The 19th meeting of Research Advisory Committee (RAC) of IGFRI was held during May 12-14, 2012 at IGFRI, Jhansi. Dr. Y S Ramakrishna, Chairman, RAC and Ex. Director CRIDA & Dr. EAH Roberts Chair on NRM Tea Research Association, Tockal Experimental Station, Jorhat, presided over the meeting. Other RAC members Dr. K S Ramachandra, Advisor, National Rainfed Area Authority, Govt. of India; Dr. S N Shukla, Ex ADG (FFC) ICAR; Dr. P S Pathak, Ex Director IGFRI & Ex ADG, ICAR; Prof. I D Tyagi, Ex Prof. & Head, Plant Breeding, CS Azad University of Agriculture & Technology, Kanpur (UP) and Prof. S R Agrawal, Ex Pro Vice Chancellor Bundelkhand University, Jhansi; Dr. S A Faruqui, Director IGFRI; Dr. Sunil Kumar, Head Crop Production Division, IGFRI and Member Secretary RAC, along with Head of Divisions of IGFRI participated in the meeting.

Dr. S A Faruqui, Director IGFRI presented the major activities and achievements of the Institute during the past five years and highlighted the important ones. Head of divisions presented the salient achievements of their respective divisions during 11th five year plan and also those of past one year.

Dr. Y S Ramakrishna, Chairman praised the research outcome of the Institute during 11th plan. Chairman gave valuable suggestions for organizing the research programmes and projects of 12th plan. He stressed upon the need to take up the transfer of technologies evolved by the institute and their up scaling to increase the visibility.

This was followed by the remarks from other RAC members. Members expressed that special efforts may be made in dairy rich areas to promote Institute’s post harvest technology. Members suggested undertaking the need based research programmes by addressing the region specific realistic problems of farmers on participatory mode. Members stressed upon to undertake the programme on improvement and management of degraded rangelands/wastelands and grazing practices management.

The Chairman opined that the efforts of IGFRI would enable forage availability across the nation and empower livestock farmers to achieve higher level of efficiency and prosperity. On the following day, RAC also visited experimental area and dairy unit at central research farm of the Institute.
Availability of quality forage seeds: Beginning of prosperity

Seed is a potential source of technology dissemination and crucial input for agricultural production. The path towards fulfilling the demand of fodder goes through timely supply of quality seeds. Quality seed production of forages in country is achieved through maintaining seed chain from nucleus seed to certified seed which finally goes to farmers' field for fodder production. This involves sincere efforts of breeders, production scientists and certification agencies. At present, more than 250 varieties of various cultivated fodder; and range grasses and legumes are available which can be made accessible to farmers through developing suitable seed chain.

There exists acute shortage of fodder crop seeds including those of range grasses and legumes. As per current demand of quality seeds the availability is only 25-30% in case of cultivated fodder while it is only 15 to 20% in range grasses and legumes. Seed chain exists in some of the important crops like sorghum, pearl millet, berseem, oat, lucerne, maize and cowpea. However, people/agencies including private companies are not coming forward for range grass and legume seed production. Because of larger interest of farmers in harvesting the crop for forage and not leaving for seed, production of forage seeds is affected. Recent example of this practice may be seen in the case of berseem. A large quantity of berseem is imported. However, many Indian cultivars of berseem are available which give better forage yield than the imported Berseem, still farmers are compelled to purchase imported seeds due to non-availability of seed. There is need of participatory seed production in cultivated forages and also to develop entrepreneurship in forage seed marketing.

