I wish you a very rewarding NEW YEAR. May the year 2005 bring all the happiness and prosperity to you. During the last year many initiatives were taken up to streamline the working of forage research at the institute and the national level. Work on perennials like Stylo and Brachiaria at different forage crops centres was initiated to strengthen the prospects of year round fodder supply in the country. The programme of organic farming and soil biology impacting production appears to provide indicators for sustainability. A search for their bench marks in different land uses and farming systems would be required to determine limits for the use of such interventions. This issue bring out results of some such studies. Our readers have started contributing more on such aspects. It is our endeavour to encourage more of such studies in future.

The results of studies on 'Bhumi-sanskara' by 'angara' and 'amritpani' before sowing the sorghum crop followed by one spray of panchagavya has resulted in increased yield of the sorghum crop. It is now important to determine its role in the system and to standardise appropriate repeat application for raising a profitable crop.

Many studies are required to be planned in future to determine the product quality of the crop that are raised through these amendment. I once again remind you that such studies will have a very high adoption value for production of quality fodder for the livestock since it impacts the human health and the environment.

IGFRI celebrated its 43rd foundation day. The foundation day lecture delivered by Dr. N. G. Hegde, an eminent development researcher, emphasised the technology generation for the small farmer. It once again drives home the importance of perennials in assuring the year round supply of green fodder to enrich the livelihood of farmers. Our emphasis to match them under different cropping systems is bound to result in applicable technologies.

The forage research agenda of the country discussed at Palampur and Bhubaneswar during the year is expected to show the results. Our AICRP centres have started responding and I am sure much more is to come in the near future. The strategic research focus in the coming decade needs to be based on basic researches to establish the structural and functional components of the forage production systems.

Let us resolve to work with added vigour to scale the newer heights of achievements in land productivity with sustainability.

(P.S. Pathak)
The 43rd Foundation Day of the IGFRI was celebrated on November 01, 2004. Dr. Ram Prasad, IFS, Vice Chancellor, Barkatullah University, Bhopal was the Chief Guest of the function. He remarked that Institute has made rapid progress in last four decades in conducting research on grasses, grasslands and fodder crops and appreciated its contributions in the progress of dairy farmers.

Dr. Narain G. Hegde, President, BAIF Research Foundation, Pune gave the foundation day lecture. In his deliberation, he highlighted the problems of the farmers and said that farmers should be our first priority for initiating the research work. Emphasizing the role of livestock husbandry in alleviating poverty of the farmers, he congratulated IGFRI for developing farmers’ friendly technologies.

The foundation day lecture session was followed by the main function for entire staff of IGFRI and the farmers. Dr. P.S. Pathak, Director, IGFRI briefed the achievements and activities of the Institute made during last one year. The Chief Guest, Dr. Ram Prasad appealed to the farmers to take full benefit of the varieties and technologies being developed by the IGFRI and other research organizations.

Dr. Hegde, Chairman of the function distributed the seed material of IGFRI varieties to the farmers. The Chief Guest presented the best worker awards one each in the Technical, Administrative and Supporting categories of the Institute staff. The prize was also awarded for best research article published during the year. On this occasion staff members receiving awards/recognitions from other organizations during the year were also felicitated.

National Group Meeting, Rabi 2004 of AICRP on Forage Crops

The meeting was held at Orissa University of Agriculture and Technology, Bhubaneswar during Oct. 8-10, 2004. The meeting was inaugurated by Dr. I.C. Mahapatra, Former Vice Chancellor, OUAT Bhubaneswar. He enlightened the participants about the new challenges related to genetic resource upgradation and the development of the varietal and production technologies for the country. He also talked about the specific problems of fodder in the state. Dr. B. Senapati, Vice Chancellor, OUAT, Bhubaneswar in his address advocated for greater emphasis towards poor farmers oriented fodder production and conservation research and transfer of suitable technologies to the farmers. Research leaders from ICAR; scientists from the Coordinating and Collaborating Centres located in SAUs, ICAR institutions; scientists from OUAT, Bhubaneswar; development professionals and personnel’s from Department of Animal Husbandry & Dairying, NDDB and NGOs were the participants.

