

Impact of Seed Invigoration with Panchagavya, Beejamrutha on Seed Quality Parameters in Bitter Gourd (*Memordica charantia*) under Salinity Conditions

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ABSTRACT: High salt conditions can inhibit seed germination and seedling growth in Bitter gourd. The present study was carried out to assess the effect of organic seed treatments on seed quality parameters of bitter gourd (*Memordica charantia* L.) under increased salinity concentrations. The study was carried out in the seed testing laboratory of Department of Genetics and Plant Breeding, SHUATS, Prayagraj with the treatments as Panchagavya, Jeevamrutham, Beejamrutha, Coconut water and Aloe vera extract of varying concentrations under salinity levels of 0 mM, 150mM and 250 mM NaCl. The results indicated that increased levels of salinity concentrations have negative impact on quality parameters of bitter gourd. Soil salinity is the major abiotic factor that hinders the growth and establishment of the seedling. Priming enhances the quality parameters of the seedling up to certain salinity concentrations depending up on the type of primer and the dosage used for priming; beyond which it may be in efficient to show impact on the growth and development of seedling. The treatment and salinity interaction (T × S) of T₃S₀- Panchagavya at 6% for 12 hrs at 0 mM NaCl stress levels found to be promising with germination of 79.50%, 34.775 cm seedling length, 8.935 g fresh weight, 1.015 g dry weight, 2762.99 seedling vigour index-i and 80.605 vigour index-ii. Priming with coconut water and aloe vera extract were not found so effective in enhancing the seed quality parameters of bitter gourd under the increased levels of salinity concentrations and its effect was recorded close to that of untreated control. The challenges which I faced during these studies was that due to the hardness of the seed coat of Bitter gourd seed it took more time in germination. Though I faced the challenges during the germination of the seed I found the seed treated with panchagavya germinated fastest among all treated and untreated bitter gourd seeds.

Keywords: Bitter gourd, Panchagavya, Bheejamruth, Jeevamruth, Coconut water and Aloe vera extract.

INTRODUCTION

Bitter gourd commonly known as balsam pear, bitter melon, bitter cucumber, African cucumber and Karela is an important vegetable of Cucurbitaceae family (Kanwar *et al.*, 2017). It is originated in the tropical regions of the world particularly in the eastern India and southern China (Saini *et al.*, 2017). Among its family members in Cucurbitaceae; it is believed as the supreme vegetable because of nutritional and medicinal properties (Nagamani *et al.*, 2015). They are the good source of nutrient factors with high carbohydrate, minerals and have the highest nutrient value among the cucurbits.

Soil salinity is the major abiotic stress that hinders the proper establishment of the seed and seed germination. Increased salt concentrations favour for physiological drought where the chances of establishment of a seed reduces heavily. Heavy salt concentrations reduce the vigour of the seedling and makes seedling as a host for most of the pathogens. Excessive salt concentrations

disturb the water potential of the plant, increases the incidence of diseases and pest attack. The present study was carried out to assess the efficiency of priming with organics under salinity conditions.

Organics play a vital role in the present days sustainable Agriculture. Aloe vera extract is a rich source of essential nutrients such as phosphorus, potassium, calcium, iron and zinc. Seed priming is a technique which is used to improve seed germination and crop stand in field. Efficient modes of seed priming include halo priming, hydro priming, osmo priming and solid matrix priming. hydro priming is easy and more economical mode of priming which increases seed germination, reduce germination (Adnan *et al.*, 2020)

Panchagavya having enriched with the essential macro and micro nutrients favours for the growth of the crop under biotic and abiotic stress conditions. Beejamrutha when applied as a priming agent, besides providing essential nutrients it even reduces the infection of fungal pathogens (Balasubramanian and Eeshwari 2019). Aloe vera extract can use as seed coating to delay

water absorption when ambient water levels are low and erratic (Mustafa, 2020). Main objective of the current experiment is to evaluate the suitable organic treatment on seed quality parameters of bitter gourd (*Momordica charantia* L.) under increased salinity concentrations. Effective improvement in yield may be brought about through selection of various yield component characters, which show association among themselves and also with yield (Gupta *et al.*, 2015).

