Agroforestry
NEWSLETTER
National Research Centre for Agroforestry, Jhansi

Vol. 8 JANUARY - DECEMBER, 96 No. 1-4

CONGRATULATIONS

Dr. Prem Shankar Pathak received education at Banaras Hindu University, Varanasi. Dr. P. S. Pathak obtained Ph. D. degree in 1967 under renowned Ecologist, Dr. R. Mishra, FNA, BHU, Varanasi.

He entered into profession as Lecturer at Agra College, Agra. Thereafter, Dr. Pathak joined Indian Grassland and Fodder Research Institute, Jhansi in 1969. He served in various professional capacities. Recently, Dr. Pathak has joined as Assistant Director General (Agroforestry) on 4th January, 1996 at Indian Council of Agricultural Research, Krishi Bhawan, New Delhi.

Dr. Pathak is associated to various professional societies and is on the Editorial board of many journals. He has visited many countries viz. Singapore, China, Japan, Thailand, Nepal, Pakistan, Taiwan and Indonesia as Fellow, Delegates or Trainees.

Dr. Pathak has published more than 212 research papers and 12 books to his credit.

We congratulate him on occupying this elevated position.

Director and staff
N.R.C.A.F., Jhansi.

Agroforestry -Extension & Training, Kisan Diwas & Kisan Gosthi

A Kisan Diwas & Kisan Gosthi was organised on 22nd February, 1996 at NRCAF, Jhansi. In which about 200 farmers participated from nearby villages of Jhansi. The chief guest of the occasion was Dr. Bhagmal, Director, IGFRI. The function was presided by Dr. A.S. Gill, Acting Director NRCAF and convened by Shri R.P. Dwivedi, Scientist (Extension) of the Centre. The programme was conducted by Dr. A.K. Bisaria, Sr. Scientist (Plant Physiology) of the Centre. The subject matter talks were given by scientists of NRCAF, IGFRI and IFFCO officers. The main objective of the Kisan Diwas was to popularize Agroforestry practices among the farmers. During Kisan Gosthi the questions of the farmers were replied by subject matter specialists.

Casuarina a wonder tree on the Tamilnadu Coast in India

K. Johnson
M. S. Swaminathan Research Foundation
Taramani, Madras-600113

India has a long coastline of about 8000 km and Tamil Nadu State alone in the Southern part of India accounts for about 1000 km, mostly along the Bay of Bengal.

M.S. Swaminathan Research Foundation, Madras with financial assistance from International Development Research Centre, CANADA is implementing a Coastal Systems Research Project in Vettaikaraniruppu, a coastal village in Nagai Quaid-E-Milleth district. The average rainfall of this village is 1091 mm per year, received mainly in the three months of October to December. Occurrence of drought as well as cyclone is also a regular feature. This village has 812 ha under cultivation and *Casuarina* (C. litorea) occupies 39% of the cultivated area followed by paddy (Oryza sativa) 15% and groundnut (Arachis hypogaea) 15%. Casuarina and groundnut are grown close to the seashore and paddy away from the shore. The coastal sandy soil contains 93% sand and is very poor in nutrient content. The moisture retentivity is also poor.

In this village, Casuarina is grown at a spacing of 1.10 x 1.10m. It is rerely irrigated and groundnut is grown as an intercrop during the 1st year inside the plantations in a few isolated cases. Against the backdrop, this project which is a participatory research programme is being implemented since 1992. While there was drought during 1992, a cyclone hit the village in 1993. But the year 1994, was comparatively a good year and hence taken for computing the yields of crops.

Agroforestry programme

Casuarina was planted in two plots of 0.10 ha each with a spacing of 2 x2m (as against a normal spacing of 1.10 x 1.10m adopted by the villagers) to facilitate intercropping inside Casuarina and also to study its growth.

In one plot improved variety of VRI-2 groundnut (Photo.1) and in another plot ADT-3 black gram (Vigna mungo) were grown as intercrop inside the plantation for three years.

(Photo - 1)

At the end of the 3rd year some interesting findings have been observed

1. Reduction in yield of agricultural crop inside the Casuarina plantations is not very high and it is only 25.68% in the case of groundnut and 22.8% in the case of black gram during normal seasonal conditions.

