

ARECANUT BASED CROPPING SYSTEM IN MAIDAN PARTS OF KARNATAKA

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ABSTRACT

Two high density multispecies cropping models consisting of pepper, cocoa, coffee, mulberry and elephant foot yam (Model-I) and banana, betelvine, lemon, coffee and tapioca (Model-II) were laid out in a 20 year old arecanut plantation during 1983-84. It is observed from the results of initial eight years that arecanut yield has increased by about 7 to 20 per cent in the arecanut based cropping systems. The yield of intercrops has also continuously and progressively increased as the years passed. In terms of net returns at the eighth year of experimentation, the systems produced Rs. 1,71,734/ha in the first model and Rs. 1,47,062/ha in the second model compared to Rs. 1,35,594/ha and Rs. 1,40,612/ha in the arecanut monocrop respectively.

INTRODUCTION

Unlike in annuals, the potential for increasing the productivity per unit area of land, time and inputs through high density cropping is considerably higher in perennial crops (Bavappa and Jacob, 1982). Arecanut as sole crop does not utilize the natural resources of crop production, viz. the soil, space and the sunlight. Studies have revealed that orientation and structure of arecanut canopy permits about 40 per cent of photosynthetically active radiation to penetrate down and become available to the crops grown underneath (Balasimha, 1989). Studies on rooting pattern revealed that the arecanut palms planted at 2.7m x 2.7m spacing could use effectively only 30 per cent of land area (Bhat and Leela, 1969). Studies on the air space utilisation showed that the space occupied by other crops was higher (47%) than that occupied by arecanut (16%) (Bavappa *et al.*, 1986). Scientific investigations on different aspects of intercropping, mixed cropping and multiple cropping in arecanut based cropping systems have been carried out at Regional Station, Vittal and Research Centre, Hirehalli of CPCRI. It is observed that inter and mixed crops in arecanut garden are not detrimental to the main crop of arecanut and cocoa, pepper, banana, betelvine, elephant foot yam, ginger, turmeric and pineapple are the best suited inter and mixed crops in different regions (Anonymous, 1984). Field experiments conducted on arecanut based cropping systems at Hirehalli (Maidan part of Karnataka) and the results obtained are reported in this paper.

MATERIALS AND METHODS

Two arecanut based high density multispecies cropping models were laid out during 1983-84 in an arecanut plantation aged twenty years at the CPCRI Research Centre, Hirehalli. The first model consisted of arecanut, cocoa, pepper, coffee, mulberry and elephant foot yam in an area of 0.92 hectare and the second model consisted of arecanut, banana, betelvine, coffee, lemon and tapioca in an area of 0.89 hectare. Planting of the companion crops was done in July. After planting the different crops, irrigations were given during summer months. All the crops in the models were manured individually with the recommended levels of N, P and K. Data on yields of various crops were collected and the economics of different crop combinations were worked out considering the prevailing market price of individual crop.

RESULTS AND DISCUSSION

Arecanut based high density multispecies cropping system - Model I

When arecanut yield in the monocrop and intercropping system was compared, it was found that there was about five per cent increase in yield in the intercropping system. The increase in yield of arecanut appeared to be by and large due to the complimentary nature of various crops in the system and recycling of organic matter contributing 50% N and 50% K (Bavappa *et al.* 1986). Elephant foot yam was

grown successfully in the initial period of two years. It had yielded 3850 and 5166 kg/ha in the years 1984-85 and 1985-86 respectively. It was removed from the system during 1985-86 as the canopy of perennial crops covered most of the land area available for this crop.

Mulberry had yielded 8744 and 6574 kg mulberry leaves per hectare in the second and third year of its planting and it was reduced to 3351 kg/ha in the fourth year. It was observed that the roots of mulberry crop had grown very luxuriantly and intermingled with the roots of main crop of arecanut and other crops, as a result of which the yield of arecanut was reduced by 11-13%. Hence, during 1987-88 mulberry crop was also removed from the system.

Coffee was also grown from 1986-87 to 1989-90 under the canopy of arecanut, but it was removed during 1989-90 as it was not economical. There was a progressive increase continuously in the yield of cocoa and pepper. During the 8th year of planting, the yield of cocoa (pods) and pepper (dry) was 4755 kg/ha and 986 kg/ha respectively.

Economics : The gross income was computed taking into account the price of marketable produce of different crops. There was a steady increase in the gross income of arecanut and other crops every year and it reached Rs. 2,03,700/ha at the 8th year of experimentation (Table 1). The additional income derived from other crops was Rs. 39,090/ha and the major share was from pepper (Rs. 29,580/ha).

