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Original Research Article

Effect of Foliar Application of Different Chemicals on Yield and Economics of Guava (*Psidium guajava* L.) var. Sardar

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A B S T R A C T

The present investigation entitled "Effect of foliar application of different chemicals on yield and quality of guava (*Psidium guajava* L.)" Var. Sardar was conducted in a well-established guava orchard on 9 years old Sardar guava trees planted at 6×6 m having uniform growth and productivity at the instructional-Cum-Research Farm, Department of Horticulture, College of Agriculture, Latur, during mrig bahar 2013-14. The experiment was laid out in Randomized Block Design (RBD) with ten treatments replicated thrice. The treatments comprised of 19:19:19 @ 1% (T_1), 12:61:0 @ 1% (T_2), 0:52:34 @ 1% (T_3), Calcium Nitrate @ 1% (T_4), Sulphate of Potash @ 1% (T_5), Calcium Nitrate @ 1% + Sulphate of Potash @ 1% (T_6), $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_7), 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8), Calcium Nitrate @ 1% + Sulphate Potash + @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_9) and Control (T_{10}). The results revealed that, the maximum number of fruits per tree (288), yield per tree (55.69 kg) and yield (15.50 t) per hectare was recorded in treatment of 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8), and it was followed by the treatment of (T_6). The maximum values of diameter of fruit (9.17 cm) and TSS (13.40 ^oBrix) were observed with the application of 0:52:34 @ 1% (T_3) and at par results were observed in Sulphate of Potash @ 1% (T_5) treatment. The minimum values for most of the yield and economical attributes studied were observed in control (T_{10}) treatment. Maximum value of B: C ratio (3.26) was obtained in the treatment of calcium nitrate @ 1% + sulphate of potash @ 1% (T_6) and it was followed by treatment 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8). The minimum values for all these parameters were observed in control (T_{10}) treatment.

Keywords

Guava, Chemicals, Yield

Introduction

Guava (*Psidium guajava* L.) "Apple of the tropics" is an important fruit crop of country. Guava is one of the fourth most important fruit crop in India after Mango, Banana and Citrus. In India, it occupies nearly 2.36 lakh hectares of area with production of 31.98 lakh metric tonnes and average productivity of 13.6 metric tonnes per hectare. In Maharashtra, it is cultivated in the area of 0.39 lakh hectare with production of 3.05 lakh metric tonnes and with an average productivity of 7.8 metric tonnes per hectare.

Low productivity of guava in Maharashtra state as compared to national, large scale use of chemical fertilizers causes the problem of ground water and environmental pollution

through leaching, volatilization and denitrification in addition to wastage of nutrients through costly fertilizers. The disproportionate use of chemical fertilizers has widened soil imbalance in terms of NPK ratio and lowered the organic carbon contents of the soil. The occurrence of multinutrient deficiencies and overall decline in productive capacity of soil has been widely reported due to non-judicious fertilizer use (Chhonkar, 2008).

The judicious supply of nutrients not only increases the productivity but it also improves the quality of the produce. As the foliar application is an effective method of nutrient management and required nutrients can be readily supplied as an when they are needed. It is an effective method for correcting the micronutrient deficiencies. Hence, in recent days it has been widely practiced in high valued fruit crops like grape, mango, banana, citrus and pomegranate etc. It has been reported that the guava plant can readily absorb mineral nutrients spray or painted on the foliage.

Spraying method using the correct strength have been great merit of simplicity and requires about 1 or 2 weeks to produce clear effects. Foliar application experiments conducted in India showed that guava has given good response to foliar application of different chemicals. Use of different mixed fertilizers and chemicals like calcium nitrate, magnesium sulphate, sulphate of potash, zinc sulphate, ferrous sulphate and boric acid through foliar application was found beneficial and the recommendations which have been suggested by different workers for different chemicals appears to have profound influence on fruit quality through its influence on size, appearance, colour, soluble solids, sugar, acidity and vitamin contents. Foliar application of different chemicals has increased the yield and quality parameters in guava (Arora and Singh, 1970; Ahamad *et al.*, 1988; Ghosh, 1988; Yadav *et al.*, 2001; Priyaawasthi, 2009; and Trivedi *et al.*, 2012).