2. Growth of Casuarina where intercropping was done is significant when compared to the Casuarina where no intercropping was done. At the end of the 3rd year, there was 12.15% increase in height and 2.46% increase in girth in one of the test plots and in another plot the height and the girth increased by 56.20% and 108.80% respectively over the control.

3. In spite of the wider spacing of Casuarina and the consequent reduction in population, the farmer does not appear to lose if the yield from the intercrop is also taken into consideration.

4. By modifying the spacing as 2m between rows and 1.5m between the plants, the scope for improving the income is more and is worth studying.

5. It is also noticed that during adverse seasonal conditions when there is moisture stress, the black gram that is grown inside Casuarina as mixed crop given more yield than the pure crop. This may be due to the availability of moisture inside the Casuarina for a longer period than in the open, where evopotranspiration is high due to the sandy nature of the soil. Black gram gave 126.92% more yield as mixed crop inside Casuarina during the year 1996, which experienced moisture stress.

Raising Paddy nursery inside the Casuarina plantation (Photo.2)

Normally there is a common belief among the farmers of this village that nothing can be grown under old Casuarina plantations. It is now successfully demonstrated that paddy nurseries can be raised even inside 7 years old Casuarina plantations with a spacing of 1.10 x 1.10m that are ready for harvest. The paddy seedlings inside the plantation grown well and are comparable to the one that are grown in the open. As a matter of fact, the nursery inside the plantation needs 5 irrigations less than that of the nursery raised in the open.

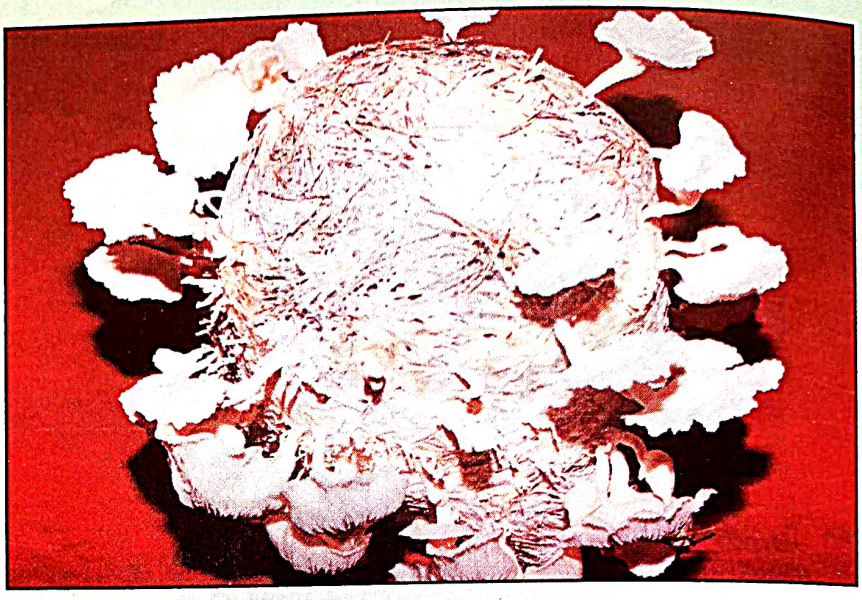
(Photo - 2)

Casuarina needle increases the yield of crops in the saline soils of the coast

Coastal areas abound in saline soils which give poor yield. Both ragi (Eleusine coracana) and paddy (Oryza sativa) crops were grown in the saline soils which were treated with Casuarina needles apart from other leaves such as Mahua (Madhuca longifolia) Neem (Azadirachta indica) and Mango (Mangifera indica) that are available locally. It is seen that the plot applied with Casuarina needle gives increased yield than the control, though the plot applied with Mahua + Mango leaves gave the highest yield. Reduction in pH is also noticed, though marginal.

Raising Mushroom with Casuarina needles (Photo.3)

Generally Oyster Mushroom is raised inpaddy straw. It was found that the dry Casuarina needle which is available in plenty can be used to raise mushroom, instead of paddy straw which is costly and required as fodder to feed the cattle.



