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# MANAGING GROWTH PARAMETERS USING DIFFERENT SEED DRESSERS


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**ABSTRACT**

Chickpea (*Cicer arietinum* L.) is an important food legume crop. In Maharashtra it ranks 2nd in area, 3rd in production. 10.51 lakh hector area is under the cheakpea crop. Production of cheakpea is 8.15 lakh tones and 775 kg/hector. This crop is cultivated on large scale in Maharashtra. Due to cultivation of chickpea in large areas it is attacked by several pathogens. Soil borne pathogens like *Fusarium, Sclreotium* and *Rhizoctonia* is major constraint to chickpea production in Vidarbha region of Maharashtra. Yield reductions results from post emergence death of seedling and weakening, wilt, root rot as well as premature death of infected plants. Growth of plants is affected due to attack of pathogens. All these parameters are controlled by using different seed dressers having combinations of different chemicals such as *Mancozeb*,*Carbendazim*,*Carboxin*,*Thiram*, and biological agents ie. *Trichoderma.*

This paper contains analysis of variance between treatment effects of different seed dressers on seed of Chickpea to get most effective combination of seed dressers with respect to the growth of the plant. Hence to control growth of chickpea, different seed dressers are used.


**KEYWORDS** : *(Cicer arietinum* L.*), RBD, CD, CV, Mancozeb, Carbendazim, Carboxin ,Thiram, Trichoderma.*

## 1. INTRODUCTION

Chickpea is most important food legume. Root rot occurs during period of seedling to flowering and pod development. Wilt occurs during period of Seedling to flowering. There is a greater loss in production of chickpea due to wilt or root rot. We can control this by different methods i.e. using fertilizers, seed dressers. But we prefer method of seed dressers. Pratibha B. Lakhani, Pooja D. Manjre, and Yogesh Ingle [8] Studied management of wilt/root rot using different seed dressers. Because the fungus is soil borne and can survive in the soil for long period, it is not possible to control the disease through normal crop rotations. Control of the disease is more efficient when integrated measures are adopted involving treatment of seeds with bio-agent and chemicals. Under such circumstances seed dressing with beneficial microbes and certain chemicals helps to manage harmful myco-flora of soil.

Present investigation undertaken to management of growth of chickpea with fungicides, and biological control agents. Here growth parameters used are number of seeds germinated, numbers of pods, number of branches, plant height and root length, 100 seed weight and total seed weight.

This study was undertaken in Regional Research Center, Amravati of Dr. Panjabrao Deshmukh Krushi Vidyapith, Akola, Maharashtra, India.

## 2. MATERIAL AND METHODS

The design used for the experiment is Randomized Block Design. In this design all the three principles of design of experiments randomization, replication, and local control given by Prof. R A Fisher are used. If the treatments are applied at random to relatively homogeneous units within each strata or block and replicated over all the blocks then the design is called as Randomized Block Design (RBD). RBD with eight treatments and three replications in which each plot is of size 3.6m X 4m. The spacing between the Blocks and plots is of 30cm X 10cm.Variety used for the experiment is *Chaffa.* Seeds were sown by the method of *Dibbling* on 24 November 2014.

For testing efficiency of test treatment we compare it with control or standard treatment. Here one control and 7 test treatments were taken. Different treatments with their combinations are given below.

$T_1$ : Untreated Control

$T_2$ : Seed treatment with *Thiram* 3g/kg plus *Trichoderma* 4g/kg of seed.

$T_3$ : Seed treatment with *Thiram* 2g/kg plus *Carbendazim* 1g/kg of seed.

$T_4$ : Seed treatment with *Carboxin* plus *Thiram* 3g/kg of seed. (Combination product)

$T_5$ : Seed treatment with *Carbendazim* plus *Mancozeb* 3g/kg of seed. (Combination product)

$T_6$ : Seed treatment with *Carboxin* plus *Thiram* 3g/kg of seed plus *Trichoderma* 4g/kg of seed.

$T_7$ : Seed treatment with *Carbendazim* plus *Mancozeb* 3g/kg of seed plus *Trichoderma* 4g/kg of seed.

$T_8$ : Seed treatment with *Trichoderma* 4g/kg of seed.

