भाकृअनुप
ICAR

53rd Foundation Day

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Director's Report

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IGFRI

ICAR-Indian Grassland and Fodder Research Institute
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On the occasion of 53rd Foundation Day of Indian Grassland and Fodder Research Institute, I congratulate all the past and present scientists, technical, ministerial and supporting staff of the Institute for their wholeheartedly contributions in each and every aspect. Due to their untiring efforts during the year, the Institute has made remarkable progress in the field of forage, research capacity building and infrastructure development. I take this opportunity to share the most noteworthy achievements in terms of Research, Transfer of Technology and Human Resource Development.

Research

The IGFRI is pursuing the cause of excellence in forage research through 64 well tailored institute funded research projects which brackets sub project. The projects funded by DST, DBT, PPV & FRA, ICARDA and ICAR have also been taken up to support the specific niche of research. The important themes of externally funded projects are enhancing grasspea production, Identification of ovule and embryo sac specific promoters and their validation, Ploidy regulated expression of genes, National Initiative on Climate Resilient Agriculture (NICRA).

Five Inter-isstitutional projects with CITH, IVRI, CIPHET, PDFSR and NIANP have been initiated this year. Flagship project on synthesis and application of P, Fe and Zn nano-particles for increased fodder and seed production has also been started. NFBSFARA funded study on understanding the adaptation mechanism of wild forage halophytes in the extreme saline-sodic kachchh plains has been initiated. In addition to these, the institute joined hands with SMD (Extension) ICAR to initiate National Initiative on Fodder Technology Demonstration (NIFTD) project in 100 KVKs located in different zones of the country for accelerating production of fodder through promotion of comprehensive fodder production, conservation and utilization in mission mode for enhancing the availability of fodder throughout the year.

Salient Research Achievements

Forage Crop Improvement

One variety of oat (JHO 2010-01) has been identified for release. New plant types were developed in pearl millet utilizing interspecific hybridization with wild perennial apomictic species. Besides, seven novel genetic stocks were developed i.e., guinea grass (obligate sexual line, 7x and 11x cytotypes), *Pennisetum orientale* (6x cytotype), Black seeded pentafoliate berseem, six stamen-two gynoecium sorghum and sexual tri-species NBS hybrid. Two pathogenic cultures were deposited in ITCC. Forage germplasm resources were enriched with introduction of 452 accessions (including 216 exotic) representing 11 crops. In Mid Term Storage Module, 8516 accessions of 23 species were conserved. For mode of reproduction, 172 differentially expressed genes were identified consisting of 157 in *Pennisetum* hybrids and 15 in *Cenchrus ciliaris*. DUS Guidelines have been developed by screening 27 oats varieties (descriptor for 40 qualitative and quantitative traits) and 28 cowpea varieties (descriptor for 24 quantitative and qualitative traits)

Resource Management

Minimum tillage during *kharif* season and minimum or zero tillage during *Rabi* season has been recommended to obtain higher net return and improved soil health in fodder sorghum + cowpea-*durum* wheat system. TSH + Sesbania + (Sorghum + Cowpea - Chickpea) production system performed better, producing 98.5 t green fodder / ha / year. In salt affected soils, pressmud proved best amendment for increasing green and dry forage yield of guinea grass, oat and NBH, whereas poultry manure was more effective for para grass. Long term study on perennial grass system reinforced that FYM application contributed more in accumulation of active pool and favoured high ratio of active to passive carbon, while, inorganic fertilizers favoured more towards passive carbon pool in lower depth of soil profile. The water use efficiency and Evapo-Transpiration of NB Hybrid + berseem system was 17.85, 32.00, 35.21 and 17.79 kg dm/ ha mm and 118.8, 95.0, 86.5 and 147.8 mm for four cuts under organic nutrient management.

