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Short Communication

Effect of Planting Density on Tree Growth, Fruit Yield and Quality of Guava at Tikamgarh District of Madhya Pradesh

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Guava (*Psidium guajava* L.) is one of the most popular tropical and subtropical fruit crops grown in India. It is belonging to family Myrtaceae, very popular fruit and bears fruit twice in a year but the best quality fruit is obtained in winter[1]. It is the fourth largest fruit crop grown after mango, banana and citrus in India and Madhya Pradesh.At present in India, it occupies nearly 270 hectares of land andproduces 4107 MT fruits per year (National Horticulture Board, Areaand Production (2018-19).is by far the most important guava producing state and area occupies 30.31 thousand ha with annual production of 523.75 MT.

It is well known fact that guava has two distinct botanical characteristics; one is the flowers are always borne on newly emerging vegetative shoots, irrespective of the time of year[2]. It is also many dietary supplements associated with antioxidants such as, β-carotene, vitamin C, vitamin E and multivitamin. It has a great demand as a table fruit and also in processing industries.

The field experiment was conducted at research farm, Department of horticulture, college of agriculture Tikamgarh, Madhya Pradesh, situated at 24°40' and 26°50' N latitudeand 76°80' and 80° 50' E longitude Tikamgarh. The Bundelkhand Agro-climatic Zone of Madhya Pradesh. The average annual rainfall is 900 mm in this zone. Out of total average annual rainfall, about 90 per cent is spread during monsoon period (June-September). The distinct dry spells are a common feature during monsoon period and the occurrence of drought is a recurring feature during recent decade. The planting spacing treatments of guava were 5x5m (T_1), 5x6m (T_2), 6x6m (T_3), 5x4m(T_4) and 4x6m (T_5).

The uniform management practices with respect to nutrient and irrigation were adopted for L-49 cultivars of guava. Ten-years old guava trees cultivar having uniform growth and vigour were selected and data were taken from selected plants with respect to growth, yield and quality. 5 fruits of each guava cultivars were randomly collected from healthy trees at fruit orchard when plants came to fruiting in 2010 to final observation in 2018. Growth, yield and quality study was made in terms of mortality (%), survival (%), plant height (m), plant spread (m), number of branches plant^{-1}, number of branchlets branch^{-1}, fruit length (cm), fruit breadth (cm), fruit weight (g), pulp weight (g), number of seeds fruit^{-1}, seed weight (g),

pulp: seed weight ratio (g), number of fruits plant^{-1}, fruit yield tree^{-1} (kg), T.S.S. (%), acidity (%), vitamin C (mg 100 g^{-1}), total phenolics (mg GAE 100 g^{-1}), total sugars (%) and protein content (%). Plant growth, yield and quality are important parameters to study the variability among the different fruit crops.

The results of the present investigation revealed that vegetative growth characters of guava plant were not much influenced at the early stage by different plant densities (Tables 1 and 2). However, at later stage they were significantly influenced by various spacing treatment. The mean data of consecutive 2 years presented in Table 2 reveal that growth parameters of guava cultivars were recorded to observe the relative growth behaviour of these cultivars under uniform management situation. Data showed that guava cultivars differed significantly with respect to their plant growth. Plant growth was recorded in terms of plant height, plant spread, girth of stem and pruning.

First to second pruning (March, 2017 to October,2018) was non-significantly affected due to different spacing treatment. However, mean maximum pruning (50.0,70.20 and 81.3 cm,) and second pruning (46.7,60.5 and 76.2 cm) at 50,100 and 150 days, respectively were maximum was recorded under treatment T1 (5.0×5.0 m) and minimum was recorded under treatment T5 (4.0×6.0 m).

East-West (m) to North-South (m) plant spread (March, 2017 to October,2018) resulted maximum plant spread East – West (0.89,1.03 and 1.19 m.) and north-south (0.84,1.06 and 1.32 m)respectively under treatment T_1(5.0×5.0 m) and minimum was recorded under treatment T_5(4.0×6.0 m). Plant Hight and stem was recorded maximum T_5(4.0×6.0 m) and T1 (5.0×5.0 m).

