Biological Forum – An International Journal **13(3): 497-500(2021)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Influence of Organic Seed Priming on Seed Quality Parameters of Cowpea (*Vigna unguiculata* L.)

Poola Harshavardhini[1*], Prashant Kumar Rai[1], Abhinav Dayal[1] and Prashant Ankur Jain[2]
[1]M.Sc. Scholar, Department of Genetics and Plant Breeding,*
NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[1]Assistant Professor, Department of Genetics and Plant Breeding,
NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[2]Assistant Professor, Department of Computational Biology and Bioinformatics
JSBB, SHUATS, Prayagraj, (Uttar Pradesh), India.

(Corresponding author: Poola Harshavardhini)*
(Received 09 June 2021, Accepted 14 August, 2021)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The current experiment was conducted to evaluate the performance of organic and botanical treatments on seed quality parameters of cowpea under simulated environmental conditions. An experiment was conducted in 2021 at Postgraduate seed testing laboratory, Department of Genetics and Plant Breeding, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The Cowpea cultivar Kashi Kanchan seeds were used for priming. Organic treatments are designated as Panchagavya 2%, 4%, 6%, 8%, Jeevamruth 1%, 3%, 5%, 7% botanical treatments are Curry leaf extract 5%, Moringa leaf extract 5%, Seaweed extract 5% are used as treatment for duration of 10 hours respectively. The results were revealed that among all the treatments treatment T11 seaweed extract 5% was found to be best in the germination percentage, root length, shoot length, seedlings length, seed vigour index-I, seed vigour index–II, because it contains multiple growth regulators such as cytokinin's, auxin, Gibberellin's and various plant essential nutrients.

Keywords: Botanical, Cowpea, Organic, Quality parameters, Seed Priming, Treatments.

INTRODUCTION

Cowpea (*Vigna unguiculata* (L) Walp is a multipurpose legume crop; in which the whole plant can be used for human and livestock consumption. It is an essential crop in developing countries in Africa, Asia and Latin America developing countries of Africa. Cereals are an important source of protein with the vitamins and minerals needed for food (Abebe *et al.,* 2015) and can therefore be used as an alternative to third world animal protein, where the latter limits its production. The role of increasing animal production through the use of feed and fodder. Legumes contribute to small amounts of income, as a high value crop and as a costly protein source for food (Patil *et al.,* 2013). In addition, legumes provide natural soil management benefits through nitrogen-fixing, which improves grain yield through crop rotation or intercropping and also provides savings to smallholder farmers at a lower rate of fertilizer use. Among legumes, cowpea, (*Vigna unguiculata* L. walp.) is widely cultivated and consumed, especially in Asia, tropical Africa, South America, parts of southern Europe, and the United States (Sisay *et al.,* 2019).

Germination and seedling formation are crucial stages in the life cycle of a plant. Stand establishment controls plant density, uniformity, and management options (Cheng and Bradford, 1999). The poor establishment is one of the primary factors for low germination in many developing countries, mainly as a crucial time in crop growth stages as a result of water scarcity. High speed and uniform germination of seeds and germination capacity under water deficiency affect crop establishment (Fischer and Turner, 1978). However, if the stress effect can be reduced during the germination stage, the chances of getting a good crop are high (Ashraf and Rauf, 2001), seed priming is the process of sowing before seedling development by modulating the metabolic activity before seedling emergence and generally increases the germination rate and plant performance (McDonald, 2000).

Numerous studies have shown that seed priming allows early DNA replication, enhances and enhances the embryonic synthesis of RNA and protein, repairs damaged seed components and reduces metabolic leakage. Common priming techniques include osmopriming (soaking of seeds in osmotic solutions such as polyethylene glycol), hollow priming (hydration of seeds in saline solutions), and hydro priming (soaking of seeds in water). Recent studies on sugarcane (Amjad *et al.,* 2007), pepper (Harris *et al.,* (1999). Agricultural seed priming (overnight soaking of seeds) results in better growth and early growth of

upland paddy, maize, and chickpeas resulting in faster growth, maturity, and higher yields, for example, hydro priming value has already been shown for many crops, for example, wheat (Harris *et al.,* 2001), maize (Ashraf and Rauf 2001), sunflower (Kaya *et al.,* 2006) and Barley (Abdulrahmani *et al.,* 2007). Since there is not much evidence about seed priming of cow dung, this research aims to investigate the effects of hydro priming with botanicals and organics and to improve crop germination and energy quality.