Modeling studies on cowpea (C_3) showed >15% increase in dry biomass when surface temperature was below 5°C. Also, dry biomass was expected to increase by 67%, under doubled CO_2 condition and enhanced surface temperature upto 4°C from its normal. However, grain yield may decrease by more than 40% with increase in temperature by 2°C.

Grassland & Silvi/hortipasture System

The institute's quest for round the year forage availability under sub marginal rainfed situation has been enriched with development of silvipasture / bael / guava based hortipasture system model. Promising pasture legumes have been identified for development / improvement / restoration of rangelands. Two tier pasture system with shrubs and forage groundnut has been developed. Model grassland of 5 ha has been developed at IGFRI, Jhansi. The grassland inventory of Kachchh region using GIS and remote sensing was prepared. Grassland development and plantation of fodder trees has been taken up on 70 ha *Charagah* land (CPR) in Soda village district Tonk, Rajasthan with *Jal Grahan Samiti*, Soda, Indian Institute for Rural Development (NGO), Malpura with technology back stopping of IGFRI; WRRS, Avikanagar.

Forage Conservation, Utilization and Animal Nutrition

Polymeric polyphenolic compound isolated from Jamun (EJ-5) hampered in vitro methane production from wheat straw and oat straw, from 35.7 to 7.5 and 23.0 to 12.2 ml/g in digestible dry matter, respectively. Among the feed ingredients evaluated, nonstructural carbohydrates (NSC) contents were lower in cotton seed cake (14.0) and rice chuni (22.7%), whereas structural carbohydrates were more in rice chuni (59.42) and gram chuni (55.35%). Average TDN and DE contents varied from 39.57-94.68% and 1.74-4.39 kcal/g, respectively in the evaluated concentrate feeds. The production performance of Bhadawari buffalo showed increasing trend (892 kg to 1495 kg) over ten years (2003-2013) with average milk fat content of 6 to 14% in different individuals. The adequate feeding during re-alimentation phase improved weight gain (429 vs 513 g/d) to compensate the lost body weight when compared to calves fed for 400 g daily targeted growth without any feed restriction.

Farm machinery

Rotary shredder operated by tractor PTO power after attaching with three point hydraulic linkages could harvest the crop upto 10 cm stubble height. In tall crops (>1.5 m) and short height crops (<1.0 m), the machine gave the output capacity of 18-20 q/hr and 11-14 q/hr respectively. Modified (210 angle of inclination, 50 rpm draper speed and 8% moisture content) berseem - chicory seed separator achieved 99% purity of berseem from berseem chicory seed mixture with capacity 12.0- 13.8 kg/hr. Conservation tillage machinery viz. tractor drawn raised bed planter (width of bed - 40 cm, width of furrow 30 cm) used for grasses viz. napier and guinea and recorded the field capacity of 0.3 ha/hr with average field efficiency of 71.4%. The evaluation of water resources of CR Farm of IGFRI (study area 2167.25 ha) Jhansi in a micro watershed mode revealed that groundwater potential was 698.5 ha-m against the use of 589 ha-m and surface water potential was 685.0 ha- m against the use of 51.14 ha-m for the year 2013

Seed technology

Nano-technological intervention revealed that four types of nanoparticles (Ag, CuO, ZnO and TiO_2) enhanced germination with vigorous seedlings growth and substantially less infection as compared to control in cowpea. *In-vitro* maturation studies in guinea grass seeds exhibited that 100 ppm / IAA solution for 7 to 10 days improved the seed filling by 34-41% as compared to 13-18% in dry panicle. Brassinosteriod 10 ppm and tryptophan 100 ppm sprays improved pollen fertility and reduced seed fall before harvest in grasses. Seed standards were developed in *Centrosema pubescens, Desmanthus virgatus, Macroptilium autropurpureum, Stylosanthes scabra* and *S. guianensis*. Participatory seed production through farmers' and *Goushalas* has been taken up for fodder sorghum, lucerne and *Stylosanthes hamata* and *Cenchrus* grasses seeds.

