



Effect of Organic and Botanicals Priming on Seed Quality Parameter of Pigeonpea (*Cajanuscajan* (L.) Millspaugh)

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Presence of hard seed coats and several seed borne pathogens hinder the normal seedling establishment in legumes. Earlier seed enhancement is mainly achieved through synthetics and growth regulators. To evaluate the effect of organics and botanicals on quality parameters of the seed an experiment was conducted in Sam Higginbottom University of Agriculture, Technology and Sciences. Treatments in the experiment comprised of Panchagavya at 3%, 5% and 7% for 12 hrs., Beejamrutha at 5%, 7% and 9% for 12 hrs., Coconut water at 6% and 8% for 12hrs., Moringa leaf extract at 5% and 7% for 12hrs and Sea weed extract at 3% and 5% for 12hrs. Priming with the selected organics and botanicals found to enhance the quality parameters compared to untreated control. The treatment Panchagavya at 7% for duration of 12 hours was found to be superior compared to the other treatments in the study.

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1. INTRODUCTION

Legumes have served as a primary source of nitrogen for several cropping systems, food for domestic animals and human beings since the earliest of the civilizations. Pigeon pea [*Cajanuscajan* (L.) Millspaugh] is an often-cross pollinated food legume (2n = 22) and belongs to Cajaninae, sub-tribe of the tribe Phaseolae and to the family Fabaceae [1]. India is the principal pigeonpea growing country for the purpose of food, feed, fodder, fuel, functional utility and as a fertilizer in the context of sustainable agriculture [2].

As a part of traditional agriculture, organic seed priming with Panchagavya, Beejamrutha and botanicals was found effective since the study was carried to evaluate promising organic treatment. According to [3] bacterial isolates from panchagavya were capable of N₂-fixation, P solubilization and IAA, GA₃ production in addition to suppression of *Sclerotium*. BalaSubramanyam *et al.*, [4] reported Beejamrutha as an organic product, that contain beneficial microorganisms predominantly lactic acid bacteria, yeast, actinomycetes, photosynthetic bacteria, nitrogen fixers, phosphorus solubilises and fungi.

Coconut water, obtained from drupe of *Cocosnucifera* has been shown to exhibit a wide range of active growth regulatory activities. Yong [5] reported that the growth regulatory agent in coconut water mainly and most importantly cytokinin. Coconut water is rich in zeatin, ascorbic acid, vitamin E, phenolic compounds, and minerals; the leaf extract of moringais known for potential to promote plant growth hence, it is used as a natural plant growth enhancer [6]. Sea weeds are used as food for human, fodder for cattle, as a substitute of chemical fertilizer because they contain multiple growth regulators.

2. MATERIALS AND METHODS

The experiment was carried out at seed testing laboratory of department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj (U. P.).

2.1 Treatments

T₀- Control, T₁- Panchagavya at 3% for 12 hrs., T₂- Panchagavya at 5% for 12 hrs., T₃-

Panchagavya at 7% for 12 hrs., T₄- Beejamrutha at 5% for 12 hrs., T₅- Beejamrutha at 7% for 12 hrs., T₆- Beejamrutha at 9% for 12 hrs., T₇- Coconut water at 6% for 12hrs., T₈- Coconut water at 8% for 12hrs., T₉- Moringa leaf extract at 5% for 12hrs., T₁₀- Moringa leaf extract at 7% for 12hrs., T₁₁- Seaweed extract at 3% for 12hrs. and T₁₂- Seaweed extract at 5% for 12hrs.

2.2 Methodology

Panchagavya was prepared from the ingredients of cow, such as milk, curd, urine, dung and clarified butter. These were added to mud pot and the contents were stirred twice a day both in the morning and evening up to 15 days to form the fermented product "Panchagavya". To prepare 3, 5 and 7% solution; 30, 50 and 70 ml of Panchagavya was taken in separate beakers, respectively and then 1000ml of distilled water is added after stirring constantly.

Beejamrutha was formed from 5 Kg of local cow dung placed in cloth; bound by tape and was submerged in 20 litres of water for 12 hrs. 50g of slaked lime was dissolved in 20 litres of water in separate container and kept stable for overnight. After 12 hrs, this bundle of cow dung was squeezed thrice, to form cow dung extract and a Kg of soil was dissolved in cow dung extract along with slitters of wild cow urine and lime water was added and mixed well to constitute Beejamrutha. To prepare 5%, 7% and 9% of solution; 50 ml, 70 ml and 90 ml Beejamrutha solution is placed in a beaker respectively then 1000 ml of distilled water will be added after stirring constantly.

