

# Effect of organic and inorganic fertilizers on Establishment and Vegetative growth of Pomegranate (*Punica granatum* L.) Cv. Ganesh

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## ABSTRACT

The present experiment carried out during 2020 in Central research field of the Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, The experiment was conducted in Randomized Block Design (RBD) with 8 Treatments and 3 Replications they are as follows : T<sub>0</sub> Control , T<sub>1</sub> 100% NPK, T<sub>2</sub> 100% poultry manure, T<sub>3</sub> 25% NPK+75% Vermicompost, T<sub>4</sub> 100% Vermicompost , T<sub>5</sub> 25% poultry Manure+25% Vermicompost+50%NPK , T<sub>6</sub> 50% poultry manure+50% Vermicompost, T<sub>7</sub> 25%NPK +75% poultry manure. The main objectives of the research is to study effect of organic and inorganic fertilizers on growth and development of pomegranate cv Ganesh. To evaluate the economics of different treatment. on the basis of result obtained in the present investigation it is concluded that the organic and Inorganic fertilizer revealed that T<sub>5</sub> 25% poultry Manure+25% Vermicompost +50% NPK to be most effective for obtaining superior plant height (cm)(84.42), Number of branches(12.89), survival percentage (100%), Mortality percentage (0.00%), leaves per plant (116.98), stem girth (2.31), plant spread (74.38), leaf area (4.86cm<sup>2</sup>) Chlorophyll SPAD (68.81).

*Key words* : Pomegranate, Organic and inorganic fertilizers, Growth, Development

## Introduction

Pomegranate (*Punica granatum* L.) is one of the important fruit crop in arid and semi-arid regions. The fruit is touted as 'super food' because of its nutritional and health promoting characters. It has wide adaptability and requires relatively low cost for its cultivation with drought tolerance and good economic returns with potential of export attributes. Hence, its area is expanding in recent years. In India, it is extensively grown in Maharashtra, Karnataka and Andhra Pradesh and it is an upcoming crop in Gujarat, Tamil Nadu, Uttar Pradesh, Haryana and

Rajasthan. In Karnataka, pomegranate is cultivated on an area of 18.49 thousand ha with an annual production of 1.99 lakh tons and productivity of 10.75 MT ha<sup>-1</sup>(KSHD, 2014), growing predominantly in districts of Chitradurga, Bellary, Bijapur, Tumkur, Koppal and Bagalkot. Pomegranate is a hardy crop that is usually cultivated under low fertile soil. But, its intensive cropping involving bahar treatment (manipulation of flowering and fruit setting involving plant hormones) without proper nutrient management is deteriorating the plant health and making plants susceptible for several biotic and abiotic stresses. Hence, there is need for balanced nutrient

application and enhancing its availability in soil that stimulates their uptake and assimilation by pomegranate Greeshma *et al.*, (2017).

All the parts of pomegranate tree are having economic importance for both therapeutic and food values. Juice is used in the treatment of leprosy, rind of the fruit is used in curing dysentery and diarrhea. It is a good source of carbohydrates (14.5%), proteins (1.6%), fats (0.1%) and minerals (0.7%) comprising calcium (10 mg/100g), magnesium (12mg/100g), phosphorus (70 mg/100 g) and iron (0.3mg/100g). Pomegranate is also a good source of vitamins like thiamine, riboflavin, nicotinic acid, ascorbic acid and citric acid.

## Materials and Methods

The experiment entitled “Effect of organic and inorganic fertilizers on Establishment and Vegetative growth of Pomegranate (*Punica granatum* L.) Cv. Ganesh” was carried out the Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj 2020-2021.

### Treatments Details

Treatment notation	Treatment combinations
T <sub>0</sub>	Control
T <sub>1</sub>	100% NPK
T <sub>2</sub>	100% Poultry manure
T <sub>3</sub>	25% NPK + 75% Vermicompost
T <sub>4</sub>	100% Vermicompost
T <sub>5</sub>	25% Poultry manures +25% Vermicompost +50% NPK
T <sub>6</sub>	50% poultry manures +50% Vermicompost
T <sub>7</sub>	25% NPK +75% Poultry manures

### Parameters Studied

**Vegetative growth parameters :** Survival percent (%), Plant mortality, Plant height (cm), Number of leaves plant, Number of branches plant, Stem girth (cm), Plant spread (E-W) and (N-S), Leaf area (cm<sup>2</sup>), Chlorophyll measurements.