India with 329 m ha geographical area has 4% area under pastures which are overgrazed. Rejuvenation of these denuded grasslands needs mission mode programmes with people’s participation. A fact remains that quality grass seed availability is a major constraint. Range grasses can be propagated by vegetative means for large scale spread but seed is considered against huge demand (758000 m) the best vehicle. Seed production of range species and their incorporation in grasslands, wastelands, fringes of forestlands should be made compulsory to utilize these alternate forage land resources to their full potential. In tropical grasses, seed production is affected by poor seed setting, extreme climatic condition, seed shattering, non-synchronization in maturity and presence of empty seeds. In order to fulfill the demand, there is research need of improving formation of pure germinating seeds. Additionally for enhancing availability, there is need to develop Micro seed production units. Creation of seed multiplication system for range /cultivated grasses and legumes for sustaining as well as spreading from fringe areas to other rangelands including deep forest zones is required. Volume of grass seed is another issue which needs attention for its reduction to have easy transportation. An initial attempt made at IGFRI in de-fluffing the grass seeds has been found encouraging. Mechanization of seed picking, threshing and processing will also augment the seed production. Perennial crops like NxB hybrid do not set seed, hence, are to be propagated through rooted slips only. This leads to cumbersome transportation of planting material from one place to other. Hence, research is needed to develop seed producing NxB hybrids and also to develop technologies for reducing the volume.

Networking of research on forage seed production and quality, utilization of natural forest and wastelands, involvement of public and private sector in forage seed production, participatory approach for fodder and seed production, farmer awareness programmes, mechanization, storage and developing organised forage and seed market may be viable remedies for successful forage seed production and fodder availability.
High density nursery of Bajra-Napier Hybrid tested

With the increasing requirement of green fodder, demand of perennial cultivated grasses like Bajra-Napier (BN) hybrid and guinea grass has rapidly increased in the past few years. These grasses are being considered as most promising forage crops having wide acceptability among farmers. In the absence of seed setting, rooted slips are the sole method of propagation in BN hybrid. Rooted slips are collected from the grass tufts containing 5-10 cm long stems with 2-3 nodes and basal roots. To meet the demand, a new technique was tested at IGFRI for quick production of rooted slips at large scale with minimum resources. The stems from the BN hybrids were collected and each stem was further chopped into 9-10 bi-nodal stem cuttings of approximately 20 cm length. The stem cuttings were closely planted in upward direction after a slant basal cut. Regular water supply was maintained for their establishment and growth. Within a fortnight, the cuttings started rooting and shooting and by 4 to 5 weeks these were ready for uprooting and transport. Results revealed that the bi-nodal stem cuttings of at least 20 cm length and proper thickness are most promising material for high density nursery. This technique has several advantages like, ability to produce rooted slips in shorter period of time, reduced labour requirement, easy management such as irrigation, uprooting, counting, loading due to small area and finally original tussocks are saved. This technique further needs to be extended for production of planting material in larger area and in different environments of BN hybrid growing areas.

(De-fluff the Deenanath grass seed to reduce volume and enhance germination

The grass seed (caryopsis) is enclosed in fluff thereby giving protection as well as dispersal mechanisms. However, for production in huge quantities this fluff invariably adds woes during transport. Eight kg of Deenanath (Pennisetum pedicellatum) grass seed with fluff occupies 0.1 cubic m volume. The true seed (caryopsis) in this fluff is less than half a kilogram and occupies very less volume due to its small size. The true seed not only increases the ease of transport but also results in easy and accurate establishment in the field. The seeds with fluff being lighter in weight are difficult to broadcast manually and have high chance of being blown off with wind. Each spikelet (fluff) contains 2-3 seeds and it is practically impossible to extract the true seed from it. Developing machine for de-fluffing these seeds has been highlighted since long. Therefore, a new initiative was devised for a feasible approach to remove the true seed from large quantities of fluff in a mechanized way. The commonly used ‘cotton quilt batting machine’ with some adjustments was used for separation of true seed from the fluff of Deenanath grass. By adjusting its components, maximum amount of true seed was obtained without any damage to seeds. This was verified through germination test and counting the normal and abnormal seedlings. Approximately 450g of true seed was obtained from 7 kg of seeds with fluff within an hour’s time. Since Cenchrus, Chrysopogon and other range species also possess similar fluff, this newly developed technique paves the way for experimentation of bulk separation of their true seeds mechanically.

