The NEW YEAR began with a very happy note at IGFRI. Encouraged by the work on Jaivik Krishi (Grassland & Fodder News 2004, September & December issues, Vol 10: 2, 3 & 4) conducted as pilot trial, our scientists decided to organize a Brain Storming session on the 1 January, 05 on the theme of 'Soil Biology, Fertility and Sustainability'. We have consolidated the researchable issues based on the points emerged. These will be crystallized as research projects in multidisciplinary mode to establish benchmarks - marks for the ecoagriculture. It is expected to create a solid base for the organic farming or the Jaivik krishi in future.

The workshop on Fodder Innovations was organized by ILRI during the month of February at ICRISAT, Hyderabad, which was attended by me. The issues pertaining to the three outputs on information systems, seed multiplication and delivery systems and multi-stakeholder alliances were discussed and crystallized to assist the farmers in fodder production and supply in the existing farming and cropping systems.

Results on the Jaivik - Krishi experiments conducted at Jhansi and Avikanagar on the crops like barley, lucerne, mustard, tomato show their promise in increasing the grain and husk yield. Role of Panchagaviya for seed priming and foliar spray has shown its effect as a hormone in boosting the yield and also affecting the population of soil borne organisms. The effect of Vedic - Krishi formulations viz., Angara and Amritpani in combination and alone with Panchagaviya primed seeds is again established as observed in the kharif crops. This confirms the value of such treatments for enhancing the production.

It is said that organic products are safe, clean and more healthy. It has been indicated by a study on feeding trial of lactating cows. It shows that long term feeding of organic fodder has not only role in better growth of animals, but the protein rich fodder of high digestibility and nutrition affects the reproductive performance. It is noteworthy that these studies are expected to open up new horizons of research for a better human nutrition.

These studies are showing very encouraging results and appear to hold promise for the future. It is now required that we evaluate the chemical and biological properties of the amendments to fix their ingredients, doses and the processes. The success of these studies rests with the interdisciplinary work which has been the way of working at this institute. The future appears to be very bright.
Fodder Innovations Project to Increase Livelihoods of Poor

ILRI organized a National Workshop on Fodder Innovations Project on February 25, 2005 at ICRISAT campus, Hyderabad. The Fodder Innovations Project is a DFID-supported multi partner learning initiative. Its main objective is to improve the livelihoods of poor livestock keepers by increasing the productivity of their livestock and sustainability of their farming systems through adoption of fodder innovations. The Project entails full participation of farmers, local communities and change agents.

The workshop was attended by representatives from IGFRI, IIM, Ahmedabad, SPWD, NDDB, CRIDA, NRSC, NABARD, Indo Swiss Project, Swiss Development Cooperation, ICRISAT, AP Rural Livelihood Program and other NGOs.

The Project Manager Dr Peter Bezskorowajnyj highlighted the objectives and approach of the project. It was followed by core partners’ presentations on the progress of the project at different project districts. The presentations referred to the food, feed, fodder interventions at project sites and farmers perceptions on these interventions. Later, the visiting Scientist Dr V L Prasad facilitated a plenary discussion during which partners identified and resolved following issues.

Information Systems
- Appropriateness of information and farmers’ information requirement
- Farmer to farmer extension
- Validating and documenting farmers’ successful experiences
- Documenting migratory routes and water resources
- Use of traditional media for information delivery
- Testing information material with user groups
- Timeliness of information delivery
- Information and material could originate from farmer as also the form in which it is to be presented
- Information should be need based and appropriate for a particular situation so it will vary from place to place

Seed Multiplication and Delivery Systems
- Community based seed production systems supported by an assured buyback mechanism
- Demand driven seed production systems
- Biodiversity to meet complexity in seed needs and to address farmers’ vulnerabilities
- Self help groups/Dairy Cooperative Societies producing seeds backed up by buyback mechanisms
- Quality assurance of seeds from individual producers and market
- Building on the past experience and expertise of seed production e.g. Guntur Milk Union
- Document the available information on seed production, preservation and distribution on the project sites
- Making resources available to farmers from April to June to procure fodder and to cope with drought situation
- Strategic requirement of farmers in crisis (like in Anantapur)

