International Journal of Applied Agricultural Research
ISSN 0973-2683 Volume 14, Number 1 (2019) pp. 41-47

http://www.ripublication.com

Effect of foliar application of Nova Tarak Plus on the quality and yield parameters of Tomato (*Lycopersicon esculentum* mill.)

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Abstract

The present investigation was undertaken with the main objective to study the effect of foliar application of tarak plus in comparison with micro nutrient foliar sprays in contributing the growth and yields of tomato. This study was carried out during the year *rabi* 2018-19. The experiment consisted of eight treatments *viz*., T_1 [Control], T_2 [RDF {N: P_2O_5 : K_2O kg ha^{-1} (75 : 100 : 50)}], T_3 [Tarak plus @ 3 gm/l at 40 & 60 DAS], T_4 [T_2 + Tarak plus @ 3 gm/l at 40 & 60 DAS], T_5 [Ferrous sulphate @ 2gm/l at 40 & 60 DAS], T_6 [Zinc sulphate @ 2gm/l at 40 & 60 DAS], T_7 [Boric acid @ 2gm/l at 40 & 60 DAS], T_8 [Multiplex @ 4 ml/l at 40 & 60 DAS] a foliar spray was imposed. The experimental results recorded a significant influence of the treatment T_4 on the growth and yield parameters of tomato. The results declared in the present study showed effect of the treatments in determining the plant height, number of compound leaves, branches, number of fruits, fruit yield (kg. $plant^{-1}$) and fruit yield (kg. ha^{-1}). The data clearly showed the yield obtained with treatment T_4 had significant influence on plant height (111.5 cm), number of compound leaves (92.5), number of branches (12.0), fruits $plant^{-1}$ (46.0), fruit yield $plant^{-1}$ (4.57 kg) and fruit yield (36.53 kg.ha-^{1}). While the treatment control (T_8) had not shown a much effect on growth and the fruit yields recorded in the present study. This treatment control recorded a plant height minimum (81.2 cm), lower number of leaves (73.9), branches (8.6), fruit number $plant^{-1}$ (23.7) and fruit yield (21.33 t ha^{-1}). Excepting the treatment control (T_8), other treatments have shown a good impact on the growth and quality of the fruits obtained.

Keywords: Tomato, Tarak plus, micro nutrients, foliar application, fruit yields

INTRODUCTION

Tomato [*Lycopersicon esculentum* (L.) mill.] is popularly known as wolf of apple or love of apple, one of the most important vegetable crop belongs to the family Solanaceae. A important leading vegetable crop popularly grown due to its adaptability to various ago-climatic conditions. Tomato is likely to be preferred by both rich and poor and have good nutritive value. The fruit is adapted to various culinary uses either in the fresh form in salad or as puree in gravies, stew and soups. More than 90% of the vitamin C in human diets is supplied by fruits and vegetables (of which tomato is the most important) (Vallejo *et al*., 2002). Tomato fruits contain high amount of ascorbic acid and lycopene (Tindall, 1983). Lycopene is an anti oxidant which imparts red colour to the tomato fruit and watermelon. It has been implicated in human health as providing protection against cardiovascular disease and some cancers, particularly that of the prostate.

All type of soils are suitable for tomato production including sandy and heavy clay with soil pH of 5.5 to 7.5 is best suitable. However sandy loam soils are considered best for early tomato crop. Maximum yields can be obtained by growing tomato in loam, clay loam and silty loams rich in organic matter.

Tomato being an exhaustive crop, removes substantial amount of micro nutrients from soil. To maintain sustainability in crop production, it is much essential to recycle nutrients in the soil as foliar spray meets the immediate requirement of the crop.

Micro nutrients are required by a plants in small quantities as they are effective in regulating plant growth, reproduction, enzymatic activities and the plant metabolism as whole affected directly or indirectly. The nutritional deficiency leads to imbalances in the crop metabolism as it would have impact on the quality and yields in tomato. Especially the micro nutrients zinc and boron have been reported in increasing seed yield of tomato.

MATERIALS & METHODS

The present field experiment was carried out at Nova Agritech Ltd. Experimental farm, Kama reddy, Telangana, India. Field trials were laid out in randomised block design with eight treatments and three replications. The tomato hybrid (*cv*. Arka Meghali) was selected for the study. A fine tilth of soil bed was prepared by ploughing the soil 2-3 times and levelling was also done. Field layout was designed by maintaining a each plot size of 166 m^2. 25 days old seedlings were selected and sown in the field beds. Row pacing of 75cm and 45 cm between the plants was maintained. The proper recommended agronomic package of practices and the plant protection measures were followed. The treatments included in this study were as followed.

