The 47th Foundation of the Institute was celebrated on November 1, 2008. The Chief Guest Dr. A.K. Srivastava, Director and Vice Chancellor, NDRI Karnal inaugurated the function and delivered the foundation day lecture. In his address, he emphasized the crucial role of livestock in providing basic livelihood to rural areas. They provide a major source of family income in arid and semiarid regions of the country. Although India has become the largest milk producing country in 2006-07 with 100.9 million tons, but still it is far behind the world average. There exists a huge gap between demand and supply of feed and fodder. For enhancing the milk production in the country, availability of sufficient feed and fodder needs to be ensured. Feed and fodder constitutes about 60-70% cost of milk production. He further emphasized that there is need to improve the productivity and shift towards buffalo and crossbreed husbandry in the country for increasing the milk production. On this occasion Dr. K.A. Singh, Director of the Institute presented the report “Year at a glance”, elucidating the achievements in the previous year. A kisan mela was also organized on this occasion. The chief guest distributed seed packets of oats and berseem to more than 100 farmers. Best worker awards to various categories of Institute staff for their significant contribution and best paper award to scientists were also presented on the occasion.
Mountains are home to one tenth world's population and occupy one fourth of the geographical area. About 10% of world's population depends directly on the use of mountain resources for their livelihood and well being and an estimated 40% depends indirectly on them for water, hydroelectricity, timber, mineral resources, recreation and flood control. The mountainous and hilly regions in India covering western Himalayas (A1), Central Himalayas (A2), Eastern Himalayas (A3) and Assam-Meghalaya hills (A4) give shelter to 41 million people and 29.4 million livestock.

Mountain ecosystems are suitable for forestry, horticulture and animal husbandry. In these hills, livestock rearing is an integral part of the living pattern. These regions have their unique livestock production systems dictated by the geographical landscape and cultural preferences of the people. In the high altitude areas, transhumant livestock production is practiced wherein animals graze in the alpine pasture in the summer and over winter in the foot hills and plains. Livestock preference by the people greatly varies between the four regions. There are also 10 hotspot districts in the mountain and hill region where all the three indicators – the human density, livestock density and number of livestock per thousand human beings are on a higher side. They together cover an area of 36151 sq km having 4.7 million and 8.0 million livestock. Cattle is important across all the four regions (251 to 398 per thousand human beings, PTH), buffalo is important for region A1 (145 PTH) and A2 (112 PTH) only; yak and mithun is important for region A3; Sheep for region A1 (269 PTH), goats for all the four regions and pigs for region A3 (235 PTH) and A4 (142 PTH). The threat of land degradation, the fodder demand and livestock production need to be carefully assessed and managed accordingly in the regions.

The hilly regions favour availability of forage biomass from diverse native annuals, perennials, fodder trees and some introduced forage plant species growing under different types of land uses - arable and non arable. Forage plant species have also ameliorative and soil conservation role and they are components of nutrient recycling in the prevailing mixed farming situation. However, because of free grazing and low arable to non arable land ratio, there is an urgent need to pursue a long term research strategy for forage resource development.

Analytical view of physiographic - climatic – socioeconomic matrix of hilly agro-ecosystems have helped to draw some useful conclusions for identifying potential niches for forage crops and priority areas of forage research: a) scopes of annual forage crops are limited due to scarcity of agricultural lands in the hills, b) depleting forage availability in the hills have caused overgrazing and resulted in the degradation of vegetation and land resources, c) potential non-competitive land use for forage crops are bamboo shaded farm lands, thin natural forest near villages,
steep un-culturable hill slopes, fruit orchards, terrace risers/ bunds and top of the hills for integrated farming systems. Intensive dairy/ goat farming can be practiced on the gentle hill slopes and the terraced lands, d) about 300 plant species mostly native constitute green forage resources in NEH Region. Among them, fodder trees contribute 25 to 60% of the total green forage resources. Fodder trees and forage grasses have conservation as well as ameliorative effects on acidic soils, and e) enriching the green forage with nutritious fodder during monsoon (April to mid October) and producing green forage during winter months (October to March) should be of prime concern for formulating forage resource management tool, to measure its environmental impact. There are other issues related to land tenure or lack of clarity in grazing rights which often creates a situation of conflict between the nomadic graziers and the forest policy. Another issue of great ecological significance is the camping of migratory buffaloes around high altitude wetlands as practiced by the nomadic Gujjars in the western and central Himalayas. What is the total number of such animals that are part of the annual cycle, their migration pattern, the duration of stay up in the hills, the status of grassland surrounding these wetlands, and the degradation over the years; all these questions could be answered only if a scientific study is initiated on this aspect. An integrated approach for pasture improvement and livestock productivity through better grazing management, reseeding with high-yielding species and creating awareness among the pastoralists together with addressing the issues of land tenure and grazing rights are needed in alpine and temperate regions.