## 3. DATA COLLECTED

Data is most important factor in Statistics. In our experiment we collected the data of following different types on the dates given in Table1

**Table1. Data collection**

| Sr. No. | Date | Collected Data |
|---|---|---|
| 1. | 03/12/2014 | Count the number of seeds germinated |
| 2. | 13/03/2015 | Count the number of pods |
| 3. | 13/03/2015 | Count the number of branches |
| 4. | 13/03/2015 | Measure the plant height (in cm) |
| 5. | 13/03/2015 | Measure the root length (in cm) |
| 6. | 26/03/2015 | Measure 100 seed weight (in mg) |
| 7. | 26/03/2015 | Measure total seed weight in kg (Yield per plot) |

## 4. ANALYSIS

To analyze the data, the software 'MS-EXCEL' is used. Data entry, tabulation and all other operations performed on the data are done in it. Collected data is written in tabular form having 5 columns for 5 sample units selected from each plot for each treatment. In this way for each replication there is a separate table and hence separate ANOVA.

**Table 2: ANOVA for germination.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| **Replication** | 2 | 127.69 | 63.85 | 2.0269 | 3.74 | **NS** |
| **Treatment** | 7 | 782.00 | 111.71 | 3.5466 | 2.77 | **S** |
| **Error** | 14 | 440.99 | 31.50 | | | |
| **Total** | 23 | 1350.69 | | | | |

**Table 3. ANOVA for number of pods.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 125.41 | 62.71 | 2.16 | 3.74 | NS |
| Treatment | 7 | 2061.45 | 294.49 | 10.13 | 2.76 | S |
| Error | 14 | 407.03 | 29.07 | | | |
| Total | 23 | 2593.89 | | | | |

**Table 4. ANOVA for number of branches.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 1.20 | 0.60 | 0.40 | 3.74 | NS |
| Treatment | 7 | 144.12 | 20.59 | 13.77 | 2.76 | S |
| Error | 14 | 20.94 | 1.50 | | | |
| Total | 23 | 166.26 | | | | |

**Table 5. ANOVA for height of plant.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 22.67 | 11.34 | 1.66 | 3.74 | NS |
| Treatment | 7 | 389.49 | 55.64 | 8.17 | 2.76 | S |
| Error | 14 | 95.34 | 6.81 | | | |
| Total | 23 | 507.50 | | | | |

**Table 6. ANOVA for Root length.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 7.16 | 3.58 | 1.06 | 3.74 | NS |
| Treatment | 7 | 138.48 | 19.78 | 5.87 | 2.76 | S |
| Error | 14 | 47.18 | 3.37 | | | |
| Total | 23 | 192.82 | | | | |

**Table 7. ANOVA for 100 seed weight.**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 0.03 | 0.01 | 0.05 | 3.74 | NS |
| Treatment | 7 | 5.24 | 0.75 | 2.77 | 2.76 | S |
| Error | 14 | 3.78 | 0.27 | | | |
| Total | 23 | 9.04 | | | | |

**Table 8. ANOVA for Yield per plot (total seed weight).**

| S.V. | D.F | S.S. | M.S.S. | F (Cal) | F (Tab) | S/NS |
|---|---|---|---|---|---|---|
| Replication | 2 | 0.20 | 0.10 | 2.89 | 19.42 | NS |
| Treatment | 7 | 5.46 | 0.78 | 2.89 | 2.76 | S |
| Error | 14 | 3.78 | 0.27 | | | |
| Total | 23 | 9.44 | | | | |

From all the above ANOVA tables, since $F_{Cal} < F_{Tab}$ , at 5 % Level of Significance, for (2, 14) Replication degrees of freedom, the null hypothesis $H_{B0}$ is accepted. Therefore we can conclude that all the blocks are Homogeneous. Also since $F_{Cal} > F_{Tab}$ , at 5 % Level of Significance, for (7, 14) Treatment degrees of freedom, the null hypothesis $H_{T0}$ is rejected. Therefore we can conclude that there is significant difference between the treatment effects on different characteristics.