(DR Malaviya, D Vijay, CK Gupta, HC Pandey and LN Singh)
Profile of a Division

SEED TECHNOLOGY DIVISION

The Division of Seed technology was established during fifth five year plan in the year 1972 to take up research activities in forage quality seed production.

Mandate

To conduct research on different aspects of production, standards and storage of forage seeds

Major research areas

- Economically viable quality seed production technologies in fodder crops, range grasses and legumes
- Seed standards and testing protocols in range grasses and legumes
- Eco-friendly safe seed storage technologies
- Quality seed production

Set up & Facilities available

The Division comprised of multi-disciplinary team involving scientists from various disciplines viz., Seed Technology, Plant Breeding, Plant Physiology, Plant Pathology, Agronomy, Agricultural Economics etc. and is supported by technical personnel and other supporting staff.

The Division has all the facilities required to conduct research in the area of seed physiology, seed pathology, seed agronomy etc. Apart from laboratory facilities, the Division has a seed processing plant to produce huge quantities of high quality seed of different classes. The division is responsible for production of Breeder seed for all varieties of forages released by IGFRI as per indents received from DAC. It also undertake production of Truthfully Labelled Seed (TFL) with the support of other divisions. Division has about 65 ha of farm area exclusively devoted for Breeder and TFL seed production in central research farm of the Institute.

Research achievements

Seed testing and physiology: Seed testing involves mainly germination and physical purity testing of seeds. Research is being conducted for developing suitable germination protocols and its enhancement in different range species as well as development of seed standards for quality estimation.

(a) Germination improvement and protocol development

- Germination testing protocols were developed in Panicum antidotale, Sehima nervosum, Bracharia decumbens, Bothriochloa intermedia, Setaria sphacelata, Stylosanthes sebrana, Desmanthus virgatus, Clitoria ternatea, Indigofera astragalina.
- Germination enhancement using GA, application is reported in Panicum antidotale, Lasius scindicus, Cenchrus ciliaris, Paspalum notatum, Setaria sphacelata.

(b) Quick viability test

- Suitable species specific preconditioning techniques like soaking in hot water (Cenchrus ciliaris, Berseem, Lucerne), longitudinal sectioning of ¼ of endosperm (Paspalum notatum), nipping of seed coat of imbibed seeds (Desmanthus virgatus, Indigofera astragalina and Stylosanthes sebrana) and by chipping of seeds (Clitoria ternatea) are developed.

(c) Physical purity analysis in grasses

- The seed samples of range grasses, viz. Sehima nervosum, Bothriochloa intermedia, Brachiaria decumbens, Dichanthium annulatum, Chrysopogon fulvus and Heteropogon contortus were analysed for their physical purity. The inert matter varied from 0.85% to 2.50% in different samples as seed picking was done manually.

(d) Physiological seed maturity

- The formation of pure germinating seed (PGS) in Deenanath grass was found to be greater than 90% whereas under normal harvest practice only 20-60% of seed was found in the fluff. It was observed that a lot of PGS are being dropped during harvesting due to its floral structure. Thus, the stage of harvest at physiological maturity is very crucial in optimizing recovery of PGS.

(e) External hormonal application

- The germination of guinea grass seeds obtained after treating the plants with 100 ppm IAA at inflorescence stage was doubled (46%) as compared to control (23%). Similar kind of research is under progress in different range species using various hormones and chemicals.

Seed production research: Research on seed production aspects is utmost important in forages including range species due to scantly availability of quality seed. The research has been concentrated mainly on developing suitable interventions for seed yield increase.

(a) Application of fertilizers

- Substantial increase in seed yield of approximately 10% was observed in berseem by application of potassium @ 80 Kg K,0/ha as there is faster depletion of available K at reproductive stage after final cut.