In XIth Plan IGFRI has started a network project on "IGFRI outreach programme on amelioration of temperate/alpine pastures for livelihood support to pastoral communities" involving NRC on Yak and CSWRI Regional Station, Garsa and IGFRI Regional Station Palampur with objectives; to understand the current status of pasture productivity and the socio-

There is need to understand the migratory routes, the grazing rights, the grazing pressure etc. so that overgrazing is avoided and the grasslands get the breathing space to rejuvenate. Poor pasture condition figures highly among constraints. Since there is no baseline data, the evolution of degradation can only be guessed and hence there is a serious need for more monitoring of pasture conditions and trends as a management tool, to measure its environmental impact. There are other issues related to land tenure or lack of clarity in grazing rights which often creates a situation of conflict between the nomadic graziers and settled people and the forest policy. Another issue of great ecological significance is the camping of migratory buffaloes around high altitude wetlands as practiced by the nomadic Gujjars in the western and central Himalayas. What is the total number of such animals that are part of the annual cycle, their migration pattern, the duration of stay up in the hills, the status of grassland surrounding these wetlands, and the degradation over the years; all these questions could be answered only if a scientific study is initiated on this aspect. An economic scenario of pastoralists; to undertake technology refinement and on farm trials/ demonstrations for enhancing livelihood options; to enhance capacities of the beneficiaries for development, management, utilization and conservation of pasture resources, and to map, monitor and document biodiversity in temperate grasslands. The outcome of the project will be helpful in developing sustainable pasture production and utilization technology.

(K.A. Singh)
Director
A new variety of cowpea UPC 621 was released and notified by the Uttarakhand State Sub Committee for Release of Crop Varieties on December 22, 2008, at Dehradun. This variety has been released for cultivation in the lower hills and plains of Uttarakhand. Yield potential of this variety is 32-35 t/ha green fodder and 5-5.5 t/ha dry matter at 80% flowering stage in 85-90 days after planting. Seed yield is 6-8 q/ha (with no cut). It has DM digestibility (60-65%) and CP content (16-17%). Slight twining tendency of this variety makes it suitable for mixed/inter cropping with maize, sorghum/bajra and other cereal forages during summer and kharif season.

(J.S. Verma, Deptt. of Genetics & Plant Breeding, GBPUAT, Pantnagar)

DNA profiling of rare sexual plant of apomictic Cenchrus ciliaris L.

Cenchrus ciliaris L. (buffel grass) is an apomictic perennial forage grass widely distributed in semi-arid tropics of India. Although apomictic mode of reproduction has its own advantages, absence of sexual reproduction in C. ciliaris has limited the possibilities of genetic improvement of this species. Rare occurrence of sexual forms in Cenchrus ciliaris has been occasionally reported (Fisher et al., 1954; Bashaw et al. 1962; Bray 1978; Gupta et al. 2001). A sexual plant of C. ciliaris (IGFRI-CcSx-08/1), very short in stature with distinct morphology (Fig. 1), was identified by embryosac analysis using pistil-clearing technique which shows eight-nucleated embryosacs wherein antipodal cells are present. The commonly found apomictic embryosacs are four-nucleated, without antipodal cells.

DNA fingerprint of the sexual plant, an elite genetic material, was developed for its easy and foolproof identification. PCR amplification of genomic DNA from the sexual plant using 10-mer random primer OPJ-13 gives a sexual plant specific band of about 0.22 kb, while OPP-14 primer gives a specific band of about 1.2 kb (Fig. 2 - M, = 100 bp DNA marker; Sx = sexual plant; Sp = sexual progeny; Ap = apomictic plant; M, = 500 bp DNA marker). The bands are specific to the sexual plant (IGFRI-CcSx-08/1), and absent in apomictic C. ciliaris plants as well as in other sexual progenies in the F2 mapping population of C. ciliaris. The sexual C. ciliaris plant will be very useful for genetic improvement/studies of this species by hybridization, studying phylogenetic relationship, genome mapping and identification of gene(s) responsible for apomixis in Cenchrus.

