



Karshini

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



Proceeding of National Group Meeting - Rabi 2012-13

IGFRI, Jhansi

September 14 - 15, 2012

PART II: RABI 2012-13

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

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PREFACE

The National Group Meet, Rabi 2012-13 of All India Coordinated Research Project on Forage Crops was organized with the objectives to review the accomplishments of Technical programme executed during Rabi 2011-12 at different coordinating and cooperating centres, in-house research activities and forage technology demonstration (FTDs); and also to formulate technical programme for Rabi 2012-13 as well as to discuss future thrust areas for fodder research in 12th plan. The meeting was jointly organized by Indian Council of Agricultural Research and Indian Grassland and Fodder Research Institute, Jhansi, during September 14-15, 2012.

The meeting was attended by the scientists engaged in forage research working under coordinating and collaborating centres located at different SAUs, ICAR institutes and NGOs. Large number of scientists including head of divisions of IGFRI and NRCAF also participated in the meeting. Representatives of NDDB, NSC, RSFP&D, private seed companies also participated in the programme and being important stake holders contributed in the development of programme and linkages strengthening future course of action. Electronic and print media of the region also participated in the meet.

This compilation contains brief report of National Group Meet, Rabi 2012-13 covering highlights on forage crop improvement, forage production and plant protection technologies generated, proceedings of different technical sessions and technical programme for the coming Rabi season 2012-13. The national meet group members discussed and planned future strategies for improving the forage productivity, quality, nutritive value to address the regional and national forage security for the livestock. The future thrust areas for the XIIth five year plan was also discussed in detail. The finalized technical programme on forage crop improvement, forage crop production and forage crop protection for Rabi 2012-13 have been given in annexure(s).

The successful conductance of the programme is attributed to the joint efforts made by the participating scientists, authorities of IGFRI and ICAR, the core staff of Project Coordinating Unit, Principal Investigators and other staff. The team of All India Coordinated Research Project on Forage Crops sincerely acknowledges their technical and organizational assistance and cooperation for successful organization of the meeting.

A. K. Roy
Project Coordinator

INAUGURAL SESSION

The inaugural session of the National Group Meet, *Rabi* 12-13 of AICRP on forage crops was organized at IGFRI, Jhansi during September 14-15, 2012. The meeting was inaugurated by Dr. R. P. Dua, Assistant Director General (Food and Fodder Crops), ICAR, New Delhi. The other dignitaries present were Dr. P. K. Ghosh, Director, IGFRI, Jhansi, Dr S. A. Faruqui, Ex. Project Coordinator (Forage Crops) and Dr A. K. Roy, Project Coordinator (Forage Crops). Dr R. V. Kumar, Organizing Secretary (NGM *Rabi* 2012-13) extended welcome to the chief guest dignitaries, participating scientists, team of NGM organizers, IGFRI staff, representative of press and media and farmers of the region.

Dr A. K. Roy, Project Coordinator (Forage Crops) presented Coordinator's report for *Rabi* 11-12. He highlighted the progress of research activities and the targets achieved as per the technical programme under the project. During *Rabi* 11-12, the research activities were conducted at 29 centers located in five zones *i.e.*, Hill, North West, North East, Central and South Zone, on aspect of forage crop improvement, forage crop production and plant protection. In *Rabi* 2011-12, 14 breeding trials of three annuals and two perennial forage species comprising test entries along with their respective checks were conducted at 29 centers. The forage species evaluated were berseem, oat (single cut, multi cut and dual), lathyrus in annuals and lucerne, tall fescue in perennials. Twenty forage crop production trials at 25 locations were undertaken to generate forage crop production technologies and improved forage crop varieties. Forage crop protection trial in major *Rabi* forages on pest occurrence, evaluation of breeding materials to pest and disease resistance, and pest management were undertaken at Anand, Bhubaneswar, Dharwad, Hisar, Hyderabad, Jhansi, Ludhiana, Palampur and Rahuri.

Dr S. A. Faruqui, Ex Project Coordinator, highlighted the importance of forage crop/livestock and fodder production technologies in unreached areas.

Dr. P. K. Ghosh, Director, IGFRI, highlighted the huge deficit of green fodder demand and supply. He also pointed out that due to population pressure forage crops are getting secondary importance. There is need to develop suitable fodder production models under biotic and abiotic stresses.

Dr. R. P. Dua, Assistant Director General (Food and Fodder Crops), ICAR, New Delhi in his chairman's remark highlighted the overall scenario of fodder production including seed production and suggested that seed production must be ensured as per indent of the DAC, GOI. He also suggested that we should give more emphasis on dual purpose aspect of forage crops *i.e.*, for human as well as animal consumption, varieties for problematic soils, conservation of forage resources and pest and disease management under climate change situation.

The inaugural function ended with vote of thanks by Dr R. V. Kumar, Organizing Secretary, to the dignitaries and participants for their valuable presence in inaugural session. He also extended gratitude to the PC Unit and other staff of the institute, different committees for their support in organization of NGM Meet of AICRP on Forage Crops.

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TECHNICAL SESSION – I

REVIEW OF RESEARCH ACTIVITIES: CENTRE WISE PRESENTATION

Chairman : Dr. R. P. Dua, ADG (FFC)
Co-Chairman : Dr. A. K. Roy, PC, AICRP-FC PI,
Reporters : Dr. J. K. Bisht and Dr. S. K. Bilaiya

The session started with introductory remarks by the chairman. It has been advised that the respective centre should provide details about the germplasm status at their centre. For the development of a variety a centre should have an ample holding of germplasm with high level of variability. The project coordinator stressed that every centre has to inform about the status and characterization of germplasm available with them and one set of germplasm should be deposited each with LTS in MBPGR, New Delhi and one set at MTS in IGFRI, Jhansi. After this, Zone wise/centre wise presentation was held.

Hill Zone:

- Palampur centre has a good collection of tall fescue grass and attempts were made for generating new genetic material in winter grasses.
- Srinagar is doing satisfactory work in Oat during *Rabi*.
- Almora is working on dual purpose crop for fodder availability during winter lean season.

North West Zone:

- Hisar, Ludhiana and Bikaner centres had presented their report. Bikaner centre has been advised not to go for selection from oat cultivar Kent for development of new variety, rather they should attempt inter-varietal crossing

North East Zone:

- Jorhat, Imphal, Faizabad, Kalyani, Bhubaneswar and Ranchi centers presented their work.
- The work of Faizabad centre was appreciated.
- Maintenance of good number of Rice bean and Maize germplasm at Kalyani Centre was appreciated.
- In Jorhat, Rice bean under rice fallow system gave good result.
- Imphal Centre was advised to fill vacant posts on priority basis.

Central Zone:

- Anand, Jabalpur, Rahuri, Raipur and Urulikanchan Centres presented their work.
- Work of Jabalpur centre was appreciated and rated as excellent.
- Good breeding programme in Lucerne at Anand was appreciated. .

South Zone:

- Coimbatore, Vellayani, Mandya and Hyderabad centres presented their work
- Hyderabad centre was advised to work on *Rabi* fodder crops which are important in their state.
- Coimbatore centre has a good programme on Bajra Napier hybrid.
- The work on transfer of forage production technology by Vellayani centre was appreciated.

Some of the important recommendations emerged out after discussion:

- All the germplasm available with different centres should be characterized and IC Numbers be obtained from NBPGR. For collection of germplasm, zone specific survey should be taken up.
- New entries in the IVT should be submitted with station trial data along with pedigree of parents.
- Every centre has to make a compilation regarding important varieties released from the centre and its deposition in NBPGR and IGFRI Gene bank.
- Barring a few centre, the performance of all the centres were found satisfactory.
- It was also decided that the cadre strength in every centre should be reviewed properly and strength of non performing centre should reduced accordingly.
- Poor results in certain crops was discussed and it was suggested that A few National programmes (on germplasm collection, pre-breeding, interspecific and intervarietal hybridization in selected crops as well as non-conventional fodder crops and package of practices) should be formulated in the XIIth plan with IGFRI and coordinating/cooperating centres.

The session concluded with the thanks to chair

Highlights: Technology Generated

A. Forage Production Technology

- In Berseem crop, application of recommended NPK+FYM 10 t ha⁻¹ +S @ 30 kg ha⁻¹ through elemental S + Mo 1 kg/ha through molybdate + Boron 4kg ha⁻¹ through sodium borate resulted in the highest green fodder yield.

B. Forage Protection Technology

- For Lucerne seed production, spraying of mancozeb (2.5g lit⁻¹) and tebuconazole (0.5 ml l⁻¹) alternately at 15 days interval enhanced >40 per cent seed yield over control. (Location: Anand, Dharwad, Hyderabad, Jhansi and Rahuri)
- Spray of hexacanozole (0.05%) and Propacanazole (0.05%) at 15 days interval minimize the disease incidence and in turn increased the quality of the forage seed yield (Location : Ludhiana, Bhubneshwar and Palampur)
- Seed treatment with NSP (50 g kg⁻¹) followed by foliar spray of NSKE (5%) at 15 days after each cut reduced the pest and disease incidence in Lucerne and increased the fodder and seed yield. (Location: Anand, Hyderabad, Jhansi and Rahuri)

TECHNICAL SESSION –II
FORMULATION OF TECHNICAL PROGRAMME (CONCURRENT)
FORAGE CROP IMPROVEMENT

Chairman : Dr. Pankaj Kaushal, Head, CI Division, IGFRI

Rapporteurs : Drs. V.K. Sood and G.B. Dash

Dr R. V. Kumar, PS & PI, Plant Breeding presented the highlights of the results of fourteen breeding trials conducted during *Rabi* 2011-12 on three annuals namely berseem, oat, lathyrus and two perennials namely Lucerne and Tall fescue. After discussion, the following breeding trials were formulated:

Berseem

- None of the entry was promoted to AVT 1
- None of the entry surpassed the best check in AVT 2.
- New trial on berseem (SC) has been constituted with four entries from Jhansi to be evaluated against Mescavi types in CZ and NWZ.

Oat

- **Oat single cut (IVTO SC):** eight entries namely, SKO-167, UPO-05-1, UPO-06-1, NDO-10, NDO-711, OS-403, JO-04-11 and RJB-1 were promoted from IVTO (SC) to AVTO-1 (SC).
- **Oat single cut (AVTO SC -1):** Nine entries, namely, SKO-170, SKO-188, JO-03-97, JO-03-99, OS-377, UPO-10-1, UPO-10-2, JHO-10-1 and JHO-10-2 were promoted from AVT oat (SC-1) to AVT oat (SC-2). Same entries will also be evaluated for seed yield under AVTO (SC-2) (Seed).
- **New IVT on Oat (SC):** New trial constituted with 12 new entries contributed by Jabalpur (1), Jhansi (2), Pantnagar (2), Faizabad (1), Hisar (1), Rahuri (2), Srinagar (1) and Ludhiana (2).
- **Oat multi cut (IVTO MC):** In oat (MC), none of the entry was promoted to AVT 1
- **Oat multi cut (AVTO MC-2):** None of the entry surpassed the best check in AVT-2.
- **New IVT on oat (MC):** New trial constituted with 6 entries contributed by Jabalpur (1), Jhansi (1), Palampur (1), Hisar (1) and Ludhiana (2)).
- **IVTO (dual):** None of the entry was promoted from IVTO (dual) to AVTO-1 dual.
- **New IVT on Oat (dual):** New trial constituted with 6 entries contributed by Jabalpur (1), Jhansi (2), Faizabad (1), Hisar (1) and Ludhiana (2).
- **IVT (Lathyrus):** Three entries JHLS-2011-1, JHLS-2011-2 and JLJ-09-1 promoted to AVT 1.
- **New IVT on Lathyrus:** New trial constituted with 7 entries contributed by Kalyani (2), Jhansi (2), Jabalpur (1) and Raipur (2).
- **New trial on Rye grass:** New trial constituted with 4 entries from Advanta
- **Perennial trials:** Perennial trials on Lucerne, Tall Fescue to continue as per technical programme.

