



## **Pre-sowing Seed Treatments with Selected Organics on Growth, Yield and Yield Attributing Traits in Chickpea Var Desi Himmat**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

The present study entitled, "Pre-Sowing Seed Treatments With Suitable Organics on Growth, Yield, Yield attributing Traits in Chickpea (*Cicer arietinum* L.) var Desi Himmat" was carried out with Panchagavya, Neem Leaf Extract, Vermiwash, Tulsi Leaf Extracts of varying concentrates at the duration of 12 hrs. To assess these treatments' effects on Chickpea and find the optimal pre-sowing treatment. The results depicted that seed treatment showed significant variation for all the recorded characters and performed well compared to the untreated control. Seed treatment with T<sub>2</sub>-Panchagavya at 10% for 12 hrs. recorded field emergence of 92.33% and plant height at maturity 71.33 cms, days to 50% flowering is 63.67 days, and days to 50% pod setting 71.67 days, days to maturity is 106.33 days, 32.99 pods per plant, 1.91 seeds per pod, 14.33 gm seed yield per plant, 23.66 gm of 100 seed weight, 35.80 gm of biological yield per plant and 39.11% of harvest index. At par treatment, T<sub>4</sub>-Vermiwash at 8% for 12 hrs. performed well with 13.66 gm seed yield per plant, and the 36.52% harvest index was promising. Thus, treating T<sub>2</sub>-Panchagavya at 10% for 12 hrs. was so productive and can be suggested for cultivation on a commercial scale.

**Keywords:** *Panchagavya; vermiwash; neem leaf extract; tulsi leaf extract.*

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## 1. INTRODUCTION

Chickpea with the chromosome number ( $2n=2x = 16$ ) and is the third most frequently cultivated legume crop after dry bean (*Phaseolus vulgaris* L.) and Field pea (*Pisum sativum* L.). Chickpea is the most significant self-pollinated pulse crop for the Rabi season [1]. It is divided into Desi and Kabuli chickpeas and has Eastern Turkey as its main region of origin. However, the desi form is more prevalent and makes up roughly 80-85 percent of global production, while Kabuli type makes up about 15-20 percent [2]. Chickpea supplied 49.3% of all pulses produced in 2020-21, with the remainder pulses receiving contributions from pigeonpea (16.2%), mungbean (10.3%), urdbean (9.3%), lentil (4.9%) and other pulses 9.9%. Legumes are the richest source of protein for humans and livestock in underdeveloped areas. In addition, they are employed as green manures and feed for livestock. They are mostly used to fix atmospheric nitrogen to enhance soil's chemical and physical characteristics [3]. In addition to increasing soil fertility, certain legumes can solubilize phosphate that would otherwise be inaccessible by excreting organic acids from their roots and improving soil fertility (Ray et al. 2017). When grown in a rotation with non-leguminous crops, legumes also aid in recovery of soil organic matter and the reduction of pest and disease issues [4]. Temperatures between 24°C to 30°C, along with appropriate moisture levels, are ideal for chickpea crop growth. It is winter crop that does well in both rainfed and irrigated environments [5-7]. It is frequently grown in heavy soil types because it's to tolerate cold climates, and the appropriate pH range of 5.5 to 7.0 for greater growth and yield [8]. Chickpeas are rich in dietary fibre, particularly raffinose, a soluble fibre [9-11]. According to [12], the plant seed is primarily edible component and richest source of protein (23.3-28.9%), carbs (61.5%), lipids (4.5%) and minerals (phosphorous, calcium, magnesium, iron, zinc). Legumes are beneficial as food not only for humans but also for cattle because of their high protein content [13-15]. Despite chickpeas' high yielding potential and several benefits, India has a low crop yield per unit area [16-19]. From 2000-01 to 2018-19, India's chickpea output climbed from 38.55 to 122.29 lakh tonnes, while the acreage increased from 53.85 to 122.29 lakh ha, and the yield increased consistently from 744 kg/ha to 1077 kg/ha [20]. Over the past three decades, the area and production of chickpeas have steadily decreased in Uttar Pradesh. The

production has reduced from 12.50 lakh tonnes even though the area has decreased from 17.26 lakh ha in 1975-76 to 7.40 lakh ha in 2005-06. However, productivity has increased from 724 to 893 kg/ha.

