

Review Article

Influence of Panchagavya on Growth, Yield and Quality of Tomato (*Lycopersicon esculentum* L.)

Comment [WU1]: What if the title of the article "Effect of Panchagavya as an organic matter on the Growth, Yield and Quality of Tomato (*Lycopersicon esculentum* L.)" please consider

ABSTRACT

An experiment was conducted to determine the "Influence of panchagavya on growth, yield and quality of tomato (*Lycopersicon esculentum* L.)" at Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Allahabad (Uttar Pradesh) during *Kharif* season 2021. Total 12 treatments and 3 Hybrids were replicated thrice in a factorial randomized block design (FRBD). Hybrids are TMTH-234, TMTH-2267 and TMTH-288. These hybrids were treated with different concentrations of panchagavya (1%, 2%, 3%) and control (water spray) were sprayed at 15, 30, 45 days after transplanting. The application of panchagavya significantly affects the vegetative as well as reproductive attributes of the crop. The results showed that hybrid TMTH-2267 with 3% spray of panchagavya performed best in terms of plant height (78.14 cm), days to 50% flowering (71.10), days to first harvest (98.10), polar diameter (5.47 cm), radial diameter (6.90 cm), number of fruits per plant (24), fruit weight (280.08 g), fruit yield per plant (1.68 kg), yield per hectare (55.88 t) and TSS (5.83 °Brix).

Key words: Growth, Panchagavya, Tomato, 50% flowering, Yield, Quality.

1. Introduction:

Tomato is the edible berry of the plant (*Lycopersicon esculentum* L.), commonly known as a tomato plant. The species originated in western South America and Central America. It belongs to the Solanaceae family. Tomato is one of the important vegetable crops grown throughout the world and ranks next to potato. Tomatoes widely grown in temperate climates across the world. **Buckseth(2012)** The red color of tomatoes is due to lycopene. The chromosome number is $2n=24$. Tomatoes are a significant source of Umami flavor. The tomatoes are now grown and eaten around the world it is used in diverse ways including the raw in salads or slices, incorporated into a wide variety of dishes, processed into ketchup or tomato soup and unripen green tomatoes can also be breaded and fried used to make salsa or pickle. Tomatoes are rich sources of folate, vitamin C minerals like calcium phosphorus and potassium. relative to phytonutrients, **Daliwal(2003)** the most abundant in tomatoes are the carotenoids. lycopene is the most prominent carotenoids followed by beta carotene, gamma-carotene and phytoene as well as several minor carotenoids several minor carotenoids. Tomato juice has grown in popularity as an appetizer and beverage. Water (94.1%), energy (23 calories), calcium (1.0 g), magnesium (7.0 mg), vitamin A (1000 IU), ascorbic acid (22 mg), thiamine (0.09 mg), riboflavin (0.03 mg), and niacin (0.8 mg) are all present in a well-ripened tomato (per 100 g of wholesome meal) **Uddain(2009)**

Panchagavya:

-The Sanskrit word Panchagavya means "five cow derivatives". when used in Ayurvedic medicine it is also called Cowpathy. Panchagavya or panchaKaviyam is a mixture used in traditional Hindu rituals that is prepared by mixing five ingredients. the three Direct constituents are cow dung, urine and milk; those two derived products are curd and ghee. Addition to this we can add jaggary, coconut water, sugarcane juice, Banana.

Somasundaram(2003) These are mixed in proper ratio and then allowed to ferment. Panchagavya is a low-cost preparation to support plant growth in organic agriculture. Panchagavya enhance the biological efficiency of the crop plant, quality and yield of fruits and vegetables. Panchagavya also includes growth hormones, like Auxins and Gibberellins which have advantageous effect on crops and acts as tonic for enhancing soil quality, promotes growth and yield of crops, that induces the plants vigor with quality production.

2. Materials and methods:

The field experiment was conducted at Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And sciences, Prayagraj (U.P.) during *Kharif* season 2021. The University is about 7 km away from Prayagraj city and it is geographically situated at 25.5° North latitude, 81.08° E longitudes. The altitude of this location is about 98 meter above the mean sea level.

