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# Assess the effect of integrated nutrient management on growth and yield parameters of Guava cv. L-49

**Jagendra Pratap Singh, Mahendra Chaudhary, Saurabh Tomar and IN Shukla**

**Abstract**
The present investigation was conducted during two consecutive years and pooled analysis also worked out. The investigation comprised ten different treatments of organic, inorganic and bio-fertilizers viz., $T_1$-Control (Without nutrient application), $T_2$-100% RDF (400:300:400 gm NPK/tree), $T_3$-75% RDF + FYM (40 Kg /tree), $T_4$-50% RDF + FYM (70 Kg /tree), $T_5$-75% RDF + *Azospirillum* (250 gm/tree), $T_6$-50% RDF + *Azospirillum* (250 gm/tree), $T_7$-75% RDF + PSB (250 gm/tree), $T_8$-50% RDF + PSB (250 gm/tree), $T_9$-75% RDF + *Azospirillum* (250 gm/tree)+ PSB (250 gm/tree) and $T_{10}$- 50% RDF + *Azospirillum* (250 gm/tree)+ PSB (250 gm/tree). The observations were recorded on growth, reproductive and yield parameters. The present investigation revealed that the all the growth parameters, reproductive parameters, yield attributes were significantly influenced with the application of different treatments of integrated nutrient management during both the years and in pooled analysis. The soil application of 75% RDF + FYM 40 Kg /tree ($T_3$) recorded maximum growth parameters (plant height, trunk girth, tree canopy spread, number of leaves per shoot, number of branches per shoot, length of selected shoot and diameter), reproductive parameters (number of flowers and fruits per plant and fruit set per cent), yield (yield per tree and per ha) during both the years and in pooled analysis.

**Keywords:** guava, bio-fertilizers, INM, yield, growth parameters

## Introduction

In India it has been introduced in early 17th century and gradually become a commercial crop all over country particularly Maharashtra, Uttar Pradesh, Bihar, Orissa, Punjab, Uttrakhand, Gujarat, Madhya Pradesh, Karnataka and West Bengal. In Uttar Pradesh is extensively grown in Lucknow. The total cultivated area of guava fruits in India ranging from 0.26 m hectare with annual production ranging from 3.65 million tonne (Anonymous, 2017) [1].

The fruit type of guava is a berry with large seedy core. The fruit may be smooth or ridge and waxy layer. Guava is shallow rooted shrub with spreading branches. The plant height is generally 4-5 meters but older trees may reach a height 9 meters. It can be grown in soils with pH ranging from 5.5-7.5 without any irrigation. It can stand maximum at above 46˚C temperature and lowest 12-14 ˚C. Guava fruits can be cultivated in saline, alkaline, waste and neglected lands where most of the horticultural crops cannot be grown.

In North India including Uttar Pradesh there are two flowering season of guava April-May for rainy season and August - September for winter season crop.

However, it has been studied the physiological, biochemical and biological activities in plant systems are highly influenced due to interaction of nutrients and plant growth regulators.

Generally Indian soil is deficient to N and P. Nitrogen is one of the most important essential plant nutrients. It is constituents of protoplasm, protein, chlorophyll, nucleotide, alkaloids, hormones and vitamins, which play an important role in crop production and awareness on health security with use of natural food. Organic food and quality produce, the judicious use of chemicals is gaining less importance and banned by few countries. The use of chemical fertilizers for production of herbal drugs is also advisable to maintain the quality and medicinal properties of herbal species. The continuous applications of huge amount of chemical fertilizers hamper the fruit quality, soil health and generate pollution. The importance of integrated nutrient supply system which involves the combined use of various plant nutrient sources has now assured significance in the field of fruit production.

The conjugation use of bio-fertilizers with nitrogenous fertilizers increases the efficiency of nitrogen, improve the soil health and control the soil pollution. It is therefore, necessary to standardize other possible sources of nutrients to a specific soil and agro-climatic condition for better plant growth, production and quality of fruits.

## Materials and Methods

The present study was conducted on eight years old guava plants. cv. L-49 (Sardar), uniform thirty trees were selected for the experimental purpose. All the possible required cultural practices and basal application of manuers and fertilizers were followed as per recommended schedules.