In total, six technical sessions on review of research activities, formulation of technical programme (Forage crops breeding, Crop protection, Agronomy and Soil), discipline wise presentation, breeder seed production, special session on Rabi forage improvement and plenary session were organized. Working groups on berseem, lucerne, oats, temperate grasses, range legumes and other rabi crops of eastern region were identified for genetic improvement. It was also emphasized that due consideration for research on potential crops at regional level should be given. The agronomical research in net-work mode was suggested. The Plenary session was chaired by Dr. S.N. Shukla, ADG (F & FC), ICAR and Co-chaired by Dr. P.S. Pathak, Director, IGFRI.
 **Vedic Krishi: Amendments Improve Fodder Yield**

It has been realized that the fertilizer use in agriculture is not only costly, but also their continuous application is adversely affecting productivity as well as quality of the produce. The preliminary study on Vedic Krishi was aimed at understanding the impact on soil through the dynamics of organisms and also to avoid and minimize the fertilizer uses particularly in the growing of forages. The field experiment on fodder sorghum with four main treatments namely control, amritpani, angara, amritpani + angara and two sub treatments panchgavya and no panchgavya spray in standing crop of sorghum was conducted in central block of CR Farm at IGFRJ Jhansi. The experimental soil was sandy loam having pH 6.9, organic carbon 0.45%, available N, P & K 180, 12, & 210 kg/ha, respectively. Before sowing the field was manured by FYM @ 10 t/ha. The result showed that there was considerable increase of 6.8 to 29.7 per cent green and 16.7 to 37.3 per cent dry fodder in presence of panchgavya spray and 1.9 to 7.6 per cent green and 1.0 to 13.6 per cent dry fodder in absence of panchgavya under all the Vedic treatments over their controls. However, angara and panchgavya combination was superior in giving highest green (29.7%) and dry fodder (37.3%) increment. Overall green (20.7%) and dry fodder (17.8%) was recorded to be higher due to panchgavya over no panchgavya spray. Irrespective of panchgavya, improvement under angara, amritpani and angara + amritpani was 18.5, 9.3 & 4.5 per cent for green and 25.6, 15.7 & 8.6 per cent for dry fodder, respectively over control. Yield attributing characters like plant height, number of leaves/plant, root length and cob length etc. were higher with panchgavya over no panchgavya in all the Vedic treatments. However, angara was superior to amritpani alone and its combination with angara except in case of plant height. The height of plant was more or less similar in amritpani and angara, but it was higher than amritpani + angara and control. The stem : leaf ratio lowered from 3.29 to 2.65 under panchgavya and from 3.61 to 3.00 under no panchgavya in all the treatments showing better fodder quality. However the panchgavya in presence of angara produced lowest leaf : stem ratio and highest fodder yield.

Thus, an improvement in fodder yield of sorghum and its quality under Vedic treatments particularly angara with panchgavya spray confirms their potential for plant growth and production. The reasons for yield enhancement can be ascribed to the changed soil biology and its improved function due to these amendments reported in the previous issue of this newsletter.

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(S.B. Tripathi and M.S. Sharma)
Comparative Performance of Oat and Barley under in-situ Grazing

Oat and barley are two most important cereal fodder crops of rabi season in North, Central and Western Zone of the country. The performance of these two crops when subjected to grazing is not properly understood so far. Since both oat and barley are grown in the same season, it was thought desirable to study the relative performance of both crops as influenced by in-situ grazing.

Oat (JHO-822) and barley (K-508) were sown in three ha area of mixed red & black soils at IGFRI farm as nutritional supplement for grazing livestock. The soils are low to medium in organic carbon (0.47-0.64 %), low in available nitrogen (144-172 kg/ha) and medium to high in available potash (180-281 kg K,0/ha). Two irrigations were provided to both the crops and other recommended package of practices were followed. Both the crops were subjected to in-situ grazing 60 days after sowing for a period of one week.

