Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

J P P Journal of Pharmacognosy and Phytochemistry

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2021; 10(1): 2136-2138
Received: 15-11-2020
Accepted: 19-12-2020

Harilalnaik TS
Department of Fruit Science, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Paramaguru P
a) Dean (Horticulture), Horticultural College and Research Institute for Women, Trichirapalli, Tamil Nadu, India
b) Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Pugalendhi L
Dean (Horticulture), Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Srinivasan S
a) Assistant Professor, (Crop Physiology), Regional Research Station Kavilangulam, Aruppukottai, Virudhunagar, Tamil Nadu, India
b) Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Corresponding Author:
Harilalnaik TS
Department of Fruit Science, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Effect of different varieties and spacing for increasing leaf production in Banana (*Musa* spp.)

Harilalnaik TS, Paramaguru P, Pugalendhi L and Srinivasan S

DOI: https://doi.org/10.22271/phyto.2021.v10.i1ad.13670

Abstract
The present investigation was carried out to evaluate the effect of different banana varieties and spacing for increasing leaf production of Banana (*Musa spp.)*, was carried at University Orchard, Department of Fruit Science, Horticulture College and Research Institute, Coimbatore during 2019-2020. The experiment was conducted by using four different banana varieties *viz.* Poovan (AAB), Karpooravalli (ABB), Monthan (ABB) and Chakkiya (ABB), planted with three different spacing *viz*. 1.5 m × 1.5 m. 1.8 m × 1.8 m. 2.1 m × 2.1 m. Consequences shown that among four banana varieties, Karpooravalli recorded significantly higher pseudostem height (335.91 cm), pseudostem girth (80.80 cm), leaf area **(**18155.71 cm^2**)**, number of leaves per mother plant (42.01) and number of leaves per sucker plant (25.60) than other varieties. Whereas, variety Chakkiya recorded the least number of days taken for shooting (267.47 days), when compared to others. Planting at wider plant spacing 2.1 m × 2.1 m resulted in significantly higher pseudostem girth (72.88 cm), leaf area (15559.96 cm^2), number of leaves per mother plant (38.77), number of leaves per sucker plant (22.03) and least number of days taken for shooting (278.10 days), as compared to other spacing. Whereas, the same variety planted under closer spacing of 1.8 m × 1.8 m has recorded maximum pseudostem height (312.70).

Keywords: banana, variety, spacing, growth, leaf production

Introduction
Banana belongs to the genus *Musa* of the family *Musaceae*, is a herbaceous perennial plant popularly known as "Kalpataru" is one of the traditional fruit of India, which is available throughout the year in almost all parts of the country. However, the fruit is well known for its rich source of vitamins, minerals, and carbohydrates which play a very important role in maintaining a healthy human diet in day to day life. Banana fruit is consumed as a fourth most important food crop in the world after rice, wheat and maize (Salvador *et al* 2007) [9]. Apart from the habit of consuming banana as fruit, leaf production has become popular due to its rising demand for quality leaves all over the country. Especially in Southern states like Tamil Nadu, Kerala and Karnataka has increasing day by day. Since serving the food on banana leaves is considered as most religious and auspicious practice and mostly followed in southern states. However, the supply of quality leaves with regular practice of fruit production act as a source of additional income to the banana growers. In the recent years, farmers started cultivating banana exclusively for leaf production in the places like Trichy, Thanjavur, Coimbatore, Madurai, Tirunelveli and Erode districts of Tamil Nadu. Standardization of cultivation practice with suitable variety and spacing for enhanced leaf production is the need of the hour. So, the present study was taken up on the cv. Poovan, Karpooravalli, Monthan, and Chakkiya, planted in three different spacing 1.5 m × 1.5 m. 1.8 m × 1.8 m. 2.1 m × 2.1 m.

Methods and Material
The present investigation was carried out at University Orchard, Department of Fruit Science, Horticulture College and Research Institute, Coimbatore during 2019-2020. The current experiment was carried out using of four different varieties of banana *viz.*, Poovan (AAA), Karpooravalli (ABB), Monthan (ABB) and Chakkiya (ABB), which are planted at three different spacing *viz.*, 1.5 m × 1.5 m. 1.8 m × 1.8 m. 2.1 m × 2.1 m. The experiment was laid out in a Factorial Randomized Block design with three replications and combination of two factors, such as varieties (Poovan (AAA), Karpooravalli (ABB), Monthan (ABB) and Chakkiya (ABB) and different spacing (1.5 m × 1.5 m. 1.8 m × 1.8 m. 2.1 m × 2.1 m.). The net area of the experimental plot was 0.12 acres. Each variety in each replication was planted at one sucker per pit (Number of suckers/treatments includes 12, number of suckers/replications

includes 4 suckers and total number of suckers used 144). Standard cultural practice was followed. Five plants were randomly selected in each variety with three different spacing and studied for quantitative characters up to shooting stage. The following observations such as pseudostem height, pseudostem girth, leaf area, number of leaves in mother plant, number of leaves in sucker plant and number of days taken for shooting were recorded in four different varieties at different spacing and the mean values of data recorded and analyzed statistically by using the method suggested by Gomez, and Gomez (1984) [5].