(b) Foliar spray of different chemicals

- KNO3 (2%, 4% and 6% solution), Thiourea (0.25%, 0.50% and 0.75% solution) and GA3 (50 ppm, 100 ppm and 150 ppm solution) at spike initiation stage increased productivity of Cenchrus ciliaris and C. setigerus.

Seed Health and Storage: Seed health is one of the quality parameters and is necessary for successful storage of the seeds from harvest to next sowing as well as for control of seed borne pests and pathogens.

(a) Seed health management during storage

- Different mycoflora associated with seeds of Cowpea (BL-1 and BL-2) and sorghum (PC-6 and PC-23) identified.
- Integration of 0.2% Carbendazim, Malathion@2.0g/kg and Neem leaves@3% found protecting the sorghum and cowpea seeds up to 3 years with good germination and vigour when kept in poly bags(700 Gauge), plastic/metal bins or in polylined bags at less than 10% seed moisture.
• Seeds of sorghum and cowpea when treated with neem leaf powder @ 3% (<12% moisture, stored in gunny bags) found protecting the seeds from pests and pathogens for 6 months.

(b) Effect of pesticides on germination of seeds of cowpea and sorghum
• The overall germination and viability of sorghum and cowpea increased by treating the seeds with 0.25 -0.30 percent fungicides which was 83 to 93% as compared to 75 to 85% in control in sorghum.
• In insecticidal treatment studies in forages, a higher germination percentage was observed in treatments with different insecticides including botanicals compared to control.

Economics of Seed Production:
The success of a seed production programme ultimately depends on its economic viability. The incurring costs at different stages of seed production as well as overall benefit cost ratio were studied in different forages. The benefit: cost ratio for berseem, oat, cowpea, sorghum and Deenanath grass seed production was estimated as 2.1, 1.16, 1.68, 2.57 and 5.24, respectively.

Seed Production:
The seed research ultimately culminates into reality through quality seed production. Realizing this goal, the seed technology division of IGFRI strives a lot for the quality seed production of breeder seed multiplication and truthfully labeled seed for the farmers’ use.

(a) At Institute
• The breeder seed production increased from 78q in 2007-08, to 243q in 2010-11 in rabi crops whereas in kharif crops, this increase was from 38q in 2007 to 54q in 2010. Similarly, the TL seed production has also increased tremendously. There was a phenomenal increase in production and sale of planting material of perennial grasses by IGFRI to the tune of 25 lakh rooted slips in 2010-11.

(b) Under participatory approach
• During 1990-2000, participatory seed production in Bundelkhand region was taken up under Indo-UK collaborative project. An emphasis was given on Cowpea (EC 4216 and Bundel lobia-1) and sorghum (M.P. Chari) in kharif and oat (UHO 822) and berseem (Wardan) in rabi season. Maximum profit was achieved with berseem seed production which motivated other farmers to take up the forage seed production programme.
• Nearly, 200 quintals of forage seed has been provided to different farmers in rabi 2010-11 under participatory seed production research in the districts of Muzaffarnagar, Meerut (UP), and Sirsa (Haryana). The seed produced has been successfully spread to others through farmer to farmer interactions.

Research Projects:
There are at present seven major research projects being conducted at division. In addition to this two externally funded research project and two revolving fund schemes are being undertaken.

Recent innovations
• Use of radiography, a non-destructive method in studies on formation of pure germinating seeds in grasses.

Use of radiography in detection of insect damage of seeds without dissecting them.
De-husking of deenanath grass seed using cotton quilt batting machine
High density nursery in BXN hybrid for quick production of rooted slips.
In vitro rooting and synthetic seed production in BXN hybrid is under progress.

Success stories
Participatory forage seed production
Farmers of Hisar, Meerut and Mujaffarnagar were provided seeds of Oat and Berseem seeds through Kisan Unions and co-operatives for fodder and seed production. It was found that there was high degree of acceptability among farmers for IGFRI varieties and quality seeds. Approximately 600 farmers participated in this programme. Due to larger interest of farmers to grow the crop for fodder, it was found difficult to convince farmers for forage seed production. However, during 2011-12, nine framers took participatory seed production around Jhansi. Farmers produced 475 kg of Berseem seed (Wardan) and 1450 kg of Oat seed (JHO-822).

