ICAR

Agroforestry Newsletter

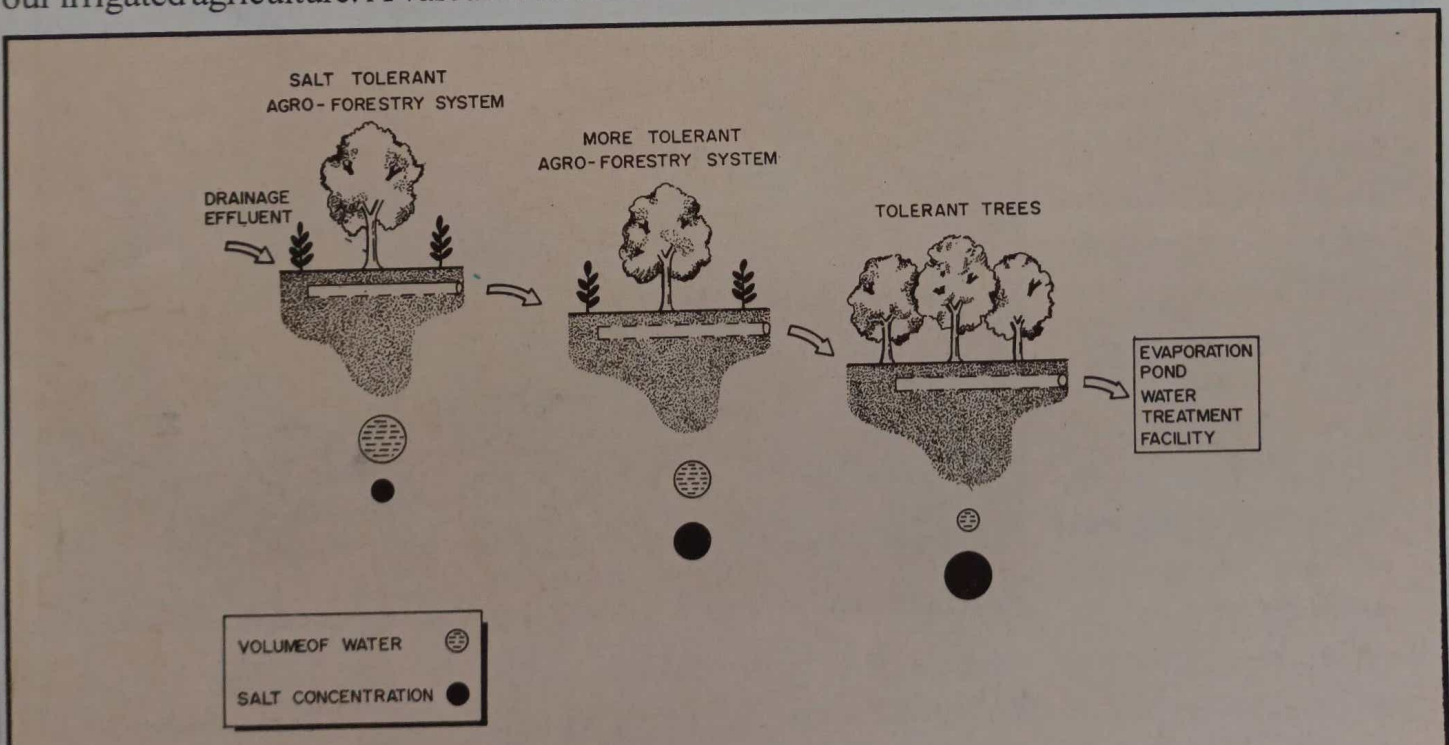
NRCAF

National Research Centre for Agroforestry, Jhansi

Vol. 11, No. 4 OCTOBER-DECEMBER, 1999

Agroforestry - An Approach for Reuse of Drainage Water

Agriculture occupies a prominent place in the Indian economy because of its contribution to the overall economic growth through supplies of food, fuel, fibre and other raw materials. It was made possible mainly due to spread of irrigation facilities through canals. Our present created irrigation potential is more than 82 m ha, whereas, it was only 22.6 m ha at the time of independence. Now, waterlogging and salinity threatens productivity of our irrigated agriculture. A vast area estimated to be about 7.17 m ha is affected by soil salinity and alkalinity, whereas, 6 m ha is affected by waterlogging. These twin problems are attributed to lack of adequate drainage, poor operation and maintenance of irrigation projects, inefficient water application at the farm level, impermeable layer at shallow depth etc. This can be overcome by reducing the source of excess water and provision of artificial drainage. Sub-surface drainage, an artificial drainage, is quite efficient system in



