Forage Production System for Sustainable Agricultural Development:
Recommendations of the National Symposium

A number of experts in specialised areas of fodders and grassland development technology, social scientists, resource management scientists and users met at IGFRI during the end of December, 1995 to discuss on the issue of sustainable agricultural development with forage production as a component of the system. The following recommendations were made after four days of deliberations:

* Adequate emphasis is required on forage germplasm evaluation, categorisation, documentation, conservation and utilization.
* Efforts are needed on basic and applied work for the improvement of quality and resistance against biotic factors.
* There is need to develop varieties for dual/multi-cut use. More breeding work is needed on fodder maize.
* Appropriate research work should be taken up on lucerne and sorghum for increased seed production and on berseem to stabilise the seed yield.
* Varietal trials should be conducted on seed production potential at the time of its release under the All India Testing Programme.
* Crop sequence sorghum-lucerne-maize in Karnataka, Dinanath grass-berseem-maize in UP hills and rice bean under pure or mixed cropping system was found best in North-Eastern India.
* Farming system approach should be adopted for integrated pasture livestock production.
Appropriate research is needed on soil-plant-animal interface including trace-elements for sustained pasture and animal production.

The biological potential of available animal feed resources and deficiency in nutrients in different regions of the country needs to be worked out for planning appropriate feeding strategy and livestock management for the region.

The intake by the animals under grazing conditions and energy spent on collecting herbage from grazingland needs to be worked out to provide nutrient balance for sustained animal production.

Agroforestry and hortipastoral systems that are effective for resource conservation and providing green matter during lean period, improving the physical and chemical properties of soils and also arrest the degradation of environment, need to be adopted.

Existing natural grassland must be improved through suitable agro-techniques and biological amelioration methods on the basis of ecological variability while maintaining the soil health condition which is important for sustainable agriculture.

Fodder conservation, establishment of fodder banks and development of cheaper post-harvest processing equipments need to be encouraged.

Soil organisms including earthworms influence the soil property and their large scale application for forage production must be attended to create very efficient composting from all wastes from cattle farm and industry.

Forage seed harvesting, packaging and processing need to be studied for economical production of high quality seed.

In addition to above, a working group for Mission Mode Programme on Grassland Pasture (Tropical and Temperate) was constituted with the following terms of references:

- Infrastructure, linkages and networking
- Generation of database
- Technological assessment/refinement, R&D interface vis-a-vis development
- Critical research issues
- Resource requirement
- Monitoring system

High yielding Oats variety - Bundel Jai, a multicut variety suitable for entire country
Bundel Guar - 2, a disease resistant variety suitable for entire growing tract
Dear Readers,

The planned and successful implementation of Research and Development programmes has not only made us self-reliant on food front but made it possible for us to move from a food scarcity to a food surplus nation.

Now, we are the second largest producer of the milk in the world. This is despite the fact that the present availability of green and dry forages (513 and 400 mt respectively) is much less against the requirement (1083 and 676 mt respectively), indicating a deficit of 53 and 41 per cent in green and dry forages respectively. We have fifteen per cent of the world’s livestock population in our share of two per cent of the global area. This number and share is of great concern since in times to come the demand of milk products would increase with increased human population while the pressure on the area under forages to shift towards production of food grains, oil seeds, or fibre would also increase. In such a situation, we are left with no other option except to concentrate our efforts in increasing per unit area production from the available physical resource and explore to harness, the available non-arable land through development of sustainable production systems.

The research on forage production and management technology development has made great strides in our country. The IGFRI, Jhansi in the lead role with an active support from the Forage Production, Testing and Demonstration Network at National level, involvement of Governmental and non-Governmental agencies for appropriate, location specific and need based technologies, I am sure, would help to achieve the demand level of this crucial input for the livestock based industry in this country.

(BHAG MAL)
Coordinated Forage Production Research in India

Since its inception during 1970 this programme is working on varied aspects of forage production technology generation for different agro-climatic locations of the country. A challenge is, therefore, put to the programme to alleviate the production so as to bridge the gap between demand and supply of forages on dry matter basis to the ever increasing animal population.

The Programme (AICRP - Forage Crops) located at IGFRI, Jhansi is operating with the following Thrust areas mandate and objectives:

**Mandate:**

- To coordinate multilocation testing programme at the national level with a view to identify appropriate varieties and production technologies for different agro-ecological conditions.

