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Papaya characteristics under different spacing regimes

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ABSTRACT

Papaya is a popular tropical fruit in the Virgin Islands and is widely grown by small farmers. The use of space is extremely critical to small farmers in order to utilize their limited resources for maximum production. The objective of this research was to determine the spacing requirements for optimal production using selected papaya varieties ('Maradol', 'Tainung 5', 'Trini x Washington' and 'Yuen Nong 1') at three spacing regimes. The spacing applied were 3 m x 3 m, 3 m x 2 m and a staggered double row of 3 m x 1 m. Data was collected on the stem diameter, height to first flower, height to first fruit and fruit size. Plant spacing did not affect height to first flower or height to first fruit set. Fruit size was significantly influenced by plant spacing for varieties 'Maradol' and 'Yuen Nong 1'. The three plant spacing regimes did not affect stem diameter. Under these ideal conditions, plant spacing only has an effect on fruit size within certain papaya varieties.

Key words: Papaya, Spacing, Tropical fruit

INTRODUCTION

Papayas are grown throughout the tropical world. In Southeast Asia, the recommended planting distance is 3 m x 3 m (Yaacob, 1995). The crop farms in the U. S. Virgin Islands are mainly small farms. The average amount of land per crop farm is 4.7 acres (National Agricultural Statistics, 2000). Most small crop farmers produce a number of crops and it is difficult to allot a large area to one crop. Little research has been done in the Virgin Islands to determine optimal plant spacing of papaya.

MATERIALS AND METHODS

Four varieties were selected for this study: 'Maradol', Tainung 5', 'Trini x Washington' and 'Yuen Nong 1'. Seedlings were trasplanted to the field in three spacing arrangements: 3 m x 3 m; 3 m x 2 m; and a staggered double row 3 m x 1 m with 3 m between each set on double rows. There were eight rows per spacing regime that were divided into two row blocks. Each row had two plants of each variety. Guard rows of other papaya varieties were planted around the plot to negate border effects. The plants were irrigated and fertilized through drip irrigation, with 1 m spaced emitter. The plots were mulched with grass hay mulch when the plants were 1 m tall.

After one month of field establishment, the plants were thinned to one plant per hill. Data was recorded on height to first flower, height to first fruit and stem diameter at 1 m. The height to the first fruit and stem diameter were measured just prior to the first

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harvest. Average fruit weight was determined from ten fruits per plant as the fruits matured. ANOVA was conducted on all treatments and mean separation tests were conducted using LSD when the ANOVA was significant.

RESULTS AND DISCUSSION

Height to first flower. Data were collected when the plants were 1.5 m tall. The height to the first initiated flower was within 1 m of the soil surface for all papaya varieties (Table 1). There were no significant differences within a papaya variety for the height at which the first flower formed among tree spacing intervals. Height to first flower is influenced by maintaining good agricultural practices to ensure active growth and development. Papaya variety selection will also influence the height to first flower.

Table 1. The average height to the first flower and the first set fruit for four papaya varieties planted in three spacing regimes.

	Height to First Flower (cm)			Height to First Fruit (cm)		
Variety	3m x 3m	3m x 2m	3m x 1m	3m x 3m	3m x 2m	3m x 1m
Maradol	43.5a*	38.8a	45.0a	52.3a	47.7a	48.0a
Tainung 5	63.8a	61.6a	61.4a	82.7a	71.0a	74.4a
Trini x Wash 5	41.5a	43.2a	36.6a	53.8a	54.9a	58.8a
Yuen Nong 1	65.7a	78.2ab	87.3b	86.8a	82.4a	94.6a

*Differences among spacing intervals within variety followed by a different letter are significant at P=0.05 LSD.

Height to First Fruit. The height to the first fruit indicates where the fruit column begins. Usually this is a greater number than height to the first flower because often the first flowers initiated are sterile and don't set fruit. The average height at which the first flowers were set was significantly different for 'Yuen Nong 1' but not for the height for the first set fruit (Table 1).

Average Fruit Size. Fruit size is controlled by the genetics of a plant and its environment. Plant spacing had a significant effect on two papaya varieties, 'Maradol' and 'Yuen Nong 1' (Table 2). While the 3 m x 1 m double row spacing yielded significantly larger fruit for 'Maradol', the 3 m x 3 m plant spacing produced the largest fruit for 'Yuen Nong 1'. This difference can be explained by the fact that 'Maradol' is a short compact tree while 'Yuen Nong 1' is a standard sized papaya tree. The greater area the 'Yuen Nong' had to expand its leaves could have contributed to the fruit size. In Puerto Rico, Goenaga et al. (2001) evaluated five papaya cultivars in two locations and found fruit size to be cultivar dependent and varied between locations.

Table 2. The average fruit weight (kg) for four papaya varieties planted in three spacing regimes.

Variety	3m x 3m	3m x 2m	3m x 1m
Maradol	2.26a*	1.89b	2.11ab
Tainung 5	1.20a	0.95a	1.07a
Trini x Wash 5	0.87a	0.76a	0.80a
Yuen Nong 1	2.86b	2.16b	4.35a

*Differences among spacing intervals within variety followed by a different letter are significant at P=0.05 LSD.

Stem Diameter. The stem diameter was recorded at 1.0 m above the soil surface. Statistical analysis did not indicate differences among spacing within a variety. There was a trend indicating that a wider plant spacing gives rise to a larger stem diameter as indicated in Figure 1. The most compact variety, 'Maradol', had the thickest stem diameter averaging 47.2 cm.

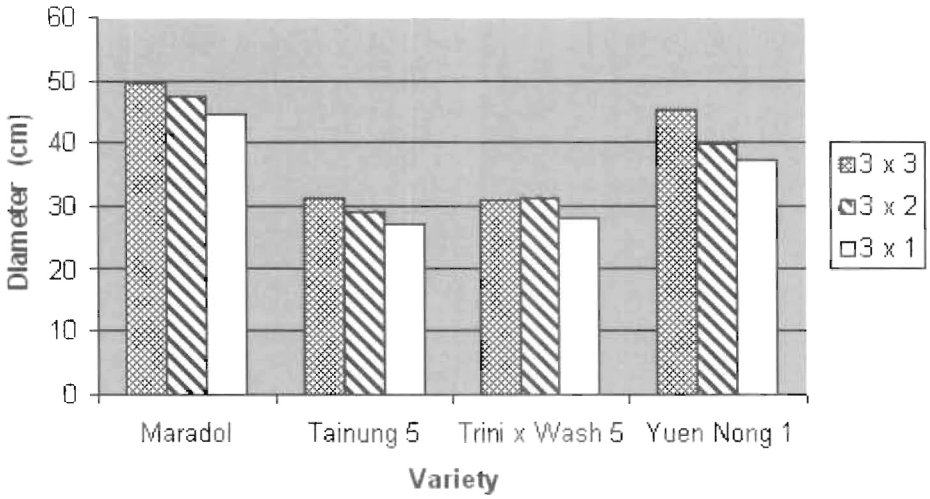

Figure 1. The average stem diameter recorded at 1 m above the soil surface.

CONCLUSIONS

Plant spacing did not influence the height to first flower, height to first fruit or stem diameter on any of the four papayas varieties evaluated. However, plant spacing did affect the fruit size on two varieties, 'Maradol' and 'Yuen Nong 1'. A double staggered row spaced at 3 m x 1 m is recommended.

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