CONCEPTUAL MODEL OF AGROFORESTRY FOR REUSE OF DRAINAGE EFFLUENT

combating the problem of waterlogging and salinity. However, major problem in this system is, how to dispose off the drainage effluent. If we introduce an agroforestry system, the utility value of water is increased by its reuse for crops and trees of differential salt tolerance. This concept helps in making wasteful drainage effluent a resource. Management of salt is the prime aim in this system. We use fresh irrigation water for salt sensitive crops. Again reuse the drainage effluent to progressively higher salt tolerant crops and trees. At one hand we are utilizing irrigation water more effectively and at another hand the concentration of salt increases in continuously reduced volumes of drainage water. The drainage water whose volume is significantly reduced could be managed by water treatment facility or by small evaporation pond.

Other advantages of this system are to draw more water due to deeper root system and higher evapotranspiration rates of trees throughout the year. Trees like *Acacia nilotica*, *Casuarina equisetifolia*, *Zizyphus mauritiana*, *Punica granatum*, *Prosopis juliflora* and *Salvadora persica* having soil surface (0-30 cm) salinity tolerance of 4.0 to 10.0 and 10.0 to 25 dS^{-1} m, respectively and crops *viz*, barley, mustard, pearlmillet, sorghum and sunflower having salinity tolerance of 10.0 dS^{-1} m in irrigation water may find place in agroforestry systems for safe use of drainage effluent.

Ramesh Singh, R.S. Yadav, Munna Ram and K.R. Solanki
National Research Centre for Agroforestry, Jhansi.

Bees and Agroforestry

The honey bees are one of the most beneficial insects to man. They have been reared in crude containers for a long time. Agroforestry offers immense potential for the utilisation of honey bees. Honey bees have a double role to play in a crop ecosystem. They can provide economic products like honey, bee jelly and bee wax while they help in pollination and seed set on crops and trees. A number of multipurpose tree species recommended in agroforestry are good pollen and nectar sources. The trees also provide

(Remaining on page 4)

From the Director's Desk.....

It is my elated pleasure in presenting 11th volume of Agroforestry Newsletter. Research on agroforestry has gained an unique position and now it is the high time to concentrate on the publication of research results in the consize form and lucid language so that interested people, researchers, planner and NGO's could be benefitted. Agroforestry Newsletter would welcomes such articles, news, views etc. for publication.

KR So Canki

(K.R. SOLANKI)

Visit of DDG (NRM)

Dr. G.B. Singh, Deputy Director General (NRM) , ICAR, New Delhi visited the Centre on 23.11.99 and addressed the scientists.

He appreciated the progress made during the recent past and was of the opinion that the NRCAF has already established potential agroforestry systems based on Agri-horti, Silvi-pasture and Agri-silvi combinations.

They have also done detailed studies on Neem and Kardhai trees. Scientists of the Centre are young, enthusiastic, sincere and hard working.

shelter and nesting sites for honey bees. The bee family consists of a number of genera but the genus Apis are the most valuable for domestication and pollination. Four species of this genus of honey bees are economically important. They are :

Rock bee	-	*Apis dorsata*
Indian honey bee	-	*Apis cerana indica*
European bee	-	*Apis mellidra*
Little bee	-	*Apis florea*