MATERIALS AND METHODS

The experiment was conducted at the Seed Testing Laboratory of the Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agricultural Technology and Sciences, Prayagaraj (U.P.) 2021. The cowpea cultivar Kashi Kanchan seeds were treated with organics and botanicals to evaluate the performance of seed quality parameters. The seeds are subjected to different soaking intensities over a period of 10 hours. The seeds are treated organically with T0-Control, T1-Panchagavya 2%, T2- Panchagavya 4%, T3-Panchagavya 6%, T4- Panchagavya 8%, T5-Jeevamaruth 1%, T6- jeevamruth 3%, T7- jeevamruth 5%, T8- Jeevamruth 7%, T9- curry leaf extract 5%, T10- Moringa leaf extract 5%, T11-Seaweed extract 5% for 10 hours respectively.

One hundred seeds in each replication were placed on blotter paper. Laboratory experiment using a complete randomized design with four replications. Seed quality parameters were determined according to standard procedures prescribed in roll towel method in germination cabinets with application of standard temperature T-20 100C for 8 days at 95% relative humidity. Quality parameter is germination%, seed length (cm), dry weight (g), strength indicators ISTA (2012).

METHODOLOGY

5g of curry leaf powder and 5g of moringa leaf powder dissolved in 1000 ml of water to constitute 5% curry leaf extract solution and 5% moringa leaf extract solution respectively.

Panchagavya contains ingredients of cow, such as milk, urine, dung, curd, and clarified butter were added to mud pot and they were stirred twice a day up to 15 days to form the fermented product “Panchagavya”. To prepare 2%, 4%, 6%, and 8% solution; 20ml,40ml, 60ml, and 80 ml of Panchagavya will be taken in a beaker of 100 ml water respectively (Amalraj *et al.,* 2013).

Jeevamrutha was prepared by taking 200 liters of water in a barrel, 10 kg local cow dung, 10 liters of aged cow urine, 2 kg jaggery, 2 kg pulse flour, and a hand full of soil were added. Periodical stirring for at least 48 hours forms Jeevamruth solution. To prepare 20% jeevamrutha 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 (Naikwade Pratap Vyankatrao 2019).

RESULT AND DISCUSSION

A. Germination percentage

Seed priming is one of the pre-sowing seed treatment techniques, which shows a significant positive effect on various aspects of seedling quality characteristics in laboratory conditions. In this present laboratory study, the seeds are evaluated for their morphological qualities and physiological quality. The germination percentage was ranged from 89% to 75% which were significantly different over the various seed priming treatment. Seaweed extract 5% primed seed (T11) recorded the highest germination (89%) whereas untreated seed (T0) recorded the lowest germination (75%) might be due to the growth-enhancing potential of seaweeds might be allocated to the presence of macro and micronutrients (Challen and Hemmingway 1965). The perspective is that red algae contain agar in their cell walls which enrich the plant protect against pest diseases**.**

(i) Root Length: Among seed weed streets, 5% of primed seed (T11) recorded the longest root length (12.368) and untreated seed (T0) recorded the shortest root length (5.493). This positive effect may be due to the fact that seaweed extract contains 5% growth promoting substance, which does not migrate into the seeds. Premature germination and increase in root length may be due to the role of seaweed compared to untreated seed (T0). This finding is consistent with previous work on increased root length, the achievement of shoot length in this study may be attributed to the presence of micronutrients and macronutrients that promote growth in seaweed extracts. Previous aqueous extracts of S. weight at 20% concentration improve the growth, shoot and root length of *Vigna sinensis* (Shivashankar *et al*., 2006).

(ii) Shoot Length: Seaweed Extract 5% Primed Seed (T11) recorded longest shoot length (15.533m) and control (T0) had the shortest shoot length (8.813cm). Similar results noticed by Bhattacharya *et al.,* (2015) Poly-saccharides in sugars improve plant growth (Roland *et al*., 2002). Also, seaweed contains nutrients, vitamins, and plant growth hormones (auxin and cytokinin) that affect cellular metabolism (Khan *et al*., 2009).

(iii) Seedling Length: Seaweed extract 5% primed seed (T11) recorded maximum seedling length (27.915cm) and untreated seed (T0) minimum seed length (14.61cm). Similar results noticed by Bhattacharya *et al.,* (2015); Roland *et al.,* (2002). Also, seaweed contains nutrients, vitamins, and plant growth hormones (auxin and cytokinin) that affect cellular metabolism (Khan *et al*., 2009).

B. Seedling fresh and dry weight

Seaweed extract 5% primed seed (T11) recorded the highest dry weight (1.045 g) and untreated seed (T0) had the lowest dry weight (0.2 g). Seaweed extract 5% primed seed (T11) had the highest fresh weight (5.53 g) and untreated seed (T0) had the lowest fresh weight (1.6 g). Dry and fresh weight gain by improving lipid consumption and activation of enzymes and increasing the root / shoot ratio due to phosphorus in seaweed extracts **(**Hernández-Herrera *et al.,* 2014).

