

## **“Pre-Sowing Seed Treatments With Selected Organics on Growth, Yield and Yield Attributing Traits in Chickpea (*Cicer arietinum* L.) var Desi Himmat”**

### **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 duration of 12hrs. with an objective to assess the effect of these treatments on Chickpea and to find the optimal pre-sowing treatment. The results depicted that seed treatment showed significant variation for all the characters that were recorded and performed well on comparison to the untreated control. Seed treatment with T<sub>2</sub>-Panchagavya at 10% for 12hrs. recorded field emergence of 92.33% and plant height at maturity 71.33cms, 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, 14.33gm seed yield per plant, 23.66gm of 100 seed weight, 35.80gm 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 13.66gm seed yield per plant and 36.52% harvest index was found to be promising. Thus treating with T<sub>2</sub>-Panchagavya at 10% for 12 hrs. was so productive and can be suggested for cultivation for commercial scale.

**Keywords:** Panchagavya, Vermiwash, Neem Leaf Extract, Tulsi Leaf Extract

## 1. INTRODUCTION

Chickpea with the chromosome number ( $2n=2x = 16$ ) and being 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 (Akansha et al., 2018). 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 (Dhima et al., 2018). 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%. The richest source of protein for both humans and livestock in underdeveloped areas is legumes. In addition, they are employed as green manures and green feed for livestock. They are mostly used to fix atmospheric nitrogen to enhance the chemical and physical characteristics of soil (Mannivan et al., 2019). In addition to increasing soil fertility, certain legumes have the capacity to solubilize phosphate that would otherwise be inaccessible by excreting organic acids from their roots in addition to 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 (Devi et al., 2019). Temperatures between 24°C to 30°C, along with appropriate moisture levels, are ideal for chickpea crop growth. It is a winter crop that does well in both rainfed and irrigated environments. It is frequently grown in heavy soil types because it tolerates cold climates, and the appropriate pH range of 5.5 to 7.0 for greater growth and yield (Farijan et al., 2018). Chickpeas are rich in dietary fibre, particularly raffinose, a soluble fibre. According to (Munirathnam et al., 2015), the plant seed is primarily an edible component and the 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. Despite the high yielding potential and several benefits of chickpeas, India has a low yield per unit area of the crop. 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 (Pooniya et al., 2019). 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. The productivity, however, has increased from 724 to 893 kg/ha.

## **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 over a period of 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 includes 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, Harvest Index were recorded and statistically analysed using ANOVA as applicable to RBD.

## **METHODOLOGY**

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

For the preparation of plant leaf extract, the fresh leaves of concerned plants were collected separately and dried under shade. The dried leaves were powdered using motor and pestle. To prepare 5% solution, 5g of leaf extract powder was added on 100ml distilled water and concerned 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 out from the beaker and pre-soaked air dried to original weight. After seed treatment seeds were sown in field for field observations.

### **3. RESULTS AND DISCUSSION**

#### **3.1. GROWTH ATTRIBUTES**

##### **(i). FIELD EMERGENCE**

The mean performance of Field Emergence(%) ranged from 83.33 to 92.33 with grand mean of 88.18. In 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 control. Among the significant treatments, Treatment T12-Panchagavya at 10% for 12hrs. was higher in comparison to control as well as other treatments.

##### **(ii). PLANT HEIGHT**

The mean performance of Plant height (cms) was ranged from 62.34 to 71.33 with 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 comparison to control. Among these treatments, T2-Panchagavya at 10% for 12hrs. was found significantly higher in comparison to control and other treatments.

##### **(iii). DAYS TO 50% FLOWERING**

The mean performance of Days to 50% flowering was ranged from 63.67 to 70.33 with 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.

