Agroforestry
NEWSLETTER

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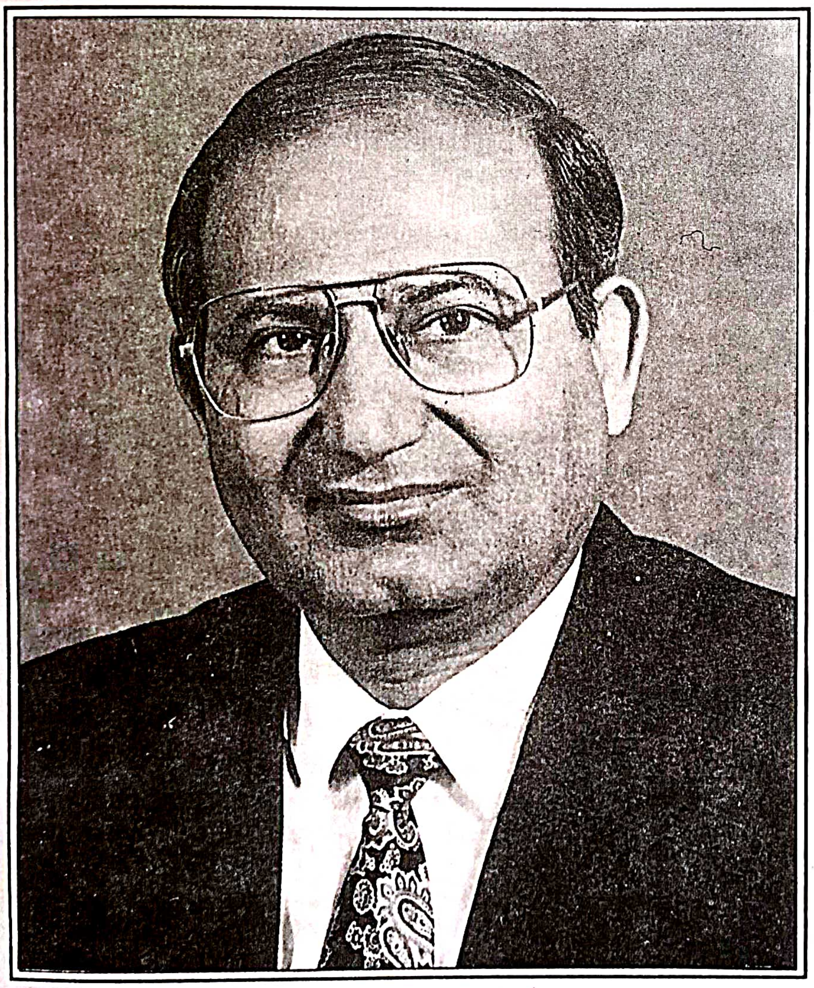
DR. R.S. PARODA THE NEW SECRETARY TO THE GOVT. OF INDIA (DARE) & DIRECTOR GENERAL (ICAR),KRISHI BHAVAN, NEW DELHI.



Dr. Rajendra Singh Paroda, a renowned Scientist of International stature has taken over the new assignment as Secretary to the Government of India (DARE) and Director General, Indian Council of Agricultural Research, Krishi Bhavan, New Delhi w.e.f. September 21,1994. Prior to that, he was on a FAO assignment at Bangkok, Thailand, responsible for the crop production, improvement and protection programme. From 1987 to 1992 he was the Deputy Director General (Crop Sciences) in ICAR, New Delhi. He has also served as the Director of the National Bureau of Plant Genetic Resources (NBPGR),New Delhi and was mainly instrumental in establishing the National Gene Bank.

Born in rural Rajasthan in 1942, Dr. Paroda received his B.Sc. in Agriculture from Rajasthan University in 1962 and his M.Sc. in Plant Breeding and Genetics from the University of Udaipur securing Gold Medal. He completed his Ph.D. degree in Plant Breeding and Genetics from the Indian Agricultural Research Institute in 1968. He was awarded a Commonwealth Scholarshiip in 1968 to 1970 for Post Doctoral studies at the University College of Wales in Biometrical Genetics, Plant Breeding and Cytogenetics. He was also awarded D.Sc. (Honoris Causa) by the Chandra Sekhar Azad University of Agriculture and Technology,Kanpur in February 1993.

