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Effect of organic manures on quality parameters of guava (*Psidium guajava*) cv. Lucknow 49

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Abstract

The experiment entitled "Effect of organic manures on quality in guava (*Psidium guajava*) cv. Lucknow 49" was conducted during 2023-2024. The experiment was laid out in randomized block design (RBD) with fourteen treatments and three replications. The treatments were designed by combined soil application of FYM, vermicompost, poultry manure and neem cake at different levels. The results revealed that combined application of FYM 10 kg + vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg tree⁻¹ exhibited superior performance in increasing the quality parameters such as TSS, ascorbic acid content, TSS: acid ratio, total sugar content, reducing sugar content, non-reducing sugar content and also recorded the lowest values for titrable acidity of the fruits in two successive crops. The untreated control registered the least values for all the quality parameters.

Keywords: FYM, vermicompost, poultry manure, neem cake, quality parameters

Introduction

Guava (*Psidium guajava* L.) is one of the most important fruit crops in India. It belongs to the family Myrtaceae, which has 140 genera and 3000 species. It is categorized under the genus *Psidium*, which has 150 species, of which only *Psidium guajava* is economically used. It is native to Tropical South America and it was introduced in India by the Portuguese in the early 17th century. Guava is the fourth most important fruit crop in terms of area and production after mango, banana and citrus. Uttar Pradesh is the leading guava producing state in the country, followed by Maharashtra, Madhya Pradesh, Bihar, Andhra Pradesh, Haryana, Punjab, West Bengal, Chhattisgarh, Gujarat, Karnataka, and Tamil Nadu. The area under guava cultivation in India is 308 thousand hectares with an annual production of 4,582 thousand metric tonnes and a productivity of 14.87 metric tonnes hectare⁻¹ (Anon, 2022) [2]. Organic manures are bulky substrates which are the store houses of major nutrients apart from containing a considerable amount of micronutrients (Anand Singh Rawat *et al.*, 2022) [1]. It has more relevance to horticultural crops which are largely consumed in fresh form immediately after harvest. Guava is one such horticultural crop, where fruits are consumed after harvest along with skin and pulp and there is a feasibility of organic farming in its cultivation (Dwivedi *et al.*, 2012) [5]. Guava plants grown with organic manures often produce fruits with better taste, texture and nutritional value and they are also free from harmful chemical residues, making them safer for consumption (Lester, 2006) [8]. Therefore, in view of the above, this study was carried out to investigate the effect of organic manures on quality parameters of guava trees cv. Lucknow 49.

Materials and Methods

The field experiment was conducted at a farmer's field in Suthamalli village, Ariyalur District, Tamil Nadu during 2023-2024. The study was carried out in three year old guava trees of the cultivar Lucknow 49. The field experiment was laid out in randomized block design with three replications. The treatment consisted of various combinations of organic manures namely farmyard manure (FYM), vermicompost (VC), poultry manure (PM) and neem cake (NC) at different levels. The treatments details are: T₁ - FYM (20 kg), T₂ - VC (10 kg), T₃ - PM (5 kg), T₄ - NC (10 kg), T₅ - FYM (20 kg) + VC (10 kg), T₆ - FYM (20 kg) + PM (5 kg), T₇ - FYM (20 kg) + NC (10 kg), T₈ - VC (10 kg) + PM (5 kg), T₉ - VC (10 kg) + NC (10 kg), T₁₀ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg), T₁₁ - FYM (10 kg) + VC (5

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kg) + NC (5 kg), T₁₂ - VC (5 kg) + PM (2.5 kg) + NC (5 kg), T₁₃ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg) + NC (5 kg), T₁₄ - control. Organic manures were applied during the month of February for the first crop and August for the second crop. The observations such as total soluble solids, ascorbic acid content, titrable acidity, TSS: acid ratio, total sugar content, reducing sugar content and non - reducing sugar content were recorded. The ascorbic acid content of fruits was estimated by using 2, 6 - dichlorophenol-indophenol dye method as described by Sadasivam and Manickam (1996) [10]. Titrable acidity of the fruit was determined by using the method suggested by Ranganna (1977) [9]. The reducing sugar content of the fruits was estimated following the method of Somogyi (1952) [11]. The statistical analysis following the standard procedures using DSASTAT software in a personal computer. Critical differences (CD) were worked out at 5 per cent level of probability.

