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Effects of seed priming and it's duration on bitter gourd

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Abstract
The poor seedling problem in bitter gourd is caused by the embryo being enclosed by a thick seed coat that prevents germination by putting mechanical restrictions on embryo development. Pre-germinated bitter gourd seeds may be planted to overcome this problem. Crop priming is the process of enhancement of germination and uniform emergence of seedlings under field conditions. As it can foster vigour and crop growth and ultimately increase yields. It is a very low-cost hydration technique in which seeds are prepared with various chemicals or also with natural water. The seeds are re-dried after processing and shown in the field. For improved crop stand, germination and yield of different vegetable crops, seed priming is commonly adopted. Hydropriming, osmopriming, halopriming, solid matrix priming, biopriming and hormonal priming are different priming techniques to boost plant growth, improve stress tolerance, increase nutrient efficiency and other plant growth factors.

Keywords: Seed priming, hydropriming, halopriming, osmopriming

Introduction
After drying, the seeds are re-dried and can be seen in the field. Seed priming is commonly used for improved crop status, germination and yield of various vegetable crops.
Solid matrix priming, Halopriming, Hydropriming, osmopriming, hormonal priming and Biopriming are a number of priming techniques designed to promote plant growth, improve stress tolerance, increase nutrient production and other plant growth factors. Bitter Gourd (*Momordica charantia* L.) (2n=22) is widely cultivated crop in Asia and Africa and it is tropical and subtropical vine which is grown for its edible fruit and is considered to be a major crop of the Cucurbitaceae family. It has a bitter taste compared to other cucurbits (Behera T, 2011) [2]. It is common in India with medical, economic and economic applications. It is commonly cultivated in India, Indonesia, Malaysia, Singapore, Thailand, Japan, tropical Africa and South America (Miniraj *et al*. 1993) [34]. Thanks to its high medicinal nature, bitter gourd is known to be the most important vegetable crop (Anonymous, 2011). Piles, leprosy and jaundice are also treated with fruit and leaves. Roots are helpful with haemorrhoids. Karela contains a variety of biologically active plants that include chemicals, including triterpenes, proteins, hormones, alkaloids, saponins, flavonoids and acids, which regulate anti-fulgal, anti-bacterial, anti-parasitic, anti-viral, anti-fertility, anti-tumour, Hypoglycemic and anti-carcinogenic. There is a charantin agent in the bitter gourd that is used to treat diabetes to automatically regulate blood sugar levels. In traditional medicine, stems, foundation, leaves and fruits of bitter gourd have been used to treat diseases such as hyper lipidemia, intestinal disorder, menstrual and microbial infections (Yibchok *et al*. & Hsu (2006) [24]. Fruits are iron-rich (2.0mg/100 g), vitamin A, B, C and a good protein supply (2 per cent).The sub-optimal temperatures i.e below 18°C by which germination of bitter gourd seed is adversely affected (Fonseka and Fonseka, 2011). In addition to this thick coat of embryo confinement, germination is impaired by the application of a mechanical constraint on embryo development (Pandita and Nagarajan 2004) [15]. The rate of seed germination is not 100 per cent due to the presence of hard seed coat (Pandita and Nagarajan, 2004) [15]. Crop priming is an effective method for enhancing seed germination and vigour. Priming increases the rate of germination, speed of germination, time of germination and seed priming is one of the most critical aspects of improving the yield and consistency of bitter gourd (Farooq *et al*., 2006) [40].

Impact of seed priming with their different methods
Crop priming is crop hydration controlled to a degree that allows for continuity of pre-germinative metabolic activity, but interrupts the actual production of the radicle. Choudhary *et al*. (2008) (2008) [35] Essentially, the priming seed is a physiological process in which the seeds are pre-soaked before planting,

allowing partial imbibition on their own, while preventing germination by Nascimento *et al*. (2004) [13]. Saleem *et al*. (2014) [10] concluded that seed soaking in water for 12 hours is capable of promoting the growth of bitter gourd cultivars in germination and seedling growth. It was concluded that under the agro-climatic conditions of the Bhimber district of Azad Kashmir, the seed soaking of the Palee cultivar for 12 hours showed the best results in maximum germination and increased growth.

