

INFLUENCE OF CHEMICAL FERTILIZERS AND ORGANICS ON GROWTH, FLOWERING, FRUIT YIELD AND QUALITY OF GUAVA (*PSIDIUM GUAJAVA* L.) CV L-49 UNDER CHHATTISGARH PLAINS

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Abstract: A field experiment was carried out during the year 2013-14 for Mrig bahar crop of guava at Horticulture Research Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) to studies on Influence of chemical fertilizer and organics on growth, flowering, fruit yield and quality of guava (*Psidium guajava* L.) cv. L-49 under Chhattisgarh plains. The experiment was laid out in Randomized Block Design (RBD) with four replications and twelve treatments. Treatment of 75% RDF+ Cowdung Slurry (T₂) resulted significantly maximum tree height (5.27 m), East West tree spread (7.04 m), North South tree spread (7.34 m) at harvesting stage, minimum number of days for flowering (33.51 days), maximum number of flowers per m² (17.62) and number of fruits per m²(14.50), fruit set per m² (90.18%) and fruit retention (93.11%), fruit diameter (9.54 cm), fruit weight (205.41 g) and pulp weight (198.17 g), yield attributing characters, number of fruits per tree (250.57), fruit yield per tree (54.66 kg) and per hectare (14.31 t ha⁻¹).

Keywords: Organics, Chemical Fertilizers, Growth, Yield, Quality, Guava

INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most important fruit crops of tropical and sub-tropical regions of India. It can be grown satisfactorily on marginal soils with minimum care and is also called as 'Apple of the Tropics'. It is largely grown in warmer tropical countries of the world. It is a rich source of ascorbic acid in human diet, content of which is three to five times more than that in fresh orange juice. Chhattisgarh has covered an area of 15.6 thousand hectares with an annual production of 121300 metric tonnes and a productivity of 7.78 metric tonnes ha⁻¹ (Anon., 2012) The recent concept of integrated nutrient supply involving organic, inorganic and bio -fertilizers has developed to meet the growing need for nutrients under intensive cultivation. In integrated plant nutrition supply system, the basic goal is to maintain or possibly improve the soil fertility and plant nutrient supply to an optimum level for sustaining the desired crop productivity through optimization of the benefits from all possible sources of plant nutrients in an integrated manner. Guava is very hardy to soil and agro-climatic conditions and gives good response to manuring in terms of increasing fruit production and quality. Fertilizer experiments conducted in India showed that guava has given good response to balanced use of inorganic fertilizers along with organic manures. It is reported that application of organics and chemical fertilizers not only increased the yield, but also improved the fruit quality in guava (Naik and Babu, 2007).

MATERIAL AND METHOD

Field experiment was carried out during the year

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2013-14 for Mrig bahar crop of Guava (*Psidium guajava* L.) cv. L-49 at Horticulture Research Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The soil of the experimental field was classified as *vertisol* and texturally known as clay. The mechanical composition were recorded as sand (21.42%), silt (35.50%) and clay (43.08%) and chemical composition as soil pH (7.21) available soil N (219 kg ha⁻¹), available soil phosphorus (14.72 kg ha⁻¹) and available soil K (360.40 kg ha⁻¹) (Jackson,1973) The experiment was laid out in Randomized Block Design (RBD) with four replications and twelve treatments namely T₀ (Control, without nutrient application), T₁ (100% RDF 600:300:300 gm NPK/tree), T₂ (75% RDF + Cowdung Slurry 10 litre/tree), T₃ (50% RDF + Cowdung Slurry 10 litre/tree), T₄ (75% RDF + *Azospirillum* 100 gm/tree), T₅ (50% RDF + *Azospirillum* 100 gm/tree), T₆ (75% RDF + PSB 100 gm/ tree), T₇ (50% RDF + PSB 100 gm/tree), T₈ (75% RDF + Vermiwash 10 litre/tree), T₉ (50% RDF + Vermiwash 10 litre/tree), T₁₀ (75% RDF + *Azospirillum* + PSB) and T₁₁ (50% RDF + *Azospirillum* + PSB). The tree height of guava trees was measured from the ground level to the tip of the tree canopy, trunk girth of tree was measured at 10 cm above the ground level and the canopy of tree from North-South and East-West were recorded by using measuring tape and average was calculated. The fertilizers were applied in the form of urea, single super phosphate and muriate of potash. organics like cow dung slurry and Vermiwash 10 lit tree⁻¹, respectively were applied, on the onset of monsoon by making ring 15 cm deep and 30 cm away from the main trunk. (1 ml = 1 crore cfu / ml.) Cultural

practices such as weeding, inter-culturing, earthing up, digging in the ring, removal of water shoots and dead limbs were done as and when required. The trees were irrigated immediately after application of fertilizers. The data collected for different observations were subjected to statistical analysis by the statistical software developed by department of Agricultural Statistics and social Science (Language).

