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Purnendra Kumar Sahu
Department of Fruit Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

SN Dikshit
Department of Fruit Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

HG Sharma
Department of Fruit Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Correspondence
Purnendra Kumar Sahu
Department of Fruit Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Studies on the effect of cowdung slurry, chemical fertilizers and biofertilizers on fruit quality and shelf life of guava (*Psidium guajava* L.) under Chhattisgarh plains

Purnendra Kumar Sahu, SN Dikshit and HG Sharma

Abstract
A field experiment was carried out during 2013-14 using Mrig bahar crop of guava at Horticulture Research Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) to studies on the effect of cowdung slurry, chemical fertilizers and biofertilizers on fruit quality and shelf life of guava (*Psidium guajava* L.) under Chhattisgarh plains. The experiment was laid out in Randomized Block Design (RBD) with four replications and twelve treatments. Results revealed significant differences amongst various quality attributes and shelf life of guava due to cowdung slurry, chemical fertilizers and biofertilizers. The application of 75% RDF + Cowdung Slurry produced the highest fruit length (9.80 cm), fruit diameter (9.54cm), fruit volume (257.50 cm), fruit weight (205.41 g) and pulp weight (198.17 g).The application of 75% RDF + Vermiwash 10 litre/tree and 75% RDF + *Azospirillum* + PSB was equally good for producing higher yield, ascorbic acid, TSS, reducing, non-reducing, total sugars were maximum under 75% RDF + Cowdung slurry 10 litre/tree. The minimum physiological loss in weight (14.36 per cent) after 10 days under ambient conditions was found to be maximum with the application of 75% RDF + Cowdung Slurry.

Keywords: guava, fruit quality, shelf life

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'. Its cultivation is getting popularity due to increasing international trade, better nutritional contents and processing of its value added products. This is a well-known fact that increases in productivity of fruit removes large amounts of essential nutrients from the soil. Without proper management, continous fruit production reduces nutrient reserves in the soil. Another issue of great concern is the sustainability of soil productivity, as land began to be intensively exhausted depletion decreases quality fruit production and soil fertility and leads to soil degradation. On the other hand, continous use of inorganic fertilizers as source of nutrient in imbalanced proportion is also a problem, causing inefficiency, damage to the environment and in certain situations, harms the plants themselves and also to human being who consumes them. (Shanker *et al.*, 2002) [15]. Therefore, integrated nutrient management is the most appropriate approach for managing the nutrient input. 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) [8]. Keeping this in view the present investigation was carried out to study the effect of cowdung slurry, chemical fertilizers and biofertilizers on fruit quality and shelf life of guava (*Psidium guajava* L.) under Chhattisgarh plains.

Materials and Methods

Field experiment was carried out during the year 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 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 length of five fruits of each treatment was measured from stalk to stylar end with the help of vernier callipers and after computing mean, it was recorded as average length of fruit in centimetre. The diameter of five randomly selected fruits were measured, perpendicular to the length at the maximum width with the help of vernier calipers and average was worked out. The volume of fruit was determined by the help of water displacement method using measuring cylinder. Five fruits of each treatment were weighed with the help of electronic balance and mean fruit weight was computed and recorded as fruit weight in gram. After peeling and extraction of seed, remaining portion of fruits was weighed and the values were averaged and determined the pulp weight. Total soluble solids was recorded by hand refractometer (0-32 0 Brix) by taking a drop of juice from fruit pulp on the prism of the refractometer and observing it against the light, the reading was recorded as total soluble solids in 0 Brix. The ascorbic acid was determined by titrating a known weight of sample with 2, 6 dichlorophenol - indophenol dye using metaphosphoric acid as a stabilizing agent. Sugars were determined by the method of Lane and Eynon as described by Ranganna (Ranganna, 1997) [14].

Results and Discussion

Effect on Fruit growth of guava: Results revealed that significant differences amongst various fruit growth attributes and yield of guava due to cowdung slurry, chemical fertilizers and biofertilizers (Table 1). The significantly maximum fruit length (9.80 cm), fruit diameter (9.54cm), fruit volume (257.50 cm), fruit weight (205.41 g) and pulp weight (198.17 g) were found in treatment T_2. The maximum fruit length was observed under 75% RDF + Cowdung slurry was probably due to better utilization of nutrients within the plant as well as translocation of more nitrogen to the apical part of plant body. Similar results were also been reported by Sharma, 2004 [17] in papaya crop. These favourable effects on quality improvement in the treatment of combined application of organic and inorganic fertilizers may be due to the result of better vegetative growth of the treated plants which resulted in production of higher quantities of photosynthates such as starch and carbohydrates and their translocation to the fruits, thus increasing the length, diameter and volume of fruits. Earlier workers have also reported the quality improvement in terms of physical attributes of fruits (Patil *et. al*., 1997) [10]. The Combined application of inorganic and organic fertilizers in T_2 improved soil nutrient availability and triggered various biological processes at soil rhizosphere, which provided better nourishment to the plant resulting in higher fruit weight and pulp weight (Sharma 2004) [17].