Spread of Deenanath grass in Bundelkhand forests
Out of many forest area planted with Deenanath grass (Pennisetum pedicellatum), the Kundar, Nivari forest area of Tikamgarh district was found to be worth mentioning wherein approximately 18 ha was covered with luxuriant growth of the grass. In this area, the crop has attained a height of 6 feet. Average production from this area was 250 q/ha for dry fodder and 2.5q for seed. Although this year the crop was left for seed production, with partnership of surrounding villages, green fodder crop could also be harvested by the villagers. Due to the prolific seeding habit of the crop, sowing of this grass in following years would not be required.
Development of Digitized Forage Herbarium

Electronic forage herbarium is a modern solution for assessment of forage diversity because it preserves a historical record of change in forage vegetation over the time. Digitizing information about forage plant species and making it available to the broader public requires digital images and information contained in plant specimens, and then effective retrieval and mobile computing mechanisms for accessing this information. Digital images of voucher specimens have been developed through scanning and photography techniques. Scanning was used for new plant type specimens whose quality and condition was better than older or damaged specimens. Photography technique was used for comparatively poor specimens to avoid distortion or damage of specimen during scanning. Digital database of specimen images along with primary information contained group of web pages are being developed using specialized HTML editor and linked together or have some coherent method of navigation. The pages will initially consist of static files of static text and other contents (like images) stored within local web server’s file system (static web pages). Thus, the complete systems will broaden the forage herbarium’s usage by providing users with efficient, easy-to-use electronic data access.

(Archana Singh, Dibyendu Deb and AK Roy)

Organic turmeric for higher income: NICRA initiative

At NICRA Project site of village Kadesarakala, District Lalitpur, farmers have been cultivating turmeric traditionally using non descript variety. They get low yield often less than 30q from half acre and earn less income Rs.13500/= only from selling of fresh rhizome. The gap was identified during PRA and farmers were motivated for scientific turmeric cultivation. Demonstration of growing organic turmeric was conducted in progressive farmer’s field. Turmeric was planted in raised bed and rhizomes were placed in shallow pits spaced at 20-25 cm apart. Locally collected powdered Neem cake was applied @ 20 gm/pits at the time of planting. Rhizomes (5q) of improved variety ‘Roma’ were planted at 50 cm row to row spacing of beds. Planted rhizomes were covered with well rotten cattle manure incubated with Trichoderma formulation @5g/kg seed (developed at IGFRI). The crop was ready in 8 months and it yielded 4120 kg rhizomes from the above plot. Produce was processed for value addition by curing the rhizomes followed by boiling in water and sun drying. Processed turmeric powder could generate income of Rs 40-45000 from half acre. Results of this intervention motivated the other farmer’s and demanded improved variety of turmeric with full scientific advice.

(Satyapriya, RK Agrawal, Sunil Kumar and HV Singh)
Women farmers' access to scientific production technologies for enhancing productivity and alleviating drudgery is less, although their knowledge about traditional agricultural practices is high. Even the extension programmes are designed and implemented keeping in view their male counterpart. Less number of women specific technologies are available to increase their efficiency and reduce their drudgery. To evolve women specific technology assessment and refinement for fodder development, it necessitates the organizing gosfhi etc. The year 2012, being the Golden Jubilee year of IGFRI, two Mahila Krishak Gosthis were organized in Jhansi District. One gosfhi was organised on March 20, 2012 at village Birguan of Baragaon block and another was organised on May 16, 2012 at village Dhikoli of Babina block. More than 200 women farmers engaged in agriculture and animal rearing activities participated in each of the gosfhi. Lecture cum demonstrations were organised on improved fodder production and utilization, horticulture system in Bundelkhand, animal rearing and feeding practices, drudgery reducing hand tools and implements for farm women, crop residue enrichment and fodder conservation, important diseases in fodder crops and diseases in animals and their management etc. Exhibition of live materials viz. important fodder crops, perennial grasses, quality seeds, post harvest technologies-complete feed block, bales, low cost feeding material etc., for animals was displayed and demonstrated by the scientist. Besides, research-extension-farm women interface was also organized in which Institute scientists, officials from NABARD, KVKs, developmental agencies and local NGOs also participated. The overwhelming response of women farmers in these Gosthis was very encouraging. There was demand for organization of such gosfhis in other villages in more frequent intervals.

