



Effect of organic spray on growth parameters of tomato (*Solanum lycopersicum* L.) cv. GT 2 under south Gujarat condition

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Abstract

The experiment entitled “Effect of organic spray on growth parameters of tomato (*Solanum lycopersicum* L.) cv. GT 2 under south Gujarat condition” was carried out during *rabi* season 2017-18 at the Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat. The experiment was conducted with a set of twelve treatments *viz.*, T₁ (Control or No spray), T₂ (Water spray at 25 DATP), T₃ (Water spray at 25 & 50 DATP), T₄ (Novel spray 2 % at 25 DATP), T₅ (Novel spray 1 % at 25 & 50 DATP), T₆ (Vermiwash 3 % at 25 DATP), T₇ (Vermiwash 1.5 % at 25 & 50 DATP), T₈ (*Panchagavya* 3 % at 25 DATP), T₉ (*Panchagavya* 1.5 % at 25 & 50 DATP), T₁₀ (Moringa extract 3 % at 25 DATP), T₁₁ (Moringa extract 1.5 % at 25 & 50 DATP) and T₁₂ (Moringa extract 1 % at 25, 50 & 75 DATP). The experiment was conducted in a Randomized Blocked Design (RBD) with three replications. The results revealed that among different treatments, *panchagavya* @ 3 % at 25 DATP exhibits maximum growth characters of tomato.

Key words : *Panchagavya*, Vermiwash, Moringa leaves extract, Novel.

Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crop grown all over the world. It is self-pollinated and a member of solanaceae family having chromosome no. $2n = 24$. Foliar application of organic spray has been widely used as supplemental dose of major and minor nutrients, plant hormones, stimulants and other beneficial substances. Plant hormones can be used to increase yield per unit area because they influence every phase of plant growth and development. Among the group of growth regulators, cytokinin enhances food production. Zeatin is one of the most common forms of naturally occurring cytokinin in plants. Banana Pseudo stem sap contain huge amount of macro and micro nutrients, which act as growth booster solution. Vermiwash contains N, P, K, Ca and hormones such as auxins, cytokinins and many useful microbes like heterotrophic bacteria, fungi *etc.* When applied on the crops, it removes the imbalances in terms of physical, chemical and physiological aspects and harmonizes the basic element, which revitalizes the growth process. Plant sprayed with *panchagavya* invariable produce bigger leaves with dense canopy. It is also increases the sugar content and aroma of fruits as well as crops to induce early flowering. Moringa Leaf Extract application improves crops performance, resulting from vigorous seedling growth, maintained optimum tissue water status, improve membranes stability, enhance antioxidant levels and activate plant defense system, increase levels of plant secondary metabolites and reduce uptake of undesirable Na^+ and Cl^- .

Materials and methods

The field experiment with entitled, “Effect of organic spray on growth parameters of tomato (*Solanum lycopersicum* L.) cv. GT 2 under south Gujarat condition” was conducted during *rabi* season of 2017-18 at the Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat. The experiment was laid out in RBD with three replication and twelve treatments viz., T₁ (Control or No spray), T₂ (Water spray at 25 DATP), T₃ (Water spray at 25 & 50 DATP), T₄ (Novel spray 2 % at 25 DATP), T₅ (Novel spray 1 % at 25 & 50 DATP), T₆ (Vermiwash 3 % at 25 DATP), T₇ (Vermiwash 1.5 % at 25 & 50 DATP), T₈ (*Panchagavya* 3 % at 25 DATP), T₉ (*Panchagavya* 1.5 % at 25 & 50 DATP), T₁₀ (Moringa extract 3 % at 25 DATP), T₁₁ (Moringa extract 1.5 % at 25 & 50 DATP) and T₁₂ (Moringa extract 1 % at 25, 50 & 75 DATP). The gross and net plot size of experiment was 4.5 m × 3.6 m and 2.7 m × 2.7 m, respectively and planted at spacing 90 × 45 cm. All the organics was collected and considered as 100 % concentration and same was used for preparing the require solution.

The plant height at 25, 50, 75, 105 DATP and at final harvest was measured periodically from the ground level to the tip of the main shoot of the selected five plants from each net plot. The number of primary branches was counted manually of selected plants from each net plot at 75 DATP and at final harvest. The number of days from the date of transplanting to date on which first flower observed and fifty per cent of the plants flowered in net plot was recorded as days to first flowering and fifty per cent flowering, respectively for that respective treatments. The number of days taken from the date of transplanting to date of first and last marketable fruits harvest from net plot were recorded for each treatment and mentioned in days. Crop span of the treatment was calculated by subtract days to first harvest of marketable fruits from last harvest of marketable fruits of the respective treatment from net plot and that days narrated as crop span of that treatment.

