

COMPARATIVE PERFORMANCE OF BANANA (*MUSA AAB* CV. NENDRAN) AT DIFFERENT PLANTING INTENSITIES

High density planting systems are in practice mainly in fruit crops. Among the tropical fruits, high density orcharding of has been reported in pineapple by Balakrishnan *et al.* (1981) and in mango by Pandey and Singh (1993). In banana cv. Robusta, a study by Venero and Marquez (1979) showed that cumulative yields of Robusta banana were higher when planted to the tune of 1667 to 2315 plants per hectare than that planted at conventional densities of 625-1250 plants per ha.

To evaluate the performance of Nendran banana under high density planting, a study was undertaken during 1991-92 and 1992-93 at the Banana Research Station, Kannara. The technical programme included eight treatments replicated thrice. Treatments consisted of different closer spacings in different methods of planting (Table 1) than the normal spacing (2x2 m) as recommended by the Kerala Agricultural University. The plot size for each treatment was 42 m². Observations on the growth and yield parameters viz., plant height, pseudostem girth, leaf number, days to shooting and bunch weight were recorded from 3 months after planting up to harvest.

Different spacings adopted did not show any significant differences in the plant characters like height, pseudostem girth and leaf number in the third and fifth month growth stage. This may be due to the fact that competition was not severe during the early stages of growth of the plant. But at shooting stage, significant difference was noticed in plant height (Table 2). Plants at the highest density (T4) with the spacing of 1.2 x 1.5 m were the tallest with a height of 3.83 m at shooting stage whereas in control (with the lowest density of 2x2 m spacing) the plant height was 3.26 m only. Pseudostem girth and leaf number did not show any significant difference between the treatments at this stage.

Research findings have shown that more than half the number of total suckers produced by a plant are produced around flowering of the mother plant. The number of suckers produced

per plant was recorded at shooting stage. The results showed that a maximum number of seven suckers were produced per plant in the treatment of lowest density (T8) and its production/number decreased with an increase in density reaching the lowest value of two in the highest density treatment. This may be due to the poor light infiltration into the ground in densely populated treatment or due to competition for nutrients. Similar trend was noticed in weed growth also. The growth of weeds was maximum in the lowest density where there was sufficient interspace between plants receiving a good amount of sunlight. The minimum weed growth was found in highest density.

Table 1. Different spacings adopted and the population per hectare

Treatments	Spacings, m	Population ha ⁻¹
T1	1.8 x 1.8	3086
T2	1.5 x 1.5	4444
T3	1.2 x 1.8	4630
T4	1.2 x 1.5	5555
T5	1.2 x 1.2 x 2	5208
T6	1.2 x 1.5 x 2	4762
T7	1 x 2 x 3	4000
T8	2 x 2	2500

Spacing had influenced the days to shooting and consequently duration of the crop. Days to shooting was significantly delayed by reduction in spacing. Plants in the highest density plot took more time (271 days) for shooting as compared to plants grown under normal spacing (233 days). Duration of the crop also increased from 320 to 357 days with increase in plant density. It was clearly observed that plants in wider spacing shooted and matured earlier than in closer ones. Due to the competition between plants in closer planting system, the plants took more number of days for the growth, development and matu

Table 2. Effect of spacing on growth and development of Nendran banana

Spacings, m	Plant characters at shooting						
	Plant height, m	Pseudostem girth, cm	Leaf No. per plant	No. of suckers produced	Weed growth, g m ²	Days to shooting	Duration, days
1.8 x 1.8	3.29	61.50	13.02	5.03	308.33	237.08	324.51
1.5 x 1.5	3.42	61.89	13.14	4.68	256.67	252.56	339.57
1.2 x 1.8	3.46	62.45	13.42	4.04	221.67	256.08	342.59
1.2 x 1.5	3.83	62.90	13.37	2.14	102.00	271.27	356.57
1.2 x 1.2 x 2	3.59	61.56	12.76	3.23	119.33	265.08	349.20
1.2 x 1.5 x 2	3.49	61.96	13.61	3.73	131.67	259.20	345.50
1 x 2 x 3	3.44	62.75	13.12	5.22	205.00	248.68	337.26
2 x 2	3.26	64.44	13.58	7.04	410.00	233.82	320.39
CD (0.05)	0.02	NS	NS	0.479	88.38	6.11	10.66

