



CAFRI

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28th Foundation Day



ICAR- Central Agroforestry Research Institute, Jhansi celebrated its 28th Foundation Day on 8th May, 2016. Dr. V.N. Sharda, Member, ASRB, New Delhi in his foundation day lecture highlighted emerging issues in agroforestry and suggested to undertake research on agroforestry production and natural resources management & protection. He suggested to undertake long-term experiments involving all important land uses of the country and study all relevant parameters by involving scientists of different disciplines. He asked scientists to undertake research which is proactive, anticipatory, problem-solving, result-oriented and farmer participatory, and in a network mode. He emphasized on protection and optimum utilization of natural resources as well as diversification of production while working with farmers and solving the problems in real field situations. He told that agroforestry is the only solution for bringing one-third area of land under forest cover. He advised that Sloping Agriculture Land Technology (SALT) need to be explored in agroforestry. Food, Fruit, Fodder, Fuelwood, Timber & Furniture demand of 2050 for human and animal population will be fulfilled by agroforestry, he said.

Dr. P.K. Ghosh, Director, ICAR-Indian Grassland and Fodder Research Institute, Jhansi appreciated the contributions made by the ICAR-CAFRI. He said that National Agroforestry Policy-2014 gave more challenges to ICAR-CAFRI.

Dr. O. P. Chaturvedi, Director, ICAR-CAFRI, Jhansi briefed about salient achievements and new initiatives of the Institute during 2015. He mentioned about the sustainable development, ecosystem services and rural livelihood issues in agroforestry, adopted villages in Uttar Pradesh and Madhya Pradesh under 'Mera Gaon Mera Gaurav' programme, organization of 'World Soil Day' and Jai Kisan-Jai Vigyan. Two progressive farmers were honoured for adopting agroforestry technologies. Three publications were released during the occasion. Scientists and officers from State line-departments, KVKs, NGOs, IFFCO, ICAR-IGFRI, Jhansi and ICAR- IISWC, Datia participated in the event.

Identification of Tree Species through Hyperspectral Remote Sensing

Recent advances in hyperspectral sensors offer considerable potential for discrimination of earth surface materials. It is because the electromagnetic spectrum is divided into hundreds of discrete, contiguous spectral bands, sufficient to read the spectral signature of the material in the image. Hyperspectral imaging systems acquire images in over one hundred contiguous spectral bands. While multispectral imagery is useful to discriminate land surface features and landscape patterns, hyperspectral imagery allows for identification and characterization of materials (Table 1). As compared to Multi-spectral sensors, Hyperspectral sensors collect reflectance from objects simultaneously in hundreds of narrow adjacent spectral bands and thus due to their high spectral resolution, they are more efficient in discriminating soils, minerals, vegetation and man-made materials.

Hyperspectral images provide ample spectral information to identify and distinguish spectrally unique materials. Vegetation Scientists are using hyperspectral imagery to identify plant species, study plant canopy chemistry and detect vegetation stress; which is not possible with multi-spectral data. Most hyperspectral sensors are airborne, with two exceptions, the Hyperion sensor from NASA, USA on board the EO-1 satellite with 242 bands and the FTHSI sensor from the US Airforce Research Lab on-board the Mightysat- II satellite with 256 bands.

Table 1: Comparison of multispectral and hyperspectral data

Characteristics	Multispectral data	Hyperspectral data
No. of spectral bands	3 – 8	100 - 256
Spectral range	400 – 1300 nm	350 – 2500 nm
Bandwidth	Broad	Narrow, discrete
Applications	Land/ Forest cover mapping, crop area estimation, etc.	Species identification, vegetation stress detection, plant canopy chemistry, mineral mapping, etc.

Well-developed scientific application areas include geology and mineral exploration; forestry; marine, coastal zone, inland waters and wetlands; agriculture; ecology; urban; snow and ice; and atmosphere. There are also numerous military applications in camouflage, littoral zone mapping, and landmine detection. Hyperspectral sensors pose an advantage over multispectral sensors in their ability to identify and quantify molecular absorption. The high spectral resolution of a hyperspectral imager allows for detection, identification and quantification of surface materials, as well as inferring biological and chemical processes.

For all of these applications, ground truth signatures collected in the field and indexed in spectral libraries are critical for many methods of analysis. While image processing packages often include basic spectral libraries, application distinct libraries containing spectra of the specific materials occurring in the target field area greatly improves the accuracy of generated interpretations. In particular, spectra of vegetation are influenced by such a wide range of environmental conditions that it makes it difficult to adequately represent this variability without the collection of site specific field spectra. With this aim, an ICAR-Extramural project has been initiated at CAFRI, Jhansi to develop a spectral library for major agroforestry tree species.

