As informed to you earlier, in order to crystallize projects on soil biology, fertility and sustainability and the ecoagriculture, we conducted our Staff Research Council meetings during May, 2005. In order to provide a proper framework for the future ecological agriculture, we also initiated a project on grassland biodiversity and have planned to establish a Biodiversity Park. These initiatives are being taken to lay a solid foundation for the organic forage production research.

Jhansi was well known in the historical past for grasslands, grass hay and its business. It is also felt that establishment of IGFRI was a step forward in this direction by the Govt. of India during 1962. The history of grass hay as an enterprise at Jhansi is presented based on available information to understand its significance. Our initiative at understanding the organized grazing paddocks systems of Tamilnadu at Kangeyum also throw light on the socio-economic perspectives of grasslands in the dry zones. The key issues of management controlling its productivity and sustainability as understood are sure to help in its future management policy formulation. The future of grasslands as a land use system depends upon their proper understanding.

In past five years, at least three years have been with scanty rainfall. Some of the range grasses viz., Pnicum antidotale are found ideal on the raised bunds in the semi-arid climates at Avikanagar for not only protecting the bunds but also producing fodder for livestock. The IGFRI bund technology with proper grass and legume species has a great future for improving the fodder supply in the dry climates even in the years with erratic monsoon. We also find that our initiative for perennials viz., stylo, hybrid napier, guinea grass, Leucaena as potential source for fodder in such climates is meeting with success in the farmers’ fields.

The initiatives taken during the last year on organic agriculture or Jaivik krishi are continuing with many good results to prove their worth. In this issue also results of Panchgavya application on wheat and berseem are encouraging. The long term effects of applying Angara and Amritpani in the soil and also the crop growth are expected to help in formulating the guidelines for ecoagriculture. Biomass management for livestock and soil and intensive study of their nutrient cycling are bound to show promise. It is expected that only through these initiatives it will be possible to evolve clean development mechanisms for sustained growth of land productivity.

During this period, we also organized the working group meeting of AICRP (FC) at Dharwad for the khairf. Reports are presented in this number. Several new varieties have been identified for use at regional and national level.

The diversity of initiatives are bound to provide firm footing for fodder research and development to sustain the rural livelihoods. Livestock based farming systems are key to rural prosperity and gainful self employment where fodder / grazing resource is the key. Let us commit ourselves to research and development on forages.
National Group Meet of AICRP (FC): Kharif 2005

The National group Meet of All India Co-ordinated Project for Research on Forage Crops (AICRP-FC) for kharif 2005 was held at University of Agricultural Sciences, Dharwad (Karnataka) from May 5-7, 2005. The meeting had two broad objectives (1) the discussions on results of the experiments conducted during rabi 2004 and (2) to formulate the technical programme for kharif 2005. In this meeting, more than 110 delegates including Scientists from Coordinating and Collaborating Centres of the SAUs/ICAR Institutes, Professors/Researchers from UAS, Dharwad, Development professionals, and the personnel from Department of Animal Husbandry & Dairying, NDDB, and NGOs participated.

Dr. S.A. Patil, Vice Chancellor, UAS, Dharwad was the Chief Guest of the function. In his inaugural speech, he provided an exhaustive account of the agricultural scenario and forage status in the country as a whole and in southern peninsular states in particular. He enlightened the participants about the new challenges related to genetic resource upgradation and the development of the varietal and production technologies. The meeting was presided over by Dr. P.S. Pathak, Director, IGFRI, Jhansi.

In total, six technical sessions i.e., Review of research activities, Formulation of technical programme (Forage Crops Breeding, Crop Protection and Agronomy & Soil), Discipline-wise presentation, Breeder seed production, Enhancing production and productivity of forages, and Present status and future possibilities of forage crop improvement in India with special reference to Southern States were organized.

The Plenary Session was Chaired by Dr. G. Kalloo, DDG (CS&H), ICAR, New Delhi. He called upon the scientists to come-out with feasible and economically viable technologies, which can help the Indian farmers to get maximum sustainable production. During this session, two catalogues on White clover and Cluster bean developed by IGFRI, RRS Palampur and Avikanagar, respectively were released by the Chairman.

The Varietal Identification Committee meeting was held under chairmanship of Dr. G. Kalloo. In all five varieties proposals in five crops namely, oats, cowpea, Anjan, maize and pearl millets were submitted to the committee. Finally three varieties viz., Bundel Jai 2001-3 (JHO 2001-3) in oats, Bundel Anjan-3 (IGFRI-727) in Anjan grass developed by IGFRI and variety UPC-618 in cowpea developed by GBPUAT were identified for release.