## 5. CONCLUSIONS

Whenever we want to compare the variability in the averages or which are measured in different units we do not merely calculate the measures of dispersion. But we calculate the coefficient of dispersion (CD) which is pure number independent of the units of measurement. Hundred times the CD based upon the standard deviation is called as coefficient of variation (CV),

$$CV = \frac{\sigma}{\bar{X}} X\ 100$$

According to Professor Karl Pearson who suggested this measure *CV is the percentage variation in the mean, Standard deviation being considered as the total variation in the mean.* Coefficient of variation is calculated to know that whether our sample drawn is correct or not. Sample drawn gives efficient results having the CV in the range four to nineteen. Since there is significant difference between the treatment effects, Critical difference is calculated from ANOVA Table to find the optional treatments for the most effective treatment. CD gives the critical difference up to which we can extend the range of disease. Following are the formulae used to calculate CD and CV;

- $Standard\ Error = SE = \frac{\sqrt{M.S.S.E}}{No.of\ Replications}$
- $Standard\ Deviation = SD = M.S.S.E.* \sqrt{2}$
- $Critical\ Difference = CD = SE * t_{(0.05,14)}$
- $Coefficient\ of\ Variation = CV = \frac{\sqrt{M.S.S.E}}{Mean\ of\ all\ observations} * 100$

**Table 9. Effect of different treatments on growth parameters of chickpea.**

| Sr. No. | Treatments | Germination % | No. of Branches | No. of Pods | Plant height (in cm) | Root Length (in cm) | 100 seed wt (g) | Yield | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Yield/Plot (Kg) | Kg/ha |
| T1 | Untreated control | 60.74 (51.26) * | 13.33 | 35.26 | 35.73 | 31.00 | 14.96 | 2.91 | 2023.135 |
| T2 | ST with Thiram (3.0 g/kg seed) + Trichoderma 4g/kg seed | 73.15 (59.10) | 18.57 | 58.84 | 43.92 | 34.84 | 14.12 | 3.49 | 2423.596 |
| T3 | ST with Thiram (2.0 g/kg seed) + Carbendazim 1g/kg of seed | 66.74 (54.84) | 14.07 | 41.38 | 37.27 | 32.63 | 15.38 | 3.36 | 2331.004 |
| T4 | ST with Carboxin + Thiram @ 3 g/kg seed (combined product) | 78.70 (62.92) | 14.67 | 50.13 | 40.20 | 35.98 | 15.84 | 4.21 | 2923.592 |
| T5 | ST with Carbendazim + Mancozeb @ 3 g/kg seed (combined product) | 52.41 (46.39) | 17.83 | 47.53 | 39.20 | 33.17 | 15.37 | 3.92 | 2722.205 |
| T6 | ST with Carboxin + Thiram @ 3 g/kg seed + Trichoderma 4g/kg seed | 58.52 (49.91) | 14.20 | 35.42 | 32.00 | 29.00 | 15.39 | 3.31 | 2296.282 |
| T7 | ST with Carbendazim + Mancozeb @ 3 g/kg seed + Trichoderma 4g/kg seed | 49.81 (44.92) | 10.83 | 28.73 | 32.23 | 28.73 | 15.10 | 2.97 | 2060.172 |
| T8 | ST with Trichoderma 4g/kg seed | 63.96 (53.38) | 12.20 | 35.45 | 32.71 | 32.47 | 15.05 | 2.72 | 1888.877 |
| | Test | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig | |
| | SE ± | 3.24 | 0.71 | 3.11 | 1.51 | 1.06 | 0.30 | 0.3 | |
| | CD (P=0.05) | 9.83 | 2.14 | 9.44 | 4.57 | 3.22 | 0.91 | 0.9 | |

*Figures in parenthesis are arcsine transformed values.