The fruits and seeds of bitter gourd possess cooling, appetising, stomachic, antipyretic, carminative, antihelminthic, aphrodisiac and vermifuge properties (Grover and Yadav, 2004). The fruits are used as digestive, laxative, antipyretic and reduces blood diseases, rheumatism and asthma (Thangamani and Pugalendhi (2013). Devakumar *et al.*, (2014) reported the presence of naturally occurring beneficial microorganism's predominantly lactic acid bacteria, yeast, actinomycetes, photosynthetic bacteria, nitrogen fixers, phosphorus solubilisers and fungi in panchagavya and beejamrutha.

Gowsalya *et al.*, (2020) stated efficacy of coconut water, vermiwash and neem extract and plant growth and rhizosphere bacteraila enhancers towards soil sustainability.

MATERIALS AND METHODS

The study was carried out at seed testing laboratory of department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture Technology and Sciences (SHUATS), Naini Agriculture Institute (NAI), Prayagraj (U. P.). Current experiment conducted using Complete Randomized Design with four replication. The Bitter gourd cultivar Laxmi (kathi) were used for experiment with different organic seed treatments T_0 to T_8 using different salinity levels designated as S_0 , S_1 and S_2 . Lab experiment data analysis were assessed by two-way ANOVA (salinity and treatments as factors) carried out according to procedure of Completely Randomized Design (Fisher, 1936) The study was conducted in order to evaluate the effect of priming on seed quality parameters of bitter gourd under salt stress condition.

Treatments: T_0 - Control, T_1 -Panchagavya at 3% for 12 hrs, T_2 -Panchagavya at 5% for 12 hrs., T_3 -Panchagavya at 6% for 12 hrs. T_4 - Beejamrutha at 4% for 12 hrs. T_5 - Jeevamrutha at 20% for 12 hrs., T_6 - Jeevamrutha at 20% for 12 hrs., T_7 - Coconut water for 12 hrs., and T_8 -Aloe vera gel for 12 hrs.; S_0 - 0mM NaCl, S_1 - 150mM NaCl and S_2 - 250 mM NaCl.

METHODOLOGY

Panchagavya, a fermented product is literally prepared from five products of a cow *viz.*, milk, urine, dung, curd and ghee. These ingredients are placed in a pot and mixed twice daily to enhance the microbial activity; on the 15th day the enriched product panchagavya is formed. To prepare 3%, 5% & 6% solution; 30ml, 50 ml & 60ml of the fermented panchagavya was taken in

beaker and then 1000ml distilled water was added with constant stirring to get mixed up properly.

Beejamrutha was prepared by taking 5 kg of local cow dung, it was bound to a tape and kept hanged in 20 litres of water for 12 hrs 50 g of slaked lime was dissolved in one litre of water after constant stirring. Earlier dissolved cow dung was squeezed in the lime water such that essential nutrients are maintained in the solution. A handful of soil was added and stirred properly to enhance microbial activity and finally 50 litres of cow urine was added with the constant stirring. To prepare 4% beejamrutha solution, 40 g of beejamrutha was taken in a beaker and was mixed with distilled water after constant stirring to get mixed up properly.

Jeevamrutha was prepared by taking 200 litres of water in a barrel, 10 kg local cow dung, 10 litres of aged cow urine, 2 kg jaggery, 2 kg pulse flour and hand full of soil were added. Periodical stirring for at-least 48 hours forms Jeevamruth solution. To prepare 20% beejamrutha solution, 200 g of jeevamrutha solution was taken in a beaker and was mixed with distilled water after constant stirring to get mixed up properly.

8.76g & 14.76g of NaCl was dissolved in 1000ml of water to constitute 150mM and 250mM NaCl salt solution respectively.

After preparation of solution of panchagavya, beejamrutha, jeevamrutha. Bitter gourd seeds are soaked in required solution for 12 hours at 25° temperature untreated seeds are called as control. After 12 hour of soaking the solution drained out from the beaker and pre-soaked were air dried to original weight and then placed for germination in laboratory under controlled condition.

RESULTS AND DISCUSSION

Germination (%): On the day of final count, the maximum number of normal seedlings of 74.08 % and 74.50 % due to the effect of treatments and salinity factors were recorded by T_3 - Panchagavya at 6% for 12 hrs. and S_0 - 0 mM NaCl stress levels respectively; the minimum with the same of 64.83 % and 63.92 % were recorded were recorded by untreated control (T_0) and S_2 - 250mM NaCl stress conditions respectively. Among treatment and salinity interactions, T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum germination of 79.50 % and T_0S_2 - Control at 250 mM NaCl stress levels recorded minimum germination of 60.00 % respectively.

