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# EFFECTS OF PANCHAGAVYA, BEEJAMRUTHA, BOTANICAL SEED TREATMENT ON SEED QUALITY PARAMETERS IN CHICKPEA *(CICER ARIETINUM L.)*

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**Abstract –** Chickpea (*Cicer arietinum* (L.) is an world pulse crop inpapilionaceae family, grown worldwide. It has been used by humans from ancient times due to its nutritional properties. Application of trading chemicals for seed enhancement is highly effective and farmers cannot afford it. The present investigation was laid out in completely randomized design (CRD) having four replications in controlled conditions at Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, prayagraj, Uttar Pradesh, India in 2020-2021, to evaluate the potential of Panchagavya, Beejamrutha, botanicals for germination, root length, shoot length, seedling length, seedling fresh weight, seedling dry weight, vigour index I and vigour index II in chickpea. Organic treatments were adopted and treatments used are T0- Control, T1- Panchagavya (3%), T2- Panchagavya (4%), T3- panchagavya (6%), T4- Beejamrutha (3%), T5- Beejamrutha (4%), T6- Beejamrutha (6%), T7- Neem leaf extract (3%), T8- Neem leaf extract (5%), T9- Curry leaf extract (3%), T10- Tulsi leaf extract (5%), T11- Moringa leaf extract (3%), T12- Moringa leaf extract (5%). Among all treatments T1 panchagavya at (3%) treatment for 12 hours recorded high germination percentage, root length, shoot length, seedling length, seedling fresh weight, seedling dry weight, vigour index I and vigour index II. However, there is no much significance difference in the seeds treated with botanicals when compared to control. The results indicate that use of Panchagavya enhances the seed performance regarding germination and vigour. The process is simple and economy, no costly equipment is required to overcome the poor germination and poor seedling establishment.

## INTRODUCTION

Pulses are the great gift of nature plays an important role in Indian wealth and diet. Among all pulses chickpea is playing crucial role in diet of many areas. Chickpea is a legume crop which is producing all over the world. It is highly grown rabi pulse crop in India. Pulses maintain soil fertility by fixing atmospheric nitrogen and improved soil structure. Pulses are playing key role in dry land by improving different properties of soil so considered good crop for natural resources for crop diversification.

Chickpea *(Cicer arietinum* L.) it is diploid 2n=16, belongs to the family leguminaceae. The word Cicer is from Greek word and the Arietinum is derived from the Latin word ram called as head shape of the chickpea. Synonym of chickpea is Bengal gram, chana, kadle. Chickpea was belived to be originated in Anatolia in Turkey. It is grown in several countries worldwide as a nutritional crop. India is the world's largest producer and consumer of pulses about 27%. Chickpea is a greatest source of protein for people in developing countries. It is considered "the poor man's meat" as its one of the less expensive sources of protein. It is popularly

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cultivated in sub tropical and semi arid to warm temperate regions. Production of chickpea in india is 112.29 lakh tonnes, area is 105.61 lakh ha, productivity is 1063 kg/ha. Madhya Pradesh is the leading state in terms of area and production.

Chickpea is mostly consumed in the form of whole grain, dhal, sprouted grain, matured dry seeds. These are used in preparation of different types of snacks, sweets. Tender leaves are used as vegetable and these leaves are having medicinal properties which are used as refreshing drink and also for blood purification. Mostly chickpea soaked grains and husk are fed to animals. Chickpea can with stand drought conditions because of its tap root system by draw out water from deeper layers of soil. Chickpea plays a key role in improving soil fertility by fixing atmospheric nitrogen and meets 80% of nitrogen (N) from symbiotic nitrogen fixation and fix up to 140kg N ha. Chickpea leaves considerable amount of nitrogen in the soil for following crops and add plenty of organic matter to maintain soil health and fertility.

Chickpea contains protein (22-28%), fat (4.8-5.5%), carbohydrate (40-65%), ash (48%), moisture (4.9-15.59), and vitamins like "A", vit- B1, B2, B3, vit- "c", vit- "D", vit- "E", vit- "K", Folate and Pantothemic acid minerals like Calcium , Iron, Molybdenum, Potassium, Manganese, Copper, etc. Other nutrients found in Chickpea are fibers and water.