(Sadhna Pandey, Maharaj Singh, Purushottam Sharma, Satyapriya, RK Sharma and J P Upadhyay)

HRD News:

Multi skill development training programmes for Casual Laborers' with Temporary status

Multi skill development training programme of 20 days at Jhansi were organized in three batches during April 16 to June 16, 2012 at IGFRI, Jhansi and one at RRS-IGFRI, Dharwad. Total 165 casual laborers with temporary status (commonly called Saman Vetal Shramik) were trained in various skills. Entire programme was devised in Hindi language.

Training Abroad

Dr. Pankaj Kaushal, Principal Scientist (Biotechnology) and Head, Crop Improvement Division, visited University of Georgia, Tifton, campus, GA, USA from March 21 to June 18, 2012 to study Molecular cytogenetic characterisation of apomixis locus in grasses (NAIP-HRD) techniques.

Training cum exposure visit

Training cum exposure visit of Trainees (35 participants each) of IWMP, NRCAF, Jhansi was organized on 10/04/2012 and 12/04/2012.

New Appointments

Dr. Ashutosh Kumar Mall
Senior Scientist (Plant Breeding)
05.06.2012

Dr. Ritu Mawar
Senior Scientist (Plant Pathology)
25.06.2012

Transfers from IGFRI

Dr. Yashpal Singh Saharawat
Senior Scientist (Agricultural Chemistry)
transferred to IARI, New Delhi
संस्थान के समागम में दिनांक 13.06.2012 की हिंदी की प्रेरणा-प्रस्ताव एवं उसके प्रावधान हेतु तकनीकी अधिकारियों/कर्मचारियों के लिए एक हिंदी कार्यशाला का आयोजन किया गया। संस्थान के निदेशक डा. एस.ए. फालूकी ने कार्यशाला के उद्घाटन में संघ की राजमार्ग नीति एवं सरकारी काम-काज में उसके महत्व और आवश्यकता पर बल दिया एवं साथ ही यह भी कहा की ऐसी कार्यशालाओं के माध्यम से अधिकारियों के हिंदी में कार्य करने हेतु ग्रेफिन निम्न के। कार्यशाला में व्याख्यान हेतु आमंत्रित श्री लक्ष्मण धिवारे, संदेह, नरकास एवं वरिष्ठ राजमार्ग अधिकारी, मंडल रेल राजवधारक, उद्यम मुख्‍य रेल, जोड़ी ने राजमार्ग नीति एवं परामर्श के बारे में, सुधीर नीति शिक्षी, शुर्लता-हिंदी, कैडिय विधालय, जोड़ी ने हिंदी की शासकीय काम-काज में प्रयोग पर एवं संस्थान के विभिन्न व्यवस्थापितों एवं वरी, तकनीकी अधिकारियों ने तकनीकी कार्य में हिंदी के प्रयोग पर व्याख्यान दिया। प्रायोगी राजमार्ग अनुभव आर. श्री, भारतवर्ष एवं सहायक निदेशक (राजमार्ग) श्री कैडिय ने कार्यशाला की रुपरेखा देखे और संस्थान के राजमार्ग हिंदी में कार्य करने हेतु विद्या गए। अबालाह में प्रबंधक दल।