VI. MIXED CROPPING IN ARECANUT

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Mixed cropping in arecanut gardens had been in vogue even in early times. Watt (1893) reported that in Mysore (Karnataka), coconut, citrus, jack, and other trees were interplanted with areca. He further reported that in Kolaba, arecanut was planted in coconut plantations. Nambiar (1969) stated that the practice of growing other crops in arecanut gardens was fairly universal. However, scientific efforts in this area received adequate attention only recently.

With a view to spotting out compatible perennial crops for growing as mixed crops with arecanut, a number of field experiments were initiated at the CPCRI, Regional Station, Vittal and Research Centres, Palode and Kannara. An exploratory trial garden was planted at Vittal in 1964 with arecanut seedlings (18 months old) and cacao (variety Criollo) seedlings (9 months old) under three systems: (*i*) arecanut and cacao at 50:50; (*ii*) arecanut as pure crop; and (*iii*) cacao

Table 23. *Flowering and yield—Arerca and cacao mixed garden during the first five years (Bhat, 1978a)*

Year	Treatment	Cacao	Areca		
		No. of pods/tree.	Palms flowered %	No. of nuts/palm	Weight (kg) of nuts/palm
1965–66	1	..	..	..	..
	2	..	..	..	..
	3	..	..	..	..
1966–67	1	10.6	..	..	..
	2	..	..	..	..
	3	..	..	..	..
1967–68	1	21.8	52.8	..	..
	2	..	44.6	..	..
	3	4.6	37.6	..	..
1968–69	1	23.2	88.9	..	..
	2	..	82.1	..	..
	3	4.9	75.0	..	..
1969–70	1	81.7	100.0	95.5	3.4
	2	..	100.0	42.7	1.6
	3	30.9	100.0	28.7	1.2

Treatment
1—Areca and cacao (50:50)
2—Pure plantation of areca
3—Cacao as a border crop in areca garden.

Table 24. *Yield of areca and cacao mixed garden during the second five years (Bhat, 1978a)*

Year	Treatment	Cacao	Areca	
		No. of pods/tree	No. of nuts/palm	Weight (kg) of nuts/palm
1970–71	1	63.5	225.2	7.7
	2	..	169.5	6.8
	3	35.6	125.4	4.4
1971–72	1	49.9	321.8	12.2
	2	..	169.3	6.8
	3	17.0	232.9	8.0
1972–73	1	76.8	391.1	13.3
	2	..	210.0	7.5
	3	21.7	242.1	8.3
1973–74	1	107.0	230.0	8.4
	2	..	130.0	8.4
	3	40.0	124.0	4.3
1974–75	1	95.0	313.5	11.4
	2	..	269.9	10.0
	3	40.8	267.2	9.3

Treatment: 1—Areca and cacao (50:50)
2—Pure plantation of areca
3—Cacao as a border crop in areca garden

along the borders of the arecanut garden. They were planted in quincunx method adopting a spacing of 4×4m. In the first system, the cacao seedlings occupied the centre of the square (4×4m). Both the arecanut palms and the cacao trees were manured with 100 g N, 40 g P_2O_5 and 140 g K_2O/ plant. They were also irrigated during the dry months from December—May every year. Based on the observations made during the initial four year period, Bhat and Leela (1968) reported that cacao was likely to go well with areca as a mixed crop considering the early bearing of cacao under the conditions prevailing in arecanut gardens. After a period of another four years, Bhat and Bavappa (1972) observed that the cacao trees commenced flowering 14 months after planting, and the first crop of mature fruits was harvested 13 months later. Bhat (1978*b*) summarised the performance of both cacao and areca at the end of 10 year plantation life. He stated that the arecanut palms commenced flowering three years after planting and that they had attained the normal bearing stage in the sixth year after planting, whereas the cacao trees attained the normal bearing age in five years after planting (Table 23 and 24). The mean yield per palm of areca in the mixed cropped plots (arecanut and cacao 50:50) was higher than that in the monocrop of areca. The cacao planted as border crop suffered from sun scorch. Based on the market prices between 1973–1975, the gross income from the arecacacao mixed cropping was 18,949

per ha compared to Rs. 13,083/ha per annum from the pure plantation of areca (Table 25).

Another mixed cropping experiment is in progress since 1969 at CPCRI Research Centre, Kannara under irrigated condition and at Palode under rainfed condition using a $2\times2\times6\times2$ split plot design to compare two methods of alignment, two levels of manuring and six hybrid progeny of cacao. At Kannara during the first six years of observation, the quincunx method of planting (4×4m) cacao with arecanut was found to be better than alternate rows of cacao with arecanut. Similarly the number of pods per tree was significantly higher at higher level (200 g N, 80 g P_2O_5 and 280 g K_2O/ tree/year) of manuring with a mean of 20 pods per tree as against 16 pods per tree at lower level (100 g N, 40 g P_2O_5 and 140 g K_2O/tree/year) of manuring (Anonymous, 1976). At Palode, under rainfed conditions the performance of cacao was poor, probably because of the high exposure and lack of adequate moisture in the soil during the hot weather period.

A spacing *cum* manurial experiment, laid out in a $6\times2\times4$ confounded asymmetrical factorial design, is running at Vittal since 1970. It has six spacing combinations for the two crops and two levels of manuring under comparison (Anonymous, 1971; Bhat, 1978*a*). The spacing combinations are: (1) both areca and cacao spaced at 2.7×2.7m; (2) areca spaced at 2.7×2.7m and cacao at 2.7×5.4m; (3) areca spaced at 2.7×2.7m and cacao at 5.4×5.4m; (4) areca and cacao spaced at 3.9×3.9m in the quincunx method; (5) areca and cacao spaced at 3.3×3.3m in the quincunx method and (6) areca at 1.8×5.4m and cacao at 3.6×5.4m. The manurial treatments are, (1) both areca and cacao fertilised at 100g N, 40g P_2O_5, and 140g K_2O per tree per year and(2) areca at 100g N, 40g P_2O_5 and

Table 25. *Yield and gross income from the mixed garden (areca and cacao)/pure garden (Areca)—(Based on mean yields during the five year period, 1970–'75).*

Particulars	Yield in the mixed garden (Treatment 1)		Yield in the pure plantation (Treatment 2)
	Cacao	Areca	Areca
No. of fruits per tree	78	296	187
No. of trees per ha (4×4m)	625	625	1250
Estimated no. of fruits ('000)/ha/year	49	185	134
Estimated dry weight (kg) of cacao beans or arecanut kernel/ha/year	1225	1482	1869
Estimated value of produce/ha/year (Rs)	8575*	10,374**	—
Gross income (Rs)	18,949		13,083

*Cacao at Rs 7.00/kg.
**Areca at Rs 7.00/kg.

140g K_2O and cacao at 200g N, 80g P_2O_5 and 280g K_2O per tree. Both the areca palms and the cacao trees have not reached the stabilised bearing stage. During the sixth year after planting, the yield of cacao pods per tree was the highest in 5.4×5.4m spacing and the lowest in 2.7×2.7m spacing. The yield per unit area was the highest in 3.3×3.3m spacing, with 5600 kg wet beans per ha, the population of cacao plants being 918/ha (Bhat, 1978; Anonymous, 1979).

The performance of cacao, so far as a mixed crop in the arecanut plantation, show that it is a highly compatible and remunerative mixed crop with arecanut.

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