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Short communication

Spacing influences growth and productivity of less spreading and short duration oriental pickling melon (*Cucumis melo* var. *conomon* Mak.) cv. 'Saubhagya'

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Abstract

To optimize the spacing and planting geometry requirements of short duration and less spreading oriental pickling melon (*Cucumis melo* var. *conomon* Mak.) cv. 'Saubhagya', a field trial involving seven spacing treatments was undertaken at Mannuthy in the summer rice fallows for two consecutive seasons. The closest spacing of 1.0 x 0.30 m (trench method), accommodating 33,333 plants ha^{-1}, yielded 28.4 t ha^{-1}, which was 184% greater than the yield obtained for in the conventional pit planting method (2.0 x 1.5 m). Furthermore, average weight of fruits and productivity increased significantly when the trench-to-trench spacing was reduced from 2 to 1 m, implying a general favourable impact of closer trench/row spacing on the performance of less spreading oriental pickling melon cultivars, which are particularly suitable for the summer rice fallows of Kerala.

Key words: Cucumber, crop geometry, population density, summer rice fallows

Oriental pickling melon (*Cucumis melo* var. *conomon* Mak.) or *Kanivellari* is a unique vegetable of Kerala. The potential for high yields over short intervals (three months) and the low input requirements make this crop an ideal choice for the vegetable growers of the state. Moreover, the short duration and less spreading varieties (e.g., 'Saubhagya') occupy a special niche for summer rice fallow cultivation. The recommended crop husbandry practices for oriental pickling melon are, however, based on trials with the vigorously growing and spreading variety, 'Mudicode'; which may not perhaps be relevant for the short duration and less spreading varieties. Additionally, in 'Saubhagya', the fruits are borne on the lower nodes that make the conventional pit sowing method (45 cm^3) particularly unsuitable—as it would lead to fruit production in the pits that, in turn, may result in fruit decay—as fertilizers and irrigation water are applied to these pits. This necessitated an investigation to optimize the spacing and planting geometry requirements of the short duration and low spreading variety 'Saubhagya'.

The field experiment was conducted in the summer rice fallows of the Agricultural Research Station, Kerala Agricultural University, Mannuthy. The site (10° 32' N and 76°10' E at an altitude of 22.5 m) experiences a warm humid tropical climate. The soil of the experimental area was Ultisol with medium organic C (0.43 %) and available K levels (55 kg ha^{-1}), beside high contents of available P (15 kg ha^{-1}). Seeds were sown in shallow 30 cm wide trenches in six spacing treatments (2.0 x 0.30 m, 2.0 x 0.45 m, 1.5 x 0.30 m, 1.5 x 0.45 m, 1.0 x 0.30 m and 1.0 x 0.45 m) along with the recommended pit sowing practice (at 2.0 x 1.5 m with three plants per pit; KAU 1996). The corresponding population densities were 16666, 11111, 22222, 14814, 33333, 22222 and 9999 ha^{-1} respectively. The experiment was conducted for two seasons viz., December 2002 to February 2003 and February to April 2003 in a randomised block design with four replications (plot size 12 m^2), and following the general crop husbandry recommendations of KAU (1996). Observations on economic characters were compared using ANOVA followed by the Duncan's Multiple Range Test.

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Data presented in Table 1 clearly indicate that closer trench and plant spacing (1.0 x 0.30 m) exhibited greater vine lengths (117.7 cm at 30 days after sowing, DAS, and 174.2 cm at the final harvest) implying a greater plant spread at higher population densities, which is probably counter-intuitive. Nonetheless, Bach and Hruska (1981) reported similar findings for the cucumber crop. Furthermore, the closer spacing showed greater leaf area per plant (88.8 cm^2 at final harvest in the 1.0 x 0.3 m spacing treatment). However, branch production was not influenced by the spacing treatments (range: 2.0 to 2.9 at 30 DAS and 3.0 to 3.8 at the time of final harvest).

Like other oriental pickling melon varieties (e.g., 'Mudicode' and 'Arunima'), 'Saubhagya' also followed a sequential flowering pattern. Indeed, the first 4-6 flowering nodes produced staminate flowers and the pistillate flowers appeared subsequently on the secondary branches and laterals. The number of female flowers and fruit set percentage were also significantly influenced by the spacing treatments. Maximum female flowers and fruit set were recorded at 1.5 x 0.45 m. In particular, fruit set was 75.8% as against 48.0% in the conventional pit method. Coincidentally, the first harvest was modestly earlier in the 1.0 x 0.30 m spacing (45 days) than at 2.0 x 0.30 m (47 days) and the final harvest extended up to 57 days in the conventional pit method (wider spacing). This is generally in conformity with the reports of Arora and Mallik (1990) for ridge gourd. Additionally, female flower production was earlier in the intermediate spacings of 1.5 x 0.45 m and 1.0 x 0.45 m (Table 2), but male flower emergence was modestly delayed in the denser treatments (statistically not significant; hence data not presented).