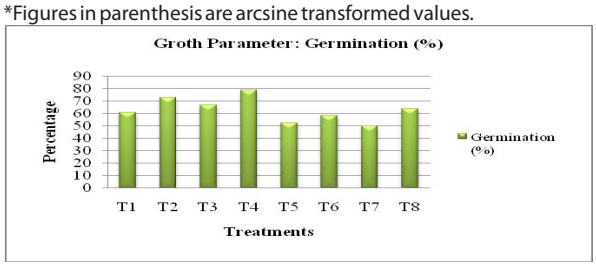

**Figure 1 –Germination Percentage.**

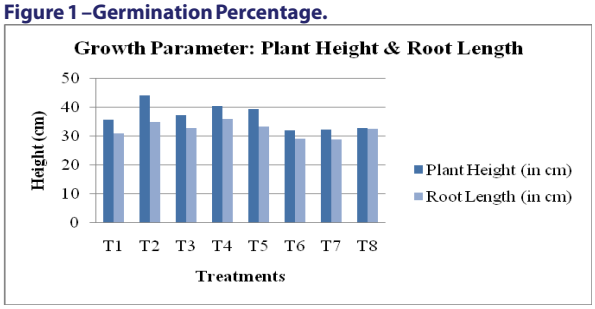


**Figure 2 – Growth Parameters : Plant Height & Root Length (in cm).**

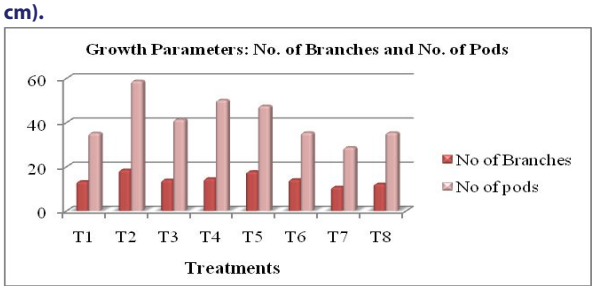


**Figure 3 – Growth Parameters: no. of branches and no. of pods.**

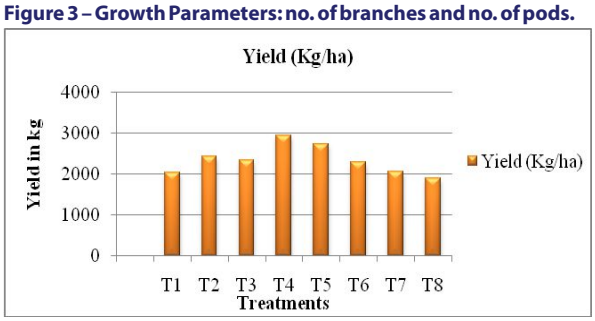


**Figure 4 - Estimated production (in kg/ha).**

## 6. Interpretation

Table 9 and figure 1 and figure 4 shows under field evaluation, maximum seed germination and maximum yield were observed in treatment T4- ST with *Carboxin* + *Thiram* (3.0 g/kg seed). In case of unavailability of this seed dresser due to some reason, with the help of CD the next effective treatments can be obtained as follows.

In table 9, CD calculated for germination percentage is 9.83. Now subtract this CD from maximum percentage of germination to get range which gives minimum tolerance limit for the germination percentage.

Range = 78.70 - 9.83 =68.87
Similarly, calculated ranges for other growth parameters are as shown in the table 10.

**Table 10: Calculated Range for different growth parameters.**

| Growth parameter | CD | Minimum Tolerance Limit | Range |
|---|---|---|---|
| Germination | 9.83 | 68.87 | 78.70 to 68.87 |
| Number of branches | 2.14 | 16.43 | 18.57 to 16.43 |
| Number of pods | 9.44 | 49.4 | 58.84 to 49.4 |
| Plant height | 4.57 | 39.35 | 43.92 to 39.35 |
| Root length | 3.22 | 32.76 | 35.98 to 32.76 |
| 100 Seed weight | 0.91 | 14.93 | 15.84 to 14.93 |
| Total yield | 0.91 | 3.3 | 4.21 to 3.3 |

Therefore from table 10 we can conclude that the next effective treatment with maximum seed germination is observed in treatment T2- ST with *Thiram* @ (3.0 g/kg seed) + *Trichoderma* @ 4g/kg seed followed by treatment T3- ST with *Thiram* @ (2.0 g/kg seed) + *Carbendazim* @ 1g/kg of seed. For the growth factors i.e. plant height, number of branches, number of pods from figure 2, figure 3 and table 9, it is observed that treatment T2- ST with *Thiram* @ (3.0 g/kg seed) + *Trichoderma* 4g/kg seed is more effective followed by the treatment T4- ST with *Carboxin* + *Thiram* (3.0 g/kg seed).

Finally we conclude that from the ranges and minimum tolerance limits of all growth parameters of chickpea, in unavailability of the most effective treatment i.e., T4- ST with *Carboxin* + *Thiram* @ (3.0 g/kg seed), the next effective treatments are T2- ST with *Thiram* @ (3.0 g/kg seed) + *Trichoderma* @ (4g/kg seed) followed by treatment T3- ST with *Thiram* @ (2.0 g/kg seed) + *Carbendazim* @ (1g/kg of seed) and T5- ST with *Carbendazim* + *Mancozeb* @ 3 g/kg seed (combined product).

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