(Photo - 3)

Casuarina needles - a fodder (Photo - 4)

In this village, there are 2865 goats but there is no grazing ground. Most of the goats are reared under stall fed conditions. Casuarina needles mixed along with other leaves like Neem, Ipomea (Ipomea sepiaria) and Subabul (Leucaena latisiliqua = L. leucocephala) are feed to the goats regularly, without any ill effects. Casuarina with subabul is relished by the goats. It was seen that 66% of the green matter is consumed leaving 34% of twigs which is used as fuel in this village.

(Photo - 4)

Raising grasses inside Casuarina wood lots

It is also seen that the interspace in Casuarina can be used for raising grasses. The following three varieties of grasses were grown inside the existing old Casuarina plantations of 1.10 x 1.10m spacing.

1. Buffalo grass (Brachiaria mutica)
2. Guinea grass (Panicum maximum)
3. Napier grass (Pennisetum purpureum) (Photo. 5)

(Photo - 5)

Apart from the above, Casuarina has several other uses. It can be harvested in a short peroid of 5 to 7 years. It is an excellent fuel wood. It is also used as props. It also serves as a wind break and helps in reducing the soil erosion in the coastal areas. It can tolerate pruning and allows light penetration. It needs very little water and comparatively free from pests and diseases and also salt tolerant.

What other better tree crop can the coastal farmers think of, to improve their livelihood other than Casuarina ? Yes! Casuarina is indeed a wonder tree.

Effect of soil radiation on available soil moisture of sorghum and pigeonpea in agroforestry system under Bundelkhand region

B. Lal, S.S. Gajbhiye, A.S. Gill and R. Deb Roy
National Research Centre for Agroforestry,
Jhansi, U.P.

Soil radiation, an active component of climate plays major role in determining the evapotranspiration and controls the effective rainfall. It exerts a marked influence on the type and quality of vegetation present in an area and thus ultimately controls the amount and kind of organic matter produced in the ecosystem. Solar radiation reaching the soil is also reduced by cloud cover and changes with the season of the year. Once the incoming solar radiation has reached the soil surface, it has to be absorbed before it is changed into heat. The absorption of solar radiation at the soil surface is affected by many variables such as soil colour variation at the soil surface with respect to the incoming solar radiation and vegetative cover. In general, the darker the colour, more radiation is absorbed and lower the albedo. Heating and cooling of soil taken place for the most part from the soil surface. The magnitude of the temperature change in the soil depends not only on the features affecting radiation but also on the thermal properties of the soil and amount of turbulence due to wind.

An agroforestry trial with sorghum- pigeonpea crop rotation was conducted in sandy loam soil at the Centre. The soil were yellowish brown in colour, medium nitrogen and potassium and low in phosphorus and organic matter. Temperature was megathermic (> 40°C temp.) in summer season and annual precipitation were also minimum (< 800 mm).

Five seedlings of sorghum and pigeonpea at 3rd leaf stage were selected from five plots of MPTS (H. binata, E. officinalis, Eucalyptus, S. cumini and A. lebbek) during the month of July 1993 and recorded surface and root zone temperature. Field capacity *1/3 bar), moisture at 15th bar, permanent wilting point and available soil moisture were observed.

Increasing value of soil radiation at root zone of sorghum and pigeonpea in different plots influenced by the type of texture, clay content and organic matter in the soil. The moisture at 1/3 bar and 15th bar pressure were estimated to be 19.02 and 5.97 respectively (Table 1). The available soil moisture were calculated by the difference of the moisture at field capacity and 15th bar, and it was recorded 13.04. However, in pigeonpea the surface soil radiation was recorded 0.860 cal cm^{-2} min^{-1}, higher than root zone soil radiation (0.813 Cal cm^{-2} min^{-1}). It might be due to available soil moisture were present in the root zone hence the soil radiation werelow at root zone area. The moisture at field capacity, 15th bar and available soil moisture for pigeonpea were recorded 17.68, 4.64 and 13.23 respectively. An overall study of soil radiation and ASM, the soil surface radiation were found more by 5.96 percent than root zone soil radiation and ASM (13.04) in sorghum. But in case of pigeonpea the surface radiation were recorded more by 5.46% than root zone soil radiation and ASM were calculated 13.23%. It is concluded that when soil radiation is more than available water becomes low. Hence, soil radiation is invertionaly propertional to the available soil moisture.