Chairman emphasised for maintenance breeding of released varieties of different forage crops. PC (FC) urged upon the breeders in HZ and NEZ and in Rajasthan area for formulating the team and taking up exploration trips in their respective areas for collection of germplasm of important forage crops in the region. Issue regarding distribution of segregating materials in different forage crops and strengthening of breeding programme in range grasses and legumes was also discussed.

Dr R. V. Kumar also urged upon all the concerned breeders

- To send the seed materials to PC (FC) by 30th Sep. 2012 positively.
- To supply *Rabi* fodder trials data by 20th June; seed yield, quality trials data by 5th July 2013.
- The detailed technical programme is being circulated separately.

The session ended with vote of thanks to the chair.

TECHNICAL SESSION –II
FORMULATION OF TECHNICAL PROGRAMME (CONCURRENT)
FORAGE CROP PRODUCTION

Chairman : Dr. S. K. Tiwari, Head, CP Division, IGFRI
Convener : Drs U. S. Tiwana, Naveen Kumar and S. R. Kantwa
Reporters : Drs. K. K. Sharma and Amit Jha

Session began with introductory remarks of chairman. Welcoming the delegates he highlighted the issues to be taken up for present and future strategies in forage agronomic research.

House decided to continue 16 ongoing trials. One exploratory trial on “Effect of integrated nutrient management on yield and quality of Oat” for NE zone is proposed. Altogether 18 experiments including one new experiment plus one AVT- 2 trial on oat has been formulated and approved by the house.

One trial was concluded and following recommendations emerged out:

- In Berseem, application of recommended NPK+FYM 10 t ha⁻¹ +S @ 30 kg ha⁻¹ through elemental S + Mo 1 kg/ha through molybdate + Boron 4kg ha⁻¹ through sodium borate resulted in the highest green fodder yield.

Session ended with vote of thanks to the chair.

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

Chairman : Dr. A. K. Roy, Project Coordinator (FC)
Convener : Drs. R.B. Bhaskar and Ritu Mawar
Rapporteurs : Drs. D.K. Banyal and A. B. Tambe

Forage Scientists of Plant Pathology and Entomology disciplines discussed in detail the achievements of the last *Rabi* season along with the ongoing technical programme. The Chairman gave valuable suggestions for further improvement of the technical programme. Based on the discussion, the following recommendations emerged.

1. The trials PPT-1, PPT-2, A & B and PPT-12 will continue in the *Rabi* 12-13.
2. PPT-11, PPT-15 and PPT-16 trials have been concluded with following recommendations:
 - **PPT-11:** For Lucerne seed production, spraying of mancozeb (2.5g lit⁻¹) and tebuconazole (0.5 ml l⁻¹) alternately at 15 days interval enhanced >40 per cent seed yield over control. (Location: Anand, Dharwad, Hyderabad, Jhansi and Rahuri)
 - **PPT-15:** Spray of hexaconazole (0.05%) and Propaconazole (0.05%) at 15 days interval minimize the disease incidence and in turn increased the quality of the forage seed yield (Location : Ludhiana, Bhubneshwar and Palampur)
 - **PPT -16:** Seed treatment with NSP (50 g kg⁻¹) followed by foliar spray of NSKE (5%) at 15 days after each cut reduced the pest and disease incidence in Lucerne and increased the fodder and seed yield. (Location: Anand, Hyderabad, Jhansi and Rahuri)
3. Two new trials i.e. PPT-17 and PPT-18 were proposed to be conducted at different locations.

The meeting ended with vote of thanks to Chair.

TECHNICAL SESSION-III

DISCIPLINE WISE PRESENTATION

Chairman : Dr. R. P. Dua, ADG (FFC), ICAR, New Delhi

Rapporteurs : Drs. Naveen Kumar & R. N. Arora

The Project coordinator Dr. A. K. Roy welcomed the chairman in the session and requested the Principal Investigators to present discipline wise report.

Forage Crop Improvement

Dr. R. V. Kumar, PI (Plant Breeding), presented report of experiments conducted during *Rabi* season. In Rabi 2011-12, fourteen breeding trials of three annuals and two perennial forage species comprising test entries along with their respective checks were conducted at 29 locations placed in five zones. The forage species evaluated were Berseem, Oat (Single cut, Multi cut and Dual), Lathyrus in annuals and Lucerne, Tall Fescue in perennials. In annuals, there were two trials in Berseem, four trials in Oat (Single cut), three trials in Oat (Multi cut), one trial in Oat (Dual) and one in Lathyrus. In perennial, one trial on Lucerne is in first year of evaluation whereas next one is in second year of evaluation. Trial on Tall Fescue is in third year of evaluation.

Annual forage trials were classified into three groups *viz.*, Initial Varietal Trial (IVT), Advanced Varietal Trial Stage-1 (AVT-1) and Advanced Varietal Trial Stage-2 (AVT-2) whereas in perennials, same trial is being evaluated for three consecutive years. A perusal of the results revealed that some entries have recorded their superiority with respect to zonal/national check. These entries were identified as promising entries and were promoted accordingly for further testing.

Forage Crop Production

Dr. S. R. Kantwa, (PI) Agronomy, presented the results of crop production trials undertaken at 25 locations in the five zones belonging to four heads *viz.*, coordinated, location specific, AVT based and new exploratory trials. Research aspect consisted: resource conservation through forages; influence of macro and micro nutrients on berseem; optimization of nitrogen for maize and sorghum in different cropping systems; tillage and nutrient management of rice-oat cropping system; performance of forage crops through waste water under varied nutrient levels; effect of soil amendment on productivity of rice-berseem cropping system; effect of soil amendment on yield of fodder sorghum in alkali soil; production potential of forages in rice fallows; banana based fodder intercropping systems; agronomic traits for AVT-2 entries of tall fescue, and oats; effect of irrigation levels on yield and quality of forages during lean period; stubble and nutrient management in rice-oats cropping system; performance of dual purpose forage crops under different cutting management system; IWM in berseem, effect of sources of nitrogen on oats and residual effect on succeeding crops, performance of BN hybrid as influenced by micro nutrients and effect of sowing time and Zn & thio urea spray on seed yield of oats.

The concluded experiment revealed that:

- In North West zone, application of recommended NPK+FYM 10 t ha⁻¹ +S @ 30 kg ha⁻¹ through elemental S + Mo 1 kg/ha through molybdate + Boron 4kg ha⁻¹ through sodium borate to berseem resulted in the highest green fodder yield.

Forage Crop protection

Dr. R. B. Bhaskar, PI (Crop Protection), presented the results of crop protection trials conducted at 9 locations in the country. The crop protection programmes are aimed at: to study occurrence and abundance of major pests and diseases in forages, screening of breeding material and development of management technology for the control of different pests and diseases in forage. During the season under report, root rot of berseem, leaf blight & leaf rot of oats were major diseases at Bhubaneswar. In Lucerne, thrips, jassids and white fly were the major pests at Anand.

Screening of breeding material at various locations resulted in the identification of resistant sources viz.,

- CAP-3-2 and ACP-3-1 of lucerne against leaf Anthracnose;
- UPO-10-2, SKO-96 & SKO-156 of oats against leaf blight and
- UPO-10-2, JO-03-98 JHO-2010-1, ANDO-3, UP-10-1 and JHO-99-2 of oats against *Sclerotium* rot.

The session ended with vote of thanks to the chair.

SPECIAL SESSION Discussion on XIIth Plan Activities

Chairman: Dr. R. P. Dua, ADG (FFC), ICAR, New Delhi
Convener: Dr A. K. Roy, Project Coordinator (FC)
Rapporteurs: Drs C. K. Kundu and A. H. Sonane

At the outset, Chairman critically highlighted importance and need of specific activities to be taken during XIIth plan. He was of the opinion that we should develop certain National Programme based on the emerging need under changed climatic condition and to optimize the available resources for fodder security of the country. After discussion among scientists present, three national programme covering different aspects of national importance such as germplasm exploration and conservation, widening genetic base of fodder crops, utilization of non conventional fodder crops and contingent crop planning under climatic changed scenario were formulated as details below:

- **National Programme -1:** Genetic improvement of Berseem, Oat and Cowpea by employing inter varietal/ interspecific crosses (Alien Gene Introgression) for fodder, grain and fodder cum grain purpose
- **National Programme-2:** Exploration, collection and evaluation of germplasm and non conventional fodder crops including multipurpose tree and shrub species
- **National Programme-3:** Contingent crop planning including forage crops with management of diseases under aberrant weather situations in relation to climate change

It was felt that centres should be provided with good laboratory and farm facilities for upgrading the research output from AICRP centres. Scientists from different centres requested to enhance the budgetary requirement for TA and contingency in view of rising cost and labour wages. Chairman assured the house to look into possibility of providing the additional facilities to the centres with good performance up to mark and suggested the centres to gear up for better research output.

The session ended with vote of thanks to the chair.

TECHNICAL SESSION – IV BREEDER SEED PRODUCTION

Chairman : Dr. D. R. Malaviya, Head, Seed Technology Division, IGFRI
Rapporteurs : Drs. A. K. Mehta & S. S. Shekhawat

At the outset, the Chairman welcomed all the participants. Dr. R. V. Kumar, Principal Investigator (Plant Breeding) presented the status of Breeder Seed Production in forage crops for *Rabi* 2011-12.

In *Rabi* 2011-12, the indent for Breeder Seed Production was received from DAC, GOI for 30 varieties in four forage crops *viz.*, Oat (12), Berseem (8), Lucerne (5) and Gobhi Sarson (5).

Against the target of 1221.31 q of breeder seed production of 30 varieties in four forage crops *viz.*, oats, berseem, lucerne and gobhi sarson, the actual production was 979.95 q that indicates the deficit of 241.36 q, *i.e.* 19.76 per cent. The shortfall in the breeder seed production of different crops was as follows:

- Production in oat was 887.25q against the indent of 1112.70q (deficit 225.45q).
- Production in berseem was 84.05q against the indent of 95.00q (deficit 10.95q).
- Production in Lucerne was 6.67q against the indent of 13.00 q (deficit 6.33q).
- Production in Gobhi Sarson was 1.98q against indent of 0.61q (surplus 1.37q).

Dr. R. V. Kumar also informed the house that till now we have not received the indent for the year *Rabi* 13-14 and as soon as we receive the indent, allotment of breeder seed production to concerned institute for the year *Rabi* 2012-13 will be done and informed at the earliest.

Many centers including IGFRI, Jhansi raised the issue of non-lifting of breeder seed by different organizations (indentors) in many crops/varieties. It was observed to be a very serious issue as on one hand we are facing chronic shortage of forage seed whereas on the other hand, quality breeder seed are not lifted and going waste. Project Coordinator (Forage Crops) informed the house that the matter has already been discussed with ADG (Seed) and certain corrective measures are being formulated at ICAR level.

The session ended with vote of thanks to the Chair.

Special session FTD and other relevant Issues

Chairman : Dr. A. K. Roy, PC (FC)
Rapporteurs : Drs. S. R. Kantwa and A. K. Mall

A total of 354 FTD's were allotted to 21 AICRP centres in ten crops namely Berseem, lucerne, oat, tall fescue, rabi maize, cowpea, rice bean, guinea, BN hybrid and rye grass. Out of 354 FTD's 89 were allocated on berseem, 52 on lucerne, 182 on oat, two on tall fescue, five on rabi maize, four on cowpea, ten on rye grass, two on rice bean, three on guinea grass and five on BN hybrid. The detail of Zone-wise FTD allotted were 32 to hill zone (oat (SC & MC), and tall fescue), 95 to NWZ (berseem, oat (SC & MC), rye grass and lucerne (annual)), 83 to NEZ (Rabi maize, oat (SC & MC), berseem and lucerne (annual)), 90 to CZ (berseem, lucerne (annual & perennial) and oat (SC & MC)) and 54 to SZ (Guinea grass, bajra napier hybrid, lucerne (annual & perennial), oat (SC & MC), cowpea and rice bean).

