Agroforestry
Newsletter
National Research Centre for Agroforestry, Jhansi-284 003

Vol.20 No. (4) October-December, 2008

TRAINING PROGRAMME FOR ICFRE SCIENTISTS

NRCAF, Jhansi organized a training programme on "Advances in Agroforestry Research and Development" for Scientists and Officers of the Indian Council of Forest Research & Education (ICFRE) from 24th November – 5th December, 2008. The Training programme was inaugurated by Dr. P.S. Pathak, Ex. ADG (Agroforestry), ICAR. Dr. Pathak , in his address, emphasized on the recent issue of climate change and the role of agroforestry in mitigation of toxic gas emissions and carbon sequestration. D. S.K. Dhyani, Director, NRCAF, stressed upon the close collaboration between ICAR and ICFRE through National Mission on sustainable Agriculture and National Mission Greening India. The training Programme was attended by scientists and officer from Tropical Forest Research Institute, (TERI) Jabalpur, Institute of Forest Genetics and Tree Breeding (IFGTB), Goimbatore, Rain Forest Research Institute, (RFRI) Jorhat, Arid Forest Research Institute, (AFRI), Jodhpur, and Hill Forest Research Institute, (HFRI) , Shimla, The valedictory function of the programme was chaired by Dr. V.K. Bhatia, Director, IASRI, (Indian Agriculture Statistical Research Institute, New Delhi, who addressed the need and important of statistical tools in agroforestry research data. 11 Scientists from different institutes of ICFRE spread over the whole country participated in the programme. This training was sponsored by ICFRE, Dehradun. The Training Programme consisted of lectures and files visits to the farmer's field. Dr. O P Chaturvedi, Pr. Scientist was the Course Coordinator and Dr. Rajendra Prasad, Pr. Scientist; Drs. Ajit and A K Handa, Sr. Scientists and Dr. R. H. Rizvi, Scientist, Sr. Scale were the Course Director of the training programme.

HAPPY NEW YEAR 2009

From Director & Editorial Board

Forthcoming Events

1. MTC, DAC Training Programme (January 2-9,2009)
2. RAC Meeting (February 2nd -3rd, 2009)
3. Winter School on "Agroforestry to meet challenges for sustainable natural resource productivity, livelihood security and mitigation of climate change" from February 4th - 24th, 2009

THE EFFECTS OF PHOSPHORUS APPLICATION ON GROWTH AND ARBUSCULAR MYCORRHIZAL COLONIZATION OF CROPS AND TREE SEEDLINGS

Arbuscular mycorrhizal (AM) fungi are known to affect growth of most plant species through various ways. Optimum P concentration can be critically important for activity of AM fungi in tree/ crop rhizosphere. Addition of P fertilizers above threshold level results in a delay in infection, decrease in percentage colonization of roots and reduction in chlamydospore production by the fungus. In the present study, efforts were made to identify the threshold P concentrations that support optimal AM association in *T. aestivum, P. mungo, E. tereticornis* and *A. procera.*

The study was conducted at NRCAF, Jhansi, UP, India (240 11' N latitude and 780 17' E longitude). Jhansi lies in agro-ecoregion 4 of India, Northern Plain and Central Highlands, Hot Semi Arid Ecoregion with Alluvium– derived Soil. Seeds of *P. mungo* (var. PU-35), *T. aestivum* (var. WH-147), *E. tereticornis* (Clone C-7, [ITC-Bhadrachalam]) and *A. procera* were used in present study. Three AM species (*A.aulospora scrobiculata, Glomus intraradix* and an unidentified *Glomus* species) were used as inoculants. Uninoculated pots served as control.