The rock bee, Apis dorsata cannot be domesticated. They build single comb nests attached to tall trees like Semul (*Ceiba pentandra*), rocks and ceilings. Many colonies may be seen on one tree. Tribals and honey sellers collect honey from these nests. A sizable portion of honey produced in India comes from this species. It is also a very efficient pollinator of crops. Attempts have been made to semi domesticate this bee but it remains in the artificial shelter for only a few months. *A. indica* and *A. melifera* can be domesticated and maintained in nest boes. These colonies provide pure honey while the foraging bees increase pollination and seed set in the crop ecosystem. There are a number of other bee species that are major pollinators though their honey production is low. *Apis florea* or the little bee is one such example. This honey bee is a very good pollinator of many crops. The trees associated with crops in agroforestry provide an optimum nesting site for this shade loving honey bee. This bee builds its nest on the lower branches of trees like babul (*Acacia nilotica*) ber bushes (*Zizyphus sp.*) Citrus (*Citrus reticulata*), Aonla (*Emblica officinalis*) and Kardhai (*Anogeissus sp.*). This species can not be economically utilised because of their frequent swarming. The honey production is also less but in a wooded ecosystem like that of agroforestry they occur naturally and are the major pollinators in the system. The honey of *A. florea* is believed to contain medicinal properties and fetches a higher price in some countries.

With the decreasing forest cover, the bee pasturage has been greatly reduced. Growing agroforestry trees like *Eucalyptus*, *Terminalia*, Karanj, Shisham, Phalsa, Soapnut, *Tamarindus*, Toon, *Citrus*, ber etc., increases bee pasturage in the cropping system.

Chitra Shankar and K.R. Solanki
National Research Centre for Agroforestry, Jhansi

Effect of Agronomical and Physiological Management Practices on Rooting Pattern of *Dalbergia sissoo* in Agrisilviculture System

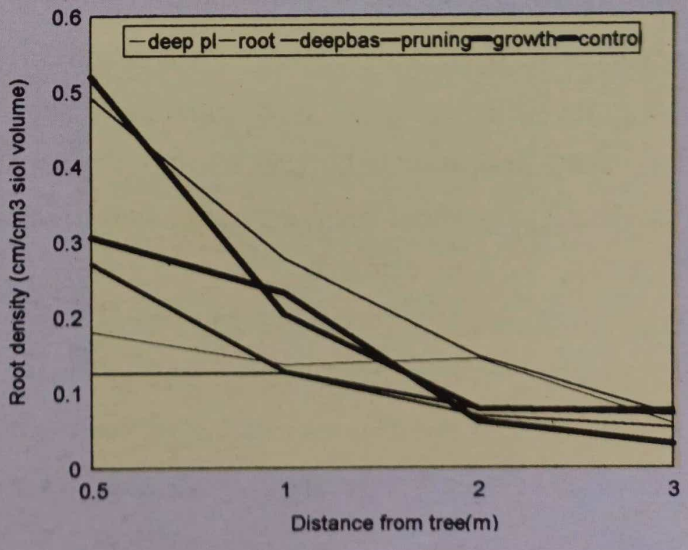
The presence of roots as documented by vertical or horizontal extent is only the first step in determining the effect of a species as a competitor for the belowground resources of water and nutrients. After the presence of roots is established in a given vertical or horizontal zone, the effectiveness of these root will depend on the related parameters of specific root length (SRL) and root length density (Lv). Species with high SRL and high Lv will be better able to extract water and nutrients than species of low SRL and Lv. Root length density can be several fold greater in water and nutrient rich zone than poor zones of soil. Knowledge of the root distribution of trees is essential to understand the ecological niche of a tree species, to design agroforestry system and its management to optimize the productivity of tree species. Once competition is observed between tree and crop, it can be minimized by limiting the components, or by harvesting them at appropriate time and/or by some management practices.

Investigations were carried out during 1994-98 at the farm of National Research Centre for Agroforestry, Jhansi with six treatments, *viz.* deep ploughing (the experimental plot was ploughed by disk plough before sowing of Kharif and Rabi crops), root barrier (after planting of sapling, 1.0 m deep and 0.30 m wide trench was prepared around the tree at 0.5 m away from tree base and 600 gauge thick polythene sheet was installed), deep basin-sunken method (in a 1x1x1 m planting hole, 0.40 m depth was filled with soil and compost mixture and planted the sapling, the rest of the 0.6 m depth was kept as open, after rain, the soil collected in deep basin was removed every year), growth regulator (100 ppm gibberellic acid solution was sprayed in each quarter of the year), pruning (pruning of tree up to 40% of the total height of the tree during December every year), control (without any management practices).