Dr. Paroda known for hard working and highly disciplined. has edited a number of books and has to his credit more than 200 research papers, popular articles and bulletins. He has been elected a fellow of the Indian National Science Academy, Indian Academy of Sciences and National Academy of Agricultural Sciences. He also served as the Regional Secretary of the Asian-Pacific Plant Breeding Society.

Simple and humane Dr. Paroda received the prestigeous Rafi Ahmed Kidwai Memorial Prize (1982-83) for Clusterbean Research and the ICAR Team Research Award (1983-84).He received the award of the Federation of Indian Chambers of Commerce and Industry in 1988 and Om Prakash Bhasin Award in 1992 for outstanding work in agriculture.

Dr. Paroda served on the Board of Trustees of the International Rice Research Institute during 1990-93. He was also the Chairman of the Central Variety Release Committee,Central Pesticide Registration Committee and represented the country on a number of official delegations abroad.

We are not only hopeful but confident that the Agroforestry research in the country and the National Research Centre for Agroforestry (NRCAF), the only nodal agency, will develop to its fullest potential and prosper under the dynamic leadership and able guidance of the New Secretary of the Department of Agricultural Research and Education, Govt. of India and the Director General, Indian Council of Agricultural Research,Krishi Bhavan, New Delhi.

We wish him all the success in his new endeavour.

DR.A.S.GILL
Director & all staff, NRCAF, Jhansi.

EXTENSION TECHNIQUES IN AGROFORESTRY

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The green revolution envisaged in agriculture can not be achieved without the farmer's self sufficiency in fuel, fodder,manure and small timber. Therefore, agroforestry is one among the means to attain green revoluation target. In India,tree planting by farmers under agroforestry systems seems to be the only solution to meet the challenge posed by the wide scarcities of firewood,timber,fodder,and the growing insecurities of our environments. The resources of the state forest departments are inadequate to plant and maintain all the vacant private lands in the country.Through agroforestry this responsibility is decentralised and the tree resources thus created are better protected and managed due to individual ownership. From the social point of view agroforestry provides the quickest means of increasing the country's tree resources and forest cover.

Under agroforestry systems, an atempt is made to grow tree and crops virtually on permanent basis in order to meet basic needs of food, fuel, fodder and fibre etc. of the growers. Not only the basic needs are to accomplished but the quality of produce as well as the production base is to be improved or atleast maintained on the sustained basis. Plantation of trees on farm bunds between two plots and also as shelter belt in desert prone areas serve as wind breaks,protect the land from further degradation and better soil moisture and fertility.

Extension research has been conspicuous by its absence in agroforestry activities Thus it would appear that one of the imminent needs in agroforestry is to build up a good extension research based by drawing upon the best available extension experties in the country as well as abroad.

Some of the important extension education strategies in promoting agroforestry are;

i) Education and need based training in agroforestry management techniques.

ii) Educating villagers to use renewable, inexhaustive and uncommercialised trees and bushes for fuel.

iii) Demonstration of multipurpose trees and agroforestry systems to the farmers at the research farm as well as at the farmer's fields.

iv) Creating awareness among the farmers to replace uneconomical cattle with cross bred cows etc, introducing stall feeding to avoid damage to the young trees.

TABLE 1 : Growth and biomass production of MPTS at 5 years of establishment.