Root length (cm): Among the treatment and salinity factors, the highest root length of 15.82 cm and 14.54 cm were found in treatment T_3 - Panchagavya at 6% for 12 hrs. and salinity stress level of S_0 - 0mM NaCl; the lowest root lengths of 8.392 cm and 10.20 cm were exhibited by untreated control (T_0) and salinity stress level S_2 - 250mM NaCl respectively. Interaction effect recorded the maximum root length in T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions of 18.675 cm and minimum in T_0S_2 - Control at 250 mM NaCl stress levels of 6.883 cm respectively.

Shoot length (cm): The maximum shoot length (cm) of 14.09 cm and 11.70 cm was shown by treatment T₃-Panchagavya at 6% for 12 hrs and salinity stress level of S₀- 0mM NaCl for treatment and salinity factors alone; the minimum of 6.75 cm and 8.52 cm for the same was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl respectively. The treatment combination T₃S₀- Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 16.08 cm and T₀S₂- Control at 250 mM NaCl stress levels recorded minimum of 6.883 cm respectively.

Seedling length (cm): Maximum seedling length (cm) of 29.96 cm and 26.24 cm was exhibited by the treatment T₃- Panchagavya at 6% for 12 hrs. and S₀- 0mM NaCl for individual effect of treatment and salinity factors respectively; minimum seedling length of 15.14 cm and 18.74 cm was recorded with the untreated control (T₀) and S₂- 250mM NaCl salinity stress level. T₃S₀- Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 34.775 cm and minimum of 18.875 cm with T₀S₂- Control at 250 mM NaCl stress levels for treatment and salinity factor interaction respectively.

Seedling fresh weight (g): Maximum seedling fresh weight (g) of 8.09 g and 7.25 g was recorded by T₃-Panchagavya at 6% for 12 hrs. and salinity stress level of S₀- 0mM NaCl for treatment and salinity factors alone; minimum of 4.76 g and 6.04 g was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl respectively. Interaction effect with T₃S₀-Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress levels recorded maximum of 8.935 g and minimum of 4.220 g with T₀S₂- Control at 250 mM NaCl stress levels respectively.

Seedling dry weight (g): Maximum seedling dry weight (g) of 0.89 g and 0.81 g was shown by treatment T₃- Panchagavya at 6% for 12 hrs. and salinity stress level of S₀- 0mM NaCl for treatment and salinity factors alone; minimum of 0.51 g and 0.58 g was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl respectively. Interaction effect with T₃S₀- Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress recorded maximum of 1.015 g and minimum of 0.395 g with T₀S₂- Control at 250 mM NaCl stress levels respectively.

Seedling vigour index-i: Highest vigour index-i of 2235.19 and 1969.85 was seen with the treatment T₃-Panchagavya at 6% for 12 hrs and salinity stress level of S₀- 0mM NaCl for individual effect of treatment and salinity factors respectively; Lowest vigour index-i of 990.24 and 1206.63 for the same was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl. With the interaction effect, T₃S₀-Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 2762.99 and minimum of 772.45 with T₀S₂- Control at 250 mM NaCl stress levels respectively.

Seedling vigour index-ii: Maximum seedling vigour index-ii of 66.451 and 60.79 was noticed with the treatment T₃- Panchagavya at 6% for 12 hrs. and salinity stress level of S₀- 0mM NaCl respectively; the minimum of 33.716 and 38.49 for the same was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl. For the interaction effect, T₃S₀- Panchagavya at 6% for 12 hrs at 0mM NaCl stress levels recorded maximum of 80.605 and minimum of 23.705 with T₀S₂- Control at 250 mM NaCl stress levels respectively.

Table 1: Mean performance on effect of treatments on seed quality parameters of bitter gourd under salinity stress conditions.

