Agroforestry *Newsletter* *ISO 9001:2008*

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Vol. 28, No. (1) **JANUARY-MARCH, 2016**

Dr. Trilochan Mohapatra is the New Chief of ICAR

Dr. Trilochan Mohapatra took over the charge of Secretary, Department of Agricultural Research and Education & Director General, ICAR, New Delhi on 22nd February, 2016.

Dr. Mohapatra was holding the position of Director-cum-Vice Chancellor of the prestigious Indian Agricultural Research Institute, New Delhi. Prior to this, he worked as the Director of National Rice Research Institute (formerly CRRI), Cuttack. He served National Research Centre on Plant Biotechnology, IARI, New Delhi as researcher and teacher for about 20 years. He is a scientist of global repute working in the area of molecular genetics and genomics.

Dr. Mohapatra has over 145 research papers in national and international journals of repute and several book chapters. His research accomplishments include development of the first high yielding Basmati rice variety resistant to bacterial leaf blight through molecular marker assisted selection, and physical mapping and genome sequencing.

He is Fellow of Indian National Science Academy, National Academy of Sciences-India, Allahabad and the National Academy of Agricultural Sciences, New Delhi.

The Director and Staff of ICAR-CAFRI, Jhansi welcome the New Director General and wish him all the best in his future endeavour.

Forthcoming Events

- Celebration of ICAR-CAFRI Foundation Day
- Annual IRC Meeting
- Institute Joint Staff Council/Women Cell / PME Cell meetings
- Farmer's Trainings and demonstrations
- AICRPAF Annual Group Meeting

Farmers Awareness through Conference and *Goshti* on Drought in Bundelkhand Region with Reference to Climate Change

Institute organized farmers awareness conference and *Gosthi* at ICAR-CAFRI, Jhansi on 21st January, 2016. The chief guest of the programme was Shri Ravi Sharma, Hon'ble MLA, Jhansi (Sadar) and the special guests were Dr. Arvind Kumar, Vice Chancellor, RLB CAU, Jhansi, Dr. P. K. Ghosh, Director, ICAR-IGFRI, Jhansi and the chairman of the programme was Dr. O. P. Chaturvedi, Director, ICAR-CAFRI, Jhansi. Among other dignitaries Dr. U.N. Sachan, Joint Director Animal Husbandry, Shri Rajendra Singh Bhagor, Chief Area Manager, IFFCO, Shri Ajay Soni, District Development Manager NABARD and Dr. S.N. Pandey, Director, Development Alternative, Tikamgarh (M.P.) were other dignitaries present in the conference.

Various aspects of climate change adaptation and mitigation through agroforestry were stated and interactively discussed with the farmers through speeches of the invited guests, scientists, subject matter specialists, farmers and through displaying exhibitions stalls by KVKs, NGOs, NABARD, IFFCO and Research Institutes etc. There were more than 400 participant including farmers, subject matter specialist and scientists. Farmers awareness conference and *Gosthi* was organized under the NICRA project. The conference was convened by Dr. Ram Newaj, Principal Scientist & PI of the NICRA, project and the Co-Conveners were Dr. Badre Alam, Dr. Rajendra Prasad, Dr. R. P. Dwivedi, Dr. R. H. Rizvi and Dr.Dhiraj Kumar.

Research Advisory Committee Meeting

18th RAC meeting of ICAR-CAFRI was held on 6th & 7th January, 2016 under the chairmanship of Dr. Tej Pratap, Former Vice-Chancellor, Sher-E-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar. Dr. J.C. Dagar, Emeritus Scientist, ICAR-CSSRI, Karnal, Dr. M.A. Shankar, Ex. Director of Research, University of Agricultural Science, Bangalore, Dr. P. Kaushal, Regional Coordinator, National Forestation and Eco-Development Board, Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan, Dr. V. K. Mishra, Ex-Dean, College of Horticulture & Forestry, Solan, Sh. Satyapal Singh Verma, Saharanpur and Dr. O. P. Chaturvedi, Director, CAFRI, Jhansi (members of RAC) participated in this RAC meeting. The Committee interacted with Scientists of the institute, reviewed the ATR and visited Research Farm of CAFRI and Parasai- Sindh Watershed.

Generalized models for predicting volume of Poplar spp.