(Suresh Kumar, Amarendra Chandra, MG Gupta and GP Shukla)
Modified low cost version of Berlese-Tullgren funnel for extraction of soil micro-arthropods

Soil micro arthropods are the key communities of the soil biota and, therefore, influence various key soil processes like nutrient cycling, carbon sequestration etc. besides the soil structure. With greater realization of the potential role of soil biota in maintaining soil fertility and health the research programmes have been initiated to study below ground biodiversity – their community structure, characterization, dynamics and functionality. Such organisms are minute and inhabit soil and litter layers.

Precise estimation of such organisms is very important in understanding the complex intricacies of below ground biodiversity and its dynamics. The present available device for extracting soil micro-arthropods is known as Berlese-Tullgren Apparatus (a battery of six units). However, it is not easily available in the market and it costs Rs. 1 to 1.5 lakhs.

Therefore a low cost (Rs.1500/ for a battery of six units) version of Berlese-Tullgren Apparatus has been developed and standardised at this institute, which is made up of locally available materials. The essential components of this extractor include a pair of sieve (10 inch diameter and 1mm pore size; one as a sample container and another used to cover the sample), a plastic funnel (10 inches diameter) over which the sample container is there and a collecting vessel below the funnel containing a liquid preservative (30-50% polyethylene glycol 200LR). 25 W light bulbs are placed 10 inches above the sample to serve as a source of heat and desiccation. A regulator is used to control the light intensity for creating a steep gradient of temperature and moisture throughout the sample. The micro arthropods react to heat and desiccation, and moves downward (away from the heat) falling through the sieve at the bottom into the preservative. Based on 5 years of work in the Soil Biology Laboratory of the institute it has been found to be a highly effective (>90%) extraction system.

(Sharmila Roy)

Donor sources identified for forage and grain yield traits in cowpea

Cowpea, Vigna unguiculata L. (Waip), is a warm season annual herbaceous grain legume having multiple uses as animal fodder and as a vegetable. Morphological evaluation of 168 germplasm lines, both exotic and indigenous within cultigroups – unguiculata, catjang and sesquipedalis, with three checks (BL-1, BL-2, UPC-5286) and one local control (IGFRI-95-1) was done. Through cluster analysis of the data, the accessions were identified as potential parents for hybridization.

![Cowpea](image)

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<tr>
<th>Sl.no. Traits</th>
<th>Donor sources</th>
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<tr>
<td>1. High biomass/plant</td>
<td>IL-1177; IL-3171 and IL-966-B</td>
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<tr>
<td>2. High fresh leaf/stem ratio</td>
<td>HY6P52-3; IL-893 and IL-99-171</td>
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<tr>
<td>3. Dry matter yield/plant</td>
<td>IL-1177; IL-3171 and IL-449</td>
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<tr>
<td>4. Early flowering</td>
<td>EC-240564 and EC-244979</td>
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<tr>
<td>5. High seed test weight</td>
<td>IL-181; IL-4216 and IL-156</td>
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<tr>
<td>6. High number of pods/plant</td>
<td>EC-24102-1; EC-240809 and IL-3117</td>
</tr>
<tr>
<td>7. Long pod</td>
<td>Local 1; IL 2000-182 &amp; NP 3-7</td>
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<tr>
<td>8. High number of seeds/pod</td>
<td>Local-2; Local-1 and IL 1057</td>
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<tr>
<td>9. Pest resistant lines</td>
<td>EC-24102-1, IL-1063 &amp; EC-240884 with 75-90%</td>
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<td>resistance against Plusia nigrisigna.</td>
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The IGFRI library has recently undergone a major facelift through automation and providing new services to the users, by adopting latest ICT tools. The housekeeping activity of library have been automatized by using "e-Granthalaya 2.0" software developed by the National Informatics Centre, New Delhi and made available through on-line OPAC (on-line catalogue). The database (profiles) of members has been developed and given on-line user log-in facility to see the status of circulation. The ICAR HQ. Library, New Delhi also uses this software to make Library facilities fully computerized.