Materials and Methods

The present investigation entitled "Effect of foliar application of different chemicals on yield and quality of guava (*Psidium guajava* L.)" Var. Sardar was carried out at College of Agriculture, Latur, during 2013-2014. The experimental site soil was medium black, slightly alkaline with uniform texture, colour and having good drainage. The experiment was conducted on well-established orchard of nine years old Sardar guava trees which are planted at 6.0 × 6.0 m spacing. The experiment was laid out in Randomized Block Design (RBD) with ten treatments replicated thrice. The treatments comprised of 19:19:19 @ 1% (T_1), 12:61:0 @ 1% (T_2), 0:52:34 @ 1% (T_3), Calcium Nitrate @ 1% (T_4), Sulphate of Potash @ 1% (T_5), Calcium Nitrate @ 1% + Sulphate of Potash @ 1% (T_6), $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_7), 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8), Calcium Nitrate @ 1% + Sulphate Potash + @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_9) and Control (T_{10}). Recommendations for RDF were used as 800 g N, 400 g P_2O_5, and 400 g K_2O/tree (Anon, 2012). After preparation of basins, FYM @ 20 Kg/plant was given to all trees.

Results and Discussion

An appraisal of the data presented in table 1 revealed that yield parameters showed significant differences with regard to number of fruits per square meter, number of fruits per tree, weight of fruit, yield per tree and yield per hectare due to the foliar application of different chemicals.

Table.1 Effect of foliar application of different chemicals on yield parameters of guava

Treatment Details	Number of fruits/m^2	Number of fruits/tree	Weight of fruit (g)	Yield/tree (kg)	Yield/ha (tonnes)	% increase over control
T_1- 19:19:19 @ 1%	9.61	207	259	53.35	14.77	33.58
T_2- 12:61:0 @ 1%	7.57	178	286	50.71	14.04	26.97
T_3- 0:52:34 @ 1%	8.80	204	266	52.43	14.52	31.26
T_4 - Calcium Nitrate @ 1%	7.53	184	219	44.91	12.44	12.45
T_5- Sulphate of Potash @ 1%	7.60	215	239	51.53	14.27	29.01
T_6- Calcium Nitrate @ 1% + Sulphate of Potash @ 1%	12.40	244	238	54.96	15.22	37.61
T_7- $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	5.16	233	181	45.76	12.67	14.57
T_8- 19: 19: 19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	7.43	288	194	55.96	15.50	40.11
T_9- Calcium Nitrate @ 1% + Sulphate of Potash @ 1% $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	6.69	240	222	53.85	14.91	34.82
T_{10}- Control.	5.34	233	170	39.94	11.06	-
S.E ±	0.81	9.24	11.26	1.37	0.37	
C.D at 5 %	2.31	27.47	33.03	4.09	1.13	

Table.2 Effect of foliar application of different chemicals on economics of guava production

Treatment Details	Cost of cultivation (Rs./ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	Per cent increase over control (%)	Benefit:cost ratio
T_1- 19:19:19 @ 1%	95661	295400	199739	46.21	3.08
T_2- 12:61:0 @ 1%	96772	280800	184028	34.71	2.80
T_3- 0:52:34 @ 1%	99960	290400	194394	42.30	2.90
T_4 - Calcium Nitrate @ 1%	96006	248800	152794	11.85	2.59
T_5- Sulphate of Potash @ 1%	101473	285400	183927	34.64	2.81
T_6- Calcium Nitrate @ 1% + Sulphate of Potash @ 1%	93148	304400	211252	54.64	3.26
T_7- $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	102952	253400	150448	10.13	2.46
T_8- 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	99199	310000	210801	54.31	3.12
T_9- Calcium Nitrate @ 1% + Sulphate of Potash + @ 1% $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3%	104332	298200	193868	41.92	2.85
T_{10}- Control.	84598	221200	136602	-	2.61

Number of fruits per square meter

The results revealed that the number of fruits per square meter of tree canopy was ranged between 5.16 and 12.40. The maximum number of fruits per square meter (12.40) was recorded in the treatment of calcium nitrate @ 1% + sulphate of potash @ 1% (T_6) and it was significantly superior over rest of the treatments and it was followed by 19:19:19 @ 1% treatment (T_1). The minimum (5.16) fruits were observed in $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + boric acid @ 0.3% (T_7).

Similar results were reported the foliar application of 4 per cent muriate of potash produced maximum flower buds (Rajput *et al.,* 1978), foliar application of 3% N plus 1% K increased the fruit set and retention (Sharma and Sharma, 1992) and 4 per cent potassium nitrate application produced maximum flowers (Singh and Singh, 1998). These findings are on same line as per the results obtained in the present investigation, hence confirms the results.