Root length and specific root length

Among all the root management practices applied to this study, deep ploughing and deep basin exhibited significantly lower root length density at different places (0.5, 1.0, 2.0 and 3.0 m) from tree base as compared to pruning, root barrier, growth regulator and control. In general, root length density at 0.5 m from tree base was higher and it declined sharply with increasing the distances from tree base (Fig.1).

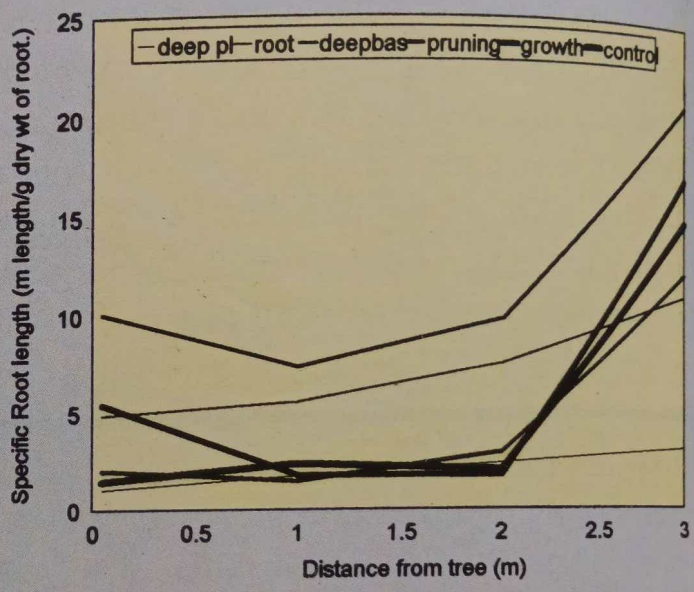
Fig.1 : Root length density at different distances from tree base under various management practices



Planting of sapling in deep basin may force to move tree roots into deeper soil, where they may spread laterally and then moves towards upper layer of soil, where nutrient and moisture are available for the plant, but it take more time to reach at upper surface of the soil as compared to other method of planting. However, the efficiency of this strategy depends on the ability of the tree root systems to colonize the top soil of neighboring field by roots growing upward and may only be effected for short duration. Deep ploughing up to 20 cm soil layer destroyed fine tree roots which lower the concentration of roots on upper soil surface before sowing of crops thereby protecting the crops for same time from tree root competetion. Although the tree roots remain active in the subsoil and may serve as a safer net against nutrient leaching. Besides the reduction of tree root competition, a desirable aspect of soil tillage in agroforestry is that it probably increased root turnover, and thus carbon inputs into the soil by the periodical destruction of the tree roots. Root barrier, pruning and growth regulator did not able to reduce root concentration on topsoil as compared to deep basin and and deep tillage. Although the root length density under these practices was lower as compared to control. The root barrier (polythene sheet) may be used to divert the fine roots towards trunk of the tree at initial stages of growth but this method was not affective as much as deep ploughing and deep basin.

Specified root length (SRL) shows a similar trend at different distances (0.5, 1.0, 2.0 and 3.0 m) from tree base (Fig. 2).

Fig.2 : Specific root length at different distances from tree base under various management practices



In general, the specific root length was lower in 15 cm topsoil layer near by the tree base and it increased sharply with the increase of distances from tree base in all the management practices. The value of SRL was higher in deep basin and deep ploughing at all the places from tree base. It indicated that deep ploughing destroyed the root on topsoil which again propagated with very fine root system and in deep basin only very fine roots could reach on upper surface of soil. The lower values of SRL in root barrier, pruning, growth regulator and control than deep basin and deep ploughing indicates more thickness of fine roots under these practices.

