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Effect of plant Vitalizers on flowering, fruiting behaviour and yield of tomato cultivar Hisar Arun

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Abstract

The study was conducted at vegetable Research Farm of Department of vegetable science, Chaudhary Charan Singh Haryana Agricultural University, Hisar during the spring-summer season of 2001 and 2002. In the present experiment four levels each of plant vitalizers (Anupaan + Anupaan R), were applied by four methods along with control treatment on tomato plants to find out their effect on flowering, fruiting behaviour and yield. The results of the study clearly indicated that flowering and fruiting behaviour of the plant was influenced by the Anupaan + Anupaan R. There was early flowering and fruit ripening in plants receiving the higher doses of Anupaan + Anupaan R when applied in soil + foliar combination. These plant vitalizers also increased number of fruits per plant. The early flowering, heavy fruiting and early ripening of fruits in plants receiving plant vitalizers might be due to commencement of early reproductive phase in plants under the influential effects of Anupaan + Anupaan R. As number and fresh weights of leaves increased more photosynthates were assimilated and consequently, transferred to the storage organ i.e. ovary and as a result fruit developed early. Fruit yield per plant and per hectare were significantly increased by higher doses of these plant vitalizers when applied as soil + foliar application. The promoting effects of plant vitalizers (Anupaan + Anupaan R) on flowering and fruiting behaviour of tomato plants and fruit yield. It is interesting to note that the application of Anupaan + Anupaan R at 50% more than suggested dose either applied in soil, foliar, root dipping or soil + foliar was found beneficial as compared to other treatments for yield attributing parameters.

Keywords: Tomato, plant vitalizers, anupaan, anupaan r, flowering, fruiting, yield

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important and popular vegetable used in every kitchen. It is a rich source of vitamins particularly vitamin A, C and minerals. The soluble solids in tomatoes are predominantly sugars, which contribute to flavour. The free sugars, representing more than 60% of the solids in tomatoes, In India tomato is grown on 8.0 lakh hectare land with an annual production of 19,328 thousand metric tonnes and productivity of 24.16 tonnes/ha. For high productivity excess of chemical fertilizers and other chemicals are being applied in vegetable crops, which may be health hazardous for human beings. Thus, organic farming has an important role to play in ensuring stability and sustainability of food production. Efforts are being made to increase and provide vegetables free from harmful effects of chemicals to consumers and the use of organic manures is a major step towards this effort. The herbal (Acorin, Emodin, Serpentine etc.) extract containing some active components which may affect the nutrient mineralization in the soil and metabolism in plants. Consequently, growth and yield of plants are affected. Annupaan, one such extract containing free sugar which affect the microbial activities in soil and Anupaan R has the capacity to repel the insect & pest. Drinkwater *et al.* (1995) ^[1] reported that nitrogen mineralization potential, microbial and parasitoid abundance and diversity were higher in organic farms as compared to conventional farms and suggested that biological processes compensated for reductions in the use of synthetic fertilizers and pesticides.

Material and Methodology

The field experiment was conducted at vegetable Research Farm of Department of vegetable science, Chaudhary Charan Singh Haryana Agricultural University, Hisar during the spring-summer season of 2001 and 2002. Soil of the experimental plot was high in pH, medium in organic carbon, nitrogen and phosphorus and high in potash.

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The treatments comprising of four levels of each vitalizers Anupan (A)+Anupan R (AR) i.e.(i) Suggested dose (225ml+225ml/acre), (S₁, F₁, S₁+F₁, D₁) (ii) 25% less than suggested dose (168.75ml + 168.75ml) (S₂, F₂, S₂+F₂, D₂) (iii) 25% more than suggested dose (281.25ml + 281.25ml) (S₃, F₃, S₃+F₃, D₃) (iv) 50% more than suggested dose (337.50ml + 337.50ml) (S₄, F₄, S₄+F₄, D₄) along with control treatment was laid out in Randomized Block Design with three replications. The suggested quantity of Anupaan + Anupaan R with respect to treatment was mixed in small quantity of soil and then mixed in the respective plots before ridges preparation. For root dipping treatments, required quantity of Anupaan + Anupaan R was mixed in 1 litre of water and tomato seedlings were dipped for ten minutes at the time of transplanting. For foliar application, required quantity of Anupaan + Anupaan R were mixed in 1 liter of water and then sprayed with baby spray pump in respective treatment at 20, 30, 40, and 50 days after transplanting. Uniformly selected healthy seedlings were transplanted at 45 cm apart on the ridges, made 60 cm distance. Experimental field was irrigated immediately after transplanting, followed by second irrigation, which was given five days after the first irrigation followed by gap filling. Subsequent irrigations were applied as and when required. Other cultural practices like hoeing, weeding, earthing up were carried out as and when required. Days to 50%