(i) Seed Vigour Index-I: Seaweed extract 5% primed seed (T11) had maximum values for energy index I (2503.8) and untreated seed (T0) recorded minimum energy index I (1096). The increase in this energy index plays an effective role due to the increase in shoot and seedling length due to the auxin content in seaweed. Plays an effective role in cell division and proliferation; Similar findings were noticed by Gollan and Wright (2006) to increase shoot growth and dry weight of plants.

(ii) Seed Vigour Index-II: Seaweed extract has the highest values for 1% primed seed (T2) energy index II (93.798) and untreated seed (T0) recorded minimum energy index II (15.015). The increase in this energy index plays an effective role due to the increase in shoot and seedling length due to the auxin content in seaweed. Plays an effective role in cell division and proliferation. Similar findings were noticed by Gollan and Wright (2006).

Table: Mean performance of seed quality parameters.

Code	Treatment	Germination Percentage	Root Length	Shoot Length	Seedling Length	Seedling Fresh Weight	Seedling Dry Weight	Seed Vigour Index-I	Seed vigour index-II
1	Control	75	5.493	8.813	14.61	1.6	0.2	1096	15.015
2	Panchagavya@ 2%	81	8.023	11.325	19.743	2.043	0.363	1607.825	29.595
3	Panchagavya@4%	79	8.925	12.555	1.728	2.3	0.458	1733.045	36.753
4	Panchagavya@6%	82	10.15	13.803	23.52	2.953	0.595	1932.578	48.838
5	Panchagavya@8%	82	10.54	14.09	24.24	5.658	0.84	1997.55	69.163
6	Jeevamruth@1%	77	7.025	9.238	17.268	1.728	0.36	1340.113	27.195
7	Jeevamruth@3%	80	6.775	10.723	19.048	1.925	0.38	1531.045	30.62
8	Jeevamruth@5%	81	9.475	12.865	22.243	2.373	0.48	1782.453	38.455
9	Jeevamruth@7%	81	9.648	13.253	24.013	2.545	0.518	1947.787	41.95
10	Curry Leaf Extract@5%	82	11.028	14.71	25.018	3.345	0.88	2064.167	72.58
11	Moringa Leaf Extract@5%	85	11.505	15.293	25.745	4.308	1.023	2188.525	86.915
12	Sea Weed Extract@5%	89	12.368	15.533	27.915	5.53	1.045	2503.8	93.798
13	**Grand Mean**	**81.166**	**9.246**	**12.683**	**22.09**	**3.025**	**0.595**	**1810.407**	**49.239**
14	C.V	2.575	11.265	7.281	8.584	12.254	9.74	8.28	9.318
15	SE(m)	1.05	0.521	0.462	0.948	0.185	0.029	74.952	2.294
16	SE(d)	1.485	0.736	0.653	1.341	0.262	0.041	105.998	3.244
17	C.D @ (5%)	3.024	1.5	1.33	2.73	0.534	0.083	215.85	6.607

CONCLUSION

Based on the positive results the overall performance under study judge T11-seaweed extract 5% treatment was found to be the best of all treatments, followed by T10 moringa leaf extract 5% for 10 hours germination percentage, root length, shoot increased length, seedling length index, seed energy index -I, seed vigour Index-II.

FUTURE SCOPE

Further experiment need to done on field condition for better findings.

Acknowledgement. The author are thankful to the Hon'ble vice chancellor, Head of the Department, Advisor and non-teaching staff Department Of Genetics And Plant Breeding, Sam Higginbottom University of Agricultural Technology And Sciences, Prayagraj, U.P. for providing all necessary facilities and support.

Conflict of Interest. Nil.

REFERENCES

Abebe G. I., Hattar B. U., & Al-Tawaha A. R. (2005). Nutrient availability as affected by manure application to Cowpea (*Vigna unguiculata* (L.) Walp.) on calcareous soils. *Journal of agriculture and social sciences, 1*(1): 1-6

Abdulrahmani, B., K. Ghassemi-Golezani, M. Valizadeh & Feizi-Asl, V. (2007). Seed priming and seedling establishment of barley (*Hordeum vulgare* L.). *J. Food Agric. Environ.*, *5*: 179-184.

Amalraj, E. L. D., Kumar, G. P., Ahmed, S. M. H., Abdul, R., & Kishore, N. (2013). Microbiological analysis of Panchagavya, vermicompost, and FYM and their effect on plant growth promotion of pigeon pea (*Cajanus cajan* L.) in India. *Org. Agric.*, *3*(1): 23–29.