| Treatments | Germination (%) | Root length (cm) | Shoot length (cm) | Seedling length (cm) | Seedling fresh weight(g) | Seedling dry weight (g) | Seedling vigour index-i | Seedling vigour index-ii |
|----------------|-----------------|------------------|-------------------|----------------------|--------------------------|-------------------------|-------------------------|--------------------------|
| T ₀ | 64.833 | 8.392 | 6.753 | 15.144 | 4.760 | 0.513 | 990.246 | 33.716 |
| T ₁ | 67.583 | 12.008 | 8.903 | 20.911 | 6.392 | 0.703 | 1426.997 | 47.794 |
| T ₂ | 70.583 | 13.708 | 11.432 | 25.140 | 6.919 | 0.725 | 1790.673 | 51.611 |
| T ₃ | 74.083 | 15.828 | 14.085 | 29.958 | 8.091 | 0.893 | 2235.191 | 66.451 |
| T ₄ | 67.000 | 11.613 | 9.287 | 20.900 | 6.233 | 0.638 | 1412.911 | 43.097 |
| T ₅ | 67.583 | 12.806 | 10.173 | 22.979 | 6.968 | 0.685 | 1569.062 | 50.131 |
| T ₆ | 73.000 | 14.376 | 12.543 | 26.919 | 7.918 | 0.837 | 1983.307 | 61.512 |
| T ₇ | 68.333 | 10.647 | 8.279 | 18.926 | 6.053 | 0.645 | 1302.108 | 44.305 |
| T ₈ | 66.083 | 11.322 | 8.826 | 20.148 | 6.261 | 0.666 | 1343.582 | 44.436 |
| Grand Mean | 68.79 | 12.30 | 10.03 | 22.34 | 6.62 | 0.70 | 1561.56 | 49.23 |
| CD at 5% | 1.455 | 0.330 | 0.417 | 0.568 | 0.210 | 0.040 | 57.567 | 2.946 |
| S.ED | 0.730 | 0.166 | 0.209 | 0.285 | 0.105 | 0.020 | 28.879 | 1.478 |
| S.EM | 0.516 | 0.117 | 0.148 | 0.201 | 0.075 | 0.014 | 20.420 | 1.045 |

Table 2: Mean performance on effect of salinity stress conditions on seed quality parameters of bitter gourd.

| | | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|-------------|-------------|----------------|--------------|
| S ₀ | 74.500 | 14.543 | 11.702 | 26.244 | 7.251 | 0.812 | 1969.848 | 60.789 |
| S ₁ | 67.944 | 12.155 | 9.872 | 22.026 | 6.573 | 0.708 | 1508.281 | 48.409 |
| S ₂ | 63.917 | 10.202 | 8.520 | 18.738 | 6.041 | 0.581 | 1206.562 | 38.486 |
| Grand Mean | 68.79 | 12.30 | 10.03 | 22.34 | 6.62 | 0.70 | 1561.56 | 49.23 |
| CD at 5% | 0.840 | 0.191 | 0.241 | 0.328 | 0.121 | 0.023 | 33.236 | 1.701 |
| S.ED | 0.421 | 0.096 | 0.121 | 0.164 | 0.061 | 0.012 | 16.673 | 0.853 |
| S.EM | 0.298 | 0.068 | 0.085 | 0.493 | 0.043 | 0.008 | 11.790 | 0.603 |

Table 3: Interaction effect of treatments and salinity conditions on seed quality parameters of bitter gourd (*Memordica charantia* L.)