Table 3. Effect of spacings on yield and yield attributes of Nendran bananas

Spacings, m	Average bunch wt, kg	No. of hands	No. of fingers	Damage by wind, %	Yield t ha ¹
1.8 x 1.8	10.71	5.24	51.70	5.2	29.32
1.5 x 1.5	9.08	4.76	47.81	7.1	37.27
1.2 x 1.8	9.24	5.04	47.66	6.8	39.17
1.2 x 1.5	7.26	4.97	46.19	15.7	31.79
1.2 x 1.2 x 2	8.46	5.11	47.29	9.1	38.85
1.2 x 1.5 x 2	10.06	5.00	49.13	10.0	42.56
1 x 2 x 3	9.47	4.97	49.35	7.7	34.18
2 x 2	11.38	5.51	56.28	0	26.40
CD (0.05)	1.05	0.32	4.61	-	-

riety of bunches than the plants under wider spacing. Similar results were obtained by Badshah *et al.* (1993) in Jahaji (AAA) banana. With regard to yield (Table 3), the heaviest bunch weight of 11.38 kg was produced in widely spaced treatment (T8). Due to competition for the nutrients, light and water between plants in closer planting, the mean bunch

weight was the lowest in densely populated treatment (7.26 kg). The number of hands and fingers per bunch were significantly more in widely spaced control plot. Rajeevan and Geetha (1989) also observed a reduction in the yield characters in high density planting of Robusta banana. In the high density planting system, more number of plants are accommo-

dated in a unit area. Greater damage due to wind was noticed in high density treatments due to the increased height of the plant. After accounting for these losses, the yield per hectare was calculated in each treatment. The highest yield of 42.56 t ha⁻¹ was obtained in the treatment with the spacing of 1.2x1.5 x 2 m (T6) accommodating 4762 plants per ha, as against 26.4 t ha⁻¹ in normal recommended planting method. Even though the per hectare

population was maximum in T4 followed by T5, the highest yield was obtained in T6 indicating that it is the optimum population per ha for getting maximum yield.

The authors are thankful to the Indian Council of Agricultural Research, New Delhi for providing financial assistance to conduct the experiment.

Banana Research Station,
Kannara 680 652, Trichur, India

K. Krishnakumary, T. C. Radhakrishnan,
S. Estellita, K. A. Mercy

REFERENCES

- Badshah, O. A., Chakrabarty, B. K., Neog, M. and Baruah, K. 1993. Phyllochron and crop duration of 'Jahaji' (AAA) banana as influenced by plant density. *Golden Jubilee Symposium on Horticultural Research - Changing Scenario, Abstracts*. Horticultural Society of India, New Delhi, 170-171
- Balakrishnan, S., Nayar, N. K., Mathew, V. and Gopalakrishnan, T. R. 1981. Studies on crop population density in pineapple var. 'Kew' (*Ananas comosus* Marr.). *Agric. Res. J. Kerala* 19(2) : 5-9
- Pandey, S. N. and Singh, O. P. 1993. High density orcharding in mango. *Golden Jubilee Symposium on Horticultural Research - Changing Scenario, Abstracts*. Horticultural Society of India, New Delhi, p. 164
- Rajeevan, P. K. and Geetha, C. K. 1989. Comparative performance of banana cv. Robusta at two planting intensities. *S. Indian Hort.* 37(1) : 44-47
- Venero, R. and Marquez, O. 1979. Study of plant spacing in banana cv. Cavendish Robusta. *Cultivos Trópicos*. 1(3) : 127-137