TECHNICAL SESSION –V

Plenary Session

Chairman	: Dr. S. K. Dhyani, Director, NRC on Agroforestry, Jhansi
Co-Chairman	: Dr. P. K. Ghosh, Director, IGFRI, Jhansi
Convener	: Dr. A. K. Roy, Project Coordinator, Forage Crops, Jhansi
Rapporteurs	: Drs. R. V. Kumar and S. R. Kantwa

The session started with introductory remarks of the Chairman. He told the house that despite being highest milk producer, there is scarcity of milk in the country and 60 per cent livestock of the country is dependent on poor grazing lands including forest. He suggested that effective plan should be prepared because coming days will be harsher due to the paucity of the fund. Co-chairman, Dr. P. K. Ghosh, discussed about fodder scenario of the country and urged the AICRP-FC centers to develop linkages with state farm corporation/state agriculture department / NGO's for effective transfer of fodder production technologies to the farmer's field. The Chairman invited the Rapporteurs of different technical sessions for presentations of proceedings. The aspect and issues pertaining to Rabi 2011-12 programme in specific and forage research in general were discussed. The recommendations of Technical Sessions were discussed and accepted after approval of the house.

At the end of the plenary session, Dr. R. V. Kumar, Organizing Secretary (NGM), IGFRI, Jhansi extended vote of thanks to the Chairman, Dr. S. K. Dhyani, Director, NRC on Agroforestry, Jhansi and co chairman Dr. P. K. Ghosh, Director, IGFRI, Jhansi, participants and local team for successful conductance of National Group Meet.

Dr. A. K. Roy, Project Coordinator (Forage Crops) also expressed heartiest thanks to ADG (FFC), ICAR; Director, IGFRI; Director, NRCAF; as well as team of IGFRI, Jhansi, members of organizing committee and all other staff involved in organization of this meeting for providing all facilities and support for successful conductance of the meeting.

General Recommendations:

- All the centres should give more emphasis on germplasm collection of their mandate crops as well as on crops for which diversity is available in those areas. After evaluation and multiplication, the germplasm can be shared by other partners.
- All the germplasm available should be characterized and IC Numbers be obtained from NBPGR.
- Centres should give emphasis on pre-breeding in their mandated crops.
- All the centres should make a compilation regarding all varieties released from the centre including state and central release.
- New entries in the IVT should be submitted with station trial data along with pedigree of parents.
- Identification of fodder crops/varieties in food-fodder cropping sequences should be given more emphasis.
- Three National programmes (on germplasm collection, pre-breeding, interspecific and intervarietal hybridization in selected crops as well as non-conventional fodder crops and package of practices) should be formulated in the XIIth plan with IGFRI and coordinating/cooperating centres. ICAR should be requested for fund allocation for these projects as it will help in germplasm enrichment, pre-breeding, development of varieties and production, protection technologies.

**AICRP ON FORAGE CROPS
FINALIZED TECHNICAL PROGRAMME OF THE FORAGE BREEDING TRIALS
RABI 2012-13**

Abbreviations: HZ-Hill zone, NWZ-North-west zone, NEZ-North-east zone, CZ-Central zone, SZ-South zone

1. IVT/Exploratory Trial Berseem (SC): Initial Varietal/Exploratory Trial in Berseem

Number of entries: 4 + 2 NC +1 ZC
Contributors: Jhansi - 4
National check: Wardan, Mescavi
Zonal checks: Bundel Berseem-2 (CZ & NWZ)
Design: RBD with 3 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row-30 cm (each plot accommodating 10 rows of 3 m length)
Seed rate: 25 g per plot (approx. 25 kg/ha)
Seed requirement 0.750 kg /entry from each contributor
Nutrients: N-20 kg, P₂O₅.80 kg/ha
Locations (8): CZ- Jhansi, Rahuri, Jabalpur, Urulikanchan, Karjat, NWZ- Bikaner, Hisar, Ludhiana
Special note Cut has to be taken at 60 Days after sowing

2. IVT Oat (SC): Initial Varietal Trial in Oat (Single cut)

Number of entries: 12 + 2 NC +1 ZC
Contributors: Hisar-1, Jabalpur-1, Ludhiana-2, Jhansi-2, Faizabad-1, Rahuri-2, Pantnagar-2, Srinagar-1
National checks: Kent and OS-6
Zonal check: SKO-90 (HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO- 2000-4 (SZ)
Design: RBD with 3 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row: 25 cm (each plot accommodating 12 rows of 3 m length)
Seed rate: 100 g per plot (approx. 100 kg/ha)
Seed requirement: 8.5 kg/entry from each contributor
Nutrients: N- 80 kg, P₂O₅kg/ha
Locations (27): HZ- Palampur, Srinagar NWZ- Bikaner, Jalore, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut NEZ- Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, CAU Imphal CZ- Jhansi, Rahuri, Urulikanchan, Karjat, Kanpur, Anand, Jabalpur, Raipur SZ- Hyderabad, Mandya, Coimbatore (Ooty)

3. AVT Oat (SC)-1: First Advanced Varietal Trial in Oat (Single cut)

Number of entries: 8+ 2 NC +1 ZC
Name of entries: SKO-167, UPO-05-1, UPO-06-1, NDO-10, NDO-711, OS-403, JO-04-11, RJB-1
National checks: Kent and OS-6
Zonal check: SKO-90 (HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO- 2000-4 (SZ)
Design: RBD with 3 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row- 25 cm (each plot accommodating 12 rows of 4 m length)
Seed rate: 120 g per plot (approx. 100 kg/ha)
Seed requirement 10.000 kg/entry from each contributor
Nutrients: N- 80 kg, P₂O₅kg/ha
Locations (27): HZ- Palampur, Srinagar NWZ- Bikaner, Jalore, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut NEZ- Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, CAU Imphal CZ- Jhansi, Rahuri, Urulikanchan, Karjat, Kanpur, Anand, Jabalpur, Raipur SZ- Hyderabad, Mandya, Coimbatore (Ooty)

4. AVT Oat (SC)-2: Second Advanced Varietal Trial in Oat (Single cut)

Number of entries 9+ 2 NC +1 ZC
Name of entries: SKO-170, SKO-188, JO-03-97, JO-03-99, OS-377, UPO-10-1, UPO-10-2, JHO-10-1, JHO-10-2
National checks: Kent and OS-6
Zonal check: Palampur-1(HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO-2000-4 (SZ)
Design: RBD with 3 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row- 25 cm (each plot accommodating 12 rows of 4 m length)
Seed rate: 120 g per plot (approx. 100 kg/ha)
Seed requirement 10.0 kg/entry from each contributor
Nutrients: N- 80 kg, P₂O₅- 40 kg/ha
Locations (27): **HZ-** Palampur, Srinagar, **NWZ-** Bikaner, Jalore, Hisar, Ludhiana, Pantnagar, Udaipur, Meerut **NEZ-** Jorhat, Kalyani, Bhubaneswar, Ranchi, Pusa, Faizabad, CAU Imphal **CZ-** Jhansi, Rahuri, Urulikanchan, Karjat, Kanpur, Anand, Jabalpur, Raipur **SZ-** Hyderabad, Mandya, Coimbatore (Ooty)

5. AVT Oat (SC)-2 (Seed): Advanced Varietal Trial –2 in Oats (Single cut) for Seed

Number of entries 9+ 2 NC +1 ZC
Name of entries: SKO-170, SKO-188, JO-03-97, JO-03-99, OS-377, UPO-10-1, UPO-10-2, JHO-10-1, JHO-10-2
National checks: Kent and OS-6
Zonal check: Palampur-1(HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO-2000-4 (SZ)
Design: RBD with 3 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row- 25 cm (each plot accommodating 12 rows of 4 m length)
Seed rate: 100 g per plot (approx. 80 kg/ha)
Seed requirement 3.500 kg /entry from each contributor
Nutrients: N- 80 kg, P₂O₅.40 kg/ha
Locations (10): **HZ-** Palampur, Srinagar, **NWZ-** Hisar, Pantnagar, **NEZ-** Jorhat, Ranchi **CZ-** Jhansi, Jabalpur, **SZ-** Mandya, Hyderabad

5A. AVT Oat (SC)-2 (Agronomy)

Number of entries 9+2+1
Name of entries: SKO-170, SKO-188, JO-03-97, JO-03-99, OS-377, UPO-10-1, UPO-10-2, JHO-10-1, JHO-10-2
National checks: Kent and OS-6
Zonal check: Palampur-1(HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO- 2000-4 (SZ)
Seed requirement 12.00 kg from each contributor for entries and national check
4.00 kg for each zonal check
Locations (11): **HZ-** Palampur, Srinagar, **NWZ-** Hisar, Pantnagar, **NEZ-** Jorhat, Ranchi, Kalyani **CZ-** Jhansi, Jabalpur, **SZ-** Mandya, Coimbatore (Ooty)

6. IVTO (MC): Initial Varietal Trial in Oat (Multi cut)

Number of entries 6 + 3 NC
Contributors: 1-Hisar, 2-Ludhiana, 1-Jabalpur, 1-Jhansi, 1-Palampur,
National checks: Kent, UPO-212 and RO-19
Design: RBD with 3 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row-25 cm (each plot having 12 rows of 3.0 m length)
Seed rate: 90 g per plot (approx. 100 kg/ha)
Seed requirement 5.500 kg /entry from each contributor
Nutrients: N-80 kg, P₂O₅ -40 kg/ha
Locations (19): **HZ:** Palampur, Srinagar, Almora **NWZ:**Pantnagar, Hisar, Jalore, Ludhiana, Udaipur **NEZ:** Ranchi, Pusa, Faizabad, Jorhat, Bhubanewar, Imphal **CZ:** Jhansi, Anand, Jabalpur, Rahuri, Urulikanchan,

7. IVT Oat (Dual): Initial Varietal Trial in Oat (Dual)

Number of entries 7+ 3 NC
Contributors: 2-Jhansi, 1-Hisar, 2- Ludhiana, 1-Faizabad, 1-Jabalpur
National checks: RO-19, UPO-212 and JHO -822
Design: RBD with 3 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row : 25 cm (each plot accommodating 12 rows of 3 m length)
Seed rate: 100 g per plot (approx. 100 kg/ha)
Seed requirement 6.500 kg/entry from each contributor
Nutrients: N- 80 kg, P₂O₅ -40 kg/ha
Locations (20): **HZ-** Palampur, Srinagar **NWZ-** Bikaner, Jalore, Hisar, Ludhiana, Pantnagar, Udaipur, **NEZ-** Jorhat, Bhubaneswar, Ranchi, Pusa, Faizabad, **CZ-** Jhansi, Rahuri, Urulikanchan, Karjat, Anand, Jabalpur, Raipur

8. IVT Lathyrus: Initial Varietal Trial in Lathyrus

Number of entries 7 + 3 NC
Contributors: 2-Kalyani, 2-Jhansi, 2-Raipur, 1-Jabalpur
National checks: Nirmal, Mahateora, Prateek
Design: RBD with 3 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row: 30 cm (each plot accommodating 10 rows of 3.0 m length)
Seed rate: 40.0 g per plot (Approx. 40 kg/ha)
Seed requirement 1. 400 kg/entry from each contributor
Nutrients: N-20kg, P₂O₅-40 kg/ha
Locations (10): Jorhat, Kalyani, Bhubneshwar, Ranchi, Pusa, Jhansi, Jabalpur, Kanpur, karjat, Raipur