### 1.1 Objectives

Present study were undertaken to determine the effect of different pre sowing seed treatments of Panchgavya, Vermiwash and Tulasi leaf extract on growth, yield and yield attributing traits of Chickpea.

## 2. MATERIALS AND METHODS

The experiment was conducted at the Seed Testing Laboratory of the Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agricultural Technology and Sciences, Prayagraj (U.P.) 2022. The Chickpea var Desi Himmat seeds were treated with organics to evaluate growth, yield and yield attributing traits. The seeds are subjected to different soaking concentrations for 12 hours. The seeds are treated organically with T1- Panchagavya 8%, T2-Panchagavya 10%, T3-Panchagavya 15%, T4-Vermiwash 8%, T5-Vermiwash 10%, T6-Vermiwash 15%, T7-Neem Leaf Extract 5%, T8-Neem Leaf Extract 10%, T9-Neem Leaf Extract 15%, T10-Tulsi Leaf Extract 5%, T11-Tulsi Leaf Extract 10%, T12-Tulsi Leaf Extract 15% for 12 hours respectively. The Experiment was laid out in RBD, with 13 treatments with three replications. In the period from germination to harvest, growth parameters were recorded at frequent intervals and after harvest yield parameters were recorded, including Field Emergence, Plant height, Days to 50% Flowering, Days to 50% pod setting, Days to Maturity, No. of pods per plant, No. of seeds per pod, Seed yield per plant, Seed Index, Biological yield per plant, and Harvest Index were recorded and statistically analysed using ANOVA as applicable to RBD.

### 2.1 Methodology

For the preparation of solution of Panchagavya and Vermiwash to prepare 8% solution take 80 ml of each solutions in a separate beaker each and they were added in 1000 ml. of distilled water with constant stirring. Then the solution volume will finally constitute to one litre, becoming an 8% stock solution of Panchagavya and Vermiwash.

To prepare of plant leaf extract, the fresh leaves of concerned plants were collected separately and dried under shade. The dried leaves were powdered using a motor and pistil. To prepare a 5% solution, 5 g of leaf extract powder was added to 100 ml distilled water, and leaf extract solutions were prepared. The leaf extracts were filtered by using muslin cloth to remove unwanted material and plant debris.

After the preparation of solutions, chickpea seeds were soaked in respective solutions for 12 hrs at 25°C temperature. Untreated seeds is called Control. After 12 hrs of soaking the solutions were drained from the beaker and pre-soaked air dried to the original weight. After seed treatment, seeds were sown in the field for field observations.

### 3. RESULTS AND DISCUSSION

#### 3.1 Growth Attributes

##### 3.1.1 Field emergence

The mean performance of Field Emergence (%) ranged from 83.33 to 92.33, with a grand mean of 88.18. Table 1 indicates that maximum field emergence (92.33%) was recorded in T2-Panchagavya at 10% for 12hrs. and least in T0-Control (83.33%). All treatments were found

significantly in comparison to the control. Among the significant treatments, Treatment T12-Panchagavya at 10% for 12hrs. was higher in comparison to control as well as other treatments.

##### 3.1.2 Plant height

The mean performance of Plant height (cms) ranged from 62.34 to 71.33 with a grand mean of 67.21. Maximum plant height was recorded (71.33 cms) in T2-Panchagavya at 10% for 12hrs. and least (62.34 cms) in T0-Control. All treatments were found significantly in comprison to the control. Among these treatments, T2-Panchagavya at 10% for 12hrs. was found significantly higher in comparison to control and other treatments.

##### 3.1.3 Days to 50% flowering

The mean performance of Days to 50% flowering ranged from 63.67 to 70.33 with a grand mean of 66.13. Among the treatments, T2-Panchagavya at 10% for 12hrs. was lowest (66.13 days) and highest was found in T0-Control (70.33 days). Among the significant treatments, Treatment T2-Panchagavya at 10% for 12hrs. was significantly lower as compared to control and other treatments.

