print media personnel of the region.

This compilation contains concise report of the National Group Meet, *Kharif* 2017 covering highlights on forage crop improvement, forage crop production, forage crop protection and proceedings of different technical sessions. The National Group Meet members discussed and planned future strategies for improving the forage productivity, quality, and soil health to address the regional and national forage security with sustainability for increasing livestock population. The finalized technical programme on forage crop improvement, forage crop production and forage crop protection for *Kharif* 2017 have been given in annexure.

The successful conductance of the event is outcome of the joint efforts made by the ICAR/IGFRI authorities, participating scientists, staff of the Project Coordinating Unit, authorities of CSK HPKV, Palampur, Principal Investigators and other staff of IGFRI, Jhansi. The team of All India Coordinating Research Project on Forage Crops & Utilization sincerely acknowledges their guidance, 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. J. S. Sandhu, Deputy Director General (Crop Science), Dr. I.S. Solanki, Assistant Director General (FFC), Dr. Dinesh Kumar (Principal Scientist, FFC) and other unit members Crop Science Division, ICAR for their constant guidance, support and encouragement as well as financial and administrative approval.

We are thankful to Dr. P. K. Ghosh, Director IGFRI and heads of divisions, scientists, administrative and finance personnel of IGFRI, Jhansi for their constant support. The authorities and organizing committee of CSK HPKV, Palampur is especially thanked for successful and smooth conductance of the meeting.

A.K. Roy
Project Coordinator

Highlights

Varieties identified

- **Marvel-09-4 [Marvel Grass (*Dichanthium annulatum*)]:** The variety was developed by MPKV, Rahuri. The entry was superior for green fodder yield, dry matter yield and crude protein yield and was also resistant to leaf blight. It was identified for cultivation as perennial grass under rainfed condition in the states of Gujarat, Uttar Pradesh, Madhya Pradesh and Maharashtra
- **RCC-10-6 [*Cenchrus ciliaris*]:** The variety was developed by MPKV, Rahuri. The entry was superior for green fodder yield, dry matter yield and crude protein yield, per day productivity and also resistant to leaf blight. It was identified for cultivation as perennial grass under rainfed condition in the states of Punjab, Rajasthan, Gujarat, Uttar Pradesh and Maharashtra.
- **JHD-2013-2 [Marvel Grass (*Dichanthium annulatum*)]:** The variety was developed by IGFRI, Jhansi. The entry was superior for green fodder yield, dry matter yield and crude protein yield and also moderately resistant to leaf blight. It was identified for cultivation as perennial grass under rainfed condition in the states of Punjab and Rajasthan.
- **PBN 342 [Bajra Napier hybrid]:** The variety was developed by PAU, Ludhiana. The entry was superior for green fodder yield, dry matter yield and also resistant to Pyricularia leaf spot and root rot. It was identified for cultivation as perennial grass under irrigated conditions in the states of Punjab, Haryana, Rajasthan, Odisha, Assam, Tamil Nadu, and Karnataka.

Forage Crop Production Technologies

- **Maize-cowpea intercropping:** In Kashmir sowing of fodder maize @ 40kg/ha in lines 30 cm mixed with cowpea @ 40kg/ha in replacement series is recommended for obtaining higher biomass and good quality fodder. The technology also improves the soil fertility and fetched highest monetary return and benefit cost ratio.
- **Maize +cowpea/soybean mixed cropping:** Under temperate conditions of Kashmir, the mixed cropping of cowpea or soybean with fodder maize is recommended for higher green, dry matter and crude protein yield. It recorded higher net returns, benefit cost ratio besides improvement in soil available major nutrients.
- **Rice- oat cropping system:** In NE Zone, 25% N through FYM + 50 % NPK of RDF+ Biofertilizer (Azotobacter+PSB) + green manure application is recommended to normal grown rice crop under rice- oat cropping system for higher productivity and remuneration. This also saves 25 % RDF of succeeding oat crop. This INM practice recorded higher productivity and net returns, over RDF supplemented through inorganic.
- **Wheat-cowpea-sorghum cropping system:** In Punjab, wheat-cowpea-sorghum cropping system with application of recommended dose of fertilizers to sorghum and wheat and only 50 % of recommended dose of P fertilizer to summer cowpea is recommended for higher yield and net monetary returns as well as benefit cost ratio.

Forage Crop Protection Technology

- Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP (50 g/kg seed) followed by two foliar sprays of 0.1 per cent propiconazole at 15 day interval is recommended for management of root rot, anthracnose and leaf blights of forage cowpea

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National Group Meeting Kharif 2017
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18-19 April 2017

SUMMARIZED MAJOR RECOMMENDATIONS AND HIGHLIGHTS

Varieties identified

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General recommendations

- Scientists were advised to properly document the developed breeding material and get the novel germplasm registered with NBPGR.
- There should be uniform pattern of reporting for all plant protection data. The guidelines developed during Rabi Forage Group Meet at MPKV, Rahuri should be followed.
- The centers were advised to communicate the status of excess breeder seed production to the PC, so that steps would be taken up for its disposal. All the centers should take utmost care to produce the allocated breeder seed as it is a national commitment. If there is shortfall, efforts should be taken to grow it in off-season so as to fulfill the commitment.
- To meet the lean period demand, fodder conservation techniques like hay, silage, blocks etc. should be popularized by Universities and other government/ NGO institutions
- The funds release broadly are under three heads i.e. Grant in aid – Capital, Grant in aid – Salaries, Grant in aid – General. These heads should be strictly followed and expenditure should not jump in any head. The money from one head can not be transferred to other head. In Salaries, please strictly follow the number and nature of posts. No retirement benefits should be charged from AICRP fund.
- It was emphasized that there is no allocation of fund for FLD in forage crops, while DAC is funding FLDs in other major crops. Project coordinator will explore the possibility of getting funding from DAC in consultation with ICAR.
- Strengthening of Stylosanthes research work may be taken up at IGFRI, RRS, Dharward, BAIF, Uralikanchan and MPKV, Rahuri.
- It was decided that a collaborative research project between AICRP Forage Crops and NDDDB should be prepared with the objectives to develop standards for quality parameters in green and dry fodder and submitted to ICAR for consideration

INAUGURAL SESSION

The National Group Meeting – Kharif 2017 of AICRP on Forage Crops and Utilization was inaugurated at CSK Himachal Pradesh Krishi Viswavidyalaya, Palampur, Himachal Pradesh on 18.04.2017. It commenced with lighting the lamps by dignitaries. The inaugural session started with the ICAR song followed by University song.

The dignitaries present included Prof. K.C. Agnihotri, Vice Chancellor, Himachal Pradesh Central University, Dr. I. S. Solanki, ADG (FFC), ICAR, Dr. Sujay Rakshit, Director, ICAR-IIMR, Ludhiana, besides HPKV officials.

Dr. R. S. Jamwal, Director Research, HPKV welcomed the delegates and presented achievements of University for the farming community of hilly state.

Dr. A. K. Roy, Project Coordinator, AICRP on Forage Crops & Utilization presented the brief introduction of the project, fodder and livestock scenario and issues in Himachal Pradesh as well as summary of activities carried out during kharif 2016.

Dr. Sujay Rakshit, Director, ICAR-IIMR, Ludhiana, stressed for more collaboration among AICRP's working on crops related to forage and highlighted the importance of Rabi Maize as fodder resource to bridge the demand and supply gap of forage availability.

Dr. I. S. Solanki, ADG (FFC), ICAR, highlighted the importance of high yielding varieties with good nutritional quality and asked the scientists to develop and disseminate the technologies for the benefit of farmers and livestock owners. The role of fodder crops in nutritional security was highlighted.

Various publications including the Annual Report of AICRP Forage Crops, Souvenir by HPKV, and extension bulletin in regional languages by different AICRP centers were released.

Prof. K.C. Agnihotri, Vice Chancellor, Himachal Pradesh Central University, in his inaugural address, urged the young scientists for out of box thinking and make efforts for path breaking research and innovative ideas and technologies for benefit of the farmers and rural community. He expressed concern over the reports of spurious livestock products especially artificial milk and eggs. He called upon the scientific community to work in holistic manner rather than adopting piecemeal approach for solving the problems.

TECHNICAL SESSION-I

INTERACTIVE SESSION WITH STAKEHOLDERS

Chairman	:	Dr. P.K. Mehta, Director, Extension Education & Dean COA, HPKV
Rapporteur	:	Dr. Rahul Kapoor

At the outset, the chairman welcomed the different stakeholders like farmers, entrepreneurs, forage seed growers, livestock keepers and animal husbandry group. About 40 stakeholders besides the delegates and University officials participated in the interactive session. The followings were the feedbacks given by the different stakeholders:

- Farmers appreciated the concerted efforts of AICRP (FCU) scientists of CSKHPKV, Palampur and informed the house that with their help and guidance, the forage production has increased considerably and such efforts should be kept going to further sustain the forage production in this region.
- Low sale price along with the poor marketing facilities of milk were the major problems highlighted by most of the dairy farmers. It was suggested that cooperative system like NDDB should be developed.
- Good quality seed/planting material of improved varieties of forage crops particularly Setaria grass, Guinea grass and Bajra Napier hybrid should be made available to farmers at reasonable price.
- In upper mountainous regions, there is an utmost need to provide/develop the quick growing and vigorous fodder varieties having winter tolerance.
- Extension services should be strengthened and showcasing of new technologies and new fodder crop varieties should be taken up on a large scale so that large number of farmers may be benefitted.
- Scientists should suggest/develop some technologies to overcome the scarcity of fodder during severe lean period of fodder shortage during the months of November to February.
- More training camps should be organized in different villages to make the farmers familiar with the advance technologies.
- Fodder conservation techniques should be popularized by Universities and other government/ NGO institutions for availability of fodder during lean period.

At the end, PC, AICRP (FCU) applauded the role of farmers in giving very useful feedbacks and assured the stakeholders to work for addressing the issues raised by them. The chairman, in his concluding remarks suggested that trainings on fodder preservation and conservation technologies should be conducted in different villages to generate the awareness amongst the farmers.

The session ended with vote of thanks to the Chairman.

TECHNICAL SESSION- II (CONCURRENT)

FORMULATION OF TECHNICAL PROGRAMME FORAGE CROP IMPROVEMENT

Chairman	:	Dr. H.K. Chaudhary, Head, Crop Improvement Dept., HPKV
Co-Chairman	:	Dr. Vijay Yadav, Head, Seed Technology Division, IGFR
Rapporteurs	:	Dr. C. Babu and Dr. Y. Jindal
Finalization of trials	:	Dr. A.K. Roy, PC, AICRP (FCU)

At the outset, the Chairman welcomed the delegates. Dr. A.K. Roy, PC presented the highlights of 12 breeding trials conducted during *Kharif* 2016 on 11 different forage crops for finalization of the technical programme for *Kharif* 2017. After detailed discussion, following breeding trials were formulated.

Annual trials:

Maize:

- **IVT fodder maize** trial will be constituted with entries contributed by different centers and will be conducted at 24 locations. More entries will be communicated in a few days by IIMR, Ludhiana and AICRP Maize centers.
- AVTM-1 and AVTM-2 are merged to form **Combined AVTM-1&2**: Seven entries *viz.*, TSFM 15-5, TSFM-15-2, ADV 6737, IAFM-2015-38, AFM-6, H 1003 and IAFM -2015-48 were promoted from IVTM-1 to AVTM-1. From AVTM-1 of *kharif* 2016, one entry *viz.*, JHM 15-1 was promoted to AVTM-2. This trial will be evaluated at 9 locations of NEZ & SZ.
- **Combined AVTM-1&2 (Seed)** will be conducted at 9 locations of NEZ & SZ with the same entries listed above. It is proposed that seed trial will be conducted at AVT-1 stage only during *kharif* 2017.

Pearl millet:

- New trial in **IVTPM** was constituted with 4 entries + checks and will be conducted at 20 locations in all the 5 zones.
- **AVTPM-1**: Four entries *viz.*, TSFB-15-4, NDFB -1502, PHBF-4 and TSFB-15-8 were promoted from IVTPM to AVTPM-1. These entries will be evaluated at 12 locations of NWZ, NEZ & SZ.
- **AVTPM-2**: Four entries *viz.*, TSFB-13-12, RBB-6, TSFB-10-5, TSFB-14-10 were promoted from AVTPM-1 to AVTPM-2 and it will be conducted at 8 locations of NWZ & SZ.
- **AVTPM-2 (Seed)**: Will be conducted simultaneously at the same locations with the same entries as in AVTPM-2.

Cowpea:

- New trial in **IVTC** was formulated with 8 entries + checks and will be conducted at 28 locations.
- **AVTC-1**: Three entries *viz.*, MFC -09-23, C-215 & TSFC-11-6 were promoted from IVTC and will be tested at 19 locations of NEZ, NWZ & SZ.

- **AVTC-2:** Six entries viz., MFC-09-13, Vellyani-1, TSFC-12-15, MFC-09-4, MFC-09-3 & UPC-1501 were promoted from AVTC-1 and it will be tested at 16 locations under CZ, SZ & HZ.
- **AVTC-2 (Seed):** Will be conducted simultaneously at the same locations with the same entries listed above.

Rice bean:

- New trial in **IVT Rice bean** was constituted with 5 entries + checks and will be conducted at 9 locations across the country.
- AVT-1 Rice bean: Two entries viz., JOR 16-2 & JRBJ 07-4 were promoted from IVT to AVT-1 Rice bean. These entries will be evaluated at 9 locations.

Perennial trials:

The following six perennial trials will be continued during *Kharif 2017* in the coded form:

1. **VT *Cenchrus ciliaris* -2015 (3rd year)**
2. **VT *Cenchrus setigerus* -2015 (3rd year)**
3. **VT Bajra Napier Hybrid -2015 (3rd year)**
4. **VT *Setaria* -2015 (3rd year)**
5. **VT *Pennisetum* hybrids – 2015 (3rd year)**
6. **VT *Desmanthus* -2016 (2nd Year)**

General remarks:

- The Chairman emphasized that 1-2 centres should be identified to deliver innovative lectures during NGM and incentives may be given to the best lecture.
- Strengthening of *Stylosanthes* research work may be taken up at IGFRI, RRS, Dharwad, BAIF, Uralikanchan and MPKV, Rahuri.