New forage cowpea UPC-618 variety developed

A new variety of forage cowpea UPC 618 developed at GBPUAT, Pantnagar has been recommended for release and cultivation in the north-west, north-east and central zones of the country in the Group Meet of AICRP (FC) for kharif 2005 at UAS, Dharwad. The yield potential of this variety is 35-40 t/ha green fodder and 4.5-5.0 t/ha dry matter at 50% flowering stage. It has high dry matter digestibility (65-70%) and crude protein (15-17%), besides lower content of NDF and ADF. It is resistant to cowpea yellow mosaic virus, bacterial blight, collar/root rot, aphids and tolerant to wilt, anthracnose, nematode and pod borer under field conditions.

(J.S. Verma, GBPUAT, Pantnagar)
Vedic amendments and Panchgavaya use for higher seed yield of wheat

Fertilizer is a costly input in agriculture. There is need to practice other alternatives like Vedic amendments and Panchgavaya use in cropping system mode for minimizing fertilizer cost and optimizing production. Field experiment on evaluation of Vedic amendments like Angara, Amritpani, Angara + Amritpani and control (no amendment) with sowing of Panchgavaya and water primed seeds was evaluated under 50% organic and 50% inorganic source of nitrogen (applied @120 kg/ha) to wheat crop. The results indicated that the use of various Vedic amendments over control produced higher seed yield of wheat to the extent of 6-10 percent under sowing of Panchgavaya primed seeds and 4-7 percent under sowing of water primed seeds, respectively (Table). However, maximum increases were obtained under amritpani particularly in case of sowing of primed seeds with Panchgavaya. When compared seed yield with Panchgavaya over no Panchgavaya under different organic amendments, it was higher by 6,8,9 and 8 percent in control, Angara, Amritpani and Angara + Amritpani, respectively. The superiority of Amritpani was also observed in recording highest seed test weight of 10 percent (fig) with sowing of Panchgavaya primed seeds compared to water primed seeds (53.9 g/1000 seeds) and by 11 percent with seed priming of Panchgavaya over control (48.4 g/1000 seeds).

The study thus concluded that the sowing of Panchgavaya primed wheat seeds along with Vedic amendments like Amritpani could be practiced for higher grain yield.

Table: Wheat grain yield (q/ha) with Vedic treatments and seed priming with Panchgavaya and water

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Seed priming</th>
<th>Increase over Control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Panchgavaya (P)</td>
<td>Water (W)</td>
</tr>
<tr>
<td>Control</td>
<td>43.00</td>
<td>40.50</td>
</tr>
<tr>
<td>Angara</td>
<td>45.50</td>
<td>42.00</td>
</tr>
<tr>
<td>Amritpani</td>
<td>47.50</td>
<td>43.50</td>
</tr>
<tr>
<td>Angara + Amritpani</td>
<td>46.25</td>
<td>43.00</td>
</tr>
<tr>
<td>Mean</td>
<td>45.56</td>
<td>42.25</td>
</tr>
</tbody>
</table>

Panchgavaya spray for augmenting seed yield of berseem

Field experiment was initiated during rabi season with use of Panchgavaya and water spray on berseem crop at 40 days for seed production. The berseem seed was sown in standing paddy crop without given any tillage practices. The result showed that the berseem seed yield was 5 percent higher under Panchgavaya spray (Fig) compared to no Panchgavaya spray (5.97 q/ha). Similarly, seed test weight of 1000 numbers was higher by 8 percent due to spray of Panchgavaya over no Panchgavaya (2.80g/1000seeds).
Sustainable grassland based livelihood system of Kangaym: An Introduction

Kangayam tract of Tamil Nadu poses distinctive opportunity for the grassland researchers. It varies with the predominant farming system of the country. Livestock based cropping system, privately owned paddocks, the system of rotational grazing, grass-tree integration, small ruminant based livelihood system, continuous and varied live hedges and non prevalence of land fragmentation certainly makes this system special from the prevailing system elsewhere in the country. Terms like silvipasture management, rotational grazing, live hedges recommended as scientific inputs for sustainable management of pastures are being followed in this part of the country over the generations.

How did it happen? What is the grass and tree composition? What would be the prevailing livestock breeds? Is it external input based system? How much is the farmers' livelihood dependence on this? Is the area under paddocks shrinking over time? These are some of the questions that could arise for the researchers of grassland visiting Kangayam tract for the first time. These mind boggling yet scientific questions certainly tempted our Director who visited the tract in the year 2002-03. An multidisciplinary team was constituted under the leadership of grassland management scientist Dr. B.K. Trivedi, drawing specialists from animal science, social science and crop science.