MPTS	Growth data/tree				Biomass Production (kg/tree)			
	Height (m)	C.D. (cm)	DBH (cm)	Main Bole	Branches	Total Wood	Leaves	Total Biomass
L.leucocephala	4.6	17.9	14.6	3.25	13.50	16.75	5.47	22.22
D.cinerea	2.7	6.0	5.4	1.78	5.49	7.27	0.86	8.13
M.azedarach	3.3	9.7	9.3	3.80	4.75	8.55	3.15	11.70
A.cupressiformis	5.3	10.2	8.5	5.45	2.18	7.63	1.19	8.82
E.officinalis	3.8	7.4	5.8	0.80	3.36	4.16	0.86	5.02
A.amara	3.2	6.7	8.0	1.34	3.05	4.39	0.16	4.55
A.nilotica	5.1	7.8	6.2	4.22	3.11	7.33	0.32	7.65
H.binata	2.4	6.4	4.7	1.16	0.69	1.85	0.41	2.26
A.procera	3.4	9.0	6.7	2.44	7.13	9.58	1.45	11.03
D.sissoo	4.9	10.7	10.2	4.60	7.03	11.63	3.00	14.63
E.tereticornis	3.2	4.2	2.1	1.10	0.17	1.27	0.30	1.57
A.indica	3.8	7.8	5.6	1.98	1.38	3.36	0.56	3.92
T. arjuna	2.5	7.1	4.3	1.92	2.13	4.05	0.66	4.71
A.pendula	1.7	3.2	0.7	0.25	1.47	1.22	0.15	1.87

v) Extension programmes for afforestation.

vi) Teaching farmers to put more area under agri-horticulture and other agroforestry systems than under agriculture alone.

vii) Conducting mass media programmes.

For successful implementation of the agroforestry programmes the behaviour (knowledge, skill and attitude) of all those involved with the creation, maintenance and utilization of natural resources must change. It may also need some institutional changes. Further, the villagers,panchayats and NGO's should be involved in management of agroforestry programmes from the planning stage. In agroforestry, the thrust of the programme should be shifted towards the small and marginal farmers and market forces should also be taken into consideration.

BIOMASS PRODUCTION FROM MPTS AT 5 YEARS OF ESTABLISHMENT UNDER RANGELAND CONDITION

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Fourteen multipurpose tree species (MPTS) were introduced for increasing the productivity of degraded rangeland during August 1988 and their evaluation is still continuing (Table 1) under rainfed condition. The saplings were planted at 8 m between rows and 4 m within rows spacing in two replications. For each species 8 plants were planted. The soil of the area was red gravelly. During the 4th week of June, 1993, one tree of each species (average size plant) was harvested and separate weight for bole, branches and leaves were recorded. At the time of harvesting plant height,collar diameter (CD) and diameter at breast height (DBH) were also recorded (Table 1).

Data (Table 1) revealed that highest plant height of 5.3 m was recorded with *A.cupressiformis* followed by *A.nilotica, D.sissoo* and *L.leucocephala.* The maximum growth in CD was observed in *L. leucocephala* (17.9 cm) followed by *D.sissoo, A.cupressiformis* and *M.azedarch.* The growth in DBH was also maximum in *L.leucocephala* (14.6 cm) followed by *D.sissoo* , *M.azedarach* and *A.cupressiformis.*

The dry weight of main bole was maximum in case *A.cupressiformis* (5.45 kg/tree) followed by *D.sissoo* (4.60 kg), *A.nilotica, M.azedarach* and *L.leucocephala.* The dry weight of branches per plant was maximum with *L.leucocephala* (13.50 kg) followed by *A.procera* (7.13 kg),*D.sissoo* (7.07 kg) and *D.cinerea* (5.49 kg). The total production of woody biomass was maximum with *L.leucocephala* (16.75 kg/tree) followed by *D.sissoo A.procera* and *M.azedarach*. The production of dry leaf fodder was maximum with *L.leucocephala* (5.47 kg/tree) followed by *M.azedarach, D.sissoo, A.procera* and *A.cupressiformis.*

The total biomass production (bole + branches + leaves) recorded at 5 years age of trees under rangeland condition showed that *L.leucocephala* gave the maximum production (22.22 kg/ tree) followed by *D.Sissoo* (14.63 kg/tree), *M.azedarach* (11.70 kg/tree), *A.procera*(11.03 kg/tree) *A.cupressiformis* (8.82 kg), *D.cinerea* (8.13kg) and *A.nilotica.*(7.65 kg/tree).

MYCOFLORA ASSOCIATED WITH SIRIS(ALBIZIA LEBBEK) SEEDS IN TARAI AREA OF DISTRICT NAINITAL, UTTAR PRADESH.

