*Asian Jr. of Microbiol. Biotech. Env. Sc. Vol. 23, No. (4) : 2021 : 644-647*

***ISSN-0972-3005***

# IMPACT OF PRESOWING TREATMENT WITH PLANT GROWTH REGULATORS AND ORGANICS ON SEED GERMINATION AND SEEDLING VIGOUR IN MUNGBEAN (*VIGNA RADIATA*)

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(Received 7 September, 2021; Accepted 4 October, 2021)

**Key words**: *Mungbean, Growth regulators, Seed germination, Seedling vigour and organics.*

**Abstract**–A Lab experiment was conducted during rabi season 2020-2021 in Mung bean at SHUATS Prayagraj, Uttar Pradesh. The study was carried out to know the impact of pre sowing treatment with Plant Growth Regulators and Organics on Seed Germination and seedling vigour in mung bean (*Vigna radiata*). The treatments consisted of $PEG_{6000}$ 100 ppm and 50 ppm, SA 100 ppm and 50 ppm, ascorbic acid 100 ppm and 50 ppm, neem leaf extract 5% , moringa leaf extract 5%, curry leaf extract 5% concentration which were laid by CRD (completely Randomized Design). The maximum value recorded at T3 (salicylic acid) 50 ppm and lowest recorded at $T_0$ (control)

## INTRODUCTION

Seed is the basic input of agriculture and agriculture is the foundation of national economy of India. Seed is a carrier of the genetic probable for higher crop production. A good quality seed may contribute to the national agricultural development. Good quality seed is presumed to possess a high genetic purity, high seed vigour, high germination percentage, free from seed borne disease and high yielding ability. Seed quality is one of the major factors determines the success or failure of crop. Mung bean (*Vigna radiata L.*) is one of the greatest important pulse crops grown in all parts of the country. *Vigna radiate L.* Wilczek (Synonym:*Phaseolus aureus Roxb.)* commonly known as green gram or mung bean has been known by severa1vernacular names in different parts in India. Pre sowing treatment is a controlled hydration process that contains exposing seeds to low water potentials that limit germination, but permits pre germinative physiological and biochemical changes to occur (Heydecker and Coolbear, 1977; Bradford, 1986; Khan, 1992). Upon rehydration, primed seeds exhibit quicker rate of germination, more even emergence, greater tolerance to environmental stresses, and reduced dormancy in many species (Khan, 1992). The few revisions on Green gram and Black gram are not overemphasized and are encouraging, but information is required before its use as a routine practice in seed technology (Knypl and Khan, 1981). Short time hydration treatment, e.g. hydro priming, humidification have been used to increase the seed vigour and extend longevity in many plant species (Burgass and Powell, 1984).

Hydro priming is a measured hydration by soaking seeds in solution of low water potential trailed by re-drying that allows per germination metabolic activities to proceed but prevent radical emergence (Bradford, 1986; Ashraf and Fooland, 2005). In simple words soaking of seeds in water before sowing, has been the experience of farmers I India in an attempt to improve crop stand creation but the practice was without the knowledge of the safe limit of soaking duration. Hydro priming is simplest form of priming which can be practiced on the farm itself and it is very useful for the farmers. Harris *et al.* (1999), encouraged a low cost, low risk technology called on-farm seed priming that would be appropriate for all farmer, irrespective of their socioeconomic status. Evaluated the properties of NaCl priming with $KNO_3$ on the germination traits and seedling growth of four *Helianthus annuus* L. under salinity conditions and described that germination percentage of primed seeds was greater than that of un-primed seeds Bajehbaj (2010).

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Opined that the urd bean seeds treated with nimbicidine @ 5ml/kg of seed has maintained germination percentage of seedling length compared to control up to six months of storage experiential cowpea seed treated with neem leaf powder at 5 /kg seed recorded highest germination and vigour index when compared to control at the end of 10 months. Maraddi (2002) stated that wheat seeds treated with neem leaf powder @ 100 gm/kg of has recorded the germination of 94% and seed damage was 12% over control respectively after 6 months of storage It is reported that seed priming is one of the most important development to help rapid and uniform germination and emergence of seeds and to increase seed tolerance to adverse environment condition this crop has good reasonable cost that helps consumers and buyers plant growth regulators plays main role to increase yield by making the plants photosynthetically more effective. So keeping these aspects in view the present experiment entitled Impact of pre-sowing treatments with plant growth regulators and organics on seed germination and seedling vigour in mung beans (*Vigna radiata*) seeds. was carried out with following objectives: assess the impact of plant growth regulators and organics on seed germination in moong bean seeds. find out the prevelance of fungi in difference presowing conditions on moong bean

## MATERIALS AND METHODS

The experimental trail was conducted in the laboratory of Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The seeds were treated with botanicals and chemicals firstly the seeds were treated with the botanicals i.e., neem, moringa and curry leaves extract for preparation of extract 1 g of leaves mix with 100 ml of distuilled water that obtains the 1% of extract for this experiment same procedure should be followed and for making of ppm 0.001 g of chemical mixed with 1000 ml of distilled water that obtains one ppm.