Seed is a natural beings and it can be decadence after the harvest due to some climatic changes and in storage conditions, or other pest and diseases due to fluctuations seeds show poor germination. The poor growth of seed may occur due to poor nutrient quality of the seed, lack of moisture, and low viability of the seed.

Main function of seed quality enhancement is to improve the quality of the seed after harvest and before sowing (Copeland and Mc Donald, 1995). An eco friendly, economic seed treatments on are used to improve the emergence, seedling vigor and yield of crop.

Seed germination can be increased by giving additional supplements of nutrients by seed quality enhancement techniques such as seed treatments with organics can increase the nutritional quality of the seed.

Seed treatment is a physiological method of drying to improve enough pre-germinative metabolic process for quick germination. Basically it is a pre sowing treatment in which seeds were soaked to maintain a moisture level which is used to initiate the early stages of germination but it is not used to emit the radical protrusion. It is a technique for controlling seed absorption and post dryness.

Seed treatment has shown more surprising results when compared to untreated seeds few studies on chickpea are not over emphasized and are improving but need to get information before it used as a regular practice in seed technology. The importance of the seed treatment in crops includes rapid emergence, uniformity of the germination and higher yield.

## MATERIALS AND METHODS

The present investigation was carried at Seed Testing Laboratory, Department of Genetics and Plant Breeding, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during rabi-2020-2021 to find the "Effects of panchagavya, beejamrutha, botanical seed treatment on seed quality parameters in chickpea *(Cicer arietinum L.)"*. The chickpea variety JG11 (Jabalpur Gram 11) is used for experiment with different organic and botanical seed treatments T0 to T12 with 4 Replications and 13 Treatments. The analysis was collected on ten randomly selected healthy seedlings from each replication and various observations were recorded. The seed standard parameters include Germination Percentage, Root length, Shoot length, Seedling length, Seedling Fresh weight, Dry weight, vigor index I, and vigor index II. The treatments were signified as:

T0- (Control) for 12hours,
T1- Panchagavya (3%) for 12hrs,
T2- Panchagavya (4%) for 6hrs,
T3- Panchagavya (6%) for 6 hrs,
T4- Beejamrutha (3%) for 6hrs,
T5- Beejamrutha (4%) for 6hrs,
T6- Beejamrutha (6%) for 12hrs,
T7- Neem leaf extract (3%) for 6hrs,
T8- Neem leaf extract (5%) for 12hrs,
T9- Curry leaf extract (3%) for 6hrs,
T10- Tulsi leaf extract (5%) for 12hrs,
T11- Moringa leaf extract (3%) for 6hrs,
T12- Moring leaf extract (5%) for 12hrs.

**Preparation of solution**

**Preparation of Panchagavya**

Panchagavya was prepared by mixing 7 kg fresh

cow dung and 1 kg ghee and incubated in a plastic drum for 2 days and it was mixed daily once. On third day, 10 liters cow urine and 10 liters of water were added and mixed thoroughly and incubated for fermentation for 13 days. Then, 3 liters milk, 2 liters curd, 100 gram yeast, 3 liters tender coconut water, 3 kg jaggery and 12 ripened bananas were added and contents were incubated for 6 days and the mixture was stirred thoroughly thrice a day. Plastic drum with all the contents was kept in shade and it was covered with wet jute bag. After 21 days of fermentation, mixture was filtered through a cotton cloth and used according to treatments schedule.

**Preparation of Beejamrutha**

**Ingredients**

For 10 kg seeds use 2litres of water
Use cow urine 250ml- 1litre of water
Use cow dung 250gms per litre of water
Use lime 2.5g per litre of water
Use clay bundles, which do not have any stone

**Method of Beejamrutha**

Inplasticorcementtankmix all ingredients in it. There is no lumps in cow dung and mix the ingredients with the help of wooden stick. Mixture should be rotated in clockwise direction. So the positive energy spread in the mixture.

Mixture tank should kept in shade place and covered the tank with jute which should not exposed to direct sun light and rainwater. After one day Beejamrutha is ready and is ready to use for seed treatment. Preparation time takes about 12-24 hrs.

