Agroforestry NEWSLETTER

Vol.7- (3) July 1995 Quarterly

Acacia auriculiformis Planted on field boundory for fencing purpoes

Acacia auriculi formis an effective biological fence

National Research Centre For Agroforestry, Jhansi.

POTENTIALITY OF BIOLOGICAL FENCES

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The farmers have an age old practice of protecting their agricultural land by providing dead materials of various kinds of biomass as well as raising shrubs or fast growing trees on field/farm boundaries. Besides protecting the crops, fuel, fruits,medicine,etc. due to repeated coppicing from time to time. With the advancement of the country on various fields which also affect the agriculture,the progressive farmers shifted to other ways of fencing their fields giving greater preference to angle iron poles and barbed wire. Also RCC poles were used as well as stone wall. But with the escalation of prices the farmers strongly felt the high cost of maintaining the angle/barbed wire fencing as well as to protect these fences against theft, ect. With change of time now it is strongly realised in various levels to adopt the age old practice of providing biological fencing which being easy to manage also provided revenue as well as rural employment e.g. in Bundelkhand region Mehndi (Lawsonia alba) was an effective way of fencing fields as well as its leaf was used for hair dye purposes, in marriages, excellent source of fodder for goats, etc. and also yielded good amount of fuel.

There are numerous plants as listed below suitable for biological fencing be selected on the basis of agro-ecological climatic condition

1. Casuarina (Casuarina equisetifolia)
2. Mehndi (Lawsonia alba)
3. Shevri (Sesbania sesban)
4. Gliricidia (Gliricidia maculeata)
5. Ingadulsis (Pithecoclobium dulce)
6. Prosopis (Prosopis juliflora)
7. Babul (Acacia tortilis)
8. Babul (Acacia nilotica)
9. Bouganivillea (Bouganivillea glabra)
10. Cactus (Cactus sp.)
11. Karonda (Carissa carandus)
12. Nutan (Dichrostachys cinaria)
13. Morraya (Morraya Panienlata)
14. Clorodendron (Clorodendron inerme)
15. Duranta (Duranta plumieri)
16. Sisal (Agave sisalana)
17. Dodonia(Dodonia viscosa)
18. Ixora (Ixora bandhuca)
19. Lantana (Lantana camars)
20. Justicia (Justicia jandrusa)
21. Subabul (Leucaena leucocephala)
22. Beshram (Ipomoea fistulosa)
23. Cassia (Cassia siamea)
24. Jatropha (Jatropha multiphide)
25. Bamboo (Dendrocalamus strictus)
26. Thuar (Euphorbia royleana)
27. Nagphani (Opuntia dilleanii)
28. Ziziphus/ber (Zizyphus rotudifolia)
29. Morpankhi(Thuja compastata)
30. Kaner (Thevotia nerifolia)
31. Gurhal (Hibiscus rosa-sinensis)
32. Tecoma (Tecoma)stans
33. Putranjiva (Putranjiva roxburghii)
34. Munjh (Sachharum munja)
35. Villayati Babul (Parkinsonia aculeata)

While choosing the biological fencing there are several factors to be considered:

1. It should be effective in protecting the land.
2. It should be easy to manage.
3. It should be easy to propogate.
4. It should not require irrigation/fertilizer etc

5. It should generate extra income e.g, providing fodder medicines, etc.
6. It should fix the atmospheric nitrogen to improve the fertility.
7. It should have more longivity.

Attempts should be made that the biological fence as selected should have the capability to fix atmosperic nitrogen, e.g. greater preference to nitrogen fixation trees/shrubs, it should not compete with the agricultural crops and the most important is that whenever the farmers so require can cut or coppice it.

It is also feasible to raise such plants which can when needed be used as barrier, shelter belt/wind break and when not required can be cut above 1.5 to 2.0m in height and remain as biological fence. As it shown in the plates Acacia auriculiformis being grown alongside of the field as an shelter belt and when not required being cut at a particular height and serving as an effective biological fence. During this process a good amount of fuel is produced which fetches a good price or reduces the farmer needs for fuel by converting cowdung to cakes for burning. The NRCAF, Jhansi is making all efforts to generate more information on this aspect in the near future.