Result and discussion

The data on growth attributing characters such as plant height, number of primary branches per plant, days to first and fifty percent flowering, days to first and last marketable fruit as well as crop span of tomato were significantly influenced with different liquid organic spray treatments.

The data pertaining to plant height influenced by different liquid organic spray have been presented in **Table 1**. The significantly maximum plant height (82.16, 94.13, 104.94 and 111.31 cm) at 50, 75, 105 DAT and at final harvest stage, respectively was came out with *panchagavya* 3 % at 25 DATP (T₈) as compare to no spray (T₁). It was followed by T₉ with at par level at all the observed stages. So it was clearly indicated that one or two spray of *panchagavya* effective for more vegetative growth as compared to other organics and water spray. These findings are in the line with those reported by Mathews *et al.* (2017) in tomato, brinjal, okra, chilli and cowpea due to positive effect of growth promoting hormones. Productions of more IAA and GA₃ by *panchagavya* stimulate the cell division and elongation in tomato plant reported by Shakila and Anburani (2008) in tomato as well as by Gayathri *et al.* (2015) in french bean. Rakesh *et al.* (2017) noted that the increased plant height might be due to *panchagavya* contains the favorable macro and micro nutrients as well as growth hormones in capsicum (Boraiah *et al.* 2017).

Similarly, in **Table 2** number of branches (6.07 and 9.00) was reported significant higher by the *panchagavya* 3 % at 25 DATP at 75 DATP and final harvest, respectively over control treatment. The increased number of branches might be due to auxins elongation of axillary bud promoting to branching in cowpea noted by Patel *et al.* (2013) and Sutar *et al.* (2017). The results of the present study are in agreement with the findings of Shakila and Anburani (2008) as well as Ramesh *et al.* (2015) in tomato. The significantly minimum days to first flowering (26.00 days) and fifty percent flowering (29.67 days) cited into *panchagavya* at the rate of 3 % at 25 DATP (T₈) over no spray. The early first and fifty flowering initiation in tomato might be due to high amount of proline amino acid present in milk, an important constitute of *panchagavya*. The similar findings are in agreement with higher endogenous proline increase cytokinin and auxin contribute towards early flowering by Mathews *et al.* (2017) in tomato, okra, chilli and cowpea along with Gunasekar *et al.* (2018) in black gram for early first flowering. This was in conformity with more photo assimilates to reproductive parts in the tomato crop assumed by Ramesh *et al.* (2015), Gunasekar *et al.* (2018) in black gram and Dutta *et al.* (2018) thought that stress condition at more vegetative growth due to slow released of nutrients from organics as compared to chemical inputs in pea for quick fifty per cent flowering.

Out rightly, the significant minimum days to first marketable fruit harvest (45.67 days) and maximum days to last marketable fruits harvest (154.33 days) as well as crop span (108.67 days) recorded into T₈ i.e. *panchagavya* 3 % at 25 DATP over no spray . This was might be due to more vegetative growth from transplanting to floral bud caused nutrient stress and it resulted to early flower. The flowering period extend for

long time due to supply of nutrient through top dress of fertilizer and higher cytokinin and auxin in the tissue by spray of organics on plant. Ultimately, two to three additional harvests were obtained by respective treatments. The vernacular result of Dutta *et al.* (2018) in pea is in agreement with the present study for first marketable fruit harvest. The data with statistical inference presented in **Table-3**.

Table-1 : Effect of organic spray on plant height of tomato cv. GT 2 under south Gujarat condition