Results show that the plant height and number of tillers were significantly influenced due to grazing in both the crops. Obviously, grazing resulted in shorter plants compared to no grazed plots. Grazing induced higher number of tillers in barley (20.04) compared to no grazed plants (11.84). The same trend followed in oat crop too. In grazed plots the total straw yield was quantified taking into account the biomass accumulated till the period of grazing and the biomass of re-growth thereafter. The total straw yield differed significantly in both the crops with regenerated shoots of barley producing about 36% higher straw yield, probably due to resultant higher number of tillers induced due to grazing. The grain production from regenerated shoots of barley (2.5 t/ha) was significantly higher compared to oat (2 t/ha). The grain yield of both the crops was higher from the no grazed plots with barley producing higher grain yield over oat. In general, the total biomass (grain+ straw) was found to be significantly higher in barley over oat in no grazed plots. However, the total biomass didn't differ significantly due to grazing/no grazing.

The perusal of data on crude protein yield indicated higher crude protein yields in barley (15% grazing; 24% no grazing) compared to oat. Based on the preliminary investigations, it could be concluded that the performance of barley was better in terms of quantity as well as quality when subjected to in-situ grazing.

Comparative performance of oat and barley as influenced by grazing

<table>
<thead>
<tr>
<th>Crop</th>
<th>Plant height (cm)</th>
<th>Tillers (number)</th>
<th>Straw yield (DM t/ha)</th>
<th>Grain yield (t/ha)</th>
<th>Total biomass (straw + grain)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grazing</td>
<td>No grazing</td>
<td>Grazing</td>
<td>No grazing</td>
<td>Grazing</td>
</tr>
<tr>
<td>Oat</td>
<td>97.48</td>
<td>125.4</td>
<td>9.4</td>
<td>6.4</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>(0.92+3.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>67.76</td>
<td>106.4</td>
<td>20.04</td>
<td>11.84</td>
<td>7.08</td>
</tr>
<tr>
<td></td>
<td>(4.28+2.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>No/Grazing</td>
<td>*</td>
<td>*</td>
<td>NS</td>
<td>1.38</td>
<td>0.77</td>
</tr>
</tbody>
</table>

(G. Suresh, P.S. Pathak and B.K. Trivedi)
Gujarat Forage Bajra-1: A Recently Released Variety

A local genotype Rajka Bajri, popular among farmers as multicut type was maintained at Main Forage Research Station, A.A.U., Anand. After the rigorous evaluation from this collection, population improvement programme was followed. This variety, Gujarat Forage Bajra 1 (AFB-2) was tested in state as well as national level under multicut management and found superior over checks. It has recorded 8.6 to 20.3 per cent higher GFY and 23.7 to 38.0 per cent higher DMY over the check varieties and also synthesized higher crude protein yield as compared to local check variety Rajka Bajri and national check variety Giant bajra. As a result of these trials the variety is recommended for summer forage bajra growing areas of Gujarat state. It grows very fast and has profuse tillering capacity in competition to local cultivars. It is suitable for four to five cuts. The pests and disease incidence was also found negligible in this variety. It is best suited in lighter type of sandy and sandy loam soils.

(H.P. Parmar, M.K. Gangani, C.C. Patel and P.C. Patel)

Forage Sorghum: A Potential Cereal for Higher Forage Yield and Quality Under P and S Fertilizer

Results of a field trial conducted in 2003 at Anand indicated that forage sorghum variety SSG 59-3 produced 11.8 and 21.5% higher dry matter (DM) and crude protein (CP) yields, respectively over the hybrid GFSH-1 in total of two cuts. Application of 40 and 80 kg P, O3/ha significantly increased green forage (GF), DM and digestible dry matter production of forage sorghum over control. Application of 20 and 40 kg S/ha significantly enhanced GF and DM yields over control. Application of 20 kg S/ha to forage sorghum SSG 59-3 recorded maximum DM (136.4 q/ha) and net incremental cost benefit ratio (net ICBR; 1:4.42). Moreover, SSG 59-3 also matured 13 days earlier than hybrid GFSH-1 and had higher tillers with thin stem. The seed production technology of SSG 59-3 is simple and cheaper as compared to GFSH-1. The seed requirement of SSG 59-3 is low (15 kg/ha) due to smaller seed size. The interaction of P (40kg) + S (20kg) recorded higher GF (559 q/ha) and showed higher net ICBR (1:7.93) as compared to higher GF yielding interaction P (80kg) + S (40kg), P (80kg) + S (20kg) net ICBR; 1:4.24 & 1:3.94, respectively.