Seed production : Institute produced 21.87 q of truthfully labeled seed in *kharif* 2013 and 262.85 q seed in *rabi* 2013-14, where breeder seed amounted to 192.05 q and TFL seed was 70.80 q.

Notable initiations

At International level - ICAR- ICARDA initiative on Cactus as alternative feed and fodder resource; project in dryland system under CPR1.1; at National level, National Initiative on Fodder Technology Demonstration (NIFTD) in collaboration with SMD (Agriculture Extension), ICAR through network of selected 100 KVKs and IGFRI-NIANP Collaborative programme :Improvement in nutritional quality & yield of grasses and exploitation of non-conventional fodder resources for higher livestock production; IGFRI-NDRI centre Kalyani for 22 demonstrations on nutritional aspects; ICAR-ICARDA-IGFRI project on Grasspea; at Institute level - Livestock based Integrated Farming Systems for semiarid region, Nano-technology for enhancing nutrient use efficiency, Establishment of forage groundnut cafeteria, Nano-technological intervention in seed quality enhancement, Forage seed coating and pelleting, Model pasture development, Participatory fodder production in mango orchards: SRRS Dharwad, Usage of rice fallows for fodder production: SRRS Dharwad.

Transfer of technology

Agricultural Technology Information Centre (ATIC)

ATIC at IGFRI is operating with the objective to supply research products, information through published literature and communication materials, and diagnostic services. 1118 visitors' were exposed to the technologies through ATIC. Farmers Scientific Co-ordination committee meets every Wednesday to answer the queries of farmers, dairy owners and other government and private clients. Kisan Call Centre of IGFRI gave the expert advice on 154 phone calls, 20 postal and 25 email queries. It published pamphlets (22) and leaflets (08) and organized three Krishak Gosthi/ Chara workshop.

Outreach activities:

- IGFRI organized twenty three farmers training, two krishak ghosthies, two Inter- Institutional women farmers training, Four livestock health camp and exhibition of fodder technologies;

- To address the issue of drought and long term perspective plan, 11 villages of Bundelkhand (5 from Uttar Pradesh and 6 from Madhya Pradesh) have been selected and being developed as IGFRI model villages.
- Adarsh Chara Gram- An outreach programme in three villages (Garera and Dhobia of Datia) and (Awas of Shivpuri) was started for scaling up of fodder technology at farmers field. The traditional crops such as groundnut which need more water has been replaced with alternate fodder crops such as sorghum, bajra and guar which are drought tolerant and help in livestock so that farmers livelihood is secured as contingent plan. An e-chara kendra has been established in the village.
- Under AICRP on FIM, package of improved implements has been tested at IGFRI Research Farm and demonstrated at farmers' field for different forage crops suitable to different category of farmers in Bundelkhand region.

Tribal Sub Plan Achievements: Under tribal sub plan agricultural, animal husbandry, poultry and fodder related interventions were demonstrated to uplift the socio-economic condition of tribal farmers in adopted villages in Dhar and Jhabua districts of MP, Banswara district of Rajasthan and Nandurbar district of Maharastra.

Awards & Recognitions

Scientists of IGFRI have received several prestigious award and fellowships during the past one year. Dr. Sultan Singh, Principal Scientist received Fellow of Animal Nutrition Society of India (ANSI), Australian Endeavour Fellowship 2013; Dr. Manoj Srivastava, Sr. Scientist received DBT-CREST award 2012-2013 at Utah State University, Logan USA; Dr. D.C. Joshi, Scientist received Indo-Australian Career Boosting Gold Fellowship (IACBGF) 2013-2014; Dr. T. Kiran Kumar, Scientist received Best Ph.D. Award from ISA, IARI, New Delhi. Dr. P. K. Ghosh, Director received XIV Hari Krishna Shastri Memorial Award 2013, ISCA Prof. Sushil Kumar Mukherjee Commemoration Lecture 2013-14, ISA Gold Medal Award (2014), Fellow of National Academy of

Sciences-Allahabad (2014), Fellow of Indian Society for Plant Physiology (2014).