RESULT AND DISCUSSION

Growth, yield and quality parameters

Data presented in Table 1 shows significant differences for height of the trees at initial stage, indicating homogeneity of tree height in experimental plot. The treatment T₂ (Treatment of 75% RDF+ Cowdung Slurry) recorded significantly higher tree height (5.27 m) at harvesting stage, East-West tree spread (7.04 m) and, North-South tree spread (7.34 m). Similar findings were reported by Ram *et al.* (2005), Shukla *et al.* (2009) in guava and Baviskar *et al.* (2011) in Sapota. The treatment T₂ also recorded significantly minimum days required for flowering (33 days), higher number of flowers per m² (17.62), number of fruits per m² (14.50), maximum fruit set (90.18%) and fruit retention (93.11%) was also

reported by Dheware and Waghmare (2009) in sweet orange, Mitra *et al.* (2010) and Shukla *et al.* (2009) in guava. In addition the treatment T₂ recorded maximum tree height, higher fruit diameter (9.54 cm), fruit weight (205.41 g) and maximum pulp weight (198.17 g) and minimum peel weight (23.04 g), number of seeds (216.45) and weight of seeds per fruit (3.58 g). These observations are in agreement with the findings of Athani *et al.* (2007) and Ram *et al.* (2007) in guava and Patel and Naik (2010) in sapota. Significantly highest number of fruits per tree (250.57), highest fruit yield per tree (54.66 kg) and highest fruit yield quintal per hectare (14.31 t ha⁻¹) were also recorded with treatment T₂. This enhanced fruit yield might be due to increased flowering and fruit set with reduced fruit drop in respective treatment. (Gobindam and Purshottam, 1984) and Yadav *et al.* (2011) in papaya. Significantly maximum total soluble solids (14.80 °Brix) were recorded with treatment T₂ 75% RDF+ Cowdung Slurry. Maximum shelf life of 5ml fruits (12.50 days) was recorded in treatment T₂. Significant influence of organics and chemical fertilizers on fruit quality was also reported by Athani *et al.* (2007), Muhammad *et al.* (2000) and Ram *et al.* (2007) in guava and Madhavi *et al.* (2008) in mango.

Table 1. Effect of chemical fertilizers and organics on growth of guava (*Psidium guajava* L.) cv.L-49

Treatments	Tree height at initial stage (m)	Tree height at harvesting stage (m)	Tree spread (m)		Tree spread (m)		Days to flowering
			E-W at initial stage	E-W at harvesting stage	N-S at initial stage	N-S at harvesting stage	
T ₀	2.90	3.52	3.29	5.10	3.40	5.25	54.82
T ₁	3.50	4.27	4.02	5.75	3.90	5.85	33.41
T ₂	3.70	5.27	4.44	7.04	4.33	7.34	33.51
T ₃	3.42	4.83	4.22	6.63	4.22	6.74	40.52
T ₄	3.33	4.62	3.99	5.91	3.98	5.95	39.81
T ₅	3.19	3.88	3.95	5.59	4.03	5.69	45.72
T ₆	3.21	4.67	3.90	6.25	4.01	6.16	43.91
T ₇	3.18	3.86	4.23	5.51	3.75	5.45	48.81
T ₈	3.61	4.86	4.06	6.93	4.08	7.17	34.74
T ₉	3.33	4.75	4.09	6.49	3.92	6.55	48.00
T ₁₀	3.55	4.85	4.02	6.85	4.01	6.94	36.70
T ₁₁	3.20	4.74	4.07	6.36	3.86	6.33	46.22
SEm	0.01	0.11	0.05	0.16	0.10	0.18	0.32
CD at 5%	0.03	0.33	0.14	0.46	0.31	0.52	0.95

T₀ Control (Without nutrient application)

T₁ 100% RDF (600:300:300 gm NPK/tree)

T₂ 75% RDF + Cowdung slurry (10 litre/tree)