HORTI PASTORAL STUDIES IN KASHMIR

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In Kashmir, a vast area is under orchards of Apple,Almond,Cherry and other stone fruits. The undergrowth of these orchards is not expolited. The forest land is under tremendous pressure because of overgrazing by 8 million cattle heads. In 1989, an experiment was laid out in an established, 15 years old almond orchard in an attempt to develope a workable hortipastoral system. Five treatments were replicated three times in plots of 18m x 9m. In each plot there were six almond trees. Four species of grasses viz. Festuca pratense,Dectylis qlomerata, Trifolium repens, and Trifolium pratense, were compared with natural undergrowth. The data were collected from June 1990, one year after establishment. The grasses were harvested from the experimental plots three times during the year, on Ist June, 15th August and Ist November. The undergrowth in the orchard was identified as Plantago major, Plantago lacelata, Tarxacum officinale, Poa balboose, Trifolium repens and Indigofera articulata.

All the introduced grasses and legumes showed increases in yield over the natural undergrowth. In the year 1990 Trifolium pratense and Trifolium repense out yielded Dactylis and Festuca. However, in the year 1991 the performance of the introduced legumes and grasses was in order of Pratense T.repens T.pratense glomerata. This trend changed again in 1992. Pratense and glomerata gave higher yields than the Trifolium Spp. This is probably due to a reduction in the productivity of clovers by the third year after seeding. (Table 1)

Grasses are the most effective soil builders. Grasses as under storey crops are usually better than crops because the forage grows taller under shade and ther fore associates with trees without mich loss of yield. The preferential shoot growth (at the expense of root growth) may be desirable to avoid root competition. The data on soil analysis (Table 2) revealed an almost neglegible change in soil pH and Ec whereas the organic matter content, an index of available N, increased. Continuous cropping depleted the soil of available P2 O5 and K2 O by 6.6% and 10.1 respectively.

EFFECT OF FUGICIDES ON VESICULA ARBUSCULARMYCORRHIZAL COLONIZATION AND GROWTH OF LEUCAENA LEUCOCEPHALA

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Vesicular arbuscular mycorrhizae (VAM) confer many benefits to the host. It improves uptake of phosphorus and certain minor elements and Ihcreases

Table 1: Yield (q/ha)

Name of grass	Total of 3 cuttings per year				Averege Over	Increase natural grass	% increase over natural grass
	1990	1991	1992	Total			
Netural grass	128.88	175.40	135.00	439.28	146.433	Nil	Nil
Dactylis glomereta	209.52	229.60	221.88	661.00	220.33	83.90	56
Festuce pretense	204.72	424.80	212.50	842.02	280.68	134.25	91
Trifolium repens	228.00	345.60	175.13	748.73	249.58	103.15	70
Trifolium pretense	230.00	319.20	188.25	737.45	245.82	99.39	62

Table 2 : Nutrient status of soil

Parameter	Value	Control	Dactylis	Festuca	Red clover	White clover	Average
		1	2	3	4	5	2-5
pH	7.00	7.00	6.95	6.95	7.00	7.00	-
o.C %	1.20	1.22	1.25	1.28	1.32	1.30	--
P2O5 kg/ha	18.60	17.80	16.72	16.70	16.00	16.07	16.37
K2O kg/ha	280.60	276.00	263.00	253.00	246.00	247.00	252.25
C.M. mohs/cm2	0.16	0.15	0.16	0.16	0.15	0.14	--

their resistance/ tolerance to diseases and water stress. Inoculation of multipurpose tree species (MPTS) with appropriate VAM fungi at nursery stage is being emphasized as per latest trends. However,fungicides are usually applied to soil to control soil borne pathogens, which may adversely affect the VAM development.