(P.C. Patel and A.V. Kotecha)

Occurrence of Entomopathogenic Nematodes in Jhansi

A survey was conducted at 25 locations in and around Jhansi for soil dwelling entomopathogenic nematodes (EPN). These soil samples were kept individually for soil baiting under laboratory conditions. The trap insects used were the final instar larvae of greater wax moth, Galleria mellonella. Positive response was noticed in one baiting trap where G. mellonella larvae was found to be infected with EPN of Steinernema species. This is the first report from Jhansi.

(N.K. Shah, M.I. Azmi and P.K. Tyagi)
Mycorrhizal Diversity of Fodder Trees under Silvopastoral Systems

Mycorrhizae are associations between higher plants and fungi and are usually beneficial. Vesicular arbuscular mycorrhiza (VAM) occur in the roots of most crop species. Species diversity of VAM associated with 20-year old fodder trees in five silvopastoral systems viz., Acacia tortilis + Cenchrus ciliaris, Leucaena leucocephala + Panicum maximum, Hardwickia binata + Sehima nervosum, Albizia amara + Cenchrus ciliaris, Albizia lebbeck + Sehima nervosum was studied at IGFRI. Eight species, belonging to four genera of VAM/AM were found to be associated with five species of fodder trees. Glomus appeared to be most dominant genus followed by Gigaspora, Acaulospora and Sclerocystis, Glomus fasciculatum occurred more frequently than any other species (absolute frequency (AF) 50.0, relative frequency (RF) 22.8) followed by Gigaspora margarita (AF 40.5, RF 18.5), G. gigantea (AF 30.5, RF 13.9), G. mosseae (AF 30.5, RF 13.9), Acaulospora spineaes (AF 25.0, RF 11.4), G. aggregatum (AF 20.5, RF 9.3), G. constrictum (AF 12.5, RF 5.7) and Sclerocystis spp. (AF 10.0, RF 4.5), indicating the species preference to this particular tree under degraded habitat. The spore density and percent colonization of VAM fungi at 30-cm depth in different tree species were studied. L. leucocephala was found to support highest species diversity as well as proved to be most efficient host of VAM spp. especially G. fasciculatum.

Species diversity of VAM/AM fungi associated with fodder trees

<table>
<thead>
<tr>
<th>Tree species</th>
<th>Mean spore density (No./100g soil)</th>
<th>Mycorrhizal Colonization (%)</th>
<th>VAM species diversity (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. leucocephala</td>
<td>200±87</td>
<td>79</td>
<td>2.63</td>
</tr>
<tr>
<td>A. amara</td>
<td>170±65</td>
<td>40</td>
<td>1.05</td>
</tr>
<tr>
<td>A. lebbeck</td>
<td>197±61</td>
<td>52</td>
<td>1.72</td>
</tr>
<tr>
<td>Hardwickia binata</td>
<td>118±49</td>
<td>35</td>
<td>1.44</td>
</tr>
<tr>
<td>A. tortilis</td>
<td>167±61</td>
<td>43</td>
<td>1.04</td>
</tr>
<tr>
<td>Control</td>
<td>39±13</td>
<td></td>
<td>0.63</td>
</tr>
</tbody>
</table>

(N. Hasan, G. Suresh and T.A. Khan)

In vitro Efficacy of Natural Antagonists against Rots of Cowpea

The disease management through ecofriendly approach using natural antagonists has become inevitable component of integrated disease management strategy because of limitation of pesticides and its hazardous impact on environment. In order to control the rots of cowpea i.e. root rot (Rhizoctonia solani) and dry/stem rot (Macrophomina phaseolina) through biological agents in vitro screening of native rhizospheric antagonists (Trichoderma spp. and Aspergillus spp.) was made. Study revealed that antagonists considerably inhibit the growth of both the pathogens under laboratory conditions. Isolates of T. harzianum (T1, T2 & T3) were most effective against these pathogens. They inhibit radial growth by 95, 91 and 81% of R. solani and 94, 84 and 86% of M. phaseolina. Isolates of T. viride were at par with T. harzianum while isolates of T. koningii and T. pseudokoningii did not show any measurable effect. Isolates of A. niger (A1, A2, A3 & A4) and A. flavus (A5, A6 & A7) also inhibit the growth of pathogens. Among Aspergillus, isolate A1 was the most effective with 77 and 76% inhibition over control with total inhibition of sclerotial production in R. solani and M. phaseolina, respectively.