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राष्ट्रीय कृषिवानिकी अनुसंधान केन्द्र, झाँसी में संघ के राजभाषा स्वर्ण जयंती वर्ष के तहत, 14 सितम्बर, 99 से 13 अक्टूबर, 99 तक हिन्दी चेतना मास के आयोजन का एक संक्षिप्त आख्या

राजभाषा हिन्दी के स्वर्ण जयंती वर्ष के उपलक्ष्य में दिनाँक 14 सितम्बर, 99 को हिन्दी चेतना मास का शुभारंभ डा. खीमराज सोलंकी, निदेशक, राष्ट्रीय कृषि वानिकी अनुसंधान केन्द्र, झाँसी की अध्यक्षता में हुआ। इस अवसर पर हिन्दी के प्रचार–प्रसार हेतु विभिन्न वक्ताओं ने अपने–अपने विचार प्रस्तुत किये। अपने अध्यक्षीय भाषण में डा. सोलंकी ने कहा कि राजभाषा के प्रयोग में हमें गर्व एवं स्वाभिमान का अनुभव करना चाहिए। उन्होंने कहा कि कृषिवानिकी तकनीकी को किसानों तक पहुँचाने के लिए हिन्दी ही एक सशक्त माध्यम है जिससे वैज्ञानिक अपनी बात किसानों तक पहुँचा सकते हैं।

दिनाँक 30 सितम्बर, 99 को बुन्देलखण्ड में कृषिवानिकी विकास विषय पर एक व्याख्यानमाला का आयोजन किया गया। जिसमें केन्द्र के वैज्ञानिकों व अधिकारियों ने विभिन्न मुद्दों पर प्रकाश डाला जो कि बुन्देलखण्ड के विकास के लिए आवश्यक है। निदेशक महोदय ने पेड़ की उपयोगिता पर बल दिया तथा बरसाती पानी का संरक्षण तथा सदुपयोग करने हेतु कृषिवानिकी की विभिन्न पद्धतियों को अपनाने हेतु आहवान किया। दिनाँक 11 अक्टूबर, 99 को एक कवि सम्मेलन का आयोजन किया गया। जिसमें हिन्दी को राजभाषा नहीं, राष्ट्रभाषा बनाने के लिए हमें अपने स्वाभिमान को जगाना होगा, इस कवि सम्मेलन का मुख्य बिन्दु था।

बुन्देली लोकवाणी के रचनाकार श्री नाथूराम साहू "कक्का" ने अंग्रेजियत के प्रभाव पर कटाक्ष करते हुए इस प्रकार कवि सम्मेलन का प्रारंभ किया

बंद डिब्बों में जबसे चला डालडा,
क्या–क्या जलवे नजर हमको आने लगे

इनकी एक अन्य रचना इस प्रकार थी

बुंदेली माटी में जनमा हूँ, बुन्देली मेरी भाषा है
संस्कृत दादी है मेरी, व बुंदेली मेरी माता है

खड़ी बोली है मौसी मेरी उर्दू उसकी सहेली है
अंग्रेजी सास है मेरी नक्टी कुरूपा नकेली है

इसी धारा को आगे बढ़ाते हुए घासानुसंधान के श्री रवीन्द्र सिंह चौहान ने कहा

दुनिया के हर देशों की अपनी अपनी भाषा है
भारत में हिन्दी भाषा की कितनी आज निराशा है

चंद्रशेखर काले कुछ इस प्रकार बोले :

अपने उद्‌गम से उदधि के मिलन तक यू,
एक नया विश्वास लेकर जी रहा हूँ।

देख नियति के विमुख होते जगत को,
एक नया कलश गरला मैं पी रहा हूँ।।

श्री नाथूराम शर्मा ने हिन्दी राष्ट्रभाषा के लिए कहा

भारत की विभिन्न भाषायें, भाषाओं में निहित एकतायें।
शायद ऐसा वन डे आ जाये, हिन्दी राष्ट्रभाषा हो जाये।।

श्री प्रमोद कुमार तिवारी विकल जी ने प्रस्तुत किया

अंग्रेजी सिर पर हिन्दी करे पुकार
फिल्मों ने चौपट किया संस्कृत का संसार

संस्कृति का संसार न जाने कहा खो गया
पश्चिम का उपहार प्राण आधार हो गया

नहीं निभाता देश के प्रति कोई कर्तव्य
धूल धूसरित हो गई भारत की छवि भव्य

श्री परमानंद जी 'परम' बोल उठे

किसे प्रयाग कहते तुम, जो कालिन्दी नहीं होती
गणित बेकार हो जाता जो एक बिन्दी न होती।
कहाँ सम्मान मिलता सूर, तुलसी और मीरा को
हमारे राष्ट्र की भाषा अमर हिन्दी नहीं होती।।