To prepare 6% and 8% coconut water solution; 60 ml and 80 ml of coconut water was taken in a separate beaker respectively and the solution was added in the 1000 ml distilled with constant stirring; then it finally constitutes to 6% and 8% coconut water solutions.

For the preparation of 5% and 7% Moringa leaf extract solution, 50g and 70g Moringa leaf powder was taken in a beaker and then it was added in 1000 ml of distilled water with constant stirring. The solution finally constitutes to 5% and 7% Moringa leaf solutions.

For the preparation of 3% and 5% sea weed leaf extract solution, 30g and 50g sea weed powder was taken in a beaker and then it was added in 1000 ml of distilled water with constant

Table 1. Influence of seed priming with organics and botanicals of seed quality parameters of Pigeonpea(*Cajanuscajan* (L.) Mills)paugh)

S. No	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
01.	T0	79.75	10.18	13.93	24.11	3.45	0.29	1923.75	23.14
02.	T1	84.50	15.31	18.43	33.74	4.36	0.33	2851.86	27.68
03.	T2	85.50	15.76	19.50	35.26	4.39	0.40	3015.08	34.00
04.	T3	88.25	17.10	21.66	38.75	5.29	0.48	3420.70	42.14
05.	T4	83.25	15.00	18.88	33.87	4.41	0.38	2819.46	31.24
06.	T5	84.75	15.09	19.08	34.17	4.38	0.36	2897.59	30.25
07.	T6	86.75	16.23	20.92	37.15	5.07	0.45	3221.87	38.57
08.	T7	81.50	10.69	14.30	24.99	4.10	0.31	2037.30	25.47
09.	T8	82.00	11.27	15.60	26.87	4.38	0.32	2203.44	26.47
10.	T9	84.75	13.16	17.16	30.31	4.21	0.34	2569.20	28.84
11.	T10	85.25	13.76	18.03	31.78	4.25	0.40	2708.48	33.67
12.	T11	83.25	14.28	18.12	32.40	4.10	0.36	2697.73	30.19
13.	T ₁₂	85.75	14.87	18.45	33.32	4.44	0.34	2856.29	29.33
Grand Mean		84.25	14.05	18.00	32.05	4.37	0.37	2709.44	30.84
F test		S	S	S	S	S	S	NS	S
SE (M)		0.909	0.280	0.338	0.525	0.121	0.014	60.163	1.192
C.D. at 5%		2.618	0.805	0.974	1.511	0.349	0.039	173.26	3.432
C.V.		2.161	3.999	3.767	3.285	5.548	7.468	4.461	5.219

stirring. The solution finally constitutes to 3% and 5% sea weed extract solutions.

3. RESULTS

The Table 01 indicates that T₃ – Panchagavya at 7% for 12 hrs. found to be promising with the maximum germination of 88.25% and the untreated control significantly recorded the minimum of 79.75%.

For seedling growth parameters; treatment T₃ – Panchagavya at 7% for 12 hrs. recorded maximum seedling length of 38.75 cm with 17.10 cm root length and 21.66 cm shoot length respectively and minimum seedling length of 24.11 cm was found in untreated control with 10.18 root length and 13.93 shoot length.

Maximum fresh weight of 5.29 g and dry weight of 0.48 g recorded with T₃ – Panchagavya at 7% for 12 hrs. and untreated control recorded minimum weights of 3.45 g and 0.29g respectively.

Maximum seedling vigour indices (i and ii) of 3420.70 and 42.14 were recorded in T₃ – Panchagavya at 7% for 12 hrs. and lowest vigour indices of 1923.75 and 23.14 were found with the untreated control.

4. DISCUSSIONS

Based on the results depicted in Table 01 it is evident that priming significantly enhanced seed quality parameters. According to (Dariiset al., 2018) seed priming not only done with chemicals and growth regulators it can also be done with antagonistic botanicals and organics which can reduce soil and seed borne pathogens and maintain nutritional and hormonal balances.

The increased fresh weight and dry weight of seedling through the treatments compared to untreated control indicates that priming with organics and botanicals maintained shown its effect on the growth of the developing seedling and maintained a balanced proportion of hormones and enzymes that are prerequisite for establishment of normal seedling (Sandaik et al., 2016).

5. CONCLUSION

The overall performance of treatments based on the positive results obtained shows that

treatment with Panchagavya at 7% for duration of 12 hours found to be promising with maximum germination of 88.25%, 38.75 cm seedling length, dry weight of 0.48 g, 3420.70 seedling vigour index-i and 42.14 seedling vigour index-ii respectively and can be recommended for seed priming.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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