Multi-stakeholder Alliances
- Make an inventory of peoples' organizations like Cattle Breeders Association, Sheep Breeders Cooperative, etc.
- Defining roles of various “actors” NGOs, donors, livestock keepers, keepers’ organizations, departments
- Synergies between various schemes/programmes to be established (policy level)
- Trust building experiences as one way of establishing multi-shareholder alliances
- Local leaders
- Veterinary and AH departments to recognize community based organizations
- Define the characteristics of those organizations for whom AH department is providing services
Brain Storming Session on Soil Biology and Fertility for Sustainable Production

The recent threats of declining land productivity and inadequate response of inputs in terms of the outputs on account of deterioration in soil health underline the need for maintenance of soil ecosystems and monitoring of soil health. The biological activities of soil are interlinked with the maintenance of soil structure and productivity. Therefore, the sound understanding of various aspects of soil flora and fauna in maintenance of soil fertility in fodder production systems is vital.

A brain storming session was organized on Soil Biology and Fertility for Sustainable Production on January 1, 2005. Dr. P.S. Pathak Director, IGFRI stressed the need to analyse various factors influencing soil biology and fertility and the research efforts required in this area to further strengthen the ongoing research programmes in the coming years.

Seven speakers highlighted the importance of various soil biota viz., earthworms (Dr. S.A. Faruqui), microbes (Dr. M.R. Pahwa), arthropods (Dr. Sharmila Roy), maintenance of soil fertility and related aspects viz., potential role of organic matter (Dr. S.B. Tripathi), soil enzymes in fertility maintenance (Dr. S.K. Das), concept of organic fodder and livestock (Dr. Sultan Singh) and carbon sequestration (Dr. R.K. Bhatt). It was followed with detailed discussions to conceptualize the research issues.

Issues

- Soil microbial biomass in various fodder production systems is an indicator to depict changes in soil fertility in a relatively shorter period than through assessment of soil organic matter.
- The dynamics of soil arthropods is closely related with soil properties and management; such information may be used to develop a bio-indicator system of soil health in fodder production systems, especially on nutrient poor soils.
- The earthworm populations are known to respond positively to various conservation practices in agriculture in a relatively much shorter time frame (1-2 years). The management practices that encourage earthworm population need to be promoted in fodder production systems.
- As the soil enzymes are the mediators and catalysts of most soil processes, they along with soil respiration have potential to provide an integrative assessment of soil health. Also on account of more precision in their measurement, they may serve as a superior indicator than measurement of microbial biomass.
- The other agent viz., VAM, nematodes, termites co-existing with the other organisms facilitates soil functions and in turns the fertility.

Research initiatives required

- Develop multidisciplinary projects through team approach based on local and regional priorities in a systems mode.
- Standardize benchmarks for different groups of soil biota in fodder production systems for general screening of soil health.
- Identify specific soil enzymes for different land uses for serving as the most useful diagnostic indicator.
- Develop bio-indicators that are easy to use under field conditions and assessable by both specialist and producers and cover a range of ecological and socio-economic conditions.
- Coordinate development of standards for soil quality/health by the agencies and interest groups involved in agriculture, environment, resource conservation, etc. to assess sustainability parameters with time.
- Apply the above knowledge for managing eco-agriculture with minimum external inputs for a sustainable production of quality products.
- Basic research addressed to below ground biodiversity and its relationships to support sustainability.

SEED CORNER

IGFRI Jhansi and its Regional Research Stations located at Dh Ward (Karnataka), Avikanagar (Rajasthan) and Palampur (Himanchal Pradesh) are producing the TFL seed of various fodder crops and range species.

The seeds are sold to the farmers, NGO's, Govt. Departments, Dairy Cooperatives, etc. to promote improved varieties of forage crops.

Seed available for sale at IGFRI, Jhansi
- 20 quintals of sorghum PC-6 variety
- 2 quintals of Dencha (green manuring crop)

Please contact:
Director, IGFRI, Jhansi
Ph.: (0517) 2730666, Fax: (0517) 2730833

Seed available for sale at IGFRI, RRS, Avikanagar
25 quintals of grass seed: Cenchrus setigerus @ Rs.150/kg
                    : Cenchrus ciliaris @ Rs. 200/kg for.

Please contact:
Officer Incharge, RRS, IGFRI,
Avikanagar (Malpura, Dist.-Tonk)  
Via- Jaipur - 304 501 (Rajasthan)
Phones: 01437-220170 (O); 220243 (R)
The excessive use of pesticides has led to environmental pollution, threat to biodiversity, and residual toxicity. With a view to find suitable alternatives, the experiments were conducted at Regional Research Station, Avikanagar to evaluate the potentials of the vedic / organic formulations. The Panchagavya was provided by IGFRI, Jhansi and the commercial Gomutra formulation was procured from, Goshala Durgapura (Jaipur).