श्री ओम प्रकाश सक्सेना "प्रकाश" ने उपमा दी

भाषा एक देश की नइयां, का है अपुन करईयॉ।
मिसरी सी बोली में चेटी, घर की लाल ततैयॉ।।

कवि सम्मेलन में सर्व श्री राम प्रकाश वर्मा 'प्रकाश', हरशरण शुक्ला, शाम ढमढेरे, प्रेमचंद भानपुरिया, सी.एल. ओझा तथा कृष्ण चन्द शर्मा नारद ने भी राजभाषा हिंदी, पर्यावरण एवं भारत में कृषि के महत्व पर अपनी रचनायें प्रस्तुत की।

दिनाँक 13 अक्टूबर, 99 को केन्द्र, में सम्पन्न राजभाषा हिन्दी के स्वर्ण जयंती वर्ष में हिन्दी चेतना मास के समापन समारोह का आयोजन किया गया। इस अवसर पर केन्द्र निदेशक डा. खीमराज सोलंकी ने कहा कि झाँसी की रानी लक्ष्मीबाई से हमें प्रेरणा लेकर अपने में स्वाभिमान और अनुशासन को बढ़ाना है।

डा. राम नेवाज, प्रभारी अधिकारी – हिन्दी ने स्वर्ण जयंती कार्यक्रम की आख्या प्रस्तुत की। इस अवसर पर केन्द्र में कार्यरत वैज्ञानिक, अधिकारी एवं कर्मचारियों को स्मृति चिन्ह भेंट करते हुए उनके हिन्दी राजभाषा कार्यान्वयन में श्रेष्ठ कार्यो के लिए सम्मानित किया गया सम्मान प्राप्तकर्ताओं में अनुक्रम से सर्व श्री डा. प्रसिद्धि राय, राम नेवाज, विन्नामी सिंह, राम बाबू शर्मा, शाम गणपति ढमढेरे, हूबलाल, कान्ता प्रसाद शर्मा, चन्द्रेश कुमार बाजपेयी एवं सुशील कुमार शुक्ल रहे। उपरोक्त कार्यक्रमों का आयोजन केन्द्र की राजभाषा कार्यान्वयन समिति द्वारा किया गया।

Honour/Award

Dr. K.S. Dadhwal, Principal Scientist, NRCAF, Jhansi has been awarded the SAARC Honorarium of 50 US Dollars for Success Story on "Rehabilitation of degraded mined lands of North-West Himalaya" in 1999.

Dr. K.S. Dadhwal, Principal Scientist, NRCAF, Jhansi has been elected Vice-President, Indian Association of Soil and Water Conservationists (IASWC) for the period 2000-2001.

Agroforestry Newsletter team congratulates Dr. Dadhwal.

New Staff Member

Dr. K. Kareemulla, Sr. Scientist (Agricultural Economics) and Sh. R.H. Rizvi, Scientist (Computer Application) joined the Centre.

Aonla Fortnight

Aonla Fortnight was organized from 1st to 15th December, 1999 in which 350 farmers including farm women and village youths visited the aonla based agri-horticultural system of agroforestry at the Centre. During the fortnight the various extension activities such as on-farm visit, demonstration sites visit, group discussion, question-answer session and scientist-farmer interactions were carried out. District Information Officer, Jhansi officials from state dapartment of agriculture, horticulture, forestry, KVK, Bharari and IFFDC, Sagar (M.P.) attended the programme. There was wide publicity of aonla based agroforestry in the National and local News papers. The farmers have shown keen interest in aonla based agri-horticultural system of agroforestry and expressed their desire to have training on budding of aonla.

Sports Meet

A contingent of 23 players participated in ICAR Zone IV Sports Meet at CSSRI, Karnal during 29th November - 2nd December, 1999 and Mrs. Chitra Shankar won the Second and Third prize in Discuss and Javelin throw, respectively.