T₃ 50% RDF + Cowdung slurry (10 litre/tree)

T₄ 75% RDF + *Azospirillum* (100 gm/tree)

T₅ 50% RDF + *Azospirillum* (100 gm/tree)

T₆ 75% RDF + PSB (100 gm/ tree)

T₇ 50% RDF + PSB (100 gm/tree)

T₈ 75% RDF + Vermiwash (10 litre/tree)

T₉ 50% RDF + Vermiwash (10 litre/tree)

T₁₀ 75% RDF + *Azospirillum* + PSB

T₁₁ 50% RDF + *Azospirillum* + PSB

Table 2. Effect of chemical fertilizers and organics on fruit set and fruit characters of guava (*Psidium guajava* L.) cv. L-49

Treatments	Number of flowers/m ²	Number of fruits/m ²	Fruit set per m ² (%)	Fruit retention per m ² (%)	Fruit diameter (cm)	Fruit weight (g)	Pulp weight (g)	Peel weight (g)
T ₀	9.44	5.35	60.89	75.55	6.22	91.96	65.47	29.03
T ₁	12.42	7.80	65.77	74.43	7.92	145.52	135.07	26.92
T ₂	17.62	14.50	90.18	93.11	9.54	205.41	198.17	23.04
T ₃	15.45	10.52	80.33	76.22	9.00	175.46	164.75	25.97
T ₄	13.00	8.54	82.99	82.99	8.23	152.71	142.28	26.26
T ₅	11.65	7.65	78.46	78.33	7.51	135.66	125.10	28.51
T ₆	13.50	8.92	76.92	76.92	8.50	159.49	146.75	23.81
T ₇	10.23	6.32	85.11	85.11	6.70	125.57	108.24	24.30
T ₈	16.50	12.44	87.33	90.44	9.26	195.45	173.31	23.55
T ₉	14.65	9.96	86.31	89.39	8.96	170.71	157.48	27.88
T ₁₀	16.00	11.45	86.40	86.31	9.15	187.79	170.59	24.33
T ₁₁	14.33	9.54	75.99	74.44	8.75	164.74	152.10	22.51
SEm	0.39	0.72	0.16	0.21	0.09	2.57	2.24	1.01
CD at 5%	1.13	2.08	0.48	0.61	0.27	7.40	6.45	2.96

Table 3. Effect of chemical fertilizers and organics on fruit quality and fruit yield of guava (*Psidium guajava* L.) cv. L-49

Treatments	Number of seeds per fruit	Seed weight per fruit (g)	TSS (⁰ Brix)	Number of fruits per tree	Fruit yield per tree (kg)	Fruit yield per hectare (t/ha)
T ₀	360.28	7.61	11.95	175.72	15.91	4.47
T ₁	308.46	6.56	12.92	215.78	26.75	8.33
T ₂	216.45	3.58	14.80	250.57	54.66	14.31
T ₃	257.35	5.32	14.35	234.47	41.50	11.43
T ₄	301.22	6.41	13.48	216.69	28.52	9.14
T ₅	336.18	6.63	12.50	203.75	24.50	7.72
T ₆	287.53	6.25	13.58	226.58	33.76	9.84
T ₇	354.14	6.88	12.46	200.55	23.75	6.94
T ₈	225.54	4.72	14.75	240.41	48.52	12.54
T ₉	265.27	5.79	14.12	230.65	38.16	10.94
T ₁₀	244.25	5.11	14.50	238.46	43.25	12.42
T ₁₁	271.37	6.14	13.90	229.18	35.75	10.33
SEm	1.81	0.12	0.36	6.76	1.77	0.28
CD at 5%	5.22	0.37	1.03	19.54	5.11	0.83

CONCLUSION

The results and discussion of the present study showed that the different treatments having different levels of chemical fertilizers and organics have significant influence on growth, flowering, yield and quality of guava. The application of 75% RDF + Cowdung Slurry 10 litre/tree (T₂) has produced significantly superior effects on most of the growth parameters, yield and quality of guava. The performance of some other treatments like T₈ (75% RDF + Vermiwash 10 litre/tree), T₁₀ (75% RDF + *Azospirillum* + PSB) and T₆ (75% RDF + PSB 100 gm/tree) for growth and yield parameters was found *at par* with the treatment T₂. The application level of inorganic fertilizers can be reduced by 25% without much reduction in fruit quality with the application of cowdung slurry @10 lit./tree.

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