flowering (no.) was recorded from the date of transplanting to the flowering in 50 per cent plants under each treatment. Days to ripening from flower anthesis were recorded in no. from the date of opening of first flower to ripening of first fruit under each treatment. Fruit per cluster (no.) from five randomly selected cluster of five selected plants from each treatment were counted and average number of fruits per cluster was calculated. Fruit per plant (no.) total number of fruits from five selected plants on each picking were summed up and fruits per plant were calculated by dividing the total number of fruits by total number of plants. Fruit size (g) Randomly ten fruits were taken from five selected plants in each treatment, weighed and average fruit weight was calculated. Fruit yield per plant (kg.) was calculated by dividing the total weight of fruits from five selected plants in each treatment on each picking. Fruit yield per hectare was calculated by fruit weight recorded from all the pickings was added to calculate that yield in kg per plot from which the yield q/ha.

Results and Discussion

Days to 50% flowering (No.)

Days to 50% flowering was not significantly affected due to different treatments of Anupaan + Anupaan R during both the years (Table 1).

Table 1: Effect of Anupaan + Anupaan R on days to 50% flowering and days to fruit ripening from flower anthesis

Sr. #	Treatments	Days to 50% flowering		Mean	Days to fruit ripening from flower anthesis		Mean
		2001	2002		2001	2002	
1	Control	46.0	48.7	47.3	50.0	52.3	51.2
2	S ₁	42.7	42.0	42.3	48.7	47.1	47.9
3	S ₂	42.7	43.3	43.0	47.3	47.7	47.5
4	S ₃	41.3	43.7	42.5	47.7	47.0	47.3
5	S ₄	42.3	42.0	42.2	48.0	47.7	47.8
6	F ₁	43.0	41.7	42.3	49.3	48.2	48.7
7	F ₂	42.7	42.7	42.7	48.1	47.3	47.7
8	F ₃	43.3	43.3	43.3	49.7	48.2	49.0
9	F ₄	43.7	42.0	42.8	49.7	49.3	49.5
10	S ₁ + F ₁	43.3	43.3	43.3	48.7	48.0	48.3
11	S ₂ + F ₂	42.3	42.7	43.5	48.1	49.7	48.9
12	S ₃ + F ₃	42.7	42.0	42.3	47.3	47.7	47.5
13	S ₄ + F ₄	41.7	41.0	41.3	46.4	46.1	46.2
14	D ₁	44.7	41.3	43.0	50.7	43.0	49.8
15	D ₂	43.7	43.3	43.5	47.0	48.7	47.8
16	D ₃	44.3	41.7	43.0	49.3	50.0	49.7
17	D ₄	43.0	43.7	43.3	49.7	48.3	49.0
SE (m)±		1.4	1.0		1.5	1.0	
C.D. at 5%		NS	NS		NS	NS	

Days to fruit ripening from flower anthesis (No.)

The number of days to fruit ripening from flower anthesis was not affected significantly by the variation in treatments of Anupaan + Anupaan R during both the years. (Table 1).

Fruit per cluster (No.)

The observations regarding number of fruits per cluster summarized in Table 2, reveal that all the treatments showed non-significant results with respect to fruits per cluster during both the years.

Fruits per plant (No.)

The data pertaining to number of fruits per plant presented in Table 2, indicate that all the treatments increased significantly the number of fruits per plant over control except S₂, F₁, F₂ and D₂ during both the years and S₁ during second year. The

highest number of fruits per plant (35.8) was recorded in S₄ + F₄ treatment during first year which was significantly superior to S₁ and S₃ treatment and statistically at par with above mentioned other treatments. During second year maximum number of fruits per plant (34.2) was also recorded in S₄ + F₄ treatment which was significantly superior to all the above said treatments except S₃ + F₃, D₃ and D₄ treatments where these were statistically at par. On the basis of observed values, maximum number of fruits per plant (35.0) was counted under the treatment S₄ + F₄.

Fruit size (g.)

The fruit size was not affected significantly by different treatments of Anupaan + Anupaan R during both the years (Table 2).

Table 2: Effect of Anupaan + Anupaan R on number of fruits/cluster, number of fruits/plant and fruit size

