ICAR

# Agroforestry Newsletter

NRCAF

National Research Centre for Agroforestry, Jhansi

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## BIENNIAL WORKSHOP OF AICRP ON AGROFORESTRY

Biennial Workshop of AICRPAF was organised by Dr. K.R. Solanki, Director, NRCAF and Coordinator of AICRP on Agroforestry at Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad (UP) from 6-7 March, 1999. Dr. B.R. Tripathi, Vice-Chancellor, NDUA&T was the Chief Guest and Dr. G.B. Singh, DDG (NRM), ICAR, Krishi Bhawan, New Delhi presided over the workshop. Dr. P.S. Pathak, ADG (AF), ICAR, Krishi Bhavan, New Delhi, Dr. S.M.A. Rizvi, Director of Research, NDUA&T, Dr. R.P. Singh, Director Extension, NDUA&T, Dr. Gurbachan Singh, Pr. Scientist, Dr. A.K. Bisaria, Sr. Scientist, Dr. A.K. Handa, Scientist, NRCAF and 125 delegates attended the workshop.

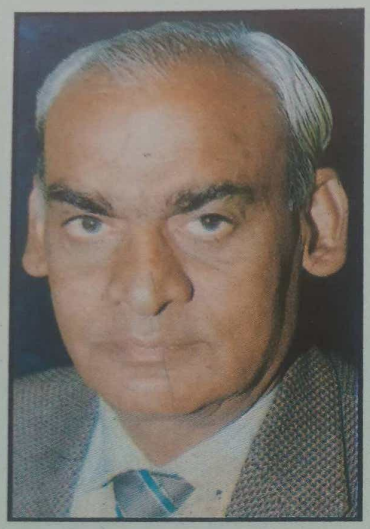

Proceedings of five technical sessions alongwith some broad recommendations

were presented by the rapporteurs of the respective sessions. The house unanimously accepted the proceedings/ recommendations

## Major Recommendations

1. Since D&D exercise has been completed by most of the centres, the final report will be prepared by ADG (AF). All the centres should send additional informations, if any, to ADG (AF) latest by 30th June, 1999. All information to this effect will be discussed in a meeting to be held at NRCAF, Jhansi within six months.
2. Regarding MPTs evaluation trial, it has been decided to speed up the evaluation of germplasm of MPTs and their exchange between centres. For tree improvement purpose, all the centres will initiate work strictly on two selected species identified in MPTs evaluation trial. There is also a need to short list of MPTs at the national level for improvement purpose.
3. There is an urgent need for developing perfect agroforestry package for marginal, medium and progressive farmers.
4. Production of quality seed and planting material of promising and already identified tree species needs to be attempted on priority. Techniques need to be standardized for asexual propagation of trees suitable for agroforestry. Controlled mist chamber facilities needs to be created at selected centres for production of true to type planting material for distribution to user agencies. As in case of agricultural crops, a mechanism needs to be evolved for the release of varieties of agroforestry species.
5. Routine kind of research in agroforestry needs to be concluded. All future research should be problem oriented and farmer's need based.
6. Role of value addition in agroforestry species needs priority attention. Introduction of high value export generating in-exploited and under exploited trees, bushes and herbaceous crops as agroforestry components needs attention.
7. Tree canopy management for reducing competition between agroforestry components and developing ideo types of agroforestry must form an integral part of future research in agroforestry. There is also a need to develop bio-fencing technology for different situations.
8. Agroforestry research decisions in the future should be in a participatory mode approach. The client must participate in development, perfection and implementation of agrofoestry technologies.
9. There is a need to properly document the transferable agroforestry technologies developed at various centres for wider application. The NRCAF, Jhansi will co-ordinate this compilation and print this document before the next workshop. All centres will provide the desired information strictly in the proforma developed and circulated by NRCAF before September 30th, 1999.
10. Since poplar based agroforestry has been adopted by the farmers in a big way in the Indo-gangetic alluvial, therefore, an inventory of farmers experiences and some case studies needs to be

## From The Director's Desk



*Forestry is the study and practice of managing forest, forest land and associated resources. Forest furnish timber, fuel wood, top fodder, fruits, gum, medicines etc. It is one of the major source of raw material for paper, ply wood, medicine industries. Forest, not only conserve natural resources but also ceases environmental contamination and land degradation. The reduction in forest cover, demographic pressure and importance of trees forced man to grow trees on farms, community lands and home gardens. This vistas is known as agroforestry. In view of the above significance, we celebrate forestry day on 21st March every year to promote forestry, create awareness among masses for tree plantation and to have clean environment and green earth.*

K R So Lanki

***(K. R. SOLANKI)***

generated and properly documented. The centres located at Ludhiana, Hissar and Pantnagar will generate this inventory under the guidance of NRCAF, Jhansi.