Treatments	Plant height (cm)				
	25 DATP	50 DATP	75 DATP	105 DATP	final harvest
T ₁ : Control(No spray)	34.03	65.50	78.03	85.31	89.78
T ₂ : Water spray (25 DATP)	33.83	#66.22	79.68	87.25	91.79
T ₃ : Water spray (25 & 50 DATP)	34.07		79.31	86.94	91.42
T ₄ : Novel spray (2 % at 25 DATP)	34.36	78.40	89.34	99.84	108.22
T ₅ : Novel spray (1 % 25 & 50 DATP)	33.76	75.23	87.36	97.19	103.28
T ₆ : Vermiwash (3 % at 25 DATP)	33.85	77.45	88.59	95.66	105.51
T ₇ : Vermiwash spray (1.5 % at 25 & 50 DATP)	34.27	72.28	84.66	92.02	100.80
T ₈ : Panchagavya (3 % at 25 DATP)	34.55	82.16	94.13	104.94	111.31
T ₉ : Panchagavya(1.5 % at 25 & 50 DATP)	34.28	79.99	92.37	102.87	109.08
T ₁₀ : Moringa extract (3% at 25 DATP)	33.82	69.01	79.06	88.97	96.19
T ₁₁ : Moringa extract (1.5 % at 25 & 50 DATP)	34.27	69.28	81.53	90.43	98.07
T ₁₂ : Moringa extract (1% at 25, 50 & 75 DATP)	34.35	69.05	80.30	88.14	96.52
S. Em.±	-	2.06	2.55	2.80	2.97
C.D. at 5%	-	6.07	7.49	8.20	8.71
C.V. %	-	4.87	5.23	5.19	5.13

(# : As these both treatments had received same spray till date, so instead of two treatments they were considered as single and ANOVA was prepared)

Table-2 : Effect of organic spray on number of branches and flowering (days) characters of tomato cv. GT 2 under south Gujarat conditio

Treatments	Number of branches		Flowering	
	75 DATP	Final harvest	Days to first flowering	Days to fifty per cent flowering
T ₁ : Control (No spray)	5.00	7.80	30.33	35.67
T ₂ : Water spray (25 DATP)	5.00	7.87	#29.17	#34.33
T ₃ : Water spray (25 & 50 DATP)	5.13	8.00		
T ₄ : Novel spray (2 % at 25 DATP)	5.80	8.73	26.67	30.33
T ₅ : Novel spray (1 % 25 & 50 DATP)	5.60	8.53	27.00	32.00
T ₆ : Vermiwash (3 % at 25 DATP)	5.87	8.67	26.33	32.00
T ₇ : Vermiwash spray (1.5 % at 25 & 50 DATP)	5.47	8.40	27.33	32.67
T ₈ : Panchagavya (3 % at 25 DATP)	6.07	9.00	26.00	29.67
T ₉ : Panchagavya (1.5 % at 25 & 50 DATP)	5.93	8.87	26.33	30.33
T ₁₀ : Moringa extract (3% at 25 DATP)	5.33	8.07	28.00	33.00
T ₁₁ : Moringa extract (1.5 % at 25 & 50 DATP)	5.47	8.27	27.67	33.00
T ₁₂ : Moringa extract (1% at 25, 50 & 75 DATP)	5.60	8.20	28.00	33.67
S. Em.±	0.23	0.25	0.82	1.07
C.D. at 5%	0.67	0.74	2.42	3.17
C.V. %	7.16	5.23	5.15	5.74

Table-3 : Effect of organic spray on first and last marketable fruit as well as crop span of tomato cv. GT 2 under south Gujarat condition

Treatments	Days to first marketable fruit	Days to last marketable fruit	Crop span (days)
T ₁ : Control (No spray)	54.00	135.33	81.33
T ₂ : Water spray (25 DATP)	53.00	135.67	82.67
T ₃ : Water spray (25 & 50 DATP)	52.67	136.67	84.00
T ₄ : Novel spray (2 % at 25 DATP)	47.00	149.67	102.67
T ₅ : Novel spray (1 % 25 & 50 DATP)	47.67	150.67	103.00
T ₆ : Vermiwash (3 % at 25 DATP)	47.00	151.67	104.67
T ₇ : Vermiwash spray (1.5 % at 25 & 50 DATP)	48.33	147.67	99.33
T ₈ : Panchagavya (3 % at 25 DATP)	45.67	154.33	108.67
T ₉ : Panchagavya (1.5 % at 25 & 50 DATP)	46.67	153.00	106.33
T ₁₀ : Moringa extract (3% at 25 DATP)	50.33	139.00	88.67
T ₁₁ : Moringa extract (1.5 % at 25 & 50 DATP)	49.33	143.33	94.00
T ₁₂ : Moringa extract (1% at 25, 50 & 75 DATP)	51.00	142.33	91.33
S. Em.±	1.61	4.37	2.84
C.D. at 5%	4.73	12.83	8.33
C.V. %	5.65	5.23	5.15

Conclusions

From the forgoing result of the experiment, it can be concluded that the plant sprayed with *panchagavya* @ 3 % at 25 DATP enhanced growth characters of tomato cv. GT 2 under south Gujarat condition as compared to other and no in study.

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