The solution of Panchagavya, Beejamrutha were prepared and dissolving 3%, 4%, 6% of organics in 100ml of distilled water each in separate beakers for making organic solutions respectively.

**Preparation of leaf extracts**

Neem A*zadirachta indica*, Tulasi *Ocimum tenuiflorum*, Curryleaves *Murraya koenigii*, Moringa *Murraya oleifera* leaves were collect from the garden to keep at room temperature to dried after to grinding with the motor and pestle to obtain the powder. The aqueous extract of Neem, Tulasi, Moringa and *Murraya koenigii* were prepared by mixing of 10g of plant material with 1000 ml of the water in beaker and shake it vigorously. The solution was filtered through the Muslin cloth (Whatman No. 42).

**Soaking in the Solution**

After preparation of solution of Panchagavya, Beejamrutha, Neem leaf extract, Tulasi leaf extract, Curry leaf extract, Moringa leaf extract chickpea seeds will be soaked in required solution for 6 and 12 hrs at 25°C temperature. Untreated seed is called as control. After 12 hoursthe solution will be drained out from the beaker and pre-soakedseeds will be dried in shadeto its original weight and then placed for germination in laboratory under controlled condition.

For the preparation of botanical leaf extracts Neem, Curry leaves, Tulsi, Moringa leaves were collected from Horticulture Research field, SHUATS. The leaves were Dried in shade and make each extract 5g of powder and dissolved in 100 ml of distilled water and make 5%of solution. After preparation of solutions, seeds are soaked in the duration of 12hours and shade dried. Dried seeds are used for additional laboratory studies to record observations.

## RESULTS AND DISCUSSION

It is apparent from the present investigation that the seed treatment with organics and botanicals has significant effect of quality parameters in chickpea like Germination percentage, Root length, Shoot length, Seedling length, Fresh weight, Dry weight, Vigor index I, Vigor index II. Most of the treatments have increased germination and vigour guidelines as compared to control.

**Germinationpercentage**

T1 Panchagavya @ 3% shows maximum germination percentage (93.75%) followed by T6 Beejamrutha @ 6% shows (93.00 %), so the minimum germination percentage was recorded by T0 Control (83.50%).

**Root length**

T1 Panchagavya @ 3% shows maximum root length (19.92cm) followed by T6 Beejamrutha @ 6% shows (19.57cm), so the minimum root length was recorded by T0 control (14.15cm).

**Shoot length**

T1 Panchagavya @ 3% shows maximum shoot length (15.15cm) followed by T6 Beejamrutha @ 6% shows (14.43cm), so the minimum shoot length was recorded by T0 control (10.70cm).

**Seedling length**

T1 Panchagavya @ 3% shows maximum total seedling length (35.05cm) followed by T6 Beejamrutha @ 6% shows (33.97cm), so the minimum seedling length was recorded by T0 control (24.82cm).

**Seedling fresh weight**

T1 Panchagavya @ 3% shows maximum total seedling fresh weight (8.05g) followed by T6 Beejamrutha @ 6% shows (7.55g), so the minimum seedling fresh weight was recorded by T0 control (5.72g).

**Table 1.** Analysis of variance for different seedling growth parameters.

| S. No. | Parameters | Mean Sum of Squares | |
|---|---|---|---|
| | | Treatments (df =10) | Error (df=33) |
| 1. | Germination percentage | 31.64* | 0.64 |
| 2 | Root length | 14.706 * | 0.42 |
| 3. | Shoot length | 6.765* | 0.12 |
| 4. | Seedling length | 41.70* | 0.84 |
| 5. | Fresh weight of seedling. | 1.88* | 0.005 |
| 6. | Dry weight of seedling. | 0.05* | 0.003 |
| 7. | Seedling vigor index I | 542908* | 11230 |
| 8. | Seedling vigor index II | 749.793* | 8.229 |

* Significant at 5% level of significance.

**Seedling dry weight**

T1 Panchagavya @ 3% shows maximum total seedling dry weight (1.35g) followed by T6 Beejamrutha @ 6% shows (1.32g), so the minimum seedling dry weight was recorded by T0 control (1.00g).