Sr. #	Treatments	Fruit/Cluster (#)		Mean	Fruit/Plant (#)		Mean	Fruit size (g)		Mean
		2001	2002		2001	2002		2001	2002	
1	Control	2.0	2.3	2.2	12.9	14.9	13.4	13.7	16.7	15.2
2	S ₁	2.3	3.0	2.7	22.8	20.8	21.8	15.7	17.6	16.7
3	S ₂	2.3	2.3	2.3	21.5	19.9	20.7	15.9	16.1	16.0
4	S ₃	3.0	3.0	3.0	25.3	23.6	24.4	14.9	16.6	15.8
5	S ₄	3.3	3.3	3.3	26.9	25.2	26.1	14.6	16.0	15.3
6	F ₁	3.0	3.0	3.0	21.3	20.1	20.7	17.0	17.0	17.0
7	F ₂	2.3	2.7	2.5	20.6	19.4	20.0	13.0	17.0	17.0
8	F ₃	3.0	3.0	3.0	27.4	26.4	26.9	14.3	14.1	14.2
9	F ₄	3.3	3.3	3.3	28.8	26.8	27.8	14.9	15.3	15.1
10	S ₁ + F ₁	3.0	3.0	3.0	29.4	27.1	28.2	14.5	15.0	14.8
11	S ₂ + F ₂	2.0	2.7	2.3	27.5	25.6	26.5	15.1	15.5	15.3
12	S ₃ + F ₃	3.0	3.3	3.2	33.6	28.7	31.2	13.5	16.0	14.8
13	S ₄ + F ₄	3.3	3.7	3.5	35.8	34.2	35.0	16.6	17.4	17.0
14	D ₁	2.3	3.0	2.7	28.0	26.2	27.1	12.7	12.9	12.8
15	D ₂	2.3	3.0	2.7	22.6	21.1	21.8	15.0	15.0	15.0
16	D ₃	2.7	3.3	3.0	29.5	28.0	28.7	12.9	12.9	12.9
17	D ₄	3.0	3.7	3.3	34.4	31.3	32.9	11.6	12.2	11.9
SE (m)±		0.5	0.4		3.4	3.3		7.3	3.6	
C.D. at 5%		NS	NS		9.8	6.9		NS	NS	

Fruit yield per plant (kg.)

The perusal of data in Table 3 on fruit yield per plant indicate that different treatments of Anupaan + Anupaan R affected significantly the fruit yield per plant. The treatments F₄, S₁ + F₁, S₃ + F₃ and S₄ + F₄ during both the years and the treatments S₃, S₄, F₃, S₂ + F₂, D₃ and D₄ during first year showed significant results over control. The maximum fruit yield per plant (0.49kg) was recorded with S₄ + F₄ treatment

during both the years. This treatment was significantly superior to all other treatments but at par with S₃ + F₃ treatment. This might be due to accelerated, mobility of photosynthates from source to sink as influenced by hormones, released or synthesized due to organic sources. Similar findings were corroborated by Rajagopal and Rao, 1974^[2], Uma, 1984^[4] and Susan, 1995^[3].

Table 3: Effect of Anupaan + Anupaan R on fruit yield per plant and fruit yield per hectare

Sr. #	Treatments	Fruit yield (kg/plant)		Mean	Fruit yield (t/ha)		Mean
		2001	2002		2001	2002	
1	Control	0.31	0.32	0.31	10.2	10.5	10.3
2	S ₁	0.36	0.37	0.36	12.8	12.2	12.5
3	S ₂	0.34	0.32	0.33	11.4	10.7	11.0
4	S ₃	0.38	0.39	0.38	13.7	13.1	13.3
5	S ₄	0.39	0.40	0.40	14.2	13.4	13.7
6	F ₁	0.36	0.34	0.35	12.0	11.4	11.7
7	F ₂	0.35	0.33	0.34	11.7	11.0	11.3
8	F ₃	0.39	0.37	0.38	13.0	12.4	12.7
9	F ₄	0.43	0.41	0.42	14.3	13.7	13.9
10	S ₁ + F ₁	0.43	0.41	0.42	14.2	13.5	13.8
11	S ₂ + F ₂	0.42	0.40	0.41	13.8	13.2	13.5
12	S ₃ + F ₃	0.45	0.46	0.46	15.9	15.3	15.6
13	S ₄ + F ₄	0.49	0.49	0.49	17.0	16.4	16.7
14	D ₁	0.36	0.34	0.35	11.9	12.0	11.9
15	D ₂	0.34	0.32	0.33	11.2	11.2	11.2
16	D ₃	0.38	0.36	0.37	12.7	12.7	12.6
17	D ₄	0.40	0.38	0.39	13.3	13.2	13.2
SE (m)±		0.02	0.02		0.7	0.5	
C.D. at 5%		0.06	0.08		2.0	1.2	

Fruit yield per hectare (t/ha.)

The data on fruit yield per hectare presented in Table 3, reveal that all the treatments of Anupaan + Anupaan R significantly increased the fruit yield per hectare over control during both the years except S₂, F₁, F₂ and D₂ treatments during both the years and D₁ treatment during the first year. Maximum fruit yield per hectare i.e. 17.0 t/ha and 16.4 t/ha was recorded with S₄ + F₄ treatment during first and second year, respectively. The treatment S₄ + F₄ was found significantly superior to all other treatments but statistically at par with S₃ + F₃ treatment during both the years.

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