Spectral Signature for Mango (*Mangifera indica*)

Hyperion hyperspectral data for Barabanki area has been downloaded from USGS website (<http://earthexplorer.usgs.gov>). USGS Hyperion product (L1R) contains 242 bands, of which 44 bands (1-7, 58-76, and 225-242) are uncalibrated bands. Also there exist spectral overlapping between VNIR and SWIR spectral range for bands 56-57 and 77-78. Therefore, out of the 198 calibrated bands, there are 196 unique spectral channels. The major atmospheric water vapour bands are centered at 940, 1140, 1380 and 1880 nm; the oxygen bands at 760 and carbon dioxide bands near 2010 and 2080 nm. The normal pre-processing of Hyperion data are: radiometric correction, atmospheric correction and geometric correction.

Downloaded data was for the period of March when fruit setting starts on the mango trees. This data has been pre-processed using ENVI software ver. 5.3 for poor band removals, de-striping, atmospheric correction, etc. Field visit was also conducted to collect reference GPS points on mango plantation as shown by yellow dots (Fig. 1). Region of interest were selected on the image with the help of GPS points (Fig. 2). The methodology for creating spectral signature for a tree species has been developed under and is being tested for other species.

Pure pixels (endmember) have been identified by pixel purity index (PPI) and n-D visualization techniques. Spectral signature created for mango species using Hyperion data is shown in figure 3. Mean spectra is shown by red line, the minimum and maximum spectra by blue and green lines. It can be observed from the signature plot that reflectance is higher in NIR spectral region (700-1300 nm) than visible region (400-700 nm). This is due to the fact absorption of sunlight is more in VIS region than NIR region. Moreover, NIR spectral region is important for vegetation analysis, but SWIR spectral region (1300-1800 nm), where water absorption bands are found; also plays an important role in differentiation of species. Beyond SWIR *i.e.* 1800 nm there is too much noise in the hyperspectral data, which result in unusual pattern (Fig. 3).

In order to harness the full potential of Hyperspectral data, development of spectral library is pre-requisite. By developing such library for a tree species, the identification and mapping of that species at a larger scale is possible.