The results obtained in the present investigation revealed that different spacings treatment had significant influence on the number of flowers plant^{-1} number of fruits plant^{-1} fruit weight, yield plant^{-1},TSS(%),Acidity (%), vitamin C(mg/100 g pulp) and total sugar(%).

Maximum number of flowers plant^{-1} (88.40), maximum no of fruits plants^{-1}(17.20), maximum fruits weight plant^{-1}(77.50g), maximum yield plant-1 (1.32kg), maximum TSS (11.40%), Vit. C (195.40 mg/100g pulp) and total sugar (8.52%) were noted under T_1 treatment[3].

Table 1 Effect of different spacings on pruning, plant spread, height, girth of guava

Treatment	First pruning (cm) (March 2017 to Oct. 2017)			Second pruning (cm) (Oct. 2017 to March 2018)			Plant height (m)			Girth of stem (cm)			Plant spread E – W (m)			Plant spread N– S (m)		
	50 (DAP)	100 (DAP)	150 (DAP)	50 (DAP)	100 (DAP)	150 (DAP)	Oct. 2017	March 2018	Oct. 2018	Oct. 2017	March 2018	Oct. 2018	Oct. 2017	March 2018	Oct. 2018	Oct. 2017	March 2018	Oct. 2018
T_1 (5.0 × 5.0 m)	47.8	68.2	79.7	46.7	67.1	76.5	0.79	0.94	1.32	1.28	2.35	3.75	0.82	1.03	1.19	0.84	1.06	1.32
T_2 (5.0 × 6.0 m)	50.0	70.2	81.3	43.1	62.0	70.2	0.86	1.01	1.38	1.18	2.31	3.54	0.88	0.98	1.16	0.82	1.02	1.22
T_3 (6.0 × 6.0 m)	45.9	67.0	77.8	42.7	60.5	68.4	0.84	1.06	1.37	1.24	2.24	3.49	0.81	0.96	1.12	0.76	0.92	1.14
T_4 (5.0 × 4.0 m)	48.7	68.4	80.0	41.2	59.9	67.2	0.94	1.14	1.47	1.27	2.28	3.46	0.89	0.99	0.97	0.81	0.90	1.16
T_5 (4.0 × 6.0 m)	44.7	65.2	76.4	37.1	53.3	59.7	0.97	1.19	1.58	1.26	2.28	3.33	0.78	0.87	0.92	0.77	0.88	1.15
Sem ±	1.318	1.812	2.344	1.109	1.609	1.800	0.047	0.059	0.038	0.033	0.060	0.082	0.029	0.038	0.053	0.021	0.045	0.031
CD at 5%	NS	NS	NS	3.417	4.957	5.546	NS	NS	0.118	NS	NS	0.252	NS	NS	0.163	NS	NS	0.096

Table 2 Effect of different spacings on quantity and quality characters

Sr. No.	Treatment	No. of flower plant^{-1}	No. of fruit plant^{-1}	Fruit weight (g)	Yield plant^{-1} (kg)	T.S.S. %	Acidity %	Vit. C (Mg/100g pulp)	Total Sugar %
1.	T_1 (5.0 × 5.0 m)	88.40	17.20	77.50	1.32	11.40	0.34	195.40	8.52
2.	T_2 (5.0 × 6.0 m)	83.40	16.50	75.40	1.25	11.00	0.33	189.00	8.10
3.	T_3 (6.0 × 6.0 m)	77.50	14.20	71.20	1.12	10.60	0.38	177.80	7.76
4.	T_4 (5.0 × 4.0 m)	76.95	13.81	73.00	1.05	10.80	0.35	181.20	7.82
5.	T_5 (4.0 × 6.0 m)	69.79	12.20	68.05	0.86	9.40	0.40	172.20	7.64
6.	Sem ±	3.803	0.7091	1.8462	0.0658	0.433	0.0163	5.1454	0.2066
7.	CD at 5%	11.719	2.1851	5.6888	0.2027	NS	NS	NS	NS

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