## Results and Discussion

The present studies on the “Effect of organic and inorganic fertilizers on Establishment and Vegetative

growth of Pomegranate (*Punica granatum* L.) Cv. Ganesh” were carried out at the experimental orchard of Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences-Prayagraj, during the year 2020-2021. The observations recorded and results obtained during the period of investigation have been presented in this chapter under the following heads.

The data show that application of different levels of organic manures (Poultry manures (100, 25, 50, 75% and Vermicompost 100, 25, 50, 75%) and inorganic fertilizer (NPK 100, 25, 50, 75%) have significant effect on survival percentage as compared to control (T<sub>0</sub>). The maximum survival percentage (100%) were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK, T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>4</sub> 100% Vermicompost, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>2</sub> 100 Poultry manure and T<sub>1</sub> 100% NPK and the minimum survival percentage (66.67) were recorded under T<sub>0</sub> NPK (RDF). Chougule (1976)

The maximum Mortality percentage (0.00%) were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK, T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>4</sub> 100% Vermicompost, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>2</sub> 100 Poultry manure and T<sub>1</sub> 100% NPK and the maximum mortality percentage (11.11) were recorded under T<sub>0</sub> NPK (RDF).

The maximum plant height (55.75, 61.25, 66.41, 71.08, 75.59) at 30, 60, 90, 120, 150 and 180 DAT were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum plant height (38.73, 42.19, 47.52, 53.14, 57.06, 62.58) were recorded under T<sub>0</sub> NPK (RDF). Bhagyasha *et al.*, (2020)

The maximum number of leaves per plant (42.22, 58.74, 72.45, 86.16, 101.57, 116.98) at 30, 60, 90, 120, 150 and 180 DAT were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure

**Table 1.** Mean performance of Establishment of Pomegranate (*Punica granatum L.*) and observing the effect of organic and inorganic fertilizers on growth and development of Ganesh variety

Treatment notation	Treatment Details	Survival percentage	Mortality percentage	Plant height (cm)	Number of leaves (cm)	Number of branches per plant	Stem girth per plant (cm)	Plant spread (cm)	Leaf area (cm <sup>2</sup> )	Chlorophyll SPAD (cm <sup>2</sup> )
T <sub>0</sub>	Control	66.67	11.11	62.58	66.99	7.21	1.62	53.93	2.24	36.04
T <sub>1</sub>	100% NPK	100.00	0.00	70.80	84.37	8.34	1.87	60.13	2.95	43.44
T <sub>2</sub>	100 Poultry manure	100.00	0.00	74.07	82.95	9.53	1.78	60.64	4.22	47.56
T <sub>3</sub>	25% NPK + 75% Vermicompost	100.00	0.00	73.98	87.95	8.58	1.84	62.49	3.81	45.49
T <sub>4</sub>	100% Vermicompost	100.00	0.00	79.53	80.02	10.74	1.91	66.70	3.51	51.33
T <sub>5</sub>	25% Poultry manures +25% Vermicompost +50% NPK	100.00	0.00	84.42	116.98	12.89	2.31	74.38	4.86	68.81
T <sub>6</sub>	50% poultry manures +50% Vermicompost	100.00	0.00	80.00	102.44	12.64	2.27	71.99	4.46	61.51
T <sub>7</sub>	25% NPK +75% Poultry manures	100.00	0.00	78.79	96.93	12.33	1.94	68.52	4.20	56.49
	<b>F-Test</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
	C.D.at 0.5%	0.149	12.03	3.049	5.88	1.198	0.113	2.565	1.189	6.8387
	<b>S.Ed (±)</b>	<b>0.049</b>	<b>5.597</b>	<b>1.422</b>	<b>2.74</b>	<b>0.558</b>	<b>0.053</b>	<b>1.196</b>	<b>0.554</b>	<b>3.188</b>

and where as the minimum number of leaves per plant (25.03, 33.48, 40.36, 47.24, 57.12 and 66.99) were recorded under T<sub>0</sub>NPK (RDF).