Amjad, M., Zif, K., Iqbal, Q., Ahinad, L., & Riaz, M. A. (2007). Effect of seed priming on seed vigour and salt tolerance in hot pepper. *Puk. J. Agri. Sci., 44*(3) 408-4193.

Ashraf, M., & Rauf, H. (2001). Inducing salt tolerance in maize (*Zea mays* L.) through seed priming with

chloride salts: Growth and ion transport at early growth stages. *Acta Physiol Plant, 23*, 407–414.

Battacharyya, D., Babgohari, M.Z., Rathor, P., & Prithiviraj, B. (2015). Seaweed extracts as bio stimulants in horticulture. *Sci. Hortic*., *196*, 39-48.

Challen, S. B., & Hemingway, J. C. (1965). Growth of higher plants in response of feeding with seaweed extracts, in Proc fifth Intl. Seaweed Symp, Halifax (Pregamon Press, Oxford), *5*: 359-367.

Cheng, Z., & Bradford, K. J. (1999). Hydrothermal Time Analysis of Tomato Seed Germination Responses to Priming Treatments. *Journal of Experimental Botany, 50*: 89-99.

Fischer, R. A., & Turner, N. C. (1978). Plant productivity in the arid and semiarid zones. *Ann. Rev. Plant Physiol., 29*: 277-317.

Gollan, J. R., & Wright, J. T. (2006). Limited grazing pressure by native herbivores on the invasive seaweed caulerpa. Taxi folia in a temperate. *Australia Estuary Marine and Freshwater Res*., *57*(7): 685-694.

Harris, D., Joshi, A., Khan, P.A., Gothkar, P., & Sodhi P. S. (1999). On-far m seed priming in semi-arid agriculture: Development and evaluation in maize, rice and chickpea in India using participatory methods. *Experimental Agriculture, 35*: 15-29.

Harris, D., Raghuwanshi, B. S., Gangwar, J. S., Singh, S. C., Joshi, K. D., Rashid, A., & Hollington, P. A. (2001). Participatory evaluation by farmers of on-farm seed priming in wheat in India. *Nepal and Pakistan Exp. Agric., 37*: 403-415.

Hernández-Herrera, R.M., Santacruz-Ruvalcaba, F., Ruiz-López, M.A., Norrie, J., Hernández-Carmona, G., (2014). Effect of liquid seaweed extracts on growth of tomato seedlings (*Solanum lycopersicum* L.). *J. Appl. Phycol., 26*: 619–628.

ISTA (2012). Seed Testing International No. 143 April ,ISSN 1999-5229.

Kaya MD. Oko G. Arak M. Ikils Y. Kolsanci O. (2006). Seed treatments to overcome salt and drought stress during germination in sunflower (*Helianthus annuus* L). *Eutrop J. Agr., 24:* 291-295.

Khan, W., Rayirath, U. P., Subramanian, S., Jithesh, M. N., Rayorath, P., Hodges, D. M., Critchley, A. T., Craigie, J.S., Norrie, J., & Prithiviraj, B., (2009). Seaweed extracts as biostimulants of plant growth and development. *J. Plant Growth Regul*., *28*: 386–399.

McDonald, M.B. (2000). Seed Priming. Chapter 9. In: Seed Technology and Its Biological Basis, Black, M. and J.D. Bewley (Eds.). Sheffield Academic Press, England, pp: 287-325.

Naikwade Pratap Vyankatrao (2019). Effect of beejamrita and Other Organic liquid treatments on seed germination and seedling growth of legume crops. *Online International Interdisciplinary Research Journal, 9*(3), 2019.

Patil DM, Sawardekar SV, Gokhale NB, Bhave SG, Sawant SS, Sawantdesai SA, Lipne KA, Sabale SN, Joshi SN (2013). Genetic Diversity Analysis in Cowpea (*Vigna unguiculata*(L.) Walp.)By Using RAPD Markers. *International Journal of Innovative Biotechnology and Biochemistry, 1*(1): 15-23.

Sisay Alemu, Mulugeta Alemu, Zemede Asfaw, Zerihun Woldu and Berhanu Amsalu Fenta (2019). Cowpea (*Vigna unguiculata* (L.) Walp., Fabaceae) landrace (local farmers' varieties) diversity and ethnobotany in Southwestern and Eastern parts of Ethiopia *African Journal of Agricultural Research, 14*(24),1029-1041.

How to cite this article: Harshavardhini, P., Rai, P.K., Dayal, A. and Jain, P.A. (2021). Influence of Organic Seed Priming on Seed Quality Parameters of Cowpea (*Vigna unguiculata* L.). *Biological Forum – An International Journal, 13*(3): 497-500.