Poplar (*Populus deltoides*) is an important agroforestry tree species widely grown in Indo-Gangetic plains of India. It is a fast growing species and has a short rotation of 6-8

years. Several equations have been developed for estimating timber volume of trees in different states. If there is a single volume equation instead of several, this will be helpful to researchers. So it is imperative to develop such a generalized equation for Poplar spp. in India.

A total of 16 equations on timber volume of Poplar species were found in the literature out of which eight equations were for Punjab state, six for Haryana and two for Uttarakhand. These equations pertains to Jalandhar and Ludhiana (Punjab); Hisar, Karnal and Yamunanagar (Haryana) and Dehradun (Uttrakhand). In these equations, diameter at breast height (D) and tree height (H) were used as independent variables. Only those equations which are based on D have been used for simulation purpose.

Out of eight published equations on volume for state of Punjab, only four equations have been used for simulations. The observed range of DBH values for the harvested trees varied from 10.0 to 41.4 cm and the observed range for the volume varied from 0.039 to 1.554 (m^3/tree). Total 101 datasets on diameter at breast height and volume have been generated which is then used for developing generalized volume equation. The model $\mathbf{V = 0.00257\ D^{1.65236}}$ (R^2 = 0.819) has been developed for Punjab state and may be used for estimating timber volume of Poplar tree (Fig. 1).

A total of six published equations on volume could be traced for state of Haryana, out of which three have been used for simulation purpose. The observed range of DBH values for the harvested trees varied from 16.56 to 35.03 cm and the observed range for the volume varied from 0.094 to 0.632 (m^3/tree). Total 45 data sets on diameter at breast height and volume have been generated which is then used for developing generalized volume equation. The model $\mathbf{V = 0.0002\ D^{2.1102}}$ (R^2 = 0.910) has been developed for Haryana and may be used for estimating timber volume of Poplar tree (Fig. 2).

Country Level Timber Volume Generalized Equation

The simulated data point (DBH and Timber volume) for these equations were clubbed into one data set for country level as a whole. Three non-linear models were fitted for timber volume of Poplar on this Country level data set. The model of the form $V = a\ [1 + \exp(p\text{-}bD)]^{-1}$ was found good fit, where V- timber volume (m^3/tree) and D- diameter at breast height (cm). Parameter estimates (a, p and b) along with their approx. standard error and Wald confidence limit has been given in (Table 1). The equation $\mathbf{V = 2.8443/\ [1+e^{(3.1012-0.0689\ D)}]}$ (R^2 =0.789) is proposed to be used for predicting the timber volume of Poplar tree for the DBH range of 14.0 to 41.0 cm (Fig. 3).

Table 1: Fitted statistics for country-level generalized model for volume of Poplar

				Wald Confidence Interval	
Parameter	**Estimate**	**A.S.E.**	**Param/ASE**	**Lower < 95%> Upper**	
a	2.84427	1.76473	1.61173	-0.64919	6.33772
p	3.10116	0.42732	7.25724	2.25524	3.94708
b	0.06895	0.01552	4.44349	0.03823	0.09967