11. Agroforestry technology package is available for selected situations including wastelands such as salt-affected soils, rainfed areas, minespoils, etc. To popularize these practices, more emphasis on adaptive research will be required.
12. Training for farmers is an important component of transfer of technology which must form an integral part of AICRPAF. There is a need to prepare leaflets in local language about proven agroforestry practices such as nursery raising and planting techniques of important agroforestry species.
13. Wherever certain forest protection act/state forest regulation act are working as disincentive in the adoption of agroforestry, it should be discussed with concerned department and modified accordingly to encourage the farmers/people in adoption of agroforestry practices.

## TREE GROWTH MODELLING : PROBLEM OF NEGATIVE AND CONSTANT ESTIMATION OF SIZE

Tree growth modelling is a mathematical phenomenon which describes the complex biological growth process in terms of equations. It is viewed as an important research/management tool to provide the mathematical/statistical summary of the time-course tree growth data. These models are generally employed for two basic purposes: firstly for descriptive use to gain an insight into the mathematical abstraction of the biological problem, secondly for predictive purposes in extrapolation/interpolation studies. The growth equation basically describes the change in the response variable (wood biomass, wood volume etc.) with respect to change in explanatory variate(s) *viz* age, tree height (H), diameter at breast height (D) or a combination of these say $D^2H$.

Various tree growth models reported so far, belongs to either of linear ,polynomial , allometric or non-linear category. This, analytical study of prediction capabilities/limitations of growth functions, primarily addresses the problem of 'negative estimation' and 'constant estimation' of tree size associated with the 'linear' and 'sigmoid' growth functions respectively. Linear models (simple linear or multiple linear) are most frequently used for tree growth , the reason being their simplicity in mathematical terms and straight fitting in application. However, looking into the prediction abilities of majority of the reported simple linear models, they suffer from the problem of 'negative estimation' of tree size exclusively for the lower range of the explanatory variable. The term 'negative estimation' meant that, the predicted values of the response variable comes out to be negative for smaller extrapolative/interpolative values of the explanatory variable. The reason being that linear functions reflects slightly unrealistic picture of tree growth.

Tree growth results from two opposing factors: firstly the positive component associated with biotic potential, photosynthesis activity, absorption of nutrients, constructive metabolism etc, and secondly the negative component representing the restraints imposed by competition, limited resources, stress, respiration and aging factors. These two components when acts together, results in the sigmoid shape of tree growth. The overall tree growth may be attributed in three phases. The biotic potential/photosynthesis/ metabolism results in exponential tree growth in the first phase; limited nutrients/environmental restraints gives rise to linear growth trend in the second phase; senescence/aging factor causing diminishing growth rates and asymptotic behaviour in the last phase of the tree life.

The apparent reason for 'negative estimation' with linear models even with satisfactory adjusted-$R^2$ value is that the data set utilized to fit the linear equation usually represents the range of response variable that belongs to the second phase and which is linear in nature. However, when using this linear equation for extrapolation in lower range, the results are not encouraging and some times vague (negative values). Due to this reason the sigmoid shape functions, belonging to the non-linear category of models, serves the purpose of a more realistic and process based tool for growth modelling. An insight into the prediction capabilities of these sigmoid functions revealed that although they solved the problem of 'negative estimation' associated with linear models, however they suffered from the problem of 'constant estimation' of tree size exclusively for the higher range of the explanatory variable. The term 'constant estimation' meant that the predicted values of the response variable comes out to be almost uniform (i.e though the predicted values increases with the increase in explanatory variate, the pace of increment is almost negligible) for higher extrapolative values of the explanatory variate.

Hence, it is advisable that linear models of growth, if at all used, must be associated with a lower bound on the explanatory variable, otherwise the sigmoid growth functions should be taken into account. Again the sigmoid functions has the lacuna of 'constant estimation', Then what should be the way out and which approach of modelling should be adopted for tree growth? An amicable solution to the problem is the use of 'simulation modelling approach' which employs the linear and sigmoid shape functions together in feasible combination.

