*Original Research Article*

# Effect of Integrated Nutrient management on physical characteristics of guava (*Psidiumguajava*) cv. Allahabad Safeda under meadow orcharding.



## Abstract

The present study, **"Effect of integrated nutrient management on physical characteristics of guava (*Psidiumguajava*) cv. Allahabad Safeda under meadow orcharding"**,was carried out in the years 2022, at Central Research Farm, Department of Horticulture, Sam Higginbottom Institute of Agriculture & Sciences, Prayagraj (U.P.). Twenty treatments made up the experiment with : ($T_0$) Control, ($T_{1)}$100% NPK (650:325:375g plant-1), ($T_2$)100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, ($T_3$)60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, ($T_4$)60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, ($T_5$)60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, ($T_6$) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, ($T_7$)40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, ($T_8$)40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, ($T_9$)25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1, ($T_{10}$)Aztobacter 250g plant-1, ($T_{11}$)Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1), ($T_{12}$)Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, ($T_{13}$)Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, ($T_{14}$)Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, ($T_{15}$)Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, ($T_{16}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, ($T_{17}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, ($T_{18}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, ($T_{19}$)Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1.These treatments were evaluated in Randomized Blocked Design with three replications. The results showed that a combination of different nutrients had a significant impact on the guava plant's growth and yield parameters, including minimum days required for flowering (24.16),minimum days required from flower to fruit set (19.31),minimum days required from fruit set to maturity (99.15),maximum number of flower per plant (256.36),maximum number of fruit per plant (246.14),maximum fruit weight (g) (144.74),maximum fruit yield per tree (kg) (35.58),maximumfruitsetting(%) (96.01),pulpweight (g) (136.03),total soluble solid ($^0$Brix) (9.52),Ascorbic acid (mg / 100 g) (206.88),minimum acidity (0.41)were all found to be best under the treatment ($T_{14}$)Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, whereas acidity (0.80%) was at its highest in $T_0$ Control.

**Key words:** *INM,bio fertilizer, micronutrients,Guava, , Yield,*

## INTRODUCTION

Guava (*Psidiumguajava* L.), belongs to the Myrtaceae family, It is a fruit that originated in Mexico or Central America and is now found across tropical America and the Caribbean. It was first introduced to India in the 17th century. It is known as the apple of the tropics and is a crucial tropical fruit crop that is produced throughout tropical and subtropical regions. It is referred to as poor man's fruit. Guavas are a highly common and well-liked fruit because of its affordable pricing, nutritional content, and pleasant taste. Although the fruit (berry) has a great source of pectin (0.5–1.8%) and ascorbic acid, it is poor in calories (Adsule&Kadam, 1995). Due to its hardy nature and prolific bearing even on marginal lands, the guava is a significant fruit crop throughout the country's tropical and subtropical areas. Its cultivation takes minimal attention and resources. The production method for this crop, however, has recently undergone a paradigm change from subsistence farming to commercial agriculture. Due to the extensive tree canopy, the traditional style of farming sometimes presented difficulties in achieving required levels of output. As a result, it became necessary to enhance the current manufacturing system in addition to raising its productivity. Modern fruit farming techniques like the Meadow Orchard use tiny or dwarf trees with modified canopies. This system can support 5000 plants per hectare, which are planted at 2.0 m × 1.0 m spacing and are regularly topped at especially during initial stages.Guava topping and hedging are useful for limiting tree growth and increasing fruit supply. To assess the potential of this method, a comparison between the meadow orchard system and the conventional method of fruit cultivation is required.The best-quality fruits are produced in Uttar Pradesh, which is the major producer state in India. But since they are so fragile, the fruits are blemished, and biochemical post-harvest alterations make them softer, causing rotting. Fresh fruit rotting can be efficiently reduced, however its storage life can be extended.The organic manure play vital role as it supplies all the essential nutrients in a balanced form maintaining the soil health physically as well as chemically. The Experiment was revealed that the vermi-compost was superior over other organic sources and closely followed by poultry manure and leaf litter in improving vegetative growth, flowering, fruiting, yield and fruit attributes and fruit quality along with improvement in soil fertility and leaf nutrient status of the guava plant (Naik*et al.*, 2007).