Number of fruits per tree

The Maximum number of fruits per tree (288) were produced by the treatment of 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8) and it was significantly superior over rest of the treatments and it was followed by the application Calcium Nitrate @ 1% + sulphate of potash @ 1% (T_6). The minimum (178) number of fruit per tree was recorded in12:61:0 @ 1% (T_2). The similar results reported that the by Trivedi *et al.,* 2012 and Rajkumar, 2014.

Weight of fruit (g)

The data clearly showed that the foliar application of 12:61:0 @ 1% (T_2) has produced significantly the heaviest fruit (286 g) of guava and it was statistically at par with the treatment of 0:52:34 @ 1% (T_3) and 19:19:19 @ 1% (T_1) The lowest fruit weight (170 g) of guava fruit was observed in control (T_{10}).

Yield per tree (kg)

It is clear from the data that, the yield per tree was ranged between 39.94 - 55.96 kg per tree due to various treatments of foliar application. The highest yield (55.96 kg) per tree was recorded in the treatment of 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8) and it was statistically at par with the treatment of Calcium Nitrate @ 1% + Sulphate of Potash @ 1% (T_6), Calcium Nitrate @ 1% + Sulphate of Potash @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_9), 19:19:19 @ 1% (T_1) and 0:52:34 @ 1% (T_3) and 19:19:19 @ 1% (T_1) While, the lowest yield (39.94 kg) per tree was recorded in control (T_{10}).

Yield per hectare (t)

The result clearly showed that, the highest yield per hectare (15.50 t) was recorded in the treatment of 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8), which recorded 40.11 per cent increase over control and it was followed by the foliar application of Calcium Nitrate @ 1% + Sulphate of Potash treatment (T_6) and recorded 37.61 per cent increase over control. The minimum yield (11.06 t) per hectare was observed in control (T_{10}). Maximum number of fruits per tree (288), highest yield (55.96 kg) per tree and per hectare (15.50 t) was recorded in the treatment of 19:19:19 @ 1% + $ZnSO_4$ @0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8). While, lowest yield (39.94 kg) per tree and yield (11.06 t) per hectare was

recorded in control (T_{10}). The similar results reported that the by several workers from the different art of the country (Arora and Singh, 1970a; Rajput *et al.,* 1978; Ghosh, 1986; Sharma *et al.,* 1991; Sharma and Sharma, 1992; Bagali, *et al.,* 1993; Ahamad *et al.,* 1998a; Balakrishanan, 2000; Meena *et al.,* 2005; Trivedi *et al.,* 2012 and Rajkumar, 2014).

Economics

The results revealed that, the highest benefit: cost ratio (3.26) was recorded in the treatment of Calcium Nitrate @ 1% + Sulphate of Potash @ 1% (T_6), which was closely followed by foliar application of 19:19:19 @ 1% + $ZnSO_4$ @ 0.5% + $FeSO_4$ @ 0.5% + Boric acid @ 0.3% (T_8) while, the lowest benefit: cost ratio (2.61) was recorded in control (T_{10}) (Table 2).

The Foliar application of different chemicals was found beneficial for increasing yield of guava. The combined application of micro plus micro- nutrients resulted in increased in increasing the production and economic returns from guava. The potential treatment for these aspects in present study was the application of 19: 19: 19 @ 1% + $ZnSO_4$ + $FeSO_4$ each @ 0.5% + Boric acid @ 0.3% (T_8) and it was closely followed by the application of Calcium Nitrate + Sulphate of Potash each @ 1% (T_6). The application of potash alone (Sulphate of Potash) @ 1% or in combination with other nutrients like Calcium Nitrate (T_6) or micronutrients (T_9) produced beneficial effects on quality attributes of guava fruits. The overall performance of application of Calcium Nitrate + Sulphate of Potash each @ 1% (T_6) was found superior and it was closely followed with the application of 19: 19: 19 @ 1% + $ZnSO_4$ + $FeSO_4$ each @ 0.5% + Boric acid @ 0.3% (T_8) for improving yield, quality and economic returns from guava.

Thus, it can be concluded that two foliar sprays of Calcium Nitrate plus Sulphate of Potash each @ 1% or 19: 19: 19 @ 1% + $ZnSO_4$ + $FeSO_4$ each @ 0.5% + Boric acid @ 0.3% at 30 and 60 days after flowering will be beneficial for increasing the yield, quality and profitability of guava under Marathwada conditions.

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