The trials consisted of six P levels (0, 5, 10, 20, 50 and 100 ppm) and was applied to the pots as KH2PO4. Seedlings (72 per tree/ crop species) were harvested after 12 weeks growth and observations on shoot length, dry weight and P uptake were recorded. To study the effect of P application on AM colonization a set of parallel experiments were undertaken. Root and soil samples were taken at monthly intervals from inoculated and un-inoculated pots and observations were recorded on presence of arbuscules, vesicles, sporocarp formation, colonization index and spore count per 100 g sand.
Best results were obtained with *Glomus* species in *P. mungo* and *A. procera, A. scrobiculata* in *T. aestivum* and *G. intraradix* in *E. tereticornis*. Threshold P concentrations for maximum benefits from the AM symbiosis in above mentioned plant species varied from 5 to 20 ppm. Mycorrhizal activity in terms of arbuscules, vesicles, sporocarp formation, colonization index and spore count per 100 g sand was maximum at P concentrations ranging from 5 to 20 ppm in different combinations.

The threshold P concentration for most effective AM inoculants in crops i.e. *Glomus* species in *P. mungo* and *A. scrobiculata* in *T. aestivum*, was 5 ppm. This P concentration corresponds to 25 Kg P2O5 ha^{-1}, which is much less than the recommended P doses for *P. mungo* (40 Kg P2O5 ha^{-1}) and *T. aestivum* (60 Kg P2O5 ha^{-1}). Thus, the results showed that inoculating above mentioned crops with a suitable AM inoculant could result in a benefit comparable to high input levels of P. A similar benefit is expected in case of tree seedlings.