9. AVT Lathyrus-1: First Advanced Trial in Lathyrus

Number of entries 3 + 1 NC
Name of entries: JHLS-2011-1, JHLS-2011-2, JLJ-09-1
National checks: Nirmal
Design: RBD with 5 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row: 30 cm (each plot accommodating 10 rows of 4.0 m length)
Seed rate: 50.0 g per plot (Approx. 40 kg/ha)
Seed requirement 2.250 kg /entry from each contributor
Nutrients: N-20kg, P₂O₅-40 kg/ha
Locations (8): Jorhat, Kalyani, Bhubneshwar, Ranchi, Pusa, Jhansi, Jabalpur, Kanpur

10. IVT Rye grass: Varietal Trial in Rye grass

Number of entries 4 + 1 C
Contributors: Advanta-4
Check PBRG-1
Design: RBD with 4 replications
Plot size: 3.0 x 3.0 m
Spacing: Row to row: 30 cm (each plot accommodating 10 rows of 3.0 m length)
Seed rate: 20.0 g per plot (Approx. 20 kg/ha)
Seed requirement: 0.750 kg /entry from each contributor
Nutrients: N-80kg, P₂O₅-40 kg/ha
Locations (8): **HZ-** Palampur, Srinagar, Almora; **NWZ-** Pantnagar, Ludhiana, Udaipur; **NEZ-**Jorhat, Barapani

11. VT Lucerne (P) - 2011: Varietal Trial in Lucerne (Perennial)-2nd year

Number of entries 7 + 2 NC
Contributors: Anand-1, Urulikanchan-1, Dharwad-1, Rahuri-1, Coimbatore-1, Bikaner-1, Advanta-1
National checks: Anand-2, RL-88
Design: RBD with 3 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row: 30 cm (each plot accommodating 10 rows of 4.0 m length)
Seed rate: 30.0 g per plot (Approx. 25 kg/ha)
Seed requirement: 1.250 kg /entry from each contributor
Nutrients: N-80kg, P₂O₅-40 kg/ha
Locations (12): NWZ- Ludhiana, Hisar, Bikaner, Jalore, Udaipur CZ- Rahuri, Urulikanchan, Anand, SZ- Hyderabad, Coimbatore, Mandya, Dharwad

Being perennial in nature, trial will be continued in Rabi 2012-13

12. VT Lucerne (P) - 2010: Varietal Trial in Lucerne (Perennial)-3rd year

Number of entries 9 + 2 NC
Contributors: Rahuri-4, Anand-3, Coimbatore-1, Bikaner-1
National checks: Anand-2, RL-88
Design: RBD with 3 replications
Plot size: 4.0 x 3.0 m
Spacing: Row to row : 30 cm (each plot accommodating 10 rows of 4.0 m length)
Seed rate: 30.0 g per plot (Approx. 25 kg/ha)
Seed requirement: =
Nutrients: N-80kg, P-40 kg/ha
Locations (10): NWZ- Ludhiana, Bikaner, Udaipur CZ- Rahuri, Urulikanchan, Anand, SZ- Hyderabad, Coimbatore, Mandya, Dharwad

Being perennial in nature, trial will be continued in Rabi 2012-13

13. VTTF (2009)- 4th Year : Varietal Trial In Tall Fescue Grass Under Sub-Temperate & Temperate Himalayan Rangelands

Number of entries 2+ 2 NC
Name of entries: Hima-14, Hima-15
National checks: Hima-1 and Hima-4
Design: RBD with 5 replication
Plot size: 2.1m x 1.5m
Spacing: slip to slip- 15 cm and row to row- 30 cm
No. of rows per plot-7 No. of hills per row-10, Root slips per hill-3
Sowing method: By rooted slips
Fertilization (kg/ha) : NPK 40:40:30 kg/ha at the time of sowing in the first year NPK 80:60:30 kg/ha in subsequent years. Half of N will be applied in the month of November and remaining half in equal splits after each cut
Harvesting: Green forage cuts should be take after 40 to 50 days interval (three to four cuts)
Locations (3): CSKHPKV, Palampur, VPKAS, Almora, SKUA&T, Srinagar

Being perennial in nature, trial will be continued in Rabi 2012-13

DATA TO BE RECORDED ON BREEDING TRIALS

- GFY (q/ha), DMY (q/ha), per day productivity for green forage and dry matter yield (q/ha/day).
- Ancillary characters, like plant height, leafiness (Leaf / Stem ratio).
- Seed and stover yield in case of Seed trial.
- In IVT trials, only CP (%) and CP yield in all the cuts.
- In AVT trials, CP (%), CP yield, NDF (%), ADF (%) and IVDMD (%) in all the cuts.
- In Oat (SC), cut for fodder at the time of 50% flowering..
- In Oat (MC), two cut for fodder has to be taken, first cut after 55-60 days of sowing and second cut at 50% flowering
- In Oat (Dual), cut for fodder after 55-60 days of sowing and then left for grain harvesting. In this trial, biological yield has to be recorded.
- In Berseem (SC), cut has to be taken at 60 days after sowing.

Note : In case of Single cut, data are to be recorded at 50% flowering stage. In case of multi-cut, data are to be recorded cut wise.

$$\text{Yield Conversion Factor : } \text{Yield (q/ha)} = \frac{\text{Yield (kg. /plot)}}{\text{Net plot size (m}^2\text{)}} \times 100$$

Important

- Seed of checks and entries to be supplied by contributors to AICRP (FC) unit, Jhansi by 30.9. 2012.
- Seed for trials will be dispatched by AICRP (FC) unit, Jhansi to the testing locations/centers by 10.10. 2012.
- Rabi trial's data are to be submitted by testing centres to PC (FC) Jhansi upto June 20, 2012. In case of seed yield and quality traits upto 5th July 2012.

AICRP ON FORAGE CROPS
TECHNICAL PROGRAMME: FORAGE CROP PRODUCTION TRIALS
RABI 2012-13

(A) ON-GOING COORDINATED TRIALS**AST 1 (AST-2): RESOURCE CONSERVATION THROUGH FORAGES****Objectives:**

- To study the effect of resource conservation techniques (RCT) on forage yield of the system
- To study the effect of resource conservation through forages (RCT) on physico - chemical status of soil.
- To study the economics of the system.

Year of start :Kharif 2009 (Establishment)**Duration:** Five years**Methodology :****Phase I: (2009)**

- Studies on initial physico-chemical status of the soil i.e., WHC, Infiltration rate, pH, OC (%), available N, P & K and microbial population.
- Formulation of zone specific RCT through forage crops in pilot trial mode.

Phase II: (2010-2011)

- Execution of the experiments as per the technical programme in the respective zone
- Observation recording on growth, yield and quality in different seasons of system in each year
- Recording observation on soil fertility status after end of the in each year.

Phase III: (2012-13)

- Recording final physico-chemical soil status after completion of the study
- Computation of data and analysis and preparation of the report

Observation to be recorded:**A. Crop growth:**

- i- Plant / shoot population at harvest (per m²) ii- Plant height at harvest
 iii- Leaf : Stem ratio

B. Yield (q/ha):

- i- Green fodder ii- Dry matter iii- Grain yield
 iv- Straw yield v- Forage equivalent yield

C. Quality:

- i- Crude protein content (%) ii- Crude protein yield (q/ha)

D. Economics:

- i-Cost of cultivation (Rs./ha) ii-Gross monetary return (Rs./ha)
 iii-Net monetary return (Rs./ha) iv-Benefit : cost ratio

E. Soil studies:

- Soil fertility status viz., pH, OC (%), EC, available NPK and microbial population before and after completion of the experiment.

Soil moisture conservation studies: Soil moisture data from 0-15 and 15-30 cm depth at initial, 15 days after germination and later on every 30 days interval.

NOTE: Specific observations will be recorded as per experimental need.

1.Hill Zone:

Subtitle: Effect of vegetative cover barriers and improved forage species on conservation of degraded grassland

Design: Split**Replication (s):** Three

Treatments :

A. Vegetative barriers

1. No vegetative barrier 2. Napier Bajra Hybrid (NB-37) 3. *Setaria anceps*

B. Planting of improved species

1. Local grass 2. *Setaria anceps* (PSS-1)
 3. *Stylosanthes hamata* 4. *Setaria anceps* + *Stylosanthes hamata*

Location : Palampur

2. North-West Zone

Subtitle: Effect of different tillage practices on productivity of forage crop in the prevalent crop sequence (Irrigated conditions)

Design : RBD

Replication(s) : Three

Treatments:

- T₁-Conventional tillage (1 Disc harrow + 2 Cultivator)
- T₂-2 Cultivation (1 Disc harrow + 1 Cultivator)
- T₃-2 cultivation (Rotavator)
- T₄-1 cultivation (Disc harrow)
- T₅-1 cultivation (Rotavator)
- T₆-Broadcasting of seed before T-3
- T₇-Broadcasting of seed before T-5
- T₈-No cultivation (zero tillage)

Locations (3): Ludhiana, Hisar and Pantnagar

3. Central Zone:

Sub title: Effect of planting methods and forage crop combinations on fodder productivity through moisture conservation

Design: RBD

Replication(s): Three

Treatments:

A. Moisture conservation techniques (main plot)

1. Ridge and furrow
2. Flat bed

B. Combination of grasses and legumes

- *Cenchrus ciliaris* + *Desmanthus virgatus*
- *C. ciliaris* + *Stylosanthes seabrana*
- *Dichanthium annulatum* + *Desmanthus virgatus*
- *Dichanthium annulatum* + *S. seabrana*

Locations (4): Rahuri, Jabalpur, Anand, Urulikanchan

4. North East Zone:

Sub title: Effect of moisture conservation practices on production of perennial grasses

Design: RBD

Replication(s): Three

Treatments:

A. Perennial grasses

1. *Brachiaria ruziziensis*
2. Guinea grass (Hamil)/Hybrid Napier
3. *Setaria* grass (Nandi variety)

B. Moisture conservation

1. Control (Without mulch)
2. Soil mulch
3. Inter cropping with legume (Cowpea/Rice bean - Berseem/Rice bean-Cowpea)

Locations (6): Jorhat, Faizabad, Ranchi, Bhubaneswar and Kalyani

5. South Zone:

(a) Sub title: Intensive forage production through silvipasture system under rainfed ecosystem

Design: RBD

Replication(s): Three

Treatments : 8

- | | |
|---|--|
| T ₁ – Subabool + <i>Cenchrus ciliaris</i> | T ₂ – Subabool + <i>Stylosanthes scabra</i> |
| T ₃ – Subabool + <i>Desmanthus virgatus</i> | T ₄ – Subabool + <i>C. ciliaris</i> + <i>Stylosanthes</i> (3:1) |
| T ₅ – Subabool + <i>C. ciliaris</i> + <i>Desmanthus</i> (3:1), | T ₆ – Subabool + Sorghum + Horse gram (2:1) |
| T ₇ – Subabool + Pearl millet + horse gram (2:1), | T ₈ – Subabool (<i>Leucaena diversifolia</i>) (Sole) |

Note: Spacing of Subabul – 3 m x 2 m

Location (3): Hyderabad, Coimbatore and Mandya

(b) Sub title: Cassava based sustainable alley farming system for rain fed areas of the humid tropics

Design: RBD

Replication: 3

Treatments: 12 Cassava variety: Vellayani Hraswa

- | | | | |
|--------------------------|---------------------------------------|--------------------------------|-------------|
| A. Grasses: | 1. BN Hybrid (Sugna variety) | 2. <i>Brachiaria brizantha</i> | 3. No grass |
| B. Legumes: | 1. Fodder cowpea (EC 4216) | 2. No fodder legume | |
| C. Biofertilizer: | 1. VAM (<i>Glomus fasciculatum</i>) | 2. No biofertilizer | |

Location: Vellayani

AST-2 (4): EFFECT OF TILLAGE AND NUTRIENT MANAGEMENT ON PRODUCTIVITY OF RICE-OAT CROPPING SYSTEM

Objective:

- To study the effect of tillage and nutrient management in oats on the productivity of the system

Duration : Three year **Design** : Split plot
Replication : 3 **Plot size** : 4m x 3m
Year of start : *Kharif 2010* (Raipur and Jabalpur - Kharif 2011)

Treatment: 12

Main plot – Tillage practices (3)

S₁- Zero tillage S₂. Minimal tillage S₃. Conventional tillage

Sub Plot - nutrient management (4)

M₁ – 75 % Recommended Dose of NPK (RD) M₂ – 75 % RD + Biofertilizers (*Azotobactor* + PSB)
M₃ – 100 % RD M₄ – 100 % RD + Biofertilizers (*Azotobactor* + PSB)

Observations:

- Initial and final status of soil fertility and microbial population
- Yield of grain and straw for rice Yield of green and dry matter of oat
- Weed studies CP% and CP yield of oat and Economics.