Table - 1 : Influence of soil radiation on availability of soil moisture in Sorghum and Pigeonpea fields at Root zones.

Crops	Soil Radiation (Cal cm^{-2} Min^{-1})			
	Surface		Root Zones	
	Range	Mean	Range	Mean
Sorghum	0.870-0.875	0.872	0.801-0.833	0.820
Pigeonpea	0.854-0.870	0.860	0.807-0.817	0.813

Crops	Soil Moisture at Root Zones (%)							
	1/3 Bar		15 Bar		PWP		ASM	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Sorghum	17.92-20.50	19.02	5.36-6.38	5.97	2.20-2.93	2.63	12.13-14.18	13.04
Pigeonpea	17.20-18.26	17.88	3.93-5.71	4.64	3.01-3.36	3.25	12.45-13.98	13.23

Growth and Biomass Production of Luecaena at 10 years of establishment in Agroforestry System

Arjun Prasad
Central Soil & Water Conservation Reserch & Training Institute,
Research Centre - Kota - 324 002

Growing of trees on field bunds in an age old practies among the farmer's of the country for meeting the demand of food, fuel, and fooder etc, simultaneously. Leuceana which is a nitrogen fixing multipurpose tree species (MPTS) was planted in August 1983 on one side of field bunds at 1m a part in South East- North West direction. Sorghum CSH 5 (Sorghum bicolor L.) Sorghum + Pigeonpea local (Cajanus cajan (L) Millsp), blackgram T-9 (Phaseolus mungo L.), green gram PS 16 (Phaseolus radiatus L.) and castor Auna (Ricinus communis L.) were grown in 8m X 30m strips perplndicular to tree line in South West direction. One strip 8m x 30m was kept fallow during Kharif season for comparision.

The growth of Leucaena tree in respect of height and diameter at breast height was in increasing order during the years. The growth and Mean Annual increment were higher in Kharif fallow plot tree and lowest was in castor (Table 1). The better growth oftree adjacent to Kharif fallow plot tree might be due to greater availability of moisture and nutrient, whereas poor performance might be due to deep rooted habit of castor, which competed for moisture and nutrient for longer period. On an average Leuceana attained 12.62m height, 10.60cm DBH and 24.98cm coller dia during 10 years.

The felling of Leucaena of tree was done for recording the fuel and fodder yield. Air dry fuel wood and leaf fodder per tree shows that significantly higher yield of fuel wood (305 kg) and leaf fodder (82 kg) was recorded in Kharif fallow plot trees and lowest was in castor plot tree. On an average Leucaena produces 238 kg of fuel wood 68 kg leaf fodder and a total biomass of 306 kg per tree above the ground level during the span of 10 years.

Table : Growth and Biomass Prodution (Kg/Tree) of Leucaena Tree in Boundary Plantation.

Treat-ments	Initial Year 1983		Year 1992		M. A. I.		Biomass (Kg/Tree)		
	HT (m)	DBH (cm)	HT (m)	DBH (cm)	HT (cm)	DBH	Fuel Wood	Fodder Leaf	Total
Sor + P.P.	2.34	1.71	12.66	20.70	1.15	2.11	270	75	345
Sorghum	2.16	1.30	12.30	19.30	1.13	2.00	212	68	280
Blackgram	1.63	0.81	12.40	19.20	1.20	2.04	224	65	289
Green gram	1.50	0.75	12.65	18.70	1.24	1.99	215	62	278
Castor	1.58	0.82	12.50	16.10	1.21	1.70	197	56	253
Khariffallow	1.39	1.06	13.20	23.80	1.31	2.53	305	82	387
SEM(±)	0.13	0.13	0.20	1.92	0.03	0.07	6.9	1.6	7.2
C.D. 5%	0.39	0.40	H.S.	H.S.	0.09	0.21	20.7	4.9	21.7

HT = Height DBH = Dia at brest height,, Sor = Sorghum, P.P.= Piglonpea M.A.I.= Mean annual inerement.

Storage studies on Aonla *(Emblica officinalis Gaertn)*

S.K. Shukla, Ram Newaj and A.S. Gill
National Research Centre for Agroforestry
Jhansi

Aonla is gaining importance day by day for utilization of wastelands in arid and semi-arid regions of our country due to nutritive and medicinal value of fruits and the ability of tree to survive under adverse agro-climatic situations. In order to avoid the glut in the local market and get better price of the produce, there is a need of enhancing the shelf life of aonla fruits.