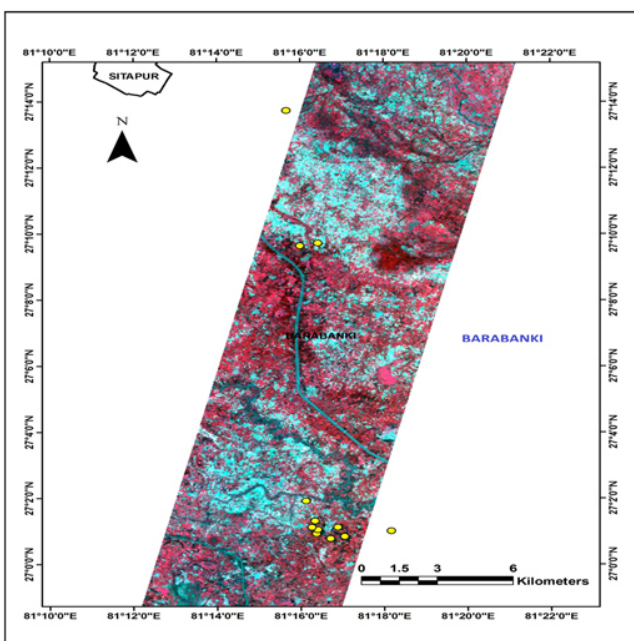


Fig. 1: GPS points collected from Barabanki shown on Hyperion image

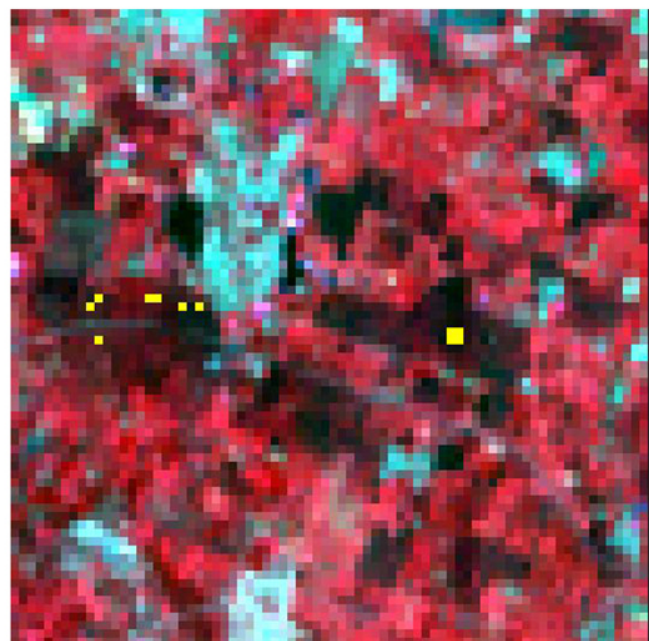


Fig. 2: Selected areas from mango plantations for signature creation

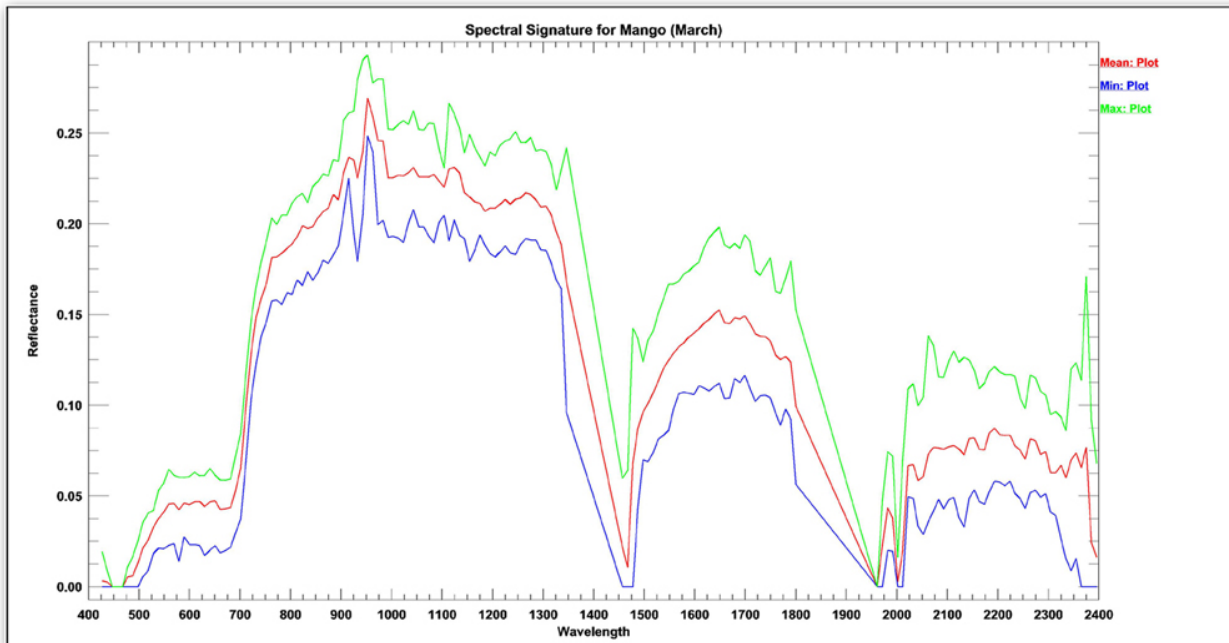


Fig. 3: Spectral signature of *Mangifera indica* generated from Hyperion hyperspectral data

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Brief Report on efforts made by Central Agroforestry Research Institute, Jhansi to save the Peepal Tree at Kakrighat, Almora

