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ARECA BASED HIGH DENSITY MULTISPECIES CROPPING SYSTEM IN COASTAL KARNATAKA*

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ABSTRACT

The studies on areca based high density multi species cropping system (HDMSCS) were conducted at Central Plantation Crops Research Institute, Regional Station, Vittal for 10 years from 1983-84 to 1992-93. The results revealed that in a HDMSCS, intercropping did not affect the arecanut yield negatively. Banana is economical in the initial years. Pepper is good inter-crop during the early years and needs replanting after 5 to 6 years in disease prone areas. Cocoa grows well with areca and gives good returns.

Key words: Arecanut, HDMSCS, Cropping systems, Mixed cropping, Coastal Karnataka, Economics

INTRODUCTION

Arecanut (*Areca catechu* Linn.) is one of the major commercial crops of Karnataka. The long pre-bearing period, low or no income in the initial years, fluctuations in the market were some of the reasons which led to the practice of mixed cropping in arecanut gardens. Mixed cropping of pepper, banana, cocoa and few other crops were found economical in arecanut gardens (Muralidharan, 1980; Nair, 1982; Khader, *et. al.* 1992; and Shama Bhat, 1988). Growing a single crop as mixed crop in areca gardens would not utilise the resources to the full extent possible. This led to the thinking of High Density Multispecies Cropping System (HDMSCS), where more than one crop is grown as mixed crops (Bavappa *et. al.*, 1986). To evaluate the suitability and economic viability of these systems, studies were started in different Research Centers of Central Plantation Crops Research Institute from 1983 onwards. The outcome of the areca based high density multi-species cropping model at CPCRI, Regional Station, Vittal is presented in this paper.

MATERIAL AND METHODS

The areca based high density multi-species cropping system was laid out in a 17 year old areca garden at Central Plantation Crops Research Institute, Regional Station, Vittal during August 1983. The place is situated at 91 M above MSL. The plot consisted of one hectare area with 1300 palms spaced at 2.7m x 2.7m. Six different crops *viz.*, pepper, banana, cocoa, coffee, pineapple and clove were grown as intercrops as described by Bavappa *et. al.*, (1986). All the crops were irrigated from November to April

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Table 1. ***Plant population and fertilizer doses for various crops in the system.***

	Crop	Population	Fertilizer doses (g/tree/year) N	P_2O_5	K_2O
1.	Arecanut	1300	100	40	140
2.	Banana	390	160	160	320
3.	Pineapple	2400	8	4	8
4.	Pepper	1300	100	40	140
5.	Cocoa	210	100	40	140
6.	Coffee	780	50	40	50
7.	Clove	180	300	250	750
	Total	6560			

and manured and managed according to the recommended package of practices (Table 1). Input and output of each crop were recorded separately. The prevailing market prices of the respective years were used to calculate the economics.

Banana was removed as it became less productive and coffee and pineapple were also removed (1988-89 season) as they were found non-profitable after 6 years of planting .

RESULTS AND DISCUSSION

The yield data of all the crops in the system are given in Table 2. Yield of arecanut ranged from 1819 to 4400 kg chali (1 kg chali = 4 kg ripe nuts). Year to year variation in arecanut yield was due to the climatic variations. The low yields of arecanut during 1990-91 and 1991-92 were due to drought and severe infestation of fruit rot (mahali) respectively. There is no reduction in yield of arecanut due to crop mixing. In fact, arecanut yield increased after establishing the component crops in the system. Similar observations were reported by Shama Bhat (1988).

Pepper started yielding in the third year of planting. The yield increased

Table 2. ***Yield data of all the crops in the areca based HDMSCS for 10 years at Vittal.***

Sl. No.	Year	Arecanut Chali (kg)	Pepper dry (kg)	Cocoa pods (kg)	Banana fresh (kg)	Pineapple fresh (kg)	Coffee dry beans (kg)	Clove dry (kg)
1.	1983-84	2773	-	-	-	-	-	-
2.	1984-85	2800	-	-	3183	771	-	-
3.	1985-86	4256	37	71	2364	423	9	-
4.	1986-87	3943	268	918	1421	244	24	-
5.	1987-88	3107	1191	980	390	427	137	-
6.	1988-89	4400	194	1798	217	17	62	-
7.	1989-90	2588	174	3951	-	-	-	2
8.	1990-91	1819	65	3221	-	-	-	10
9.	1991-92	1819	92	4324	-	-	-	16
10.	1992-93	2718	132	4026	-	-	-	24

from 37 kg in the third year to 1191 kg in the fifth year. During the sixth year the yield declined drastically as a result of death of several vines due to slow/quick wilt disease. The highest yield in 1987-88 indicates that if full population is maintained with healthy pepper vines, it can give good yield.

Cocoa crop started yielding in the third year of planting. The yield is gradually increasing and a maximum yield of 4323 kg fresh pods was obtained during 1991-92 from 210 trees. The yield per tree was about 20 kg fresh pods, which will give an yield of 13 tonnes of pods from there commended population of 650 trees in areca + cocoa mixed garden of one hectare. With a bean to pod ratio of 15 per cent, this will yield about 2000 kg dry beans. The potential yield of cocoa in terms of dry beans is 2000-3000 kg/ha. (Shama Bhat, 1988).