The gross income on unit area basis progressively increased from Rs. 47,394/ha to Rs. 1,48,335/ha in the monocrop of arecanut and Rs. 56,417/ha to Rs. 2,03,700/ha in the multispecies cropping system. The same trend was seen in the system where pepper and cocoa were grown in the arecanut garden. The cost of cultivation of the system had increased progressively from Rs. 19,048/ha to Rs. 31,966/ha due to increase in the labour wages and cost of inputs (Table I).

Arecanut based high density multispecies cropping system - Model II

About five per cent increased yield of arecanut in Model II was noticed when compared to monocrop of arecanut (control). The arecanut yield increase again appeared to be due to the cropping system adopted and the organic matter recycling which contributed 50% nitrogen and equal amount of potash (Bavappa *et al.* 1986).

Tapioca was removed immediately after one year (1986). Coffee was found to be not economical and was removed from the system during 1990. There was a steady increase every year in the yield of betel leaves, banana and lemon. Highest yield of betel leaves (685,800 No./ha), banana (2761 kg/ha) and lemon (890 kg/ha) was obtained after eighth year of planting (1991-92).

Economics : There was a steady increase in the gross income of arecanut monocrop as

Table I High density multispecies cropping system - Model I
Economics of arecanut monocrop and arecanut with other crops* (Rs./ha)

Year	Arecanut monocrop			Arecanut with other crops*		
	Gross income	Cost of cultivation	Net income	Gross income	Cost of cultivation	Net income
1984-85	47394	3745	43649	56417	19048	37369
1985-86	73950	4149	69801	81128	17714	63614
1986-87	73800	4916	68884	79838	15664	64174
1987-88	76190	6792	69398	103999	18528	85471
1988-89	126900	11355	115545	164665	29048	135617
1989-90	110460	9115	101345	158296	20886	137410
1990-91	153732	16580	137152	201216	34298	166918
1991-92	148335	12741	135594	203700	31966	171734

* Other crops are elephant foot yam, mulberry, cocoa, pepper and coffee

Table II. High Density multispecies cropping system - Model II
Economics of arecanut monocrop and arecanut with other crops* (Rs./ha)

Year	Arecanut monocrop			Arecanut with other crops*		
	Gross income	Cost of cultivation	Net income	Gross income	Cost of cultivation	Net income
1984-85	47394	5730	41664	45011	14829	30182
1985-86	73950	4852	69098	86305	14760	71545
1986-87	73800	5758	68042	94137	14672	79465
1987-88	76190	5648	70542	95970	19049	76921
1988-89	126900	7125	119775	155808	21066	134742
1989-90	86100	9092	77008	109259	22558	86701
1990-91	151110	13962	137148	173054	27873	145181
1991-92	155031	14419	140612	176757	29695	147062

* Other crops are betelvine, lemon, banana, coffee and tapioca

well as in the other crop combinations. The highest gross income of Rs. 1,76,757/ha was obtained in the 8th year of planting (Table II). The additional income derived from other crops was Rs. 15,402/ha and the major share was from banana (Rs. 6,902/ha) and betel leaves (Rs. 6,720/ha). The cost of cultivation for arecanut and other crops was progressively increasing from Rs. 14,829/ha to 29695/ha due to increased cost of labour and other inputs every year. The net income in the monocrop of arecanut increased from Rs. 41,664/ha in the year 1984-85 to Rs. 140,612/ha in 1991-92 (Table II). This increased income is not only due to increased yield of different crops but also due to increased cost of produce.

From the results, it is evident that growing either cocoa and pepper or banana, betelvine and lemon in the interspace of arecanut garden is profitable. A net income of Rs. 1,71,734/ha and Rs. 1,47,062/ha could be obtained by adopting the high density multispecies cropping system.

The increase in yield and income/unit area by the High Density Multispecies Cropping Systems may be attributed to the cropping systems adopted, efficient recycling of the organic matter and build up of nutrients. From the study,

it can be concluded that there is vast scope to increase the yield and monetary returns from areca garden by proper selection of inter/mixed crops.

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DISCUSSION

N. PALANI : How can the increase in arecanut yield in the first year for intercropping system be attributed to organic matter recycling?

M. SANNAMARAPPA : All the associated crops were manured separately with the recommended levels of NPK, and there was leaf fall from cocoa as well as pepper. Probably this has indirectly helped to get more yield in arecanut in the intercropping system.

P.R.V. SUBRAMANIA IYER : In any intercropping, you will try to select those crops which give the best combination of maximum dry matter with maximum price advantage. What is your conclusion from your experiment based on this?

M. SANNAMARAPPA : We have not studied the dry matter production in different intercrops, but recorded only the yield aspects of different crops to select suitable intercrops for arecanut garden and our aim is to get more production and income.

A.K. SADANANDAN : The yield of pepper per vine is very low. Is it because of cocoa and if so, the effective harvesting of pepper may be from 1¹/₂ to 2 m above the ground.

M. SANNAMARAPPA : Yield of 990 kg/ha is not a very low in the intercropping system.