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The experiment was laid out in Factorial Randomized Block Design (FRBD) with 12 treatments and 3 replications viz., T₀: V₁P₀(Hybrid 1 + Control), T₁: V₁P₁ (Hybrid 1 + 1% spray of Panchagavya), T₂: V₁P₂(Hybrid 1 + 2% spray of Panchagavya), T₃: V₁P₃ (Hybrid 1 + 3% spray of Panchagavya), T₄: V₂P₀(Hybrid 2 + Control), T₅: V₂P₁(Hybrid 2 + 1% spray of Panchagavya), T₆: V₂P₂(Hybrid 2 + 2% spray of Panchagavya), T₇: V₂P₃(Hybrid 2 + 3% spray of Panchagavya), T₈: V₃P₀(Hybrid 3 + Control), T₉: V₃P₁ (Hybrid 3 + 1% spray of Panchagavya), T₁₀: V₃P₂(Hybrid 3 + 2% spray of Panchagavya), T₁₁: V₃P₃ (Hybrid 3 + 3% spray of Panchagavya) were sprayed at 15, 30, 45 days after transplanting. Tomato hybrids, TMTH-234, TMTH-2267 and TMTH-288 these three hybrids were used in the experiment. The plot size was 2.6m x 2.4m with a spacing of 60cm x 45cm rows and plants. The Panchagavya solution was prepared from their respective solutions and ingredients. Three plants were randomly selected for recording observations on growth, yield and quality attributing parameters.

3. Results and Discussion:

3.1 Growth Parameters

The statistical data on growth parameters in different treatments was recorded (Table 1). In the experiment the results revealed that the plant height was increased significantly with the application of Panchagavya. TMTH-2267 + 3% spray of Panchagavya was recorded with maximum plant height (78.14 cm) followed by TMTH-288 + 3% spray of Panchagavya was recorded with

(77.08cm) whereas the minimum plant height was recorded in TMTH-234 + control (60.32 cm). The growth in plants may be attributed to the spray Panchagavya. Its positive effect on growth and productivity of crops has been reviewed and documented by many workers. Chemical analysis revealed that Panchagavya possess almost all macro, micronutrients and growth promoting hormones (IAA, GA) required for plant growth. Ruban. S *et al.*, (2019) who reported that plant height significantly increased with application of Panchagavya over control in black gram. The data indicated in Table 1 show that application of Panchagavya significantly reduces days to 50% flowering which was recorded in TMTH-2267 + 3% spray of Panchagavya with minimum days for 50% flowering (71.10) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (71.77) whereas the maximum days for 50% flowering was recorded in TMTH-234 + control (81.16). Days taken for 50% flowering was significantly influenced by various treatments. Earliest flowering was observed with foliar application of Panchagavya (3%) alone. Readily available N, P, K and growth regulators in Panchagavya may have induced early flowering in tomato. Similar findings were recorded by Saraswathi. T and Praneetha. S (2013).

3.2 Yield Parameters

In this study the application of Panchagavya at regular intervals after transplanting shows significant difference on yield parameters as compared to control which was shown in Table 1. The results obtained in present

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study shows that application of Panchagavya **significantly reduces** days to first harvest which was recorded in TMTH-2267 + 3% spray of Panchagavya (98.10) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (102.29) whereas the maximum days to first harvest was recorded in TMTH-234 + control (110.16). Using Panchagavya helps to decrease the days to harvest and increase more yield and quality. Similar findings were seen in **Bharadwaj (2021)** as compared to esculents were increased in 3% Panchagavya spray when compared with control and other concentration. Readily available N, P, K and growth regulators in Panchagavya has resulted for this. Maximum polar diameter was recorded in TMTH-2267 + 3% spray of Panchagavya (5.47 cm) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (5.35 cm) whereas the minimum polar diameter was recorded in TMTH-234 + control(4.00 cm).The application of Panchagavya increased the fruit diameter by increasing the cell division and enlargement of cell and resulted in more development and diameter of fruits It boosts photosynthetic activities and makes them more efficient for translocation and use of photo-synthetics that could be useful for the plant's growing section or growth stimulant.**Gopakkali. (2014)**.Maximum radial diameter was recorded in TMTH-2267 + 3% spray of Panchagavya (6.90 cm) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (6.62 cm) whereas the minimum radial diameter was recorded in TMTH-234 + control(4.93 cm).Fruit circumference was high in

Panchagavya treatment. This may be due to the growth promoting effect of Panchagavya which leads to increasing the diameter of fruit **S. Nandakumar(2021)**.Maximum number of fruits was recorded in TMTH-2267 + 3% spray of Panchagavya (24.00) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (23.73) whereas the minimum number of fruits was recorded in TMTH-234 + control (21.22).The number of fruits was higher in the treatments with 3% spray of Panchagavya, which may be due to increased supply of major plant nutrients and are required in larger quantities for growth and development of plants. The increased nutrient availability from the organic manures might have increased the various endogenous hormonal levels in the plant tissue, which might be responsible for enhanced pollen germination and pollen tube growth, which ultimately increased the number of fruits per plant, resulting in higher yields. This is in line with the findings of **Jenny and Malliga(2016)** in tomato, **Bade(2017)** in chilli.Maximum fruit weight was recorded in TMTH-2267 + 3% spray of Panchagavya (280.08 g) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (264.59 g) whereas the minimum fruit weight was recorded in TMTH-234 + control(186.73 g).Taller plants with a greater number of branches have increased photosynthetic area, favorable physiological activities might have resulted in more production and translocation of photosynthates which in turn accelerated the formation of more fruits with larger size and with weight ultimately leading to higher fruit yield Soluble forms of