- To coordinate and monitor research relating to problems of national and regional importance.

- To conduct strategic and applied research for boosting production and productivity of forage crops.

- To function as a major service centre for exchange of scientific information and research material relating to forage crops.

**Objectives:**

- Development of superior varieties/hybrids in forage crops for increased animal production.

- Development of appropriate forage production technology and utilization through multidisciplinary approach for different cropping systems.

- Development of appropriate technology for seed production of forage crops.

**Current Thrust Areas:**

- Intensification of plant breeding work for crops varieties specially for drought resistance, moisture stress specific farming system and improvement of herbage through quality traits.

- Pasture improvement and technology development for sub-tropical and regions.

- Intensification of research on tropical range grasses and legumes.

- Forage production research on problem soils.

- Nutrient management to boost forage crop production including bio-fertilization.

- Forage seed production research and development of appropriate seed standards.

**RESEARCH ACHIEVEMENTS:**

**Crop Improvement:**

The work on cultivated forage crops and various range species have been tailored for breeding of cultivars for specific purpose or trait including specific disease-pest resistance in specific crop. It has been possible to release a total of 102 varieties in forages of which 50 varieties of important fodders were released during 1989-1995.

**Crop Production Technology:**

Technology on forage crop production including seed crops etc. has been generated in the areas like-

Crop management for increased forage production, cropping systems and rotations, nutrient management, bio-fertilizers, forage production in existing cropping systems and developing package of practices for recently developed cultivars.
Forage Seeds:

A concerted effort has been made to augment the seed production, technology for increased seed harvest in all forage crops. Appropriate forage seed production areas for different fodder crops in the country have been identified. Programme is also effectively producing sufficient quantity of breeder seed to sustain the production chain both for cultivated fodders and range grasses.

The programme has working linkages with other Co-ordinated Programmes:

- Sorghum Improvement Project for Forage Sorghum.
- Pearl millet Improvement Project for Forage Pearl millet.
- Maize Improvement Project for Forage Maize.
- Project on Arid Legumes for Guar and Cowpea.
- Project on Under Utilized Plants for Amaranthus and Ricebean.

Activities:

- Research Advisory Committee (RAC) met during May 22-24, 1996 under the chairmanship of Dr. R.P. Singh, Ex-Director, CRIDA to give a final shape to the Institute Perspective Plan on the basis of discussions with other RAC members, Dr. J.P. Tandon, Dr. K.L. Mehra, Dr. S.K. Arora, Dr. M. Ahluwalia, the Director and Divisional Heads.

- Staff research Council (SRC) meeting was held during May 29-31, 1996 under the chairmanship of Dr. Bhag Mal, Director, IGFRI. The Annual Research Programme for 1996 was finalised on the basis of discussions among the members and the advise of the expert members Dr. S.N. Desai, Dr. V.P. Gupta and Dr. S.K. Arora.

- Quinquennial Review Team members visited Institute Regional Stations, Avikanagar (Rajasthan) on April 21-22, 1996, Dharwad (Karnataka) on April 28, 1996, proposed Sub-station, Palampur (HP) on May 19-20, 1996 and Jhansi June 6-7, 1996.

- Two training programmes on “Agro-forestry, Forage Production and Animal Nutrition” under NARP (XVI & XVII in the series) organised during April 1-30, 1996 and June 1-30, 1996 were attended by 14 and 34 scientists from State Agriculture Universities.

- Our Extention and Training Division organised many training visits of the trainers/farmers under the State-NGO’s programmes like watershed, soil conservation etc. for technology appraisal. Under them field demonstrations, Ber buddings with improved varieties were performed in the village grazing areas/farmers fields in five villages in MP and UP.

Visits:

Dr. C.R. Hazra, Project Coordinator (FC) and Dr. C.R. Ramesh, Principal Scientist (Plant Pathology) at IGFRI Regional Station, Dharwad visited Australia during March 31 - April 21, 1996 under CSIRO organised International Workshop on Stylosanthes research.
Engineering practices e.g. contour bunds, staggered bunds, terraces, peripheral bunds, drainage channels etc. are essential for wasteland/rangeland development. Several site specific soil and water conservation practices including bundings at required vertical interval alongwith three tier/sown pasture system have been developed and practised for development of watershed/wastelands. Such techniques can be extended for development of other wastelands/rangelands after incorporating location specific modifications.

