

# CROPPING SYSTEM IN ARECANUT

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## ABSTRACT

*Studies on high density multispecies cropping system in arecanut garden in different agro climatic regions of India are remunerative. While 60 per cent. of the sunlight alone is intercepted by arecanut palms, by growing intercrops the sunlight utilisation can be increased to about 95 per cent. The interspace of arecanut garden can profitably be exploited by raising crops like banana, lemon, elephant foot yam, cocoa, tapioca, pepper and betelvines.*

Arecanut (*Areca catechu* L.) is one of the important commercial crops grown in parts of Karnataka, Kerala, Assam and West Bengal. The long pre-bearing period, low returns during the initial bearing stage, fluctuations in market prices, unexpected loss due to pests and diseases and natural calamities are some of the problems associated with arecanut cultivation. To overcome these problems farmers started growing crops like banana, betelvine, pepper, tapioca, colocasia, dioscoria, pineapple and even coconut and jack to realise some income during juvenile phase of arecanut. This practice of growing crops along with arecanut palms is called mixed/inter cropping. Central Plantation Crops Research Institute started a scientific study of inter/mixed cropping during 1970s and High Density Multispecies Cropping during 1980s with the objectives of increasing productivity per unit area and maximising the economic returns.

### Scope for mixed cropping

Approximately 60 per cent of the light is intercepted by an adult areca palm. By growing intercrop this can be increased to about 95 per cent. The root distribution studies in arecanut have revealed that at the recommended spacing arecanut uses only about 35 per cent of the space. Remaining 65 per cent of the space is not effectively used and this can be used for raising mixed/intercrops. Intercropping also leads to organic matter recycling. In arecanut and cocoa mixed cropping the higher litter fall and prunings of cocoa improves the organic matter and soil fertility through increased microbial activity.

The large number of experiments conducted at CPCRI, Regional Station, Vittal and many other places have indicated some points to be noted while

practicing inter/mixed cropping. The crop chosen should not have any problem of soil exhaustion and pest build-up and at the same time should have maximum production or maximum returns per unit input to the farmers. Crops which love shade or those which can withstand the canopy of arecanut palms and heavy drip during the monsoon are to be preferred. The choice of intercrops also depends upon the locality.

A large number of annuals, biennials and perennial crops have been tried in areca gardens to evolve suitable crop combination at CPCRI, Regional Station and the Research Centers spread over the states of Karnataka, Kerala, Assam and West Bengal. Crop like banana, pepper, cocoa, elephant foot yam, citrus, betelvine, pineapple etc. were found suitable for mixed cropping with arecanut. However, it is found that as the age of the garden advances, only few crops can be grown profitably as mixed crops viz., pepper, cocoa, banana, lime and betelvine. The intercrops, apart from giving additional income, created additional job opportunities.

### Crop Husbandry

Following are the cultural practices for some of the important intercrops and the summary is given in Table 1.

#### (i) *Banana*

Disease free, sword suckers of two to three months age are planted in pits of 50 cm cube filled with 10 to 12 kg of cattle manure in the centre of four areca palms. Recommended dose of fertilizer is 160 g N, 160 g P<sub>2</sub>O<sub>5</sub> and 320 g K<sub>2</sub>O per plant per annum

Fertilizer is applied in two splits i.e. half of the dose is applied two to three weeks after planting and the other half, four to five months after planting. Only one or two good suckers should be allowed to grow. Besides the main crop, two ratoon crops can be harvested in three years period and at the end of three years the entire crop will have to be replanted in pits dug at changed sites. Banana can yield as much as 10 t per ha, when intercropped with arecanut. Banana varieties Malbhog, Chinichempa are suitable for West Bengal. Varieties Kadali, Mysore, Highgate, Karpuravalli, Pooven and Nendran are suitable for Karnataka where as Mysore, Pooven, Karpuravalli and Robusta are suitable for Kerala. The study to investigate the long term effect of banana on arecanut at CPCRI, RS, Vittal did not show any adverse effect of banana on arecanut yield. An additional income of Rs. 10,000 to Rs. 15,000 per ha can be achieved with intercropping of banana.

#### (ii) Pepper

Pepper is grown in arecanut garden using areca palms as the standard. Two rooted cuttings are planted in the pits of 50 cm cube size on the northern side of the areca palm dug at a distance of 75 cm. As the vines grow the shoots are tied to the palms as often as required. The vine should not be allowed to touch the arecanut fruit bunches. Manuring at the rate of 100 g N, 40 g P<sub>2</sub>O<sub>5</sub> and 140 g K<sub>2</sub>O has to be done for adult vines every year in two equal splits during May and September. One third of the full dose of the fertilizer is given during the first year, two thirds during the second year and full dose from the third year onwards.

Pepper begins to yield in the third year and comes to full bearing by seventh to eighth year. Harvesting of the spikes is done when two to three berries in a spike turn red in colour. The berries are separated manually and dried in the sun for 7-10 days till they turn black in colour. The recovery of black pepper is between 25-33 per cent depending on the varieties. On an average 1 Kg dry black pepper can be obtained from a vine. Research results at Vittal have indicated that Karimunda and Panniyur-1 varieties are more suitable for growing in arecanut gardens. Pepper can give an additional income of about Rs. 30,000 to Rs. 35,000 per ha.