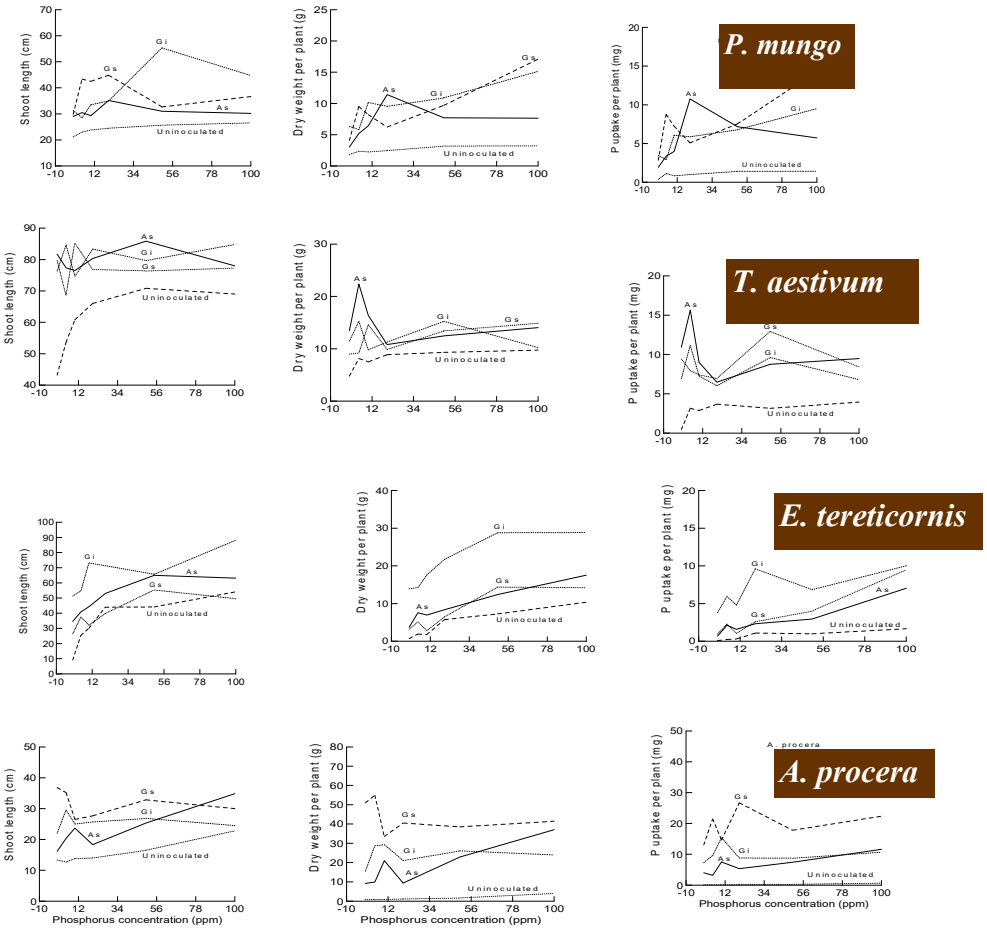


Fig. 1: Effect of P application on shoot length, dry weight and P uptake of inoculated and uninoculated seedlings of *P. mungo, T. aestivum, E. tereticornis* and *A. procera.* As-*Acaulospora scrobiculata*; Gi- *Glomus intraradix* and Gs- *Glomus* species

Table : Threshold P concentrations, Optimum P concentrations for colonization index and Spore count for different AM fungi for maximum benefit from AM symbiosis in P. mungo, T. aestivum, E. tereticornis and A. procera

AM inoculants	Threshold P (ppm) based on			Optimum P (ppm) concentration based on	
	SL (cm)	DW (g plant^{-1})	PU (mg plant^{-1})	Colonization index 3 MAI[a]	Spore count 3 MAI
Phaseolus mungo					
A. scrobiculata	20	20	20	20	5
G. intraradix	-	10	10	10	10
Glomus species	5	5	5	20	5
Triticum aestivum					
A. scrobiculata	--	5	5	5	5
G. intraradix	5	5	5	10	10
Glomus species	10	10	-	20	5
Eucalyptus tereticornis					
A. scrobiculata	--	5	5	20	10
G. intraradix	10	--	5	10	5
Glomus species	5	5	5	10	5
Albizia procera					

A. scrobiculata	10	10	10	5	5
G. intraradix	5	5	10	5	5
Glomus species	5	5	5	5	5

Ashok Shukla, Anil Kumar, Anuradha Jha, Madhavi Kamalvanshi,
Neha Chakravarty and Garima Gupta
National Research Centre for Agroforestry, Jhansi 284 003

Stylosanthes seabrana – A PROMISING PASTURE LEGUME FOR DEGRADED RAKAR SOILS OF BUNDELKHAND

Stylosanthes popularly known as stylo is an important pasture legume. There are large numbers of species of *Stylosanthes* grown in India. The important species are S. *hamata, S. humilis, S. guianensis, S. fruticosa, S. scabra, S. montevidensis, S. mucronata and S. seabrana.* Among these, S. *hamata, S. humilis, S. guianensis and S. scabra* are commonly grown in Bundelkhand area. Recently, *S. seabrana* was introduced in Bundelkhand region from Karnataka. It was grown on the Rakar soils of experimental farm of NRCAF, Jhansi where it produced outstanding growth and yield signaling its bright future in Bundelkhand region particularly on Rakar soils which are widely distributed in this part of India.

Stylosanthes seabrana is a copiously branching, tall growing herbaceous fodder legume. It is a semi-erect growing plant having indeterminate maturity. Stylo is a widely distributed plant mainly found in tropical and subtropical region covering 35^0 North and South of equator. It prefers sandy to sandy loam soils and performs well in 500 -1250 mm annual rainfall receiving regions. S*tylosanthes seabrana* is a nutritious and palatable pasture legume. The crude protein , crude fibre, fat and nitrogen-free extract content of *Stylosanthes seabrana* ranges between 12-17%, 25-37%, 0.6-2.5% and 40-50 %, respectively.

It can be grown as sole pasture crop and also with compatible grasses and legumes in silvipasture systems on a variety of soils. It shows a good compatibility with grasses particularly, short growing like C*hrysopogon fulvus, Heteropogon, Cenchrus ciliaris, Dichanthium,* etc. Tall growing grasses may suppress it in subsequent years. It is a strong competitor of short growing grasses and weeds as obvious from the present investigation where weeds and other short growing grasses were suppressed by it. It is a drought tolerant legume and survives drought because of its annual habit and heavy seeding capacity. Being a legume, it fixes atmospheric nitrogen in symbiotic association with *Rhizobium*. Thus it adds to soil fertility through N- fixation and biomass addition through leaf fall. It also checks soil erosion by acting as cover crop. It is also suitable for hay and silage making.