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The role of seed mycoflora of siris (Albizia lebbek), grown in Tarai area of Nainital (U.P.) on germination failure was studied. Physiologically matured pods were collected from agroforestry block,horticultural centre, Pantnagar. Seeds were manually extracted from dried pods stored in a clean polyethylene bags at room temperature. Four hundred seeds were tested by standard blotter methods (ISTA 1985) and agar plate methods. To isolate internally seed borne fungi, the seeds were first surface sterilized by freshly prepared 1.0 % mercuric chloride for 30-40 seconds followed by thrice rinsing with sterile water placed in three layered moist blotter papers in plastic petridishes of 9.0 cm diametre. Similarly, such seeds were plated on potato dextrose agar separately. Then blotter and agar plates were incubated at 25 ± 1° c for 7 days under 12 hours alternating cycle of near ultra violet light and darkness. The seeds were examined under stereobinocular microscope and fungi isolated on PDA were cultured on PDA slants for further identification.

The study revealed that nine fungal genera were associated with the seeds of siris, of which 16 species were isolated from surface sterilized seeds. The percent incidence of fungi isolated from normal seeds was lower as compared to abnormal seeds (Table 1). The most predominant fungi like *Aspergillus, penicillium fusarium* and *cladosporium cladosporoides* were recorded on seeds. Deep seated fungi have been reported to be determental to seed germination. Most of the fungal species detected in the present investigation have also been reported in Albizia species seeds.

In towel paper method, higher percent of germination (40.38) in normal seeds and 31.92% in abnormal seeds was recorded. However the seeds rot was 37.4% in abnormal seeds and it was only 265% in healthy seed lot.

To ascertain the role of seed-borne fungi of siris in germination, pot culture experiments were conducted in glass house. There was a significant reduction in germination of abnormal seed when compared to healthy seeds.

Table 1: Percent incidence of fungi associated with seed (based on 400 seeds) as determined by blotter and agar plate methods.

Fungi	Normal seeds		Average	Abnormal seeds		Average
	Blotter method	Agar plate method		Blotter method	Agar plate method	
Aspergillus candidus	7	6	6.5	9	12	10.5
Alternaria alternata	0	6	3	3	9	6.0
Botryodiplodia theobromae	0	2	1	0	4	2
Aspergillus flavus	0	1	0.5	0	4	2
A.niger	0	4	2	0	8	4
Penicllium chrysoqenum	0	2	1	0	3	1.5
Epicoccum nigrum	0	1	0.5	0	6	3
Mucor spp.	0	1	0.5	1	2	1.5
Rhizopus oryzae	1	2	1.5	3	3	3
Aspergillus versicolor	2	3	2.5	4	2	3
Penicillium funiculosum	0	3	1.5	0	4	2
A.fumigatus	2	8	5	6	12	9
Paecilomyces variotii	0	5	2.5	0	7	3.5
Fusarium spp.	3	2	2.5	5	8	6.5
Penicillium pinophilum	0	9	4.5	3	15	9
Cladosporium spp.	0	10	5	5	30	17

AGRI- HORTICULTURAL STUDIES IN CITRUS SPECIES IN VILLAGE BHATAGAON (DISTRICT JHANSI)

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Citrus occupies a significant position in the country. Practically, citrus is found growing in all the states. It occupies more than 8% of the total fruit production. It is grown in 0.148 million ha and yield 1.7 million tonnes of the fruit. Due to its wide adaptability and importance, attempts were made to raise the citrus species on farmers field and exploit the interspaces by grrowing grain/pulse crops. In this direction a field trial was initiated in village Bhatagaon (Jhansi District) during 1991-92. There were three citrus species viz. *C. sinenses* (Mousambhi), *C. reticulata* (Kinnow) and *C. aurantifolia* (Nibbu) (Table 1) planted in 6 m x 6 m spacing in August 1991 in combination with 2 crop rotations (urdbean-wheat and urdbean-chickpea). In all there were 6 treatment combinations laid out in a Randomised block

AGRI -HORTICULTURAL STUDIES IN VILLAGE BHATAGAON - Rabi 1992-93 (On field boundary MPTS planted)

TABLE 1 : Growth data of citrus species and grain yield during the rabi season in the interspaces of the citrus species.