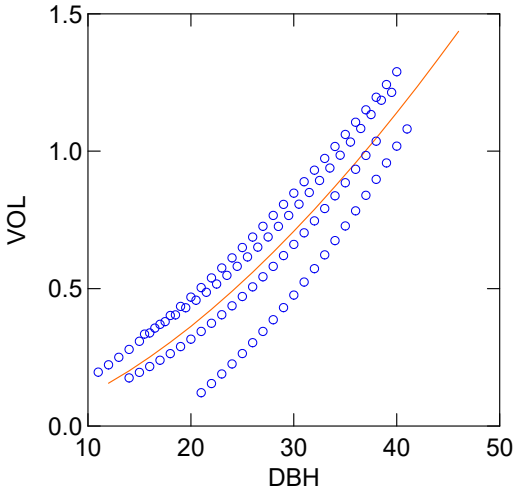


Fig.1: Fitted generalized volume model for Punjab

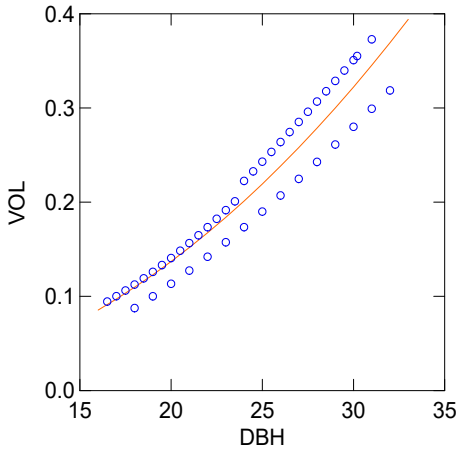


Fig.2: Fitted generalized volume model for Haryana

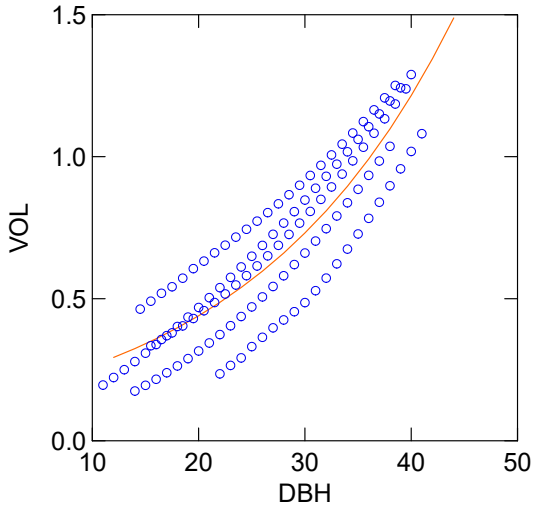


Fig.3: Country-level fitted generalized volume model for Poplar

The developed generalized models will be useful for predicting the timber volume of Poplar species in India and will help in estimation of carbon stock under trees.

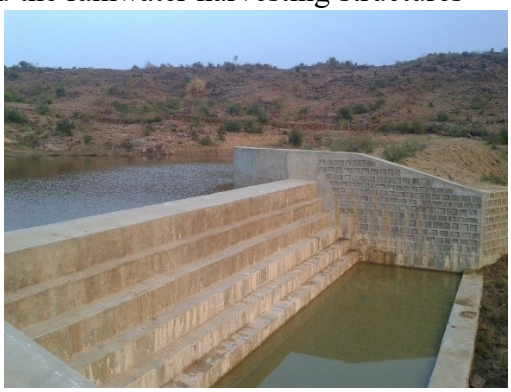
R. H. Rizvi[1], A. K. Handa[1] and Ajit[2]
[1]ICAR- Central Agroforestry Research Institute, Jhansi
[2]ICAR- Indian Agricultural Statistics Research Institute, New Delhi

Drought Mitigation through soil and water conservation measures in forests of Bundelkhand: A successful Initiative

An impact evaluation study was conducted under consultancy project entitled 'Impact Assessment of Soil and Water Conservation Measures in Forest Areas of Bundelkhand Region of Uttar Pradesh'. The objective of the study was to assess the influence of various soil and water conservation measures on floral and faunal biodiversity and on socio-economic benefits to the people in forests- fringe in study area under 'Special Bundelkhand Drought Mitigation Package'. The field surveys were conducted during November, 2014 to December, 2015. The study was based

on primary data collected on structured schedule, applying stratified random sampling. From each forest division, three forest range have purposively been selected on the basis of maximum area covered under the project. Two sites, preferably separate forest block, from each forest range have been selected on the basis of highest soil and water conservation works done under the project. From each selected site, one nearest site was selected for comparison as control. Focus group discussions (FGDs) was conducted in the each selected site. The team covered 48 forest blocks covering 29 forest range and conducted 48 FGDs.

The study revealed that, species such as *Anogeissus pendula*, *Prosopis juliflora*, *Diospyrous melanoxylon*, *Holoptelia integrifolia*, and *Butea monosperma* was found most abundant. They showed good natural regeneration. As the micro-climatic condition of the area improved, the population of birds, butterflies and insects increased. These areas have now become the breeding and nesting grounds. The population of herbivores also increased radically. These structures are now serving as permanent drinking water source for wildlife, livestock and villagers. Major source of water for domestic chores and pumping of water for irrigation of crops. It was observed that, the water level of the open shallow dug wells located in and around the rainwater harvesting structures increased up to 0.5 to 2 m. The irrigation intensity and pumping hours increased due to water availability. Nomads used to camp near the structures with their sheep, ponies, donkeys and horses due to availability of water, pasture etc. Cropping pattern of the area shifted towards more profitable crops and cropping intensity increased substantially. Crop diversification was also noticed to large extent. Twofold increment in crop yield was observed. The fallow lands lying vacant for decades came under cultivation due to water availability. Gully and ravines got stabilized up to some extent due to introduction of trees and grasses. Runoff, soil loss and sedimentation was checked. The crop raiding incidences decreased due to regular forage availability in the forest for wild animals. The pressure of cattle grazing in forest area reduced due to availability of forage resources near the water harvesting structures. Prior to interventions, the communities in the fringe areas were highly food insecure, a situation that caused regular outmigration of inhabitants to other areas in search of food in times of even minor droughts. Soil and water conservation techniques not only improved and stabilized food production, but also reduced the impact of climate variability and rainfall irregularities, thereby improving household resilience. The conservation approach was successful in instilling a sense of ownership and responsibility among the stakeholders.



