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# Effect of integrated nutrient management strategies on quality of guava (*Psidium guajava* L.) cv. Gwalior 27

**Pratibha Jatav, AK Barholia and Arjun kashyap**

**Abstract**
Field trial was conducted at Pomology Orchard, College of Agriculture, Gwalior (M.P.) during 2016-17 & 2017-18 to evaluate the effect of integrated nutrient management strategies on quality of guava (*Psidium guajava* L.) cv. Gwalior 27. The experiment was laid out in Randomised Block Design (RBD) with three replications and twenty three treatments. The two years pooled data reavealed that hightest value in terms of quality attributes like fruit volume (209.4ml), number of seed per fruit (331.5), seed weight (8.92g), pulp weight (232.7g), pulp: seed ratio (0.038), TSS (11.52°Brix) and acidity(0.22) was obtained with the application of 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree.

**Keywords:** *Psidium guajava*, quality, neem cake, azotobacter, PSB, potash rich

## Introduction
Guava (*Psidium guajava* L.), is one of the most popular fruits grown in tropical, sub-tropical and some parts of arid regions of India. Guava belongs to the family Myrtaceae. Basically guava is a hardy crop but it gives good response to manuring and fertilization. Like any other plants, guava also requires different nutrient elements for proper growth and yield. Use of inorganic fertilizers, organic manures along with biofertilizers are chief sources of plants nutrients and have resulted in beneficial effects on growth, yield and quality of various fruit crops (Ram and Rajput, 2000) [5]. In general, the fruit tree supplemented with mixed quantity of the organic fertilizers and inorganic manures at full bearing stage is necessary to harvest sustainable production with optimum quality fruits. The total area under guava cultivation and production in India is about 2.51 lakh hectares and 4083,000 MT, respectively. The productivity of guava in India is 16.2 MT/ha. The total area and production of guava in Madhya Pradesh is around 24370 hectares and 9.12 Lakh MT, respectively. Madhya Pradesh ranks first in productivity with 37.4 MT/ha. Guava shares 4.5 per cent of area and 3.3 per cent of production among fruit crops in India (Anonynous, 2015) [1].

## Materials and Methods
The investigation was carried out at the Pomology orchard, College of Agriculture, Gwalior (M.P.) on 22 year old guava tree of cv. Gwalior 27. Gwalior is situated at $26^0$ 13' N latitude and $78^0$ 14' E longitudes at an altitude of 211.5 m above mean sea level in Gird belt. It has a subtropical climate with hot and dry summer where maximum temperature exceeds $45^0$ C in May June. The winters are cold and minimum temperature reaches as low as $2^0$ C in December and January. The experiment comprised of three replications with 23 treatments viz., $T_1$ = Control, $T_2$ = 100% NPK (500:300:400g) per tree, $T_3$ = 100% NPK + FYM 30kg per tree, $T_4$ = 100% NPK + Vermi-compost 15 kg /tree, $T_5$ = 100% NPK + Neem cake 8 kg per tree, $T_6$ = 75% NPK (375:225:300g) + FYM 30kg per tree, $T_7$ = 75% NPK + Vermi-compost 15 kg per tree, $T_8$ = 75% NPK + Neem cake 8 kg per tree, $T_9$ = 75% NPK +FYM 30kg + Azotobacter 30ml per tree, $T_{10}$ = 75% NPK+FYM 30kg + Potash rich 30ml per tree, $T_{11}$ = 75% NPK +FYM 30kg + Azotobacter 30ml+PSB 30ml per tree, $T_{12}$ = 75% NPK +FYM 30kg + Potash rich 30ml+PSB 30ml per tree, $T_{13}$ = 75% NPK +FYM30kg+Azotobacter30ml +Potash rich 30ml+PSB 30ml per tree, $T_{14}$ = 75% NPK+Vermi compost 15kg + Azotobacter 30ml per tree, $T_{15}$ = 75% NPK + Vermi compost 15kg + Potash rich 30ml per tree, $T_{16}$ = 75% NPK+ Vermi compost 15kg + Azotobacter 30ml+PSB 30ml per tree, $T_{17}$ = 75% NPK + Vermi compost

15kg + Potash rich 30ml+PSB 30ml per tree, $T_{18}$ = 75% NPK + Vermi compost 15kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree, $T_{19}$ =75% NPK + Neem cake 8 kg + Azotobacter 30ml per tree, $T_{20}$ =75% NPK + Neem cake 8 kg + Potash rich 30ml per tree, $T_{21}$ = 75% NPK + Neem cake 8 kg + Azotobacter 30ml+PSB 30ml per tree, $T_{22}$ = 75% NPK + Neem cake 8 kg + Potash rich 30ml+PSB 30ml per tree, $T_{23}$ = 75% NPK + Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree.