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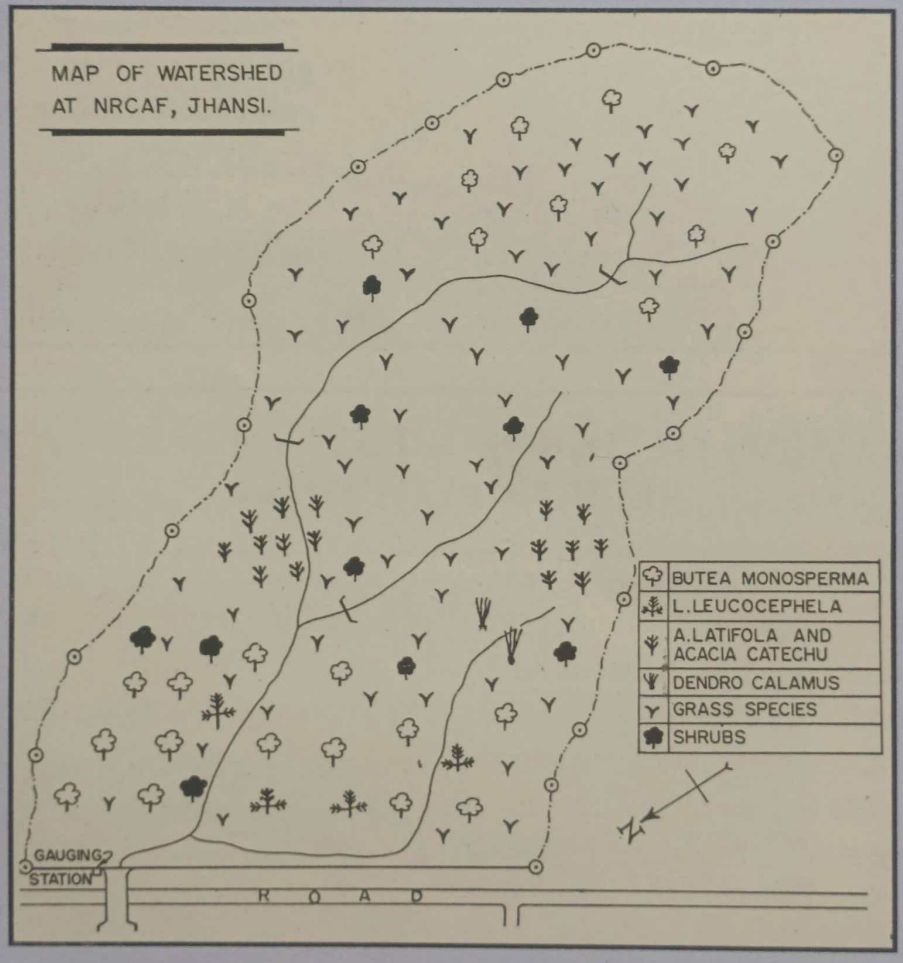
# MANAGEMENT OF DEGRADED LANDS THROUGH AGROFORESTRY SYSTEMS ON WATERSHED BASIS

Land is the most valuable natural resource on which the well being of mankind is dependent. However, the growing biotic interference throughout the globe has resulted in considerable degradation of our natural resources (land, water, vegetation, ground water acquifiers, etc.). In India, nearly 175 m ha, out of total geographical area of 328 m ha is subjected to serious soil and water erosion problems and other degrees and forms of degradation.

The Bundelkhand region of the country has nearly 45% of the area degraded. If these degraded lands of the region are rehabilitated and optimally utilized with viable technology, then they can meet the growing demands of food, fodder, fuel, fibre and timber on sustainable basis. Keeping this in view, a micro watershed of about 10 ha was chosen at the farm of NRCAF, Jhansi in 1998 to identify and evaluate land potential, site specific conservation measures and to develop degraded and marginal lands with agroforestry land use systems for conservation and productivity.

## Vegetation Survey

The initial vegetation survey of the watershed was conducted in 1998 with an objective to know the status of the vegetation existing naturally with respect to predominant MPTS, and grasses of the area (Fig.1).




For conducting the survey quadret method was employed and the whole area of the watershed was divided into lower, middle and upper portion depending upon the variations observed with respect to physiography, type of soil, slope, vegetation, etc. (reconnaissance survey). These region were further divided into 3 parts across the width of the watershed into right,

left and centre thus dividing the whole watershed into 9 parts.