Results and Discussion

Effect of different banana varieties and spacing on growth parameters

All the parameters were found to be significant in the varieties used in the study (Table 1). The height of the pseudostem was found to be highest in the variety Karpooravalli (335.91 cm), while the lowest pseudostem height was found to be in variety Poovan (268.96 cm). Maximum pseudostem girth was observed in the variety Karpooravalli (80.80 cm) and minimum pseudostem girth was observed in variety Chakkiya (64.19 cm) (Table 1). Similar results have been reported earlier by Kavitha *et al.* (2009) [7].

Different spacing followed in the present study significantly affected the growth parameters of banana pseudostem height, pseudostem girth, (Table 1). Closer spacing of 1.5 m × 1.5 m produced significantly higher pseudostem height (312.65 cm). Whereas, the lower pseudostem height (274.88 cm) was recorded in the wider spacing of 2.1 m × 2.1 m. Similar results have been reported earlier by Reddy and Singh (1993). The girth of the pseudostem was found highest (72.88 cm) in the wider spacing of 2.1m × 2.1 m followed by the spacing of 1.8 m × 1.8 m (70.64 cm). The lowest pseudostem girth (69.87 cm) was observed in closer spacing of 1.5 m × 1.5 m. (Table 1). Similar results have been reported earlier by Gogoi *et al.* (2015) [4].

Effect of different banana varieties on leaf production parameters

Leaf area was found highest in the variety Karpooravalli **(**18155.71 cm^2**),** followed by the variety Monthan (15418.78 cm^2). Whereas, the lowest leaf area was recorded in variety Poovan (13450.16 cm^2) (Table 2). Similar results for leaf area was found by Karuna and Rao (2016) [6] in most of the banana genotypes.

The maximum number of leaves per mother plant (42.01) and the number of leaves produced per sucker plant (25.60) was recorded the variety Karpooravalli, which is followed by the variety Monthan which produced (39.98) number of leaves per mother plant and (22.49) number of leaves produced per sucker plant (Table 2). Whereas, the variety poovan produced the minimum number of leaves per mother plant (34.43) and sucker plant (17.59). These differences in the production of number of leaves per mother plant and number of leaves in sucker plant, within the variety at the time of shooting may be attributed due to the genetic potential of the variety and environmental factors such as climate and nutrient availability. Present findings are also in conformity with the results obtained by Suvittawat *et al.* (2014) [11].

In crop duration of different banana varieties (Table 2), early shooting was observed in variety Chakkiya (267.47 days), whereas late shooting was recorded in variety Karpooravalli (303.27 days). The same trend of variation on days taken to the shooting was due to varietal characters and growing conditions was reported by Deshmukh *et al.* (2004) [3].

Effect of different spacing on leaf production parameters

Significantly highest leaf area (15559.96 cm^2) was observed from the wider spacing of 2.1m × 2.1 m, which was found on par with the spacing 1.8m × 1.8m (15398.92 cm^2). Whereas, the lowest leaf area (15269.23 cm^2) was recorded in the closer spacing of 1.5 m × 1.5 m. (Table 3), as the planting density increased leaf area decreased (Table 3). This is in accordance with the results of Berrill (1963) [2] who reported that increase in leaf area in wider spacing may be due to reduced leaf emergence under very close planting owing to the lower temperature inside the canopy. Since temperature had a significant influence on leaf emergence and size of the leaf.

Total number of leaves per mother plant (38.77) was significantly higher in the wider spacing of 2.1 m × 2.1 m and is found on par with the spacing 1.8 m × 1.8 m (37.90). Whereas, lesser number of leaves per mother plant (37.00), was observed in closer spacing of 1.5m × 1.5m. Significantly maximum number of leaves per sucker plant (22.03) was recorded in wider spacing 2.1 m × 2.1 m followed by the spacing 1.8 m × 1.8 m (21.02). However, lower number of leaves per sucker plant (19.99) was observed in the closer spacing of 1.5 m × 1.5 m. (Table 3). The maximum number of leaves at wider spacing may be due to adequate availability of nutrients for individual plants to induce production of more leaves, provided with ample space for more light interception and air movement. Similar result was reported by Sarrwy *et al.* (2012) [10].