The whole quantity of the organic manure and bio fertilizer (Azotobater, PSB and Potash rich) was applied as a basal dose on the onset of monsoon. Then required doses of fertilizers were applied in two split doses in the month of July and August. For application of manure and fertilizers the top soil around the tree (equal to the leaf canopy of the tree) was dug up to 30 cm and the fertilizers were uniformly mixed into the soil, which was then leveled. Irrigation was supplied immediately after fertilizer application.

**Table 1:** Effect of integrated nutrient management on Physical quality parameters of guava

| Treatment | Fruit Volume (Ml) | No of seed / fruit | Seed weight (g) | Pulp Weight (g) | Seed/Pulp Ratio |
|---|---|---|---|---|---|
| $T_1$ | 167.3 | 270.1 | 8.55 | 181.5 | 0.047 |
| T2 | 175.9 | 288.1 | 8.64 | 198.2 | 0.044 |
| T3 | 177.3 | 287.0 | 8.65 | 199.2 | 0.044 |
| T4 | 179.2 | 289.5 | 8.67 | 201.8 | 0.043 |
| T5 | 180.6 | 293.7 | 8.67 | 204.2 | 0.043 |
| T6 | 169.8 | 276.2 | 8.59 | 188.3 | 0.046 |
| T7 | 172.1 | 277.2 | 8.61 | 191.0 | 0.045 |
| T8 | 173.7 | 281.0 | 8.63 | 193.2 | 0.045 |
| T9 | 183.4 | 298.5 | 8.69 | 204.8 | 0.043 |
| T10 | 187.4 | 302.2 | 8.70 | 207.9 | 0.042 |
| T11 | 192.8 | 308.5 | 8.75 | 216.1 | 0.041 |
| T12 | 194.4 | 316.0 | 8.76 | 216.8 | 0.040 |
| T13 | 203.0 | 328.9 | 8.85 | 227.3 | 0.039 |
| T14 | 184.9 | 299.6 | 8.70 | 206.3 | 0.042 |
| T15 | 189.8 | 306.4 | 8.72 | 210.3 | 0.042 |
| T16 | 196.5 | 318.3 | 8.78 | 218.7 | 0.040 |
| T17 | 197.7 | 321.4 | 8.79 | 220.4 | 0.040 |
| T18 | 207.3 | 330.0 | 8.87 | 230.3 | 0.039 |
| T19 | 186.2 | 300.7 | 8.70 | 207.4 | 0.042 |
| T20 | 191.6 | 307.0 | 8.73 | 212.9 | 0.041 |
| T21 | 199.6 | 322.8 | 8.80 | 221.9 | 0.040 |
| T22 | 201.8 | 324.1 | 8.82 | 222.7 | 0.040 |
| T23 | 209.4 | 331.5 | 8.92 | 232.7 | 0.038 |
| SE(m) | 0.520 | 3.582 | 0.007 | 2.742 | 0.001 |
| CD (at 5%) | 1.46 | 10.08 | 0.02 | 7.71 | 0.002 |

## Results and Discussions

The experimental findings obtained from the present study have been discussed in following heads

### Physical parameters

The result of the investigation mentioned in Table -1 revealed that physical parameters viz., fruit volume, seed weight, number of seeds per fruits, pulp weight and seed pulp ratio were significantly influenced by different treatments in which different combinations of organic, inorganic and bio fertilizers were applied in guava. The maximum volume of fruit (209.4ml), maximum number of seeds per fruit (331.5), seed weight (8.92g), pulp weight(232.7g) and minimum seed pulp ratio (0.038) were recorded in treatment $T_{23}$ 75% NPK (375:225:300g)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml per tree. The minimum volume was supplemented (167.3ml), number of seeds per fruit (270.1) seed weight (8.55g) and pulp weight (181.5g) and maximum seed pulp ratio (0.047) were found in treatment $T_{1=}$ control. The various treatments with respect to number of seed per fruit varied from 270.1to 331.5was found significant and seed pulp ratio varied from 0.047 to 0.038 also vary significantly among all different treatment. The data given in table 1 indicated that the effect of bio fertilizers, chemical fertilizers and organic manures on different physical parameters viz., number of seed per fruit and seed pulp ratio were found significant these were influenced by application of bio fertilizers, chemical fertilizers and organic manures.