Lin & Sung, (2001) [39] noted that the embryo of bitter gourd plants, which affects germination and induces low field emergence and seedling establishment, is enclosed by a thick seed coat. Crop soaking is also a positive prerequisite for a definite successful seedling establishment for bitter gourd growers under sub-optimal temperature conditions. Thirusenduraselvi and Jerlin (2007) define an appropriate pre-germination process that could provide the maximum percentage of the emergence of bitter gourd cv. 100% pre-germination of bitter gourd seeds was obtained after sowing and among the different treatments when immersed in panchakavya @ 3% solution for 9 h with 7 days of incubation, which was equal to soaking in KNO3 @ 2 percent.

Hydropriming

Soak the seeds in water before sowing, that may or may not be proceeded through air drying process of the seeds. In both saline and non-saline conditions, hydropriming will improve the percentage of seed germination and the growth of seedlings (Roy and Srivastava, 1999) [27]. Bitter gourd seed hydropriming has the ability to increase seed germination, seedling growth and bitter gourd yield. Crop soaking in hot water (45oC) effectively improved germination speed, seedling vigour, other growth parameters such as primary branch length, leaf distance, etc. and reproductive characteristics such as first flowering days, first fruit setting and total fruit per plant for 5 minutes, while other water soaking treatments were also better at various temperatures and time (Tania *et al*. (2019) [38].

The increase in germination can also be related to metabolic repair processes after 72 hours of priming (Mehta *et al*. 2010) [36]. And under sub-optimal soil temperature conditions, 72 hours of seed hydro-priming at a temperature of 20 ° C is optimal for increasing seed quality parameters (Mehta *et al*. 2014) [37].

Osmopriming

Osmopriming is the immersion of seeds in osmotic solutions containing chemicals such as polyethylene glycol (PEG), mannitol, glycerol, sorbitol etc., also known as osmoconditioning (B. Raj and K. Raj, 2019) [32]. Seeds are immersed in an aerated solution of sugar (sorbitol, mannitol, etc.) or polyethylene glycol (PEG) during osmopriming, typically accompanied by surface drying or re-drying. Several studies have reported that under ideal and sub-optimal conditions, osmopriming increases seedling and seedling / crop development (Sher *et al*., 2019) [21]. Relative to other treatments and unprimed, PEG osmopriming at 5 per cent of 12 hours Bitter Guard shows a substantially high percentage of seed germination, seedling length, fresh weight, dry weight, germination rate and growth rate. Less priming time efficiency decreased seed germination and vigour (Saini *et al*. 2017) [19] and embryo expansion and endosperm compression, along with tissue deformation, were influenced by osmopriming (Liptay and Zariffa 1993) [7]. A number of other studies have recorded that PEG priming increased the germination of muskmelon (Nascimento 2003) [12], bitter gourd (Pandita and Nagarajan 2004; Thirusenduraselvi and Jerlin 2009) [15, 22]. Osmpriming with PEG significantly increased soya seed growth and crop yield (Arif *et al*. 2008) [1].

Halopriming

In this technique, the seeds are immersed in inorganic salt solution, i.e. NaCl, KNO3, CaCl2, CaSO4, etc. A number of studies have shown major improvements in seedling growth, germination, planting and final yield in salt-affected soil in response to halo-priming (Khan *et al*., 2009) [5]. Improvement in 5-007-amylase and dehydrogenase activities due to seed priming with potassium nitrate in muskmelon (Singh *et al*. 1999). Salinity increased electrolyte leakage in snake melon seedlings, but KNO3 primed seeds had lower electrolyte leakage and higher DW (dry weight) seedlings compared to other treatment seedlings (Gharahlar *et al*., 2010) [17]. The effect of priming NaCl on salinity toll was higher than that of non-primed seed (Nascimento, 2003) [12]. In addition to mediated osmocontrol by the aggregation of organic solutes, NaCl priming of melon seeds has improved the resistance of seedling salinity by encouraging K and Ca aggregation increase (Sivritepe *et al*. (2002).