CITRUS SPECIES	FRUIT GROWTH (MAY 1994)			WHEAT GRAIN YIELD(Q/ha)			CHICKPEA GRAIN YIELD(Q/ha)		
	HEIGHT (cm)	CANOPY (cm)	C D (cm)	1991-92	1992-93	1993-94	1991-92	1992-93	1993-94
NIBBU	116	92	2.80	48.2	39.5	30.9	8.6	12.3	8.0
MOUSAMBI	220	196	6.96	52.1	40.1	32.8	6.8	11.4	4.6
KINNOW	197	147	5.35	49.4	39.2	29.1	8.9	14.1	6.8

design with 4 replications. Plot size was 12 m x 18 m . Experimental soil was extremely poor in fertility status and in texture. Leucaena was planted on the field boundary for fodder and fuel production.

Growth data in respect to citrus species (Table 1) showed the better performance of Mousambi for plant height, canopy and collar diameter followed by Kinnow. In Nibbu the growth was extremely poor as compared to Mousambi and Kinnow.

Interestingly, wheat productiion (Table 1) was maximum in the interspaces of Mousambi during the initial three years for which the data is reported. However, in Nibbu and Kinnow, the wheat production was similar to a great extent. In case of chickpea, during the initial two years highest grain productivity was achieved from the interspaces of Kinnow and during 1993-94 it was found to be in case Nibbu (8.0 q/ha). Chickpea gave lowest grain yield during all the 3 years for the results as reported from the interspaces of Mousambi. The study demonstrated the usefulness of the system i.e. citrus species gave different response for wheat and chickpea.

BROOM GRASS - A POTENTIAL PLANT FOR AGROFORESTRY ON SLOPY LANDS.

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Broom grass (*Thysanolaena maxima*), family Poaceae common throughout the tropics grows vigorously and all its parts are used for one purpose or the other. Leaf is used for fodder (crude protein 8-10%; TDN 50-55%), stem for fuelwood or fencing, penicles for brooms, extends protection against fire (as the plant. remains green during winter months) and for restoring eroded sites. As far as protection of sites is concerned it is at par with vetiver (*Vetiver zizynoides*) .

In the North-Eastern region, the species is well distributed from sub-tropical plain zone to sub-temperate zone, and is important component of many traditional agroforestry systems. In addition to its natural occurance with *Schima wallichii,Pinus kesiya* and other forest species, it is planted on terrace risers and in pear orchads. At Research Farm, Barapani (980 m msl, av. rainfall 2428 mm yr-1), the non-arable land (wastelands) on hill slopes (30- 42%) were successfully utilised with broom-grass and *Michelia champaca* under a silvipastoral system of agroforestry. Within a period of 4 years, a total biomass of 17.93 t ha-1 (DW) was obtained from such a system (Table 1). Thus, the system not only provided a net income of Rs. 10.122 ha-1 (Table 2) but also extended in generating employment and protecting the degraded hill slopes.

Table: 1. Growth attributes and biomass production of *Thysanolaena maxima* (Optimum spacing 2m x 1m)

Silvipastoral System Component	Culm/ Plant	Culm height (m)	Flowering (%)	Biomass (t/ha) (DW)			
				Leaf	Stem (branch/ wood)	Flowering twigs	Total
Broom Grass	210	2.38	46	6.09	9.88	1.96	17.93
Michelia Champace (4 Yrs)	–	–	–	–	9.60	–	

Table:2. Economic returns of Thysanolaena maxima with Michelia champace under silvipastorl system of agroforestry on hill slopes.

Silvipastoral system-Component	Gross return (Rs./ ha) leaf	fuelwood	flowering twigs	Expenditure (Rs./ ha)	Net return (Rs./ ha)
1. Michelia champaca* (age 4 yrs).	-	4800.00	-	2375.00	2425.00
2. Broom grass**	761.00	1976.00	7840.0	2880.00	7697.00
				Total	10.122.00

* Michelia Champaca- 500 plants/ha **Broom grass - optimum spacing 2 x 1 m.