Effect on quality of guava: The significantly maximum total soluble solid percentage was observed in treatment T_2 (14.80 0Brix), the ascorbic acid percentage was significantly maximum under the treatment T_2 (236.60 mg/100 g pulp), that significantly maximum reducing sugar percentage was recorded under the treatment T_2 (5.30 %), maximum non-reducing sugar percentage was observed in treatment T_2 (5.47 %), significantly maximum total sugar percentage was recorded under the treatment T_2 (10.50 %). These results are in agreement with was also reported by Ram and Rajput (2000) [13] and Dey et al. (2005) [2]. The increase in TSS might be due to accumulation of sugars and other soluble components from hydrolysis of protein and oxidation of ascorbic acid (Sharma *et. al*., 2009) [16]. Enhancement in ascorbic acid might be ascribed due to optimum availability of nutrients in T_2. The results are in close conformity with the report of Pandey *et. al*., 1990 [9] in guava. Due to the balanced absorption of macro and micro nutrients which have exerted regulatory role as an important constituent of endogenous factors in affecting the quality of the fruits. The carbohydrate reserves of the roots and stems are drawn upon heavily which might have resulted in higher sugar contents in fruits as has also been reported by Dey, 2005 [2].

Effect on per cent physiological loss in weight of guava: The data pertaining to physiological weight loss of guava fruits after 2, 4, 6 and 10 days as affected by different treatments tried has been presented in table 3, showed significant differences among all the treatments. From the perusal of the data, post harvest life of the fruits showed that the shelf life of guava fruit was observed maximum (10 days) with the treatment comprising 75% RDF + Cowdung slurry (10 litre/tree) (T_2). The minimum weight loss after two days (1.56 per cent), four days (3.50 per cent), six days (5.53 per cent), eight days (9.13 per cent) and after ten days (14.36 per cent) days, respectively, was observed with the trees receiving 75% RDF + Cowdung slurry (10 litre/tree) (T_2). It was observed that T_8 was statistically at par with T_2. Similar findings were reported by Sharma *et. al* (2013) [18], who reported that the minimum physiological loss in weight after 10 days under ambient conditions were found to be maximum with the application of Azotobacter + 50% of N tree^{-1} through FYM + 50% of N tree^{-1} through inorganic fertilizer. This may be due to altered physiology and biochemistry of the fruit as influenced by both organic and inorganic fertilizers that reduced respiration and transpiration which intern resulted in low cumulative physiological loss in weight and increased shelf life. In conclusion, result showed that 75% RDF + Cowdung slurry played a vital role in increasing physico-chemical attributes and shelf life of guava cv. L-49.

Table 1: Effect of cowdung slurry, chemical fertilizers and biofertilizers on fruit growth attributes and yield of guava cv. L-49.

Treatments	Fruit length (cm)	Diameter of fruit (cm)	Volume of fruit (cc)	Fruit weight (g)	Pulp weight (g)
T_0	5.98	6.22	143.25	91.96	65.47
T_1	7.44	7.92	183.00	145.52	135.07
T_2	9.80	9.54	257.50	205.41	198.17
T_3	8.72	9.00	242.75	175.46	164.75
T_4	7.87	8.23	189.75	152.71	142.28
T_5	6.57	7.51	175.50	135.66	125.10
T_6	8.01	8.50	212.00	159.49	146.75
T_7	6.21	6.70	168.50	125.57	108.24
T_8	9.60	9.26	253.25	195.45	173.31
T_9	8.54	8.96	229.75	170.71	157.48
T_{10}	9.10	9.15	245.25	187.79	170.59
T_{11}	8.24	8.75	224.00	164.74	152.10
SEm±	0.40	0.09	0.05	2.57	2.24
CD (P=0.05)	1.17	0.27	10.62	7.40	6.45

Table 2: Effect of cowdung slurry, chemical fertilizers and biofertilizers on quality of guava cv. L-49.

Treatments	Total soluble solids(0 Brix)	Ascorbic acid (mg/100 gm pulp)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)
T_0	11.95	193.29	3.90	4.62	8.52
T_1	12.92	208.57	4.40	5.20	9.56
T_2	14.80	236.60	5.30	5.47	10.50
T_3	14.35	224.48	5.10	5.31	10.30
T_4	13.48	212.24	4.60	5.22	9.77
T_5	12.50	205.13	4.20	5.05	9.45
T_6	13.58	215.87	4.70	5.23	10.02
T_7	12.46	203.10	4.00	4.92	9.12
T_8	14.75	233.46	5.21	5.33	10.40
T_9	14.12	221.26	5.00	5.30	10.23
T_{10}	14.50	227.03	5.17	5.32	10.36
T_{11}	13.90	216.35	4.90	5.26	10.22
SEm±	0.36	1.38	0.11	0.13	0.20
CD (P=0.05)	1.03	3.98	0.33	0.39	0.57

Table 3: Effect of cowdung slurry, chemical fertilizers and biofertilizers on percent physiological loss in weight of guava cv. L-49 under ambient conditions.