The session ended with vote of thanks to the Chairman.

TECHNICAL SESSION- II (CONCURRENT)

FORMULATION OF TECHNICAL PROGRAMME FORAGE CROP PRODUCTION

Chairman	:	Dr. R.K. Agrawal, P.I Crop Production (PC, unit) Jhansi
Rapporteurs	:	Dr. B.G. Shekara & Dr. R. Joseph Koireng

Session began with introductory remarks of Chairman and he emphasized to submit report on uniform parameters as per format mentioned in the technical programme along with photograph (JPEG format) of each trials. On –going technical programme was discussed in detail. Four trials have been concluded and ten coordinated trials and two location specific trials will continue. The house also decided trial on “Compatibility of *Stylosanthes hamata* with Sewan (*Lasiurus indicus*) and Dhaman Grass (*Cenchrus setigerus*) in arid condition will be concluded.

In addition to these trials, three coordinated trials, one location specific trials and four AVT based trial have also been formulated.

1. Concluding trials

- a. Effect of varying seed rate of forage legumes on productivity of fodder maize.in Srinagar centre
- b. studies on intercropping of fodder legumes with fodder maize cropping system in Srinagar centre
- c. Effect of stubble management and INM on forage productivity in rice-oat cropping system at Jorhat and Bhubaneswar centers.
- d. Residual effect of P applied to wheat on the succeeding summer fodders in sorghum-wheat-summer fodders cropping system in PAU, Ludhiana of North West Zone.

2. New Trials

A. Coordinated trials

- a. Standardization of seed production techniques in fodder maize (IGKV, Raipur and RARS, Rajouri).
- b. Studies on effect of new generation herbicides on forage yield and quality of fodder maize (JNKVV-Jabalpur, IGKV-Raipur, BAIF-Urlikanchan, MPKV-Rahuri and AAU-Anand NDUAT- Faizabad, OUAT-Bhubaneswar & Karaikkal-Puduchery)
- c. Studies on performance top feeds under varied planting geometry with and without intercrop. (ZARS-Mandya, TNAU-Coimbatore, KAU-Vellayani, PJTSAU-Hyderabad and Karaikkal-Puduchery).

B. Location specific

1. Studies on effect of Rice bean + Teosinte intercropping system and INM on succeeding Kharif rice (AAU-Jorhat)

3. AVT based trials

- a. Effect of phosphorus levels on forage yield and quality of promising entries of fodder cowpea (AVT-2) **HZ**-Palampur, **CZ**- Rahuri, Raipur, **SZ**- Mandya, Hyderabad
- b. Effect of nitrogen levels on forage yield of promising entries of forage hybrid maize (AVT-2): **NEZ**: Bhubaneswar, Jorhat and Imphal
- c. Effect of nitrogen levels on forage yield of promising entries of forage hybrid maize (AVT-2): **HZ**: Palampur and Srinagar, **NWZ**: Ludhiana and Pantnagar
- d. Effect of nitrogen levels on forage yield and quality of promising entries of fodder pear millet (AVT-2) **NWZ**-Ludhiana, Hisar, **SZ**-Coimbatore, Hyderabad, Mandya

Meeting ended with vote of thanks to the Chair.

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

Chairman	:	Dr. P. N. Sharma, Head, Dept. of Plant Pathology, HPKV
Rapporteurs	:	Dr. Pravasini Behera and Dr. Ashlesha Singla
Finalization of trials	:	Dr D. K. Banyal

Crop Protection Scientists of the Forage group discussed in detail the results of the last *Kharif* season along with the ongoing technical programme. Scientists appraised the Chairman, regarding the results of last *Kharif* season along with the technical programme. The Chairman appreciated the work done by this small group and gave valuable suggestions. He emphasized on the importance of monitoring and surveillance of diseases and insect pests in forage crops, which may create a gap in fodder production and plant protection group, can play an important role in minimizing this gap.

Following recommendations emerged after discussions.

- The trials PPT-1, PPT-2, PPT-16, PPT-19, PPT-22 and PPT-23 will continue in *Kharif* 2017 as per the technical programme approved in last NGM
- PPT 17 (Biological management of defoliators on cowpea) has been conducted for three years and the treatment (*Beauveria basiana* @ 5g (cfu 10⁶)/lt was found effective for the management of defoliators on cowpea). It will be validated for one year on large area during *Kharif* 2017 as new trial PPT 24.
- The PPT-20 was concluded and validated on large field (500m²) during *kharif* 2016 for management of the root rot and foliar diseases of forage cowpea and the following recommendation was proposed - Seed treatment with tebuconazole 2DAS @ 1g/kg of seed+ NSKP (50g/kg seed) followed by foliar spray of propiconazole @ 1ml/l at 15 days interval is effective for the management of root rot and foliar diseases of forage cowpea.
- PPT 21-Integrated Management of BLSB of forage Maize was modified.

The session ended with vote of thanks to the chair.

TECHNICAL SESSION –III

Scientific, Administrative and Financial Issues

Chairman	:	Dr. A.K. Roy, PC, AICRP (FCU)
Rapporteurs	:	Dr. A. H. Sonone

Dr. A.K. Roy, Chairman and Project Coordinator, AICRP on Forage Crops and Utilization informed the house that the 12th plan has ended now and new EFC proposal for first three years of the 13th plan has been submitted to the ICAR for approval.

The following points were emphasized for implementation

- Vacant posts should not be filled at any centers till further orders.
- Salary of staff engaged on contractual basis should be drawn from recurring contingency and not from salary head.
- Care should be taken that no person in higher scale be placed in AICRP on FC & U than sanctioned post.
- Any staff drawing salary from AICRP on FC & U has to devote maximum period for the cause of AICRP FC&U project only.
- Retirement benefits should not be drawn from the ICAR – AICRP FC&U funds.
- All centers should submit Utilization Certificate before 20th April of every year, which should be signed by the OIC and Comptroller/ financial head.
- Those centers who have so far not submitted Utilization Certificate for the year 2016-2017 must submit it before Monday, April, 24th 2017.
- The funds release broadly are under three heads i.e. Grant in aid – Capital, Grant in aid – Salaries, Grant in aid – General. Head-wise grants should be strictly followed and expenditure should not jump in any head. The money from one head can not be transferred to other head. In Salaries, please strictly follow the number and nature of posts. No retirement benefits or arrears should be charged from AICRP fund.

The session ended with the vote of thanks to the Chairman

TECHNICAL SESSION – IV

Discipline wise report

Chairman	:	Dr I. S. Solanki ADG (FFC), ICAR
Co-Chairman	:	Dr. Sujoy Rakshit Director IIMR
Rapporteurs	:	Dr. A. K. Mehta and Dr. S. K. Jha

Crop Improvement: Dr. A. K. Roy Project coordinator presented the result of forage breeding and quality evaluation conducted during *Kharif* 2016. Total 11 trials involving 4 in annual and 7 perennials crops were conducted at 40 locations with the success rate of 88 %. Total 113 entries was tested (51 annual + 62 perennial) with their respective checks. The summary of annual trials is as follows

- **IVTM : FORAGE MAIZE :** Out of 10 entries 7 entries *viz.* TSFM 15-5, TSFM-15-2, ADV 6737, IAFM-2015-38, AFM-6, H 1003, IAFM-2015-48 were proposed to be promoted in AVT-1 For NEZ and SZ
- **Combined AVTM-1 & 2: FORAGE MAIZE:** One entry *viz.* JHM 15-1 proposed for AVT-2 for NEZ. **AVTM-2 (seed): MAIZE:** Trial completed and one proposal will be submitted for VIC consideration
- **IVTPM: PEARL MILLET:** Out of six entries four entries *viz.* TSFB-15-4, NDFB - 1502, PHBF-4, TSFB-15-8 were proposed to be promoted to AVT -1 for NWZ, NEZ and SZ.
- **AVTPM-1: PEARL MILLET:** Out of five entries, four entries *viz.* TSFB-13-12, RBB-6, TSFB-10-5, TSFB-14-10 were proposed to be promoted to AVT-2 for NWZ and SZ
- **IVTC: COWPEA:** Out of seven entries, three entries *viz.* MFC-09-23, C-215, TSFC-11-6 were proposed to be promoted to AVT-1 for NEZ, NWZ and SZ
- **AVTC -1: COWPEA:** Six entries *viz.* MFC-09-13, Vellyani-1, TSFC-12-15, MFC-09-4, MFC-09-3, UPC-1501 promoted to AVT-2 for CZ, SZ and HZ
- **IVT: RICE BEAN:** Out of three entries, two entries *viz.* JOR 16-2, JRBJ 07-4 promoted to AVT-1. In **AVT-1 RB: RICE BEAN** none of the entry promoted to AVT-2.
- **VTBN-2013 (4th year): Bajra Napier Hybrid:** Trial completed – Two entries proposed for consideration of VIC.
- **VT *Dichanthium*-2013 (4th year):** Trial completed – Two entries proposed for consideration of VIC.
- **VT *Cenchrus ciliaris* -2013 (4th year):** Trial completed – One entry proposed for consideration of VIC

Crop Production: Dr. R. K. Agrawal PI (Agronomy) presented the results of crop production trials undertaken at 20 locations. A total of 17 experiments comprising of seven coordinated and ten location specific trials were conducted. The major thrust of the trials were to generate technology on cropping system, resource conservation, planting geometry, climate resilient production technologies, nutrient management, silvi-pastoral system and quality of fodder in different crop and cropping system. During the presentation, four forage production technologies were recommended.

Following recommendations emerged:

- In Kashmir conditions, the fodder maize @ 40kg/ha in lines 30 cm sown mixed with cowpea @ 40kg/ha in additive series is recommended for obtaining higher biomass (339.5q green or 64.74 dry matter/ha, 9.1% CP) and good quality fodder. The technology also improves the fertility of the soil as well as fetched highest monetary return and benefit cost ratio.
- Under temperate conditions of Kashmir, the mixed cropping of cowpea or soybean with fodder maize produces higher green, dry matter biomass and crude protein yield (466.32q green, 458.49q dry matter or 13.56q crude protein /ha). The technology recorded higher net returns, benefit cost ratio (2.04) beside 5.6 to 10.1% improvement in available major nutrients in the health.
- In NE Zone, it is recommended that 25% N through FYM + 50 % NPK of RDF+ Biofertilizer (Azotobacter+PSB) + green manure should be applied to normal grown rice crop under rice- oat cropping system for higher productivity (772 q/ha GFEY) and remuneration (Net return Rs.57039). This also saves 50 % RDF of succeeding oat crop (40:20:20 kg N, P₂O₅ and K₂O kg/ha). This INM practice recorded 19 and 28.2 % higher productivity and net returns, respectively over supplemented with RDF.
- In Punjab, wheat-cowpea-sorghum cropping system with application of recommended dose of fertilizers to sorghum and wheat and only 50 % of recommended dose of P fertilizer to summer cowpea is recommended. The system is capable of producing 1903.5 q Sorghum Equivalent Yield with net monetary returns of Rs 73749/ha and benefit cost ratio of 1.96.

Crop Protection: The report on plant protection trials conducted at 9 experiments with 7 locations was presented by Dr. D. K. Banyal Pr. Scientist (PP). The experiments aimed to study the occurrence and abundance of major disease and pest in forages, screening of breeding material and development of management technologies for the control of disease and pest in maize, pearl millet, sorghum, cowpea and rice bean. Following recommendation were given for Palampur and Ludhiana

- Seed treatment with tebuconazole 2DS @ 1g/kg seed + NSKP (50 g/kg seed) followed by two foliar sprays of 0.1 per cent propiconazole at 15 day interval gave best management of root rot, anthracnose and leaf blights of forage cowpea

During this session following suggestions were made

- IIMR, Ludhiana will contribute the forage type maize entries in forage co-ordinated trials.
- There should be more effective collaboration with Maize, Pearl Millet and Sorghum coordinated projects and institute on forage aspect.
- Dr. Digvijay Singh from NDDDB suggested the use of biogas slurry in Bajra Napier Hybrid to increase productivity of the crop and also suggested testing for pesticide residue in pest management trials.

Meeting ended with vote of thanks to the Chair.

TECHNICAL SESSION - V

BREEDER SEED PRODUCTION

Chairman	:	Dr Sujay Rakshit, Director, IIMR, Ludhiana
Rapporteur	:	Dr R. K. Agrawal

Dr. A. K. Roy Project Coordinator, presented the indent, allocation and production of Kharif, 2017 indent (production year Kharif 2016). The total indent received from DAC, Government of India was 93.25 q for 6 varieties of three forage crops, which was allocated to 7 institutes, NGOs/ SAU. The total quantity indented included forage maize 83.15 q, cowpea 9.10 q and pearl millet 1.0 q.

The overall breeder seed production was higher in comparison to allocated quantity. In maize the production was 92.5 q (10.35q surplus) excluding the production of Pratap Makka Chari-6, in pearl millet 5.25 q (4.25q surplus), in cowpea 5.12 q (3.98 q deficit). The production data for Pratap Makka Chari-6 from MPUAT, Udaipur are still awaited. Thus, the total production was 15.41 q or 16.53 percent higher than the indented quantity. Only in one variety, EC-4216, the production was less than the indented quantity.

It was informed that the breeder seed indent for Kharif 2018 (production year kharif 2017) has not been received so far. The indented quantity will be allocated to production centers at ICAR institutes, SAUs and NGO after receiving the indent.

Chairman expressed satisfaction over the seed production scenario. He further emphasized that efforts should be made to increase the forage seed demand.

All the centers should take utmost care to produce the allocated breeder seed as it is a national commitment. The centers were also advised to communicate the status of excess breeder seed production to the PC, so that steps would be taken up for its disposal.

The meeting ended with vote of thanks to the chair.

TECHNICAL SESSION VI

REVIEW OF CENTRE WISE ACTIVITIES

Chairman	:	Dr. J. P. Yadavendra
Convener	:	Dr. A. K. Roy
Rapporteurs	:	Dr. M. Shanti & Dr. Amit Jha

The coordinating AICRP units from different zones presented their activities. A total of 23 presentations were made during this session.

Hill Zone: Palampur, Srinagar and Almora centers presented their activities. The Srinagar center has collected Lucerne germplasm in three species *Medicago varia*, *M. sativa* and *M. falcata*. These species have been established at Srinagar for use in improvement programme.