Promotion

Dr. Anil Kumar, Scientist (Sr. Scale) was promoted to Sr. Scientist at the Centre.

Transfer

Dr. G.R. Rao, Scientist (Forestry) got transfered to CRIDA, Hyderabad.

World Food Day

World Food Day was celebrated on 16th October, 1999 at the Centre.

Our New E-mail Address

nrcaf@hub1.nic.in

Visitors

- Dr. G.B. Singh, DDG (NRM), ICAR, Krishi Bhavan, New Delhi.
- Dr. P.S. Pathak, ADG (AF), ICAR, Krishi Bhavan , New Delhi.
- Dr. V.P. Gupta, Vice Chancellor, Rajendra Agriculture University, Pusa, Bihar
- Dr. R. Deb Roy, Ex. Director, NRCAF, B-387, Sarita Bihar, New Delhi.
- Dr. S.K. Arora, Ex Dean, College of Basic Science, CCSHAU, Hisar.
- Dr. G.P. Lodhi, Dean, P.G. Studies, CCSHAU, Hisar
- Dr. V.K. Mishra, Executive Director, Society for Promotion of Wasteland Development, New Delhi.
- Dr. N.P. Tadoria, Prof. &Head, Dept. of Forestry, Garhwal University, Srinagar alongwith 14 M.Sc. (Final) Forestry Students.
- Dr. C.P. Arora, Sr. Scientist, CSWCR&TI, Dehradun
- Dr. K. Pradhan, Former Vice Chancellor, Rajasthan Agriculture University, Bikaner
- Dr. R. Kanniyan, Vice Chancellor, Tamil Nadu Agriculture University, Coimbatore.
- Dr. J.S. Bhatia, ADG (EP&D), ICAR, Krishi Bhawan, New Delhi.
- Dr. R.C. Thakur (Asstt. Prof.) and Dr. B. Gupta (Asstt. Prof.) of Dr. Y.S. Parmar University, Solan alongwith 40 students (B.Sc. Forestry) visited the Centre.

"कृषिवानिकी द्वारा प्राकृतिक संसाधनों का टिकाऊ प्रबंधन" पर संगोष्ठी

भारतीय कृषिवानिकी समिति, राष्ट्रीय कृषिवानिकी अनुसंधान केन्द्र, झाँसी (उ0प्र0) के सहयोग से झाँसी में सितम्बर 12–14, 2000 को "कृषिवानिकी द्वारा प्राकृतिक संसाधनों का टिकाऊ प्रबंधन" पर राष्ट्रभाषा हिन्दी में एक संगोष्ठी करने जा रही है। संगोष्ठी का मुख्य उद्देश्य कृषिवानिकी तकनीक से भूमि के प्रबंधन की उपयोगिता को उजागर करना है और किसानों एवं अन्य लोगों तक इस संदेश को पहुँचाना है कि किस प्रकार भूमि से कृषिवानिकी पद्यतियों द्वारा अनाज, चारा, लकड़ी इत्यादि सभी आवश्यकताओं को पूरा कर सकते हैं एवं पर्यावरण भी संतुलित रख सकते हैं। इसलिए इस संगोष्ठी में कृषिवानिकी के क्षेत्र में कार्यरत वैज्ञानिक, तकनीकी अधिकारी, विकास अधिकारी/कर्मचारी, गैर सरकारी संगठनों एवं किसानों आदि की भागीदारी एवं विचारों के आदान–प्रदान सुनिश्चित किया गया है। संगोष्ठी की भाषा हिन्दी रखी गयी है जिससे वैज्ञानिक तकनीक का संदेश सीधे किसानों तक पहुँचे। संगोष्ठी के लिए सारांश 31 मार्च तक भेजे जा सकते है। विस्तृत जानकारी के लिए डा. के. एस. डढ़वाल, प्रधान वैज्ञानिक एवं संगोष्ठी आयोजन सचिव, राष्ट्रीय कृषिवानिकी अनुसंधान केन्द्र, झाँसी (उ0प्र0) से सम्पर्क किया जा सकता है।

Supervision and Guidance : Dr. K.R. Solanki, Director, NRCAF, Jhansi

Compiled & Edited by :	Published by :	Printed at :
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