##### **(iv). 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.

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

<b>Treatments</b>	<b>Field Emergence</b>	<b>Plant Height</b>	<b>Days to 50% Flowering</b>	<b>Days to 50% Pod Setting</b>	<b>Days to Maturity</b>
<b>T<sub>0</sub></b>	83.33	62.34	70.33	78.33	111.33
<b>T<sub>1</sub></b>	86.33	67.33	66.67	75.00	108.00
<b>T<sub>2</sub></b>	92.33	71.33	63.67	71.67	106.33
<b>T<sub>3</sub></b>	89.33	63.67	69.33	74.67	108.33
<b>T<sub>4</sub></b>	91.33	70.33	64.67	72.00	107.33
<b>T<sub>5</sub></b>	86.67	68.00	69.00	75.33	111.00
<b>T<sub>6</sub></b>	88.33	64.66	67.33	73.33	110.33
<b>T<sub>7</sub></b>	89.67	65.67	64.33	76.67	109.67
<b>T<sub>8</sub></b>	86.67	68.67	64.67	74.00	107.67
<b>T<sub>9</sub></b>	86.33	69.67	64.33	74.67	107.67
<b>T<sub>10</sub></b>	87.67	66.67	66.00	72.67	109.33
<b>T<sub>11</sub></b>	89.67	67.67	65.33	73.33	108.33
<b>T<sub>12</sub></b>	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
<b>C.V</b>	1.08	2.50	2.64	2.09	1.47
<b>T.value</b>	2.06	2.06	2.06	2.06	2.06
<b>C.D. at 5%</b>	1.56	2.83	3.17	2.59	2.69

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

<b>Treatments</b>	<b>No.of Pods per Plant</b>	<b>No.of Seeds per Pod</b>	<b>Seed Yield per Plant(g)</b>	<b>Seed Index(g)</b>	<b>Biological Yield(g/plant)</b>	<b>Harvest Index(%)</b>
<b>T<sub>0</sub></b>	25.67	1.55	7.33	20.33	22.67	31.82
<b>T<sub>1</sub></b>	28.67	1.22	9.67	21.33	29.67	30.33
<b>T<sub>2</sub></b>	32.99	1.91	14.33	23.66	35.80	39.11
<b>T<sub>3</sub></b>	27..66	1.40	7.33	20.34	22.07	33.23
<b>T<sub>4</sub></b>	32.00	1.78	13.67	23.34	35.60	36.52
<b>T<sub>5</sub></b>	30.33	1.29	11.67	22.00	30.93	36.64
<b>T<sub>6</sub></b>	28.67	1.53	7.67	20.67	22.27	34.44
<b>T<sub>7</sub></b>	28.33	1.67	8.33	22.67	22.60	35.41
<b>T<sub>8</sub></b>	30.67	1.28	12.33	22.67	33.47	35.86
<b>T<sub>9</sub></b>	28.33	1.32	12.67	21.33	33.60	37.71
<b>T<sub>10</sub></b>	29.34	1.35	9.33	21.67	24.80	36.29
<b>T<sub>11</sub></b>	29.67	1.62	10.33	22.33	30.40	32.91
<b>T<sub>12</sub></b>	29.67	1.77	11.67	21.33	28.74	36.29
<b>Grand Mean</b>	29.52	1.51	10.48	21.82	28.66	35.12
<b>F-Test</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>S.Em</b>	0.59	0.03	0.18	0.29	0.47	0.55
<b>S.Ed</b>	0.59	0.05	0.38	0.33	0.90	1.01
<b>C.V</b>	3.51	3.09	3.01	2.30	2.83	2.72
<b>T-value</b>	2.06	3.06	2.06	2.06	2.06	2.06
<b>C.D. at 5%</b>	1.74	0.07	0.52	0.84	1.37	1.61

### **(v). DAYS TO MATURITY**

The mean performance of days to maturity ranged from 106.33 to 111.33 with grand mean of 108.51. For Days to Maturity all the treatments were significantly lower in comparison to control. Among the treatments, T2-Panchagavya at 10% for 12hrs. was found lowest (106.33 days) in comparison to control and other treatments.

## **3.2. YIELD ATTRIBUTES**

### **(vi). PODS PER PLANT**

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

### **(vii). SEEDS PER POD**

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

### **(ix). 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). For seed yield per plant (g), all the treatments were significantly higher in comparison to 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.

### **(x). SEED INDEX(g)**

The mean performance of 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.

### **(xi). 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.

### (xii). HARVEST INDEX(%)

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

## CONCLUSION

It is concluded from the present experimentation of seed treatments with different kind of seed treatments were found affecting significantly different characters of growth, yield in chickpea. Treating with T2-Panchagavya at 10% for 12hrs. was found superior which affected all the growth and yield parameters in chickpea in compare with control and other treatments. Thus seed treating with T2-Panchagavya with 10% for 12hrs. is useful in improving yield in chickpea.

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