Fruits of four aonla cultivars were harvested in the first week of January 1996 and packed in polythene bags (24 cm length x 15.5 cm breadth x 200 gauge thickness) and paper bags (control). Polythene bags were perforated with a view to permitting controlled aeration. Zero (Completely sealed), two, four, six and eight holes (size of hole 0.12 cm2) were made in sealed polythene bags. Data were recorded on weight loss of fruits at ambient temperature.

The results (Table 1) indicated that weight loss was minumum in completely sealed polythene bags. In this treatment, the fruits of all the cultivars maintained their firmness even after a month. The increased perforation resulted in increased weight loss. However, the differences were non-significant in most cases. Fruits packed in paper bags showed maximum and statistically significant weight loss over other treatments.

Table 1 : Effect of polythene packing on weight loss of aonla fruits.

Treatments	weight loss of fruits (%)			
	NA-7	Krishna	Kanchan	Chakaiya
Sealed polythen bages	1.73 a	1.83 a	1.74 a	1.76 a
Polythen bag with two holes	4.95 b	5.10 b	4.51 b	2.73 a
Polythene bags with four holes	7.06 bc	7.34 b	5.75 b	2.85 a
Polythen bags with six holes	7.21 bc	7.41b	6.52 b	3.29 a
Polythene bags with eight holes	9.46 c	7.95 b	9.24 c	4.51 a
Paper bags	47.11 d	47.00 c	48.23d	39.26 b

Note : Values in each column followed by the same letter are not significantly different (P,0.05) from each other according to Duncan's multiple range test.

Green fodder yield of Leucaena in alley cropping under rainfed conditions in S. E. Rajasthan

Arjun Prasad
Central Soil & Water Conservation Research & Training Institute,
Research Centre
Kota - 324002

In Rajashtan, the cattle population in more than the human population. There is always scarcity of fodder specially in rainfed areas where monsoon are uncertain and erratic in nature. Leuceana provide protien rich fodder, increases soil fertility, supplement the need of fuel and reduces soil erosion.

A field experiment was conducted in 10 consecutive years during 1981 to 1990. Leucaena was grown in narrow specing (0.75m x 0.25m) as well as wider spacing (3.75m x 0.75m). In widely speced Leucaena, intercrops of Sorghum

CSH 5 (Sorghum bicolor L.). Sorghum + Pigeonpea (1:1) local (*Cajanus cajan* (L) Millsp) and Pigeonpea + Blackgram T9 (Phaseolus mungol) were grown at 30 cm a part between two rows of *Leucaena* having plot size of 11.75m x 6.0m in a randomised block denign with three replications. Four month old seedling of Leucaena were planted in July 1981 with a basal does of 20 Kg N + 50 Kg P/ha and there after no fertilizer was given. The Leucaena was allowed to grow upto 1.25m height and pollared to 0.70m periodically for green fodder yield. The 7 to 9 cutting of Leucaena per year were taken dopending upon rainfall distributions.

Year wise Leucaena green fodder yield was recorded in increasing order except in the year 1986 when rainfall was inadequate. The drastic reduction in fodder yield was noticed in all the treatments during 1990, might be due to degeneration and termite attacks. Among the treatments, closer spacing (0.75m) gave significantly higher yield over wider spacing (3.75m). Among the crops with *Leuceana*, the maximum fodder yield was recorded in Leuceana + (Pigeonpea + blackgram 1:1) in each years folled by Leucaena + Sorghum (Table 1). It indicates that companionship of *Leucaena* with Pigeonpea + blackgram or Sorghum is beneficial.

On an average higher green fodder (44.88 t/ha/year) was recorded when Leuceana was spaced pure at 0.75m followed by 3.75m a part (19.79/ha/year). The fodder yield further reduced when Leuceana was grown in association of Sorghum, Sorghum + Pigeonpea and Pigonpea + blackgram by 65.4, 73.8 and 63.0 and 21.5 40.1 and 16.0 % respectively compared with their pure stand spaced at 0.75m and 3.75m respectively. The reduction in green fodder yield was comparable as expected maximum reduction of 80% on space basis.

