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Effect of Individual and Combined Application of Organic and Inorganic Manures on the Productivity of Guava (*Psidium guajava* L.)

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Abstract: The experiment was conducted to study the effect of farm yard manure and inorganic fertilizers applied alone or in combination on the productivity of Winter crop of guava. It has been observed that combined application of farmyard manure and NPK proved best to increase the fruit size, weight and total yield. Alone application of manure was found better than alone application of NPK. The effect of combined application of manure with NP, NK and PK was found in descending order to improve the production. Total soluble solids were not affected with any of the treatment and almost same level of TSS was noted in all cases. However, the yield was significantly increased when all the three major elements (NPK) were applied along with rottened farm yard manure.

Key words: Guava, organic manure, inorganic fertilizers, winter crop, productivity

Introduction

Guava (*Psidium guajava* L.) is one of the important fruit of Pakistan. It occupies fourth position in the fruit industry of Pakistan. It occupies an area of 56.8 thousand hectares with annual production of 454.4 thousand tonnes (Anonymous, 1997). It is the richest source of vitamin-C. It is liked much by all kinds of people due to its excellent taste, flavour and nutritional values. It gives two crops in a year and for this reason it remains available in the market for most of the time of the year. Summer crop is usually affected with attack of whitefly due to which most of the fruit is destroyed and does not remain marketable. Sometimes, farmers can not get any income from this crop and have to suffer great losses. The winter crop is free from such attack and good quality fruit is produced. But due to number crop in summer season, the trees become exhausted and as a result the bearing of winter crop is seriously affected. If proper nutrient level of soil and trees is maintained for winter crop, we can get improved production. The summer crop is mostly useless from market point of view, thus it must be discouraged by dropping flowers artificially. In this way the health of the tree is maintained and we can get good winter crop. Use of inorganic fertilizers is a common practice by our farmers but the latest research has shown that the combined application of organic and inorganic manures give better results than their individual applications. Nitrogen, phosphorus and potassium fertilizers were applied individually and in different combinations to guava before initiation of new growth. It was observed that NPK applied together produced more number of fruits of bigger size having more weight than their individual applications (Aiyelaagbe, 1989). Twelve different fertilizer treatments, comprising organic (poultry manure, cattle manure, goat manure) and inorganic (urea, NPK, $(\text{NH}_4)_2\text{SO}_4$) fertilizers alone or in various combinations, were applied to guava. Plant height, stem diameter, number of leaves, number of fruits, fruit weight and TSS were significantly affected and being greatest by NPK in combination with cattle manure (Villasurda and Baluyut, 1990). In 3 separate trials with 10 year old guava trees, cv. 'Fan Retlef', the effects were compared of calcium ammonium nitrate, superphosphate, potassium chloride and cattle manure each applied at annual rates of 0-2000, 0-750, 0-1000 g/tree and 0-100 kg/tree, respectively individually and in different combinations. The highest yields were obtained with annual application rates of calcium ammonium nitrate at 800 g/tree, superphosphate at 300 g/tree, KCl at 400 g/tree and manure at 80 kg/tree (Koen *et al.*, 1990). Different levels of urea (300, 600, 900 g/tree), superphosphate (100, 150, 200

g/tree), potassium nitrate (200, 250, 300 g/tree) were applied to guava along with 50, 70 or 100 kg of manure. Maximum yield and fruit size was observed with a combined application of urea 300 g, superphosphate 150 g, potassium nitrate 250 g and manure 70 kg per tree annually (Woulter, 1992). Keeping in view these facts present project was initiated to evaluate the effect of organic and inorganic manures on guava production.

Materials and Methods

These studies were carried out at Horticultural Research Station, Dera Ghazi Khan during 1997-99. Twenty five trees of guava were selected for the studies. All the trees were growing under similar agroclimatic condition. Age of the trees was about 10-12 years and they were uniform in size. The flowers of the summer crop were immediately dropped just after opening. Thorough cultivation and hoeing of the trees was done. Manure and fertilizers were applied in the end of August, 1997 and 1998. There were four replications. Various treatments were comprised as under:

- T₁ = NPK (500, 250, 250 g)
- T₂ = FYM (80 kg)
- T₃ = NPK + FYM (half doze of fertilizer + 80 kg FYM)
- T₄ = NP + FYM (half doze of fertilizer + 80 kg FYM)
- T₅ = NK + FYM (half doze of fertilizer + 80 kg FYM)
- T₆ = PK + FYM (half doze of fertilizer + 80 kg FYM)
- T₇ = Control

When the application of manure and fertilizer were applied in combined form, the dozes of the inorganic fertilizers were reduced to one half of the individual application. Data were collected on the following parameters:

- (i) Yield per plant (kg)
- (ii) Fruit size (cm)²
- (iii) Average weight of single fruit (gm)
- (iv) TSS

The experiment was laid out according to the randomized complete block design and difference among treatment means was compared by using Duncans New Multiple Range test (Steel and Torrie, 1980).