**Effect on Mustard production**

Mustard crop is damaged by aphids and white rust. The effect of organic formulations was studied on mustard variety RS-30.

Two sprays were applied after 30 days of sowing at the interval of 21 days. Significantly higher grain yield (37.6% and 35.4%) was obtained with the application of Panchagavya + CuSO₄ and Gomutra + CuSO₄ respectively over the control. The appearance of the aphids and white rust was also comparatively less in the treated plots. The overall plant height was higher in the organic treated plots as compared to control and Monocrotophos treated plots. Thus, use of organic formulations would be beneficial in mitigating the deteriorous effects of pest and disease and an alternative for pesticides to conserve biodiversity and ecofriendly sustainable production.

**Effect on Lucerne fodder production**

Lucerne is seriously damaged by lucerne weevil and other pests and diseases including lucerne rust. Since the crop is cut and fed to animals, the use of pesticides lead to harmful effects on the animals and their products. Therefore, an effort was made to use the vedic / organic formulations to see their effect on lucerne (var. T9) production and management of pest and diseases.

Seed soaking with Panchagavya and Gomutra solution (10%) for 12 hours was done before sowing the seed and no inorganic fertilizer was applied in the experimental field. However, FYM equivalent to 20 kg N/ha was applied at the time of field preparation. Three foliar sprays were done.

The data of four cuts revealed that all the treatments significantly increased the green fodder yield over the control. Highest green fodder yield 33.3 t/ha (49.63% increase over control) was recorded in the treatment with seed soaking in Panchagavya + Panchagavya foliar spray. Similarly seed soaking with Gomutra + foliar spray of Gomutra enhanced the green fodder yield (32.42 t/ha) (45.69% 49.53% increase over control). The higher green fodder yield was recorded in first and second cut in the treatments with seed soaking in either Panchagavya or Gomutra. The crop was comparatively free from insect / pests.

The beneficial effect of vedic / organic formulations was also observed on tomato crop at farmers' fields.

(R.K. Jain and R.P. Nagar)
Considering the beneficial effects of Jaivik amendments on the sustainable production of crop, Panchgavya was foliarly applied at vegetative and flowering initiation stage in Barley cv 2508 during rabi season (2004-05). The soil was sandy loam in texture neutral in pH was basally applied with nutrients (80 kg N and 40 kg P O ). The observations on plant height, ear length, number of seeds/ear, straw yield, seed yield and seed test weight were recorded. The results revealed that plant height increased by 10 cm over the control. The seed yield increased by 22.78\% in the Panchgavya treated crops over the untreated control crops (5.26 t/ha). The straw yield, number of seeds per ear, seed test weight and harvest index are also increased by 18.2, 5.5, 4.1 and 2.4 per cent, respectively in the Panchgavya treated crops. The results suggested that foliar application of Panchgavya has improved the source and its functioning for the maximization of photosynthetic production, which was efficiently translocated towards the sink in turn the higher grain yield.

![Graph showing the effect of foliarly applied Panchgavya on plant height, ear length, no. of seeds/ear and seed test weight in barley cv. 2508](image1)

![Graph showing the effect of foliarly applied Panchgavya on seed and straw yield of barley cv. 2508](image2)

(R.K. Bhatt and M.S. Sharma)

**Nutritive Value of Organic and Inorganically Grown Sorghum**

Sorghum cv. PC-6 grown under organic and inorganic agronomic practices was evaluated for its chemical constituents and in vitro dry matter digestibility (IVDMD) at green stage. For in vivo evaluation 12 milch cattle with a mean body weight of 312± 9.2 kg were selected; 6 each were fed organic and inorganically grown sorghum hay to assess their relative impact on feed intake, nutrients digestibility and milk composition. The CP content of organic sorghum was higher (10.82 and 6.9\%) than inorganic (8.94 and 6.13 \%) both at green and hay stage, respectively. The accumulation of fiber (NDF, ADF and cellulose) was 3-4 units less in organic vis-a-vis inorganic sorghum. The lignin contents of organic and inorganic sorghum were 4.31 and 5.82 at green and 5.54 and 6.79 \% at hay stage indicating lower accumulation of lignin in organic than inorganic sorghum. IVDMD (\%) was 4 units more in organic than inorganic sorghum.