(Rashmi Nigam and Pradeep Saxena)
Land Use Systems Impact Soil Meso Fauna

Deteriorating soil health is emerging as major concern on account of land degradation. Soil biota dynamics and diversity play a key role in maintaining soil productivity and there are opportunities to manipulate their population for a better soil health.

A three year study on the spatial pattern and seasonal population built up of soil meso fauna (collembola and mites) in different land use systems under semi arid rainfed situation has indicated that while natural grassland supported highest species diversity, leucaena plantation supported highest population built up of major species. The population built up was higher by 353.75, 256.64 and 122.54 per cent over the control (bare land) in leucaena plantation, silvipasture and natural grassland, respectively. The trend of population built up in different seasons was directly influenced by the population dynamics of micro flora as their food resource. There was also a significant positive correlation with soil moisture and relative humidity and a significant negative correlation with air and soil temperatures.

The litter mass loss of respective systems in different periods of year showed a positive trend with the population built up of meso fauna, suggesting their potential role in maintaining soil nutrient dynamics.

The present study indicates that activities of these organisms may be better managed for promoting sustainable production in semi arid rainfed situations.

A committee constituted by the ICAR under the Chairmanship of Dr. S. A. Patil, Vice Chancellor, UAS Dharmawad and Dr. S. Rai, Ex-ADG, Dr. G. P. Lodhi, Ex Dean, HAU Hisar, Dr. S. N. Shukla, ADG (F&FC) and Dr. P.S. Pathak, Director, IGFRI as members visited WRRS, Avikanagar. Dr. R. K. Jain, Officer Incharge, briefed about the achievements of the center. The term of reference for the team was to suggest the alternate site for this center.

(SEED CORNER)

RRS, Avikanagar is producing the TFL seed of range grasses viz. *Cenchrus setigerus* and *C. ciliaris* since last 15 years. The centre has produced and supplied about 17 tones of range grass seed till date, to various developmental agencies and research organizations.

At present about 27 quintals of grass seed is available for sale @ Rs.150/kg for *Cenchurus setigerus* and Rs.200/kg for *Cenchrus ciliaris*.

Please contact Officer Incharge, RRS, IGFRI, Avikanagar (Malpura, Distt.- Tonk) Via-Jaipur-304.501 (Rajasthan)
Phones : 01437-220170 (O); 220243 (R)
email: rkjain@cesri.raj.nic.in
A Krishak Goshthi was organized at village Pindari of Jalaun district of UP on Nov. 6, 2004. Sri Uday Singh Pindari, a farmers' leader and progressive farmer of the area was chief guest of this function. A large number of farmers from nearby villages, Birguna, Piraua, Chamari, and Jakhauti participated in this program. Seeds of IGFRI developed varieties of Berseem and Oat were distributed among participating farmers.

Kisan Chaupal organized by District Science Club, Jhansi were attended by Institute scientists as resource persons for crops/fodder production and its utilization. The Chaupals were organized at village Bamhori (Mauranipur), Jhansi on Dec. 19, 2004, Ninora, Lalitpur on Dec. 22, 2004 and Bamhuri (Tahrioli), Jhansi on Dec. 24, 2004.

A training program for farm women on agricultural technologies with special reference to drudgery reducing tools under IVLP/NATP program at village Sanora of Datia district of M.P. was organized on Nov. 27, 2004. About 50 farm women from different villages attended this programme. Some important hand tools were distributed.

A Mahila Krishak Goshthi was organized at the institute on Dec. 24, 2004 under IVLP/NATP program. About four hundred farmwomen from villages of M.P. and U.P. part of Bundelkhand region participated in this Gosthi. Mrs. Aparna U., IAS was the chief guest of the function. A visit to the central research farm of the institute, exhibition of fodder technologies, question answer sessions and lecture cum demonstrations were organized.

Retirement
Sri G.P. Veerak
Asstt. Administrative Officer,
IGFRI retired on Dec. 31, 2004

We wish him a happy & healthy life.

Season's Greetings and Best Wishes for
a
Happy New Year

Editorial Team
Grassland & Fodder News