An experiment was designed to elucidate the influence of six fungicides on vesicular arbuscular mycorrhizal colonization and growth parameters on Subabul (Leucaena leucocephala) under nursery. Observations on mycorrhizal colonization and growth parameters were made on five month old seedlings. Bavistin, Captaf and PMA. did not inhibit the mycorrhizal colonization, while Blitox, Dithane M-45 and Kavach were found inhibitory. None of the treatments affected plant growth,adversely except Kavach at 100 mg/kg soil (Table 1). The information shall be useful, while selecting fungicide(s) for the disease control under nursery conditions.

Root Nodulation and Biological N-fixation in Groundnut influenced by organics and DAP in Agroforestry system

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The regular use chemical fertilizers alone creates salinity/sodicity problems and detoriate the soil physical condition, soil flora and fauna. In veiw with this object, a study of organics with combination of DAP and their effect on root nodulation and biological nitrogen fixation in ground nut were tested.

The experiment was conducted in red and lateritic soil during 1993. The soil was sandy gravely in texture, acidic in soil reaction,having pH 5.6 and electrical conductivity 0.8 d5m-1, tested for low Nitrogen (0.0436%). Application of organics like industrial waste, litter fall and FYM were done one month befor sowing were done prior starting of mansoon in Bundelkhand region, provided irrigation to maintain soil temperature. The root nodules were collected from 75 days old groundnut crop, counted, oven dried, weighed and estimated biological nitrogen.

Effect of organics: The root length, number of root nodules, dry weight of nodules and nitrogen fixation were found increased by 26.25,33.50,29.41 and 40.70 percent respectively over control with application of F.Y.M. However, in combination with litterfall, industril/waste, the treatment (FYM + litter- fall) possessed higher root length (33.05%), root nodules (67.17%), dry weight of root nodules (67.56%) and nitrogen fixation (67.82%) over control. Also increased root length, root nodules, weight of root nodules and nitrogen fixation by 9.32, 50.63, 54.05 and 45.83 percent respectively over FYM application. However,with application of (FYM + litterfall + Industrial waste) the root length, number of nodules, weight of root nodules, and amount of nitrogen were also increased by 12.22,38.27, 41.46 and 55.81 percent respectively over control. But found decreased root length, number of root nodules, weight of root nodules and N- fixation by 20.83, 28.9, 26.1 and 12.01 percent respectively when compared with the application of FYM + litterfall. The application of industrial waste + FYM + litterfall did not gave positive response on root nodulation and nitrogen fixation in groundnut due to association of toxic elements with industrial waste affected on

Table 1: Effect of fungicides on VAM colonization and growth of leuceana leucocephala

Fungicide	Dose (mg/kg soil)	Mycorrhizal colonization (%) (cm)	Shoot length (cm)	Root length (g/plant)	Total dry wt.	P (%)
Bavistin	5	22.4 cd*	69.5 cde	29.3 a	11.5 ab	0.82 abcd.
	10	28.9 de	63.5 bcd	30.2 ab	14.9 b	0.87 abcde
Captaf	100	28.2 de	77.6 e	37.3 b	15.8 bc	0.93 e
Blitox	50	7.9 a	71.1 de	34.0 ab	14.4 b	0.92 de
	100	8.4 a	70.7 de	33.3 ab	13.6 b	0.95 e
Dithane M-45	50	6.5 a	73.8 de	36.7 b	21.1 c	0.77 a
	100	4.6 a	59.1 abc	37.3 b	21.4 c	0.82 abc
Phenyl murcury	50	25.7 cde	73.3 de	35.3 ab	12.1 ab	0.89 bcde
acetate (PMA)	100	32.0 e	75.8 C	40.4 o	12.4 ab	0.91 cde
Kavach	50	20.0 bc	54.3 ab	31.7 ab	15.6 bc	0.91 e
	100	16.8 b	51.5 a	31.0 ab	7.3 a	0.80 ab
Control	-	28.4 de	65.3 bcde	31.3 ab	14.4 bc	0.85 abcde

* Values with common letters in the same column do not differ significantly at 5% probability leval according to

microbial population and it ultimately results on poor performance on nodulation and nitrogen fixation. But in case of FYM and litterfall application root length, and amount of nitrogen fixation were reported maximum.