## Experimental Details

The treatment combinations, consisting of different in-organic, organic and biofertilizers, were used to determine their effects on yield and quality of guava fruits. The details of experimental plan of present investigation as per proposed technical programme is given below:-

**Total number of treatments –** 10

| Treatments | Treatments combination |
|---|---|
| $T_1$: | Control (Without nutrient application) |
| $T_2$: | 100% RDF (400:300:400 gm NPK/tree) |
| $T_3$: | 75% RDF + FYM (40 Kg /tree) |
| $T_4$: | 50% RDF + FYM (70 Kg /tree) |
| $T_5$: | 75% RDF + Azospirillum (250 gm/tree) |
| $T_6$: | 50% RDF + Azospirillum (250 gm/tree) |
| $T_7$: | 75% RDF + PSB (250 gm/tree) |
| $T_8$: | 50% RDF + PSB (250 gm/tree) |
| $T_9$: | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) |
| $T_{10}$: | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) |

**Experimental Design -** R.B.D. (Randomized Block Design)

## Results and Discussion

The growth parameters (Table-1 to 8) such as plant height, trunk girth, tree canopy spread, number of leaves per shoot, number of branches per shoot, length of selected shoot and diameter were significantly influenced by different treatments of integrated nutrient management during both the years and in pooled analysis.

**Table 1:** Effect of integrated nutrient management on plant height increment

| Treatments | | m | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 0.39 | 0.41 | 0.40 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 0.60 | 0.63 | 0.62 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 0.62 | 0.66 | 0.64 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 0.47 | 0.50 | 0.48 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 0.50 | 0.53 | 0.51 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 0.46 | 0.49 | 0.47 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 0.52 | 0.55 | 0.54 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 0.43 | 0.45 | 0.44 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.54 | 0.57 | 0.56 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.48 | 0.51 | 0.49 |
| CD at 5% | | 0.040 | 0.0410 | 0.041 |
| SEm± | | 0.013 | 0.014 | 0.014 |

**Table 2:** Effect of integrated nutrient management on trunk girth increment

| Treatments | | cm | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 3.01 | 3.18 | 3.10 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 5.11 | 5.41 | 5.26 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 5.31 | 5.62 | 5.46 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 3.81 | 4.03 | 3.92 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 4.11 | 4.35 | 4.23 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 3.71 | 3.93 | 3.82 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 4.31 | 4.56 | 4.43 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 3.41 | 3.61 | 3.51 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree) + PSB (250 gm/tree) | 4.51 | 4.77 | 4.64 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree) + PSB (250 gm/tree) | 3.91 | 4.14 | 4.02 |
| CD at 5% | | 0.332 | 0.33 | 0.34 |
| SEm± | | 0.111 | 0.11 | 0.12 |

**Table 3:** Effect of integrated nutrient management on canopy spread increment N-S

| Treatments | | m | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 0.18 | 0.19 | 0.18 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 0.39 | 0.43 | 0.41 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 0.41 | 0.45 | 0.43 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 0.26 | 0.28 | 0.27 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 0.29 | 0.32 | 0.30 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 0.25 | 0.27 | 0.26 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 0.31 | 0.34 | 0.32 |

| | | | | |
|---|---|---|---|---|
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 0.22 | 0.24 | 0.23 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.33 | 0.36 | 0.34 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.27 | 0.29 | 0.28 |
| CD at 5% | | 0.022 | 0.024 | 0.024 |
| SEm± | | 0.007 | 0.008 | 0.008 |

**Table 4:** Effect of integrated nutrient management on canopy spread increment E-W

| Treatments | | m | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 0.19 | 0.21 | 0.20 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 0.41 | 0.46 | 0.43 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 0.43 | 0.48 | 0.46 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 0.27 | 0.30 | 0.29 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 0.30 | 0.34 | 0.32 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 0.26 | 0.29 | 0.28 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 0.33 | 0.36 | 0.34 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 0.23 | 0.25 | 0.24 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.35 | 0.38 | 0.37 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 0.28 | 0.31 | 0.30 |
| CD at 5% | | 0.025 | 0.027 | 0.26 |
| SEm± | | 0.008 | 0.009 | 0.09 |