North West Zone: Presentations were made by Ludhiana, Hisar, Pantnagar and Bikaner centres. The Project Coordinator complimented the fodder seed production and dissemination taken up by Hisar centre through RKVY project and suggested other centers to follow these lines to overcome fodder seed deficit. Hisar center should share Teosinte seed to Jorhat center. The Ludhiana center initiated work on colchicine induced hexaploidy in BN hybrids.. Pantnagar center has maintained good crop cafeteria.

North East Zone: Six centres viz., Faizabad, Ranchi, Kalyani, Bhubaneswar, Jorhat and Imphal centres presented their activities. While complementing work of single scientist in Faizabad and Imphal, the chairman insisted on initiating sound crop improvement programme at Ranchi. The regular absence of OIC and senior breeder of the Bhubaneswar center was raised and it was decided that matter should be taken up with higher authorities.

Central Zone: Anand, Jabalpur, Jhansi, Rahuri, Uralikanchan and Raipur centres presented their activities. The work on thorn less cactus i.e., *Opuntia* was initiated at Anand center in support from NDDB. The chairman suggested exploring the tribal districts of Chhattisgarh state for germplasm of cowpea, Lathyrus and grasses by collaborating with other AICRP centers.

South Zone: Hyderabad, Mandya, Coimbatore and Vellayani centres presented their activities. PC encouraged the centers to contribute entries for IVT in multicut bajra. The house applauded the achievements of Coimbatore centre.

In general the following were the observations made by the Chair and Co-Chair

- The germplasm collected and maintained by different centers should be submitted to NBPGR along with all the pass-port data to get IC No.
- After identification of varieties, all centers must submit the proposal to CVRC for release and notification within 2 months.
- To avoid publishing in on-line journals which are of poor rating and value.
- All centers must put emphasis on popularizing the technologies and publish the results in good journals.
- Scientists were advised to properly document the developed breeding material and get the novel germplasm registered with NBPGR.

The session ended with vote of thanks to the Chair.

TECHNICAL SESSION VII

FTD & TSP FORMULATION

Chairman	:	Dr. R. K. Agrawal
Finalisation of programme	:	Dr. K. K. Sharma

At the outset, the chairman welcomed all the participants. He discussed with scientists of AICRP (FC &U) Coordinating and Cooperating centres for allotting FTD for *Kharif* 2017. A total of 785 FTD's were proposed to be allotted to AICRP centres and co-operating centre during *Kharif* 2017 for the crops *viz.*, BN hybrid, sorghum (including multicut and perennial), rice bean, maize, pearl millet, guar, setaria, Para and guinea grass. Out of 785 FTD's, 285 were allocated to BN Hybrid, 35 to Rice bean, 150 to Maize, grass 50 to forage sorghum, 90 to Pearl millet, 85 to Cowpea, 15 to guinea grass, 10 to para, 15 to Congo-signal grass and 40 to Setaria.

Regarding FTDs, it was emphasized that

- There is budget constraint and centers should use the resources of their respective institutions for carrying out the activities. The FTDs should be more advisory based rather than input based.
- FTDs should be conducted in the new villages every year so that the technologies can be spread in large areas
- It was emphasized that there is no allocation of fund for FLD in forage crops, while DAC is funding FLDs in other major crops. Project Coordinator will explore the possibility of getting funding from DAC in consultation with ICAR.

TSP programme

- TSP programme was proposed by AAU, Jorhat; BCKV, Kalyani; JNKVV, Jabalpur; BAIF, Uralikanchan; MPKV Rauri; HPKV, Palampur; SKUAST-K, Srinagar; CAU, Imphal; IGKV, Raipur; KAU, Vellayani; GBPUAT, Pantnagar; ANGRAU, Tirupati and RARS Rajouri center which was approved by the house. Availability of fund will be subjected to grants available from ICAR.
- The guidelines issued by Tribal Welfare Ministry, ICAR should be strictly followed.
- Centers can take help of KVK's and NGO's for effective execution of TSP programme
- Centers can use the budget for technology demonstration on fodder production and conservation, livestock development and distribution of small tools to tribal rural people.

All the centers need to provide following information regarding FTDs and TSPs

- The list of beneficiaries and their details including mobile number.
- Area covered under the programme and the relevant data on yields..
- Every year the village and farmers should be changed.
- Efforts should be made to collect data on vertical and horizontal transfer of technologies.

FTD Allocation for Kharif 2017												
Centre	BN hybrid	Rice bean	Maize	Bajra	Cow pea	Sorghum	Guar	Guinea grass	Para grass	Congo signal grass	Setaria	Total
Jorhat	20	5							5	15	10	55
Bhubaneswar	10											10
Kalyani	10	10	10									30
Ranchi	10		10		10							30
Faizabad				5								5
Jabalpur	5	5	5									15
Anand	10			5								15
BAIF	10			10	5							25
Bikaner				15	10							25
Ludhiana	100											100
Hyderabad	25		25	25	25							100
Mandya	10		25	10	25	20 (MC)		10				100
Rahuri	15										15	30
Palampur	15										15	30
Srinagar			15									15
Imphal		10	10									20
Raipur			10			10 (P)						20
Vellayani	20											20
Pantnagar			10	10		10						30
Rajouri			10			10						20
Coimbatore	5		5					5				15
Hissar				10	5							15
Tirupati	15	5	10		5		10		5			50
Karaikal	5		5									10
Total	285	35	150	90	85	50	10	15	10	15	40	785

TECHNICAL SESSION VIII

PGR/BREEDING/PRODUCTION/PROTECTION ISSUES

Chairman	:	Dr. A. K. Roy
Rapporteurs	:	Dr. Santosh Jha & Dr. P. S. Takawale

In this session, lecture on **Centre for Analysis and Learning in Livestock and Food (CALF) for Fodder Analysis** was presented by Rajiv Chawla & Harshendra Singh Scientists, NDDDB, Anand.

- In this presentation, details on overview of laboratory, facility for Forage Testing and identification of areas for collaboration, technical capabilities and competency was given.
- Area of service provided by CALF are Cattle feed and feed ingredients, milk & milk products, food and agricultural products, genetic analysis in blood and semen, training to quality control professional from dairy cooperatives.
- CALF is accredited by NABL, DST, BIS and FSSAI for chemical, microbiological and Genetics analyses and various dairy products.
- The laboratory is well equipped for the analysis of different parameters viz, Feed and Feed Ingredient -Compositional Analysis, Mineral Mixture and Mineral Salts, Nutritional Analysis, Chemical Contaminant, Microbiological Analysis
- During the presentation, it was also mentioned about availability of current Services for Fodder Analysis like, Crude Protein, Crude Fat, Crude Fibre, Total Ash, AIA, Mineral profiles, Fatty Acid Profiles, Vitamins and Contaminants Heavy metals, Pesticides and mycotoxins

After presentation the house was opened for suggestions and discussion.

It was decided that a collaborative research project to develop standards for quality parameters in green and dry fodder will be developed and submitted for consideration.

The session ended with vote of thanks to the Chair.

Proceedings of Varietal Identification Committee Meeting

The meeting of Varietal identification Committee of AICRP on Forage Crops and Utilization was held under the chairmanship of Dr. I. S. Solanki, Assistant Director General (FFC), ICAR on 18th April, 2017 at CSK HPKV, Palampur.

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

Marvel-09-4 [Marvel Grass (*Dichanthium annulatum*)]: The proposal was submitted by MPKV, Rahuri for identification in Central and South Zones. The committee noted its superiority in terms of green fodder yield, dry matter yield and crude protein yield. The entry was also found resistant to leaf blight. The committee identified the entry for cultivation as perennial grass under rainfed condition in the states of Gujarat, Uttar Pradesh, Madhya Pradesh and Maharashtra

RCC-10-6 [*Cenchrus ciliaris*]: The proposal was submitted by MPKV, Rahuri for identification in North West and Central Zones. The committee noted its superiority in terms of green fodder yield, dry matter yield and crude protein yield and per day productivity. The entry was also found resistant to leaf blight. The committee identified the entry for cultivation as perennial grass under rainfed condition in the states of Punjab, Rajasthan, Gujarat, Uttar Pradesh and Maharashtra.

JHD-2013-2 [Marvel Grass (*Dichanthium annulatum*)]: The proposal was submitted by IGFRI, Jhansi for identification in North-West Zone. The committee noted its superiority in terms of green fodder yield, dry matter yield and crude protein yield. The entry was also found moderately resistant to leaf blight. The committee identified the entry for cultivation as perennial grass under rainfed condition in the states of Punjab and Rajasthan.

PBN 342 [Bajra Napier hybrid]: The proposal was submitted by PAU, Ludhiana for identification in North-West, North East and South Zones. The committee noted its superiority in terms of green fodder yield, dry matter yield. The entry was also found resistant to Pyricularia leaf spot and root rot. The committee identified the entry for cultivation as perennial grass under irrigated conditions in the states of Punjab, Haryana, Rajasthan, Odhisha, Assam, Tamil Nadu, and Karnataka.

PAC-746 [Forage Maize hybrid]: The proposal was submitted by Advanta UPL Limited, Hyderabad. The committee observed that agronomy data of the entry is not available. The committee recommends resubmission of proposal after generating the agronomic data.

PBN 346 [Bajra Napier hybrid]: The proposal was submitted by PAU, Ludhiana for identification in North East Zone. The committee did not recommend its identification.

AICRP on Forage Crops and Utilization Technical Programme Crop Improvement Kharif 2017

1. IVTM: Forage Maize (New)

Entries	:	13 + 2 (NC)
Entries	:	TNFM -132-4, TSFM-16-3, KDFM-2, HPFM-8, IAFM 2015-15, IAFM-2015-26, IMH 1526, IMH 1527, IIMRFH-17-1, IIMRFH-17-2, IIMRFH-17-3, BAUFM-1, DMRH 1410
Checks	:	African Tall, J-1006
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	50 Kg/ha (36g/Plot)
Fertilizers	:	80:40 kg/ha (N:P) 40:40 kg/ha (N:P) basal+ 40 N after 30 days
Seed	:	3.0 Kg/entry and 3.0 Kg/ NC
Locations (24)	:	HZ -Palampur, Srinagar; Rajouri, Almora NWZ -Ludhiana, Hisar, Udaipur, Pantnagar, Jalore NEZ -Faizabad, Bhubaneswar, Ranchi, Jorhat, Imphal; CZ -Anand, Raipur, Jabalpur, Rahuri, Urulikanchan, Jhansi; SZ -Hyderabad, Coimbatore, Mandya, Karaikal

2. Combined AVTM-1 & 2: Forage Maize

Entries	:	7+1+ 2 (NC)
Entries	:	07 for AVT-1: TSFM 15-5, TSFM-15-2, ADV 6737, IAFM-2015-38 , AFM-6, H-1003, IAFM -2015-48 01 for AVT-2: JHM 15-1 for NEZ
Checks	:	African Tall & J-1006
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	50 Kg/ha (60g/Plot)
Fertilizers	:	80:40 kg/ha (N:P) 40:40 kg/ha (N:P) basal+ 40 N after 30 days
Seed	:	2 Kg/entry and 2 Kg/NC
Locations (9)	:	NEZ -Faizabad, Bhubaneswar, Ranchi, Jorhat, Imphal SZ -Hyderabad, Coimbatore, Mandya, Karaikal

3. AVTM-2 (seed): Forage Maize (seed)

Entries No.	:	7+1+ 2 (NC)
Entries	:	07 for AVT-1: TSFM 15-5, TSFM-15-2, ADV 6737, IAFM-2015-38 , AFM-6, H- 1003, IAFM -2015-48 01 for AVT-2: JHM 15-1 for NEZ
Checks	:	African Tall, J-1006
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	50 Kg/ha (60g/Plot)
Fertilizers	:	80:40 kg/ha (N:P) 40:40 kg/ha (N:P) basal+40 N after 30 days
Seed	:	2 Kg/entry and 2 Kg/NC
Locations (9)	:	NEZ -Faizabad, Bhubaneswar, Ranchi, Jorhat, Imphal SZ -Hyderabad, Coimbatore, Mandya, Karaikal

It is proposed that seed trial may be conducted at AVT-1 stage only.