The increase in fruit volume, seed weight and pulp weight by the application of integrated nutrient management treatments might be due to optimum supply of proper plant nutrients in right amount during entire crop period caused vigorous vegetative development of the plant and ultimately production of more photosynthates. Application of NPK along with neem cake, the required quantity of nitrogen was supplied at slowler rate that might have resulted into increased vegetative growth. Phosphorus plays an important role in photosynthesis and accumulation of food material and Potassium in carbohydrate & protein synthesis and in the regulation of water relations. It may also act as a catalyst in the formation of more complex substances and in the acceleration of enzymatic activities which ultimately leads to improvement in physical characters of the fruit. Similar results have also been reported by Koen *et al*. (1990) [2] and Kundu *et al*. (2007) [3] in guava.

**Table 2:** Effect of integrated nutrient management on Chemical quality parameters of guava

| Treatments | TSS (º Brix) | Acidity % |
|---|---|---|
| T1 | 8.63 | 0.50 |
| T2 | 9.25 | 0.45 |
| T3 | 9.40 | 0.43 |
| T4 | 9.45 | 0.42 |
| T5 | 9.60 | 0.41 |
| T6 | 8.68 | 0.47 |
| T7 | 8.83 | 0.46 |
| T8 | 9.02 | 0.46 |
| T9 | 9.88 | 0.39 |
| T10 | 10.20 | 0.37 |
| T11 | 10.68 | 0.32 |
| T12 | 10.77 | 0.31 |
| T13 | 11.27 | 0.25 |
| T14 | 9.98 | 0.38 |
| T15 | 10.45 | 0.36 |
| T16 | 10.88 | 0.30 |
| T17 | 10.90 | 0.29 |
| T18 | 11.42 | 0.24 |
| T19 | 10.15 | 0.37 |
| T20 | 10.53 | 0.34 |
| T21 | 11.02 | 0.29 |
| T22 | 11.08 | 0.28 |
| T23 | 11.52 | 0.22 |
| SE(m) | 0.052 | 0.006 |
| CD (at 5%) | 0.097 | 0.016 |

The chemical fruit quality in terms of maximum TSS (11.52º Brix) and minimum acidity (0.22) were found with the application of treatment $T_{23}$ = 75% NPK (375:225:300gNPK/tree)+ Neem cake 8 kg + Azotobacter 30ml +Potash rich 30ml+PSB 30ml. and the minimum TSS (8.63º Brix) and maximum acidity (0.50%) were noted under $T_1$ (control). Application of nitrogen fixing bacteria with lower dose of inorganic fertilizers might have exhibited regulatory role on the absorption and translocation of various metabolites, in which carbohydrates are most important which affected chemical quality the quality of fruits. During ripening of fruits the carbohydrates reserves of the root and stem were drawn upon heavily and hydrolyzed into sugars hence, results in better fruit quality. The results are in accordance in with Ram and Rajpoot (2000) [5]. The improvement in various chemical characteristics by application of optimum dose of NPK may be explained by the fact that Phosphorus enters into the composition of phospholipids and nucleic acids, the latter combines with proteins and resulted in the formation of nucleo proteins which are important constituents of the nuclei of the cells. Potassium acts as a catalyst in the formation of more complex substances and in the acceleration of enzyme activity. These carbohydrates and coenzymes are beneficial in the improvement of fruit quality and Nitrogen enhanced the uptake of Phosphorus and Potassium. The chain reactions in these components might have possibly been the reason of the improvement in quality of the fruit. Application of nitrogen fixing bacteria with lower dose of inorganic fertilizers might have exhibited regulatory role on the absorption and translocation of various metabolites, in which carbohydrates are most important which affects the quality of fruits. During ripening of fruits the carbohydrates reserves of the root and stem are drawn upon heavily and hydrolyzed into sugars hence, results in better fruit quality. Similar results have also been reported by Wagh and Mahajan (1987) [7], Uma Shankar *et al.* (2002), Kundu *et al*. (2007) [3], Kumar *et al.* (2008) [4].

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