Banana started yielding in the second year of planting and gave 3193 kg fruits. The yield started declining from the third year and in the sixth year the yield was only 27 kg fruits. Coffee yields were increasing upto fifth year from 9 kg dry beans in the third year of planting to 137 kg dry beans. In the sixth year the yield was drastically reduced to 62 kg. Pineapple also started yielding in the second year of planting and gave 771 kg fruits. In the sixth year the yield was only 17 kg fruits. Clove started yielding in the seventh year of planting. In three years the yield increased from 2 to 24 kg from 180 trees.

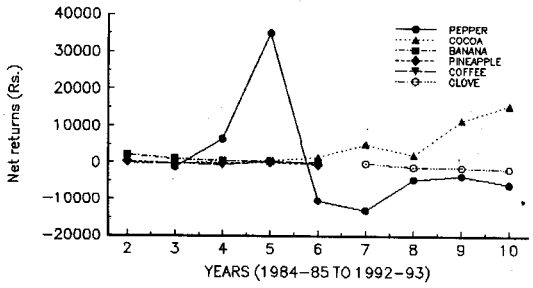

Fig. 1. Net returns from different crops in areca based HDMSCS.

The net returns from the mixed crops in the areca based HDMSCS is depicted in Fig. 1. Returns from pepper was maximum (Rs. 35,104) in the fifth year and later on the returns was negative. Profitability of growing pepper with areca was reported earlier by Singh *et. al.*, (1982) and Khader *et al.*, (1992). The returns from cocoa was on positive side and reached about Rs. 15,720 in the 10th year from only 210 trees, which contributed 10 per cent of the total net returns from the system. Similar observations were made by Shama Bhat (1988). Apart from these two crops, only banana gave positive net returns. But banana became lanky due to the competition for light with cocoa and pepper and the yields started declining (Table 2) and so was the net returns. As a result banana was removed from the system. Pineapple and coffee gave

Table 3. *Costs, returns and gross margin (Rs/ha) of arecanut based HDMSCS model at Vittal.*

Sl. No.	Year	Costs (Rs)	Returns (Rs)	Gross Margin (Rs)
1.	1983-84	21,404	92,441	71,037
2.	1984-85	13,046	97,130	84,083
3.	1085-86	17,867	1,46,091	1,28,223
4.	1986-87	22,948	1,46,038	1,23,089
5.	1987-88	29,304	1,31,952	1,02,648
6.	1988-89	34,511	1,59,701	1,25,189
7.	1989-90	34,549	1,42,660	1,08,110
8.	1990-91	31,696	1,45,808	1,14,111
9.	1991-92	37,763	1,60,751	1,22,987
10.	1992-93	50,133	1,98,030	1,47,897

negative returns because of the low yields in all the years (Table 2). Singh *et al.*, (1982) recorded negative increase in total net profit when pineapple was grown with arecanut. So both coffee and pineapple were removed from the system. Clove gave negative returns as it started yielding in the seventh year only and the yields are not stabilised.

This indicates that pepper can be grown profitably for the first 5 to 6 years and later on it has to be replanted in a disease prone area. Cocoa gives consistently high returns over the years and banana can be profitable in the initial years, when all these crops are grown as mixed crops in arecanut garden at the same time.

The cost of production and returns of the whole system are given in Table 3. Although the returns are predominantly from areca due to the high ruling price of arecanut, it is to be noted that even at a low population of 210 cocoa trees, the returns are substantial. Secondly, the returns from pepper until the disease sets in, were also high. Thus in the event of a crash in arecanut prices or further improvement in cocoa and pepper prices, these crops will be playing a vital role in either maintaining high returns or improving the returns further.

The average cost composition of different crops in the system over 10 years is given in Fig. 2. The cost of production is divided into labour, manures and fertilizers, plant protection chemicals, fuel and others. Fuel charges were included in arecanut because mixed crops did not get extra irrigation. No plant protection measures were undertaken for clove, banana, pineapple and coffee. Among the cost components, labour cost was maximum

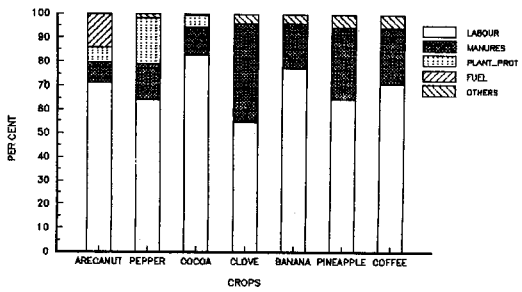

Fig. 2. Cost composition of different crops in Areca based HDMSCS at Vittal.

in all the crops. About 71 per cent of the production cost in arecanut was towards labour. This was followed by the cost of fuel (15 per cent), manures and fertilizers (8 per cent) and plant protection (6 per cent). In pepper about 19 per cent of the production cost was towards plant protection chemicals to control wilt disease, followed by manures and fertilizers (15 per cent). Cocoa had more than 80 per cent production cost towards labour. Cost of production of clove include labour and manures and fertilizers as main components contributing 55 and 44 per cent respectively. In banana, pineapple and coffee more than 2/3rd of the production cost was for labour.

The labour requirement for arecanut alone was 377.8 man days/ha/year. When mixed crops were grown, additional labour requirement ranged from 70 per cent when cocoa, pepper and clove were grown to 103 per cent when all the seven crops were in the field. Since majority of areca cultivation unlike in other plantation crops is done in homestead gardens, the additional employment generated through mixed cropping would provide employment to the farm family throughout the year. Nair and Bavappa

(1975) highlighted the tremendous potentialities of intercropping in arecanut and coconut plantations to generate additional employment opportunities for improving the quality of rural life. Muralidharan (1990) also reported increased employment opportunities with intercropping in areca gardens.

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