Farm machinery namely IGFRI pitter disc harrow for creating micropits per hectare, IGFRI Spike tooth harrow which creates micro seed beds for seed placement under rangeland conditions, IGFRI Channel cum bund former which makes bunds and channels and IGFRI Seed pelleting machine which makes pellets of grass seeds for direct seed broadcasting (including broadcasting by helicopter) enable easier, economic and effective greening of wastelands/rangeland.
Performance of *Stylosanthes* in different agro-climatic regions of India

Savannah region (8.04 °N - 23.5 °N latitude) spread over the majority of land area of central and peninsular India in the rainfall regime 40-400 cm. annually, having varying climate (humid, sub-humid to semi-arid) - soil complex (deep black, red loams, laterites to coastal alluvium) support natural grasslands dominated by *Cenchrus-Lasiurus* and *Sehima-Dichanthium* grass cover.

Among the introduction's of range legumes for improvement of grasslands in India, *Stylosanthes* has been found to have adaptation to varying climate, soil and pH conditions. Studies at IGFRI, Jhansi and regional Station, Dharwad have identified a number of promising ecotypes of *Stylosanthes* adapted to varying ecological niches. *Stylosanthes hamata* cv. *Verano* introduced in drier climatic regions of Deccan plateau having long growing season has shown superior climatic adaptation to lower latitudes of peninsular India resulting in early growth, early and continuous flowering and maturation thereby higher forage and seed yield. Ecotypes E.C. 168628 and 168634 (Natural tetraploids) were found to behave as perennials, but were severely affected by leaf and stem spotting disease particularly in the wet season. EC 168631 having thin stem and narrow leaf also showed reasonable degree of adaptiveness to the drier tracts of the region. Among the *Stylosanthes hamata* populations evaluated at Jhansi, 25-27 °N latitude, ecotypes EC 168628, EC 168637, EC 168628 and EC 168634 (tetraploids) exhibited superior adaptations and higher herbage and seed yield as compared to *S. hamata* cv. *Verano*.

Among *S. scabra* accessions evaluated, *cv. Sica* showed higher persistency, forage, seed yield and adaptation to drier tracts of central and peninsular India. *S. scabra* cv. *Fitzroy* has been found to produce higher biomass, but seed yield was found to be low. They were found to be free from leaf and stem spotting disease.

In Coastal regions of peninsular India, North-Eastern region of central India and Andmans & Nicobar Islands which receive high rainfall, *S. guayanensis* cv. *Schofield*, are found to be quite adaptive as sole crop or as inter-crop under plantation. (Dr. P.K. Jayan, IGFRI Regional Station, Dharwad).

*Stylosanthes* - a widely adapted range legume
IGFRI offers expertise in:

- Productive grass-legume pastures.
- Tree based pastures.
- Revegetation of degraded land, mine spoils, ravines etc.
- Forage based watershed production.
- Year round forages for milkshed areas.
- Livestock production and management.
- Forage conservation.

For further information kindly contact: Director, IGFRI, Jhansi

AN APPEAL

To our Readers
If you wish to share any of your experiences relating to forage production, utilization, etc. with our other readers, you are welcome to write to the editor along with photographs, if any. We would be too happy to publish them in the Newsletter.

To our technology users
If you are facing any problem or have any query on forage production technology kindly feel free to write to editor. All the information you require would be provided through these columns.

You can reach to us in person or through mail at:
Indian Grassland and Fodder Research Institute, Gwalior Road, Jhansi - 284003,
Telephones: (0517) 440908, 444385, 444771 Fax: (0517) 440833, E-mail: IGFRI @ x 400.NICGW. NIC. IN

Supervision and Guidance: Dr. Bhag Mal, Director, IGFRI, Jhansi

Editors:
S.A. Faruqui
S.N. Zadoo
A.K. Shrivastava

Compilation:
G.P. Nigam
K.P. Rao

Assistance:
Prem Chand
M.C. Jetwani

Published by: Director, IGFRI, Jhansi
Printed at: Mini Printers, Jhansi