Treatments:

T1: Control (No recommendation of any fertilizer).

T2: Recommended dose of fertilizers (RDF): N: 75kg; P: 100kg: K: 50kg

T3: Tarak plus @ 3 gm/l at 40 & 60 DAS

T4: T2 + Tarak plus @ 3 gm/l at 40 & 60 DAS

T5: Ferrous sulphate @ 2gm/l at 40 & 60 DAS

T6: Zinc sulphate @ 2gm/l at 40 & 60 DAS

T7: Boric acid @ 2gm/l at 40 & 60 DAS

T8: Multiplex @ 4 ml/l at 40 & 60 DAS

There were eight treatments involving six treatments with micro nutrients formulations applied through foliar spray along with control and one treatment with recommended dose of fertilizers. All the micro nutrients were applied as a foliar spray at 40 and 60 DAS. A total of two sprays were given at an interval of 20 days.

The observations of study involved both vegetative and reproductive growth parameters like the plant height (cm), number of branches, number of compound leaves, number of fruits, fruit yield per plant, fruit yield per hectare were recorded for each replication separately. The data was taken from the five randomly selected plants in each replication separately. Average values were computed and the data was subjected to statistical analysis (Panse and Sukhatme, 1985).

RESULTS & DISCUSSION

Vegetative growth stage:

First spray (40 DAS):

The data collected and recorded 20 days after the first spray presented in the table 1. The results showed the growth parameters like plant height (69.7 cm), number of compound leaves (85.7) and branches (10.3) were significantly recorded in the treatment plot which was given a foliar spray of tarak plus and recommended fertilizer dose. Treatments with micro nutrients foliar spray, Fe, B and Zn plays an vital role in plant metabolic activities and they were not shown a significant variation with regard to the plant height, number of leaves and the branches characterised in this study. Treatment T_1 recorded minimum plant height (43.8 cm), less number of branches (7.6) and leaves (69.3). While the treatment T_2 registered plant height (55.2 cm), number of branches (8.9), and leaves (70.4). The increase in trend for growth parameters was followed in the order of T_5, T_6 and T_7. Highest plant height (69.7 cm), number of branches (10.3) and leaves (85.7) recorded in T_4 followed by T_3 and T_8 registered plant heights (60.4 & 63.1 cm), number of branches (9.1 & 9.4) and leaves (73.6 & 76.3), respectively. The significant plant data was recorded in T_4 (Tarak plus + RDF) as it was indicated its superiority over other treatments.

Second spray (60 DAS):

The results presented in the table indicated the treatment T_4 had significant influence on the plant height (111.5 cm), number of leaves (92.5) and branches (12). Next after T_4, the commercial formulation T_8 registered a plant height (103.1 cm), compound leaves (87.7) and branches (10.9) followed by T_3 which was exhibited a plant height (96.8 cm), number of leaves (86.7) and branches (10.7). The treatment control was recorded a minimum of plant height (81.2 cm), number of branches (8.6) and leaves (73.9). The treatment T_2 (RDF) recorded a plant height (92.7 cm), number of leaves (83.4), branches (9.8) and further increase in the trend was observed in the treatments T_5, T_6 and T_7. Those treatments who were treated with Fe, Zn, B micro nutrient foliar spray found more or less uniform with regard to growth parameters studied. The treatment T_4 which was consisted of micro nutrient mixture along with recommended fertilizer dose found superior over the treatments tested in the present study.

Maximum growth rate was observed in the treatment T4 due to the availability of key micro nutrients (Zn, B, Mn and Fe) with application of tarak plus along with recommended dose of fertilizers. The increase in uptake of various nutrients reported to be played a significant role in determining the growth and yield. Micro nutrient application did not show a significant change when applied as individually. The reports said that tremendous vegetative growth can be observed with the combined effect of micro nutrients and fertilizers additionally. Control (T8) without a foliar spray have not shown much influence for the vegetative growth characters under the study.