Recording primary observations related to paddocks across the seasons, studying the prevailing live hedges, performance of small and big ruminants, collection of block level relevant secondary data, interviewing farmers of varied economic groups, interactions with the block level officials coupled with the literature collections were the methods followed to study the Kangayam paddocks. The team has visited the tract thrice in different seasons. Each visit was spread over to 10-15 days to analyse the performance of paddocks across the seasons.

The Kangayam tract is spread over five districts of Tamil Nadu namely, Erode, Karur, Namakkal, Dindigul and Coimbatore. Paddocks are concentrated heavily in four taluks of Erode and two taluks of Karur and are sparsely distributed in 3 taluks of Namakkal, 7 taluks of Dindigul and 4 taluks of Coimbatore.

Paddocks, live fencing, trees in between, pens, livestock, farm family and market are the components identified by the study group. These components are integrated in a simple yet sustainable mode.

Paddocks

Paddocks are privately owned i.e., owned by the individual farmer. Their average size varies between 2-4.5 ha. Soils of the paddocks are predominantly red loam and rich in Kanker gravel. Cenchrus ciliaris is the dominating species, though in total it has 43 herbaceous and 16 woody species. During good rainfall years, soil is disturbed by scultivating sorghum and Phaseolous tribulus, exclusively for fodder purpose. Inorganic fertilizer is not applied to the paddocks.

Trees

Grasslands are interspersed with Acacia leucophloea (Raunja) spaced 10-15 feet randomly. The trees provide shade to the animal and also act as a protein bank by supplying pods to animals during the months of February-March. The small farmers store the excess pods for off season feeding. The trees are felled every 10-12 years and fetch Rs.1200-1400 depending upon the age and girth of the tree. On an average 42-50 trees ha' are found. Trunks of trees are shaved to prevent pricking of thorns when animals rub against these trees and also to ensure straight growth.

Fencing

Every paddock has very well managed live fence, which is planted and managed over the generations. Balsamodendrum berryl, Agave americana, Cactus and Moringa oleifera are used for live fence, though the former is found more widely. Paddocks with B. berryl fencing indicate that they are oldest. While B. berryl are planted in two rows, Agave and Cactus are in single row. Pruning and gap filling are done in alternate year by planting the stem during June-July, which costs about Rs.3750-5000/ha towards labour charges.
Pens

A small enclosure measuring approximately 5x4.5 m² (for 30 sheep) is erected for keeping sheep. Pens are fenced either with live hedge of soft awned Acacia or dried coconut leaves twined together. Between mid November-mid January, they are covered with a polythene sheet to protect the sheep from dew in the night. Every evening sheep are herded into this enclosure after their day-long grazing in the paddocks.

Livestock

Small ruminants dominate in areas where concentration of paddocks is more. Mecheri sheep, native to the grassland are reared widely. This sheep apart from meat are valued highly for its hide. This region is the breeding tract of the famous Kangayam cattle known for its drought power. Of late, their numbers have declined considerably due to farm mechanization. Now crossbred cows have replaced the Kangayam cattle. The calculated value of adult cattle unit is 0.96 ACU ha⁻¹, indicating the optimum grazing pressure for sustainable management of paddocks.

Farm families

Over the generations the family size is consciously restricted either to 2+1 or 2+2 by majority of the farmers keeping in mind to maintain the size of the land holding owned by the family. This is followed irrespective of the gender of the children and caste. So land fragmentation in the area is negligible. Therefore, the productive size of the paddocks has been retained. The area where paddocks are found continuously and intensively, the utilization of family labour in livestock rearing is very less. Thus, each family invests labour in handloom weaving for certain parts of the year and earn additional livelihood. Farmers follow the rotational grazing and for four months (October-January) livestock is exclusively allowed to graze in the paddocks. The farmers reported that during this period animals maintain excellent health and productivity level. A farmer with 20 sheep is ensured with an income of Rs. 30000 even when computed at lower price. During remaining period, farmers follow mainly stall-feeding by utilising sorghum stover and hay of Phaseolus trilobus stacked for the purpose.

