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## Effect of Foliar Application of Water Soluble Fertilizers on Growth and Yield of Hybrid Tomato cv. Phule Raja

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### Abstract

The investigation was conducted on hybrid tomato cv. Phule Raja at Tomato Improvement Scheme, MPKV., Rahuri during *rabi* season of 2017-18, 2018-19 and 2019-20. Foliar application of three water soluble fertilizers NPK 19:19:19, 00:52:34 and 13:00:45 at different crop growth stages and in different concentrations was experimented along with soil application of gross recommended fertilizer dose for hybrid tomato. The experiments were laid out in a randomized block design with eleven treatments and three replications. The results of the experiments revealed that The maximum plant height( 177.79 cm), fruit Weight (87.98 g), pericarp thickness (6.65 mm), equatorial diameter (5.09 cm) and Yield (2.07 kg plant<sup>-1</sup>, 73.03 kg plot<sup>-1</sup> and 61.41 t ha<sup>-1</sup>) recorded in treatment T5 i.e. combination of 87.5% GRDF i.e. 262.5:131.25:131.25 kg NPK ha<sup>-1</sup> with foliar application of WSF 19:19:19 (1.5%) at 15, 30 and 45 DAT, 00:52:34 (1.5%) at 60, 75 and 90 DAT and 13:00:45(1.5%) at 105 and 120 DAT.

### Key words :

Tomato (*Lycopersicon esculentum* L.), is a member of Solanaceae family originated from Andean region. It is mostly used as a fresh vegetable, salad and also as processed products like paste, juice, sauce and powder or as a whole. Tomato is important source of minerals, vitamins, and antioxidants (Grierson and Kader, 1986). It is grown all over the world in India it occupying an area of about 0.81 M ha with production about 20.51 m MT and having productivity 16.1 MT ha<sup>-1</sup> Production share of India to different countries are 11.2% (NHB 2018-2019). Success of tomato cultivation depends on careful application of fertilizers. The efficiency of fertilizers applied to soil is generally

low due to various losses like fixation. Foliar application, of liquid fertilizers found beneficial to improve yield and quality of different vegetable crops. Water soluble fertilizers are used as foliar spray. Water soluble fertilizers are generally considered 100% soluble in water having low salt index to reduce the potential for burning of plant tissue and suitable for foliar application or fertigation. The NPK combination are starter grades (19:19:19) for growth in middle stage and mono-potassium phosphate (0:52:34); potassium nitrate (13:0:45) for sugar conversion and disease resistance. (Malhotra, S. K. 2016). Use of liquid or water soluble fertilizers in India is meagre in comparison to

developed countries. (Patel 2011). The present study was undertaken in hybrid tomato cv. Phule Raja to study the effect of foliar spray fertilizers, in combination with GRDF on growth and yield attributes of tomato.

### Material and Methods

The investigation was carried out at Tomato Improvement Scheme, Department of Horticulture, MPKV., Rahuri during the *rabi* season of 2017-18, 2018-19 and 2019-20, to study the effect of water soluble fertilizers on growth and yield in hybrid tomato. Hybrid tomato cv. Phule Raja was selected for the study. The experimental field is irrigated and soil type is medium black. The experimental plots were of size 3.6m x 3.3 m. The seedlings were transplanted at the spacing of 90 x 30 cm. Three water soluble fertilizers NPK 19:19:19, 00:52:34 and 13:00:45 were selected for the study along with Gross Recommended Fertilizer Dose of hybrid tomato. GRDF of hybrid tomato is 300:150:150 kg NPK ha<sup>-1</sup>. Foliar application of WSF NPK 19:19:19 was carried out on 15, 30 and 45 DAT. NPK 00:52:34 applied on 60, 75 and 90 DAT and NPK 13:00:45 applied on 105 and 120 DAT. Observations regarding plant height, fruit weight, polar and equatorial diameter of fruit, pericarp thickness, yield per plant and yield pot<sup>-1</sup> were recorded. The experiment was laid out in RBD with eleven treatments and three replications. Treatment details are given in Table 1.

### Result and Discussion

The pooled data recorded in Table 2 shows that the plant height significantly varied with the foliar application of water soluble fertilizers. The treatment T5 consist of 87.5% GRDF i.e. 262.5:131.25:131.25 kg NPK ha<sup>-1</sup> with foliar application of 1.5% of water soluble fertilizers NPK 19:19:19, 00:52:34 and 13:00:45 recorded maximum (177.79 cm) plant height.