Although length and girth of fruits were not significantly influenced by population density, average fruit weight increased at the closer trench spacing of 1.0 x 0.45 and 1.0 x 0.30 m (774.4 g and 682.5 g respectively). Fruit yield and number of fruits per plant were also greater at the highest density (1.0 x 0.30 m). This treatment had 33,333 plants ha^{-1} and yielded 28.4 t ha^{-1} (184% greater than that at the recommended pit spacing of 2.0 x 1.5 m). The next closer spacing (1.0 x 0.45 m or 22,222 plants ha^{-1}) produced the second highest yield of 25.8 t ha^{-1}. Higher yields at closer spacing are feasible as it accommodates more plants per unit area; in turn, producing more fruits, which is particularly relevant for a less spreading variety like 'Saubhagya'. Better vegetative growth and full coverage of the interspaces at closer spacing (Table 1) further underscores this point. Hafidh (2000) in summer squash and Paroussi and Saglam (2002) in pickling cucumber also reported similar findings. The most important result of this experiment, however, is the clear demonstration that the less spreading and short duration oriental pickling melon varieties grown in the summer rice fallows of Kerala should be planted in trenches at closer spacing 1.0 x 0.30 m) than in widely spaced pits, which has been found suitable for the spreading plant types.

Table 1. Effect of various spacing treatments on vegetative characters and flowering in oriental pickling melon 'Saubhagya'

Spacing (m)	Vine length (cm)		Leaf area per plant (cm^2)		No. of female flowers	Fruit set (%)
	30 DAS	Final harvest	30 DAS	Final harvest		
2.0 x 0.30	98.2^{b}	142.3^{bc}	68.8^{b}	76.7^{bc}	6.3^{bc}	58.4^{cd}
2.0 x 0.45	92.0^{c}	141.1^{c}	56.6^{c}	72.4^{c}	5.8^{c}	62.7^{d}
1.5 x 0.30	103.6^{ab}	160.8^{b}	71.9^{ab}	76.6^{bc}	6.2^{bc}	66.7^{c}
1.5 x 0.45	91.5^{c}	157.1^{b}	62.6^{bc}	76.8^{bc}	7.3^{a}	75.8^{a}
1.0 x 0.30	117.7^{a}	174.2^{a}	71.5^{ab}	88.8^{a}	6.3^{bc}	70.4^{b}
1.0 x 0.45	105.9^{ab}	169.4^{ab}	77.6^{a}	82.8^{ab}	6.4^{b}	70.8^{b}
2.0 x 1.50	89.3^{cd}	142.3^{bc}	55.8^{c}	72.5^{c}	6.4^{b}	48.5^{e}

DAS-days after sowing

Spacing 2.0x1.50 m is recommended as per KAU (1996) and it follows pit method while in all other treatments the planting is in trenches

Means followed by the same superscript do not differ significantly

Table 2. Effect of various spacing on earliness and yield characters in oriental pickling melon 'Saubhagya'

Spacing (m)	Days to			Average fruit weight (g)	Yield per plant (kg)	Productivity (t ha^{-1})
	Anthesis[1]	First harvest	Final harvest			
2.0 x 0.30	30.3^{a}	47.35^{a}	54.0^{bc}	594.6^{bc}	3.5^{bc}	14.23^{de}
2.0 x 0.45	30.5^{a}	46.6^{b}	54.8^{bc}	555.2^{bc}	3.2^{cd}	12.80^{ef}
1.5 x 0.30	30.4^{a}	47.3^{a}	56.0^{b}	602.9^{b}	3.8^{ab}	17.70^{d}
1.5 x 0.45	29.6^{c}	45.9^{c}	56.7^{a}	636.1^{ab}	4.5^{a}	18.90^{c}
1.0 x 0.30	30.6^{bc}	45.2^{c}	54.4^{c}	682.5^{a}	4.3^{a}	28.40^{a}
1.0 x 0.45	29.7^{c}	45.9^{bc}	55.4^{b}	774.1^{a}	4.3^{a}	25.80^{ab}
2.0 x 1.50	30.8^{a}	46.8^{ab}	57.1^{a}	602.0^{b}	2.6^{d}	10.00^{f}

Spacing 2.0x1.5 m is recommended as per KAU (1996) and it follows pit method while in all other treatments the planting is in trenches

Means followed by the same superscript do not differ significantly

[1] anthesis of first female flower

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