Reproductive growth stage :

Data on the yield obtained in the study of investigation presented in the table 2. The results revealed that highest fruit per plant (46), fruit weight (4.57 kg.plant^{-1}), fruit yield per ha (36.53 t.ha^{-1}) recorded in the treatment T_4 followed by T_8 which has been registered fruit number (39), fruit weight (3.94 kg.plant^{-1}) and fruit yield per ha (31.52 t.ha^{-1}). While the treatment T_1, control with out spray recorded a lowest fruit yield of (21.33 t.ha^{-1}). The treatments T_5 recorded fruit number (34.7), fruit weight (3.58 kg. plant^{-1}) and fruit yield (28.61 t. ha^{-1}) when compared to T_6 and T_7 as they registered with slight more number of fruits (36.3 & 37.3), fruit weight (3.65 & 3.90 kg.plant^{-1}) and the fruit yield (29.20 & 31.20 t. ha^{-1}). The treatment, T_3 recorded a fruit yield of (29.76 t. ha^{-1}) followed by T_2 (27.68 t. ha^{-1}) which were found slight superior over the control (21.33 t. ha^{-1}). The treatments with foliar spray of individual micro nutrients Fe, Zn and B have not shown much difference with regard to the fruit yields recorded. The treatment control recorded a lesser fruit weight (2.67 kg. plant^{-1}) and the fruit yield (21.33 t. ha^{-1}). The treatment T_1 (control) found much inferior to T_4, which has treated with a commercial formulation along with recommended dose of fertilizers.

Significant yields were recorded with the application of tarak plus along with the recommended dose of fertilizers. These results obtained are similar to the findings of who reported that mixture of micro nutrient foliar spray subjected to increase number of fruits, fruit weight and the fruit yield. As the higher yields recorded in the treatment T4 is due to the adequate nutrient availability.

In the results of present investigation, yields recorded with various treatments are more or less similar to the findings of Kumbhar and Deshmukh (1993) and Bose and Tripathi (1996) who revealed that increase in dry matter production and yield due to the accumulation of photo synthates and favourable effect on the vegetative growth and retention of flowers and fruits, which increased number of fruits per plant besides increasing the size and weight. Increase in plant height, number of leaves and branches might be due to the availability of micro nutrients such as zn, plays a role in photosynthates translocation to the fruit, and decrease in flowers and fruits abscission (Graham *et al*., 2000; Ruby *et al*., 2001; Ali *et al*., 2008), B regulates the metabolism of carbohydrates (Haque *et al*., 2011) and increase carbohydrate supply for formation of flowers and fruit set in tomato (Smit and Combrinke, 2005; Desouky *et al*., 2009) and Fe being a component of ferrodoxin, plays a crucial role in photosynthesis might have helped in better vegetative growth (Hazra *et al*., 1987). The combined effect of micro nutrients was an important factor contributes complete vegetative growth and reproductive growth which ultimately subjected to increase the crop yield than they applied individually.

Table 1. Effect of foliar micro nutrient formulations with response to vegetative growth parameters and their influence on the crop yield of tomato.

TREATMENTS	PLANT HEIGHT (cm.)		NUMBER OF COMPOUND LEAVES		NUMBER OF BRANCHES	
	FIRST SPRAY	SECOND SPRAY	FIRST SPRAY	SECOND SPRAY	FIRST SPRAY	SECOND SPRAY
	40 DAS	60 DAS	40 DAS	60 DAS	40 DAS	60 DAS
T_1. Control (No recommendation of any fertilizer)	43.8	81.2	69.3	73.9	7.6	8.6
T_2. Recommended dose of fertilizers (RDF): N: 75kg;P: 100kg:K: 50kg	55.2	92.7	70.4	86.1	8.9	10.6
T_3. Tarak plus @ 3 gm/l at 40 & 60 DAS	60.4	96.8	73.6	86.7	9.1	10.9
T_4. T2 + Tarak plus @ 3 gm/l at 40 & 60 DAS	69.7	111.5	85.7	92.5	10.3	12.0
T_5. Ferrous sulphate @ 2gm/l at 40 & 60 DAS	58.4	92.9	72.4	86.0	9.0	9.9
T_6. Zinc sulphate @ 2gm/l at 40 & 60 DAS	59.7	93.3	72.6	83.4	8.8	9.8
T_7. Boric acid @ 2gm/l at 40 & 60 DAS	61.3	94.8	75.0	83.6	9.1	10.2
T_8. Multiplex @ 4 ml/l at 40 & 60 DAS	63.1	103.1	76.3	87.7	9.4	10.7
SEM(±)	1.191	2.689	2.365	2.624	0.367	1.789
C.D (0.05)	3.649	8.236	7.242	8.035	1.124	0.584
C.V (%)	3.502	4.862	5.505	5.347	7.04	9.796