**Table 5:** Effect of integrated nutrient management on number of leaves per shoot

| Treatments | | | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 4.62 | 5.12 | 4.87 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 6.72 | 7.45 | 7.08 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 6.92 | 7.67 | 7.29 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 5.42 | 6.01 | 5.71 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 5.72 | 6.34 | 6.03 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 5.32 | 5.89 | 5.61 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 5.92 | 6.56 | 6.24 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 5.02 | 5.56 | 5.29 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 6.12 | 6.78 | 6.45 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 5.52 | 6.12 | 5.82 |
| CD at 5% | | 0.46 | 0.51 | 0.48 |
| SEm± | | 0.154 | 0.17 | 0.16 |

**Table 6:** Effect of integrated nutrient management on number of branches per selected shoots

| Treatments | | | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 9.62 | 10.66 | 10.14 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 11.72 | 12.99 | 12.35 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 11.92 | 13.21 | 12.56 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 10.42 | 11.55 | 10.98 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 10.72 | 11.88 | 11.30 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 10.32 | 11.43 | 10.88 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 10.92 | 12.10 | 11.51 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 10.02 | 11.10 | 10.56 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 11.12 | 12.32 | 11.72 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 10.52 | 11.66 | 11.09 |
| CD at 5% | | 0.867 | 0.96 | 0.91 |
| SEm± | | 0.290 | 0.321 | 0.30 |

**Table 7:** Effect of integrated nutrient management on length of selected shoots

| Treatments | | cm | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 15.21 | 26.74 | 20.97 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 19.31 | 33.95 | 26.63 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 19.51 | 34.30 | 26.90 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 18.01 | 31.66 | 24.84 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 18.31 | 32.19 | 25.25 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 17.91 | 31.49 | 24.70 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 18.51 | 32.54 | 25.53 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 17.61 | 30.96 | 24.28 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 18.71 | 32.89 | 25.80 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 18.11 | 31.84 | 24.97 |
| CD at 5% | | 1.47 | 2.58 | 0.2.02 |
| SEm± | | 0.49 | 0.86 | 0.67 |

**Table 8:** Effect of integrated nutrient management on diameter of selected shoots

| Treatments | | cm | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 1.47 | 1.85 | 1.66 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 3.57 | 4.49 | 4.03 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 3.77 | 4.74 | 4.26 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 2.27 | 2.86 | 2.56 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 2.57 | 3.23 | 2.90 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 2.17 | 2.73 | 2.45 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 2.77 | 3.48 | 3.13 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 1.87 | 2.35 | 2.11 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 2.97 | 3.74 | 3.35 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 2.37 | 2.98 | 2.68 |
| CD at 5% | | 0.21 | 0.26 | 0.23 |
| SEm± | | 0.07 | 0.08 | 0.078 |

**Table 9:** Effect of integrated nutrient management on number of flowers per plant

| Treatments | | | | |
|---|---|---|---|---|
| | | $Y_1$ | $Y_2$ | Pooled |
| $T_1$ | Control (Without nutrient application) | 540.06 | 542.76 | 541.41 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 599.85 | 602.77 | 601.31 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 615.55 | 618.63 | 617.09 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 574.68 | 577.55 | 576.12 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 605.89 | 608.92 | 607.4 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 608.35 | 611.4 | 609.87 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 610.32 | 613.38 | 611.85 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 603.83 | 606.85 | 605.34 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 570.89 | 573.75 | 572.32 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 510.25 | 512.8 | 511.53 |
| CD at 5% | | 47.61 | 47.84 | 47.73 |
| SEm± | | 15.90 | 15.98 | 15.94 |

**Table 10:** Effect of integrated nutrient management on number of fruits per plant

| **Treatments** | | | | |
|---|---|---|---|---|
| | | **$Y_1$** | **$Y_2$** | **Pooled** |
| $T_1$ | Control (Without nutrient application) | 183.09 | 191.33 | 187.21 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 285.88 | 298.34 | 292.11 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 300.56 | 314.09 | 307.32 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 244.50 | 255.50 | 250.00 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 273.45 | 285.76 | 279.60 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 229.66 | 239.99 | 234.83 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 254.23 | 265.67 | 259.95 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 226.32 | 236.50 | 231.41 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 274.49 | 276.39 | 275.44 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 234.00 | 244.53 | 239.27 |
| CD at 5% | | 20.59 | 23.67 | 22.13 |
| SEm± | | 6.87 | 7.90 | 7.39 |