Note: Tillage and nutrient management will be done in oat crop and residual effect of the treatments will be studied on *Kharif* rice. **Data will be reported in Rabi.**

Locations (6): Bhubaneswar, Ranchi, Kalyani, Jorhat, Raipur and Jabalpur

AST-3 (AST-5): PERFORMANCE OF FORAGE CROPS RAISED THROUGH WASTE WATER UNDER VARIED NUTRIENT LEVELS

Objectives

- To access the production and quality of various forage crops raised through waste water under varied nutrient level
- To work out the economics

Year of Start: *Kharif 2010* **Duration:** 3 years
Design: Split Plot **Replications:** Three

Treatments

Main Plot -Forage Crops – 4

C₁ – Cumbu Napier Hybrid grass - CO (CN) 4/ APBN-1 C₂ – Guinea Grass - CO(GG)3
C₃ – Multicut fodder sorghum - CO (FS) 29 / Para grass C₄ – Lucerne - CO 1

Sub Plot -Nutrient Levels – 5

S₀. Control, S₁- 25% RDF, S₂ - 50% RDF, S₃. 75% RDF, S₄ - 100% RDF

Observations:

- Plant population / m row, Plant height at harvest, Leaf stem ratio
- Green fodder and dry matter yield (q/ha)
- Crude protein content (%) and Crude protein yield (q/ha)
- Economics (Rs/ha/yr)
- Chemical analysis of waste water, soil and fodder for heavy metals
- Soil fertility at initial and at end of the year

Note: **Data will be reported in Rabi**

Locations (2): Coimbatore and Hyderabad

AST - 4 (AST-14): Studies on the effect of irrigation levels on green forage yield and quality of different forage crops during lean period

Objectives:

- To study the performance of forage crops under varied moisture regimes
- To identify suitable and most remunerative crop for existing situation / under limited irrigations

Year of start: Rabi -2011-12

Duration: Two years

Design: Split plot

Replication: Three

Treatments: 12

Plot size: 4.0m x 3.6m

Treatment details:

Main plot (Irrigation levels-3)

I₁- IW/CPE—0.6

I₂- IW/CPE—0.8

I₃- IW/CPE—1.0

Sub plot (Crops – 4)

C1-Fodder maize

C2-Fodder sorghum

C3-Fodder pearl millet

C4- Baby corn

Observation to be recorded:

- Plant height (cm)
- L: S ratio
- Green and DFY (q/ha)
- CP content (%)
- WUE (kg/ha/cm)
- Gross and net returns (Rs./ha)
- Benefit-cost ratio
- crude protein yield (q/ha)

Data reporting: Rabi

Locations: Mandya, Hyderabad and Dharwad

AST- 5 (AST-15): Effect of stubble management and INM on forage productivity in Rice-Oat cropping system

Objectives:

- To study the effect of different cutting height of rice stubble on crop establishment and forage productivity of oat
- To evaluate the relative performance of different stubble management and INM treatment on Productivity of Rice -Oat cropping system.

Treatments: 12

Main Plot- Rice Stubble management

S1- Cutting of rice stubble at ground level

S2- Cutting of rice stubble at 30cm height

S3- Normal cultivation

Sub Plot- INM treatment

M1- 100% NPK (Inorganic fertilizer)

M2-50% N through FYM+50%NPK through inorganic fertilizer

M3-25% N through FYM+Green manure+50% NPK through inorganic fertilizer+Biofertilizer

M4 -50% N through FYM +GM+ PSB+ Biofertilizers

Design: Split Plot Design

Replication: 3

Plot size: 4mx3m

Year of Start: Kharif 2012

- INM treatment will be given to Rice crops
- 50% RDF will be given to oat crop
- In stubble management practices except normal cultivation system oat will be sown behind the plough

Observation:

- Initial and final fertility status of soil
- Yield of component crop.
- Equivalent yield
- Economics
- Soil fertility before and after harvesting of crop cycle.

Data reporting: Rabi

Locations: Jorhat and Bhubaneswar

AST 6 (AST-16): Performance of dual purpose forage crops under different cutting management system

Objectives:

- To study effect of cutting management on forage and seed production potential of forage crops

Technical details:

Treatment (12)

(a) Main plot (Crops-3)

Oats Barley Wheat

(b) Sub plots (Cutting management -4)

(For Hill Zone)

No cutting Cutting of fodder at 70 days after sowing

Cutting of fodder at 80 days after sowing Cutting of fodder at 90 days after sowing

(For NWZ, NEZ and Central Zone)

No cutting Cutting of fodder at 50 days after sowing

Cutting of fodder at 60 days after sowing Cutting of fodder at 70 days after sowing

(Second cut will be taken for seed)

Design: Split plot design

Replications: 3

Plot Size: 4.00 m X 3.00 m

Duration: Three years

Year of start: Rabi -2012-13

Observations to be recorded

- Tiller No. / m row length
- Plant height (cm)
- Leaf: Stem ratio
- Green and dry fodder yields (qha⁻¹)
- Grain/seed and straw yields (qha⁻¹)
- CP content (%) and crude protein yield (q/ha)
- Gross and net returns (Rs. ha⁻¹)
- Benefit: Cost ratio.
- EGY (of wheat, barley and oat)
- Quality analysis of grain by biochemists
- Soil fertility status before and after crop season

Locations (13): (1) HZ-Palampur, Srinagar, Almora, (2) NWZ- Ludhiana, Hisar, Bikaner, (3) NEZ- Jorhat and Bhubaneswar, (4) CZ- Jabalpur, Raipur, Rahuri, Anand and Urulikanchan

(Data reporting: Rabi)

(NB: The recommended varieties of the crops for a particular location for the purpose will be used and crops will be grown with recommended package of practices).

Seed availability: Testing centers will make their own arrangement of seed

AST 7 (AST-17): Effect of weed management on forage and seed yield of berseem (*Trifolium alexandrinum* L.)

Objectives

- To assess the effect of weed management treatments on forage and seed yield of berseem
- To study the efficacy of herbicides in controlling weed in berseem

Technical details:

Treatment details (10)

- T₁ – Weedy check (Control)
- T₂ – Pendimethalin @ 0.3 kg a.i.ha⁻¹
- T₃ – Pendimethalin @ 0.4 kg a.i.ha⁻¹
- T₄ – Pendimethalin @ 0.5 kg a.i.ha⁻¹
- T₅ – Oxyflourfen @ 0.100 kg a.i.ha⁻¹
- T₆ – Imazethapyr @ 0.100 kg a.i. ha⁻¹ (Immediate after harvest of Ist and IInd cut)
- T₇ – Oxyflourfen @ 0.100 kg a.i.ha⁻¹ + Imazethapyr @ 0.100 kg a.i.ha⁻¹ (Immediate after harvest of Ist cut).
- T₈ – Pendimethalin @ 0.300 kg a.i.ha⁻¹ + Imazethapyr @ 0.100 kg a.i.ha⁻¹ (Immediate after harvest of Ist cut).
- T₉ – Pendimethalin @ 0.400 kg a.i.ha⁻¹ + Imazethapyr @ 0.100 kg a.i.ha⁻¹ (Immediate after harvest of Ist cut).
- T₁₀ – Pendimethalin @ 0.500 kg a.i.ha⁻¹ + Imazethapyr @ 0.100 kg a.i.ha⁻¹ (Immediate after harvest of Ist cut).

Design: RBD

Plot size: Gross: 4.00 x 3.00 m²,

Crop & Variety: Berseem (Wardan)

Year of start: Rabi 2012-13

Replications: Three

Net plot: 3.40 x 2.40 m²

Seed rate: 30 kg/ha

Duration: 3 years

Observations to be recorded:

A) Weed studies :

Species wise weed count /m²
Weed control efficiency (%)

Weed dry matter /m²
Weed Index

B) Crop studies

Plant population/ m row length
Leaf: Stem ratio
Seed and straw yield (qha⁻¹)

Plant height (cm) at harvest.
Green and dry fodder yields (qha⁻¹)
CP content (%) and CP yield (qha⁻¹)

C) Economics:

- Gross and Net monetary returns (Rs. ha⁻¹) Benefit: Cost ratio.

D) Soil studies:

- Soil fertility status (OC, NPK and microbial population) before and after crop season

Locations (7): CZ: Rahuri, Jabalpur, Raipur, Urulikanchan; **NEZ:** Ranchi; **NWZ:** Ludhiana, Pantnagar

(NB: Crop will be left for seed production after two-three forage cut)

B- ONGOING LOCATION SPECIFIC TRIALS

AST 8 (AST-6): OPTIMIZATION OF NITROGEN FOR MAIZE IN DIFFERENT FORAGE BASED CROPPING SYSTEMS

Year of start: Rabi 2011-12

Duration: Three years

Design: Split plot

Replications: Three

Plot size: 5m x 4m

Treatments : 4x4=16

(a) Cropping System (4)

- | | |
|----------------------------|-------------------------------|
| 1. Oat – Maize – Cowpea | 2. Oat – Maize – Rice bean |
| 3. Barley – Maize – Cowpea | 4. Barley – Maize – Rice bean |

(b) Nitrogen Levels (4)

- | | |
|----------------------------------|----------------------------------|
| 1. 50% of Recommended dose of N | 2. 75% of recommended dose of N |
| 3. 100% of Recommended dose of N | 4. 125% of recommended dose of N |

Note: N level treatments will be applied to maize. Other crops of the sequence will be grown with recommended NPK doses and other packages.

Observations to be recorded

A. Crop Growth

- | | |
|---------------------------------|--|
| Plant Population/m ² | Growth parameters (Plant height and leaf stem ratio) |
| Green fodder and dry matter | Forage equivalent and crude protein yield (q/ha) |

B. Economics (Rs./ha/year)

- | | |
|----------------------|------------------------|
| Cost of cultivation | Gross monetary returns |
| Net monetary returns | Benefit: Cost ratio |

C. Nutrient Studies

- | | |
|---|-------------------------|
| Nitrogen uptake by each crop and entire system | Nitrogen use efficiency |
| Soil fertility status before and after completion of sequence | |

(Data reporting: Kharif)

Location: Shillong

AST- 9 (AST 7): EFFECT OF SOIL AMENDMENTS ON PRODUCTIVITY OF RICE-BERSEEM AND CHANGES IN SOIL PROPERTIES OF SODIC SOIL

Year of start : Kharif 2009

Duration : Five years

Plot size : 4m x 3m

Design : RBD

Replication : 3

Treatments: GR = Gypsum Requirement

- | | |
|----------------------------------|--|
| • T1 = RDF (Control) | • T6 = RDF + Press mud @ 50 % GR |
| • T2 = RDF + FYM 10 t/ha | • T7 = RDF + Gypsum @ 75 % GR + FYM 10 t/ha |
| • T3 = RDF + Gypsum @ 75 % (GR) | • T8 = RDF + Gypsum @ 50 % GR + FYM 10 t/ha |
| • T4 = RDF + Gypsum @ 50 % GR | • T9 = RDF + Pressmud @ 75 % GR + FYM 10 t/ha |
| • T5 = RDF + Press mud @ 75 % GR | • T10 = RDF + Pressmud @ 50 % GR + FYM 10 t/ha |

Note:

- All the soil amendment treatments will be applied to rice only. Hence, berseem crop will be grown with recommended fertilizer dose.
- Calculation of doses of soil amendments will be based on gypsum requirement.