Visits Abroad/Trainings

Dr. V.K. Yadav, Principal Scientist visited North Dakota State University Fargo, USA; Dr. K.K. Dwivedi, Sr. Scientist visited Utah State University Utah, USA; Dr. Shahid Ahmad, Sr. Scientist visited South Dakota State University Brookings, USA, Dr. Ritu Mawar, Sr. Scientist visited Agroinnova University of Turino, Italy; Dr. A.K. Misra, Head, PAR Division visited Canberra, Australia; Dr. P.K. Ghosh, Director visited Rabat, Morocco under ICAR-ICARDA Work Plan, Cornell University, Ithaca, USA

Additionally 21 scientists' attended training in different national organization. The institute organized four training courses and three brain storming sessions.

Publications

Research papers (56), Popular article/Newsletters (19), Book chapters (21), Training manuals (15), Leaflets (9), Symposium/ Abstract papers (50), Technical bulletin (4) were published during the year.

New appointments

Dr. Khem Chand joined as Head, Social Science Division on 02.06.2014; Dr. Sevanayak Dheeravathu joined as Scientist on 09.04.2014 and Dr. (Ms.) Divya joined as Scientist on 01.02.2014.

Selection/Transfers

Dr. Diwakar Bahukhandi, Sr. Scientist (Plant Pathology) transferred to Directorate of Maize Research, New Delhi; Dr. A.K. Rai, Sr. Scientist selected as Principal Scientist (Soil Science) at CSSRI, Karnal and Dr. (Mrs.) Anita Kumari, Scientist selected as Assistant Professor at CCS, HAU, Hisar.

Promotions

During the period, Technical Staff (7) were promoted to next higher grades, Skilled Support Staff (8) were promoted to ministerial or technical posts.

Technical personnel : Sh. M. S. Verma (T-5 to T-6) ; Sh. Harish Chandra (T-4 to T-5) ;Sh. Pradeep Kumar Karpe (T-7/8 to T-9); Dr. R. K. Verma (T-8 to T-9); Smt. Seema Khatri (T-6 to T-7/8) ; Sh. P. C. Gahlot (T-5 to T-6) ; Sh. H. K. Agrawal (T-5 to T-6).

Administrative personnel : Sh. Hari Ram Khushiya (SSS (Peon) to LDC); Sh. Sanjay Kumar (LDC to UDC).

Skilled Supporting Staff : Sh. Ramesh/ Ramma [SSS (Lab Attd.) to T-1], Sh. Mathura Singh [SSS (Cleaner) to T-1]; Sh. Khubi Ram [SSS (Lab Attd to T-1]; Sh. Shivhari [SSS (Painter Attd) to T-1], Sh. Ram Singh Lodhi [SSS (Lab Attd.) to T-1]; Sh. Balwan [II-MACP Granted].

Retirements

Scientists (2), Administrative (2), Technical (2) and Skilled Support Staff (8) were retired on superannuation during the past one year.

Dr. R.B. Bhaskar, Scientist in June 2014; Pradeep Behari, Scientist in August 2014; Sh. Vishan Das, Driver in May 2014; Sh. Makrand Singh, UDC in July 2014; Sh. Nanjoo, LDC in August 2014; Sh. Atar Singh, SSS in December 2013; Sh. Vijay Bahadur, SSS in June 2014; Sh. Kishan Lal/Ganesh, SSS in July 2014; Sh. Vijay Ram, SSS in July 2014; Sh. Nandkishor, SSS in July 2014; Sh. Siya Ram, SSS in July 2014; Sh. Ramdas, SSS in August 2014; Sh. Prabhu Dayal, SSS in October 2014; Sh. L.K. Khare, T-1 in July 2014.

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