**Table 11:** Effect of integrated nutrient management on per cent fruit set

| **Treatments** | | **%** | | |
|---|---|---|---|---|
| | | **$Y_1$** | **$Y_2$** | **Pooled** |
| $T_1$ | Control (Without nutrient application) | 33.90 | 35.25 | 34.58 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 47.66 | 49.49 | 48.58 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 48.83 | 50.77 | 49.80 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 42.55 | 44.24 | 43.39 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 45.13 | 46.93 | 46.03 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 37.75 | 39.25 | 38.50 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 41.66 | 43.31 | 42.49 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 37.48 | 38.97 | 38.23 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 48.08 | 48.17 | 48.13 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 45.86 | 47.69 | 46.78 |
| CD at 5% | | 3.89 | 4.05 | 3.97 |
| SEm± | | 1.30 | 1.35 | 1.32 |

**Table 12:** Effect of integrated nutrient management on fruit yield per plant

| **Treatments** | | **Kg/plant** | | |
|---|---|---|---|---|
| | | **$Y_1$** | **$Y_2$** | **Pooled** |
| $T_1$ | Control (Without nutrient application) | 23.40 | 25.31 | 24.34 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 48.63 | 52.52 | 50.56 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 52.16 | 56.42 | 54.27 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 36.79 | 39.79 | 38.27 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 45.12 | 48.10 | 46.61 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 32.76 | 35.43 | 34.09 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 41.88 | 45.30 | 43.58 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 29.50 | 31.90 | 30.69 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 46.16 | 48.80 | 47.48 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 37.86 | 40.95 | 39.39 |
| CD at 5% | | 3.60 | 3.89 | 3.75 |
| SEm± | | 1.20 | 1.3 | 1.25 |

**Table 13:** Effect of integrated nutrient management on fruit yield per hectare

| **Treatments** | | **Tonne/ha** | | |
|---|---|---|---|---|
| | | **$Y_1$** | **$Y_2$** | **Pooled** |
| $T_1$ | Control (Without nutrient application) | 3.74 | 4.05 | 3.90 |
| $T_2$ | 100% RDF (400:300:400 gm NPK/tree) | 7.78 | 8.40 | 8.09 |
| $T_3$ | 75% RDF + FYM (40 Kg /tree) | 8.35 | 9.03 | 8.68 |
| $T_4$ | 50% RDF + FYM (70 Kg /tree) | 5.89 | 6.37 | 6.12 |
| $T_5$ | 75% RDF + Azospirillum (250 gm/tree) | 7.22 | 7.81 | 7.51 |
| $T_6$ | 50% RDF + Azospirillum (250 gm/tree) | 5.24 | 5.67 | 5.45 |
| $T_7$ | 75% RDF + PSB (250 gm/tree) | 6.70 | 7.25 | 6.97 |
| $T_8$ | 50% RDF + PSB (250 gm/tree) | 4.72 | 5.10 | 4.91 |
| $T_9$ | 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 7.38 | 7.70 | 7.54 |
| $T_{10}$ | 50% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree) | 6.06 | 6.55 | 6.30 |
| CD at 5% | | 0.57 | 0.626 | 0.60 |
| SEm± | | 0.19 | 0.209 | 0.20 |

The results clearly indicated that the soil application of 75% RDF + FYM 40 Kg /tree ($T_3$) recorded maximum plant height, trunk girth, tree canopy spread increment followed by application of 100% RDF 400:300:400 gm NPK/tree ($T_2$) as compared to other treatments and minimum increment in plant height, trunk girth, tree canopy spread in control ($T_1$) during both the years and in pooled analysis. Maximum number of leaves per shoot, number of branches per shoot, length of selected shoot and diameter were recorded with the application of75% RDF + FYM 40 Kg /tree ($T_3$) followed by application of 100% RDF 400:300:400 gm NPK/tree ($T_2$) as compared to other treatments and minimum were recorded in control ($T_1$). Organic manure and bio fertilizer favored for good soil fertility status which improve availability of nutrient and improve in number of tillers $m^{-2}$ favored better availability. Increase in plant height, trunk girth, tree canopy spread, number of leaves per shoot, number of branches per shoot, length of selected shoot and diameter may be attributed to the fact that the better nourishment causes beneficial effects such as accelerated rate of photosynthesis, assimilation, cell division and vegetative growth. These results are in agreement with the findings of Ram *et al.* (2007) [6, 7], Naik and Babu (2007) [5] Dutta *et al.* (2009) [3] and Goswami *et al.* (2012) [4] in guava Atom (2013) [2].