Mahendra Singh, K. B. Sridhar, A. R. Uthappa, R. P. Dwivedi, Inder Dev, Asha Ram, S. B. Chavan, Ramesh Singh, Rajesh Kumar Singh, Rajendra Singh, R. K. Tewari and O. P. Chaturvedi
ICAR- Central Agroforestry Research Institute, Jhansi

Indoxacarb resistant strain solution of *Trichogramma chiloris*

Due to indiscriminate use of chemical pesticides has led tomany environmental hazards such as development of resistance in pests to pesticides, outbreak and resurgence of target and non-target pests, destruction of beneficial organisms and pesticide residues in food, fodder and feed etc. Besides this, pesticides act adversely on the nervous system, microbial activity in soil, honey bees, our aquatic ecosystem and human health. Therefore, there is a recognized need for implementation of more sustainable integrated pest management (IPM) strategies with a greater emphasis on biologically based tactics of crop protection and reduced reliance on broad spectrum insecticides. Amongst the parasitoids utilized for the control of insect pests, the chalcid egg parasitoid *Trichogramma* spp is the most important and has received the maximum attention because of its importance in biological control. All over the world, use of *Trichogramma* has been attempted at least against 28 different phytophagous pest species on 20 different crops. Every year more than 32 million ha area is treated worldwide using *Trichogramma*. In India, 12 indigenous species of *Trichogramma* have been used besides a few introduced species in the release programmes. Among these, *T. chilonis* Ishii is widely distributed in the Indian subcontinent and is used widely for the control of many lepidopterous pests.

Rearing of *T. chilonis* (Ishii)

Nucleus culture of *T. chilonis* Ishii was obtained from National Bureau of Agricultural Insect Resources (NBAIR), Bangalore. The parasitoid was reared on the cleaned and UV-sterilized eggs of the factitious host *Corcyra cephalonica*. Culture of the parasitoid was maintained in the glass vials of 10m x 2.5cm size at 25±1˚C and 65±5%RH in a culture room. Egg cards containing approximately 1000-1500 parasitised eggs, which turned black, were kept in each vial for adult emergence. Soon after emergence, parasitoids were offered for parasitisation an egg card (12m x 2.5 cm) containing approximately 0.5 cc of 0.-24 h old, UV sterilized eggs of *C. cephlonica*. On the next day, the egg card was removed and kept for development in a fresh tube after removing the live parasitoids. Parasitised eggs turned black on the fourth day after parasitization. Freshly emerged adult parasitoids were used for regular maintenance of the culture and also for the studies.

Strain selection of *T. chilonis*

The development of Indoxacarb resistant strain of *T.chilonis* under laboratory conditions in Bundelkhand region of Central India is being carried out. It was observed that, parasitoids possess poor tolerance to certain climatic conditions like high temperature and low humidity. Biological control of insects by augmentation *i.e.* to increase their effectiveness as natural enemies accelerates the destructive action of the natural enemies resulting in effective insect control. It is very essential to know the biological limitations of the mass-produced parasitoid to ensure that they are being used in the most effective way. Indoxacarb (oxadiazone group insecticide) was sprayed at the variable concentrations to calculate LC_{50} and LC_{90} values. Before shifting to the next concentration, a susceptible population was also exposed to the same concentration to determine mortality (%) and parasitism as compared to tolerant population. *Per cent* parasitism was recorded after five days of exposure. The *T. chilonis* used for testing the mode of pesticides have been selected and are reared in the laboratory. Preliminary range finding tests were carried out to fix the test concentrations, which caused 10-90% mortality of the parasitoid. Different concentrations of the insecticide solutions were prepared using water for the bioassay studies, taking dosages lower to higher than the field recommended dosages. Mortality was recorded

after 6 hrs of the insecticide application. Parasitism was recorded on 5th day, while emergence was recorded on 9th day of the the treatment. It was observed that 63.29 mg ai/100 ml caused about 50% mortality (Table 1 & Fig. 1).