| Interaction | Germination (%) | Root length (cm) | Shoot length (cm) | Seedling length (cm) | Seedling fresh weight(g) | Seedling dry weight (g) | Seedling vigour index-i | Seedling vigour index-ii |
|-------------------------------|-----------------|------------------|-------------------|----------------------|--------------------------|-------------------------|-------------------------|--------------------------|
| T ₀ S ₀ | 70.250 | 10.063 | 7.563 | 17.623 | 5.270 | 0.643 | 1238.500 | 45.163 |
| T ₀ S ₁ | 64.250 | 8.230 | 6.705 | 14.935 | 4.790 | 0.503 | 959.785 | 32.280 |
| T ₀ S ₂ | 60.000 | 6.883 | 5.993 | 12.875 | 4.220 | 0.395 | 772.453 | 23.705 |
| T ₁ S ₀ | 73.250 | 14.080 | 10.558 | 24.638 | 6.918 | 0.783 | 1804.690 | 57.318 |
| T ₁ S ₁ | 67.500 | 11.943 | 8.878 | 20.820 | 6.195 | 0.713 | 1405.375 | 48.095 |
| T ₁ S ₂ | 62.000 | 10.003 | 7.273 | 17.275 | 6.063 | 0.613 | 1070.925 | 37.970 |
| T ₂ S ₀ | 77.500 | 16.065 | 13.030 | 29.095 | 7.648 | 0.830 | 2254.855 | 64.325 |
| T ₂ S ₁ | 69.500 | 13.488 | 10.775 | 24.263 | 6.915 | 0.728 | 1686.195 | 50.550 |
| T ₂ S ₂ | 64.750 | 11.573 | 10.490 | 22.063 | 6.195 | 0.618 | 1430.968 | 39.958 |
| T ₃ S ₀ | 79.500 | 18.675 | 16.080 | 34.755 | 8.935 | 1.015 | 2762.995 | 80.605 |
| T ₃ S ₁ | 73.250 | 15.830 | 13.868 | 29.698 | 8.065 | 0.883 | 2175.838 | 64.565 |
| T ₃ S ₂ | 69.500 | 12.980 | 12.308 | 25.423 | 7.273 | 0.780 | 1766.740 | 54.183 |
| T ₄ S ₀ | 72.250 | 13.543 | 11.090 | 24.633 | 6.803 | 0.733 | 1779.905 | 52.915 |
| T ₄ S ₁ | 66.500 | 11.890 | 9.178 | 21.068 | 6.128 | 0.645 | 1400.760 | 42.918 |
| T ₄ S ₂ | 62.250 | 9.408 | 7.593 | 17.000 | 5.770 | 0.538 | 1058.068 | 33.458 |
| T ₅ S ₀ | 73.750 | 14.950 | 12.188 | 27.138 | 7.548 | 0.833 | 2001.730 | 61.383 |
| T ₅ S ₁ | 67.000 | 12.795 | 10.093 | 22.888 | 6.948 | 0.750 | 1533.505 | 50.263 |
| T ₅ S ₂ | 62.000 | 10.673 | 8.240 | 18.913 | 6.408 | 0.473 | 1171.950 | 38.748 |
| T ₆ S ₀ | 79.000 | 17.068 | 14.758 | 31.825 | 8.588 | 0.940 | 2515.165 | 74.300 |
| T ₆ S ₁ | 72.500 | 14.015 | 12.263 | 26.278 | 7.955 | 0.853 | 1905.395 | 61.805 |
| T ₆ S ₂ | 67.500 | 12.045 | 10.610 | 22.655 | 7.210 | 0.718 | 1529.360 | 48.430 |
| T ₇ S ₀ | 73.000 | 12.975 | 9.973 | 22.948 | 6.665 | 0.755 | 1674.880 | 55.065 |
| T ₇ S ₁ | 66.000 | 10.205 | 8.253 | 18.458 | 5.990 | 0.640 | 1217.638 | 42.235 |
| T ₇ S ₂ | 66.000 | 8.760 | 6.613 | 15.373 | 5.503 | 0.540 | 1013.805 | 35.615 |
| T ₈ S ₀ | 72.000 | 13.470 | 10.078 | 23.548 | 6.888 | 0.778 | 1695.915 | 56.030 |
| T ₈ S ₁ | 65.000 | 10.998 | 8.835 | 19.833 | 6.170 | 0.660 | 1290.038 | 42.970 |
| T ₈ S ₂ | 61.250 | 9.498 | 7.565 | 17.063 | 5.725 | 0.560 | 1044.793 | 34.308 |
| Grand Mean | 68.79 | 12.30 | 10.03 | 22.34 | 6.62 | 0.70 | 1561.56 | 49.23 |
| CD 5% | 1.689 | 0.572 | 0.722 | 0.983 | 0.542 | 0.546 | 99.709 | 1.987 |
| S.ED | 1.264 | 0.287 | 0.362 | 0.493 | 0.183 | 0.035 | 50.019 | 2.560 |
| S.EM | 0.894 | 0.203 | 0.256 | 0.349 | 0.129 | 0.025 | 35.369 | 1.810 |

SUMMARY

Among the treatments, the maximum germination of 74.08 % was exhibited by the treatment T₃-Panchagavya at 6% for 12 hrs; the minimum germination due to the effect of treatments of 64.83 % was recorded with the untreated control (T₀). Among the salinity stress conditions, the salinity stress level of S₀- 0mM NaCl recorded maximum germination of 74.50 % and salinity stress level S₂- 250mM NaCl recorded the lowest germination of 63.92 %. In the interaction of treatment and salinity (T × S) maximum germination was recorded with T₃S₀- Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions of 79.50% and minimum in T₀S₂- Control at 250 mM NaCl stress levels 60.00 % of germination.