Table 2. Effect of foliar application of micro nutrient formulated products on the reproductive growth and yield response of tomato

TREATMENTS	NUMBER OF FRUITS	FRUIT YIELD /PLANT (kg.)	FRUIT YIELD / ha (kg.)
T_1. Control (No recommendation of any fertilizer)	23.7	2.67	21.33
T_2. Recommended dose of fertilizers (RDF): N: 75kg;P: 100kg:K: 50kg	33.0	3.46	27.68
T_3. Tarak plus @ 3 gm/l at 40 & 60 DAS	38.7	3.72	29.76
T_4. T2 + Tarak plus @ 3 gm/l at 40 & 60 DAS	46.0	4.57	36.53
T_5. Ferrous sulphate @ 2gm/l at 40 & 60 DAS	34.7	3.58	28.61
T_6. Zinc sulphate @ 2gm/l at 40 & 60 DAS	36.3	3.65	29.20
T_7. Boric acid @ 2gm/l at 40 & 60 DAS	37.3	3.90	31.20
T_8. Multiplex @ 4 ml/l at 40 & 60 DAS	39	3.94	31.52
SEM(±)	2.133	0.179	
C.D (0.05)	6.531	0.548	
C.V (%)	10.236	8.418	

CONCLUSION

Results of the experiment stated that the yield and yield contributing characters of tomato were performed best due to the foliar application of nova tarak plus in addition to the recommended fertiliser dose as prescribed in the present study. Therefore, A multi micro nutrient foliar spray with adequate NPK fertilizers and the proper agronomic management practices may be recommended for higher yields of Tomato. Combined effect of NPK fertilisers and the micro nutrient mixture will be advised for supplementation of various nutrients uptake which might have played a crucial role in determining the crop yields.

REFERENCES

[1] Ali, S., et al. 2008. Assessment of different crop nutrient management practices for yield improvement. Aust. J. Crop Sci. 2(3): 150- 157.

[2] Bose, U.S. and S.K Tripathi, 1996. Effect of micronutrients on growth, yield and quality of tomato cv. Pusa Ruby in M.P. Crop Res. 12:61- 66.

[3] Desouky, I.M., L.F. Haggog, M.M.M. Abd-ElMigeed, Y.F.M. Kishk and E.S. El-Hadi, 2009. Effect of boron and calcium nutrients sprays on fruit set, oil content and oil quality of some olive cultivars. World J. Agric. Sci. 5: 180–185.

[4] Graham, R.D., R.M. Welch and H.E. Bouis, 2000. Addressing micronutrient nutrition through enhancing the nutritional quality of staple foods. Adv. Agron. 70: 77-161. https://doi. org/10.1016/S0065-2113(01)70004-1

[5] Haque, M.E., A.K. Paul and J.R. Sarker, 2011. Effect of nitrogen and boron on the growth and yield of tomato (Lycopersicon esculentum M.). Int. J. Bio-Res. Stress. Manag., 2: 277–282.

[6] Hazra, P., T.K. Maity and A.R. Mandal,1987. Effect of foliar application of micronutrients on growth and yield of okra (Abelmoschusesculentus L). Prog. Hort., 19: 219-222.

[7] Kumbhar, V.S and S.S. Deshmukh, 1993, Effect of soil application of ferrous sulphate on the uptake of nutrients, yield and quality of tomato Cv. Rupali. Sou. Ind. Hort., 41:144-147.

[8] Panse, VG., and PV. Sukhatme, (1985). Statistical methods for Agricultural workers, ICAR, New Delhi: pp.145-152

[9] Ruby, R., V.S. Brahmachari and R. Rani. 2001. Effect of foliar application of calcium, zinc and boron on cracking and physicochemical composition of litchi. Orissa J. Hort., 29:50-54.

[10] Smit, J.N. and N.J.J. Combrink. 2005. Pollination and yield of winter-grown greenhouse tomatoes as affected by boron nutrition, cluster vibration and relative humidity. South Afr. J. Plant Soil. 22: 110–115. https://doi.org/10.1080/0257186 2.2005.10634691

[11] Tindall HD (1983). Vegetables in the Tropics. Macmillan Education Ltd. Houndmills Hampshire. pp. 533.

[12] Vallejo, F., FA., Tomas-Barberan and C., Garcia-Viguera, (2002). Potential bioactive compounds in health promotion from broccoli cultivars grown in Spain. J. Sci. Food Agric., 82:1293-1297.