Dry matter intake (\% body weight and g/kg ) was comparable in the animals fed organic (2.37±0.16 and 99.61±3.94) and inorganic sorghum (2.35±0.23 and 98.93±7.68). However, the digestibility (\%) of DM, OM, CP, NDF and cellulose was higher (non-significantly) in animals fed organic (50.91±1.51, 53.54±1.40, 35.50±2.02, 43.90±1.50 and 56.31±1.60) vis-a-vis inorganic (47.52±0.83, 50.14±0.75, 33.84±2.10, 46.71±0.86 and 53.08±0.92). The digestibility of hemi-cellulose was significantly (P<0.05) higher in organic (60.71±1.11) than inorganic (56.38±1.04 \%). The milk constituents (fat, protein, TSS and SNF) were identical in animals fed organic and inorganic sorghum.

The most interesting finding was recorded on the reproductive performance of animals, where 50\% of the animals fed organic sorghum came into heat, while none of the animals fed inorganic sorghum showed the estrus symptoms. The results of the present study show a ray of hope that organically grown fodders could be more nutritious, more digestible and above all improves the reproductive efficiency of animals.

(Sultan Singh and G. Suresh)
Barley grains are generally used in industry and also as concentrate to feed animals. The use of vedic treatments in organic farming are expected to be helpful for higher yield and quality. A field study was undertaken with soil application of various sources of vedic amendments (Angara, Amritpani and Amritpani + Angara and control) and seed priming with panchgavya and ordinary water on barley crop.

The grain yield of barley increased to the extent of 10.5-16.0 percent due to seed priming with panchgavya over no panchgavya. However the highest percent increase (16.0%) was showed when panchgavya primed seeds were sown in angara + amritpani treated plots followed by amritpani treated plots (13.2 %). The production potential of barley crop with soil application of angara, amritpani and angara + amritpani was recorded to be 33, 25 and 26 percent higher over control (28.81 q/ha) with sowing of panchgavya treated seeds and 33, 22 and 20 percent higher over control (26.06 q/ha) with sowing of water treated seeds, respectively. Overall the use of panchgavya treated seeds produced grain yield of barley by 12.7 percent compared to water treated seeds. Irrespective of seed priming with water and panchgavya, the grain production of barley was maximum under angara followed by angara + amritpani. As regards yield attributing characters are concerned, the plant population per running metre, plant height, leaf length and seed test weight was highest with the use of panchgavya treated seeds sowing particularly under soil application of angara. The next in the order was angara + amritpani. The microbiological studies related to microbial population, biomass carbon and activity have supported production data (Table-1 and 2). The study thus suggests that the seed priming with panchgavya for the sowing and use of amendments like angara improve crop yield.

Table 1. Periodical change in fungi (x 10'), actinomycetes (x 10') and bacteria (x 10')

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Fungi</th>
<th>Actinomycetes</th>
<th>Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>W 3 P 4</td>
<td>W 4 P 6</td>
<td>W 5 P 7</td>
</tr>
<tr>
<td>Angara</td>
<td>W 6 P 8</td>
<td>W 8 P 12</td>
<td>W 10 P 15</td>
</tr>
<tr>
<td>Amritpani</td>
<td>W 8 P 12</td>
<td>W 12 P 16</td>
<td>W 10 P 15</td>
</tr>
<tr>
<td>Angara + Amritpani</td>
<td>W 9 P 15</td>
<td>W 15 P 20</td>
<td>W 10 P 15</td>
</tr>
</tbody>
</table>

Table 2. Periodical change in soil microbial biomass (mg C/kg soil) and microbial respiration (mg CO₂-C/kg soil) in soil.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Microbial Biomass</th>
<th>Microbial Respiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>W 181.8 P 218.1</td>
<td>W 81.8 P 173.9</td>
</tr>
<tr>
<td>Angara</td>
<td>W 230.3 P 290.8</td>
<td>W 103.6 P 181.2</td>
</tr>
<tr>
<td>Amritpani</td>
<td>W 368.4 P 448.4</td>
<td>W 165.8 P 203.9</td>
</tr>
<tr>
<td>Angara + Amritpani</td>
<td>W 399.4 P 479.9</td>
<td>W 152.7 P 215.9</td>
</tr>
</tbody>
</table>

W: Water; P: Panchgavya; D: Soil sampling on 18 Oct. 2004; D: Soil sampling on Jan. 5, 2005