On the directives of the Hon'ble Director General, ICAR and Secretary DARE for an extremely important and noble mission to save the dying Peepul tree under which Swami Vivekananda meditated in 1890 and experienced one of the greatest moments of his life during his visit to Kumaun region of Himalaya, Director, Central Agroforestry Research Institute, Jhansi along with a team (Dr. A. K. Handa, Principal Scientist, CAFRI, Jhansi; Dr. Salil Tewari and Dr. B. K. Dwivedi, GBPUA&T, Pantnagar; Dr. J. K. Bist, VPKAS, Almora and Representative of Rama Krishna Mission, Almora) inspected the drying Peepal tree on the bank of Koshi river at Kakrighat in Almora district of Uttarakhand in October, 2013 and observed that the tree was drying as it is quite old and a concrete stone structure constructed all around the tree base severely affected the tree growth. The tree was dried more than 80 percent and infected by different insects and pests and invaded by other plants viz. kharik (*Celtis australis*), Bakain (*Melia azedarach*), other parasitic plants. These invaded plants made a strong base on subject tree and grown vigorously. The team made efforts to seek the assistance of the DFO, State Forest Department, Uttarakhand for the removal and harvesting of the dead portion of the tree to revive. However, the tree dried and deteriorated at a faster rate. Therefore it was decided to preserve the legacy of this historical tree through raising clonal plants from this tree. The coordinating centre of All India Coordinated Research Project on Agroforestry located at GBPUAT was asked to raise the clonal plants from the live material from the sacred tree. The Centre took prompt action and 10 clonal plants raised from the original tree. On 15th July, 2016 cloned sapling of the Peepul Tree were planted at the same spot of the old Tree, thus carrying the legacy to future generations. The architect of the project Dr. S. Ayyappan, Ex. DG, ICAR and Secretary, DARE was present in the function. Swami Balabhadranandaji, Assistant General Secretary, Ramakrishna Math & Mission performed the holy act of plantation with utmost reverence and devotion. Governor 's message was read in the post plantation function by DM Almora.



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स्वच्छता पखवाड़ा

संस्थान द्वारा दिनांक 16 से 30 मई, 2016 तक भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के निर्देश पर स्वच्छता पखवाड़े का आयोजन किया गया। कार्यक्रम के अन्तर्गत संस्थान के कर्मचारियों ने स्वच्छता शपथ ली। स्वच्छता के महत्व पर बोलते हुए संस्थान के निदेशक डा. ओ. पी. चतुर्वेदी ने कार्बनिक तथा अकार्बनिक कचरे के पृथक्करण तथा उनके उपयोग के बारे में बताया। इस अवसर पर पखवाड़े के विभिन्न कार्यक्रमों की जानकारी दी गयी। करके दिखाओं कार्यक्रम के अन्तर्गत प्रति दो घंटे स्वच्छता के लिए निर्धारित किये गये। इस दौरान तीन गाँवों 'सिमरधा, हस्तिनापुर और करारी' में स्वच्छता अभियान चलाकर प्लास्टिक कचरे की सफाई की गयी। गाँव में स्त्री, पुरुष और बच्चों को स्वच्छता के लिए प्रेरित किया गया। किसानों के साथ मिलकर रास्ते के किनारे उग रही पार्थिनीयम घास को जड़ से उखाड़कर मिट्टी में दबाया गया। रास्तों के किनारे एकत्र गोबर के ढेर को कम्पोस्ट पिट में डालने के लिए प्रेरित किया गया। संस्थान के आस-पास के क्षेत्र में भी सफाई अभियान चलाकर अविनाशी खरपतवार को नष्ट किया गया। संस्थान के आवासीय परिसर में रहने वाले कर्मचारियों के परिजनों के साथ मिलकर कार्बनिक कचरे को कचरादान में फेका गया। शोध प्रक्षेत्र पर भी स्वच्छता बढ़ाने के उद्देश्य से रास्तों के आस-पास से घास और झाड़ियाँ साफ की गयी। कृषि यंत्रों की साफ-सफाई की गयी और सूखी लकड़ियाँ एकत्र की गयी। कार्यक्रम के अन्तर्गत स्वच्छता संबंधित नारा लेखन तथा ड्राइंग का आयोजन किया गया जिसमें सभी वैज्ञानिकों, अधिकारियों, कर्मचारियों तथा शोध अध्येताओं ने बढ़-चढ़ कर भाग लिया। उत्कृष्ट नारों और ड्राइंग को कृषिवानिकी आलोक के अगले संस्करण में छापने का निर्णय लिया गया, जिससे स्वच्छता की विचारधारा को जन-जन तक पहुँचाया जा सके। कार्यक्रम के अन्तिम दिन "स्वच्छ धरा, परिवेश हरा" विषय पर डा. राजेन्द्र प्रसाद, प्रधान वैज्ञानिक ने व्याख्यान दिया। कार्यक्रम की समाप्ति पर यह शपथ ली गयी कि स्वच्छता अभियान को पखवाड़े के बाद भी जारी रखा जायेगा और नियमित रूप से जागरूकता अभियान चलायें जायेंगे। संस्थान द्वारा संचालित विविध कार्यक्रमों जिनमें वैज्ञानिक तथा अधिकारी गाँव में जाते हैं, में भी स्वच्छता जागरूकता



पर विशेष बल दिया जा रहा है। संस्थान सम्प्रति मेरा गाँव मेरा गौरव के अन्तर्गत 13 गाँवों तथा जल समेट कार्यक्रम के अन्तर्गत 09 गाँवों में कार्यरत है और ग्रामीण स्वच्छता जागरूकता में अपना योगदान दे रहा है।