Table 1: Soil characteristics in the experimental field

Soil Characteristics	Mean value (%)
Small stones and particles > 2 mm size	30.5
Less than 2 mm size	69.5
Sand	53.2
Silt	11.8
Clay	4.5
pH	6.9
Organic carbon (g/kg)	3.8
EC (dSm-1)	0.082

In present observational trial, *Stylosanthes seabrana* was grown on Rakar soil characterized by poor soil physical properties (Table 1). The small stones and particles having greater than 2 mm size constituted nearly 30.5% while remaining 69.5% comprised of sand (53.2%), Silt (11.8%), and clay (4.5%). The mean organic carbon content in the soil

was 3.8 g/kg with pH 6.9 and EC 0.082 dS/m. The slope of the field is high and multidirectional. On such a poor soil, *Stylosanthes seabrana* was line sown in July, 2007 at 100 cm spacing. In the first year, due to low and erratic rainfall, the performance of the stylo was poor and on an average , its plant population /m^2, plant height and branches /plant were 15, 37 cm and 9.2 , respectively. The green biomass and dry matter yield were 369.4 and 249.6 kg/ha only. However, in 2008, due to abundant and continuous rainfall, the growth and yield of *S. seabrana* was excellent. (Fig 1 and Table 2). In the second year, plant population/m^2 and plant height increased to 22 and 132 cm, respectively. The tertiary branches/plant were as high as 50 which show the forage value of the legume. The green and dry biomasses were 21 and 10.983 tones/ha, respectively which shows the potential of this legume on Rakar soils of Bundelkhand.

Table 2: Growth and yield of *S. seabrana* (2nd year)

Attributes	Mean value
Plant population/m^2	22
Plant height (cm)	132
Primary branches/plant	11
Secondary branches/plant	30
Tertiary branches/plant	50
Green biomass (t/ha)	21.0
Dry biomass (t/ha)	10.983

Fig. 1 Luxurious growth of *S. seabrana*

D.R. Palsaniya, Munna Ram, P. Rathakrishnan, P. Rai, U.P. Singh and R.K. Tewari
National Research Centre for Agroforestry, Jhansi (U.P.)

PME MEETING

The PME meeting was started with the visit of experimental fields of ongoing research projects and research farm on 18th October, 2008. All the Scientists participated in the PME meeting. During meeting Director, NRCAF, informed that this year the area has received higher rain (>1200 mm) than the normal rainfall, after the continuous drought for last four years. The rain started quite early (from 13th June) and continued for long time. Therefore, *kharif* crop could not be taken in majority of the fields and this has to be kept in mind during evaluation of research projects. Despite of this fact, very good crop is seen in majority of the experimental fields due to timely sowing adequate drainage and intercultural operations in red soil.

INSTITUTE JOINT STAFF COUNCIL

Institute Joint Staff Council (IJSC) meeting was held on 24th December 2008 under the Chairmanship of Director Dr. S. K. Dhyani.

WOMEN CELL

A meeting of Women Cell was held on 27th December, 2008 under the Chairmanship of Director Dr. S. K. Dhyani at NRCAF Jhansi.

RAJBHASHA SAMITEE

A meeting of Hindi Rajbhasha Samitee was held on 30th December, 2008.

INDIA-AFRICA COOPERATION FOR SUSTAINABLE FOOD SECURITY: OPPORTUNITIES FOR AGROFORESTRY COLLABORATION

Dr. S. K. Dhyani, Director participated in Roundtable discussion for Agroforestry collaboration opportunities to develop a Framework for cooperation between India, selected African nations & ICRAF at Nairobi, Kenya on 24th to 25th October,2008. The meeting was organized by World Agroforestry Centre, Nairobi, Kenya. The meeting was very successful.