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nutrients are easily available in Panchagavya and makes the plant physiologically more active, which influences fruit weight positively. **Gajjela(2019)**Maximum fruit yield per plant was recorded in TMTH-2267 + 3% spray of Panchagavya (1.68 kg) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (1.58 kg) whereas the minimum fruit yield per plant was recorded in TMTH-234 + control(1.12 kg).Maximum fruit yield per hectare was recorded inTMTH-2267 + 3% spray of Panchagavya (55.88 t) followed by TMTH-288 + 3% spray of Panchagavya was recorded with (52.77 t) whereas the minimum fruit yield per hectare was recorded in TMTH-234 + control (37.22 t).The increased fruit yield might also be due to increased photosynthetic efficiency resulting in higher accumulation of photosynthates as evidenced from significantly higher concentration of chlorophyll (a, b and total) content in Panchagavya treated plants. Findings are from **Swarnam(2016)**.

3.2 Quality Parameters

In the study the application of Panchagavya at regular intervals after transplanting shows significant difference on quality parameters as compared to control which was shown in Table 1. The results obtained in present study shows that maximum TSS was recorded in TMTH-2267 + 3% spray of Panchagavya (5.83 °Brix) followed by

TMTH-288 + 3% spray of Panchagavya was recorded with (5.77 °Brix) whereas the minimum TSS was recorded in TMTH-234 + control (4.91 °Brix).This may be due to the higher potassium supply from Panchagavya, which paved way for the conversion of radiation energy to chemical energy in translocation of assimilated sugars from leaves to fruits that ultimately resulted in higher TSS. These results are in close conformity with the findings of **Jenny and Malliga(2016)**.

Conclusion: Based on the results of the present investigation entitled “Influence of Panchagavya on growth, yield and fruit quality of tomato (*Lycopersicon esculentum* L.)” in Prayagraj. Treatment consisted of Hybrid TMTH-2267 along with 3% spray of Panchagavya was recorded maximum performances with respect to almost all the characters viz., Plant height at harvest, days to 50% flowering, days to first harvest, Polar diameter, Radial diameter, Number of fruits, Fruit weight, Fruit yield/plant, yield/ha, Total Soluble Solids.

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Table 1: Influence of Panchagavya on growth, yield and quality parameters of tomato.

Treatment	Plant height at Harvest (cm)	Days to 50% Flowering	Days to first harvest	Polar diameter (cm)	Radial diameter (cm)	Number of fruits	Fruit weight (g)	Fruit yield per plant (kg)	Fruit yield per hectare (t)	TSS (^o Brix)
V₁ x P₀	60.32	81.16	110.16	4.00	4.93	21.22	186.73	1.12	37.22	4.91
V₁ x P₁	71.75	78.22	105.11	4.71	5.52	22.10	216.51	1.29	43.10	5.15
V₁ x P₂	73.54	75.44	104.11	5.11	6.08	22.55	227.43	1.33	44.22	5.26
V₁ x P₃	76.08	72.88	102.88	5.28	6.36	23.44	243.81	1.46	48.55	5.54
V₂ x P₀	71.36	80.11	107.04	4.52	5.51	22.00	206.33	1.23	41.10	5.06
V₂ x P₁	73.42	76.22	104.50	4.84	5.93	22.44	226.41	1.35	45.11	5.25
V₂ x P₂	74.54	73.88	103.55	5.18	6.28	23.00	237.93	1.42	47.44	5.38
V₂ x P₃	78.14	71.10	98.10	5.47	6.90	24.00	280.08	1.68	55.88	5.83
V₃ x P₀	71.21	80.33	108.29	4.16	4.99	21.89	204.91	1.22	42.44	5.00
V₃ x P₁	72.38	76.55	105.11	4.76	5.70	22.22	221.16	1.32	44.11	5.18
V₃ x P₂	74.18	74.66	104.11	5.11	6.23	22.88	234.33	1.40	46.66	5.30
V₃ x P₃	77.08	71.77	102.29	5.35	6.62	23.73	264.59	1.58	52.77	5.77
CD_{0.05}	0.87	5.08	4.94	0.90	0.89	1.32	5.48	46.47	2.15	0.28
S. Ed (±)	0.42	2.46	2.37	0.43	0.42	0.63	2.64	22.41	1.03	0.14

Reference:

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