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Annual Group Meeting All India Coordinated Research Project on Agroforestry (18-20 June, 2016)

Dr. V S Thakur, Hon'ble Vice Chancellor of Dr. YSPUH&F, Solan inaugurated the three days Annual Group Meeting of All India Coordinated Research Project on Agroforestry organized at Dr. YSPUH&F, Solan on 18th June, 2016. In his inaugural speech Dr. Thakur stressed upon dissemination of appropriate agroforestry models for the benefit of small and marginal farmers. He emphasized the need for integrating livelihood options in the agroforestry models. Dr. P. S. Pathak, Ex. ADG (Agroforestry), ICAR highlighted the gaps in the research programmes and future thrust areas. Dr. S. Bhaskar, ADG (Agron., AF and CC) ICAR emphasized on the need to redesign the technical programme keeping in view the current scenario and to initiate work ecosystem services of agroforestry. Dr. O.P. Chaturvedi, Project Coordinator and Director, ICAR-Central Agroforestry Research Institute, Jhansi presented the Coordinators Report and the brief summary of the research achievements of the project for the year. In the beginning, Dr. P. K. Mahajan, Dean College of Forestry of the host University welcomed the dignitaries and delegates. During the occasion four publications namely Agroforestry Technologies for different agro-climatic zones of the country, Potential Agroforestry systems for Haryana, A Profile-AICRP on Agroforestry-2016 and *Grewia optiva* an important MPTs of North Western Himalaya were released. The group meet was attended by 26 coordinating centres located in SAUs. During the meeting there were 9 Technical sessions including inaugural and plenary sessions. The Plenary session was chaired by Dr. N.S. Rathore, DDG (Education), ICAR and Dr. P. K. Khosla, Ex. VC, CSKHPKV, Palampur was the Guest of Honour. The group meet was attended by members of RAC, CAFRI namely Dr. J.C. Dagar, Ex. ADG (Agron. & AF), Dr. M.A. Shankar, Ex. Director of Research UAS, Bangalore, Dr. V K Mishra, Ex. Dean, CoF, Solan and Dr. P. Kaushal, Regional Director, Solan. During the meeting region based new projects Terminalia based silvipasture for lower Himalayas, Salix based for Kashmir valley, Eucalyptus based agrisilviculture and Shisham multi-location evaluation for Indo-gangetic, Gmelina based system for Humid sub-humid, Ailanthus based for arid region, teak based for semi-arid region, Melia based for tropical region and *Dendrocalamus stocksii* based for high rainfall and coastal regions. The best presentation award was presented to coordinating centre, TNVASU, Kattupakkam.



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अन्तर्राष्ट्रीय योग दिवस

भा.कृ.अनु.प.—केन्द्रीय कृषिवानिकी अनुसंधान संस्थान, झाँसी में दिनांक 21 जून, 2016 को अन्तर्राष्ट्रीय योग दिवस मनाया गया। इस अवसर पर संस्थान में योग से संबंधित विभिन्न कार्यक्रमों का आयोजन किया गया जिसमें श्री शुभम, योगाचार्या, झाँसी द्वारा प्रातः 7.00 से 8.00 बजे तक संस्थान के महिला कर्मिकों एवं कर्मिकों के परिवार के सदस्यों जिसमें महिलायें व बच्चे शामिल थे, को संस्थान के अन्तःक्रीड़ा परिसर में योगासन कराया गया। डा. रमेश सिंह, प्रधान वैज्ञानिक द्वारा संस्थान के समस्त वैज्ञानिकों, अधिकारियों, कर्मचारियों, शोध अध्येता, शोध सहायक, शोध छात्रों एवं संविदा श्रमिकों को संस्थान के मुख्य कार्यालय प्रांगण में योगासन कराया गया। डा. रमेश सिंह ने योग के बारे में विस्तृत जानकारी दी तथा योग से होने वाले लाभों को भी इंगित किया। कार्यक्रम की कड़ी में अपराह्न 3.00 से 4.00 बजे तक एक कार्यशाला का आयोजन किया गया, जिसमें योग के इतिहास, योग से होने वाले विभिन्न लाभों के बारे में डा. इन्द्र देव, प्रधान वैज्ञानिक द्वारा एक व्याख्यान के माध्यम से बताया गया। कार्यक्रम में प्रभारी निदेशक डा. आर. के. तिवारी ने स्वस्थ तन, मन व मस्तिष्क के लिए योग को आत्मसात करने के लिए सभी से अपील की।



इन्द्र देव

भा.कृ.अनु.प.—केन्द्रीय कृषिवानिकी अनुसंधान संस्थान, झाँसी-284003

Institute Joint Staff Council Meeting

Institute Joint Staff Council (IJSC) meeting was held on 18th May, 2016 under the Chairmanship of Dr. O. P. Chaturvedi, Director. Various issues related to welfare of the staff were discussed.