**Table 1. Mean performance effect of seed treatments on growth,yield and yield attributing traits in chickpea**

Treatments	Field Emergence	Plant Height	Days to 50% Flowering	Days to 50% Pod Setting	Days to Maturity
T0	83.33	62.34	70.33	78.33	111.33
T1	86.33	67.33	66.67	75.00	108.00
T2	92.33	71.33	63.67	71.67	106.33
T3	89.33	63.67	69.33	74.67	108.33
T4	91.33	70.33	64.67	72.00	107.33
T5	86.67	68.00	69.00	75.33	111.00
T6	88.33	64.66	67.33	73.33	110.33
T7	89.67	65.67	64.33	76.67	109.67
T8	86.67	68.67	64.67	74.00	107.67
T9	86.33	69.67	64.33	74.67	107.67
T10	87.67	66.67	66.00	72.67	109.33
T11	89.67	67.67	65.33	73.33	108.33
T12	90.33	68.33	64.67	73.67	108.67
<b>Grand Mean</b>	88.30	67.25	66.17	74.25	108.76
<b>F-Test</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>S.Em</b>	0.53	0.97	0.88	0.89	0.92
<b>S.Ed</b>	0.76	1.27	1.24	1.25	1.25

Treatments	Field Emergence	Plant Height	Days to 50% Flowering	Days to 50% Pod Setting	Days to Maturity
C.V	1.08	2.50	2.64	2.09	1.47
T.value	2.06	2.06	2.06	2.06	2.06
C.D. at 5%	1.56	2.83	3.17	2.59	2.69

T0- Control, T1- Panchagavya at 8% for 12 hrs., T2- Panchagavya at 10% for 12 hrs., T3- Panchagavya at 15% for 12 hrs., T4- Vermiwash at 8% for 12 hrs., T5- Vermiwash at 10% for 12 hrs., T6- Vermiwash at 15% for 12 hrs., T7- Neem leaf extract at 5% for 12 hrs., T8- Neem leaf extract at 10% for 12 hrs., T9- Neem leaf extract at 15% for 12 hrs., T10- Tulsi leaf extract at 5% for 12 hrs., T11- Tulsi leaf extract at 10% for 12 hrs

**Table 2. Mean performance effect of seed yield and biological yield in chickpea**

Treatments	No. of Pods per Plant	No. of Seeds per Pod	Seed Yield per Plant (g)	Seed Index(g)	Biological Yield (g/plant)	Harvest Index(%)
T0	25.67	1.55	7.33	20.33	22.67	31.82
T1	28.67	1.22	9.67	21.33	29.67	30.33
T2	32.99	1.91	14.33	23.66	35.80	39.11
T3	27.66	1.40	7.33	20.34	22.07	33.23
T4	32.00	1.78	13.67	23.34	35.60	36.52
T5	30.33	1.29	11.67	22.00	30.93	36.64
T6	28.67	1.53	7.67	20.67	22.27	34.44
T7	28.33	1.67	8.33	22.67	22.60	35.41
T8	30.67	1.28	12.33	22.67	33.47	35.86
T9	28.33	1.32	12.67	21.33	33.60	37.71
T10	29.34	1.35	9.33	21.67	24.80	36.29
T11	29.67	1.62	10.33	22.33	30.40	32.91
T12	29.67	1.77	11.67	21.33	28.74	36.29
Grand Mean	29.52	1.51	10.48	21.82	28.66	35.12
F-Test	S	S	S	S	S	S
S.Em	0.59	0.03	0.18	0.29	0.47	0.55
S.Ed	0.59	0.05	0.38	0.33	0.90	1.01
C.V	3.51	3.09	3.01	2.30	2.83	2.72
T-value	2.06	3.06	2.06	2.06	2.06	2.06
C.D. at 5%	1.74	0.07	0.52	0.84	1.37	1.61