In the lower reaches where soil moisture was in plenty, the dominant tree species found was *Butea monosperma*. There are about 20 trees of *B. monosperma* and its natural regeneration was also observed with 15-20 saplings present. Other tree species found in this region were *Leucáena leucocephala* (4), *Azadirachta indica* (8), *Acacia catechu* (3) and *Albizia lebbeck* (2).

In the middle reaches having rocky habitat at place and stressed moisture conditions, the dominant tree species found were *Anogeissus latifolia* (25) and *Acacia catechu* (20). These two species were present in rocky patches only. Other tree species present are *Azadirachta indica* (4), *Butea monosperma* (5) and *Dendrocalamus* species (2).

In the upper reaches *Butea monosperma* (1.0 to 1.5 m height) and *Anogeissus latifolia* were present very sparsely with stunted growth. Other species introduced in 1997 i.e. *Emblica officinalis*, *Acacia cupressiformis* and *Acacia senegal*, are having about 50 percent survival after one year.

Most of the shrub and grass species present in the watershed area were uneconomical. The important shrub species in all the reaches were *Zizyphus numularia*, *Lantana camaera* and *Carrissa carandus*. The only two economically important grass species present in the area were *Cenchrus ciliaris* and *Heteropogan* species.

**A.K. Handa, K.S. Dadhwal, R.S. Yadav, Ram Newaj and K.R. Solanki**
National Research Centre for Agroforestry, Jhansi

## NURSERY RAISING OF AGROFORESTRY TREES - A BOON FOR SELF EMPLOYMENT

Shri Kashi Naresh Singh is a 24 years old unemployed rural youth. He comes from village Gothaon under development block Rahi, of district Rae-Bareli. He passed his high school examination in the year 1991 and was married in the year 1992. He has been blessed with a female child. He has his old parents and a younger brother, who is also married. Thus, he has seven members in his family. His father is a retired person. This family has 0.3 ha. of land. Being Kzhatriya by caste, working as agricultural labour is also a social taboo for him and his family members. Under such pitiable socio-economic situation he has been experiencing the highest order of suffocation on account of nominal family income, large family population and unemployment.

Shri Kashi Naresh Singh, having failed to find a job even after his concerted efforts of several years had developed a feeling that he has to bear a life of poverty and privation. Once he visited Krishi Vigyan Kendra, Rae Bareli with a sample of his diseased paddy plant to get the disease identified and treatment prescribed by the scientists of this centre. At that time some training programme was going

on in which rural youths are imparted training in vocations like goatery, poultry, nursery raising of (i) fruit & flower plants (ii) medicinal, aromatic and agroforestry plants, dairy etc. for self-employment. At the end of such training courses, viable projects are developed and if necessary such projects are linked with Banks for providing financial assistance. Shri Singh came to the centre and expressed his desire to be trained in some suitable vocation, keeping in view his qualification, resources, interest and need he was selected for training in nursery raising of agroforestry plants. Accordingly he was imparted training in September, 1995 for 10 days. He started establishing a nursery in 0.025 ha. land and raised plants of Teak (sagon), Eucalyptus, Poplar, Shisham, Gulmohar, Amaltash, Bottlebrush, Casurina and Mango. An idea about the various expenses incurred by him for this purpose can be had from following details.

Shri Singh was able to raise and sell 7435 plants after incurring an expenditure of Rs. 7635.00. From sale of these plants he could earn a gross profit of Rs. 23010. 00.

The results of this small project have been very encouraging, highly positive and most remunerative. Now Shri Singh and his family is happy because he has been able to earn a net income of Rs. 15375.00 in about 8 months time. He finds this project a boon for over coming poverty, seeking self employment and earning additional income. Now he is convinced that he can definitely over come the problems of poverty and privation, and he can live a life of promises and prospects for a better future. As a result now he is planning to take up nursery raising project of agroforestry plants (Multipurpose trees) in his entire land (0.3 ha.) with financial assistance from the bank, because he is fully convinced that due to the income from this project he can afford to meet all the basic requirements of his family and yet have some saving too.

**A.K. Srivastava and J. Chaturvedi***
A.I.C.R.P. on Agroforestry, Kanpur
*Krishi Vigyan Kendra, Dariyapur, Rae-Bareli

National Research Centre for Agroforestry was awarded Second Prize for Exhibition Stall at IGFRI, Jhansi Kishan Mela (Farmer's Fair) on 20th March, 1999.