(B.K. Trivedi, S. Natraj, Anil Kumar and Nagaratna Bidar)
Building Empire on Hay
(A brief story of Abbott of Jhansi)

Jhansi, in the years gone by, had excellent grasslands where the business of baled hay had flourished a hundred years ago. James Harold Abbott (1863-1945) was the pioneer of Central India hay trade (The Imperial Gazetteer of India, 1908). J.H. Abbott was son of William Lumsden Abbott (1828-1880), a native of Scotland, who arrived in India as a private soldier of British army in 1850. William got wounded in the first war of Independence in 1857 and returned back to England in 1858. He came back to India and settled in Morar near Gwalior along with his six children (3 sons and 3 daughters). J.H. Abbott was the eldest child. William Lumsden Abbott died in 1880. In 1881, the Morar Cantonment was ordered to be vacated immediately and hence J.H. Abbott along with his mother and 3 siblings came to Jhansi leaving behind everything and settled in front of the present day Jhansi Hotel. In 1885, he struck upon an idea of supplying hay to army. The army at that time had a large number of animals including horses, elephant, mules etc. to cater to their transport need. For feeding of animals the army used to purchase hay locally but the quantum required was substantial. J.H. Abbott contacted the army and offered to supply all the requirements of hay, which was agreed upon.

The grasslands are locally called 'Rund' which we still find today in names of places as 'Rund Karari'. In the beginning Abbott organized the supply of hay locally through contractors. The army also found it convenient that their requirement was being met without any fuss. Moreover, J.H. Abbott was a man of word. He kept his word in meeting the supply of hay in time. With passage of time army cantonments from elsewhere started placing their requirement to Abbott. This provided him an opportunity to expand his business and incorporate innovative ways to transport his hay to far off places. Orders for hay started pouring from places as far as Quetta, Lahore and Peshawar in Pakistan. Transporting them loose was not feasible. Therefore, J.H. Abbot purchased an old steam engine. Each bale of grass weighed approx. 1 mound (40 kg). The first such plant was established at Ganeshpura near Karari in Jhansi. Each bale was accurately weighed before being dispatched. The Imperial Gazetteer of India (1908) also mentions that "Grass is also exported from Jhansi and hay was baled in large quantities for the Military Department during the Tirah expedition of 1895 and the South African War".

With the demand for baled hay pouring from far and wide, another plant for baling of grasses was established at Markundi in Manipur in 1895. J.H. Abbott used to collect the grasses which grew in abundance in Jhansi and Manipur. They were harvested and collected in October and November, dried and staked near the baling machines. The baling operations used to start from December which continued upto February.

This engine used for the baling of grass is now displayed at Cantt area in Jhansi. Extensive sheds and the tin roof could still be seen now in village Balta (Karari). Initially wood was used to power the engine to produce steam. But later on crude oil was used for the purpose. Not much is known about the baling operations that were carried out at Markundi, Manipur.

J.H. Abbott, had 4 sons and 2 daughters. He had put three of his sons at different places to look after the business of baling and distribution of hay, while the eldest son Roy Leslie Abbott looked after agriculture in Sagar district. Neil Abbott was the incharge of the baling plant at Karari.

Charles Abbott looked after the baling operations at Markundi, Manipur. Bruce Abbott was stationed at Lahore, who looked after the distribution of bales, which used to arrive from Jhansi and Manipur. A street in Lahore is known as 'Abbott Road' even today. Thus, the extent of the hay business of Abbott covered almost whole of the North India. It also contributed to the war preparations in meeting the strategic supplies of baled hay for feeding animals used for transport of men and weapons. Baled hay from Jhansi was also used during the Tirah expedition of 1895 and the South African War.

J.H. Abbott was a man of vision and an astute businessmen. He was a man of words and used to keep promise in making timely delivery of the baled hay which in turn brought him more orders from far off places. He neither used to drink nor smoke. He would say that he had no money to indulge in these things in his youth and when he could afford, he did not need them.
He was fondly called 'Chief' by the people.

Within a short span of time the business of baled hay spread far and wide and J.H. Abbott was now a rich man. He started diversifying his activity. He opened the Jhansi Hotel in 1905 at the place where he had taken refuge in 1881 after being driven out of Morar (Gwalior). The Jhansi Hotel has now completed 100 years of continuous service. He had also ventured in the contract business.

J.H. Abbott, also took up agriculture in a big way. In 1932, the Raja of Jabalpur Raja Goku Das started selling villages under his suzerainty in the districts of Sagar, Damoh and Jhansi. J.H. Abbott bought almost all of the villages sold by the Raja. The areas under the control of Abbott included villages in Jhansi (including Karari, Ganeshpura etc.) and many villages in Sagar district. His descendants still own a large chunk of area in Khurai (Bahrol, Sagar distt.).