T0- Control, T1- Panchagavya at 8% for 12 hrs., T2- Panchagavya at 10% for 12 hrs., T3- Panchagavya at 15% for 12 hrs., T4- Vermiwash at 8% for 12 hrs., T5- Vermiwash at 10% for 12 hrs., T6- Vermiwash at 15% for 12 hrs., T7- Neem leaf extract at 5% for 12 hrs., T8- Neem leaf extract at 10% for 12 hrs., T9- Neem leaf extract at 15% for 12 hrs., T10- Tulsi leaf extract at 5% for 12 hrs., T11- Tulsi leaf extract at 10% for 12 hrs

### 3.1.4 Days to 50% pod setting

The mean performance of Days to 50% pod setting was ranged from 71.67 to 78.33 with grand mean ranged from 73.79. Among these treatments T2-Panchagavya at 10% for 12hrs. was lowest (71.67 days) and highest found in T0-Control (78.33 days). Among the significant treatments, Treatments T2-Panchagavya at 10% for 12hrs. was significantly lower as compared to control and other treatments.

### 3.1.5 Days to maturity

The mean performance of days to maturity ranged from 106.33 to 111.33, with a grand mean of 108.51. For Days to Maturity, all the treatments were significantly lower than the

control. Among the treatments, T2-Panchagavya at 10% for 12hrs. was found lowest (106.33 days) compared to control and other treatments.

## 3.2 Yield Attributes

### 3.2.1 Pods per plant

The mean number of pods per plant ranged from 25.67 to 32.99, with a grand mean of 29.67. All the treatments were significantly higher for the number of pods per plant compared to the control. Among the treatments, T2- Panchagavya at 10% for 12hrs. (32.99) was found significantly higher in comparison to control and other treatments.

### 3.2.2 Seeds per pod

The mean performance of the Number of Seeds per pod ranged from 1.15 to 1.91, with a grand mean of 1.64. Among the treatments, no. of seeds per pod treatment T2-Panchagavya at 10% for 12hrs. (1.91) was found significantly higher compared to control and other treatments.

### 3.2.3 Seed yield per plant (g)

The mean performance of Seed yield per plant (g) was ranged from 7.33 (g) to 14.67 (g) with a grand mean of 10.15 (g). All the treatments were significantly higher for seed yield per plant (g) compared to the control. Among the treatments, seed yield per plant (g) treatment T2-Panchagavya at 10% for 12hrs. (14.67 g) was found to be higher in comparison to control and other treatments.

### 3.2.4 Seed index (G)

The mean performance of the Seed Index (g) was ranged from 20.33 (g) to 23.66 (g), with a grand mean of 21.72 (g). Among the treatments, seed index treatment T2-Panchagavya at 10% for 12hrs. (23.66 g) was found to be highest in comparison to control and other treatments.

### 3.2.5 Biological yield (g)

The mean performance of Biological yield (g) was ranged from 22.67 (g) to 35.87 (g) with a grand mean of 28.74 (g). For biological yield (g), all the treatments were significantly higher in comparison to control. Among the treatments, for biological yield treatment T2-Panchagavya at 10% for 12hrs. (35.87 g) was found significantly higher in comparison to control and other treatments.

### 3.2.6 Harvest index (%)

The mean performance of the Harvest Index (%) ranged from 31.82 to 39.11, with a grand mean of 35.21. For Harvest Index, all the treatments were significantly higher than the control. Among the treatments, for harvest index T2-Panchagavya at 10% for 12 hrs. (39.11%) was found significantly higher compared to control and other treatments.

## 4. CONCLUSION

It is concluded from the present experimentation of seed treatments with different kinds of seed

treatments were found to affect significantly different characteristics of growth, and yield in chickpeas. Treating with T2-Panchagavya at 10% for 12 hrs. was found superior affecting all the growth and yield parameters in chickpea compared with control and other treatments. Thus seed treating with T2- Panchagavya with 10% for 12hrs. is helpful in improving the yield in chickpeas.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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