4. IVTPM: Forage Pearl millet (New)

Entries	:	5 + 2 (NC) + 1 (ZC)
Entries	:	RBB-9, TSFB-16-6, AFB-38 , FBL-1, TSFB-16-10
Checks	:	Raj Bajra Chari-2 (NC), Giant Bajra (NC), BAIF Bajra 1 (CZ) + AFB-3 (NWZ) + APFB-9-1 (NEZ), Moti Bajra (SZ)
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/Plot)
Fertilizers	:	40:20 kg/ha (N:P) basal
Seed	:	1 Kg/entry; 1 Kg/NC and 0.25 Kg/ZC
Locations (20)	:	HZ – Palampur, Rajouri NWZ -Ludhiana, Hisar, Bikaner, Jalore NEZ -Faizabad, Pusa, Bhubaneswar, Ranchi CZ -Anand, Jamnagar, Jabalpur, Rahuri, Urulikanchan, Jhansi SZ -Coimbatore, Hyderabad, Mandya, Raichur

5. AVTPM-1: Forage Pearl millet

Entries	:	4+ 2 (NC) + 1 (ZC)
Entries	:	TSFB-15-4 , NDFB -1502 , PHBF-4, TSFB-15-8
Checks	:	Raj Bajra Chari-2 (NC), Giant Bajra (NC), AFB-3 (ZC-NWZ) + APFB-9-1 (ZC-NEZ), Moti Bajra (ZC-SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	12 Kg/ha (15g/Plot)
Fertilizers	:	40:20 kg/ha (N:P) basal
Seed	:	1 Kg/entry; 1 Kg/NC and 0.30 Kg/ZC
Locations (12)	:	NWZ -Ludhiana, Hisar, Bikaner, Jalore NEZ -Faizabad, Pusa, Bhubaneswar, Ranchi SZ -Coimbatore, Hyderabad, Mandya, Raichur

6. AVTPM-2: Forage Pearl millet

Entries	:	4+ 2 (NC) + 1 (ZC)
Entries	:	TSFB-13-12, RBB-6, TSFB-10-5, TSFB-14-10
Checks	:	Raj Bajra Chari-2 (NC), Giant Bajra (NC), AFB-3 (NWZ), Moti Bajra (SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	12 Kg/ha (15g/Plot)
Fertilizers	:	40:20 kg/ha (N:P) basal
Seed	:	1 Kg/entry; 1 Kg/NC and 0.30 Kg/ZC
Locations (8)	:	NWZ -Ludhiana, Hisar, Bikaner, Jalore SZ -Coimbatore, Hyderabad, Mandya, Raichur

7. AVTPM-2 (seed): Forage Pearl millet (seed)

Entries	:	4+ 2 (NC) + 1 (ZC)
Entries	:	TSFB-13-12, RBB-6, TSFB-10-5, TSFB-14-10
Checks	:	Raj Bajra Chari-2 (NC), Giant Bajra (NC), AFB-3 (ZC-NWZ), Moti Bajra (ZC-SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	12 Kg/ha (15g/Plot)
Fertilizers	:	40:20 kg/ha (N:P) basal
Seed	:	1 Kg/entry; 1 Kg/NC and 0.30 Kg/ZC
Locations (8)	:	NWZ -Ludhiana, Hisar, Bikaner, Jalore SZ -Coimbatore, Hyderabad, Mandya, Raichur

8. IVTC: Forage Cowpea (New)

Entries	:	8+ 2 (NC) + 1 (ZC)
Entries	:	MFC 16-4, MFC 16-3, UPC -1701, TSFC 16-1, PFC-12, C-543, C-217, HFC-16-1
Checks	:	National checks: Bundel Lobia-1, UPC-5286, Zonal checks: Bundel Lobia-2 (NWZ), UPC-622 (HZ), UPC-628 (NEZ), UPC-9202 (CZ) & MFC-8-14 (SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 1.8 m accommodating 4 m long 6 rows at 30 cm
Seed rate	:	35.0 kg/ha (26 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	2.5 Kg/entry; 2.5 Kg/NC and 0.6 Kg/ZC
Locations (26)	:	HZ -Palampur, Srinagar, Rajouri NWZ -Ludhiana, Hisar, Pantnagar, Bikaner, Udaipur, Jalore NEZ -Faizabad, Bhubaneswar, Ranchi, Jorhat, Kalyani, Imphal CZ -Anand, Rahuri, Urulikanchan, Jhansi, Raipur SZ -Coimbatore, Vellayani, Mandya, Hyderabad, Dharwad & Raichur

9. AVTC-1: Cowpea

Entries	:	3 + 2 (NC) + 1 (ZC)
Entries	:	MFC -09-23 , C-215, TSFC-11-6
Checks	:	National checks: Bundel Lobia-1, UPC-5286 Zonal checks: Bundel Lobia-2 (NWZ), UPC-628 (NEZ), & MFC-8-14 (SZ)
Design	:	RBD with 4 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	35.0 kg/ha (42 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	3.5 Kg for entry, NC and 1.3 kg for ZC
Locations (18)	:	NWZ -Ludhiana, Hisar, Pantnagar, Bikaner, Udaipur, Jalore NEZ -Faizabad, Bhubaneswar, Ranchi, Jorhat, Kalyani, Imphal SZ -Coimbatore, Vellayani, Mandya, Hyderabad, Dharwad & Raichur

10. AVTC-2: Cowpea

Entries	:	5 + 2 (NC) + 1 (ZC)
Entries	:	MFC-09-13, Vellyani-1, TSFC-12-15, MFC-09-3, UPC -1501
Checks	:	National checks: Bundel Lobia-1, UPC-5286, Zonal checks: UPC-622 (HZ), UPC-9202 (CZ), MFC-8-14 (SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	35.0 kg/ha (42 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	2.0 Kg for entry, NC and 1.0 kg for ZC
Locations (14)	:	HZ -Palampur, Srinagar, Almora, CZ -Anand, Rahuri, Urulikanchan, Jhansi, Raipur SZ -Coimbatore, Vellayani, Mandya, Hyderabad, Dharwad & Raichur

***MFC-09-4- Promoted to AVT-2 but Mandya center could not provide seeds hence dropped from trial no 10 & 11 AVTC -2 and AVTC-2 seed**

11. AVTC-2 (seed): Cowpea

Entries	:	5 + 2 (NC) + 1 (ZC)
Entries	:	MFC-09-13, Vellyani-1, TSFC-12-15, MFC-09-3, UPC -1501
Checks	:	National checks: Bundel Lobia-1, UPC-5286, Zonal checks: UPC-622 (HZ), UPC-9202 (CZ), MFC-8-14 (SZ)
Design	:	RBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	35.0 kg/ha (42 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	2.0 Kg for entry, NC and 1.0 kg for ZC
Locations (13)	:	HZ -Palampur, Srinagar, Almora, CZ -Anand, Rahuri, Urulikanchan, Jhansi, Raipur SZ -Coimbatore, Vellayani, Mandya, Hyderabad, Dharwad,

12. IVT Rice bean

Entries	:	5+ 2 (NC)
Entries	:	JOR-17-1, JOR-17-2, KRB-63, KRB-65, JRBJ-08-1
Checks	:	K-1 (Bidhan-1), Bidhan-2
Design	:	4 m x 1.8 m accommodating 4 m long 10 rows at 30 cm
Plot size	:	RBD with 3 replications
Seed rate	:	35.0 kg/ha (26 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	1.0 Kg/entry and 1.0 Kg/NC
Locations (9)	:	Kalyani, Ranchi, Bhubaneswar, Jorhat, Pusa, Vellayani, Jabalpur, Imphal & Palghar (Dapoli)

13. AVT-1 Rice bean

Entries	:	2 + 3 (NC)
Entries	:	JOR 16-2, JRBJ 07-4
Checks	:	K-1 (Bidhan-1), Bidhan-2, RBL-6
Design	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Plot size	:	RBD with 4 replications
Seed rate	:	35.0 kg/ha (26 g/plot)
Fertilizers	:	20:40 kg/ha (N:P) basal
Seed	:	1.2 Kg/entry and 1.2 Kg/NC
Locations (9)	:	Kalyani, Ranchi, Bhubaneswar, Jorhat, Pusa, Vellayani, Jabalpur, Imphal, Palghar (Dapoli)

14. VT *Cenchrus ciliaris* -2015 (3rd year): (Perennial)

The trial will continue in coded form at the locations already established for Kharif 2017 also.

15. VT *Cenchrus setigerus* -2015 (3rd year): (Perennial)

The trial will continue in coded form at the locations already established for Kharif 2017 also.

16. VTBN-2015 (3rd year): Bajra Napier Hybrid (Perennial)

The trial will continue in coded form at the locations already established for Kharif 2017 also.

17. VT *Setaria* -2015 (3rd year): *Setaria anceps* (Perennial)

The trial will continue in coded form at the locations already established for Kharif 2017 also.

18. VT Pennisetum hybrids – 2015 (3rd year): (*P. gluacum* x *P. squamulatum*) (Perennial) :

The trial will continue in coded form at the locations already established for Kharif 2017 also.

19. VT *Desmanthus* -2016 (2nd Year): *Desmenthus* (Perennial)

The trial will continue in coded form at the locations already established for Kharif 2017 also.

Seed Requirement of the Check Varieties for Kharif 2017 Trials

Seed should be dispatched immediately by speed post to reach Jhansi before 10th May, 2017.

SN	Crop	Variety	Quantity (in kg)	Institution
1.	Maize	African Tall	Total 12.5 kg [IVT - 3.0 + CAVT1 & 2 - 2.0; AVT 2 seed - 2.0 +5.5 kg for agronomy]	MPKV, Rahuri
		J-1006	Total 12.5 kg [IVT - 3.0 + CAVT1 & 2 - 2.0; AVT2 seed - 2.0 +5.5 kg for agronomy]	PAU, Ludhiana
2.	Pearl Millet	Raj Bajra Chari-2	Total 4.5 kg [IVT -0.8 + AVT1 – 0.8; AVT-2 - 0.8;AVT2 Seed – 0.8 +1.2 for agronomy]	SKRAU, Bikaner
		Giant Bajra	Total 4.5 kg [IVT -0.8 + AVT1 – 0.8; AVT-2 - 0.8;AVT2 Seed – 0.8 + 1.2 for agronomy]	MPKV, Rahuri
		BAIF Bajra-1	0.3 kg (IVT)	BAIF, Urulikanchan
		AFB-3	1.6 kg [IVT -0.2 + AVT1 – 0.3+AVT-2- 0.3 + AVT-2 seed – 0.3 + AVT agronomy 0.5]	AAU, Anand
		APFB-9-1	0.5 kg [IVT -0.2 + AVT1 – 0.3]	PJTSAU, Hyderabad
		Moti Bajra	1.6 kg [IVT -0.2 + AVT1 – 0.3+AVT-2- 0.3 + AVT-2 seed – 0.3 + AVT agronomy 0.5]	PJTSAU, Hyderabad
3.	Cowpea	Bundel Lobia-1	13.5kg [IVT -2.5 + AVT1 – 3.5; AVT2 – 2.0; AVT2seed – 2.0 + 3.2 for agronomy]	IGFRI, Jhansi
		UPC-5286	13.5 kg [IVT -2.5 + AVT1 – 3.5; AVT2 – 2.0; AVT2seed – 2.0 + 3.2 for agronomy]	GBPUAT, Pantnagar
		Bundel Lobia-2	2.0 kg [IVT -0.7 + AVT1 – 1.3]	IGFRI, Jhansi
		UPC-622	4.0 kg [IVT -0.8 + AVT2 – 1.0 + AVT -2 seed 0.7 + agronomy 1.5]	GBPUAT, Pantnagar
		UPC-628	2 kg [IVT -0.7 + AVT1 – 1.3]	GBPUAT, Pantnagar
		UPC-9202	4.5 kg [IVT -0.8 + AVT2 – 1.0 + AVT -2 seed 1.0 + agronomy 1.5]	GBPUAT, Pantnagar
		MFC-8-14	5.5 kg [IVT -0.8 + AVT1 – 1.2+ AVT-2 – 1.0 + AVT-2 seed -1.0 + Agronomy -1.5]	UAS, ZARS Mandya
4.	Rice Bean	Bidhan-1	2.2 kg [IVT -1.0 + AVT1 – 1.2]	BCKV, Kalyani
		Bidhan-2	2.2 kg [IVT -1.0 + AVT1 – 1.2]	BCKV, Kalyani
		RBL-6	1.2 kg [AVT1 – 1.2]	PAU, Ludhiana

Seed requirement for entries

IVT Maize: 3.0 kg/ entry;

AVT Maize: 2.0 kg/entry

AVT maize seed: 2.0 kg /entry

AVT agronomy : kg /entry JHM 15-1 – 2.20 kg ; PAC -746 – 3.0 kg

IVT Pearl millet: 0.8 kg/ entry

AVT-1 Pearl millet: 0.8 kg/ entry

AVT -2 Pearl millet: 0.8 kg/ entry

AVT -2 Seed Pearl millet: 0.8 kg/ entry

AVT -2 Pearl millet Agronomy : 1.2 kg/ entry

IVT cowpea: 2.5 kg /entry

AVT-1 cowpea: 3.5 kg /entry

AVT-2 Cowpea – 2.5 kg per entry

AVT-2 cowpea seed – 2.0 kg per entry

AVT-2 cowpea seed – 3.2 kg per entry for agronomy

IVT – Rice bean – 1.0 kg/ entry

AVT – Rice bean – 1.2 kg/ entry

CHARACTERS TO BE OBSERVED

(A) GENERAL: FOR EACH TRIAL

1. Days to 50% flowering
2. Green fodder yield (q/ha)
3. Dry matter yield (q/ha)
4. Production efficiency (q/ha/day)
5. Dry matter percentage (DM %)
6. Seed yield (q/ha) of AVT-2 (Seed) trials.
7. In perennial crops seed yield is to be recorded only in final year.
8. Plant height (cm) (In case of Ricebean and Cowpea, vine length should be recorded)
8. Leaf/ Stem ratio
9. Quality attributes
 - (a) Crude protein yield (q/ha)
 - (b) Crude protein content (%)
 - (c) ADF and NDF estimates (%)
 - (d) IVDMD%

Note. The cut for green forage is to be taken at 50% flowering stage and per day productivity of each entry is to be reported.

Note:

1. Green fodder yield data to be recorded at 50% flowering stage.
2. For multi cut perennial crops it has to be recorded as per local agronomic practice (first cut at 50 days, subsequent cuts at 40 days).
3. All Kharif trials except seed trials are to be conducted strictly under rain-fed conditions.
4. Any Breeding trial comprising of the lesser entries due to missing of seed packets/damage of seed etc. should be compensated by increasing of replication or inclusion of the local checks/variety/strain so that the Degree of Freedom may not be less than 12.

(B) Yield conversion Factor:

$$\text{Yield (q/ha)} = \frac{\text{Yield (Kg /plot)}}{\text{Net plot size (m}^2\text{)}} \times 100$$

$$\text{Yield q/ha/day} = \frac{\text{Yield (q/ha)}}{\text{No. of days to harvest}}$$

- (C) 1. The Centres are expected to provide experimental details as per format given herewith.
 2. Each Centre must communicate trials at a glance as per columns given below:

AICRP ON FORAGE CROPS			
FORAGE BREED TRIALS/RANGE GRASSES & LEGUMES EVALUATION TRIALS AT A			
GLANCE			
S. No.	Trials allotted (No. & Name)	Trials conducted (No. & Name)	Trials not conducted/failed, also give reasons for not conducting the trials/failure (No. & Name)
1.			
2.			

DATA SHEET FOR PROVIDING POOLED DATA (OVER CUTS) OF THE BREEDING TRIALS

Name of the Trial : _____
 Location : _____
 Soil type : _____
 Date of sowing : _____
 Plot size (Unit) : Gross: _____ Net: _____
 Replications (No.) : _____ Design: _____
 Character : _____

Entry Code	R ₁	R ₂	R ₃	R ₄	Total	Mean	Rank

Mean = _____
 SE (m) ± = _____
 CD at 5% = _____
 CV% = _____

Note:

1. Data for each character and trial must be provided in separate sheet.
2. For green fodder and dry matter yield, data for all the cuts taken must be provided replication-wise in the format. A Table showing summation over the cuts replication-wise is also required. For other characters, such as plant height, etc. average of cuts taken must be provided.
3. Please also provide data cut-wise in case of multicut entries as per data sheet given separately.
4. For quality parameters, data for crude protein (%) and crude protein yield (q/ha) must be supplied replication-wise for one cut only & for second cut in multicut crops. For IVDMD, NDF & ADF, a composite sample of all the replications may hold good for the cut specified above.