Women Cell Meeting

A meeting of Women Cell was held on 18th May, 2016 under the Chairmanship of Dr. O. P. Chaturvedi, Director.

हिन्दी कार्यशाला

संस्थान में दिनांक 10 जून 2016 को संस्थान की राजभाषा कार्यान्वयन समिति की तिमाही बैठक एवं एक दिवसीय तिमाही हिन्दी कार्यशाला आई.सी.ए.आर. कुलगीत से प्रारम्भ हुई। कार्यक्रम की अध्यक्षता करते हुए संस्थान के निदेशक डॉ. ओ.पी. चतुर्वेदी ने आवहन किया कि हमें राजभाषा में कार्य करने में हिचक नहीं होना चाहिए तथा हिन्दी में कार्य करने को बढ़ावा देना चाहिए। उन्होंने जोर देते हुए कहा कि हिन्दी में लिखे गये शोध-पत्र, लेख इत्यादि को भी अंग्रेजी के बराबर सम्मान देने की आवश्यकता है। उन्होंने कहा कि संस्थान कि वार्षिक रिपोर्ट द्विभाषी प्रकाशित की जायेगी।



कार्यशाला के मुख्य अतिथि एवं वक्ता डॉ. के. एन. सचान, वरिष्ठ राजभाषा अधिकारी, बी.एच.ई.एल., झाँसी ने "केन्द्रीय कार्यालयों में राजभाषा हिन्दी का व्यावहारिक प्रयोग" विषय पर व्याख्यान प्रस्तुत किया एवं विस्तृत जानकारी दी। उन्होंने भारत सरकार के गृह मन्त्रालय के अन्तर्गत राजभाषा विभाग, राजभाषा संसदीय समिति, राजभाषा अधिनियम 1963 की धारा 3(3) के बारे में विस्तृत जानकारी दी। उन्होंने कार्यालय में दैनिक

प्रयोग होने वाले द्विभाषी शब्दों को सरलतम रूप में प्रयोग करने की कला को बहुत ही रोचक तरीके से प्रस्तुत किया एवं समझाया।

कार्यक्रम के अन्त में डॉ. आर. पी. द्विवेदी, प्रभारी अधिकारी (राजभाषा) ने मंचासीन अतिथियों एवं सभागार में उपस्थित संस्थान के वैज्ञानिक, अधिकारी, कर्मचारी एवं शोध सहायक/अध्येयता का स्वागत किया। प्रभारी अधिकारी (राजभाषा) ने पिछली तिमाही में राजभाषा के अन्तर्गत किये गये कार्यों की विस्तृत आख्या प्रस्तुत की। कार्यक्रम में संस्थान के वैज्ञानिक, अधिकारी, कर्मचारी एवं शोध सहायक/अध्येयता उपस्थित रहे।

आर. पी. द्विवेदी एवं ओम प्रकाश
भा.कृ.अनु.प.—केन्द्रीय कृषिवानिकी अनुसंधान संस्थान, झाँसी-284003

Institute Research Council

Institute Research Council (IRC) meeting was held on 1st & 2nd July, 2016. All the Scientists of the Institute participated in the meeting and presented the progress and significant findings of their project. New Project Proposals were also discussed and approved.

Human Resource Development

Dr A K Handa participated in the Coordination-cum-Empowered Committee (CEC) meeting on Mineral Development and Regulation, held under the chairmanship of Secretary (Mines), GoI, on 6th April, 2016 at New Delhi.

Dr. Anil Kumar, Dr. Ram Newaj, Dr. A K Handa, Dr. Dhiraj Kumar and Dr. C K Bajpai participated in the Annual Group Meeting of All India Coordinated Research Project on Agroforestry from 18th to 20th June, 2016 at Dr. Y S Parmar University of Horticulture and Forestry, Solan (H.P.).

National symposium on

**Agroforestry for environmental challenges,
sustainable land use, biodiversity conservation
and rural livelihood options
3-5 December, 2016**

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