Lowest plant height (150.01cm) observed in Control (T1). The increase in plant height might be due to more availability of macro and micro nutrients by soil and foliar application (Patil *et al.*, 2008).

The maximum fruit Weight (87.98 g), pericarp thickness (6.65 mm) were recorded in treatment T5. The better supply of K with its split application and supplementation of secondary and micro nutrients might have enhanced the fruit size, fruit weight and pericarp thickness. (Batra *et al.*, 2002). Treatment T5 recorded highest equatorial diameter (5.09 cm) and lowest polar diameter (3.33 cm). Fruit diameter might be increased due to uptake of nutrients and better utilization of photosynthesis resulting in food accumulation in edible parts (Guievence and Badem, 2000).

Table 2 pooled data of treatments indicates that treatment T5 recorded maximum Yield (2.07 kg plant<sup>-1</sup>, 73.03 kg plot<sup>-1</sup> and 61.41 t ha<sup>-1</sup>). The optimum supply of N and phosphorus causes better synthesis of cytokine which results in more number of fruits (Premsekhar and Rajashree, 2009). There are also reports on higher fruit setting by soil or foliar supplementation of secondary and micro

**Table 1.** Treatment details

Treatment	GRDF (300:150: 150 kg NPK ha <sup>-1</sup> (%))	WSF dose (%)		
		19:19: 19	00:52: 34	13:00: 45
T <sub>1</sub> (Control)	100	-	-	-
T <sub>2</sub>	100	0.5	0.5	0.5
T <sub>3</sub>	100	1	1	1
T <sub>4</sub>	87.5	1	1	1
T <sub>5</sub>	87.5	1.5	1.5	1.5
T <sub>6</sub>	75	1.5	1.5	1.5
T <sub>7</sub>	75	2	2	2
T <sub>8</sub>	62.5	2	2	2
T <sub>9</sub>	62.5	2.5	2.5	2.5
T <sub>10</sub>	50	2.5	2.5	2.5
T <sub>11</sub>	50	3	3	3

**Table 2.** Effect of foliar application of water soluble fertilizers on growth and yield of hybrid tomato cv. Phule Raja (Pooled mean of three years)

Treat-ments	Plant height (cm)	Fruit weight (g)	Diameter (cm)		Pericarp thickness (cm)	Yield plant-1 (kg)	Yield plot-1 (kg)	Yield (t ha-1)
			Polar	Equatorial				
T <sub>1</sub>	150.01	75.58	5.40	4.50	6.40	1.53	58.00	46.92
T <sub>2</sub>	153.87	78.07	5.23	4.72	6.16	1.77	64.80	54.78
T <sub>3</sub>	157.42	80.34	5.22	4.81	6.49	1.90	68.11	57.53
T <sub>4</sub>	169.80	82.24	5.08	4.91	6.43	1.86	67.28	56.77
T <sub>5</sub>	177.79	87.98	3.33	5.09	6.65	2.07	73.03	61.41
T <sub>6</sub>	171.21	79.71	5.45	5.02	6.23	1.83	66.74	55.89
T <sub>7</sub>	168.98	83.67	5.18	4.94	6.62	1.98	70.46	59.17
T <sub>8</sub>	169.69	79.66	5.20	4.85	6.34	1.71	61.78	51.38
T <sub>9</sub>	155.59	82.83	5.25	5.04	6.19	1.69	63.92	53.79
T <sub>10</sub>	155.96	80.02	5.19	4.98	5.98	1.69	62.58	52.42
T <sub>11</sub>	162.49	79.66	5.18	4.87	6.33	1.71	60.05	51.21
S.E. ±	6.34	1.15	0.33	0.17	0.16	0.05	1.14	1.22
C.D. at 5%	18.71	3.41	0.98	0.50	0.49	0.14	3.37	3.62

nutrients which may be attributed to supply of nutrients at critical stage i.e. at flowering and fruit set (Naik *et al.*, 2002).

### Conclusion

From the study it can be concluded that, the T5 treatment i.e. combination of 87.5% GRDF i.e. 262.5:131.25:131.25 kg NPK/ha with foliar application of WSF 19:19:19 (1.5%) at 15, 30 and 45 DAT, 00:52:34 (1.5%) at 60, 75 and 90 DAT and 13:00:45(1.5%) at 105 and 120 DAT found to be highly beneficial for maximizing the yield of hybrid tomato cv. Phule Raja in *rabi* season.

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