WORKING SCHEDULE FOR KHARIF-2017

1. Seed supply from contributors to PC Unit, Jhansi: Before May 7, 2017
2. Trials seed dispatch from PC Unit Jhansi: Before June 7, 2017
3. Trials sowing report to PC (FC): Within 7 days of sowing
4. Information on trials failure, etc. be communicated immediately to PC (FC) through the Director of Research/Director ICAR Institute
5. Submission of *Kharif* trials analyzed data (except seed and quality traits) before November 30, 2017; however, data on seed and quality are to be submitted before December 20, 2017.
6. Reporting of Breeder seed (BSP-IV): January 10, 2018

Observations to be recorded:

1. Plant height (cm)
2. Plan population/meter length
3. Seed yield , Straw yield, HI
4. Cob observation: Cob length, grain /cob,
5. Seed quality: Test wt., seed viability, seed germination.
6. Stover Quality: Dry matter (%), Crude protein.
7. Economics: Gross return, net return, B:C ratio

K-17-AST-3: Effect of new generation herbicides on weeds and forage yield of forage Maize.

Locations: CZ: Jabalpur, Raipur, Urlikanchan, Rahuri and Anand	Data Reporting: <i>kharif</i>
NEZ: Ranchi, Bhubaneswar, Faizabad	Start year: <i>kharif 2017</i>
SZ: Karaikkal- Pudducherry	Concluding Year: <i>kharif 2019 (After two year)</i>

Objectives:

1. To study the associated weed flora in fodder Maize.
2. To adjudge the suitable dose of new post emergence herbicides against weeds.
3. To study the effect of different treatments on growth and seed yield of fodder Maize.
4. To workout the economics of treatments.

Experimental details:

Design	: RCB	Season	: Kharif-17
Replication	: 3	Treatments	: 10
Gross Plot Size	: 4.0mx3.0m	Seed Rate	: 40kg/ha
Net plot size	: 3.0m x1.8m	Variety	: African Tall
Nutrients	: 80:40:20(N:P ₂ O ₅ :K ₂ O kg/ha)	Distance between replication	: 1.0 m
Distance between rows	: 0.6 m	Distance between plots	: 1.5m
Total number of plots	: 24		

Treatments:- 10 Weed control measures

SN	Treatments	Dose a.i. /ha	Time of application
T1	Tembotrione	120g/ha	20 DAS
T2	Topramezone	35g/ha	20 DAS
T3	Tembotrione + Atrazine	120g+ 250g/ha	20 DAS
T4	Topramezone + Atrazine	35g+ 250g/ha	20 DAS
T5	Atrazine	1000g/ha	Pre-emergence
T6	Pendimethlin	1000 g/ha	Pre-emergence
T7	Atrazine + Pendimethlin	750+750 g/ha	Pre-emergence
T8	2,4-D	0.5kg/ha	20 DAS
T9	Hand weeding		20 and 40 DAS
T10	Weedy Check		

Observation to be recorded

1. Pre-harvest observations	Crops
A. Weed flora in fodder maize	<ul style="list-style-type: none"> • Plant population/m row length at 15 DAS
<ul style="list-style-type: none"> • Weed population/m² species wise at 30 and 60 DAS • Dry weight of weeds /m² at 30 and 60 DAS 	<ul style="list-style-type: none"> • Plant height at 30, 60, and harvest • No. of leaves at 30 and 60 DAS
2. Post-harvest	<ul style="list-style-type: none"> • Leaf area at 30 and 60 DAS • Stem girth at 30,60 and harvest
<ul style="list-style-type: none"> • Green Fodder yield • Dry Fodder yield 	Data to be computed
<ul style="list-style-type: none"> • CP content • L:S ratio 	<ul style="list-style-type: none"> • Weed index (%) • Weed control efficiency (%)
Economics of treatments (on per ha basis area basis)	<ul style="list-style-type: none"> • Leaf area index
<ul style="list-style-type: none"> • Cost of cultivation in rupees • Gross monetary returns in rupees • Net Monetary returns in rupees • Benefit – cost ratio 	<ul style="list-style-type: none"> • Green Fodder yield • Dry Fodder yield (kg/ha)

Location Specific trials:

K-17-AST-4: Effect of Rice bean+ Teosinte intercropping system and INM on succeeding *kharif* Rice.

Locations: AAU, Jorhat (Assam).

Start year: *kharif* 2017

Data Reporting: *kharif*

Concluding Year: *kharif* 2019 (After two year)

Objectives:

- To assess the productivity of rice based food-forage cropping system.
- To determine the economics of food - forage cropping system

Experimental details:

Design : Split Plot

Replication : 3

Plot Size : 6 m x 4 m

Season : Kharif-17

Treatments : 12

Nutrients : As per treatment

Main plot: Inter Cropping System-4 (Summer Season)

1. Sole Teosinte
2. Sole Rice bean
3. Teosinte + Rice bean (3:2)
4. Teosinte + Rice bean (3:3)

Sub plot: Nutrient Management - 3

1. 100 % RDF through Inorganics
2. 50% N of RDF through inorganics + 50% N through FYM
3. 50% N of RDF through inorganics + 50% N through Vermicompost

Observations to be recorded:

I) Soil physico-chemical properties

- ✓ Physico chemical properties before and after completion of sequence.

II) Yield attributes and yields of Teosinte and rice bean

1. Plant height (cm)	2. Plant population /sq.m	3. Dry matter percent
4. Leaf- stem ratio	5. Green forage Yield	6. Dry matter yield

III) Yield attributes and yields of Rice

- Plant height (cm)
- Plant population /sq.m
- Grain and straw yield/ha

IV) Quality of Fodder crops and rice straw

- CP content of rice bean, teosinte and rice straw
- Crude protein yield

V) Productivity of cropping system:-

Land Equivalent Ratio (LER)

Green Forage Equivalent Yield

Rice equivalent yield

VI) Economic analysis

Expenditures and monetary returns will be worked out by following economic analysis

Gross return

Net return

Return per rupee invested

C. AVT Based trials on Fodder Maize, Fodder Pearl millet and Fodder Cowpea

K-17-AST-5 AVTM-2-1: Effect of nitrogen levels on forage yield of promising entries of forage hybrid maize

Locations (3) NEZ: Bhubaneswar, Jorhat and Imphal
Year of Start: 2017 (1 year)

Data Reporting : kharif
Concluding Year: kharif 2018

Objective: To study the response of promising entries of maize to nitrogen levels

Entries No.	:	(1+2): 3
Entries Name	:	JHM 15-1
Checks	:	African Tall , J-1006 (Checks)
N Levels	:	Four: 40, 80 and 120 kg N/ha (half N as basal and half N after 30 DAS and 40 kg P ₂ O ₅ /ha as basal to all treatments)
Design	:	FRBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	50 kg/ha (60g/plot)
Fertilizers	:	60:20 kg/ha (P:K) basal
Total plots	:	36
Seed requirement/entry /Centre	:	720 gm per center
Seed requirement/entry/all Centre	:	2.20 kg Total/entry for 3 centres

Observations:

- Plant population/m², Plant length and Leaf: stem ratio
- Green fodder and dry matter yields (q/ha)
- Crude protein content and crude protein yield (q/ha)
- Agronomic Optima and Agronomic Maxima

AVTM- 2-2: Effect of nitrogen levels on forage yield of promising entries of forage hybrid maize

Locations (4) HZ: Palampur and Srinagar
NWZ: Ludhiana and Pantnagar

Data Reporting : kharif

Year of Start: 2017 (1 year)

Concluding Year: kharif 2018

Objective: To study the response of promising entries of maize to nitrogen levels

Entries No.	:	(1+2): 3
Entries Name	:	PAC-746
Checks	:	African Tall, J-1006 (Checks)
N Levels	:	Four: 40, 80 and 120 kg N/ha (half N as basal and half N after 30 DAS and 40 kg P ₂ O ₅ /ha as basal to all treatments)
Design	:	FRBD with 3 replications
Plot size	:	4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	:	50 kg/ha (60g/plot)
Fertilizers	:	60:20 kg/ha (P:K) basal
Total plots	:	36
Seed requirement/entry /Centre	:	720gm per center
Seed requirement/entry/all Centre	:	3.0 kg Total/entry for 4 centres

Observations:

- Plant population/m², Plant length and Leaf: stem ratio
- Green fodder and dry matter yields (q/ha)
- Crude protein content and crude protein yield (q/ha)
- Agronomic Optima and Agronomic Maxima

AVTPM-2-1: Second Advanced Varietal Trial in Forage Pearl millet (Agronomy)

Locations (5) NWZ-Ludhiana, Hisar SZ-Coimbatore, Hyderabad, Mandya	Data Reporting : kharif
Year of Start: 2017 (1 year)	Concluding Year: kharif 2018

Entries No.	: 4+3 in NWZ 4+3 in SZ
Entries Name	: TSFB-13-12, RBB-6, TSFB-10-5, TSFB-14-10
Checks	: Raj Bajra Chari-2 (NC), Giant Bajra (NC), AFB-3 (ZC-NWZ), Moti Bajra (ZC-SZ)
N Levels	Four (0, 30, 60, 90 kg/ha)
Design	: RBD with 3 replications
Plot size	: 4 m x 3 m accommodating 4 m long 10 rows at 30 cm
Seed rate	: 15 kg/ha (20g/plot)
Fertilizers	: 40:20 kg/ha (P:K) basal
Total plots	84 in SZ 84 in NWZ
Seed requirement/entry /Centre	240g in each zone
Seed requirement/entry/all Centre	for entry and NC = 1.2 kg Total/entry for 5 centres ZC AFB-3, ZC Moti Bajra = 0.5 kg

Observations:

- Plant population/m², Plant length and Leaf: stem ratio
- Green fodder and dry matter yields (q/ha)
- Crude protein content and crude protein yield (q/ha)
- Agronomic Optima and Agronomic Maxima

AVTC-2: Second Advanced Varietal Trial in Cowpea (Agronomy)

Locations (7)	Data Reporting : kharif Year of Start: 2017 Concluding Year: kharif 2018
<ul style="list-style-type: none"> • HZ-Palampur • CZ- Rahuri, Raipur • SZ- Mandya, Hyderabad 	

Entries No.	: 4 + 2 NC + 1 ZC=7
Entries Name	: MFC-09-13, Vellyani-1, TSFC-12-15, MFC-09-3
Checks	: Bundel Lobia-1 (NC), UPC-5286 (NC), UPC-622 (HZ) UPC-9202 (CZ), MFC-8-14 (SZ)
P Levels	Three (30, 60 & 90 kg/ha)
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 (48g/plot)
Fertilizers	: 20:40 kg/ha (N:K) basal
Seed requirement	: 48 gm/plot
Total plots	81
Seed requirement	432g/ entry /Centre
Seed requirement/entry/all Centre	3.2 kg Total /entry for 7 centres for entry and NC 1.5 kg for ZC

Observations:

- Plant population/m², Plant length and Leaf: stem ratio
- Green fodder and dry matter yields (q/ha)
- Crude protein content and crude protein yield (q/ha)
- Agronomic Optima and Agronomic Maxima

PS-14-AST-3: Response of Congo-signal grass (*Brachiaria ruziziensis* cv. DBRS 1) to planting geometry and N levels

Locations (2): Dharwad and Mandya	Data reporting: Kharif
Year of Start: 2014	Concluding report: Kharif :2018

Objectives:

- To evaluate performance of *Brachiaria ruziziensis* (var. DBRS 1) under irrigated and rainfed conditions
- To study the effect of planting geometry and nitrogen nutrition on the performance of *Brachiaria spp.*
- To study the interactive effect of growing systems, planting geometry and nitrogen nutrition on the performance of *Brachiaria spp.*

Technical details

Design: Split-split plot design **Replications:** Three **Plot size:** 3.6 m x 3.6 m
Start: Kharif 2014 **Duration:** Three year

Treatments:

Growing systems: 2 (Main plot)

- (i) Rainfed (G₁) (ii) Irrigated (Based on available soil moisture regime) (G₂)

Planting geometry: 2 (Sub plot)

- (i) 45 cm x 45 cm (8 rows plot) (P₁) (ii) 60 cm x 60 cm (6 rows plot) (P₂)

Nitrogen nutrition: 4 (sub-sub plot)

- Control
- 10 kg N/ha (Basal and after each cut) (N₂)
- 20 kg N/ha (Basal and after each cut) (N₃)
- 30 kg N/ha (Basal and after each cut) (N₄)

Observations:

Plant observations:

- Plant height at each cut
- No. of tillers at each cut
- Dry matter per /tiller at each cut
- Light interception at 30 days interval
- GFY and DFY/ha /cut & year
- CP content (%) and yield (q/ha) at each cut

Soil observation:

- OC (%), available N, P and K initial and at one year interval

CS-15-AST-4: Development of climate resilient production technologies on productivity and economics of food - fodder based cropping systems

Locations: (4): Pantnagar, Ranchi, Kalyani, Jabalpur

Objectives

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

Experimental detail:

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

Main plot: (Climate Resilient technology): 04

1. Zero tillage- (All the crops)
2. Minimum tillage single pass of cultivator + sowing with seed drill.
3. Conventional tillage
4. Zero tillage- minimum tillage- Zero tillage.