Table 1: Mortality, parasitism and emergence of *T. chilonis* at different conc. of Indoxacarb

S. No	Doses (mg/100 ml)	g a.i.	%Mortality	Parasitism	Emergence
1	1.89	1.5	0.80	17	9
2	3.16	2.5	1.80	29	17
3	6.33	5.0	8.60	99	82
4	12.66	10.0	18.40	139	112
5	25.32	20.0	27.00	141	123
6	37.97	30.0	36.40	156	136
7	50.63	40.0	47.80	232	190
8	63.29	50.0	50.60	363	211
9	75.94	60.0	61.80	395	242
10	88.61	70.0	64.00	410	323

g ai= g active ingredient; Field recommended dose=0.0634% or 50 g ai/ha; Total No. of adults=500

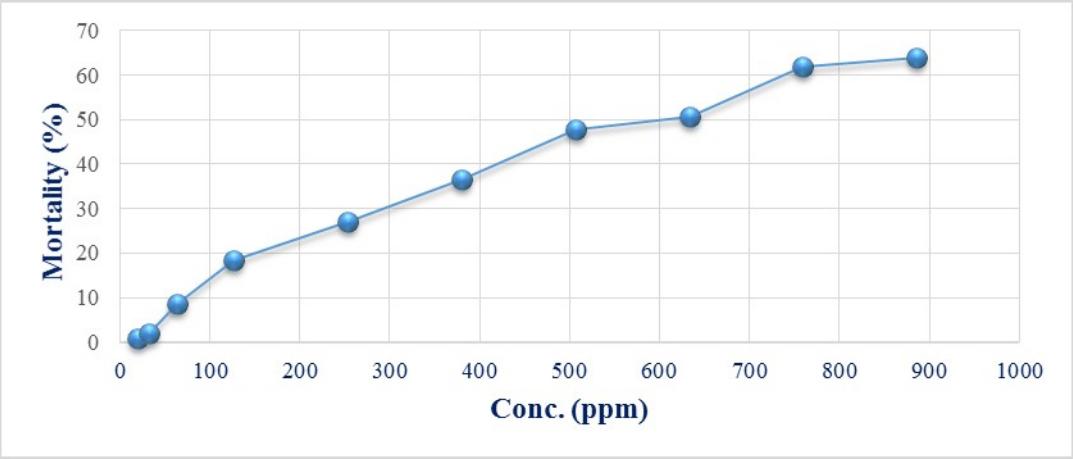


Fig.1. Effect of Indoxacarb on *T. chilonis* at different concentrations

T. chilonis rearing	Parasitized cards of *T. chilonis*	Adult Trichogramma

Madhulika Srivastava and Veeresh Kumar
ICAR- Central Agroforestry Research Institute, Jhansi-284 003 (U.P.), India

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Human Resource Development

- Dr. S. Vimala Devi, Sr. Scientist attended ICAR-CAFT Training programme on "Applications of Computer Algorithms and Statistical Software Packages in Agriculture" during 8th December, 2015 to 7th January, 2016 held at IASRI, New Delhi.

- Dr. R. P. Dwivedi, Principal Scientist delivered the Invited Plenary Lecture on "Gender Sensitivity to Natural Resource Conservation" at International Conference on "Technology, Innovation and Management for Sustainable Development" during 11th -13th February 2016 held at ITM University campus, Gwalior (M P).

- Dr. Badre Alam, Principal Scientist participated in three days (10th -12th February, 2016) Training cum Workshop on "Competency Development for HRD Nodal officers of ICAR" held at NAARM, Hyderabad. Various aspects of Training of the employees of the ICAR Institutes, utilization of HRD budget, implementation of the Annual Training Plan, Training Needs Assessment of employees were discussed during the workshop. The programme was organized by ICAR-NARRM association with HRM unit of ICAR.

- Dr. R. H. Rizvi, Sr. Scientist participated in the National Conference on "Natural Resource Management in Arid and Semi- arid Ecosystem for Climate Resilient Agriculture and Rural Development" at SKRAU, Bikaner during 17th to 19th February, 2016. He presented a research paper entitled "Assessment of Carbon Sequestration Potential of Agroforestry Systems in Sikar and Hisar district using Co_2 Fix model and remote sensing."