Observations to be recorded:

- Plant /shoot population at harvest (per m²), Plant height at harvest, grain and straw yield and Harvest index (Rice).
- GFY, DMY, Forage equivalent yield, CP % and CPY (Berseem)
- Net monetary return (Rs/ha/yr)
- Uptake of N, P and K (kg/ha) by each crop and entire system
- Initial soil fertility status viz., pH, EC, Exch. Na, OC and available NPK
- Soil fertility status after completion of sequence i.e. pH, EC, OC, available NPK and exchangeable sodium percentage

(Data reporting: Rabi)

Location: Faizabad

AST-10 (AST-8): EFFECT OF SOIL AMENDMENTS ON YIELD OF FODDER SORGHUM IN SALINE ALKALI SOIL

Objectives:

- To know the effects of soil amendments on fodder yield
- Enhancing productivity, Water and land use efficiency
- To work out economics

Technical details:

Treatments: Eight

Design: RCBD

Replication: Three

Duration: Three years

Year of start: Rabi 2010-11

Treatment details:

1. Rec. NPK alone through inorganics
2. Rec. NPK + FYM 10t ha⁻¹
3. Rec. NPK + Press mud 10 t ha⁻¹
4. Rec. NPK + Vermi compost 5t ha⁻¹
5. Rec. NPK + FYM 10t ha⁻¹ + Elemental sulphur 25 kg ha⁻¹
6. Rec. NPK + FYM 10t ha⁻¹ + Gypsum 100 %GR
7. Rec. NPK + FYM 10t ha⁻¹ + ZnSO₄ 20 kg ha⁻¹
8. Rec. NPK + FYM 10t ha⁻¹ + ZnSO₄ 20 kg ha⁻¹ + Gypsum 100% GR

Observation to be recorded

- Plant height
- Number of tillers
- Leaf:stem ratio
- Green fodder yield
- Dry matter yield
- Crude protein content (%) and yield (q/ha)
- Economics (Gross Returns, Net Returns (Rs/ha) and BC Ratio)
- Soil pH, OC%. And NPK status before and after experimentation

Location: Mandya

(Data reporting: Rabi)

AST-11 (AST 9): PRODUCTION POTENTIAL OF FORAGE CROPS IN RICE FALLOWS UNDER VARIED NITROGEN LEVELS

Objectives:

- To identify suitable crops in rice fallow
- To identify optimum dose of nitrogen for sustained yield

Technical Details:

Design : Split Plot

Replication : 4

Treatments : 9

Plot size : 3.0 m x 3.6 m

Treatments Details:

A. Main plot (Crops- 3)

C1- Sorghum+ cowpea (3: 1)

C2- Maize + Cowpea (3:1)

C3- Pearl millet + Cowpea (3:1)

B. Sub plot (Nitrogen levels – 3)

N1: 50% RDN

N2: 75% RDN

N3: 100% RDN

- FYM 10 ton / ha common in all treatment
- P&K as per recommended dose

Observation to be recorded

- Plant height
- Leaf:stem ratio
- Green fodder yield
- Dry matter yield
- Economics (Gross Returns, Net Returns and BC Ratio)
- Crude protein yield
- Soil pH, OC%. and NPK status before and after experimentation

(Data reporting: Rabi)

Location: Mandya

AST-12 (AST-10): BANANA BASED FODDER INTERCROPPING IN THE HOMESTEADS OF KERALA

Objectives

- To evaluate the production potential, quality and economics of fodder crops in banana based production system

Year of Start	:	<i>Kharif</i> 2010	Duration	:	3 years
Design	:	RBD	Replication	:	3
Plot size	:	5.8 m x 5.4 m			
Treatments	:	12			
		T ₁ –Banana+ Guinea grass			T ₂ – Banana + Hybrid Napier
		T ₃ – Banana + Congo signal			T ₄ – Banana + cowpea
		T ₅ – Banana sole (variety-Njalipoovan)			T ₆ – Guinea grass sole
		T ₇ – Hybrid Napier sole			T ₈ – Congo signal sole (<i>B. ruziziensis</i>)
		T ₉ – Cowpea sole (Variety-EC 4216)			

Observations to be recorded:

Banana

- Bunch yield (q/ha)

Fodder Crops

- Plant height at harvest (cm), plant population ,Leaf stem ratio
- Forage yield and forage equivalent yield(q/ha)
- Crude protein content (%) and Crude protein yield (q/h)
- Crude fibre content (%) and Crude fibre yield (q/ha)
- Economics (Gross Returns, Net Returns and BC Ratio)

Nutrient studies

- NPK uptake by each crop and entire system
- Nutrient use efficiency of NPK by each crop and entire system
- Soil fertility status before and after completion of the sequence i.e., pH, OC (%)
- EC, available NPK before and after completion of experiment

Note: Data will be reported in Rabi

Location: Vellayani

AST-13 (AST 18): EFFECT OF SOURCES OF NITROGEN ON OAT AND RESIDUAL EFFECT ON SUCCEEDING CROPS

Objectives

- To find out the most feasible cropping sequence with respect to quality fodder production.
- To find out the best source of nitrogen and
- To work out the relative economics of the cropping sequences.

Technical details:

Design	:	Split Plot Design	Replication	:	Three (3)
Year of start	:	Rabi-2011-12	Duration	:	Three years

Treatment details (10)

Main Plot (Cropping sequences-2)

C1= Oat-Maize-Turnip

C2=Oat- Maize+ Cowpea-Turnip

Sub Plot (Source of Nitrogen-5)

F1= 100% N through Urea

F2= 75% N through urea + 25% N through FYM

F3= 50% N through urea + 50% N through FYM

F4= 75% N through urea + 25% N through sheep manure

F5= 50% N through urea + 50% N through sheep manure

Observations to be recorded:

- Plant height and Leaf stem ratio at 50% flowering
- Green fodder yield and Dry fodder yield (q/ha) at 50% flowering
- CP content and CP yield
- Cost of cultivation
- Gross monetary return
- Net monetary return
- Benefit-cost ratio
- N content and uptake by each crop and entire system
- Soil fertility status before and after completion of sequence

Note: N sources will be applied to Oats. Other crops of the sequence will be grown with recommended package (instead of 100 % RDF, 75 % RDF will be applied to succeeding crops)

Location: SKAUST, Srinagar.

AST-14 (AST-19): PERFORMANCE OF BAJRA NAPIER HYBRID GRASS AS INFLUENCED BY MICRONUTRIENTS UNDER IRRIGATED CONDITIONS

Objectives:

- To study the effect of conjoint application of organic manure, inorganic fertilizers and micronutrients on forage yield, economics of production and soil properties.

Technical detail:**Treatments details: (9)**

T₁- NPK alone

T₂ - NPK + FeSO₄ @50 kg/ha

T₃ - NPK + FeSO₄ @100 kg/ha

T₄ - NPK + ZnSO₄ @25 kg/ha

T₅ - NPK + ZnSO₄ @50 kg/ha

T₆ - NPK + FeSO₄ @50 kg/ha + ZnSO₄ @25 kg/ha

T₇ - NPK + FeSO₄ @100 kg/ha + ZnSO₄ @25 kg/ha

T₈ - NPK + FeSO₄ @50 kg/ha + ZnSO₄ @ 50kg/ha

T₉- NPK + FeSO₄ @ 100kg/ha + ZnSO₄ @ 50 kg/ha

Design : RBD **Replications** : Three

Year of start : Kharif 2012 **Duration** : 3 Years

NB:- 1. N – Basal and split as per recommendation

2. P&K -Basal

3. Micronutrients- Basal and split application

4. FYM @ 25 t/ha as basal in the first year only.

Observations to be recorded

- Plant population at harvest (Per m²)
 - Leaf stem ratio at harvest
 - CP content (%) and CP yield (q/ha)
 - Benefit cost ratio
 - Soil fertility status before and after completion of field trial i.e., pH, OC, EC, available NPK and Fe and Zn.
- Plant height at harvest
Green fodder and dry matter yields (q/ha)
Gross and net return (Rs./ha)

(NOTE: During kharif 2012, micronutrient analysis of soil will be done. The experiment will be conducted under Zn and Fe deficit soils)

(Data reporting: Rabi)

Location: Coimbatore

AST-15 (AST 20): EFFECT OF SOWING TIME AND ZN & THIOUREA APPLICATION ON SEED YIELD OF DUAL PURPOSE OAT

- Objectives:** (i) to find out the effect of sowing time on seed yield of oats.
(ii) to observe suitable Zinc fertilizer dose and thiourea application schedule for higher productivity and WUE of oat.

Technical details:

Year of start : Rabi 2012-13 **Design** : Split plot design
Replication : 3 **Plot size** : 4m X 3m
Duration : Three seasons

Treatment details

(a) Main plot (sowing time)

1. 1st November (timely sown)
2. 15th November
3. 30th November

(b) Sub plot (Zn & TU application)

1. Control (no Zn & no TU)
2. 25 kg ZnSO₄ / ha soil application at sowing
1. 12.5 kg ZnSO₄ / ha soil application at sowing followed by 0.5% ZnSO₄ sprays
2. 12.5 kg ZnSO₄ / ha soil application at sowing followed by 0.5% ZnSO₄+ 0.05% TU sprays
3. 12.5 kg ZnSO₄ / ha soil application at sowing followed by 0.05% TU sprays

Observations to be recorded:

- Tillers/meter row length
- Growth attributes viz., plant height and I:S ratio , GFY, DFY, Protein content (%), 1000-seed weight, seed yield and straw yield
- Economics (net returns and benefit cost ratio)
- Zn concentration in dry matter and seed

Location: Bikaner

C: AVT – 2 BASED AGRONOMY TRIALS

AST -16 (AST 11): EFFECT OF N LEVELS ON PROMISING ENTRIES OF TALL FESCUE GRASS

Year : Rabi 2011-12 **Duration** : Two years
Design : RBD **Replications** : 4
Plot Size : 3m x 3m

Treatments: 16

(A) Entries (4) = 2+2 - (HIMA-14, HIMA-15, HIMA-1(ZC) and HIMA-4(ZC))

(B) N-levels: 4 = (0, 40, 80 and 120 kg N/ha) in three splits i.e. half as basal, ¼th at first cut and ¼th at second cut

Observations to be recorded

- Plant population/ shoot number /m²
- Growth parameters (Plant height and Leaf : stem ratio)
- Green fodder, dry matter and crude protein yield (q/ha)

Seedling requirements= 1200 seedling per entry per location (Source-Palampur)

(Data reporting: Rabi)

Location: Palampur and Bajaura

AST 17: EFFECT OF NITROGEN LEVELS ON FORAGE YIELD OF PROMISING ENTRIES OF OAT (AVT- 2 SC)

Year : Rabi 2012-13 **Design** : Split plot
Replications : Three **Plot size** : 4 m x 3 m
Seed rate : 100 g/plot (80 kg/ha) **Spacing** : R X R-25 cm
Treatments : **Combinations: 12x 3=36**

Treatment details:

Main plot:

(A) Entries : 12 (9+2(NC)+ 1 (ZC):
Entries (9) : SKO-170, SKO-188, JO-03-97, JO-03-99, OS-377, UPO-10-1, UPO-10-2, JHO-10-1, JHO-10-2

National checks (2): Kent, OS-6

Zonal checks (1): Palampur-1 (HZ), OL-125 (NWZ), JHO-99-2 (NEZ), JHO-822 (CZ), JHO-2000-4 (SZ)

Sub-plot:

(B) N- levels: 3 (40, 80, and 120 kg N /ha) (Split application of nitrogen)

Observations to be recorded:

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

Seed distribution: Project Coordinating Unit, AICRP-FC, Jhansi

Locations (11): HZ-Palampur, Srinagar; NWZ-Hisar, Pantnagar; NEZ-Jorhat , Ranchi, Kalyani
CZ- Jhansi, Jabalpur; SZ- Mandya, Coimbatore

Seed requirement: Testing entry/national check : 12.00 kg
Zonal check : 4.00 kg

D: NEW RESEARCH TRIALS

AST-18 (NT): EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD AND QUALITY OF OAT (Exploratory)

Objectives: To assess the effect of INM on yield and quality of oat

Design: RBD **Plot Size:** 4 mx3 m
Spacing: 25cm (R-R) **Variety:** JHO 822/851

Treatments

T1- RDF T2- N @ 60kg/ha + 5t FYM/ha
T3- N @ 60kg/ha + 7.5t FYM/ha T4- N @ 60kg/ha + 10t FYM/ha
T5- N @ 100kg/ha + 5t FYM/ha T6- N @ 100kg/ha + 7.5t FYM/ha
T7- N @ 100kg/ha + 10t FYM/ha T8- N @ 120kg/ha + 5t FYM/ha
T9- N @ 120kg/ha + 7.5t FYM/ha T10- N @ 1200kg/ha + 10t FYM/ha

Observation to be recorded:

- Soil studies initial, after each season and final
- Plant height (cm) L: S ratio
- Plant population/m row length GFY, DMY (q/ha)
- CP% & CPY (q/ha) Economics

(Data will be reported in Rabi)

Location (2): Imphal & Kalyani

GENERAL SUGGESTIONS

- The technical programme must not be changed without prior approval of the Project Coordinator (FC). The data are to be recorded as per technical programme and reported to the Project Coordinator (FC) accordingly well in time scheduled. A soft copy of the data (in CD) and also through E-mail must be provided to the Project Coordinator (FC) in MS WORD and MS EXCEL. In case of location – specific trials, the text of the trial should also be supplied by the Centre concerned.
- Data must be analyzed factor-wise statistically (with two-way tables) having Sem±, CD at 5% and CV %. In case of interaction, two-way tables must be reported.
- Following (statistically analyzed) data with yield data must be reported for comparisons and making valid conclusions.
- Net monetary return (Rs./ha/yr) of the complete sequence (Crop sequences trial).
- Component-wise and total green fodder and dry matter yield (q/ha), net monetary return (Rs./ha/yr) and Land Equivalent Ratio (LER) (Intercropping trial)
- Component-wise and total crude protein yield (q/ha) as well as crude protein (%)
- Initial and final fertility status of the soil, i.e., after completion of trial which should essentially include pH, EC, OC (%), available N, P & K (Crop sequences and fertility trials).
- In trials on problematic soils, initial and final fertility status of the soil, i.e., after completion of trial and uptake of NPK by the crop(s) in each season is to be provided.
- In multi-cut crop(s)/variety(s), data on growth and quality parameters (i.e., plant population / m row length, L:S ratio, No. of tillers / m row length, No. of branches/plant and crude protein content (%) are to be recorded as per schedule given below :
- In Cereals and grasses, growth observations, in general, are to be recorded for first and last harvest. However, in cutting management trials or in trials with split application of N, the observations are to be taken for each cut.
- Data on dry matter estimation and crude protein analysis are to be recorded for each cut
- Centres / Locations are advised to send complete information on soil characteristics, variety (ies), agronomic recommendations, No. of cuts, etc., for the experiments in the prescribed format.
- In case of net monetary return, current market price (Rs./q) must be indicated.
- Centres /Locations are advised to provide trials at a glance in one sheet mentioning trials allotted, trials conducted, data reported (character-wise-analyzed) and trials not conducted (with valid reasons) while supplying data to the Project Coordinator (FC). The format is attached herewith.
- **Meteorological data of Rabi 2012-13 from 40th SMW to 21st SMW will be needed for inclusion.**
- **The data of Rabi season should be send to PC Unit before 20th June.**

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

**AICRP ON FORAGE CROPS
AGRONOMY TRIALS AT A GLANCE
Year: Rabi 2012-13 Centre/Location:**

Trials Allocated (No. & Name)	Trials conducted No. & Name	Trials not conducted/failed, also give reason for not conducting the trial/failure (No. & name)

**AICRP ON FORAGE CROPS
TECHNICAL PROGRAMME: FORAGE CROP PROTECTION TRIALS
RABI 2012-13**

**PPT. 1: MONITORING OF PATHOGEN AND INSECT-PEST ASSOCIATED WITH
BERSEEM, LUCERNE AND OAT ECOSYSTEM**

Locations: Anand, Hisar, Jhansi, Hyderabad, Ludhiana, Bhubneswar, Rahuri, Dharwad and Palampur

Observation to be recorded:

- Occurrence and severity of pathogens, insect pests at 15 days interval.

**PPT-2.A: FIELD SCREENING OF RABI BREEDING TRIALS FOR RESISTANCE
TO DISEASES AND INSECT-PESTS**

Location: Anand, Hisar, Jhansi, Bhubneswar, Rahuri, Hyderabad, Palampur, Dharwad, Ludhiana

**PPT-2.B: EVALUATION OF BERSEEM ENTRIES FOR RESISTANCE TO ROOT
AND STEM ROT DISEASE UNDER SICK PLOT**

Location: Hisar, Jhansi and Palampur

PPT-12: DISEASE MANAGEMENT IN WHITE CLOVER

Location: Palampur

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

Treatments:

- T₁ = Seed treatment with carbendazim @ 2 g/kg seed
- T₂ = Seed treatment with *Trichoderma viride* @ 5g/kg
- T₃ = T₁ + Foliar spray of carbendazim @ 0.1 %
- T₄ = T₂ + Foliar spray of carbendazim @ 0.1 %
- T₅ = T₁ + Foliar spray of hexaconazole @ 0.05 %
- T₆ = T₂ + Foliar spray of hexaconazole @ 0.05 %
- T₇ = T₁ + Foliar spray of carbendazim @ 0.1 % + Foliar spray of hexaconazole @ 0.05 %
- T₈ = T₂ + Foliar spray of carbendazim @ 0.1 % + Foliar spray of hexaconazole @ 0.05 %
- T₉ = T₁ + T₂ + Foliar spray of carbendazim @ 0.1 % + Foliar spray of hexaconazole @ 0.05 %
- T₁₀ = Control

Observations:

1. Disease severity of powdery mildew
2. Disease incidence of clover rot
3. Seed yield (q/ha)

PPT 17: TO STUDY THE PATHOGENIC VARIABILITY

A. *Erysiphe graminis* f. sp. *avenae* on oat

Location: Palampur

1st year:

- i) Collection of fungus oat powdery mildew isolates
- ii) Evaluation of oat germplasm for resistance.

2nd year: Standardization of differentials for variability

3rd year: Characterization of pathogenic virulence.

4th year: Characterization of pathogenic virulence.

B. *Helminthosporium avenae* on oat

Location: Palampur, Ludhiana, Bhubneshwar and Jhansi

1st year: Collection and isolation of *Helminthosporium avenae* from different locations

2nd year: Pathogenicity, re-isolation and characterization of *Helminthosporium* cultures

3rd year: Collection and maintenance of germplasm

4th year: Evaluation of germplasm against different isolates of *Helminthosporium* and resistant/tolerant entries will be identified and used in breeding programme

* The oat leaf blight samples will be supplied by centres

PPT 18: EVALUATION OF ENTAMOPATHOGENIC FUNGI ON INSECT PESTS OF LUCERNE

Design: RBD

Replication: 3

Plot size: 3 x 4 m²⁺

Location: Rahuri, Hyderabad, Jhansi and Dharwad

Treatments

- T1: Foliar application of *Verticillium lecanii* @ 4x10⁶ cfu/ml (2g/l)
- T2: Foliar application of *B. bassiana* @ 4x10⁶ cfu/ml (2g/l)
- T3: Foliar application of *Metarrhium anisopliae* 4x10⁶ cfu/ml (2g/l)
- T4: Foliar application of *N. releyi* 4x10⁶ cfu/ml (2g/l)
- T5: T1 + T2 (half dose of each)
- T6: T1 + T3 (half dose of each)
- T7: T1 + T4 (half dose of each)
- T8: T2 + T3 (half dose of each)
- T9: T2 + T4 (half dose of each)
- T10: T3 + T4 (half dose of each)
- T11: Untreated control

Observations:

- Pre count and post treatment count of insect pests, natural enemies, pollinators at 7 DAS
- GFY and DMY (q/ha)
- Seed yield (q/ha)

List of Participants	
ALL INDIA COORDINATED RESEARCH PROJECT ON FORAGE CROPS	
(Indian Council of Agricultural Research)	
NATIONAL GROUP MEET – RABI-2012-13	
Date : September 14-15, 2012	Venue : IGFRI,
Jhansi	
S. N.	Name and affiliation
Indian Council of Agricultural Research, Krishi Bhavan, New Delhi-110 001	
1.	Dr. R.P. Dua, ADG (FFC)
AICRP on Forage Crops, Project Coordinating Unit, IGFRI, Jhansi	
2.	Dr. A K Roy, Project Coordinating, (Forage Crops)
3.	Dr. R.V. Kumar, PS & PI (Plant Breeding)
4.	Dr. S.R. Kantwa, Sr. Sci. (Agronomy)
5.	Dr. A K Mall, Sr. Sci. (Plant Breeding)
6.	Dr. Ritu Mawar, Sr. Sci. (Plant Pathology)
7.	Mr. O.N. Arya, Sr. Tech. Officer
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12.	Dr. R.B. Bhaskar, CI Division
13.	Dr. Vijay Yadav, CI Division
14.	Dr. M.K. Srivastava, CI Division
15.	Dr. A. Radhakrishna, CI Division
16.	Dr. K.K. Dwivedi, CI Division
17.	Dr. Tejveer Singh, CI Division
18.	Dr. Kumar Durgesh, CI Division
19.	Dr. S. Ahmed, CI Division
20.	Dr. N.K. Shah, CI Division
21.	Dr. A.K. Singh, CI Division
22.	Dr. Geetanjali Sahay, CI Division
23.	Dr. Rameshwar Prasad Sah, CI Division
24.	Dr. S.K Tiwari, Head, CP Division
25.	Dr A. K. Dixit, CP Division
26.	Dr. Rajeev Agrawal, CP Division
27.	Dr. D.R. Malaviya, Head, ST Division
28.	Dr. D. Vijay, ST Division
29.	Dr. Vikash Kumar, ST Division
30.	Dr. C.K. Gupta, ST Division
31.	Dr. D. Bahukhandi, ST Division
32.	Mr. N Manjunatha, ST Division
33.	Dr. N. Das, Head, PAR Division
34.	Dr. S.K. Mahanta, PAR Division
35.	Dr. K.K. Singh, PAR Division
36.	Dr. P. Sharma, SS Division
37.	Dr. Archana Singh, GSM Division

38.	Dr. Dibyendu Deb, GSM Division
39.	Dr. H.V. Singh, GSM Division
40.	Dr. P.K. Pathak, AE Division
41.	Dr. C S Sahay, AE Division
42.	Dr Vinod Wasnik, ST Division
43.	Dr T Kumar, CP Division
	IGFRI -Regional Stations
44.	Dr. B. G Shiv Kumar, RRS Dharwad
45.	Dr. N.S. Kulkarni, Dharwad
46.	Dr. S. Karthigeyan, SRRS, Dharwad
47.	Dr. S S Meena, RRS Avikanagar
48.	Dr. S L Meena, RRS Avikanagar
	Ministry of Agriculture, Krishi Bhavan, New Delhi
49.	Dr. Harbans Singh, Dy. Commissioner, DAC
	AICRP ON FORAGE CROPS CENTRES
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Other participating institutes/organizations	
95.	Dr. S K Gupta, DGM, NSC, Pusa, New Delhi
96.	Dr. Anil Kumar Garg, DGM, NDDB, Anand
97.	Mr Shashikant Kulkarni , Marketing Manager, Advanta India Ltd., Hyderabad
98.	AK Upadhaya, Agronomist, ITC, Bangalore