(S.B. Tripathi, M.R. Pahwa and M.S. Sharma)
Severe Incidences of Sclerotium Root Rot of Berseem (Trifolium alexandrinum)

Berseem root and stem rot caused by mixed Rhizoctonia solani, Fusarium semiactum in association with nematode, Tylenchorhynchus vulgaris and Sclerotinia trifoliorum have been reported from many parts of the country including Bundelkhand region of UP. The root rot due to Sclerotium rolesi occurred in severe form in berseem growing fields of central research farm of the Institute. Profuse growth of the fungal mycelium and sclerotia were seen in the root region of the infected plants. Isolation on culture media, Potato Dextrose Agar medium yielded pure culture of Sclerotium rolfsi with profuse growth of white cottony mycelium and black coloured round shaped sclerotia. Although this disease occurred in all the berseem fields, but maximum incidence (20-30%) were in black soil field compared to light soil (red) fields (5-10%). The disease started appearing in the second fortnight of March 05. The last cut suffered maximum loss of green fodder yield due to the occurrence of this disease.


Lucerne Weevil Damage in Shaftal

The Lucerne weevil, Hypera postica (Coleoptera : Curculionidae) has been considered as most damaging pest of Lucerne particularly in northern, north-western part of country. The grubs feed on young leaves during December-March when the temperature is low. The weevil is of common occurrence in Medicago species. During January-February, 2005, the Lucerne weevil damage has been seen in several lines of shaftal (Trifolium resupinatum) grown at experimental farm of IGFRI, Jhansi. The tiny grubs (1-2mm) feed on the young folded leaves and make small shot holes. This is the first report of occurrence of Lucerne weevil on shaftal from this area.

(K. C. Pandey, D. R. Malaviya and A. K. Roy)

IGFRI - Transfer of Technology

Krishi Vigyan Mela

A three day Krishi Vigyan Mela was organized by IGFRI, Jhansi at the Institute campus from Feb. 11-13, 2005. The event was inaugurated by Dr. S.N. Shukla, ADG (FFC), ICAR and was presided by Dr. P.S. Pathak, Director, IGFRI. On this occasion an Agriculture Exhibition was organized and was inaugurated by Dr. N. Balraman, Vice Chancellor, TNAU, Chennai. A Kisan Gosti was also organized on Feb. 12, 2005, which was presided by Dr. K.R. Solanki, ADG (AF), ICAR, New Delhi.

Exhibitions Participated

IGFRI, Jhansi participated in the agricultural exhibitions at:
CSAUT, Kanpur Campus, Bharari Farm, Jhansi on 21.03.2005
Central Institute of Subtropical Horticulture, Lucknow on 26.02.2005

Kisan Mela Participated

RRS, IGFRI, Avikanagar participated in Kisan Mela and Pashu Vigyan Pradarshani organized by CSWRI, Avikanagar. The exhibition was awarded first prize.

Farmers Training

Training cum demonstration of farm implements and machinery was conducted at village Ishagarh - Behra on 19th March 2005. Series of lectures and live demonstration of use of implements and farm machineries were conducted in the farmers' field.
The RAC meeting of IGFRI and NRCAF was held from March 2-3, 2005 under the Chairmanship of Dr. S.A. Patil, VC, UAS, Dharwad. The members of RAC are Dr. G. Vijay Kumar, Dr. R.C. Thakur, Dr. Arun Varma, Dr. R.S. Dhanda, Dr. J.P. Chandra, Sh. Zafar Akhtiar, Sh. Ravindra Shukla, ADG (FFC), ICAR and ADG (Agroforestry), ICAR.

Dr. P.S. Pathak, Director, IGFRI presented IGFRI Vision 2020. Similarly, Dr. P. Rai, Director, NRCAF presented Vision 2020 of the Centre.

The RAC recommended that

- Top feed / and silvipasture work should be further strengthened at IGFRI.
- Summarize economic capsules through technology to be taken to the farmers.
- Technology spread / adopted.
- Research has to be result oriented and relevant to farming community.
- Codex standards - as per WTO be considered for adoption.
- Small ruminants rearing models for various regions of country be developed.
- Clonal multiplication of MPTS emphasized.
- Gender related issues to be incorporated.
- Network project on fodder.

- The focus on grassland should be increased and a section on environmental issues and basic research should be created.

IGFRI organised National Seminar on Animal Feed Science and Technology in Indian Perspective from Feb. 12-14, 2005


Republic Day Celebrations - 2005