

Effect of biofertilizer on physico-chemical characteristics of guava (*Psidium guajava*) fruit*P DEY¹, MATHURA RAI², S KUMAR³, VISHAL NATH⁴, BIKASH DAS⁵ and NN REDDY⁶

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Decline in soil health due to excessive dependence on chemical inputs left us with other option of utilizing biological inputs like biofertilizers have been sought to be one of the answers to restore the soil health apart from solving nutrition problem of plants. Biofertilizers are basically carrier-based microorganisms used for maintaining soil health. They play an important role in plant nutrition through dinitrogen fixation (nitrogen fixers) and transformation of different nutrients in available forms (eg phosphorus solubilizers) besides helping plants to survive under water-stressed situation. Under Chotanagpur condition, guava (*Psidium guajava* L.) provides sustainable return in hand to farmers under rainfed situation. Physico-chemical characteristics of fruit are important parameters in horticulture to reckon with. A poor supply of major nutrients seems to be the main cause of tree decline, low yields and poor fruit quality in guava (Kadam and Patil 1993, Shankar *et al.* 2002). It was therefore considered worthwhile to study the effect of biofertilizer on fruit characteristics of guava.

A field experiment was conducted in 1999 at Farm I (Plandu) of Horticulture and Agro-forestry Research Programme (23°25'N and 85°20'E, at 620 m above mean sea-level), Ranchi. The soil was Alfisol having sandy-loam texture with pH 5.8, organic carbon 4.5 g/kg, available (Bray-I) P 3.5 kg/ha and available K 115 kg/ha (Jackson 1973). Treatments included 2 free-living nitrogen-fixers (*Azotobacter* and *Azospirillum*) and 3 phosphate-solubilizers (vesicular-arbuscular mycorrhiza (*Glomus mossae*), microphos and phosphobactrin). Biofertilizers were applied in 'L 49' guava in July @ 200 g/tree/year charged with 20 kg farmyard manure in a randomized block design with 4 replications and 2 plants/unit. Suitable control (20 kg farmyard manure) was kept for

comparison. Two-year (2000 and 2001) data on physico-chemical properties were pooled for statistical analysis. Total soluble solid was determined by standard procedure using refractometer. Titrable acidity was determined by titrating the juice against N/10 NaOH and expressed as citric acid equivalent. The ascorbic acid (vitamin C) content was determined by titrating meta-phosphoric acid extracted juice against the standardized dye (2,6-Dichlorophenol indophenol dye) and expressed as mg/100 g.

Application of P solubilizers significantly influenced physico-chemical characteristics of fruits compared with control (Table 1). Highest fruit weight, fruit length, and fruit diameter were obtained with the application of phosphobactrin which was, however, on a par with that obtained with vesicular-arbuscular mycorrhiza. Application of vesicular-arbuscular mycorrhiza resulted in highest total soluble solid (10.1°Brix) and total soluble solid : acid ratio (15.78). Application of P solubilizers significantly influenced vitamin C content in guava over the control (140.0 mg/100g). Highest vitamin C (ascorbic acid) content (151.8 mg/100 g) was recorded with vesicular-arbuscular mycorrhiza, which was, however, on a par with the

Table 1 Influence of biofertilizers on fruit physico-chemical properties of 'L 49' guava

Treatment	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Total soluble solid (°brix)	Acidity (%)	Total soluble solid : acid ratio	Vitamin C (mg/100 g)
<i>Azotobacter</i>	136.30	3.93	4.35	9.68	0.66	14.67	129.0
<i>Azospirillum</i>	135.30	3.85	4.03	9.25	0.71	13.03	136.0
Vesicular-arbuscular mycorrhiza	147.00	4.15	4.58	10.10	0.64	15.78	151.8
Microphos	139.80	4.00	4.45	9.58	0.62	15.45	147.5
Phosphobactrin	154.50	4.27	4.68	9.68	0.62	15.61	149.3
Control	128.50	3.25	3.68	9.30	0.63	14.76	140.0
CD	8.80	0.18	0.40	0.18	NS		5.04

(P = 0.05)

*Short note

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application of phosphobactrin (149.3 mg/100 g) and microphos (147.5 mg/100 g). Kadam and Patil (1993) also observed positive effect of phosphorus in Sardar guava. Acidity was not influenced by the application of biofertilizer. However, highest acidity (0.71%) was recorded with the application of *Azospirillum*. Ram and Rajput (2000) observed good response of *Azotobacter* under Uttar Pradesh condition; however, their study did not include P solubilizers. When grouped together, P solubilizers were found to have more beneficial influence on fruit physico-chemical parameters of guava than that of N fixers under acid soil condition of Chotanagpur region. Very low available P (3.5 kg/ha) due to high P fixation in acid soil which gets released for plant uptake due to activity of P solubilizers is the reason for beneficial effect of P solubilizers. Thus based on physico-chemical characteristics of fruits, efficacy of biofertilizers followed the order : phosphobactrin > vesicular-arbuscular mycorrhiza > microphos > *Azotobacter* > *Azospirillum*.

SUMMARY

A field experiment was conducted in 1999 at Farm I (Plandu) of Horticulture and Agro-forestry Research Programme, Ranchi (Alfisol), to study the effect of 2 free-living N fixers (*Azotobacter* and *Azospirillum*) and 3 phosphate-solubilizers [vesicular-arbuscular mycorrhiza (*Glomus mossae*), microphos and phosphobactrin], on fruit physico-chemical characteristics of 'L 49' guava (*Psidium guajava* L.). Biofertilizers were applied in July @ 200 g/tree/year charged with 20 kg farmyard manure in a randomized block design with 4 replications and 2 plants/unit. Application

of P solubilizers significantly influenced fruit weight of guava over the control (128.5 g). Highest fruit weight (154.5 g), fruit length (4.27 cm), and fruit diameter (4.68 cm) were obtained with the application of phosphobactrin. Application of vesicular-arbuscular mycorrhiza gave highest total soluble solid (10.1°Brix) and total soluble solid : acid ratio (15.78). Application of P-solubilizers significantly influenced vitamin C content of guava over the control (140.0 mg/100 g). Highest vitamin C (ascorbic acid) content (151.8 mg/100 g) was recorded with vesicular-arbuscular mycorrhiza, which was, however, on a par with the application of phosphobactrin (149.3 mg/100 g) and microphos (147.5 mg/100 g). When grouped together, P solubilizers were found to have more beneficial effect on physico-chemical parameters of guava than that of N fixers under acid soil condition of Chotanagpur region. The efficacy of biofertilizers followed the order : phosphobactrin > vesicular-arbuscular mycorrhiza > microphos > *Azotobacter* > *Azospirillum*.

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