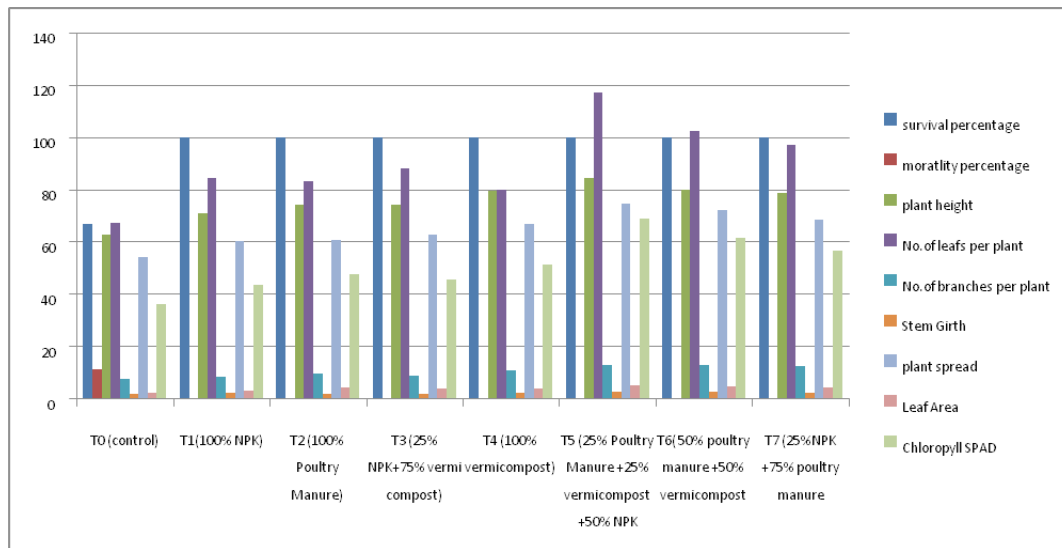
The maximum number of branches per plant (5.82, 7.31, 8.72, 9.55, 11.37 and 12.89) at 30, 60, 90, 120, 150 and 180 DAT were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum number of branches per plant (2.57, 3.63, 4.69, 5.14, 6.50 and 7.21) were recorded under T<sub>0</sub> NPK (RDF) Greeshma *et al.*, (2017).

The maximum stem girth (1.38, 1.49, 1.58, 1.68, 2.12, 2.31) at 30, 60, 90, 120, 150 and 180 DAT were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum stem girth (0.88, 1.14, 1.22, 1.32, 1.46 and 1.62) were recorded under T<sub>0</sub> NPK (RDF).

The maximum plant spread (37.77, 43.32, 51.25, 55.88, 62.27 and 74.38) at 30, 60, 90, 120, 150 and 180 DAT were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum plant spread (20.42, 26.41, 32.96, 39.05, 46.53 and 53.93) were recorded under T<sub>0</sub> NPK (RDF) Sangeeta *et al.*, (2017).

The maximum leaf area (4.86 cm<sup>2</sup>) were recorded under application of T<sub>5</sub> 25% Poultry manures + 25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures +50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum leaf area (2.24 cm<sup>2</sup>) were recorded under T<sub>0</sub> NPK (RDF).

The maximum Chlorophyll SPAD (68.81) were recorded under application of T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK followed by T<sub>6</sub> 50% poultry manures + 50% Vermicompost, T<sub>7</sub> 25% NPK +75% Poultry manures, T<sub>3</sub> 25% NPK + 75% Vermicompost, T<sub>4</sub> 100% Vermicompost and T<sub>2</sub> 100 Poultry manure and where as the minimum Chlorophyll SPAD (36.04) were recorded under T<sub>0</sub> NPK (RDF)



Chat 1. Establishment of Pomegranate (*Punica granatum* L) and observing the effect of organic and inorganic fertilizers on growth and development of Ganesh variety

## Conclusion

From the present investigation it may be concluded that T<sub>5</sub> 25% Poultry manures +25% Vermicompost +50% NPK resulted in highest survival percentage and vegetative growth parameters like survival percentage, Mortality percentage, plant height, number of leaves per plant, number of branches per plant, stem girth, plant spread, leaf area and Chlorophyll SPAD.

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