The maximum root length (cm) of 15.8283 cm and 14.54 cm was exhibited by the treatment T₃-Panchagavya at 6% for 12 hrs. and salinity stress level of S₀- 0mM NaCl respectively. The minimum of 8.392 cm and 10.20 cm was recorded with the untreated control (T₀) and salinity stress level S₂- 250mM NaCl respectively. Interaction effect with T₃S₀- Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 18.675 cm and minimum of 6.883 cm with T₀S₂- Control at 250 mM NaCl stress levels.

The maximum shoot length (cm) of 14.09 cm and 11.70 cm was exhibited by the treatment T₃- Panchagavya at 6% for 12 hrs. and salinity stress level of S₀- 0mM NaCl respectively. The minimum of 6.75 cm and 8.52 cm was recorded with the untreated control (T₀) and

salinity stress level S_2 - 250mM NaCl respectively. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 16.080 cm and minimum of 5.993 cm with T_0S_2 - Control at 250 mM NaCl stress levels.

The maximum seedling length (cm) of 29.96 cm and 26.24 cm was exhibited by the treatment T_3 - Panchagavya at 6% for 12 hrs. and salinity stress level of S_0 - 0mM NaCl. The minimum of 15.14 cm and 18.74 cm was recorded with the untreated control (T_0) and salinity stress level S_2 - 250mM NaCl. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 34.775 cm and minimum of 18.875 cm with T_0S_2 - Control at 250 mM NaCl stress levels.

The maximum seedling fresh weight (g) of 8.09 g and 7.25 g was exhibited by the treatment T_3 - Panchagavya at 6% for 12 hrs. and salinity stress level of S_0 - 0mM NaCl. The minimum of 4.76 g and 6.04 g was recorded with the untreated control (T_0) and salinity stress level S_2 - 250mM NaCl respectively. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress levels recorded maximum of 8.935 g and minimum of 4.220 g with T_0S_2 - Control at 250 mM NaCl stress levels.

The maximum seedling dry weight (g) of 0.89 g and 0.81 g was exhibited by the treatment T_3 - Panchagavya at 6% for 12 hrs and salinity stress level of S_0 - 0mM NaCl. The minimum of 0.51 g and 0.58 g was recorded with the untreated control (T_0) and salinity stress level S_2 - 250mM NaCl. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 1.015 g and minimum of 0.395 g with T_0S_2 - Control at 250 mM NaCl stress levels.

The maximum seedling vigour index-i of 2235.19 and 1969.85 was exhibited by the treatment T_3 - Panchagavya at 6% for 12 hrs and salinity stress level of S_0 - 0mM NaCl. The minimum of 990.24 and 1206.63 was recorded with the untreated control (T_0) and salinity stress level S_2 - 250mM NaCl. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs under 0mM NaCl salinity stress conditions recorded maximum of 2762.99 and minimum of 772.45 with T_0S_2 - Control at 250 mM NaCl stress levels.

The maximum seedling vigour index-ii of 66.451 and 60.79 was exhibited by the treatment T_3 - Panchagavya at 6% for 12 hrs. and salinity stress level of S_0 - 0mM NaCl. The minimum of 33.716 and 38.49 was recorded with the untreated control (T_0) and salinity stress level S_2 - 250mM NaCl. Interaction effect with T_3S_0 - Panchagavya at 6% for 12 hrs at 0mM NaCl stress levels recorded maximum of 80.605 and minimum of 23.705 with T_0S_2 - Control at 250 mM NaCl stress levels.

CONCLUSION

The results indicates that priming is an alternate strategy to maintain the vigour of a seed under adverse abiotic environmental factors. The performance of untreated control, aloe vera extract and coconut water had not shown any significant impact on the quality

parameters of bitter gourd with the increased salinity levels.

Organic priming with Panchagavya at 6% for 12 hrs at 0mM NaCl stress levels found to be promising with germination of 79.50%, 34.775 cm seedling length, 8.935 g fresh weight, 1.015 g dry weight, 2762.99 seedling vigour index-i and 80.605 vigour index-ii.

From the result, it can be concluded that seed priming is an alternate strategy to develop healthy seedlings under salinity conditions to a particular extent; priming with organics, Panchagavya and Jeevamrutha were found promising and can be suggested for commercial cultivation.

FUTURE SCOPE

The further investigation needs to conduct for the field trail in the research farm or pot culture in the green house using salt affected soils in the different region of the country as the bitter gourd variety used in this study Laxmi (Kathi) which is widely recommended in the Uttar Pradesh state of the India.

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Conflict of Interest. Nil.

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