

## INTERCROPPING OF IRRIGATED BANANA (*MUSA AAB NENDRAN*) WITH TAPIOCA, GROUNDNUT AND VEGETABLES

Intercropping as well as high density planting are two vistas of crop production for maximising productivity from unit area and for achieving higher resource use efficiency. Bhat (1978) pointed out the prospects of intercropping tapioca with pulses and groundnut. The present experiment was laid out at the Agricultural Research Station, Mannuthy in order to find out the feasibility of intercropping Nendran banana with tapioca either alone or in combination with vegetables, pulses and oil seeds during 1979-80, 1980-81 and 1983-84.

The experiments were conducted in randomised block design with three replications, each plot of 64 m<sup>2</sup> containing sixteen banana plants. The seven treatments tested were:

- T1 Tapioca alone
- T2 Banana alone
- T3 Banana + tapioca
- T4 Banana + tapioca + groundnut (along with tapioca in initial phase)
- T5 Banana + tapioca + cowpea (along with tapioca in initial phase)
- T6 Banana + tapioca + bittergourd (along with tapioca in advanced phase)
- T7 Banana + tapioca + cowpea (along with tapioca in the advanced phase)

Tapioca was planted on ridges between two adjacent lines of banana; groundnut, cowpea and bittergourd were planted on either side of the ridges of tapioca according to treatments. The varieties used for the trial were M<sub>4</sub>, a popular non-branching type of tapioca, TMV-2, a bunch type of groundnut, Kanakamany, a dual purpose cowpea and a local type of bittergourd.

The cultural and manurial practices recommended for banana and intercrops were followed (KAU, 1982). The groundnut and cowpea were harvested 120 and 90 days after planting, respectively. Tapioca was harvested nine months after planting. The important observations recorded in banana were height and girth of pseudostem and number of functional leaves at late vegetative phase, height of pseudostem at harvest, length and weight of bunch, number of hands and number of fingers per bunch. Observations recorded in respect of tapioca were plant height at harvest, length of internodes and number and weight of tubers per plant. In groundnut, dry weight of pods and in cowpea green pod weight were recorded.

The observations recorded at the late vegetative phase of banana especially height and girth of pseudostem and number of functional leaves revealed no significant difference due to intercropping (Table 1). The bunch characters like length and weight, number of hands per bunch, number of fingers per bunch and yield per plot were also not influenced by intercrops (Table 1). Chundawat *et al.* (1984) observed no yield reduction or delay in harvesting by intercropping in banana. Ashokan (1986) also found that height of pseudostem, leaf area, number of hands and fingers and weight of bunch were not influenced by cassava and floor crops like cowpea and groundnut. Intercropping also did not have any favourable effect on the yield of banana. However, the weed growth in intercropped banana was very much suppressed. This observation was supported by the reports of Chundawat *et al.* (1984). As per the reports of Simmonds (1966) and Arunachalam *et al.* (1976) the yield of banana is a combined effect of factors like number of hands, number of fingers and girth and weight of fingers. In the present investigation, since none of these vegetative or bunch characters was influenced by intercropping, the yield was also not affected favourably or adversely.

Table 1. Effect of intercrops on growth characteristics of banana at late vegetative phase, bunch characters and yield of banana

Tr. No.	Growth characters at late vegetative phase			Bunch characters				Yield, kg ha <sup>1</sup>
	Height, cm	Girth, cm	No. of functional leaves	Length, cm	Weight, kg	No. of hands	No. of fingers	
T1	-	-	-	-	-	-	-	-
T2	171	42	13.3	31.7	6.10	4.6	37.6	15250
T3	175	38	12.5	30.3	6.23	4.5	37.0	15575
T4	199	45	13.2	32.0	6.44	4.6	38.1	16100
T5	200	47	12.1	28.5	6.24	4.3	38.2	15600
T6	179	42	13.3	30.5	6.64	4.6	39.0	16600
T7	192	42	12.4	30.5	6.63	4.6	36.7	16575

F test not significant

Table 2. Effect of intercropping on growth characteristics and yield of tapioca

Tr. No	Plant height, cm	Internode length, cm	No. of tubers/plant	Yield/plant, kg	Yield, kg ha <sup>1</sup>
T1	3.68	1.90	8.78	3.84	12968
T2	-	-	-	-	-
T3	4.13	2.54	7.22	3.63	11667
T4	4.44	2.85	8.00	3.26	10938
T5	4.30	2.58	7.89	3.61	11980
T6	4.31	2.69	7.16	3.69	13230
T7	4.45	2.71	8.95	3.63	12448
SEM±	0.08	0.19	0.43	0.29	501.56
CD (0.05)	0.25	0.59	NS	NS	NS

Height and internodal length of tapioca were significantly higher when intercropped in banana as against pure crop. This observation was also reported by Ashokan (1986). However, when groundnut, cowpea or bittergourd were grown as intercrops on the ridges of tapioca, they could not influence these characters. Number and weight of tubers

per plant and yield per plot were not influenced by banana or other intercrops tried (Table 2).

Cowpea and groundnut planted on the ridges of tapioca in the initial phase of growth gave reasonable yield, but bittergourd and cowpea planted on the ridges of tapioca in the

Table 3. Benefit cost analysis of intercrops in banana var. Nendran

Tr. No.	Yield, kg ha <sup>-1</sup>			Addl. cost incurred (Rs ha <sup>-1</sup> )	Addl. income (Rs ha <sup>-1</sup> )	Benefit cost ratio
	Tapioca	Cow pea (green pods)	Groundnut (dry pods)			
T1	-	-	-	-	-	-
T2	-	-	-	-	-	-
T3	9740	-	-	5000	7305	1.46
T4	8960	-	313	7000	7659	1.09
T5	9390	600	-	7000	8242	1.18

In T6 and T7 bittergourd and cowpea did not come up

advanced phase did not come up due to the complete shade of grown up banana and tapioca. When cost benefit ratio was analysed for different intercrops (Table 3) the highest value of 1.46 was obtained for intercropping tapioca alone with banana. On an overall analysis it was found that intercropping tapioca in irrigated banana produced 30.65% increase in

profit, whereas in other two treatments namely banana + tapioca + groundnut and banana + tapioca + cowpea it was 29.85% and 21.32%, respectively. This indicates that the returns from cowpea and groundnut are not high enough to compensate the extra cost incurred on the fertilizers, planting materials and labour for these two crops.

Kerala Agricultural University  
Vellanikkara 680 654, India

K. P. Prasanna, M. L. T. Kanakam any  
Tessy Joseph, V. K. Sasidhar

## REFERENCES

- Arunachalam, A., Ramaswamy, N. and Muthukrishnan, C.R. 1976. Studies on the nutrient concentration in leaf tissue and fruit yield with nitrogen levels for cavendish clones. *Progr. Hort.* 8(2) : 13-22
- Ashokan, P.K. 1986. Production potential of cassava based cropping systems. Ph.D. (Ag) thesis, Kerala Agricultural University, Trichur, Kerala
- Bhat, H. R. K. 1978. Intercropping tapioca with pulses and groundnut. M.Sc. (Ag) thesis, Kerala Agricultural University, Trichur, Kerala
- Chundawat, B.S., Joshi, H.H. and Patel, N.L. 1984. Studies on intercropping in Basrai bananas. *South Indian Hort.* 32 (1) : 23-25
- KAU, 1982. *Package of Practices Recommendations*. Kerala Agricultural University, Trichur, Kerala
- Simmonds, N.W. 1966. *Bananas*. 2nd ed., Longman, London, p. 33-37