**Treatments**: $T_0$-control, T1-PEG600 100 ppm, $T_2$-PEG600 50 ppm, $T_3$- SA 100 ppm, $T_4$ – SA 50 ppm, $T_5$- Ascorbic Acid 100 ppm, $T_6$- Ascorbic Acid 50 ppm, $T_7$ – Neem leaf extract 5%, $T_8$ – Neem leaf extract 3%, $T_9$ – Moringa leaf extract 5%, $T_{10}$– Moringa leaf extract 3%, $T_{11}$ – curry leaf extract 5%, $T_{12}$ – Curry leaf extract – 3%

## METHODOLOGY

The seeds were treated with botanicals and chemicals for 12 hrs, after 12 hrs they were made to dry in a shade, and next the experiment is done with between paper method 100 seed should be placed in germination paper of four replication of each treatment.

Germination test is conducted between blotting paper method by using the formula as

$$\text{Germination (\%)} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds put for germination}} \times 100$$

To measure the root length ten seedlings selected of each replication on the 7th day from germination test. lengths of roots should be observed and make it as record with the help of scale the roots was measured in centimeters by the same procedure shoot length is also measured the seedling length has to be measured on the day of final count the seedling of the fresh weight was taken from the each treatment the seedling was weighted with the help of electronic weighing balance and the dry weight taken by using hot air oven at 1000C temperature for 24 hrs and the seeds were made to weight with the help of weighing balance

And seedling vigour index I and II were calculated by the multiplication of the germination percentage with the seedling dry weight on the day of final count.

Seedling vigour index = germination (%) x total seedling lengths (cm)

Vigour index mass = germination (%) x seedling dry weight

## RESULTS AND DISCUSSION

In this present experiment different growth regulators and botanicals used ie., PEG6000, SA, ASCORBIC ACID, neem leaf extract, moringa leaf extract and curry leaf extract. Growth regulators play an important role in regulating the germination and vigour, the growth regulators the more result occur in the SA and in botanicals neem leaf extract shows higher result.

Among all the treatments $T_3$ (SA) 100 ppm for 12 hrs treatment shows highest germination % (86. 5%) and $T_{12}$ (curry leaf extract) shows lowest germination% (76.5%). $T_3$ (SA)100 ppm shows maximum root length (17.35 cm) and $T_0$(control) shows lowest root length (9.35 cm), $T_3$ (SA) 100 ppm shows heighest shoot length (17.35 cm) and $T_0$

shows lowest shoot length (12.37cm), $T_3$ (SA) 100 ppm shows highest total seedling length (38.17cm) and the T0 (control) shows lowest total seedlings length (21.2 cm). $T_3$ (SA) 100ppm shows highest seedling fresh weight (4.29 g), $T_0$ shows lowest seedling fresh weight (3.78 g). $T_3$ (SA) 100 ppm shows highest seedling dry weight (0.99 g). $T_{12}$ (moringa leaf extract) 50 ppm for 12 hrs shows lowest seedling dry weight (0.83 g). $T_3$ (SA) 100 ppm for 12 hrs shows highest seeding vigour index-I (3303.29). T0 shows lowest seedling vigour index-1(1677.60). $T_3$ (SA) 100 ppm for 12 hrs shows highest seedling vigour index-I I (86.29). T0 shows lowest seedling vigour index-II (64.35).

salicylic acid (SA) helps in plant growth and development , opening and closing of stomata is regulated by SA increases the germination percentage, seedling length a PEG $_{6000}$ helps in development of root length. ascorbic acid regulates cell division and plant growth in transduction neem leaf extraction increases germination percentage and seedling vigour. moringa increases the growth parameter.