The chemical fertilizers have played a very significant role in providing nutrients for intensive crop production, which has brought about manifold increase in production of fruit crops. Though the chemical farming helped the farmers to accomplish new strides in Horticulture, but their indiscriminate and unscrupulous use in horticulture/agriculture has led to Deterioration of soil health. With the increased use of fertilizers in an unbalanced manner, will led to diminishing soil productivity and multiple nutrient deficiencies. The gravity of Environmental degradation caused by the faulty cultivation practices had led to focus on Ecologically sound, viable and sustainable farming system. One such alternative horticulture system, which will help to overcome the problem of soil degradation and declining soil fertility and crop yield, is integrated nutrient management (INM).

The integration of organic manures and inorganic fertilizers was more effective in increasing growth and yield of guava trees than the inorganic fertilizers alone. It is also helpful to reduce the inorganic fertilizer requirement, to restore the organic matter in soil and to increase nutrient use efficiency, to maintain quality in terms of physical, chemical and biological properties of soil, to maintain the nutrient balance between the supplied nutrient and nutrient removed by plant and to improve soil health and productivity on sustainable basis

**Comment [DAL1]:** Very long Introduction! Please give an essential information

## MATERIALS AND METHOD

A field experiment was conducted during 2022 at Central Research Farm, Department of Horticulture, Sam Higginbottom Institute of Agriculture & Sciences, Prayagraj (U.P.).The experiment was conducted in randomized block design. The experiment consist of twenty treatments. The treatment were control ($T_0$) Control, ($T_{1)}$100% NPK (650:325:375g plant-1), ($T_2$)100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, ($T_3$)60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, ($T_4$)60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, ($T_5$)60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, ($T_6$) 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, ($T_7$)40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, ($T_8$)40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, ($T_9$)25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC

7.5 kg plant-1, ($T_{10}$)Aztobacter 250g plant-1, ($T_{11}$)Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1), ($T_{12}$)Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1, ($T_{13}$)Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1, ($T_{14}$)Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1, ($T_{15}$)Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1, ($T_{16}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1, ($T_{17}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1, ($T_{18}$)Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1, ($T_{19}$)Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1. Five to Six years old guava trees of uniform vigor and size were selected for investigation. Whole tree was used as single experimental unit. All the treatments were arranged in randomized block design and each treatment was replicated thrice. Thus, total of 60 plants were selected for each set of experiment. The whole of the organic manure was applied as a basal dose on the onset of monsoon. Then required doses of fertilizers were applied in the month of August and then bio-fertilizers were applied one week after each application of inorganic fertilizer. 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. Micronutrient were applied before flowering of guava plants. The various fruit parameters fruit length and diameter were noted using the vernier caliper, volume of fruit was recordedby water displacement method and weight of fruit was recorded using electronic weigh balance. Yield perhectare was calculated on the basis number of tree per hectare and yield per plant. For determination of chemical parameters of fruit viz., acidity, total soluble solids (TSS), sugars, ascorbic acid, pH and pectin content, four healthy fruits were selected randomly from each tree at full maturity stage. Hand refractometer was used for determination of T.S.S. in 0Brix. Acidity was estimated by simple acid–alkali titration method as described in A.O.A.C. (1970). Sugars in fruit juice were estimated by the method as suggested by Nelson (1944). Assay method of ascorbic acid was followed given by Ranganna (1977).The estimation of pectin was according to the methods of Kertesz (1951).

**Comment [DAL2]:** Where did you inspire? In the literature? Please indicate the source

**RESULT AND DISCUSSION**

The growth parameter characters of the tree were significantly influenced by different treatments (Table 1). Days required for flowering, Days required from flower to fruit set, Days required from fruit set to maturity, Number of flower per plant, Number of fruit per plant, Fruit weight (g), Fruit yield per tree (kg). Maximum increase in Plant height. It was also found that Treatment $T_{15}$was found to be at par with treatment $T_{14}$.

The salient features of the result obtained are summarized below:-

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required for flowering (24.16). Where as the maximum days required for flowering (50.30) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required from flower to fruit set (19.31). Where as the maximum days required from flower to fruit set (43.1) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum days required from fruit set to maturity (99.15). Where as the maximum days required from fruit set to maturity (140.29) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum number of flower per plant (256.36). Where as the minimum number of flower per plant (137.18) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum number of fruit per plant (246.14). Where as the minimum number of flower per plant (107.07) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum fruit weight (g) (144.74). Where as the minimum fruit weight (g) (81.47) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum fruit yield per tree (kg) (35.58). Where as the minimum fruit yield per tree (kg) (8.72) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximum polar and radial diameter (cm) (6.20 and 6.43). Where as the minimum polar and radial diameter (cm) (4.05 and 4.23) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumnumberofseedsperfruit (278.12). Where as the minimum numberofseedsperfruit (217.92) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumpulpweight (g) (136.03). Where as the minimum pulpweight (g) (75.21) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumseedweight (g) (7.71). Where as the minimum seedweight (g) (6.26) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumfruitsetting(%) (96.01). Where as the minimum fruitsetting(%) (78.05) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumtotal soluble solid ($^0$Brix) (9.52). Where as the minimum total soluble solid ($^0$Brix) (7.18) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumAscorbic acid (mg / 100 g) (206.88). Where as the minimum Ascorbic acid (mg / 100 g) (153.63) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken maximumtotalsugars (7.85). Where as the minimum totalsugars (6.09) was found in control.

Treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was taken minimum acidity (0.41). Where as the maximum acidity (0.80) was found in control.

## CONCLUSION

In the present investigation concluded that among the different treatment combinations the treatment $T_{14}$Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 was superior in respect to fruit growth, yield and quality parameters and also best in net return (Rs. 1622.82 /tree) with Benefit Cost Ratio (4.86)respective.

**Table 1. Effect of integrated nutrient management on Yield Attributes of Guava (*Psidium guajava*) cv. Allahabad Safeda under meadow orcharding**

| Treatment notation | Treatment combinations/concentrations | Days required for flowering | Days required from flower to fruit | Days required from fruit set to maturity | Number of flower per plant | Number of fruit per plant | Fruit weight (g) | Fruit yield per tree (kg) | Pulpweight (g) | Fruitsetting(%) |
|---|---|---|---|---|---|---|---|---|---|---|
| $T_0$ | Control | 50.30 | 43.31 | 140.29 | 197.43 | 197.43 | 81.47 | 8.72 | 75.21 | 78.05 |
| $T_1$ | 100% NPK (650:325:375g plant-1) | 32.17 | 27.41 | 133.32 | 211.00 | 211.00 | 116.96 | 15.27 | 109.70 | 87.73 |
| $T_2$ | 100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1 | 40.40 | 35.97 | 129.97 | 268.17 | 268.17 | 106.18 | 19.73 | 98.30 | 90.23 |
| $T_3$ | 60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1 | 43.34 | 35.86 | 125.48 | 260.10 | 260.10 | 104.55 | 18.87 | 96.80 | 92.22 |
| $T_4$ | 60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 | 47.55 | 40.00 | 132.86 | 239.41 | 239.41 | 126.81 | 20.46 | 119.54 | 91.71 |
| $T_5$ | 60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1 | 38.29 | 33.24 | 124.11 | 244.44 | 244.44 | 114.52 | 18.88 | 107.13 | 90.03 |
| $T_6$ | 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1 | 41.54 | 35.41 | 136.23 | 231.17 | 231.17 | 122.59 | 17.65 | 115.08 | 87.70 |
| $T_7$ | 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1 | 40.41 | 33.85 | 130.52 | 245.92 | 245.92 | 107.03 | 16.53 | 99.49 | 87.92 |
| $T_8$ | 40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1 | 35.33 | 26.78 | 122.26 | 269.04 | 269.04 | 127.52 | 24.26 | 120.44 | 92.14 |
| $T_9$ | 25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1 | 42.01 | 34.96 | 129.81 | 277.56 | 277.56 | 130.48 | 26.22 | 123.00 | 93.39 |
| $T_{10}$ | Aztobacter 250g plant-1 | 48.01 | 42.19 | 134.48 | 267.03 | 267.03 | 114.52 | 21.25 | 107.42 | 91.96 |
| T11 | Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1) | 36.23 | 28.63 | 137.26 | 254.95 | 254.95 | 121.18 | 20.75 | 113.84 | 90.90 |
| T12 | Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1 | 37.64 | 29.90 | 122.29 | 291.59 | 291.59 | 110.85 | 22.17 | 103.36 | 90.82 |
| T13 | Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1 | 28.19 | 24.31 | 117.86 | 307.84 | 307.84 | 137.00 | 30.27 | 128.78 | 93.95 |
| T14 | Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 | 24.16 | 19.31 | 99.15 | 330.61 | 330.61 | 144.74 | 35.58 | 136.03 | 96.01 |
| T15 | Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1 | 26.91 | 21.27 | 110.67 | 323.05 | 323.05 | 142.53 | 33.69 | 133.93 | 94.70 |
| T16 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1 | 33.01 | 27.79 | 128.15 | 293.47 | 293.47 | 112.52 | 22.54 | 104.53 | 91.65 |
| T17 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1 | 47.00 | 37.44 | 133.85 | 295.78 | 295.78 | 107.89 | 22.12 | 99.81 | 91.43 |
| T18 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1 | 44.67 | 35.55 | 133.89 | 270.55 | 270.55 | 122.85 | 22.81 | 114.95 | 93.35 |
| T19 | Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1 | 39.23 | 31.55 | 134.23 | 282.11 | 282.11 | 120.90 | 23.91 | 113.49 | 93.73 |
| | **F-Test** | **S** | **S** | **S** | **S** | **S** | **S** | **S** | **S** | **S** |
| | **C.D. at 0.5%** | **5.322** | **3.293** | **5.059** | **12.299** | **12.660** | **8.120** | **1.914** | **8.140** | **0.596** |
| | **S.Ed. (±)** | **2.629** | **1.627** | **2.499** | **6.075** | **6.254** | **4.011** | **0.946** | **4.021** | **0.294** |