Table 1: Effect of different banana varieties and spacing on growth parameters

Variety	Pseudostem height at shooting stage (cm)	Pseudostem girth at shooting stage (cm)
Poovan	268.96	66.02
Karpooravali	335.91	80.80
Monthan	297.10	73.51
Chakkiya	277.85	64.19
S.Em ±	1.88	0.64
CD= p (0.05)	5.51	1.88
Spacing		
1.5m × 1.5m	312.65	69.87
1.8m × 1.8m	297.33	70.64
2.1m × 2.1m	274.88	72.88
S.Em ±	1.62	0.55
CD= p (0.05)	4.77	1.63
Interactions		
S.Em ±	3.25	1.11
CD= p (0.05)	9.54	3.27
CV (%)	1.91	2.71

Table 2: Effect of different banana varieties leaf production at shooting stage

Variety	Leaf area at shooting stage (sq.cm)	Number of leaves in mother plant up to shooting stage	Number of leaves in sucker plant up to shooting stage	Number of days taken to shooting
Poovan	13450.16	34.43	17.59	286.96
Karpooravali	18155.71	42.01	25.60	303.27
Monthan	15418.78	39.98	22.49	277.84
Chakkiya	14614.21	35.25	18.39	267.47
S.Em ±	229.28	0.51	0.18	1.53
CD= p (0.05)	672.51	1.51	0.54	4.48
CV (%)	4.46	4.08	2.66	1.61

Table 3: Effect of different plant spacing on leaf production of banana at shooting stage

Spacing	Leaf area at shooting stage (sq.cm)	Number of leaves in mother plant at shooting stage	Number of leaves in sucker plant at shooting stage	Number of days taken to shooting
1.5 m × 1.5 m	15269.23	37.00	19.99	288.80
1.8 m × 1.8 m	15398.92	37.90	21.02	284.78
2.1m × 2.1 m	15559.96	38.77	22.03	278.10
S.Em ±	198.56	0.44	0.16	1.32
CD= p (0.05)	582.41	1.31	0.47	3.88
Interactions				
S.Em ±	397.13	0.89	0.32	2.65
CD= p (0.05)	1164.83	2.62	0.94	7.77
CV (%)	4.46	4.08	2.66	1.61

Studies on crop duration of different banana varieties revealed that (Table 2), early shooting was observed in the wider spacing 2.1m × 2.1m (278.10 days). Whereas, late shooting was recorded in the closer spacing (288.80 days), the lesser number of days taken from planting to shooting was recorded in wider spacing (2.1m × 2.1 m). This might be due to the higher net assimilation rate on account of better growth leading to the production of endogenous metabolites earlier these results are in line in with the findings of Arumugam and Manivannan (2001) [1].

Conclusion

From the above study, it could be concluded that variety Karpooravalli planted with wider spacing of 2.1 m × 2.1 m performed better with production of maximum number of leaves per mother plant (42.01) and number of leaves per sucker plant (25.60). Followed by the variety Monthan planted with wider spacing recorded number of leaves per mother plant (39.98) and number of leaves per sucker plant (22.49). Whereas, the variety Poovan planted with closer spacing of 1.5 m × 1.5 m recorded minimum number of leaves per mother plant (34.43), number of leaves per sucker plant (17.59). From the findings of the present study, it is inferred that variety Karpooravalli planting with wider spacing 2.1 m × 2.1 m is the best variety with optimum spacing for enhancing the commercial leaf production.

References

1. Arumugam S, Manivannan K. Response of *in vitro* raised banana cv. Robusta to different levels of N and K application. South Indian Hort 2001;49:362-363.
2. Berrill, FW. Bunch covers in bananas. Queensland Agric. J 1963;82:435-440.
3. Deshmukh SS, Badgujar CD, Dusane SM. Comparative evaluation of banana varities under Jalgaon condition of Maharastra state, Agricultural Science Digest 2004;24(2):118-20.
4. Gogoi B, Khangia B, Brauh K, Khousal A. Effect of high-density planting and nutrient on growth and yield of Banana Cv. Jahaji (Musa AAA). Int. J. Agric. Innov. Res. 2015;315:1465-1469.
5. Gomez KA, Gomez AA. Statistical procedures for agricultural research. John Wiley & Sons.
6. Karuna Y, Rao KK. Studies on Phenological Characters of Different Banana Cultivars (Musa) in Visakhapatnam, Andhra Pradesh, International Journal of Science and Research 2016;5(5):1689-1693
7. Kavitha PS, Balamohan TN, Kumar N, Veeraragavathatham D. Genetic variability studies in banana hybrids, The Asian journal of Horticulture 2008;3(2):265-269.
8. Reddy BMC, HP Singh. High density planting in banana. Adv. Hort. 1993;2:649-661.
9. Salvador A, Sanz T, Fiszman SM. Changes in colour and texture and their relationship with eating quality during storage of two different dessert bananas. Postharvest Biol. Technol. 2007;43:319-325.
10. Sarrwy SMA, Mostafa EMA, Hassan HSA. Growth, yield and fruit quality of Williams Banana as affected by different planting distances. Intl. J. Agric. Res. 2012;7(5):266275.
11. Suvittawat K, Silayoi B, Teinseree N, Saradhuldhat P. Growth and yield of eight 'Namwa' (AAB) Banana in Thialand, Acta Horticulture 2014;1024:241-46.