**Vigor index I**

T1 Panchagavya @ 3% shows maximum total seedling vigor index I (3288) followed by T6 Beejamrutha @ 6% shows (3163.57), so the minimum seedlingvigor index was recorded by T0 control (2076).

**Vigor index II**

T1 Panchagavya @ 3% shows maximum total seedling vigor index II (126.57) followed by T6 Beejamrutha @ 6% shows (123.25), so the minimum seedling vigor index II was recorded by T0 control (83.57).

Similar results was obtained by Sreenivas *et al.,* (2010); Kumar *et al.,* (2020); Swain *et al.,* (2015); Kamatchi Kala *et al.,* (2019); Kumbar *et al.,* (2016); Leo Daniel Amalner *et al.,* (201); Shubha (2014) Bhargavi *et al.,* (2019) (Table 1).

## CONCLUSION

Based on the present investigation, priming of

**Table 2.** Mean performance of seed quality parameters due to various priming treatments in Chickpea.

| Treatments symbol | Germination percentage | Root length | Shoot length | Seedling length | Seedling Fresh weight | Seedling Dry weight | Seedling vigor index-1 | Seedling vigor index-2 |
|---|---|---|---|---|---|---|---|---|
| T0 | 83.50 | 14.15 | 10.70 | 24.82 | 5.72 | 1.00 | 2076.02 | 83.57 |
| T1 | 93.75 | 19.92 | 15.15 | 35.05 | 8.05 | 1.35 | 3288.65 | 126.57 |
| T2 | 91.00 | 18.25 | 13.22 | 31.47 | 6.82 | 1.25 | 2864.75 | 113.77 |
| T3 | 92.25 | 18.50 | 13.61 | 32.10 | 7.15 | 1.30 | 2962.85 | 119.97 |
| T4 | 90.00 | 17.26 | 13.01 | 30.25 | 6.60 | 1.15 | 2725.20 | 103.52 |
| T5 | 91.50 | 18.41 | 13.31 | 31.70 | 6.95 | 1.20 | 2903.20 | 109.82 |
| T6 | 93.00 | 19.57 | 14.43 | 33.97 | 7.55 | 1.32 | 3163.57 | 123.25 |
| T7 | 88.00 | 15.33 | 11.72 | 27.05 | 6.10 | 1.07 | 2382.12 | 94.62 |
| T8 | 89.00 | 16.23 | 12.03 | 28.25 | 6.25 | 1.10 | 2517.32 | 97.90 |
| T9 | 87.25 | 14.80 | 11.40 | 26.17 | 6.05 | 1.05 | 2286.72 | 91.65 |
| T10 | 88.50 | 15.40 | 11.75 | 26.85 | 6.15 | 1.07 | 2403.00 | 95.15 |
| T11 | 89.50 | 16.71 | 12.66 | 29.32 | 6.55 | 1.12 | 2629.02 | 100.70 |
| T12 | 92.50 | 19.16 | 14.12 | 33.27 | 7.45 | 1.30 | 3070.32 | 120.25 |
| Mean | 89.98 | 17.206 | 12.85 | 30.02 | 6.72 | 1.17 | 2713.98 | 106.20 |
| F. | S | S | S | S | S | S | S | S |
| C.D. | 1.155 | 0.936 | 0.508 | 1.321 | 0.099 | 0.076 | 152.145 | 7.818 |
| S.E.(m) | 0.402 | 0.326 | 0.177 | 0.460 | 0.034 | 0.027 | 52.988 | 2.723 |
| S.E.(d) | 0.569 | 0.461 | 0.250 | 0.650 | 0.049 | 0.038 | 74.93 | 3.851 |
| C.V. | 0.894 | 3.787 | 2.755 | 3.064 | 1.024 | 4.513 | 3.905 | 5.127 |

chickpea seeds with organics and botanicals shown a high performance in germination and vigour parameters of chickpea. Organic treating with T1 (Panchagavya @ 3%) for 12 hours is found to be best in all the treatments followed by T6 (Beejamrutha @ 6%), T12 (Moringa leaf extract @ 5%) and control being the lowest. Botanicals being economic,Eco friendly and easily available to the farmers for better seed quality parameters.

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