AGRI-HORTICULTURAL STUDIES IN VILLAGE SIMARDHA (JHANSI DISTRICT)

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Field studies were initiated on farmers field in village Simardha (District Jhansi) with some important fruit trees (Table 1) and crops were raised in the interspaces during the initial establishment years, in the agri-horticultural system at NRCAF Jhansi under the IDRC Project. Treatments combination comprised of 4 important fruit trees viz-Guava (*P.guajava*), Kinnow (*C.speciosa*), Ber (*Z.mauritina*) and Anar (*P.granatum*) in a spacing of 6m x 6m with two crop rotations

AGRI -HOSTICULTURAL STUDIES IN VILLAGE SIMARDHA - THE FARMER WITH NRCAF STAFF EXAMINING THE FIELD TRIAL (moonbean-wheat and urdbean-wheat) under irrigated condition. In all there were 8 treatment combinations laid out in a randomised block design, replicated 3 times. Fruit tree saplings were planted during the *Kharif* 1992. The experimental soil was sandy loam in texture, poor in nitrogen and phosphorus and medium in potash, well drained and netural in reaction.

Survival count during 1993-94 in fruit tree species was highest in Guava (95%) and Ber (95%) followed by Kinnow (75%) and lowest in Anar (70%).

Results for 1992-93 and 1993-94 recorded under wheat are reported in the present paper (Table 1). Maximum plant population, tiller count, effective tiller count, plant height and test weight in wheat was recorded from the fifth row, irrespective of the fruit trees.

For wheat grain and straw yield, the trend was similar i.e. maximum productivity was recorded in the fifth row from the tree irrespective of the fruit tree species.

On an average of 2 years, maximum grain yield was recorded from the interspaces of Kinnow (35.9 q/ ha) followed by Anar (34.8 q/ha). Guava and Ber registered similar wheat grain yield (33.6 q/ha) from the fifth row.

Table 1 : Wheat growth and yield attributing characters, grain and straw yields as influenced by the fruit trees (Av. of 2 years)

FRUIT TREE SPECIES	Row No. from the tree	Plant Population count per m. Row	Tiller count per m row	Effective tiller count per mrow	Plant height (c m)	Grain weight per earhead (g)	Grain yield (q/ha)	yield (q/ha)	Test weight (g)
P.guajava	I	21.9	72.6	67.6	91.0	2.1	30.5	35.4	45.9
	III	21.8	69.2	65.0	92.5	2.4	32.2	27.7	45.6
	V	22.4	71.8	68.6	94.3	2.8	33.6	40.7	47.0
C specicosa	I	21.6	77.6	71.4	92.7	2.6	34.8	40.8	46.9
	III	21.5	66.8	61.6	94.1	2.1	33.9	39.8	45.9
	V	23.3	75.2	71.6	95.3	2.5	35.9	41.0	47.6
Z. mauritiana	I	21.5	67.6	63.4	91.1	2.1	33.0	36.6	46.0
	III	20.3	70.6	67.2	93.9	2.5	32.7	36.8	48.9
	V	22.5	71.2	68.0	95.2	2.4	33.6	39.8	47.9
P granatum	I	19.5	63.8	59.0	89.7	2.4	31.1	37.1	45.1
	III	20.2	63.0	62.0	93.4	2.8	32.1	39.2	46.7
	V	21.8	71.8	68.8	95.4	2.7	34.8	42.4	49.4

INTERCROPPING IN GUAVA ON SLOPY LAND.

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Guava proved promising in mid hill areas of North-Eastern region. The fruits are available during October-November when it is not available in other parts of the country. Guava being perennial crop, it takes 3-4 years to come into full bearing stage and upto that period farmer has to wait for income while recurring expenditure for maintenance of orchard is involved from first year onwards. Therefore, an attempt was made to screen some suitable intercrops which can generate additional income till guava gives economical yield.

Guava orchard was established on slopy land (20-25% slope) and intercrops like turmeric, colocasia, french bean, dolichos jackbean and pine apple were evaluated for two consecutive years. The intercrops were grown in the interspaces by making bunds. The intercrops were grown in the interspaces by making bunds to conserve soil in situ between two rows of guava trees. Turmeric recorded a net return of Rs. 8,726 with a cost benefit ratio of 2:1:1. Thus. it was most economical than other intercrops tried in the system (Table 1).However, in 3 years old orchard it was only pine apple suitable intercrop while others had adverse effect on the fruit yield of guava. Guava can be a suitable tree component in horticulture based cropping system because of its wider adoptibility. In addition it develops better canopy coverage which can protect the hill slope from soil erosion. In the pre-bearing stage (2-3 years) of guava , crops like turmeric , colocasia , jackbean , Srenchbean and pineapple can be grown successfully without offecting the productivity of the orchard but propercrop rotation practice has to be followed.