Effect of D A P: Application of DAP alone did not give superior response as application of FYM and litterfall on root length, root nodulation and amount of nitrogen fixation. But in addition with FYM, increased root length, root nodulation and N-fixation by 24.36, 45.04, 32.31 percent respectively. However application of DAP alongwith FYM and litterfall gave best response to ground nut crop and increased root length, root nodulation and nitrogen fixation by 25.61, 61.79 and 43.63 percent respectively when compared with DAP application alone. In overall, it is concluded that application of DAP with FYM and litterfall was given best response to the nodulation and amount of nitrogen fixation in groundnut crop due to improvement of soil physical condition by litterfall and FYM.

Performance of aonla (Emblica officinalis) in association with Leucaena and intercrops under rainfed conditions.

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Jhansi.

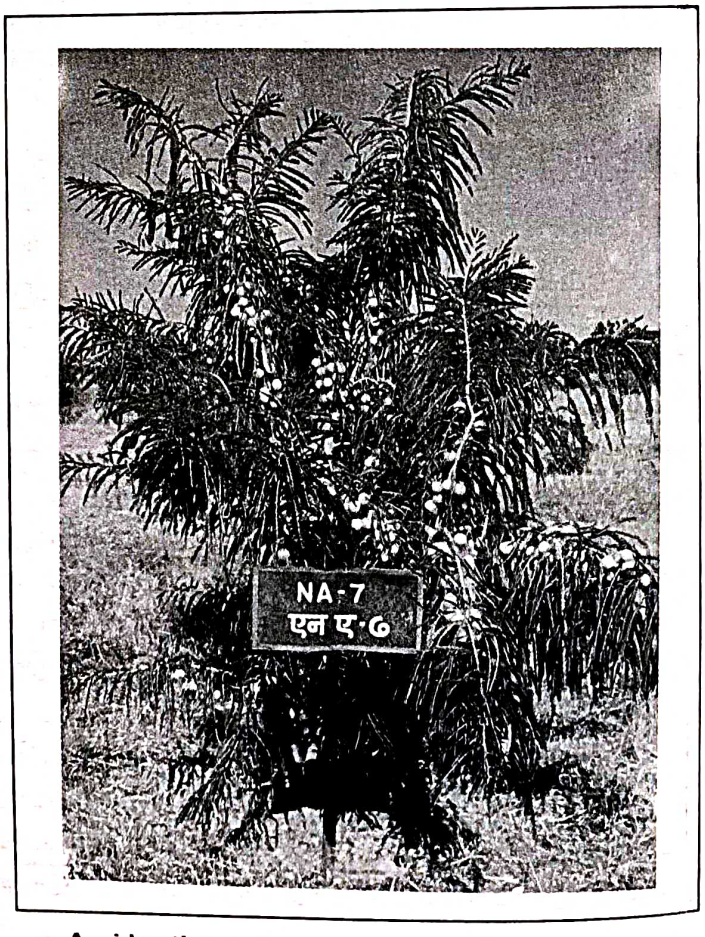
Fruits of aonla are widely used in Ayruvedic and Unani mediecin for their antibacterial and antiviral properties. The aonla fruits is the richest source of Vitamin-c. Inclusion of Leucaena and crops with fruits trees, affect the microclimate of the surroundings and also help to conserve the soil moisture and reduces losses of soil organic matter and nutrients through the maintenance of a ground-surface litter cover.

Keeping above point in view an experiment was conducted during 1989-90 with four varieties of aonla (Chakaiya, kanchan, krishna and NA-7), two spacings (10m x 6m and 5m x 6m) and six crop combinations viz. fallow, sosame and blackgram with and without leucacna to determined the effect of Leucaena and intercrops in growth and fruiting of aonla and overall affect on soil improvement.

The planting of Leucaene with fruit trees had shown negative effect on growth of fruit trees. The plant height, collar diameter and canopy were better under without Leucaena as compared to with Leucaena. The influence of intercrops on fruit trees were not significant. Fruit bearing in aonla was started after four years of plantation (1992-93). The fruit yield was less in the begning and fruit yield increases in the subsequent years. The maximum fruit (average 10.12 kg/plant) yield was achieved during 1994. The percentage of beared fruit trees were lower under with Leucaena as compared to with out Leucaena (Table 1).