- Dr. O. P. Chaturvedi, Director, Dr. A. K. Handa, Principal Scientist and Sh. A.R. Uthappa, Scientist participated in the International Conference on "Potential of Agroforestry for Natural Resource Conservation Higher Productivity from Ravines and Degraded Lands" during 7th to 9th March, 2016 organized by RVSKVV, Gwalior (M.P.).

Institute Joint Staff Council

Director, ICAR-CAFRI, Jhansi constituted of the Institute Joint Staff Council for the period of 1st March,2016 to 28th February,2019.

Chairman : O. P. Chaturvedi (Director)				
Category	**Staff Side**		**Office Side**	
Technical	Sh. Prabhu Dayal, Technical Officer	Member	Dr. Ram Newaj, Pr. Scientist	Member
	Sh. Kashi Ram, Driver, Tech. Asstt.	Member	Dr. A K Handa, Pr. Scientist	Member
Administration	Sh. Tridev Chaturvedi, Stenographer	**Secretary**	Dr. R H Rizvi, Sr. Scientist	Member
	Sh, Birendra Singh, Assistant	**Member, CJSC**	Sh. Rajendra Singh, ACTO	Member
Supporting	Sh. Attar Singh, SSS	Member	Sh. J L Sharma, A.O. & H.O.	**Secretary**
	Sh. Ram Singh, SSS	Member	Sh. S B Sharma, AF&AO	Member

Dr. O. P. Chaturvedi, Director & Project Co-ordinator, AICRP on Agroforestry and Dr. A. K. Handa, Pr. Scientist visited the following AICRP on Agroforestry Centres during the period

- AICRP on Agroforestry Centre at JNKVV, Jabalpur during 18 -19th January, 2016.
- AICRP on Agroforestry Centre at SKNRAU, ARS, Fathpur Shekhabati during 8th -9th February, 2016.
- AICRP on Agroforestry Centres, i.e. on 16th February, 2016 at UAS, Banglore, on 17th & 18th COF, Ponnampet and on 19th & 20th February,2016 at FCRI,TNAU,Mattupalayam.

- AICRP on Agroforestry Centre at NDUA&T, Faizabad during 14th -16th March, 2016.

Visitors

- Sh. Ravi Sharma, Hon'ble MLA, Jhansi(Sadar).
- Dr. Panjab Singh, Chancellor, RLB CAU, Jhansi.
- Dr. Gurbachan Singh, Chairman, ASRB, New Delhi.
- Dr. Tej Pratap, Former Vice-Chancellor, Sher-E-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar.
- Dr. J.C. Dagar, Emeritus Scientist, CSSRI, Karnal.
- Dr. M.A. Shankar, Ex. Director of Research, University of Agricultural Science, Bangalore.
- Dr. P. Kaushal, Regional Coordinator, National Forestation and Eco-Development Board, Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan,
- Dr. V. K. Mishra, Ex-Dean, College of Horticulture & Forestry, Solan.
  Sh. Satyapal Singh Verma, Saharanpur (Progressive Farmer).

Farmers' and Trainers' Training for Promotion of TBOs

A two days training program on "Farmers' and Trainers' training for Promotion of TBOs" was organized at ICAR-CAFRI, Jhansi on 4 & 5th March,

2016 under the National Mission on Oilseeds and Oil Palm, Mini Misson- III (NMOOP-MM-III) project funded by DAC&FW, MoA&FW, GoI, New Delhi. 35 Farmers from 16 villages and 23 trainers from 8 districts of the U P state from various departments and Krishi Vigyan Kendras participated in the awareness program on Tree borne oilseeds. Dr. A. K. Handa, Dr. S. Vimala Devi, Dr. K. B. Sridhar and Sh. A. R. Uthappa were part of the organizing team.

Bundelkhand Krishi Pradarshoni Evam Kisan Gosthi

ICAR-CAFRI participated in Agriculture Exhibition held on 29th and 30th March, 2016 during *Bundelkhand Krishi Pradarshini Evam Kisan Gosthi* at Lalitpur. In the exhibition agroforestry technologies and work related watershed was showcased. Hon'ble Union Minister Sushri Uma Bharati, Minister for Water Resources, River Development and Ganga Rejuvenation inaugurated the gosthi and visited the ICAR-CAFRI Exhibition Stall. This function was organized by ICAR- ATARI, Kanpur along with KVK, Lalitpur.



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