Sub plot (Cropping systems): 04

1. Rice (upland) – Berseem - Maize + Cowpea
2. Maize (Baby corn) – Berseem – Sorghum (Fodder)
3. Maize (Baby corn) – Wheat – Rice bean (Fodder)
4. Sorghum (Fodder) – Berseem – Maize (Baby Corn)

Observation to be recorded:

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

K-15-AST-3 L: Studies on Integrated nutrient management in Fodder Rice bean**Location: Imphal****Objectives:**

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

Experimental Details:

Design : RBD
Plot Size : 4X3
Seed rate : 35 kg/ha

Replications: 3
Spacing: 30 cm (R-R)
Duration: 03 years

Treatments

T ₁	100% RDF	T ₂	75% RDF for phosphorus + 1 tonne Poultry manure
T ₃	75% RDF for phosphorus + 2 tonne Poultry manure	T ₄	50% RDF for phosphorus + 1 tonne Poultry manure
T ₅	50% RDF for phosphorus + 2 tonne Poultry manure	T ₆	25% RDF for phosphorus + 1tonne Poultry manure
T ₇	25% RDF for phosphorus + 2 tonne Poultry manure		

Observation to be recorded:

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

K-15-AST-5L: Studies on carbon sequestration in subabul based silvi-pastoral cropping system under rain fed agriculture

Location: Hyderabad

Objectives

- To study the organic matter input to soil through subabul based perennial fodder cropping system
- To study organic matter partitioning added through the ROTH-C

Experimental details

Design : RBD

Replications: 3

Treatments: 8

Duration: 05 years

Treatments	In subabul plantation
T ₁	Subabul (Sole crop)
T ₂	Subabul + APBN-1 as intercrop
T ₃	Subabul + APBN-1 + <i>Desmanthus</i> in 3:1 ratio
T ₄	Subabul + APBN-1 + <i>Desmanthus</i> (3:1) in stylo ground cover
T ₅	Subabul + <i>Cenchrus ciliaris</i>
T ₆	Subabul + <i>Cenchrus ciliaris</i> + <i>Desmanthus</i> intercrop (3:1 ratio) in Stylo ground cover
T ₇	Subabul + <i>Cenchrus ciliaris</i> + <i>Desmanthus</i> intercrop (3:1 ratio)
T ₈	Subabul + <i>Desmanthus</i> as intercrop

Observation to be recorded:

- Growth parameters of Subabul and companion crop.
- GFY and DFY at flowering and at seed maturity
- CP%, CF% at flowering and at harvest crops.
- Monthly OM input surface soil 0-30 cm
- Root biomass and carbon assessment from all component species.

Inputs for model

- Clay % in soil
- Plant residue input viz.,
 - Root biomass measured immediately after harvesting crop (Franzluebbers et al, 1999)
 - Rhizodeposition of C from root exudates and root turn over (Shamoot et al, 1968)
 - Leaf litter
- Monthly mean temperature, rainfall, evaporation

Note: Studies will be continued & observations will be recorded in existing Subabul based Cropping system

K-15-AST-6L: Nutrient Management in genotypes of B x Napier hybrid.

Location: MPKV, Rahuri

Objectives:

- To find out the optimum fertilizer dose for various B x Napier Hybrid genotypes.
- To study the economics of different treatments.

Experimental Details:

Crop: B x Napier Hybrid	Variety: As per treatment
Design: FRBD	Replications: 3
Season: Kharif-2015-16	Plot size: Gross: 4.50 x 6.00 m. Net: 2.70 x 4.80 m.
Treatments: 8	Duration: 05 years

Treatment Details:

A) Main Factor: Variety (2)	B) Sub-Factor: (Fertilizer levels-4)
V ₁ - RBN 2011-12	F ₁ - 75 % RDF (112.5: 37.5:30 Kg NPK ha ⁻¹)
V ₂ - Phule Jaywant	F ₂ - 100 % RDF (150:50:40 Kg NPK ha ⁻¹)
	F ₃ - 125 % RDF (187.5:62.5:50 Kg NPK ha ⁻¹)
	F ₄ - 150 % RDF (225:75:60 Kg NPK ha ⁻¹)

Note:

- FYM - 10 t ha⁻¹ year⁻¹ before planting.
- Seed treatment with 250 g *Acetobactor* and PSB each 1000 rooted slips.
- Green forage cut will be taken at 60 days interval.

Fertilizer application schedule per year**a) F₁- 75 % RDF (112.5:37.5:30 Kg NPK ha⁻¹)**

- Basal dose- (37.5:18.75:15 Kg NPK ha⁻¹)
- After six month of planting (At time of 1st earthing up) (15:18.75:15 Kg NPK ha⁻¹)
- Top dressing after each cut 15 Kg N ha⁻¹

b) F₂- 100 % RDF (150:50:40 Kg NPK ha⁻¹)

- Basal dose- (50:25:20 Kg NPK ha⁻¹)
- After six month of planting (At time of 1st earthing up) (20:25:20 Kg NPK ha⁻¹)
- Top dressing after each cut 20 Kg N ha⁻¹

c) F₃- 125 % RDF (187.5:62.5:50 Kg NPK ha⁻¹)

- Basal dose- (62.5:31.25:25 Kg NPK ha⁻¹)
- After six month of planting (At time of 1st earthing up) (25:31.25:25 Kg NPK ha⁻¹)
- Top dressing after each cut 25 Kg N ha⁻¹

d) F₄- 150 % RDF (225:75:60 Kg NPK ha⁻¹)

- Basal dose- (75:37.5:30 Kg NPK ha⁻¹)
- After six month of planting (At time of 1st earthing up) (30:37.5:30 Kg NPK ha⁻¹)
- Top dressing after each cut 30 Kg N ha⁻¹

Observations to be recorded:

- | | |
|---|---|
| a. Number of tillers per tussock. | b. Plant height (cm) |
| c. Leaf: stem ratio | d. Tussock persistency |
| e. Tussock girth (perimeter) | f. Green fodder yield (q ha ⁻¹) |
| g. Dry matter yield (q ha ⁻¹) | h. Crude protein yield (q ha ⁻¹) |
| i. Crude Fiber (%) | j. Acid Detergent Fiber (ADF) (%) |
| k. Neutral Detergent Fiber (NDF) (%) | l. In-vitro digestibility (IVDMD) |
| m. Soil fertility status at initial stage (Composite) | n. Soil fertility status at initial stage after completion of experiment (pH, OC, EC, N, P, K) (each treatment) |
| o. Economics. | |

K-15-AST-7L: Screening of genotypes of fodder bajra under sodic soil.

Location: Faizabad

Objective:

- To identify promising genotypes of bajra and oat for fodder production under sodic soil of eastern UP.

Experimental detail:

Design : RBD	Replication : Three
Plot Size : 4m x 5m	
Treatments: Kharif: Bajra genotypes: Eight	Rabi: Oat genotypes: Eight

Observations to be recorded:

- Plant height (cm) at 50% flowering, green forage yield, dry mater yield, CP%, CP yield and leaf: stem ratio for both the crops.
- Soil properties: Initial OC%, EC, pH, Exchangeable Na% and available NPK (kg/ha).

K-15-AST-8 C: Compatibility of *Stylosanthes scabra* with sewan and dhaman grass pastures under north-western India

Locations: DFRS, Arjia (Bhilwara)

Objectives:

- ✓ To study the effect of individual grass on pasture establishment and growth.
- ✓ To study the effects of *Stylosanthes scabra* and Sewan and Dhaman grass cropping systems on pasture establishment and fodder production.
- ✓ To analyse the quality of fodder and economic of treatments.

Design : RBD	Replications: 3	Treatments: 8
Plot size: 6.0 x 4.0 m.	Start of experiment: Kharif 2015	Duration: 04 years

Treatments	(grass and grass +legume mixture study)
T ₁	100 % seed of sewan grass (<i>Lasiurus indicus</i> L.)
T ₂	100 % seed of dhaman grass (<i>Cenchrus ciliaris</i> L.)
T ₃	100 % seed of <i>Stylosanthes scabra</i> legume
T ₄	75 % seed of sewan grass+ 25% <i>Stylosanthes</i> legume
T ₅	75 % seed of dhaman + 25% <i>Stylosanthes</i> legume
T ₆	50 % seed of sewan grass+ 50% <i>Stylosanthes</i> legume
T ₇	50 % seed of dhaman + 50 % <i>Stylosanthes</i> legume
T ₈	33 % seed of every grass (1/3 sewan ,1/3 dhaman & 1/3 <i>Stylosanthes</i> legume)

Observations to be recorded: After establishment (observations would be recorded twice in a year i.e. December and May months and data will be reported during Rabi season)

Number of shoots/ clump	Shoot weight	Root weight
Shoot/ root weight ratio	Dry fodder yield per year.	Inter crop capability parameters
Fodder quality parameters analyses	Soil nutrient status (initial and final) each year	

Note: Seed rates 6 kg/ha of grass/legume as individual crop would be used, and sowing at 50 cm row spacing will be done, finally maintaining the plant stand at the geometry 50 X 50 cm

K-15-AST-10 C: Intensive Forage Production through Agase based (*Sesbania grandiflora*) cropping system under Protective Irrigation

Locations (2): Mandya, Vellayani

Objectives:

- ✓ To study the effect of cropping system on fodder yield, quality & soil fertility.
- ✓ To work out the economics.

Experimental Details:

No. of treatments : 7

Year of start: Kharif 2015

No. of replications: 3

Spacing: 2.0m x 1.0 m (Agase Sole)

Design: RCBD

Plot Size: 6.0 x 5.0 m

Treatment Details:

T ₁ - Agase + Congo Signal grass (2:4)	T ₂ - Agase + Rhodes grass (2:3)
T ₃ - Agase + Guinea grass (2:3)	T ₄ - Agase + Napier Bajra hybrid (2:2)
T ₅ - Agase + Paragrass (2:4)	T ₆ - Agase + Perennial fodder Sorghum (2:6)
T ₇ - Agase (Sole)	

Note: Agase will be raised in the paired row method (between pair 2mt & with in pair 1 mt)

Observations to be recorded:

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

K-15-AST-13 C: performance of multicut Sorghum and Pearl millet mixture at variable seed rates under different methods of sowing.

Location: Palampur & Ludhiana

Objective

- To find out suitable method of sowing mixture of multicut sorghum and pearl millet with optimum seed rate.

Experimental Details:

Design	: RBD	Replications	: Three
Plot size	: Gross 4 x 5.5 m, Net 3.60 m x 5 m		

Treatments

A) Varieties	Sorghum- PSC-4, Pearl millet- FBC-16 (different varieties for Palampur)
b) *Seed rates	Sorghum: pearl millet (5) 100: 0, 75:25, 50:50, 25:75, 0:100
c) Sowing methods	(2): Broadcast and line sowing (22.5 cm)
Seed rate	as per treatments
Fertilizer	As recommended for respective crop and in proportion of crop mixtures

* Seed rate: Sorghum- 37.5 kg/ha and pearl millet – 20 kg/ha

Observations to be recorded:

Growth parameters: Plant population, plant height (cm) and leaf: stem ratio of both the crops and equivalent ratio.

Yield parameters: Green fodder and dry matter yield of mixture and individual crops.

Quality parameters: CP content and yield.

Soil fertility parameters: Soil fertility status before experiment and after experiment each year.

Economics: Net returns and BC ratio.

K-16-AST-2: Effect of different techniques of seed priming on productivity of forage maize

Locations (6): Urulikanchan, Anand, Jabalpur, Kalyani , Bhubaneshwar	Data Reporting: Kharif
Year of Start: 2016 for three years	Concluding year: Kharif 2019

Objectives:

- To identify the ideal seed priming methods for enhanced germination and improved crop yield in forage maize.
- To study economics of different seed priming methods
- To study effect of different seed priming methods on soil chemical properties

Experimental Details:

1. Design	RBD	6. Seed rate (kg/ha)	75
2. Replications	03	7. Spacing (cm)	30
3. Plot size Gross	4 x 3 m	8. No. of rows/plot	10
4. Plot size Net	3.4 x 2.4	9. Method of sowing	Line sowing
5. Fertilizers (N:P:K kg/ha)	80:40:40	10. Treatments	09

Note: Recommended package of practices will be followed as per the crop

Treatment details:

T₁	Seed priming with water for 6 hrs	T₆	Seed priming with KNO ₃ @ 0.5% for 12 hrs
T₂	Seed priming with water for 12 hrs	T₇	Seed priming with KH ₂ PO ₄ @ 0.5% for 6 hrs
T₃	Seed priming with ZnSO ₄ @ 0.5 % for 6 hrs	T₈	Seed priming with KH ₂ PO ₄ @ 0.5% for 12 hrs
T₄	Seed priming with ZnSO ₄ @ 0.5 % for 12 hrs	T₉	Control (no priming)
T₅	Seed priming with KNO ₃ @ 0.5% for 6 hrs		

K-16-AST-3: Effect of Phosphorus & Zinc application and cutting management on fodder and seed yield and quality in dual cut cowpea.

Locations (2): Bikaner, Sriniketan, W.B. and DUVASU, Mathura
Year of Start: 2016 for three years

Data Reporting: Kharif
Concluding year: Kharif 2019

Objectives:

- To study the effect of P & Zn and cutting management on yield and quality of green fodder and seed.
- To study economics of different cutting management, P & Zn nutrition.

Experimental Details:

Design : FRBD **Replications** : 3
Plot size Gross : 4 x 3 m **Fertilizers (N:P:K kg/ha)** : As per recommendation
Treatments : 15

Note: Recommended package of practices will be followed as per the crop

Treatment details:

Factor A (P & Zn Levels: 3)		Factor B (Cutting Management-5)	
T ₁	Control (No P & Zn application)	C ₁	Harvesting for green fodder at 50% flowering
T ₂	20 Kg P + 5 Kg Zn/ha	C ₂	Harvesting at maturity for grain yield
T ₃	40 Kg P + 10 Kg Zn/ha	C ₃	Harvesting green pod + Fodder at grain filling stage
		C ₄	C1 + harvest of regrowth for green pod + Fodder
		C ₅	C1+harvest of regrowth for grain

*10 Kg N/ha will be applied after cut in C4 and C5 beside uniform application recommended N dose at sowing.