#### (iii) Cocoa

Cocoa grafts/buds are planted in alternate rows at a distance of 2.7 m to give a spacing of 5.4 m × 2.7 m. One hectare of arecanut garden planted at spacing of 2.7 m × 2.7 m in the square system will accommodate 650 trees of cocoa.

Pits of size 75 cm cube may be dug and have to be filled upto half with a mixture of 15 kg FYM and top soil. The planting of cocoa grafts can be done before or after the monsoon. Adult cocoa trees require

a fertilizer dose of 100 g N, 40 g P<sub>2</sub>O<sub>5</sub> and 140 g K<sub>2</sub>O, which is to be applied in two equal splits in May and September. The fertilizer has to be broadcast at the base of the plant upto a radius of 75 cm and forked into the soil. One third of the adult dose has to be given in the first year, two third in the second year and full dose from the third year onwards. Cocoa has to be pruned and shaped to get a canopy at a height of 1.5 to 2.0 m.

The average unrestricted height of cocoa is 6 to 8 m, but by pruning it can be restricted to less than 3 m allowing only a single storey of fan branches. Cocoa flowers from second year onwards and the pods take about 140-160 days to mature and ripen. Harvesting has to be done with the help of a sharp knife, without damaging cushions when the pod colour changes to yellow. Cocoa bears round the year though two peaks are seen around June and December. On an average 20 kg pods per tree are produced in a year. About 10 pods give 1 kg as wet beans and 3 to 4 kg wet beans give 1 kg dry beans.

#### (iv) Other crops

In addition, lemon and betelvine can also be grown as mixed crops in arecanut gardens in Maidan parts of Karnataka and West Bengal. In West Bengal, lemon variety Gandh-Raj is suitable while seedless variety of lemon can be grown in Maidan parts of Karnataka. Betelvine variety Gaachpan is suitable for West Bengal.

### High Density Multispecies Cropping System

The research revealed that growing of only one mixed crop in arecanut gardens will not utilise the resources to the full extent. This left scope for taking more than one crop in the arecanut gardens as mixed crops. This system of growing more than one crop mixed with arecanut is called High Density Multispecies Cropping System (HDMSCS). Research efforts at CPCRI, RS, Vittal and CPCRI, RC, Hirehalli and Mohitnagar have revealed that banana, cocoa, pepper, lemon, betelvine, elephant foot yam and tapioca can be grown with arecanut as HDMSCS.

The economics worked out in these studies in a 17 year old arecanut at Vittal revealed that pineapple and coffee were not remunerative. Banana is profitable during first three years with average returns per year of Rs. 1,420. Pepper gave a gross return of Rs. 35,104 in the fifth year. However due to incidence of slow and quick wilt diseases the returns were negative during subsequent years (Table 2.). Cocoa with a population of 210 trees provided a net returns of Rs. 12,720 per ha.

At Hirehalli cocoa, pepper, banana and lemon can be grown profitably (Table 2.). At Mohitnagar, a combination of arecanut, banana and pepper increased the net returns by 2.5 times.

Table 1 : Crop Species, spacing and plant population of crops grown with arecanut

Crop	Spacing M	Population per ha	Fertiliser		FYM		Remarks
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O		
			g/palm or tree		Kg/palm		
Arecanut	2.7×2.7	1300	100	40	140	10	
Black Pepper	2.7×2.7	1300	100	40	140	..	Planted at the base of the palm
Banana	2.7×5.4	650	160	160	320	20	Planted at the centre of four palms
Cocoa	2.7×5.4	650	100	40	140	..	Planted at the centre of four palms
Lemon	2.7×.4	650	300	250	500	20	Planted at the centre of four palms
Betelvine	2.7×2.7	1300	100	40	140	20	Planted at the base of the palm

Table 2 : Economics of Arecanut based mixed cropping system Models (Rs./ha/yr at 1992-93 prices) after 10th year of planting

Place/Model	Cost of Cultivation	Yield kg/ha	Gross returns	Net returns
<b>Vittal</b>				
I Arecanut	32,408	2720	1,72,171	1,39,762
Cocoa	4,039	4026	19,760	15,720
Clove	4,179	25	2,472	-1,707
Pepper	9,505	132	3,626	-5,878
Banana <sup>1</sup>	860	2364	262	
Total	50,991	..	1,99,291	1,48,295
<b>Hirchalli</b>				
I Arecanut	17,556	3916	1,56,640	1,39,084
Cocoa	3,825	4983	27,030	23,205
Pepper	15,387	1735	52,050	36,663
Total	36,768	..	2,35,720	1,98,952
II Arecanut	15,007	3203	1,28,120	1,13,113
Banana	1,896	2165	6,495	4,595
Lemon	2,117	1390	2,780	663
Total	19,020	..	1,37,395	1,18,370

1 = Banana upto 3rd year only.