

SPACING TRIAL IN ARECANUT

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INTRODUCTION

Spacing influences the growth, yield and yield components of crops. In arecanut plantations the spacing adopted in different tracts varied from 1.25×1.25 m to 3.6×3.6 m (Nambiar, 1949). Since the plants compete for nutrients, sun light, moisture and aeration, it is necessary to find out the fair combination between the spacing and plant densities to obtain maximum yield under different agroclimatic conditions. With this objective, experiments were conducted at different arecanut growing regions, namely, Vittal (South Kanara), Hirehalli (Maidan part of Karnataka), Peechi (Central Kerala) and Kahikuchi (Assam) during 1958 to 1978.

Optimum spacing in the nursery

A number of nursery trials were carried out at the Central and Regional Stations between 1959-60 and 1961-62 to find out the optimum spacing in the nursery. In all these centres, four spacing viz., (i) 22.9×22.9 cm ($9'' \times 9''$), (ii) 30.5×30.5 cm ($12'' \times 12''$), (iii) 38.1×38.1 cm ($15'' \times 15''$) and (iv) 45.7×45.7 cm ($18'' \times 18''$) were tried. Bavappa and Mathew (1960) reported that spacing given in the nursery significantly influenced the growth of seedlings. Seedlings planted at wider spacing showed better shoot and root growth. A spacing of 35 to 45 cm was optimum for a growth period of one year in the nursery. Sowing unsprouted seednuts gave seedlings with significantly more height (57.4 cm) and girth (1.9 cm) than the sprouted seednuts at Vittal. Spacing did not have any significant

influence on the growth measurements examined. However, 30.5×30.5 cm spacing recorded increased height (55.8 cm) and number of leaves (3.7) as compared with other spacings (Anonymous, 1963a). Similar results were also obtained from the experiments laid out at Hirehalli and Peechi. At Kahikuchi it was observed that the plants resulting from sowing of unsprouted seednuts had significantly greater height (57.9 cm) and also in wider spacing of 38.1×38.1 cm and 45.7 cm plants had significantly greater height (58.2 cm and 58.1 cm) than the plants in other two narrow spacings (Anonymous, 1963b).

Bavappa and Mathew (1960) made a study of the root system of areca seedlings in the nursery stage and observed that the spacing of seedlings in the nursery markedly influenced root production. Root growth was poor in closely spaced seedlings.

Spacing Trials in the Field

Spacing experiments were started at Vittal in 1958, Peechi in 1960, Hirehalli in 1961, and at Kahikuchi in 1962. In all these centres six spacing treatments, viz. 1.8×1.8 m, 1.8×2.7 m, 1.8×3.6 m, 2.7×2.7 m, 2.7×3.6 m and 3.6×3.6 m were adopted.

Observations recorded for 14 years at Vittal are summarized (Bhat *et al.* 1972) in Table 1. They found that the various attributes like leaf fall, number of spadices produced per palm, percentage of leaf fall to spadices, number of

female flowers per palm and number of flowers set were highly influenced by the spacing adopted.

The number of leaves shed, spadices and female flowers produced, flower set and percentage of flower set/palm invariably increased with increase in spacing. Similar results were also obtained at Hirehalli, Peechi (CPCRI, 1971) and Kahikuchi (CPCRI, 1981) centres.

The cumulative yield data for Vittal (Bhat *et al.* 1972), Kahikuchi (CPCRI, 1979), Peechi (CPCRI, 1974) and Hirehalli are presented in Table 2. In all these trials the 2.7 × 2.7 m spacing had given significantly higher yields as compared

to other spacing treatments. However, at Hirehalli 1.8 × 3.6 m spacing also gave higher yields.

Incidence of Sun Scorch

Areca nut palms are susceptible to sun scorching when exposed to the south-western sun. In order to know whether alignment of planting can minimise such a damage, a trial with three spacings and two alignments of row was conducted at Vittal from 1960 to 1968. The spacings adopted were 2.4 × 2.4m in the square method; 2.7 × 2.7m in the square method and 3.6 × 3.6m in the quincunx method. The two alignments were north-south direction and spacing at an angle of 20° north-south. The observations recorded for five years showed that

Table 1. *Effect of spacing on the performance (leaf fall, spadices and female flower production) of areca palm (mean number/palm/year) at Vittal.*

Treatments (spacing)	Leaf fall	Spadices produced	Female flowers produced	Percentage of flower set
1.8 × 1.8	6.51	3.83	659.8	11.8
1.8 × 2.7	6.94	4.64	878.7	17.5
1.8 × 3.6	7.19	5.06	1025.8	19.4
2.7 × 2.7	5.53	6.01	1296.7	24.9
2.7 × 3.6	7.97	6.27	1289.0	27.7
3.6 × 3.6	7.78	6.14	1396.9	27.1
F test	--	--	--	--
CV (%)	2.96	11.67	11.08	--
CD (P=0.05)	0.30	0.94	182.2	--

Table 2. *Effect of spacing on cumulative yield of areca nut (kg chali/ha)*

Treatment (m)	Vittal	Hirehalli	Kahikuchi	Peechi
1.8 × 1.8	6290.8	3130.0	751.2	1749.4
1.8 × 2.7	8167.4	3705.0	1890.4	1766.1
1.8 × 3.6	7829.3	4132.5	1632.2	1710.4
2.7 × 2.7	10722.8	3867.5	1715.8	1867.9
2.7 × 3.6	8047.9	3592.5	1650.4	1641.8
3.6 × 3.6	6169.1	2417.5	1143.5	1448.9

7 years cumulative yield

there was no significant variation in the performance of palms among treatments. However, the palms planted at 3.6×3.6 m in quincunx method in the north-south direction showed lower incidence of sun-scorching (CPCRI

1972). In the field experiments conducted at Vittal, Hirehalli and Peechi, it was observed that the percentage of palms affected by sun scorching increased in wider spacings between palms (Table 3).

Table 3. Effect of spacing on the incidence of sun scorching on arecanut palms (%)

Treatment spacing (m)	Vittal	Hirehalli	Peechi
1.8 × 1.8	0.91	4.8	10.45
1.8 × 2.7	3.06	6.1	26.51
1.8 × 3.6	19.69	22.0	56.82
2.7 × 2.7	10.32	13.5	42.61
2.7 × 3.6	54.76	21.4	82.14
3.6 × 3.6	66.60	35.0	90.00

Root Distribution

Bhat and Leela (1969) found that 61 to 67 per cent of all roots and 51 to 55 per cent of fine roots are concentrated within 50 cm radius from the centre of the palm irrespective of the density of planting. In the next zone lying between 50 to 100 cm from the stem there was much variation in the concentration of roots depending on the density of planting. Trees spaced at 3.6×3.6 m had 22 per cent of all their roots and 27 per cent of fine roots within the second zone, whereas those spaced at 2.7×2.7 m had 27 per cent and 33 per cent respectively. Trees spaced at 1.8×1.8 m had still greater percentages of roots within this zone, the proportions being 39 and 45 per cent respectively. They also found that the roots may extend to a depth of 2.0 to 2.6 m below ground level. The maximum concentration of all roots (66 to 79%) and all the fine roots (72 to 76%) are within the first 50 cm layer of the feeding zone. The second layer 51 to 100 cm below ground level contains from 18.3 to 22.3 per cent of all roots and from 13 to 20 percent of fine roots. The strata below 100 cm contain only 2-12 per cent of all roots and 4-14 per cent of fine roots in different spacing treatments.

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