Observations to be recorded:

Growth (At each harvest)	Yield and quality:
Plant height (cm)	Green fodder yield (q/ha)
No. of leaves per plant	Dry Fodder/ by product yield (q/ha)
No. of branches per plant	Dry matter yield (q/ha)
Days to 50 % flowering	Crude protein yield (q/ha)
Leaf stem ratio	Dry matter (%)
	Crude protein (%)
	Green pod yield (q/ha)
	Seed Yield (q/ha)

Economics: Net monetary returns & benefit cost ratio

Soil studies: Soil fertility status before and after crop season for pH, EC, OC, N, P, K & Zn

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

Location: NDUAT, Faizabad	Data Reporting: Rabi
Year of Start: kharif 2016	Concluding Year: Rabi 2019

Objectives:

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

EXPERIMENTAL DETAILS

Design : RCBD **Replication(s)** : Three **Crop sequence** : Rice-Oat

Plot size : 4 x 3 m **Duration** : 4 years **No of Treatments**: 8

Treatment details:

T₁-Control

T₂- RDF 120 Kg N:60Kg P₂O₅:40 KgK₂O:25 Kg ZnSO₄/ha

T₃- 75 % RDF + 25%N substitution through bio- compost (press mud)

T₄- 75 % RDF + 25%N substitution through green manuring (dhaincha)

T₅- 75 % RDF + 25%N substitution through crop residue

T₆- 50% RDF + 50%N substitution through bio- compost (press mud)

T₇- 50% RDF + 50%N substitution through green manuring (dhaincha)

T₈- 50% RDF + 50%N substitution through crop residue

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

Observations to be recorded:

Growth:

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

Yield and quality:

- Green fodder yield (q/ha)
- Crude protein yield (q/ha)
- Crude protein (%)
- Straw Yield (q/ha)
- **economics**: Net monetary returns & benefit cost ratio
- **Soil Properties**: OC %, EC, p^H, Exchangeable Na% available NPK (Kg/ha)
- Dry matter yield (q/ha)
- Dry matter (%)
- Grain Yield (q/ha)
- Harvest Index (%)

K-16-AST-9: Seed production potentiality of fodder maize as influenced by Zinc and Boron under red and lateritic soil of West Bengal

Location (1): Sriniketan, Visva-Bharati, West Bengal	Data Reporting: kharif
Year of Start: 2016	Concluding Year: kharif 2019

Objectives:

- To study the seed production potentiality of **fodder** maize as influenced by Zn and B application.
- To study the seed quality of fodder maize as influenced by Zn and B.
- To study Economics of fodder maize seed production.

EXPERIMENTAL DETAILS

Design: FRBD		Spacing : as per recommendation	
No. of Factors : 2		Plot Size: 4 X3 m	
No. of treatments : 16		Year of start : Kharif 2016	
No. of replications: 3			
Factor A (Levels of Zinc (Kg/ha)- 4)		Factor B (Levels of Boron (kg/ha)-4)	
Z1	0	B1	0
Z2	2.5	B2	0.5
Z3	5.0	B3	1.0
Z4	7.5	B4	1.5

Observations to be recorded:

Plant height (cm)	Plant population/meter length
Seed yield (t/ha)	Stick yield (t/ha)
Seed quality: Test wt., seed viability, seed germination,	Stover Quality: Dry matter (%), Crude protein, Crude fibre
Crude protein % and crude protein yield.	Economics: Gross return, net return, B:C ratio

**AICRP on Forage Crops and Utilization
Technical Programme
FORAGE CROP PROTECTION
Kharif 2017**

PPT 1: Monitoring of diseases and insect pests in *Kharif* forage crops ecosystem.

Locations: Bhubaneswar, Hyderabad, Palampur, Rahuri, Ludhiana, Dharwad

PPT 2: Evaluation of *Kharif* breeding materials for their resistance to diseases and insect pests.

Locations: Bhubaneswar, Hyderabad, Palampur, Rahuri, Ludhiana, Dharwad

PPT 16: Efficacy of different biopesticides against aphids on forage sorghum

Location: Rahuri and Ludhiana

Design : RBD

Variety : Ruchira

Plot size : 3X 4 m²

Treatments:

T₁: Foliar application of *Verticillium lecani* @ 10⁸ CFU/g (5 g/lit)

T₂: Foliar application of *V. lecani* @ 10⁸ CFU/g (7.5 g/lit)

T₃: Foliar application of *Beuveria bassiana* @ 10⁸ CFU/g (5 g/lit)

T₄: Foliar application of *B. bassiana* @ 10⁸ CFU/g (7.5 g/lit)

T₅: Foliar application of *Metarhizium anisopliae* @ 10⁸ CFU/g (5 g/lit)

T₆: Foliar application of *M. anisopliae* @ 10⁸ CFU/g (7.5 g/lit)

T₇: NSE 5%

T₈: Azadirachtin 1% (Commercial neem product)

T₉: Untreated control

Observations:

1. Survival population of aphids 5 and 7 days after treatment
2. Count of natural enemies 5 & 7 days after spray treatment
3. Crude protein content
4. Green forage and dry matter yield (q/ha)

Note: Bio-pesticides to be used in PPT 16 will be supplied by Rahuri center.

PPT 19: Efficacy of different biopesticides against aphids on forage cowpea

Location: Hyderabad

Design : RBD

Variety : local

Plot size : 3x 4 m²

Treatments:

T₁: Foliar application of *Verticillium lecani* @ 10⁸ CFU/g (5 g/lit)

T₂: Foliar application of *V. lecani* @ 10⁸ CFU/g (7.5 g/lit)

T₃: Foliar application of *Beuveria bassiana* @ 10⁸ CFU/g (5 g/lit)

T₄: Foliar application of *B. bassiana* @ 10⁸ CFU/g (7.5 g/lit)

T₅: Foliar application of *Metarhizium anisopliae* @ 10⁸ CFU/g (5 g/lit)

T₆: Foliar application of *M. anisopliae* @ 10⁸ CFU/g (7.5 g/lit)

T₇: NSE 5%

T₈: Azadirachtin 1% (Commercial neem product)

T₉: Untreated control

1. Survival population of aphids 5 and 7 days after treatment
2. Count of natural enemies 5 & 7 days after spray treatment
3. Crude protein content
4. Green forage and dry matter yield (q/ha)

PPT 21: Integrated Management of BLSB of forage Maize (Modified)

Locations : Palampur and Bhubaneswar

Design : RBD

Replication : 3

Plot size : 3 x 2 m²

Treatments :

- T1:** Seed treatment with *T. viride*@ 5g/kg
T2: Seed treatment with carbendazim@ 2 g/kg seed
T3: T₁+ Two spray of carbendazim@ 1g/l
T4: T₁+ Two foliar sprays with *P. fluorescens*@ 5g (CFU 10⁷) /l
T5: T₁+ Two foliar sprays with (Tryflosystrobin+Tebuconazole) @ 1g/1l
T6: T₂+ Two spray of carbendazim@ 1g/l
T7: T₂+ Two foliar sprays with (Tryflosystrobin+Tebuconazole) @ 1g/1l
T8: T₂+ Two foliar sprays with *P. fluorescens*@ 5g (CFU 10⁷) /l
T9: T₃+ One spray each of carbendazim@ 1g/l and *P. fluorescens*@ 5g (CFU 10⁷) /l
T10: T₃+ One spray each of carbendazim@ 1g/l and *P. fluorescens*@ 5g (CFU 10⁷) /l
T11: T₃ + One spray each of (Tryflosystrobin+Tebuconazole) @ 1g/1l and *P. fluorescens* @ 5g (CFU 10⁷) /l
T12: Stripping of lower leaves
T13: Control

PPT 22: Integrated Management of foliar diseases of forage Sorghum

Locations : Palampur and Ludhiana

Design : RBD

Replication : 3

Plot size : 2 x 2 m²

Treatments :

- T1:** Seed treatment with *T. viride* @ 5g/kg
T2: Seed treatment with carbendazim @ 2 g/kg seed
T3: Two foliar sprays with neem bio-pesticide (Achook) @ 3%
T4: Two foliar sprays with propiconazole @ 1g/l
T5: T₁+ Two foliar sprays with neem bio-pesticide (Achook) @ 3%
T6: T₁+ Two foliar sprays with propiconazole @ 1g/l
T7: T₂+ Two foliar sprays with neem bio-pesticide (Achook) @ 3%
T8: T₂+ Two foliar sprays with propiconazole @ 1g/l
T9: T₁+ One spray each of neem bio-pesticide (Achook) @ 3% and propiconazole @ 1g/l
T10: T₂+ One spray each of neem bio-pesticide (Achook) @ 3% and propiconazole @ 1g/l
T11: Control

Target Diseases:

1. Anthracnose (*Collectotrichum graminicola*)
2. Zonate leaf spot (*Gloeopercospora sorghi*)
3. Grey leaf spot (*Cercospora sorghi*)

PPT 23: Management of downy mildew of pearl millet using bioagents

Locations : Ludhiana

Design: RBD **Replication:** 3 **Plot size:** 2x2 m²

Treatments:

T1: Seed treatment with *Trichoderma viride* @ 5 g/kg seed

T2: Seed treatment with *Pseudomonas fluorescens* @ 5g/kg seed

T3: Seed treatment with *Bacillus subtilis* @ 5g/kg seed

T4: Seed treatment with Metalaxyl @ 2g/kg seed

T5: T₁ + two foliar spray of *Trichoderma viride* @ 5g/l

T6: T₂ + two foliar spray of *Pseudomonas fluorescens* @ 5g/l

T7: T₃ + two foliar spray of *Bacillus subtilis* @ 5g/l

T8: Two foliar spray of Ridomil MZ @ 2.5g/l

T9: Control

Target diseases: Downy mildew (*Sclerothora graminicola*)

PPT 24: Validation for biological management of defoliators on cowpea.

Replication: 4 Design: RBD Plot size: 3 x 4 cm²

Locations: Dharwad and Rahuri

Treatments:

T1: *Beauveria basiana* @ 5 g(cfu 10⁶)/lt

T2: Untreated control

Observations:

1. Survival population of defoliators 5 and 7 days after treatment
2. Count of natural enemies at 5 & 7 days after spray treatment
3. Green forage and dry matter yield (q/ha)

Note: Bio-pesticides to be used in PPT 16 will be supplied by Rahuri center.

**All India Coordinated Research Project (FCU)
National Group Meet Kharif 2017
April 18-19 2017
CSK HPKV Palampur**

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39.	Dr. S.V. Damame	Scientist (Bio Chemistry), Mahatma Phule Krishi Viswavidyalaya, Rahuri, Ahmednagar (Maharashtra)
40.	Dr. B. T. Sinare	Scientist Agronomy, Mahatma Phule Krishi Viswavidyalaya, Rahuri, Ahmednagar (Maharashtra)
41.	Prof. P. P. Surana	Res. Officer, Grass Breeding Scheme Mahatma Phule Krishi Viswavidyalaya, Rahuri, Ahmednagar (Maharashtra),
42.	Dr. H.P. Parmar	Res. Scientist (Plant Breeding) & OIC AICRP –FC, Anand Agricultural University, Anand (Gujarat)
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46.	Dr. Rahul Kapoor	Sr. Forage Breeder, Punjab Agricultural University, Ludhiana (Punjab)
47.	Dr. Meenakashi Goyal	Asstt. Biochemist, Punjab Agricultural University, Ludhiana (Punjab)
48.	Dr. Ashlesha	Astt. Plant Pathology, Punjab Agricultural University, Ludhiana (Punjab)
49.	Dr. C. Babu	Assoc. Prof (PB)& OIC AICRP –FC, Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)
50.	Dr. S. D. Sivakumar	Asstt. Prof. (Agronomy), Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)
51.	Dr.(Mrs.) Suchismita Tripathy	Sr. Agronomist, Orissa University of Agric. & Technology, Bhubaneswar (Orissa)
52.	Mrs. Pravasini Behera	Jr. Pathologist, Orissa University of Agric. & Technology, Bhubaneswar (Orissa)
53.	Dr. Kalyan Jana	Agronomist & OIC AICRP –FC, Bidhan Chandra Krishi Viswavidyalaya, Kalyani (West Bengal)
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58.	Dr. S.K. Jha	(Agronomy), Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh)
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62.	Dr. N. V. Naidu	Director Research, Acharya N. G. Ranga Agricultural University, camp office Vijaydurga Towers, MG Inner Ring Road YSR Circle GUNTUR
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64.	Dr. Umesh S. Kudtarkar	Jr. Agrostologist, Dr. B.S. Kokan Krishi Vidyapeeth, Agric. Res. Station, Mahim Road , Dapoli, Palghar (Maharashtra)
65.	Dr. S. Mala	Professor (Agronomy), Pandit Jawaharlal Nehru College of Agril. & Research Institute, Karaikal (Puduchery)
66.	Dr. J. K. Bisht	PS (Agronomy),ICAR-VPKAS, Almora (Uttarakhand)
67.	Dr. A. V. Umakant	P.S. and PI Sweet Sorghum, ICAR-IIMR, Rajendranagar, Hyderabad (Telangana)
68.	Dr. P. K. Mukherjee	Senior Scientist, Agronomy, ICAR-IVRI, Bareilly (Uttar Pradesh)
69.	Dr. R Bhar	Officer In charge ICAR-IVRI, Regional station- Palampur Kangra, Himachal Pradesh
70.	Dr. Rajeev Chawla	National Dairy Development Board, Anand (Gujarat)/Noida
71.	Dr. Digvijay Singh	Senior Manager (Animal Nutrition), NDDB, Anand Gujarat)/Noida
72.	Sh. Harshendra Singh	Sr. Manager (Business Development),NDDB, Anand (Gujarat)/Noida