The new additions to the IGFRI Library are:

**On-line Catalogue:** Catalogue information of books/Reports/Journals available in library is being converted into computerized catalogue and the users can search publication on any descriptor like Author, Title, Keyword, Subject etc., on Home Page of this web site (http://e-library/e-g2/welcome.asp).

**On-line Reference:** The Library provides On-line reference to the users either over phone or e-mail also.

**Developing Library Network (DELNET):** DELNET (http://delnet.nic.in) is the first major operational library network in South Asia. It has more than 1326 libraries as its members, which includes libraries in different states, union territories and abroad. DELNET maintains an On-line Union Catalogue of Books and more than twenty other databases including the National Bibliographic Database. The members of IGFRI library can access this by putting their login name and password.

**CD-ROM / CD-ROM Databases:** Library has CD of CAB Abstracts (1975-2005), Agris (1980-2004) and Agriola (1970-2004) on different topics. User may utilize this facility by visiting IGFRI Library, Jhansi and through Institute LAN.

**On-line Portals/Journals through CeRA (NAIP):** CeRA (Consortium of e-Resources in Agriculture) is Consortium of e-journals being subscribed by NAIP, ICAR and provided access to 123 libraries of National Agriculture Research System (NARS) for the years 2008-10. IGFRI is also one of the beneficiary of this initiative. Presently a total of 1153 on-line journals are available on CeRA.

i. **Springerlink:** It is a platform of Springer and provides a bouquet of e-journals on different Subjects published by Springer.

ii. **Annual Reviews:** Annual Reviews are authoritative, analytic reviews on 34 focused disciplines within the Biomedical, Life, Physical, and Social Sciences. Users can access the full text of articles from 1990 onwards.

iii. **CSIRO (Australia):** Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO) provides access to full text of articles.

The above e-resources can be accessed by visiting URL: http://www.cera.jccc.in through IGFRI LAN.

(Seema Khatri and KP Rao)

**Capacity building of IGFRI scientists**

Under the capacity building initiative for scientific and technical staff for better discharge of their professional and personal duties, a training programme on 'Participatory Technology Development' was organised from **November 3-7, 2008** by National Institute of Agricultural Extension Management, Rajendranagar, Hyderabad in which 25 scientists of IGFRI participated.

**Congratulations**

Dr. Pankaj Kaushal, Senior Scientist of IGFRI, Jhansi has been selected as Principal Scientist, Biotechnology at Central Rice Research Institute, Cuttack and joined there in December 2008.
The first meeting of network project entitled 'Amelioration of temperate/alpine pastures for livelihood support to pastoral communities' was held at IGFRI on December 19, 2008, under the chairmanship of Dr. K.A. Singh, Director, IGFRI. Dr. Mohan Battacharya, Director, NRC for Yak, Dhirang (Arunachal Pradesh) and Dr. S.A. Karim, Director, CSWRI, Avikanag (Rajasthan) also participated in the meeting with their kind presence and points of advice. Dr. M.M. Roy, Co-ordinator of the project presented the technical programme which was thoroughly discussed and a road map for its implementation was finalized. A total of 12 delegates attended this meeting. The project will be launched with effect from April 1, 2009.

A Winter School on, "Recent advances in Forage Evaluation and Utilization for Sustainable and Economic Livestock Production", sponsored by ICAR was organised at IGFRI, Jhansi from 31st October to 20th November 2008. The themes included; nutritional evaluation of commonly available forage in the country, development of forage based economical feeding systems for livestock, technology options for forage conservation and processing, biotechnological approaches for efficient utilization of crop residues and improvement of common property resources, besides others. Twenty-two participants in the rank of Assistant Professor or equivalent from State Agricultural Universities; ICAR Institutes; Krishi Vigyan Kendra covering 10 states of the country joined the 21 days training programme. The programme was inaugurated by Dr. A.K. Srivastava, Director and Vice Chancellor, NDRI Deemed University, Karnal. At the end of the training programme, certificates were distributed to the participants by Shri V.K. Mittal, Vice Chancellor, Bundelkhand University, Jhansi. A compendium entitled, "Forage for sustainable livestock production", based on the compilation of lectures delivered by the respective subject matter specialists was also released on this occasion.