**Table 2. Effect of integrated nutrient management on Chemical characters of Guava (*Psidium guajava*) cv. Allahabad Safeda under meadow orcharding**

| Treatment notation | Treatment combinations/concentrations | Total soluble solid ($^0$Brix) | Ascorbic acid (mg / 100 g) | Totalsugars | Acidity |
|---|---|---|---|---|---|
| $T_0$ | Control | 7.18 | 128.71 | 6.09 | 0.80 |
| $T_1$ | 100% NPK (650:325:375g plant-1) | 8.34 | 132.25 | 6.71 | 0.64 |
| $T_2$ | 100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1 | 7.56 | 135.52 | 6.39 | 0.61 |
| $T_3$ | 60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1 | 7.57 | 131.15 | 6.73 | 0.69 |
| $T_4$ | 60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 | 8.20 | 132.11 | 7.14 | 0.57 |
| $T_5$ | 60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1 | 8.46 | 130.66 | 7.17 | 0.64 |
| $T_6$ | 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1 | 7.98 | 148.66 | 6.93 | 0.57 |
| $T_7$ | 40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1 | 8.05 | 135.88 | 6.64 | 0.65 |
| $T_8$ | 40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1 | 8.29 | 138.15 | 7.21 | 0.56 |
| $T_9$ | 25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1 | 8.52 | 140.15 | 6.49 | 0.60 |
| $T_{10}$ | Aztobacter 250g plant-1 | 8.36 | 144.36 | 7.08 | 0.71 |
| T11 | Aztobacter 250g plant-1 +100% NPK (650:325:375g plant-1) | 8.15 | 145.25 | 7.20 | 0.74 |
| T12 | Aztobacter 250g plant-1+100% NPK (650:325:375g plant-1)+FYM 13.2kg plant-1+VC 9.9kg plant-1+PM 3.3 kg plant-1 | 8.19 | 148.54 | 7.31 | 0.77 |
| T13 | Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ FYM 16 kg plant-1 | 9.07 | 153.15 | 7.66 | 0.46 |
| T14 | Aztobacter 250g plant-1 +60% NPK (390:195:225g plant-1)+ VC 12 kg plant-1 | 9.52 | 154.55 | 7.85 | 0.41 |
| T15 | Aztobacter 250g plant-1+60% NPK (390:195:225g plant-1)+ PM 4 kg plant-1 | 9.17 | 153.25 | 7.74 | 0.43 |
| T16 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+VC 9 kg plant-1 | 7.76 | 148.25 | 7.18 | 0.73 |
| T17 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ FYM 12 kg plant-1+PM 4 kg plant-1 | 8.16 | 150.15 | 7.19 | 0.71 |
| T18 | Aztobacter 250g plant-1 +40% NPK (260:130:150g plant-1)+ PM 3 kg plant-1+VC 9 kg plant-1 | 8.18 | 151.55 | 7.17 | 0.67 |
| T19 | Aztobacter 250g plant-1+25% NPK (162.5:81.25:93.75)+FYM 10 kg plant-1+PM 2.5kg plant-1+VC 7.5 kg plant-1 | 8.34 | 152.44 | 7.25 | 0.72 |
| | **F-Test** | **S** | **S** | **S** | **S** |
| | **C.D. at 0.5%** | **0.429** | **6.864** | **0.256** | **0.138** |
| | **S.Ed. (±)** | **0.212** | **3.390** | **0.126** | **0.068** |

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