The Leucaena was harvested twice in a year and gave about 6.82 to 10.33 q/ha wood and 5.21 to 9.19 q/ha leaves during first year.This yield was increased in the subsequent years.

The grain yield achieved under wider (10m x 6m) spacings was higher as compared to lower spacings (5m x 6m). The varietal influence did not record any difference in crop yield. The grain yield of various crops was less under with Leucaaena as compared to with out Leucaena (Table 10).



Agri horti culture under ranged condition Anola plant with profound fruiting

Table 1: EFFECT OF LEUCAENA IN ASSOCIATION WITH FRUIT TREE (Emblica officinalis) ON YIELD OF FRUIT AND INTERCROPS

TREATMENTS	GRAIN YIELD	EQUIVALENT TO TIL (q/ha)			MEAN FRUIT YIELD Kg/PLANT		
	1991	92	93	94	92	93	94
SPACINGS							
10M x 6M	0.69	0.61	0.45	0.41	0.95	5.43	3.88
5M x 6M	0.82	0.69	0.24	0.24	2.07	8.1	6.14
SEM ±	0.08	0.04	0	0.19			
C.D. (5%)	NS	NS	NS	NS			
VARIETIES							
CHAKAIYA	0.51	0.74	0.34	0.24	0	2.34	2.84
KANCHAN	0.75	0.72	0.33	0.6	1.64	11.24	10.42
KRISHNA	0.95	0.73	0.35	0.24	0	3.44	0.94
NA-7	0.83	0.51	0.37	0.22	1.46	10.23	5.84
SEM ±	0.25	0.13	0.09	0.25			
C.D. (5%)	NS	NS	NS	NS			
CROP COMBINATIONS							
WITHOUT MPTS							
FALLOW	-	-	-	-	3.81	13.05	9.28
SESAME	0.77	0.87	0.7	0	1.02	10.57	7
BLACKGRAM	1.89	1.87	0.43	1.26	2.48	8.96	5.47
WITH MPTS							
FALLOW	-	-	-	-	0.42	3.75	3.43
SESAME	0.57	0.9	0.49	0	0.84	2.18	2.96
BLACKGRAM	1.33	0.98	0.47	0.72	0.05	2.34	1.77
SEM±	0.45	0.22	0.22	0.53			
C.D.(5%)	NS	NS	NS	NS			

CONSTITUTION OF SCIENTIFIC RESEARCH COUNCIL AT NRCAF, JHANSI.

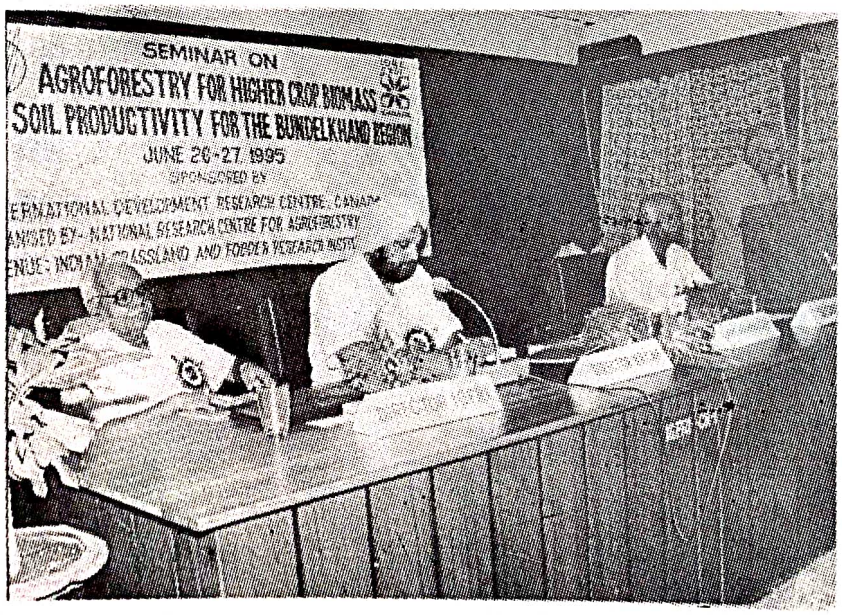
Dr. R.S. Paroda, Secretary to the Govt. of India (DARE) and Director General (ICAR), Krishi Bhawan, New Delhi has been pleased to constitute the SRC of NRCAF, Jhansi (UP) having the following distinguish Scientists possessing greater knowledge in the field of agroforestry research:

1 Dr. S. Chinnamani,
Ex-Asstt. Director General (AF),
Indian Council of Agril. Research,
Krishi Bhawan,
NEW DELHI- 110001

2. Dr. R.P. Dhir,
Ex-Director,
Central Arid Zone Research Institute,
Jodhpur-342 003 (Raj.)

3. Dr. R.S. Dhanda,
Professor of Forestry,
Department of Forestry &
Natural Resources,
Panjab Agricultural University,

The centre S.R.C. is fixed for September 1-2, 1995 at NRCAF, Jhansi



ORGANISATION OF IDRC SPONSORED AGROFORESTRY SEMINAR AT NRCAF, JHANSI (JUNE 6-27,1995)

CELEBRATION OF WORLD ENVIRONMENT DAY AT NRCAF, JHANSI.

ANTI-TERRORIST DAY CELEBRATION AT NRCAF, JHANSI.

AGROFORESTRY CALENDER

S.No.	TITLE	DATES	PLACE	CONTACT POINT
1.	National Symposium Integrated watershed Management for Sustainable Production.	Dates not confirmed	Balachaur	Dr. H.S. Sur. Reg.Res.station, Ballowal, Teh. Balachaur, Distt. Hoshiarpur (PUNJAB)
2.	International Neem Conference	Feb.4-9 ,1996	Australia	Dr. Efol Hassan,Plant Prod. Deptt., the Univ.of Queensland Gatton College Lower,Queensland 4343, AUSTRALIA
3.	II Intl. Crop Science Congress	Nov. 17-23,1996	New Delhi	Dr.S.K. Sinha IARI, New Delhi-110012
4.	II Congress on Tradl. Science and Tech. of India.	Dec. 27-31,1995	Madras	Dr. L.Kannan, Tradl. S&T Congress sectt. Student, centre Anna University, Madras - 600025 India.
5.	Intl. Seminar on Sustainable Re-construction of highland and headwater regions.	Oct. 6-8, 1995	Delhi	Dr. R.B. Singh, Deptt. of Geography, Delhi School of Eco., University of Delhi, Delhi-110007
6.	4th Intl. Course on Fodder Tree Legumes- Multipurpose Species for Agriculture.	Nov./Dec. 1996	Australia	Course sect., Deptt. of Agril., The Univ. of Queensland St. Lucia Queensland 4072
7.	Annual Congress 95 (Plant Genetic Resources)	Nov. 16-17 1995	SriLanka	Congress Office PGIA P.O. Box. 55, Peradeniya, Sri Lanka
8.	National Workshop on Soil Resource Inventory for Perspective use planning	Sept. 26-29 1995	Nagpur	Dr. J.L. Sehgal, NBSS&LUP, Amravati Road, NAGPUR-440010
9.	First World Congress on Allelopathy.	Sept. 16-20 1996	Spain	Prof. Francisco A.Macias, Deptt. of Organic Chemistry, Faculty of Science ,Univ. of Cadiz. Apdo. 40 11510, Puerto Real, SPAIN

Edited & Complied by : Dr. A.S.Gill, and Dr. A.K.Bisaria

The agroforestry newsletter aimed at providing important highlights on research, development, education and training in India published quarterly by the National Research Centre for Agroforestry (ICAR) Jhansi. Contributions, letters, comments, queries, etc. on any aspects of agroforestry may be sent to Director, NRCAF, Jhansi (India) : 284 003

Date of Printing : August 1995

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Printed at : Veer Bundelkhand Press (Offset Printers), 178, Gusainpura, Jhansi : Phone : 0517 - 440931