**Table 1.** Analysis of variance for Lab character of mung beans seeds.

| S. No. | Characters | Mean sum of squares | |
|---|---|---|---|
| | | Treatments (df=11) | Error (df=40) |
| 1. | Germination % | 41.67** | 3.28 |
| 2. | Root length | 22.28 | 1.81 |
| 3. | Shoot length | 21.12** | 1.87 |
| 4. | Total seedling length | 85.67** | 6.08 |
| 5. | Seedling fresh weight | 0.11** | 0.02 |
| 6. | Seedling dry weight | 0.01** | 0.001 |
| 7. | Vigour index-I | 877843.6* | 41562.81 |
| 8. | Vigour index-II | 232.81* | 73.05 |
| 9. | Seed health | 8.11 | 1.01 |

* and ** significant at 5% and 1% level of significance, respectively

## CONCLUSION

It is concluded from the present investigation that Impact of pre-sowing treatments with plant growth regulators and organics on seed germination and seedling vigour in mung beans (*vigna radiata*) seeds.

The invigoration of mung bean seeds by salicylic acid (SA) may increase germination of seeds. invigoration with SA (100 ppm) increased the germination (%) and seed vigour in mung seeds. SA exhibited high mean value for Seedling characters like seed germination percentage (86 %), root length (17.35 cm), shoot length (20.82 cm), seedling length (38.17 cm), and seedling dry weight (0.99 g), seed vigour index (86.29), in comparison to other treatments and botanicals neem leaf extract 5% showed high in all botanicals treatments.

The salicylic acid has many effects, such as stimulating the plant to form protein-related with

**Table 2.** Mean performance of mung beans seeds for 9 seedling characters.

| S. N. | Treatments | Germination % | Root Length (cm) | Shoot Length (cm) | Total Seedling Length (cm) | Seedling fresh weight (gm) | Seedling dry weight (g) | Seedling vigour index -I | Index | Seed health |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | **$T_0$** | 77.25 | 9.35 | 12.37 | 21.72 | 3.78 | 0.83 | 1677.60 | 64.35 | 5.25 |
| 2. | **$T_1$** | 85 | 15.05 | 16.81 | 31.86 | 4.25 | 0.98 | 2708.68 | 83.37 | 3 |
| 3. | **$T_2$** | 79.75 | 13.44 | 15.41 | 28.85 | 4.02 | 0.95 | 2300.17 | 75.58 | 2.25 |
| 4. | **$T_3$** | **86.5** | **17.35** | **20.82** | **38.17** | **4.29** | **0.99** | **3303.29** | **86.29** | **0.25** |
| 5. | **$T_4$** | 84 | 13.80 | 15.96 | 29.77 | 4.14 | 0.97 | 2500.06 | 81.49 | 0.75 |
| 6. | **$T_5$** | 78.75 | 11.48 | 14.14 | 25.62 | 3.95 | 0.91 | 2018.33 | 72.25 | 2.5 |
| 7. | **$T_6$** | 77.75 | 10.71 | 13.23 | 23.94 | 3.81 | 0.84 | 1865.90 | 65.32 | 3.5 |
| 8. | **$T_7$** | 79.25 | 13.15 | 15.33 | 28.48 | 3.98 | 0.94 | 2259.12 | 75.12 | 1 |
| 9. | **$T_8$** | 79 | 11.51 | 14.40 | 25.91 | 3.96 | 0.93 | 2045.56 | 73.36 | 1.5 |
| 10. | **$T_9$** | 78.5 | 11.36 | 14.10 | 25.47 | 3.91 | 0.89 | 1998.00 | 70.26 | 3.5 |
| 11. | **$T_{10}$** | 78.25 | 10.78 | 14.08 | 24.87 | 3.89 | 0.87 | 1947.30 | 68.40 | 3.25 |
| 12. | **$T_{11}$** | 78 | 10.31 | 13.15 | 23.46 | 3.86 | 0.85 | 1830.61 | 66.66 | 1.75 |
| 13. | **$T_{12}$** | 77.5 | 10.21 | 13.03 | 23.24 | 3.8 | 0.83 | 1798.38 | 64.63 | 2 |
| 14. | **F- test** | S | **S** | **S** | **S** | **S** | **S** | **S** | **S** | **S** |
| 15. | **S. Ed. (±)** | 1.28 | 0.95 | 0.96 | 1.74 | 0.10 | 0.07 | 144.15 | 6.04 | 0.71 |
| 16. | **C. D. (P = 0.05)** | 1.81 | 1.93 | 1.95 | 3.52 | 0.20 | 0.15 | 291.35 | 12.21 | 1.43 |
| 17. | **C.V.** | 2.26 | 1.34 | 1.36 | 2.46 | 0.14 | 0.10 | 203.86 | 8.54 | 1.00 |

pathogenesis, and increasing the flowering period, inhibits the formation of ethylene, germinating the seeds and closing wounds. SA was able to significantly reduce fungi, because SA is a natural phenolic compound that have inhibitory effect on microbial sand that is the reason to toxic effect on fungus.

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