Reproductive parameters like as number of flowers per plant, number of fruits per plant and fruit set per cent were significantly influenced by the soli application of the different integrated nutrient management treatments during both the years of investigation and in pooled analysis of data.

Results clearly indicated that the application of 75% RDF + FYM 40 Kg /tree ($T_3$) recorded highest number of flowers per plant which, was closely followed by treatment $T_7$ (75% RDF + PSB (250 gm/tree). The treatment $T_3$ recorded significantly higher number of flowers per plant than treatment $T_1$, $T_2$, $T_4$, $T_9$ and $T_{10}$. Whereas, it was statistically at par with treatments $T_5$, $T_6$, $T_7$ and $T_8$. However, minimum number of flowers per plant was counted in $T_{10}$ (50% RDF + Azospirillum 250 gm/tree+ PSB 250 gm/tree). It has been well documented that the beneficial effects of farm yard manure along with inorganic fertilizers help in improving the soil health in terms of nutrient availability as well as by improving the soil physical and biological condition thereby, increasing the nutrient availability for the growth and developmental processes of the plant. Maximum number of fruits per plant was picked in treatment $T_3$ (75% RDF + FYM 40 Kg /tree) followed by in $T_2$ (100% RDF, 400:300:400 gm NPK/tree). However, minimum number of fruits per plant was recorded in $T_1$ (without nutrient application). The treatment $T_3$ recorded significantly higher number of fruits per plant than rest of the treatment except $T_2$ which was statistically at par with it. The combined application of RDF with farm yard manure increased the vegetative growth in terms of leaf number and size, ultimately increased the photosynthetic area which resulted in increased accumulation of carbohydrates needed for reproductive growth of the plant which was reflected in production of more number of flowers, increased fruit set and fruits under the treatment of 75% RDF + FYM 40 Kg /tree. The present findings are in accordance with the reports of Sharma (2004) [8] and Atom (2013) [2].

The observations recorded on fruit set per cent revealed that the maximum fruit set % was calculated in treatment $T_3$ (75% RDF + FYM 40 Kg /tree) followed by $T_9$ 75% RDF + Azospirillum (250 gm/tree)+ PSB (250 gm/tree). However, minimum number of fruit set % was recorded in $T_1$ (without nutrient application).

Yield is final product of all physiological, metabolic processes and influenced by many yield components like number of branches per plant, number of flowers and fruits per plant, fruit length, fruit diameter and fruit set %. The data regarding to yield per plant and per hectare summarized in Table-4.12 & 4.13. The perusal of data revealed that the various treatments of integrated nutrient management significantly influenced the yield and yield attributes. Soil application of -75% RDF + FYM 40 Kg /tree ($T_3$) produced highest fruit yield followed by treatment $T_2$ (100% RDF, 400:300:400 gm NPK/tree), $T_9$-75% RDF + *Azospirillum* (250 gm/tree) + PSB (250 gm/tree) and $T_5$-75% RDF + *Azospirillum* (250 gm/tree). However, minimum fruit yield was recorded in $T_1$ (without nutrient application). The treatment $T_3$ produced significantly higher fruit yield than rest of the treatments except treatment $T_2$ which was statistically at par with it. The improvement in the yield may be due to the combined application of organic and inorganic fertilizers is a result of the interaction between them which helped in increasing the soil nutrient availability and their uptake by the plants that resulted in better vegetative growth in terms of shoot length and number of leaves which have produced the higher quantum of carbohydrates needed for the development of the fruits thereby, increasing the number, size and weight of fruits which ultimately leads towards getting higher yield in these treatments. The lowest yield in control treatment ($T_1$) could be the result of poor vegetative growth on account of scarce nutrient availability in turn, reducing the number, size and weight of the fruits. The results on similar lines were also reported by earlier researchers namely Ram and Pathak (2007) [6, 7] and Dutta *et al.* (2009) in guava.

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