HUMAN RESOURCE DEVELOPMENT

Dr. R K Tewari, Pr. Scientist , Dr. R. S. Yadav, Sr. Scientist, Dr Ramesh Singh, Scientist (Sr. Scale) and Dr. D. R. Palsaniya, Scientist of the Centre participated in the Planning Workshop on "Model Watershed for Sustaining Agricultural Productivity and Improved Livelihood" from 6th to 7th November,2008 at ICRISAT, Patancheru, Hyderabad.

Dr. Badre Alam, Sr. Scientist and Dr. P. Rathakrishnan, Scientist of the Centre participated in the Golden Jubilee Conference on "Challenges and Emerging Strategies for Improving Plant Productivity" during 12th to 14th November,2008 at IARI, New Delhi.

All the Pr. Scientists, Sr. Scientists, Scientists and Technical Officers participated in National Symposium on "Agroforestry Knowledge for Sustainability, Climate Moderation and Challenges Ahead" from 15th to 17th December, 2008 organised by the NRCAF and Indian Society of Agroforestry, Jhansi.

Dr. R K Tewari, Dr. Rajendra Prasad, Pr. Scientists and Dr. A. Venkatesh, Sr. Scientist attended 3 days training cum workshop on IPR at NBPGR, Lucknow from 18th to 20th December,2008 organized by IPR Cell of ICAR, New Delhi. The main theme of the workshop was geographical indications.

PROMOTION

Dr. R. S. Yadav, Scientist, Sr. Scale, promoted to the post of Sr. Scientist from December , 2005 under the provision of Revised Career Advancement Scheme.

Dr. A. Datta, Technical Officer (T –6) promoted to the post of Sr. Technical Officer (T –7/8) w. e. f.

Sh. S. P.S. Chauhan, Technical Officer (T –6) promoted to the post of Sr. Technical Officer (T –7/8) w. e. f. .

AWARDS

- Dr. O P Chaturvedi, Pr. Scientist of the Centre received Academy's Award (Biennium

2007-08) By National Academy of Agricultural Sciences For Significant Contribution in Soil, Water & Environmental Sciences.

- Dr. O P Chaturvedi, Pr. Scientist, NRCAF and Dr. B. Mohan Kumar, Associate Professor, COF, KAU, Thrissur received **Dr. K.G. Tejwani Award for Excellence in Agroforestry Research and Development (2007 - 2008)**. The award consists of cash prize of Rupees Ten Thousand and a Citation.

VISITORS

- Dr. A K. Srivastava, Director & Vice Chancellor, NDRI, Karnal (HR).
- Dr. K.G. Tejwani, Director, Land Use Consultant (Intl.), New Delhi.
- Dr. V. K. Bhatiya, Director, ISRI, New Delhi.
- Dr. P.S. Pathak, Ex ADG (Agroforestry), ICAR, New Delhi.
- Dr. K.R. Solanki, Ex ADG (AF), ICAR, New Delhi.
- Dr. A. Subba Rao, Director, IISS, Bhopal (M.P.).
- Dr. V.P. Singh, ICRAF, New Delhi.
- Dr. A.K. Mandal, Director, TFRI, Jabalpur (M.P.).
- Dr. B.P. Bhatt, Jt. Director, ICAR NEHR, Nagaland Centre.
- Dr. N.P. Malkania, Ex PC, AICRP on FC, IGFRI, Jhansi (U.P.).
- Dr. S. S. Singh, Prof (Plant Breeding), IARI, New Delhi.
- Dr. A. R. Sharma, Pr. Scientist (Agronomy), IARI, New Delhi.
- Dr. P. S. Pathak, Ex. ADG (Agroforestry), ICAR, New Delhi.
- Dr. S. P. Tewari, OIC, Regional Research Station, CSWCR&TI, Datia (M.P.).
- Dr. K.S. Dadhwal, Head (Soil Science), CSWCR&TI, Dehradun (Uttrakhand).