रबी पर अ.भा. ग्रुप मीट प्रारंभ

झांसी। भारतीय चरागाह एवं चारा अनुसंधान में अखिल भारतीय समन्वित चारा अनुसंधान परियोजना की अखिल भारतीय ग्रुप मीट रबी 2012-13 डा. आर पी दुआ, सहायक महानिदेशक एफएफसी, भाकूअनु परिषद नई दिल्ली के मुख्यअतिथि एवं डा. पी के घोष निदेशक, ग्रासलैण्ड की अध्यक्षता, डा.एसए फारुकी पूर्व परियोजना समन्वयक एवं निदेशक एवं डा. एके राय की उपस्थिति में शुभारंभ हुआ। अतिथियों द्वारा कार्यक्रम के प्रारंभ में दीप प्रज्वलन किया गया। डा. एके राय ने स्वागत भाषण देते हुए परियोजना रिपोर्ट प्रस्तुत की।

मुख्य अतिथि डा. आरपी दुआ ने अपने उद्बोधन में विकसित नई प्रजातियों को पशुपालन सहकारिता से समन्वय बनाकर तथा बहुकटान वाली किस्मों के विकास, शुष्क तथा अनुपयोगी भूमियों के अनुरूप कार्यक्रम



बनाने, बीज उत्पादन पर विशेष ध्यान केंद्रित करने के संबंध में बताया। डा. एसए फारुकी ने चारा फसलों की मांग एवं उपयोगिता को ध्यान में रखते हुए कार्य करने को कहा। संस्थान निदेशक डा. पी के घोष ने देश की पशुधन संस्था के अनुरूप चारे की उपलब्धता में कमी को बताते हुए गुणवत्तायुक्त चारे-दाने के विकास की उपयोगिता व महत्व बताया। इसके उपरांत अतिथियों द्वारा फैजाबाद कु बुलेटिनो दुधारू पशुओं हेतु बरसीम की उन्नत समसविधियां एवं पौष्टिक

चारा हेतु जई उगाइये तथा आनंद गुजरात के प्रोडक्शन टेक्नोलॉजी ऑफ मार्बल ग्रास का विमोचन किया गया।

कार्यक्रम का संचालन एवं आभार डा. आर वी कुमार ने किया। इसके उपरांत आयोजित तकनीकी सत्र प्रथम-विषयवार प्रगति आख्या, द्वितीय-विभिन्न केंद्रों की अनुसंधान कार्य समीक्षा, तृतीय-जंगली रबी के लिए अनुसंधान कार्यक्रम, चारा प्रजनन, चारा उत्पादन एवं पौध संरक्षण आयोजित किये गये।

राष्ट्रबोध 15 सितंबर 2012

बीज उत्पादन की गुणवत्ता जरूरी : डा.दुआ

अखिल भारतीय ग्रुप मीट रबी का ग्रासलैण्ड में शुभारंभ
टेक्नोलॉजी ऑफ मार्बल ग्रास पुस्तिका का विमोचन

नगर संवाददाता/झांसी

भारतीय चरागाह एवं चारा अनुसंधान संस्थान में अखिल भारतीय समन्वित चारा अनुसंधान परियोजना की अखिल भारतीय ग्रुप मीट रबी 2012-13 डा.आरपी दुआ, सहायक महानिदेशक एफएफसी, भारतीय कृषि अनुसंधान परिषद नई दिल्ली के मुख्य अतिथि एवं डा.पीके घोष, निदेशक ग्रासलैण्ड की अध्यक्षता में डा.एसए फारुकी, पूर्व परियोजना समन्वयक एवं निदेशक एवं डा.एके राय की उपस्थिति में शुभारंभ हुआ। अतिथियों द्वारा कार्यक्रम के प्रारंभ में दीप प्रज्वलन किया गया। डा.एके राय ने स्वागत भाषण देते हुए परियोजना रिपोर्ट प्रस्तुत की। मुख्य अतिथि डा.आरपी दुआ ने



अपने उद्बोधन में विकसित नई प्रजातियों को पशुपालन सहकारिता में समन्वय बनाकर तथा वह कटान वाली किस्मों के विकास, शुष्क तथा अनुपयोगी भूमियों के अनुरूप कार्यक्रम बनाने, बीज उत्पादन पर विशेष

ध्यान केन्द्रित करने के संबंध में बताया। डा.एसए फारुकी ने चारा फसलों की मांग एवं उपयोगिता को ध्यान में रखते हुए कार्य करने को कहा। संस्थान के निदेशक डा.पीके घोष ने देश की पशुधन संख्या के अनुरूप चारे की

उपलब्धता में कमी को बताते हुए गुणवत्तायुक्त चारे-दाने के विकास की उपयोगिता एवं महत्व बताया। इसके उपरांत अतिथियों द्वारा फैजाबाद के बुलेटिनो, दुधारू पशुओं हेतु बरसीम की उन्नत सस्यविधिया एवं पौष्टिक चाय हेतु जई उगाइये तथा आनंद गुजरात के प्रोडक्शन टेक्नोलॉजी ऑफ मार्बल ग्रास का विमोचन किया गया। कार्यक्रम का संचालन एवं आभार डा.आरवी कुमार ने किया।

इसके उपरांत आयोजित तकनीकी सत्र प्रथम में विषयवार प्रगति आख्या, द्वितीय क्षेत्र के विभिन्न केंद्रों की अनुसंधान कार्य समीक्षा, तृतीय जंगली रबी के लिए अनुसंधान कार्यक्रम, चारा प्रजनन, चारा उत्पादन एवं पौध संरक्षण आयोजित किये गये।



झाँसी : ग्रुप मीट रबी 2012-13 को सम्बोधित करते अतिथि।

ग्रास लैण्ड में ग्रुप मीट रबी शुरू

झाँसी : भारतीय चरागाह एवं चारा अनुसंधान संस्थान परियोजना की अखिल भारतीय ग्रुप मीट रबी-2012-13 का उद्घाटन मुख्य अतिथि एफएफसी भारतीय कृषि अनुसंधान परिषद, नई दिल्ली डॉ. आरपी दुआ ने करते हुये कहा कि विकसित नई प्रजातियों के मामले में पशुपालन व सहकारिता में समन्वय बनाकर कार्य करें। उन्होंने कहा कि बीज उत्पादन पर विशेष ध्यान दें। प्रारम्भ में

डॉ. एके राय ने परियोजना की रिपोर्ट प्रस्तुत की। डॉ. एसके फारुख ने चारा फसलों की मांग एवं उपयोगिता को ध्यान में रखते हुए कार्य करने को कहा। संस्थान के निदेशक डॉ. पीके घोष ने देश की पशुधन संख्या के अनुरूप चारे की उपलब्धता में कमी को बताते हुए गुणवत्तायुक्त चारे-दाने के विकास की उपयोगिता एवं महत्व बताया। उन्होंने कहा कि पशुओं हेतु बरसीम की उन्नत विधियाँ एवं पौष्टिक चारा हेतु जई उगायें। इस अवसर पर आनन्द गुजरात के प्रॉडक्शन टेक्नॉलॉजि ऑफ मारबल ग्रास का विमोचन किया गया। संचालन डॉ. आरबी कुमार ने किया।

बीज उत्पादन पर

ध्यान देने की जरूरत

झाँसी। अखिल भारतीय समन्वित चारा अनुसंधान परियोजना की अखिल भारतीय ग्रुप मीट रबी - 2012 में बीज उत्पादन पर ध्यान देने की जरूरत पर बल दिया गया।

भारतीय चरागाह एवं चारा अनुसंधान संस्थान में आयोजित कार्यक्रम के मुख्य अतिथि सहायक महानिदेशक एफएफसी डा. आर पी दुआ ने नई प्रजातियों को पशुपालन व सहकारिता के समन्वय से विकसित करने, बहुकटान वाली फसलों के विकास, शुष्क व अनुपयोगी भूमियों के अनुरूप कार्यक्रम बनाने तथा बीज उत्पादन पर विशेष ध्यान देने पर बल दिया। परियोजना निदेशक डा. ए एस फारुखी ने चारा फसलों की मांग व उपयोगिता को ध्यान में रखकर कार्य करने को कहा। अध्यक्षता करते हुए ग्रासलैंड के निदेशक डा. पी के घोष ने गुणवत्तायुक्त चारा व दाना के विकास का महत्व बताया।

ग्रासलैंड में अखिल भारतीय ग्रुप मीट रबी प्रारम्भ

झाँसी (एसएनबी)। भारतीय चरागाह एवं चारा अनुसंधान संस्थान में अखिल भारतीय समन्वित चारा अनुसंधान परियोजना की अखिल भारतीय मीट रबी 2012-13 डा. आर पी दुआ सहायक महानिदेशक एफ एफ सी था. कु. अनु. परिषद, नई दिल्ली के मुख्य अतिथियों एवं डॉ. पीके घोष निदेशक ग्रासलैंड की अध्यक्षता, डा. एस ए फारुखी पूर्व परियोजना समन्वयक एवं निदेशक की उपस्थिति में शुभारम्भ किया गया। अतिथियों द्वारा दीप प्रज्वलन कर कार्यक्रम के शुभारम्भ उपरांत डा. ए के राय ने परियोजना रिपोर्ट प्रस्तुत की। मुख्य अतिथि आर पी दुआ ने विकसित नई प्रजातियों को पशुपालन, सहकारिता से समन्वय बनाकर तथा बहुकटान वाली किस्मों के विकास, शुष्क तथा अनुपयोगी भूमियों के अनुरूप कार्यक्रम बनाने एवं बीज उत्पादन पर विशेष ध्यान केन्द्रित करने पर बल दिया। डा. एस के फारुखी ने चारा फसलों की मांग एवं उपयोगिता अनुसार कार्य करने को कहा। निदेशक डा. घोष ने देश की पशुधन संख्या के अनुरूप चारे की उपलब्धता में कमी बताते हुये गुणवत्ता युक्त चारे-दाने के विकास की उपयोगिता एवं महत्व के सम्बंध में जानकारी दी। कार्यक्रम का संचालन डा. आर वी कुमार ने किया इसके उपरांत आयोजित तकनीकी सत्र प्रथम में विषय वार प्रगति आख्या, द्वितीय सत्र में विभिन्न केन्द्रों की अनुसंधान कार्य समीक्षा एवं तृतीय सत्र में जंगली रबी के लिये अनुसंधान कार्यक्रम चारा प्रजनन, चारा उत्पादन एवं पौधसंरक्षण का आयोजन किया गया।

अखिल भारतीय ग्रुप मीट रबी शुरू

झाँसी। भारतीय चरागाह एवं चारा अनुसंधान संस्थान में अखिल भारतीय ग्रुप मीट रबी का शुभारम्भ किया गया। अखिल भारतीय समन्वित चारा अनुसंधान परियोजना के अन्तर्गत आयोजित इस मीट के मुख्य अतिथि डा. आर पी दुबे ने विकसित नई प्रजातियों को पशुपालन-सहकारिता से समन्वय बनाकर कई किस्मों के विकास आदि के बारे में बताया। उन्होंने शुष्क तथा अनुपयोगी भूमियों के अनुरूप कार्यक्रम बनाने बीज उत्पादन पर विशेष ध्यान केन्द्रित करने के संबंध में भी जानकारी दी। इस मौके पर डा. ए के राय, डा. पी के घोष, डा. आर बी कुमार आदि उपस्थित रहे।