Table 1. Economics of guava based cropping system

Intercrops	Marketable produce of guava (t/ha)		Produce intercrops (t/ha)		Net return (Rs/ha)		Cost benefit ratio	
-	A	B	A	B	A	B	A	B
Control	0.64	6.50	-	-	2680	12160	0.42	2.64
French bean	0.70	4.20	4.5	2.2	4950	7862	1.48	1.87
Jackbean	0.66	3.70	20.0	9.8	8380	10473	1.87	2.48
Dolichos	0.71	2.30	4.0	3.6	2950	7110	1.27	2.03
Colocasia	0.65	3.30	12.5	4.7	9150	2048	1.52	1.16
Turmeric	0.67	3.50	16.5	5.3	27110	8720	2.11	1.49
Pineapple	0.78	3.90	0.8 *	24.0	6860	28412	0.56	4.92

A : 2 year old orchard; B:3 year old Orchard; *yield of rice bean

GUAVA BASED CROPPING SYSTEM ON SLOPY LAND (NEH REGION)

WHITHER AGROFORESTRY SANS POLICY - THE INDIAN CONTEXT

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Agroforestry is an inter-sectoral subject spanning two important and, at times, competitive landuse systems-agriculture and forestry. Whereas development of agriculture is aimed at ensuring food security, forestry endeavours to maintain ecological stability. Forestry ensures sustained agriculture and meets fuelwood, fodder and timber needs of the nation especially of its rural poor. Basic tenet of the two land-uses is to Increase the productivity per unit area (land) per unit-time on a sustained basis without endangering ecological secutiry. Increasing population requires food as well as fodder, fuelwood and timber making it obligatory for planners to design schemes for increasing production of foodgrain and forest products. In agriculture a two pronged strategy for increasing production has been adopted:

1. Increasing the area under agriculture by bringing more area under irrigation.

2. Increasing productivity per unit area per unit time by increased use of high yielding varieties, fertilisers, pesticides, irrigation etc.

It is important to note that much forest land has been diverted for agriculture use. This strategy has led the country towards food security, but has also contributed to ecological destabilisation by passively supporting the conversion of forest lands into agriculture fields and water reservoirs of hydroelectric and irrigation projects.

Diversion of forest land for agriculture and other developmental activities since independence has resulted in severe depletion and shrinkage of good forest cover. This was in face of the growing realisation of preservation of forests not only for their sustainable utilisation but for their role as the biggest gene pool resource and for their contribution towards maintenance of ecological balance and sustenance of agriculture. Concern for conservation of forests is amply reflected in the National Forest Policy of 1988 which puts severe restrictions on transfer of forest land for non-forestry purposes, and by and large, precludes practice of agforforestry on legal forest land. This makes it necessary to accord highest priority to agricultural lands especially marginal lands followed by community and wastelands for development of agroforestry.

NEEDS FOR AGROFORESTRY POLICY

At present India does not have a consistent agroforestry policy. There is no single document that outlines the needs, strategies and approaches for an agroforestry policy. Agroforestry is an integrative approach which holds great promise for increasing biomass productivity per unit area per unit time on a sustained basis. If appropriately practised, it can promote ecological stability. Like development of any other sector, adoption of policy guidelines on agroforestry will be a prerequisite and key to successful implementation of agroforestry at the field level.

Situation is not much different in other developing countries in the region. Study of available literature from India and other developing countries notably China, Nepal, Bangladesh, Thailand and Kenya shows that none of the countries has a well designed agroforestry policy in spite of the the fact that agroforestry plays an important role in many public and private programmes.

In India, the Forest Policy of 1988, inter-alia, recommends that the raw material requirements of forest based inductries should be met by growing of trees through social forestry and farm/agroforestry schemes without adversely affecting foodgrain production.