DIRECTOR'S VISITS AS PROJECT COORDINATOR, AICRPAF

- AICRPAF Centre at OUAT, Bhuvneshwar and BCKV, Jhargram from 10th to 15th November, 2008.
- Dr. S. K. Dhyani, Director participated in the Regional Committee IV meeting at IIVR, Varanasi from 20th to 23rd November, 2008

NATIONAL SYMPOSIUM ON AGROFORESTRY KNOWLEDGE FOR SUSTAINABILITY, CLIMATE MODERATION AND CHALLENGES AHEAD

A National Symposium on Agroforestry Knowledge for Sustainability, Climate Moderation and Challenges Ahead was organized by Indian Society of Agroforestry and National Research Centre for Agroforestry from 15th – 17th December, 2008 at NRCAF, Jhansi. Dr. K.G. Tejwani, Director, Land Use Consultant (Int'l), New Delhi was the special guest. Dr. A. Subba Rao, Director, IISS, Bhopal.was the Chief Guest of the function. The National Symposium was organized to celebrate the Silver Jubilee of All India Coordinated Research Project on Agroforestry initiated in 1983.

A total of about 250 participants attended the symposium. The delegates represented all states of the country except Arunachal Pradesh and Manipur. Thus, the National symposium has a representation from whole of the Country. The Symposium was attended by researchers and students representing 27 SAU's and 9 ICAR Institutes, 4 ICFRE Institutes, besides representatives from KVK's, NGO's, Financial Institutions, Industry and farmers. Among the delegates there were 20 students, some of them were from outside Uttar Pradesh,

showing the great enthusiasm among the young generation for the subject.

As the title of the Symposium reflects, there were three sub themes of the Symposium , namely, Agroforestry for enhancing system productivity, Environment Challenges and Socio-Economic aspects and agroforestry linkages. There were 8 technical sessions in addition to plenary and valedictory session during the symposium, which were very efficiently handled by the respective Chairman and Co-Chairman. There were two Plenary Lectures addressed by Dr. A. Subba Rao, Director, Indian Institute of Soil Science, Bhopal and Dr. K.G. Tejwanji, Director, Land Use Consultant (Int'l), New Delhi, 16 key note addresses, including address by Dr. V. P. Singh, Regional Representative WAC for South Asia, Dr. P.S. Pathak, Ex ADG (AF), ICAR, Dr. K.R. Solanki, Ex ADG (AF), ICAR, Dr. A.K. Mandal, Director, TFRI, Jabalpur, 42 oral presentations and 75 poster presentations. The poster evaluation panel selected three best posters for award.

Following recommendations have emerged from the National Symposium :

- Due to increase in demographic pressure grazing land is decreasing while cattle units per ha of grazing land are increasing. Fodder produced under agroforestry systems needs to be quantified.
- The agroforestry produce should be treated as farm produce for all purposes and there should be no restriction for felling of trees and marketing of timber produced under agroforestry by the farmers
- The contribution of agroforestry towards fuel wood, small timber, leaf fodder, fruit production as well as meeting day to day needs of the house hold are to be quantified.
- Contribution of agroforestry for soil and water conservation, ground water recharge, watershed development, carbon sequestration and environment is well appreciated but needs to be quantified.
- To prevent, arrest and reverse the degradation of natural resources pertaining to land and water through partnership should be emphasized.
- Contribution of livestock and nutrient trade through livestock movement in productivity of agroforestry systems needs to be assessed.
- The diagnosis should address the issue of natural assets *viz.* decline in water table, land degradation, per capita land availability, changing land use pattern, rising soil pollution and global warming, before initiation of new research projects on agroforestry. It is essential to direct it towards the National Plan Objectives and design new initiative on farmer's field.
- There is need to involve industry and NGO's in the quality planting material production and quality planting material should be site and requirement specific.
- To make agroforestry sustainable and more credit worthy inclusions of medicinal, aromatic and high value crop varieties should be emphasized.
- An agroforestry policy on the lines of forest and agriculture policies should be developed.
- Hazards of Tsunami and other natural disasters can be minimized by making bio-shield of tree species.
- Different agroforestry system needed to offset the effect of CO_2 elevation should be identified.
- Role of agroforestry in employment generation and poverty elevation needs to be emphasized.
- There is a need for detailed study on Reproductive biology, insect pest diseases and pruning of Jatropha and other biofuels species.