73.	Sh. Narayan Kolikar	Advanta India Limited, Unicorn House, Plot No.-3, Balaji Enclave, Secunderabad
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75.	Dr. Shahid Ahmad	PS (PB), ICAR- Indian Grassland and Fodder Research Institute, Jhansi
76.	Dr. Rahul Gajghate	ICAR- Indian Grassland and Fodder Research Institute, Jhansi
77.	Dr. Gitanjali Sahay	ICAR- Indian Grassland and Fodder Research Institute, Jhansi
78.	Dr. B G Shivakumar	I/c, ICAR- IGFRI, Jhansi SRS, Dharwad
79.	Dr. K. Sridhar	PS, ICAR-IGFRI SRS, Dharwad
80.	Sri O. N. Arya	CTO, AICRP on Forage Crops & Utilization, IGFRI, Jhansi
81.	Sri H. K. Agarwal	Sr. TO, AICRP on Forage Crops & Utilization, IGFRI, Jhansi
82.	Dr. G. Krishna Reddy	Principal Scientist (Agronomy) ANGRAU, RARS, TPT
Farmers		
83.	Sh. Dharam Singh	Village Kanarthu, P.O. Pathar (Bajjnath)
84.	Sh Jagroop Chand	Village Kanarthu, P.O. Pathar (Bajjnath)
85.	Sh. Naval Kishor	Village Kanarthu, P.O. Pathar (Bajjnath)
86.	Sh. Mahender Singh	Village Kanarthu, P.O. Pathar (Bajjnath)
87.	Sh. Sanjay Kumar	Village Kanarthu, P.O. Pathar (Bajjnath)
88.	Sh. Thakur Dass	Village Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
89.	Sh. Rajeev Kumar	Village Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
90.	Sh. Prakesh Chand	Village Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
91.	Sh. Kehar Singh	Village Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
92.	Sh. Bihari	Village Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
93.	Sh. Satish Kumar	Vill. Dhodo Khariyala, Tehsil Khudia Distt. Kangra
94.	Sh. Parshotam Chand	Vill. Dhodo Khariyala, Tehsil Khudia Distt. Kangra
95.	Sh. Preet Beas	Vill. Dhodo Khariyala, Tehsil Khudia Distt. Kangra
96.	Sh. Ramesh Thakur	Vill. Dhodo Khariyala, Tehsil Khudia Distt. Kangra
97.	Sh. Santosh Kumar	Vill. Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
98.	Sh. Ravi Kumar	Vill. Tanda, P.O. Rajpur, Tehsil Palampur, Distt. Kangra
99.	Sh. Milap Chand	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
100.	Sh. Rakesh Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
101.	Sh. Ramesh Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
102.	Sh. Ajay Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
103.	Sh. Ravi Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
104.	Sh. Chamaru Ram	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
105.	Sh. Mallu Ram	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
106.	Sh. Vinod Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
107.	Sh. Karam Chand	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
108.	Sh. Raj Kumar	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
109.	Sh. Mehar Chand	Vill. Jhikli Bbeth, Tehsil Bajjnath, Distt. Kangra
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111.	Sh. Bhag Singh	Vill Kanarthu, Bajjnath, Distt. Kangra
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114.	Sh. Chhatter Singh	Vill Kanarthu, Bajjnath, Distt. Kangra
115.	Smt. Promodh Kumari	Vill Kanarthu, Bajjnath, Distt. Kangra
116.	Sh. Sanjeev Kumar	Vill Kanarthu, Bajjnath, Distt. Kangra
117.	Sh. Piar Chand	Vill Kanarthu, Bajjnath, Distt. Kangra
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119.	Dr. P. K. Mehta	Director Extension Education cum Dean COA, CSK HPKV Palampur
120.	Dr. Ashwani Basandrai	Dean Post Graduate Studies, CSK HPKV Palampur
121.	Dr. R. K. Agnihotri	Dean , CoVAS, CSK HPKV Palampur
122.	Dr. Promila Kanwar	Dean, College of Home science, CSK HPKV Palampur
123.	Dr. P. K. Dogra	Head Deptt. LPM, CSK HPKV Palampur
124.	Dr. V. K. Sharma	PS, Animal Nutrition CSK HPKV Palampur

125.	Dr. Vipin Katoch	Joint Director, Animal Husbandry, Govt. of HP
126.	Dr. Arun Vyas	DAO, Deptt. of Agriculture, Govt. of HP
127.	Dr. S C Negi	Head, Agronomy, CSK HPKV Palampur
128.	Dr. T R Sharma	Head, Biotechnology, CSK HPKV Palampur
129.	Dr. D C Sharma	Head, Entomology, CSK HPKV Palampur
130.	Dr. H K Chaudhary	Head, Crop Improvement, CSK HPKV Palampur
131.	Dr. P N Sharma	Head, Plant Pathology, CSK HPKV Palampur
132.	Dr. SP Dixit,	Head, Soils, CSK HPKV Palampur
133.	Dr. S C Chauhan	Head, Economics, CSK HPKV Palampur
134.	Dr. Y S Chauhan	Head, Vegetables, CSK HPKV Palampur
135.	Dr. SK Upadhyaya	Head, Horticulture, CSK HPKV Palampur
136.	Dr. D K Vatsa	Head, Agri. Engineering, CSK HPKV Palampur
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138.	Dr. S K Rana	PS Plant Pathology, CSK HPKV Palampur
139.	Dr. Viveka Katoch	Scientist, CSK HPKV Palampur
140.	Dr. Vedna	PS, CSK HPKV Palampur
141.	Dr. Amar Singh	PS Plant pathology, CSK HPKV Palampur
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143.	Dr. G D Sharma	PS Agronomy, CSK HPKV Palampur
144.	Dr. Arun Sood	PS Plant Pathology, CSK HPKV Palampur
145.	Dr. Hirday Paul	Joint Director, PRO, CSK HPKV Palampur
146.	Dr. Pawan Pathania	PS Agronomy, CSK HPKV Palampur
147.	Dr. M C Rana	PS Agronomy, CSK HPKV Palampur
148.	Dr B L Kapoor	CORD (NGO) Dharamshala
149.	Media Person	8 No.

ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS & UTILIZATION

(Indian Council of Agricultural Research)

NATIONAL GROUP MEET: *Kharif 2017*

Date: April 18-19, 2017

Venue: CSK HPKV, Palampur

PROGRAMME

April 18, 2017

08:00-10:00	REGISTRATION
10.00-11.00 TECHNICAL SESSION-I INTERACTIVE SESSION WITH STAKEHOLDERS	
Chairman	Dr. P. K. Mehta, Director, Extension Education and Dean COA, HPKV
The session will be held with 2-3 lectures on technical aspects and ready to share technologies by SAU/ICAR. It will also showcase advances made by certain centers at farmer's field. Different stakeholders like Animal husbandry group, livestock keepers, dairy personnel, fodder growers, forage seed growers will present their expectations and problems in the interaction meeting.	
Rapporteurs	Dr. Rahul Kapoor
Tea 11.00-11.15	
11:15-13.00 TECHNICAL SESSION-II (concurrent sessions) FORMULATION OF TECHNICAL PROGRAMME	
TECHNICAL SESSION-II (Concurrent)–FORAGE CROP IMPROVEMENT	
Chairman	Dr. H. K. Chaudhary, Head, Crop Improvement Department, HPKV
Rapporteurs	Dr. C. Babu & Dr. Y. Jindal
Finalization of varietal trials	Dr. A. K. Roy, PC
TECHNICAL SESSION-II (Concurrent)–FORAGE CROP PRODUCTION	
Chairman	Dr. P. K. Mehta, Director, Extension Education and Dean COA HPKV
Rapporteurs	Dr. B. G. Sekhara & Dr. Joseph Koering
Finalization of trials	Dr. R. K. Agrawal
TECHNICAL SESSION-II (Concurrent)–FORAGE CROP PROTECTION	
Chairman	Dr. P. N. Sharma, Head, Department of Plant Pathology, HPKV
Rapporteurs	Dr. Pravisini Behera & Dr. Ashlesha Dhingra
Finalization of trials	Dr. D. K. Banyal
13.00-14.00	TECHNICAL SESSION-III: Scientific, Administrative and financial issues
Chairman	Dr. I. S. Solanki, ADG (FFC), ICAR
Convener	Dr. A. K. Roy, Project Coordinator (FCU)
Rapporteur	Dr. A. Sonone
Lunch 14.00-15.00	
15.00-16.30	INAUGURATION
Chief Guest	Dr. I. S. Solanki, ADG (FFC), ICAR
Guest of Honour	Dr. Sujoy Rakshit, Director, IIMR
Chairman	Prof. Kuldip Chand Agnihotri, Hon'ble VC, HP CU
Welcome address	Dr. R. S. Jamwal, Director Research, HPKV
Project Coordinator's Report	Dr. A. K. Roy, Project Coordinator
Remarks of Guest of Honour	Dr. Sujoy Rakshit, Director, IIMR
Remarks of Chief Guest	Dr. I. S. Solanki, ADG (FFC), ICAR
Chairman's Address	Prof. Kuldeep Chand Agnihotri, Hon'ble VC, CU HP
Vote of Thanks	Dr. P.K. Mehta, Dean COA, HPKV Palampur
16.30-16:45	High Tea
16.45- 17.45 TECHNICAL SESSION-IV: DISCIPLINE WISE REPORT	
Chairman	Dr. I. S. Solanki, ADG (FFC), ICAR
Co-Chairman	Dr. Sujoy Rakshit, Director- IIMR
Forage crop Improvement	Dr. A. K. Roy, PC
Forage crop Production	Dr. R. K. Agrawal
Forage crop Protection	Dr. D. K. Banyal
Rapporteurs	Dr. A. K. Mehta & Dr. S. K. Jha

17.45 - 18:00 TECHNICAL SESSION-V: BREEDER SEED PRODUCTION	
Chairman	Dr. Sujoy Rakshit, Director, IIMR
BSP Report & Allocation	Dr. A. K. Roy, PC
Rapporteurs	Dr. R. K. Agrawal

18:00 - 19:00	VARIETAL IDENTIFICATION COMMITTEE MEETING
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April 19, 2017

09.15-13.00	TECHNICAL SESSION VI: REVIEW OF CENTRE-WISE ACTIVITIES
Chairman	Dr. J P Yadvendra
Convener	Dr. A. K. Roy, Project Coordinator (FCU)
Rapporteurs	Dr. M. Shanti & Dr. Amit Jha
Hill Zone	CSK HPKV Palampur ; SKUAT (K) Srinagar; VPKAS Almora
North West Zone	PAU Ludhiana, CCS HAU Hisar, GBPUAT Pantnagar, SKRAU, Bikaner,
Tea 11.00	
North East Zone	NDUAT, Faizabad ; BAU Ranchi ; BCKV Kalyani; OUAT Bhubaneswar ; AAU Jorhat ; CAU Imphal
Central Zone	AAU Anand ; JNKVV Jabalpur ; IGFRI Jhansi ; MPKV Rahuri; BAIF Urulikanchan; IGKV Raipur ; Dhari/Dapoli
South Zone	PJTSAU Hyderabad ; UAS (B) ZRC Mandya ; TNAU Coimbatore ; KAU Vellayani; IGFRI-RRS; Dharwad

Lunch 13.00-14.00	
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14:00-15:00	TECHNICAL SESSION-VII: FTD & TSP FORMULATION
Chairman	Dr. R. K. Agrawal
Rapporteurs	Dr. K. K. Sharma

15:00-15:30	TECHNICAL SESSION VIII:PGR/breeding/production/protection issues
Chairman	Dr. A. K. Roy, PC
Rapporteurs	Dr. Santosh Jha& Dr. P Takwale
Lecture by NDDB followed by discussion	
15:30-15:45	Tea

15:45-17:00	TECHNICAL SESSION-IX: PLENARY SESSION
Chairman	Dr. P. K. Mehta, Director Extension Education, HPKV Palampur
Convener	Dr. A. K. Roy, PC
Rapporteurs	Drs. R. K. Agrawal & Dr. P. Mahadevu

Presentation of the recommendations by respective rapporteurs	
Technical session – I Interactive session with stakeholders	Dr. Rahul Kapoor
Technical session - II Forage Crop Improvement	Dr. C. Babu
Technical session - II Forage Crop Production	Dr. B. G. Sekhara
Technical session – II Forage Crop Protection	Dr. Pravasini Behera
Technical session – III – Scientific/ administration/ financial issues	Dr. A. Sonone
Technical session – IV Discipline-wise presentation	Dr. S. K. Jha
Technical session – V Breeder Seed Production	Dr. R. K. Agrawal
Technical session – V Centre wise activities	Dr. M. Shanti
Technical session – VII FTD & TSP formulation	Dr. K. K. Sharma
Technical session-VIII PGR/breeding/production/protection issues	Dr. P. Takawale
Varietal Identification Committee Meeting Report	Dr. A. K. Roy
Chairman's Remarks	Dr. P. K. Mehta, Director Extension Education, HPKV Palampur
Vote of Thanks	Dr. Naveen Kumar & Dr. A. K. Roy

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

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- AgriCat
- Agricultural Scientists Recruitment Board
- AgriInnovate India Limited
- ARS Scientists' Forum
- Consortium for e-Resources in Agriculture (CeRA)

AICRP on Forage Crops & Utilization – National Group Meeting Kharif 2017

18th April 2017, Palampur, Himachal Pradesh

The National Group Meeting – Kharif 2017 of the All India Coordinated Research Project on Forage Crops and Utilization was inaugurated at CSK Himachal Pradesh Krishi Vignavidyalaya, Palampur, Himachal Pradesh today.

Prof. K.C. Agnihotri, Vice Chancellor, Himachal Pradesh Central University, in his inaugural address, exhorted the young scientists to do some path breaking research and come out with innovative ideas and technologies for benefit of the farmers and rural community. He expressed concern over the reports of spurious livestock products especially artificial milk and eggs. He called upon the scientific community to work in holistic manner rather than piecemeal approach for solving the problems.

Dr. I. S. Solanki, ADG (FFC), ICAR, Chief Guest, highlighted the importance of high yielding varieties with good nutritional quality and asked the scientists to develop and disseminate the technologies for the benefit of farmers and livestock owners. The role of fodder crops in nutritional security was highlighted.

Dr. Sujoy Rakshit, Director, ICAR-IHR, Ludhiana, Guest of Honour stressed for more collaboration among various projects related to fodder crops and highlighted the importance of maize especially Rabi Maize as fodder resource to bridge the demand and supply gap of forage availability.

Dr. R. S. Jamiwal, Director Research, HPKV welcomed the delegates and presented achievements of University for the farming community of hilly state.

Dr. A. K. Roy, Project Coordinator, AICRP on Forage Crops and Utilization presented the brief introduction of AICRP Forage project, Fodder and livestock scenario and issues in Himachal Pradesh and summary of activities carried out in kharif 2016.

Various technical sessions were held on 18th and 19th April and technical programmes for Kharif 2017 were finalized. A special session on nutrient, pesticides residue analysis was held in which presentations were made by NDBB followed by discussion.

Varietal Identification Committee meeting was held and four varieties (Harvel-09-4 and JHD-2013-2 in *Dichanthium annulatum*; PBN-342 in Bajra Napier Hybrid; RCC-10-6 in *Cenchrus ciliaris*) were identified for cultivation.

Plenary session was held on 19th April and recommendations of various sessions were approved after discussion and suitable modifications.

(Source: AICRP on Forage Crops, IGRI, Jhansi)

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