Results and Discussion

The data presented in Table 1 indicated that the soil application of different sources of organic manures at varied levels significantly influenced the quality parameters of guava. Among the treatments, application of FYM 10 kg + vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg tree⁻¹ (T₁₃) registered the highest TSS (13.11 and 12.79 °brix), ascorbic acid content (194.79 and 189.35 mg 100 g⁻¹), TSS: acid ratio (93.64 and 85.26) and the same treatment recorded a lowest titrable acidity (0.14 and 0.15%) in the first and second crop respectively followed by T₁₂ (vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg tree⁻¹). The least TSS (11.30 and 11.03 ° brix), ascorbic acid content (148.89 and 147.24 mg 100 g⁻¹) and TSS: acid ratio (93.64 and 85.26) in the first crop and second crop were recorded in the untreated control (T₁₄). Application of organic manures increased the fruit quality parameters which might be due to the better role of nutrients which is involved in the carbohydrate synthesis, breakdown and translocation of starch, synthesis of protein and neutralization of physiologically important organic acids. The increase in ascorbic acid content due to various organic

treatments may due to the proper nutrition to the treated plants which ultimately improves the vitamin and mineral contents of the fruits (Anand Singh Rawat *et al.*, 2022) [1]. Poultry manures may enhance the ascorbic acid content in fruits through a sustained release of essential macro and micro nutrients. This balanced nutrient supply could facilitate carbohydrate assimilation, subsequently boosting ascorbic acid synthesis (Devi and Mitra, 2018) [4].

Results in Table 2 revealed that the quality parameters was significantly influenced by different treatments. Soil application of FYM 10 kg + vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg (T₁₃) recorded the highest values of total sugar content (8.50% and 8.11%), reducing sugar content (5.77% and 5.51%) and non - reducing sugar content (2.73% and 2.60%) in the first and second crop respectively. The next best treatment was T₁₂ (vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg tree⁻¹). The treatment (T₁₄) control recorded the least values for total sugar content, reducing sugar content and non - reducing sugar content in fruits compared to all other treatments. The increased fruit quality characteristics are attributable to the addition of various organic manures which may have promoted the biosynthesis and translocation of carbohydrates into the fruits. The increased availability of organic nitrogen and humic substances from vermicompost might have enhanced the carbohydrate metabolism in plants and stimulated the accumulation of reducing sugars and non-reducing sugars. The increased sugar content in fruits due to the application of poultry manures proved the direct effect of availability of vital nutrients and indirect effect of sustained release of growth hormones and vitamins as observed by Butani and Chovatia, (2014) [3]. Similar findings on the effect of organic manures on quality of guava fruits were also reported by Goswami *et al.* (2015) [6], Tyagi *et al.* (2018) [12] and Kumrawat *et al.* (2018) [7]. Among the different sources of organic manures evaluated in the present study, FYM 10 kg + vermicompost 5 kg + poultry manure 2.5 kg + neem cake 5 kg tree⁻¹ significantly enhanced quality parameters of Lucknow 49 guava fruits.

Table 1: Effect of organic manures on TSS (° brix), ascorbic acid content (mg 100 g⁻¹), titrable acidity (%) and TSS: acid ratio in guava cv. Lucknow 49