Results

The data procured on various parameters is given in Table 1 and discussed as under.

Muhammad *et al.*: Guava, organic manure, inorganic fertilizers, winter crop, productivity

Table 1: Effect of individual and combined application of organic and inorganic manures on the productivity of guava (*Psidium guajava* L.) 1997-99

| Treatments | Yield per plant (kg) | Fruit size (cm ²) | Average wt of single fruit (gm) | Total soluble solids |
|--------------------------|----------------------|-------------------------------|---------------------------------|----------------------|
| T ₁ NPK | 39.56c | 24.75b | 49.50b | 8.8a |
| T ₂ FYM | 48.25b | 31.25ab | 53.25b | 8.9a |
| T ₃ NPK + FYM | 63.58a | 35.15a | 62.56a | 9.3a |
| T ₄ NP + FYM | 28.50d | 22.14bc | 44.70c | 7.7a |
| T ₅ NK + FYM | 27.92d | 21.15bc | 41.00c | 6.9a |
| T ₆ PK + FYM | 27.56d | 20.22bc | 36.25cd | 6.3a |
| T ₇ Control | 19.45e | 16.25c | 29.15e | 6.8a |

Yield/plant (kg): Table 1 depicts highly significant results for various treatments. T₃ got the highest position by producing 63.58 kg fruits per plant. This was followed by T₁ and T₂ by producing 48.25 and 39.56 kg fruits, respectively. These three treatments were found different statistically. Next group of treatments was formed by T₄, T₅ and T₆ by producing 28.50, 27.92 and 27.56 kg fruits per tree, respectively and no statistical difference could be located among them. The lowest yield (19.45 kg) was found in case of control.

Fruit size (cm)²: T₃ maintained its supremacy over all other treatments for improving the size of fruits as is revealed from Table 1 by producing 35.15 cm² fruit size. All other treatments except control behaved statistically similarly and T₂, T₁, T₄, T₅ and T₆ were found in descending order having a fruit size of 31.25, 24.75, 22.14, 21.15 and 20.22 cm², respectively. Control was observed at the bottom with a fruit size of 16.25 cm².

Average weight of single fruit (gm): Table 1 indicates the traditional supreme position of T₃ with average weight of single fruit of 62.56 gm. Next best position was obtained by T₂ which was statistically similar to T₁, T₄, T₅ and T₆ formed another group of treatments which were statistically at par with minor differences by producing 44.70, 41.00 and 36.25 gm weight of a single fruit on average basis. Lowest position was occupied by control.

Total soluble solids: Different treatments were found ineffective to change the total soluble solids and no statistical difference could be located among any of the treatments or control. The TSS was found in an order of 9.3, 8.9, 8.8, 7.7, 6.9, 6.3 and 6.8 for T₃, T₂, T₁, T₄, T₅, T₆ and T₇, respectively.

Discussion

Yield of the guava was found increased with the application of farm yard manure and fertilizers. Although alone application of manure and fertilizer was observed favorable

for improvement of the production but the combined application was found more suitable. Farm yard manure when applied with NPK proved best because most of the major and minor elements are thought to be present in the farm yard manure, but they may be in unavailable form. When NPK was applied, the elements present in the manure were activated and converted into available form. Thus the production was found increasing with their combined application than individual applications, or control. Similar results were obtained by Koen *et al.* (1990), Villasurda and Baluyut (1990) and Woulter (1992).

References

- Aiyelaagbe, I.O.O., 1989. Effect of NPK fertilizer on the growth and yield of guava. Kadawa, Kano State, NIHORT Technical Bulletin, No. 11, pp: 137-139.
- Anonymous, 1997. Agriculture statistics of Pakistan, 1997-98. Govt. of Pak. Food and Agriculture Division, Planning Unit, Islamabad.
- Koen, I.J., S.F. Plessis, A. Hobbs and S.F. Du-Plessis, 1990. Effect of nitrogen, phosphorus and potassium fertilizer levels and manures on yield and fruit size of guavas. Information Bulletin, Citrus and Subtropical Fruit Research Institute, South Africa, No. 211, pp: 8-11.
- Steel, R.G.D. and P.A. Torrie, 1980. Principles and Procedures of Statistics. McGraw-Hill, Kogakusa Ltd., Tokyo, Japan, pp: 377-400.
- Villasurda, P.J. and N.M. Baluyut, 1990. Growth and yield of guava (*Psidium guajava* L.) as affected by different levels and sources of organic and inorganic fertilizers. USM College Agric. Res. J., 1: 18-33.
- Woulter, J.S., 1992. Effect of organic and inorganic manures on yield of guava (*Psidium guajava* L.). Ann. Agric. Sci., 27: 132-137.