Treatments	After 2 days	After 4 days	After 6 days	After 8 days	After 10 days
T_0	2.20	7.57	13.94	19.35	25.37
T_1	1.87	6.89	13.15	18.23	20.79
T_2	1.56	3.50	5.53	9.13	14.36
T_3	1.73	3.90	5.93	9.95	15.65
T_4	1.85	4.31	8.76	14.90	20.78
T_5	1.91	7.04	13.33	18.43	23.67
T_6	1.81	4.23	9.16	14.82	19.90
T_7	2.08	7.08	13.56	18.76	24.13
T_8	1.60	3.67	5.68	9.56	14.77
T_9	1.73	4.15	9.00	14.20	19.52
T_{10}	1.68	3.86	6.23	9.73	15.50
T_{11}	1.77	4.21	8.41	14.61	19.79
SEm±	0.11	0.38	0.49	0.64	0.80
CD (P=0.05)	0.33	1.10	1.41	1.85	2.31

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References

1. Barne VG, Bharad SG, Dod VN, Baviskar MN. Effect of integrated nutrient management on yield and quality of guava. Asian Journal of Horticulture. 2013; 6(2):546-548.
2. Dey P, Rai M, Kumar S, Nath V, Das B, Reddy NN. Effect of biofertilizers on physico-chemical characteristics of guava *Psidium guajava* L. fruit. Indian Journal of Agricultural Sciences. 2005; 75(2):95-96.
3. Dutta P, Maji SB, Das BC. Studies on the response of biofertilizers on growth and productivity of guava. Indian J Hort. 2009; 66(1):39-42.
4. Dwivedi V. Effect of integrated nutrient management on yield, quality and economics of guava. Annals of Plant and Soil Research. 2013; 15(2):149-151.
5. Godage SS, Parekh NS, Nehete DS, Jagtap VM. Influences of chemical and biofertilizers on growth, flowering, fruit yield and quality of guava *Psidium guajava* L. cv. Allahabad Safeda. Bioinfolet. 2013; 10(2A):480-485.

6. Goswami AK, Lal S, Misra KK. Integrated nutrient management improves growth and leaf nutrient status of guava cv. Pant Prabhat. Indian J Hort. 2012; 69(2):168-172.
7. Muhammad F, Shakir MA, Salik MR. Effect of individual or combined application of organic and inorganic manures on the productivity of guava *Psidium guajava* L. Pakistan J. Biological Sciences. 2000; 3 (9):1370- 1371.
8. Naik MH, Babu RS. Feasibility of organic farming in guava *Psidium guajava* L. *Acta Horticulturae*. 2007; 735:365-372.
9. Pandey RC, Pathak RA, Pathak RK. Physico – chemical changes associated with growth and development of fruit in ber *Zizyphus mauritiana* Lamk. Ind. J Hort., 1990; 47:1247.
10. Patil KB, Patil BB, Patil MT. Studies on manurial requirement of papaya. J of Soils and Crops. 1997; 7(2):123-127.
11. Patil KB, Patil BB, Patil MT. Nutritional investigation in papaya var. Washington. J Maharastra Agril. Univ. 1995; 20(3):364-366.
12. Ram RA, Pathak RK. Integration of organic farming practices for sustainable production of Guava: A case study. Acta Horticulturae. 2007; 735:357-363.
13. Ram RA, Rajput MS. Role of biofertilizers and manures in production of Guava *Psidium guajava* L. cv. Allahabad Safeda. Haryana J Hort. Sci. 2000; 29(3 & 4):193-194.
14. Ranganna S. Handbook of analysis and quality control for fruit and vegetable products. Tata McGraw Hill Publishing Co. Ltd., New Delhi. 1997, 109-111.
15. Shanker, Uma., Pathak, R. A., Pathak, R, K., Ojha, C. M., Shanker U. Effect of NPK on the yield and fruit quality of guava cv. Sardar. Progressive Horticulture. 2002; 34(1):49-55.
16. Sharma A, Kher R, Wali VK, Bakshi P. Effect of biofertilizers and organic manures on physico-chemical characteristics and soil nutrient composition of guava *Psidium guajava* L. cv. Sardar. Journal of Research, SKUAST-J., 2009; 8(2):150-156.
17. Sharma HG. Studies on blending impact of nutrients under different fertigation levels on growth, yield and quality of papaya *Carica papaya* L. Ph.D. Thesis, College of Agriculture, IGKV, Raipur, 2004.
18. Sharma A, Wali VK, Bakshi P, Jasrotia J. Effect of organic and inorganic fertilizers on quality and shelf life of guava *Psidium guajava* L. cv. Sardar. The Bioscan. 2013; 8(4):1247-1250.