The absence of an effective agroforestry policy in most developing countries has been identified by FAO. The Organisation realises that policy issues relating to agroforestry need to be addressed for all out development of agroforestry in developing countries. Institutional issues in agroforestry are also critical and need attention. For national level agroforestry planning to succeed, it will be desirable to evolve effective means of coordination between different sectors and understanding policy and legal issue affecting adoption of agroforestry.

Proposed policy

It, therefore,becomes imperative to commission research to develop an agroforestry policy framework suitable to the socioeconomic, cultural and ecological considerations of India. Since many countries do not have a documented agroforestry policy, the policy frame work could also be helpful as a starting point on which to build up suitable policies according to needs of particular countries.

As has already been emphasised, thrust of development of agroforestry in the Indian scenario has to be on agricultrual lands - a landuse that involves individuals and individual land ownerships. This fact has to be borne in mind while dwelling upon policy prescriptions for agroforestry. This will clearly imply that the proposed policy needs to be a policy of incentives rather than that of restrictions which will suit and promote socio - economic interests of individuals for adoption and popularisation of agroforesry.

The proposed agroforestry policy framework may address the following areas:

1. Possibility of apportioning land for different landuses on national,regional and local levels.

2. Recommendation of agroforestry systems with choice of spp.

3. Adjusting government regulations on movement, sale trade of agroforestry products.

4. Defining roles of public and private organisations, banks and NGO's.

5. Reduction of conflict between different landuses.

6. Research and development under farm conditions.

7. Extension and farmer to farmer exchanges.

AGROFORESTRY CALENDER

S.No.	TITLE	DATES	PLACE	CONTACT POINT
1.	Seminar on Agroforestry for higher crop , biomass and soil productivity with special reference to Bundelkhand regeon.	June	Jhansi	Dr.P.Rai,Org.Secretary NRCAF,Jhansi(U.P.)-284003.
2.	National Symposium on Managing Water Resources for Agriculture and Environment.	May 9-11 1995	Bhopal	Dr.R.K.Batta, Organising Secretary, Directorate of Water Management Research, Rahuri- 413722. Fax|02426-43348.
3.	National Symposium on Intergrated Watershed Management for Sustainable Production.	Sept. 6-8 1995	Balachaur	Dr.H.S.Sur,Reg. Res. Station, Ballowal, Teh. Balachaur Dist. Hoshiarpur (Punjab).
4.	International Neem Conference	Feb. 4-9 1996	Australia	Dr. Efol Hassan Plant Plant Production dept. The Univ. of Queensland Gatton College Lawes, Queensland 4343, Australia.
5.	II International Crop Science Congress	Nov. 17-23 1996	New Delhi	Dr.S.K.Sinha IARI, New Delhi:110012 India
6.	II Congress on Traditional Science and Technologies of India.	Dec. 27,1995 Jan 1,1996	Madras	Dr.L.Kannan Traditional S&T Congress Sectt. Student Centre Anna University Madras : 600025 India.
7.	International Seminar on Sustainable Reconstruction of highland and headwater regions	Oct. 6-8 1995	Delhi	Dr. R.B.Singh Dept. of Geography ,Delhi School of Eco. University of Delhi Delhi :110 007
8.	National Workshop on Combining Sustainable Development & Biodiversity Conservation in integrated Watershed management	June 14-17 1995	Bhopal	Dr. T.H.Babu IIFM, P.Box 357 Bhopal :462003
9.	4th International Course on Fodder Tree Legumes-Multipurpose Species for Agriculture	Nov./Dec. 1996	Australia	Course Sect .Dept. of Agriculture ,The Univ. of Queensland St. Lucia Queensland. 4072
10.	Annual Congress 95 (Plant Genetic Resources)	Nov 16-17 1995	Sri Lanka	Congress office PGIA P.O.Box 55 Peradeniya Sri Lanka.
11.	National Workshop on Soil resource inventory for perspective land use planning.	Sept. 26-29 1995	Nagpur	Dr. J.L.Sehgal, Director, NBSS & LUP, Amravati Road, Nagpur-440010.

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