

# EFFECT OF PLANTING DISTANCE ON THE PERFORMANCE OF GRAVIOLA (*Annona muricata* L.)

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## Abstract

Graviola/ Soursop is an evergreen tree species which bears the largest fruit in Annonaceae family, known for its anti-cancer and therapeutic properties, due to its annonaceous acetogenins content. An experiment entitled was laid out in a Randomized Block Design, replicated five times with five treatments viz., planting distance of 1 x 1m (T<sub>1</sub>), 2 x 2 m (T<sub>2</sub>), 3 x 3 m (T<sub>3</sub>), 4 x 4 m (T<sub>4</sub>) and 5 x 5 m (T<sub>5</sub>). The results of the experiment revealed that, among the various planting distance tried, 1 x 1m (T<sub>1</sub>) recorded the maximum value for the characters like plant height, number of leaves, leaf area, Fresh weight of leaves per plant, Dry weight of leaves per plant, Plant spreading (East-West) and Plant spreading (North-South) which was followed by the planting distance of 3 x 3 m (T<sub>3</sub>).

**Key words:** Graviola /Soursop, Planting distance

## Introduction

Graviola/ Soursop (*Annona muricata* L.) which belongs to Annonaceae family is an evergreen tree species known for its anti-cancer properties, thanks to its annonaceous acetogenins content. It is a native of Central America. It bears the largest fruit among Annonas. It is mostly distributed in tropical and subtropical regions of the world. Soursop leaf contains annonaceous acetogenins which exhibited significant inhibitory effects against six human cancer cell lines: lung, breast, colon, pancreatic, kidney carcinoma (Vieira *et al.*, 2010). It has also been found to contain compounds which were responsible for inhibiting uric acid formation in hyperuricemic induced lab wistar rat and it shows potential for developing medicine to cure gout (Sri-Wahjuni *et al.*, 2012). Soursop Leaves Crude Extract (AMCE) exhibited cytotoxicity toward

breast cancer cell lines and reduced the tumor's size and weight in lab mice. Thus it is a promising candidate for cancer treatment especially in breast cancer as an alternative to conventional drugs (Najmuddin *et al.*, 2016). Therefore, due to changing market demand, leaf production of soursop would be a lucrative business since the leaves contain annonaceous acetogenins. Moreover economic returns can be obtained in a short period of time since there is no need to wait for the plants to attain reproductive stage like in the case of fruit production. Owing to its immense medicinal properties, wide range of uses and its lucrative price, it would be of great national importance to popularize this plant among the growers. Hence, an experiment was conducted to study the effect of planting distance on the performance of graviola/soursop.

### Materials and Methods

An experiment was laid out in a Randomized Block Design, replicated five times with five treatments *viz.*, 1 x 1m spacing (T<sub>1</sub>), 2 x 2 m (T<sub>2</sub>), 3 x 3 m (T<sub>3</sub>), 4 x 4 m (T<sub>4</sub>) and 5 x 5 m (T<sub>5</sub>). The field was cleared of weeds. Planting pits at the size of 60 cm x 60 cm x 60 cm were dug at different spacing. 20 kg of FYM and recommended fertilizers (40 g N, 30 g P, and 60 g K) were applied in each pit. 6 months old seedlings were planted in the pits and watered. Watering was done regularly and plant protection measures were given as and when needed.

### Results and Discussion

The results on the seedling growth revealed that increase in plant height (96.12 cm), number of leaves (87.55), leaf area (69.68 cm<sup>2</sup>), fresh weight (1424.44 g) and dry weight of leaves (436.87 g) were observed in the treatment 1 x 1 m (T<sub>1</sub>) at 120 DAP. Whereas significantly least values for plant height (75.06 cm) , number of leaves( 70.51), leaf area (49.83 cm<sup>2</sup>), fresh weight (1059.06 g) and dry weight of leaves per plant (330.69g) were observed in 4 x 4 m (T<sub>4</sub>). At 120 DAP, T<sub>1</sub> (1 x 1 m) recorded maximum plant spreading (E-W) (37.16 cm) followed by T<sub>3</sub> (3 x 3 m) (35.50 cm) and 2 x 2 m (T<sub>2</sub>) (34.81 cm). Minimum value for plant spreading (E-W) was recorded in T<sub>4</sub> (4 x 4 m) (31.51 cm). T<sub>1</sub> (1 x 1 m) recorded maximum plant spreading (N-S) (45.76 cm) followed by T<sub>3</sub> (3 x 3 m) (36.89 cm) and 2 x 2 m (T<sub>2</sub>) (35.02 cm). Minimum value for plant spreading (N-S) was recorded in T<sub>4</sub> (4 x 4 m) (24.13 cm) (Table 1).

The superior results obtained in close planting of 1 x 1 m might be due to the fact that the suppression of weed growth in close planting is significantly higher than wider planting which results into utilization of more solar radiation, soil moisture by plant that leads to superior plant growth characteristics viz., plant height, number of leaves, biomass, etc. Close spacing responses highly to the availability of ample amount of macronutrients (NPK) due to lesser weed growth resulted in a better vegetative growth of the crop. The ultra density crop facilitate in maintaining the soil fertility status which leads to proper growth and development of crop with producing higher number of branches resulted into maximum number of leaves per plant, height and spread. Leaves as the site for photosynthesis accumulates more carbohydrates to further increase their numbers (Ughade and Mahadkar, 2015).

Talukder *et al.* (2003), Makinde and Macarthy (2006) opined that in nature the competition effect may be completely absent until population density reaches some threshold at which resources become limited . Further, increase in plant height in closer spacing might be due to competition for light because of insufficient space (Pandey *et al.*, 2015).

Since planting distance of 1 x 1 m produced superior plants in the field, it was chosen as optimum spacing for leaf production in graviola/ soursop. This improved growth might be due to the fact that the plants are at young stage. As the plants continue to grow and spread competition among the plants may hinder growth. So, the next best planting distance of 3 x 3 m or 2.5 x 2.5m may be recommended for long term graviola /soursop cultivation.

## References

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**Table 1. Effect of planting distance on the performance of soursop**

Treatments	Plant height (cm)	Number of leaves	Leaf area (cm <sup>2</sup> )	Fresh weight of leaves per plant (g)	Dry weight of leaves per plant (g)	Plant spreading (East-West) (cm)	Plant spreading (North-South) (cm)
T <sub>1</sub> - 1 x 1 m	96.12	87.55	69.68	1424.44	436.87	37.16	37.16
T <sub>2</sub> - 2 x 2 m	83.02	83.48	54.74	1308.97	404.04	34.81	30.17
T <sub>3</sub> - 3 x 3 m	83.50	86.17	57.02	1377.86	423.09	35.50	31.64
T <sub>4</sub> - 4 x 4 m	75.06	70.51	49.83	1059.06	330.69	31.51	22.84
T <sub>5</sub> - 5 x 5 m	79.15	77.26	51.55	1186.71	369.30	33.64	29.46
SED	0.16	0.31	0.21	11.69	3.38	0.16	0.18
CD (P=0.05)	0.34	0.67	0.45	24.78	7.16	0.35	0.38