## RECOGNITION

Dr. M. Gulam Dasthagir, Professor and Head, Department of Agroforestry, Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam and Principal Investigator of ICAR - AICRP on Agroforestry has been awarded best researcher in agroforestry (Gold Medal) by the Chancellor and Governor of Tamil Nadu at the 20th Convocation of Tamil Nadu Agricultural University held on 5th February, 1999 at Coimbatore. Agroforestry Newsletter felicitates Dr. Dashtagir for this recognition.

Society of Environmental Science (SES) has conferred Honorary Fellowship on Dr. K.S. Dadhwal, Principal Scientist (Soils) of this Centre in 1999 for his outstanding contributions in the field of Environmental Science. Agroforestry Newsletter congratulates Dr. Dadhwal for this recognition.

## HUMAN RESOURCE DEVELOPMENT

- Dr. A.K. Bisaria and Dr. A.K. Handa attended a workshop on "Sustainable Production and Marketing of Non-Woody Forest Products" held at SFRI, Jabalpur from 28-30th January.
- Dr. K.R. Solanki and Dr. Gurbachan Singh attended International Workshop on "Prosopis State of Knowledge", 8-9 February at Jodhpur.
- Dr. K.R. Solanki, Dr. Gurbachan Singh and Dr. R.S. Yadav attended IV Agricultural Science Congress, 21-24 February at Jaipur.
- Dr. K.R. Solanki, Director, NRCAF, Jhansi attended divisional meeting of NRM division, ICAR at DWMR, Patna from 11-12 January.

## VISITORS

- Dr. A.N. Asthana, Director, IIPR, Kanpur on 7 January.
- Dr. L.P. Mishra, Head, Seed Technology Division, IGFRI, Jhansi on 17 February.
- Sh. D.D. Verma, Sr. FAO, IGFRI, Jhansi on 17 February.
- Dr. K.G. Tejwani, (Chairman RAC) Ex. Director, CSWCR&TI, Dehradun on 18-19 February.
- Dr. N.P. Melkania, Project Co-ordinator (F.C.), IGFRI, Jhansi on 19 February.

## STAFF RESEARCH COUNCIL

The field SRC meeting of the Centre was held on 18-19 January under the Chairmanship of Dr. K.R. Solanki, Director, NRCAF, Jhansi. The Council reviewed the work for 1998 and approved new projects.

## MANAGEMENT COMMITTEE

The third Institute's Management Committee meeting was held on 17 February, 1999 at NRCAF, Jhansi under the Chairmanship of Dr. K.R. Solanki, Director, NRCAF, Jhansi.

Dr. L.P. Mishra, Head, Seed Technology Division and Sh. D.D. Verma, Sr. FAO, IGFRI, Jhansi also attended the meeting.

The house discussed the research programmes at length and sounded appreciation for the research work in particular about the *Hardwickia binata* (Anjan), *Emblica officinalis* (anola), *Zizyphus mauritiana* (Ber), *Anogeissus Spp.* (Kardhai) and vegetative propagation of Neem (*Azadirachta Indica*), Kardhai (*Anogisus pendula*) through air layring.

## RESEARCH ADVISORY COMMITTEE

The third Research Advisory Committee (RAC) meeting was held on 18-19 February, 1999 under the Chairmanship of Dr. K.G. Tejwani, Ex. Director, CSWCR&TI, Dehradun.

The RAC recommended that greater emphasis should be laid to identify output in specific and/or quantifiable terms so that one could be able to evaluate the tangible output and convert in technology. The RAC observed that good work is going on at NRCAF.


## KISHAN GOSTHI

A kishan gosthi was organised on March 15,1999 at village Kandhari Kala, block Talbehat in Lalitpur district of Uttar Pradesh. Dr. K.R. Solanki, Director, NRCAF and Chairman of the gosthi suggested that farmers should adopt cooperative system for fulfilling their needs for seeds, fertilizer, weedicides, pesticides and for sustainable land use management of the existing natural resources. On the occasion, special guest Shri I.K. Trivedi, Sub Divisional Officer (Agril. Extension) emphasized the utility of agri-silviculture, agri- horticulture and silvipastoral system of agroforestry. He suggested the farmers to have guidance for scientific agricultural production. During Kishan gosthi about 500 farmers of village Kandhari Kala and neighbouring villages, including farm women and rural youth, participated.


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