Treatments	TSS (°brix)			Ascorbic acid (mg 100 g ⁻¹)			Titrable acidity (%)			TSS: acid ratio		
	First crop	Second crop	Mean	First crop	Second crop	Mean	First crop	Second crop	Mean	First crop	Second crop	Mean
T ₁ - FYM (20 kg)	11.93	11.61	11.77	162.22	161.95	162.20	0.22	0.23	0.23	54.22	50.47	52.34
T ₂ - VC (10 kg)	11.79	11.47	11.63	159.09	158.80	159.56	0.23	0.24	0.24	51.26	47.79	49.52
T ₃ - PM (5 kg)	11.64	11.34	11.49	155.94	154.77	156.66	0.24	0.25	0.25	48.50	45.36	46.93
T ₄ - NC (10 kg)	11.49	11.19	11.34	152.89	150.99	153.73	0.25	0.26	0.26	45.96	43.03	44.49
T ₅ - FYM (20 kg) + VC (10 kg)	12.40	12.12	12.26	176.30	174.24	175.27	0.19	0.20	0.19	65.26	60.60	62.93
T ₆ - FYM (20 kg) + PM (5 kg)	12.30	12.03	12.16	173.00	171.40	172.20	0.19	0.20	0.19	64.73	60.15	62.44
T ₇ - FYM (20 kg) + NC (10 kg)	12.18	11.87	12.02	168.50	167.99	168.24	0.20	0.21	0.21	60.90	56.52	58.71
T ₈ - VC (10 kg) + PM (5 kg)	12.54	12.26	12.40	180.15	177.23	178.69	0.18	0.19	0.18	69.66	64.52	67.09
T ₉ - VC (10 kg) + NC (10 kg)	12.05	11.87	11.96	165.31	164.95	165.23	0.21	0.22	0.22	57.38	53.95	55.66
T ₁₀ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg)	12.86	12.53	12.69	187.50	183.33	185.41	0.16	0.17	0.16	80.37	73.70	77.03
T ₁₁ - FYM (10 kg) + VC (5 kg) + NC (5 kg)	12.69	12.40	12.54	184.15	180.44	182.29	0.17	0.18	0.17	74.64	68.88	71.76
T ₁₂ - VC (5 kg) + PM (2.5 kg) + NC (5 kg)	12.98	12.66	12.82	191.28	186.34	188.81	0.15	0.16	0.15	86.53	79.12	82.82
T ₁₃ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg) + NC (5 kg)	13.11	12.79	12.95	194.79	189.35	192.07	0.14	0.15	0.14	93.64	85.26	89.45
T ₁₄ - Control	11.30	11.03	11.19	148.89	147.24	149.97	0.27	0.28	0.27	41.85	39.39	40.62
SEd	0.04	0.03	0.03	1.53	1.20	1.37	0.003	0.003	0.003	1.16	1.00	1.08
CD at 5%	0.11	0.10	0.10	3.09	2.42	2.76	0.008	0.008	0.008	2.43	2.10	2.26

Table 2: Effect of organic manures on total sugar content (%), reducing sugar content (%) and non - reducing sugar content (%) in guava cv. Lucknow 49

Treatments	Total sugar content (%)			Reducing sugar content (%)			Non - reducing sugar content (%)		
	First crop	Second crop	Mean	First crop	Second crop	Mean	First crop	Second crop	Mean
T ₁ - FYM (20 kg)	6.66	6.36	6.51	4.63	4.40	4.51	2.03	1.96	1.99
T ₂ - VC (10 kg)	6.42	6.16	6.29	4.49	4.27	4.38	1.93	1.89	1.91
T ₃ - PM (5 kg)	6.21	5.94	6.08	4.36	4.13	4.24	1.85	1.81	1.83
T ₄ - NC (10 kg)	5.98	5.72	5.85	4.23	4.00	4.11	1.75	1.72	1.73
T ₅ - FYM (20 kg) + VC (10 kg)	7.40	7.10	7.25	5.09	4.89	4.99	2.31	2.21	2.26
T ₆ - FYM (20 kg) + PM (5 kg)	7.26	6.97	7.11	5.00	4.80	4.90	2.26	2.17	2.21
T ₇ - FYM (20 kg) + NC (10 kg)	7.04	6.70	6.87	4.87	4.62	4.74	2.17	2.08	2.12
T ₈ - VC (10 kg) + PM (5 kg)	7.63	7.30	7.46	5.23	5.01	5.12	2.40	2.29	2.34
T ₉ - VC (10 kg) + NC (10 kg)	6.88	6.57	6.72	4.76	4.53	4.64	2.12	2.04	2.08
T ₁₀ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg)	8.05	7.72	7.88	5.50	5.27	5.38	2.55	2.45	2.50
T ₁₁ - FYM (10 kg) + VC (5 kg) + NC (5 kg)	7.84	7.53	7.68	5.36	5.15	5.25	2.48	2.38	2.43
T ₁₂ - VC (5 kg) + PM (2.5 kg) + NC (5 kg)	8.27	7.92	8.09	5.63	5.39	5.51	2.64	2.53	2.59
T ₁₃ - FYM (10 kg) + VC (5 kg) + PM (2.5 kg) + NC (5 kg)	8.50	8.11	8.30	5.77	5.51	5.64	2.73	2.60	2.67
T ₁₄ - Control	5.72	5.46	5.59	4.08	3.85	3.97	1.64	1.61	1.63
SEd	0.10	0.08	0.09	0.05	0.04	0.04	0.03	0.02	0.02
CD at 5%	0.21	0.19	0.20	0.12	0.10	0.11	0.06	0.05	0.05

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