Table :- Year wise Leucaena Green Fodder (t/ha) In Alley Cropping.

Parameters	Green fodder field of leucaena (t/ha)										
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Poll
T_1 Leu. (0.75x0.25m)	0.58	13.56	45.16	47.74	58.40	43.40	52.06	68.93	69.79	49.23	44.88
T_2 Leu. (3.75x0.25m)	0.60	3.09	14.81	19.09	23.29	17.02	25.23	33.62	37.59	23.26	19.79
T_3 T_2 + Sorghum	0.00	0.75	7.32	10.66	18.44	14.75	21.66	28.37	31.35	29.99	15.53
T_4 T_2 + Sor+P.P.	0.00	9.18	2.37	2.75	5.38	10.64	15.74	26.38	32.48	22.69	11.86
T_5 T_2 + P.P.+BG	0.12	1.30	8.60	9.74	18.48	15.74	22.98	29.36	37.02	22.84	16.62
SEM (±)	-	0.17	0.35	0.26	0.20	0.37	1.77	1.95	2.13	0.67	0.36
C.D. %	-	0.54	1.16	0.86	0.66	1.22	5.79	6.37	6.95	2.18	1.16

leu = *Leucaena*, Sor = Sorghum, P.P. = Pigeonpea, BG = Blackgram

Intercropping studies with bamboo (*Bambusa arundinacea*) under rainfed conditions

P. Rai, A.S. Gill, A.K. Handa and A. Datta
National Research Centre for Agroforestry
Jhansi

Bamboo which belongs to the family Graminae has a wide ranging distribution in Asia and the Pacific. It is not only found in the natural forests either pure or in association with other species, but also cultivated in village and home gardens (FAO, 1982). Bamboo in India has acquired an unique position in that it is a poor man's timber as well as the mainstay of the pulp and paper industry. Little information is available where bamboo in cultivated and in the interspaces crops can be raised.

Keeping in view the importance of Bamboo, intercropping studies with Bambusa arundinacea were initiated during 1994-95, although, plantation of bamboo was done during 1993-94 at 6m X 6m spacing, to know the most suitable intercrops under rainfed conditions at the National Research Centre for Agroforestry, Jhansi. The five treatments consisting of Bamboo alone, Bamboo + Soyabean, Bamboo + Groundnut, Soyabean alone and Groundnut alone were laid out in Randomised Block Design with three replications. Due to early withdrawal of monsoon, the intercrops failed during 1994-95, however, plant population of soyabean and groundnut did not show any variation, either grown alone or in association with bamboo. During, 1995-96, moong and til were sown as intercrops, due to failure of soyabean and groundnut in the previous year. The grain (0.39 t/ha) and straw (0.68 t/ha) yield recorded with moong in association with Bamboo was at par with control (grain 0.38 t/ha and straw 0.70 t/ha). While in case of til, the production of grain (0.32 t/ha) and stick (1.03 t/ha) was slightly higher in control as compared to in association with bamboo (grain 0.26 t/ha and stick 0.92 t/ha).

The data recorded during December 1994 on the survival and growth parameters of Bamboo revealed that survival, plant height, number of culms/ rhizome and canopy diameter were slightly higher when bamboo grown in association with crops as compared to control (Table 1). Data recorded during June, 1995 showed that survival and canopy diameter of bamboo was at par either grown with or without intercrops, whereas, plant height and number of culms/ rhizone were slightly higher when grown in association with intercrops as compared to control. During June

1995, 20 cm lower plant height was recorded as compared to December, 1994 under both the situations. This is because of drying of tips of Bamboo due to high temperature and long dry spells during summer season. Data recorded during December, 1995 showed that plant height and number of culms/ rhizome were 17.2 and 31.9 % higher when grown in association with intercrops as compared to control. While growth in canopy diameter was at per in both the systems.

Thus, it may be concluded that intercropping has no adverse effect on initial growth and survival of Bamboo while slightly enhances the growth of bamboo as compared to control (bamboo alone). Further, B. arundinacea is generally grown in humid/high rainfall area, but considering two years survival and growth performance under the trail, it can be grown under semi-arid region under rainfed condition also without affecting the yield of intercrops like moong and til.