Feeding of leaves of trees and shrubs is one of the viable option to bridge the gap between the demand and availability of feed and fodder in the country. The north eastern part of India is rich in biological diversity and many different trees and shrubs of the region can be used as potential top feeds for animals. Leaves of Atrocarpus lakoocha (Barhal), Saurania nepautensis (Gogun), A. heterophyllus (Jackfruit), Ficus hookeri, F. hirsuta, Salix babylonica (Willow), Scheflera wallachina (Paratree) Symingtonia pouleanea (Exbucklandia), Alnus nepaensis (Alder), Arundinaria hookeriana (Chinese bamboo), Bambuscosia thoracious, Lagerstroemia speciosa (Thumera), Prunus avinus (Cherry), F. hispida and Moris oleifera collected from NE states were analysed for CP, fibre fractions, minerals, tannins and phenolics. The CP content ranged between 8.69-24.5% which may be considered as adequate to maintain the level of ammonia required for optimum rumen fermentation. Among the cell wall fractions NDF and ADF content were 37.5-83.8% and 17.4-62.3%, respectively. The lignin content varied widely (3.03-38.5%) among the plants. Cellulose and hemicellulose content varied from 6.0-61.6% and 2.5-35.2%, respectively. Calcium (1.05-4.87%) and magnesium (0.70-4.61%) were present in adequate quantities but phosphorus (0.1-1.0%), sodium (0.02-0.04%) and potassium (0.3-1.88%) were less than the requirement. Among the micro minerals the level of copper (13.1-22.9 ppm) and iron (237-781ppm) were present in higher concentration.

The condensed tannin (0.08-0.77%) content based on vanillin assay was less than the prescribed threshold value of 5%. Total phenolics measured by Prussian Blue assay was in the range of 0.1-10.96%. The investigations revealed that these plants can be used as suitable top feed sources with some supplementation of inadequate minerals and other requirements.

(SK Nag, BK Bhadoria, Sultan Singh, AB Majaumdar & DK Niranjan)
सोनपुर मेला, बिहार (18-21 नवम्बर, 2008)

बिहार राज्य के सारण प्रमण्डल के श्री हरिचंद्र मंदिर क्षेत्र, सोनपुर में इस वर्ष विश्व प्रसिद्ध सोनपुर मेला 2008 का उद्घाटन माननीय 
पुरुषमत्री श्री नीरूकांश युगार, बिहार सरकार ने बुधवार दिनांक 12 नवम्बर, 2008 को किया। बुधवार दिनांक 19 नवम्बर, 2008 को 
माननीय दृष्टि मंजरी श्री नागपर्व, श्री श्रीकांतान गार्डे, मुख्य सचिव कृषि, बिहार श्रीमती चुनिंदा सिंहा (पूर्व मंजरी) एवं वशीय कृषि 
पदाधिकारियों एवं सहयोगियों के साथ सोनपुर मेला शिर कृषि प्रदर्शनी 2008 के विभिन्न पटाका का निर्माण करने के उपरांत 
विस्मान किसान माहौल एवं बनवनों को संबंधित किया। प्रदर्शनों में भारतीय चरमाध एवं चारा अनुसंधान संस्थान, जानिया द्वारा नए 
पटाका से किसान जानकारी एवं बीज पाकर लाभान्वित हुए। बिहार के किसान एवं जनसता हाल में आई बाधि के प्रकोप से उबरने के 
लिए में दृष्टि के स्थ-खास के प्रति शरजगति दिखाई दिए। विश्व भर में चारा फसलों के उद्यमन एवं उपलब्धता के प्रति उत्सुक 
दिए। में 18-21 नवम्बर के बीच वेबसाइट विभाग फसलों में हुए नए की उत्पादन कृषि एवं बीज. 216 से किसान के उद्यम के रूप 
के, चारा फसल का क्रमशः: 12 रूपये प्रतिकिलों बीज एवं 90 सौर प्रतिकिलों बीज का अवधि किया गया। में कृषि 
विकास के लिए इस में में डरा, अजय कुमार सिंह (सरकार बैंकार एवं बाजार प्रशासन), श्री रामदेव, तकनीकी सहायता एवं 
श्री शामसलाह, सहयोगी किर्मितिय ने योगदान दिया।

संस्थान में कौशीं एकता संपादक का आयोजन

संस्थान द्वारा आयोजित विभिन्न कृषि कार्यशाला एवं गोष्टी