SIVER JUBILEE FUNCTION OF AGROFORESTRY

All India Coordinated Research Project on Agroforestry, initiated by ICAR in 1983, has completed 25 years and on 15th December, 2008. NRCAF celebrated its Silver Jubilee at the time of National Symposium. The, project was contributed remarkably in the field of agroforestry research in India. It is one of the largest AICRPs in the ICAR with 36 coordinating centres located throughout the country. During last twenty five years large number of technologies have been developed and identified by the coordinating centres of the project. A publication was brought out entitled "Twenty Five Years of Agroforestry Networking" which compiles the technologies and research achievements in agroforestry were brought out on the occasion.

Awards of ISAF

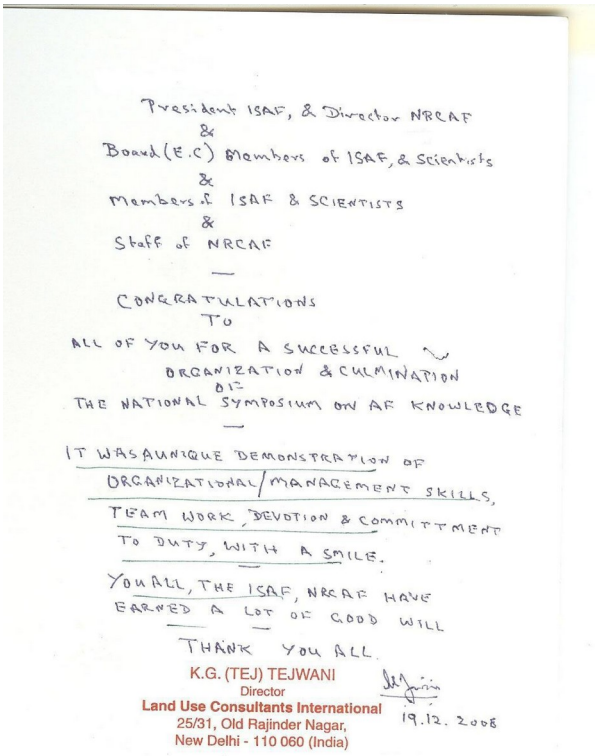
At the time of National Symposium following awards were given by Indian Society of Agroforestry and National Research Centre for Agroforestry:

(a) Recognition Awards -

Honorary Fellowship award given to Dr K. G. Tejwani for life time contribution in the field of agroforestry research.

(b) Gold Medal –

This award was given to Dr K.R. Solanki and Dr K. S. Dadhwal for contribution in development and growth of Society.


President ISAF, & Director NRCAF
&
Board (E.C) Members of ISAF, & Scientists
&
Members of ISAF & SCIENTISTS
&
Staff of NRCAF

CONGRATULATIONS
TO
ALL OF YOU FOR A SUCCESSFUL
ORGANIZATION & CULMINATION
OF
THE NATIONAL SYMPOSIUM ON AF KNOWLEDGE

IT WAS A UNIQUE DEMONSTRATION OF
ORGANIZATIONAL/MANAGEMENT SKILLS,
TEAM WORK, DEVOTION & COMMITTMENT
TO DUTY, WITH A SMILE.

YOU ALL, THE ISAF, NRCAF HAVE
EARNED A LOT OF GOOD WILL

THANK YOU ALL.

K.G. (TEJ) TEJWANI
Director
Land Use Consultants International
25/31, Old Rajinder Nagar,
New Delhi - 110 060 (India)
19.12.2008

Publications released during Symposium

On 15th December, 2008 at the time of Inaugural function of National Symposium following publications were released by the chief guests:

- Krishivaniki Avam Jalvau Parivartan
- Two Decades of Academic Achievements
- Bench Grafting Techniques
- Garhkundar-Dabar Watershed

PRIME MINISTER RELIEF FUND