Table 1 : Survival and growth performance of bamboo grown with and without intercrops under rainfed conditions.

Parameter	December 1994		June 1995		December, 1995	
	Contr.	Inter	Contr.	Inter.	Contr.	Inter.
Survival (%)	833	91.7	83.3	83.3	83.3	83.3
Pl. Ht (m)	2.5	2.7	2.3	2.5	2.9	3.4
No. Of culms/rhizome	6.1	6.4	11.3	13.0	9.4	12.4
Canopy Dia.	2.0	2.1	2.1	2.1	2.2	2.2

Influence of tree densities on growth of Anjan (Hardwikia binata)

A.K. Bisaria, R. Newaj, Ajit, B. Lal and R. Tiwari
National Research Centre for Agroforestry, JHANSI (U.P.)

Hardwikia binata varn. Anjan of family Leguminosae is a tree species of acknowledged merit and also consetilation of economic characters has been found to be a most suitable tree species for agroforestry system. This tree species offers dark red durable heavy heartwood, bark and leaves used as fibre and fodder respectively. H. binata was tested in agrisilvicultural system of agroforestry. Studies in progress on H. binata employing three population densities viz. 800, 400 and 200 trees/ha reveal that plant did not check much of the solar radiations through its canopy and therefore did not enter into competition for solar radiations with understorey crops.

The data for the year 1995-96 on growth parameters viz. height, DBH and CD for theree spacings viz. 5.0 x 2.5, 5.0 x 5.0 and 5.0 x 10.0 m which yielded 800, 400 and 200 tree population per hectare and each at two levels of crop (tree only and tree+crop) was compiled and analyzed in accordance with RBD design for three replicates. The ANOVA of growth parameters reveal that the first two population densities (800 and 400/ha) exhibit significant differences (at P=.01 in first spacing and at P= .05 in second spacing) in case of tree height, collar diameter and diameter at breast height

in both the groups i.e. silviculture and agroforestry situation. While in case of third (CD and DBH) for the two groups are not significant (at P=.05). These experimental finding are in accordance with the expectation since the third population density (200 tree per hectare) the competition in the tree and crop is minimized due to larger tree spacing and as such the differences are not significant (Table 1).

Effect of tree densities on the growth attributes of *H. binata*

	800 tr/ha			400tr/ha			200tr/ha		
	With Crop	Without Crop	Diff.	With Crop	Without Crop	Diff.	With Crop	Without Crop	Diff.
Ht. (cm)	426.6	502.2	75.6**	415.8	463.4	47.6 *	456.1	477.3	212 ns
CD (cm)	9.4	10.9	1.6**	9.3	10.5	1.2*	9.9	10.8	0.9 ns
DBH (cm)	7.1	8.5	1.4 **	7.1	8.1	1.0 ns	7.8	7.9	0.1 ns

** denotes significantly different at 1% level

* denotes significantly different at 5% level

ns denotes not significant

A report on training of rural youth on scientific prunning in Ber

A training of rural youth on "Scientific pruning in ber plants" was organised on 27th May, 1996 at village Karari in Jhansi district with the objective of improving the skills of the farmers about ber pruning. It was attended by 13 farmer. On this occasion, Dr. K.R. Solanki, Director, NRCAF, Jhansi, emphasized the importance of ber and its furture prospects for Bundelkhand region. In addition to generating employment opportunities, such training programmes will go a long way in improving the productivity of ber in Buendelkhand region and thereby enhancing the income of the farmers, he added. R.P. Dwivedi coordinated the trainng programme and highlighted the importance of ber trees in fruit tree based agroforestry systems. The theoretical as well practical aspects were expounded by Dr. S. K. Shukla, Scientist (Horticulture) of the centre. The principles of pruning were explained in detail and the method of scientific pruning was demonstrated. The training aroused the farmers' interest and they expressed their willingness to have similar type of training programme on budding of deshi ber with improved cultivars in order to increase yield and quality of fruits.

Compiled & Edited by :
A. K. Bisaria
P. Rai
Ajit
Rajeev Tiwari

Published by :
Dr. K. R. Solanki
Director
N.R.C.A.F.,
Jhansi

Printed at :
Mini Printers
Antia Talab Road
Jhansi
Ph. :446820