With the wealth earned from his business, Abbott acquired a 100 acre plot in Pithoragarh, called Abbott Mount now. It was primarily meant for retired people to spend their time in serene ambiance of lush green surroundings and mountains. In Jhansi, he had established low cost housing colonies like Royganj, Charliganj, Mahaganj etc. which still retains their name today. James Harold Abbott passed away in 1945.

Most of the dependants of J.H. Abbott have left India after independence and settled in countries like New Zealand and Australia. However, one of the sons of J.H. Abbott, Roy Leslie Abbott (1893-1963) chose to continue living in India looking after agriculture especially in Sagar district. Roy Leslie Abbott had one son named N.R. Abbott (born 1926) and one daughter. N.R. Abbott went to Dehradun for his studies in 1937 and 6 years later joined Indian Military Academy as a cadet. After passing out from IMA, he served the Indian Army as Captain for 5 years. On the call of his father, who was keeping ill health, he left the army to take up the business and agriculture of his father. Captain N.R. Abbott now spends most of his time in Sagar district looking after the agricultural activity. He has one son aged 55 years based in Australia.

The life and work of J.H. Abbott is of great relevance because the work on baling and densification, which has great value to us was practiced by this man more than a century ago. It was given the shape of a business which we now dream of creating. Even otherwise, there is need to explore and understand how and why his business of baled hay flourished. The machinery employed in baling of grasses and management of Rund-the grassland. It would also give an insight into the vegetation during that period.

The IGFRI takes pride that it has taken forward the work that was started more than hundred years ago. There is also the need to have a re-look in to the history of Indian agriculture and emphasize the importance of Jhansi during the period gone by, as never before this flourishing trade in baled hay finds a mention. Whenever, there is a talk of the process of baling and densification at any platform, Jhansi should find the foremost place.

{(Anil Kumar)

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**SEED CORNER**

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

**Seed available for sale at IGFRI, Jhansi**

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<tr>
<th>Crop</th>
<th>Seed Available</th>
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<tr>
<td>Berseem (Wardan)</td>
<td>1300 kg</td>
<td>@ Rs.130/-</td>
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<tr>
<td>Oats (JHO-832)</td>
<td>1850 kg</td>
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<tr>
<td>Oats (Kent)</td>
<td>650 kg</td>
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<tr>
<td>Barley</td>
<td>950 kg</td>
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<tr>
<td>CV-2618</td>
<td>750 kg</td>
<td>@ Rs.75/-</td>
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<td>CV-2508</td>
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<tr>
<td>K-508</td>
<td>1250 kg</td>
<td>@ Rs.125/-</td>
</tr>
</tbody>
</table>

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

**Seed available for sale at IGFRI, RRS, Avikanagar**

<table>
<thead>
<tr>
<th>Crop</th>
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<tbody>
<tr>
<td>Cenchrus setigerus</td>
<td>175 kg</td>
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<tr>
<td>Cenchrus ciliaris</td>
<td>430 kg</td>
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<tr>
<td>Guar (Breeder seed)</td>
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<tr>
<td>BG-1</td>
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<tr>
<td>BG-2</td>
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<tr>
<td>BG-3</td>
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<tr>
<td>Dolichos lablab</td>
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<tr>
<td>JLP-3</td>
<td>60 kg</td>
<td>@ Rs.60/-</td>
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<tr>
<td>JLP-4</td>
<td>30 kg</td>
<td>@ Rs.30/-</td>
</tr>
</tbody>
</table>

**Please contact:**
Officer Incharge, RRS, IGFRI,
Avikanagar (Malpura, Distt.-Tonk)
Via - Jaipur - 304 501 (Rajasthan)
Phones: 01437-220170 (O); 220243 (R)
Dr. G. Kalloo, Dy. Director General (CS&H), Indian Council of Agricultural Research, New Delhi accompanied by other scientists visiting the experimental area at the IGFRI Regional Research Station, Dharwad.

Society of Extension Education awarded Young Scientist Award-2005 to Dr. B.S. Meena for his contribution in the field of agricultural extension, at the occasion of 3rd National Extension Education Congress (27-29 April, 2005) at NDRI Karnal.

Society of Extension Education awarded best poster presentation awards-2005 to B.S. Meena, P. Sharma, Sadhna Pandey & R.N. Dwivedi for their paper entitled "Impact of participatory research on farmers knowledge and adoption of animal production technologies", and to Sadhna Pandey, B. S. Meena, R. N. Dwivedi & P. Sharma for their paper entitled "Decision-making and gender involvement pattern of farm families in food, feed and fodder production" under different Themes on the occasion of 3rd National Extension Education Congress (27-29 April, 2005) at NDRI Karnal.


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