Solid Matrix Priming

Because of the high cost of osmotic agents, solid matrix priming (SMP) or matriconditioning, and mechanical aeration problems of osmopriming (Paparella *et al*. 2015) [31]. This process involves the incubation of seeds with a small volume of water in a solid insoluble matrix such as charcoal, peat moss, vermiculite, diatomaceous earth, clay, sand and confers a gradual imbibition (Mondal and Bose, 2014) [30]. The preparation of seeds of cucumber cv K-75 with various solid matrix carriers *viz*., Perlite, Sphagnum moss, Cocopeat, Vermiculite, Saw dust, Wheat bran, Corn cobs, Bituminous soft coal, The findings showed that for most horticultural traits and for yield and yield contributing characteristics, the strong matrix priming of the seed with Cocopeat followed by Perlite provided the best findings (Mehta *et al.*, 2013) [8].

Kanwar and Mehta (2017) [6] resulted that seed priming with solid matrix carrier ‘Perlite’ for 72 hrsmay be used as an effective pre-sowing treatment to improve the emergence, growth and yield properties of seedlings in bitter gourd.

Biopriming

Biopriming is a seed therapy that includes seed inoculation with beneficial microorganisms (biological aspect) and seed hydration control (physiological aspect) for the management of biotic and abiotic stress (Bisen *et al*., 2015) [3]. Biopriming with beneficial microbes offers groundbreaking crop protection, according to Rakshit *et al*. (2015) [3], by enhancing the quality of seeds, seedling vigour and plant ability to withstand sub-optimal growth conditions, by ensuring sustainable crop production Mahmood *et al*. (2016) [9] reviewed the fact that biopriming accelerates the germination process, ensures the uniformity of the emergence of seedlings and thus increases crop yields and efficiency. The involvement of Trichoderma asperellum cucumber roots activates salicylic acid and jasmonate pathways in the plant and enhances the activity of peroxides, thereby ensuring defence for cucumber plants against foliar pathogens (Segarra *et al*., 2007) [20].

Seed Priming with Plant Growth Regulators, Hormones, and Other Organic Sources

In order to boost the production and productivity of field and horticultural crops under optimum and sub-optimal conditions, hormone-priming plants, growth-promoting rhizobacteria and other organic sources have been reported. Seed priming with plant growth regulators, hormones and other organic sources is a viable solution to improve seed germination, crop production and crop productivity. (Sher *et al.* 2019) [21].

Various plant growth hormones such as GA3, kinetin, NAA and ascorbate are treated in hormonal priming seeds. This are essentially pre-soaking therapies that encourage the growth and production of seedlings (Ashraf *et al*., 2001). Uh, HM *et al*. (2018) [18] concluded that, for twenty-four hours, the seeds treated with gibberlic acid @ 100 ppm resulted in increased germination of certain bitter gourd genotypes by increasing water permeability, encouraging digestive enzymes, and also based on the genetic structure of the crop. Hassan local (75.80) percent demonstrated slightly improved germination of all genotypes compared to all other genotypes. Nagamani *et al*. (2015) [14] The influence of growth regulators was more apparent in the rainy season than in the spring summer season. GA3 @ 50 ppm, NAA @ 200 ppm, ethereal @ 50 ppm were successful for enhancement of vegetative growth, fruit and seed yield and change of sex speech.

Conclusion

Under adverse agro-climate conditions, seed priming enhanced stand establishment with increased tolerance to stress situations, increased disease resistance, improved germination, seedling growth, and other seed quality parameters among all seed vigour classes. Seed priming is an environmentally safe and effective technology which can be easily adopted by resource-poor farmers and benefited the farmers in a number of ways. Seed priming is a tool for sustainable agriculture. Due to its simplicity and reduced cost and therefore, for its subsequent highest likelihood of a large-scale commercial use, seed priming is an interesting alternative.

References

1. Arif M, Jan MT, Marwat KB, Khan MA. Seed priming improves emergence and yield of soybean. Pakistan Journal of Botany 2008;40(3):1169-1177.
2. Behera TK. Genetic diversity analysis and inheritance of fruit traits in bitter gourd (*Momordica charantia* L.) (Doctoral dissertation, iari, 1 genetic diversity analysis and inheritance of fruit traits in bitter gourd (*Momordica charantia* L.) Dalamu division of vegetable science) 2011.
3. Bisen K, Keswani C, Mishra S, Saxena A, Rakshit A, Singh HB. Unrealized potential of seed biopriming for versatile agriculture. In Nutrient use efficiency: from basics to advances Springer, New Delhi 2015, 193-206.
4. Hemal Fonseka H, Fonseka RM. Studies on deterioration and germination of bitter gourd seed (*Momordica charantia* L.) during storage. In V International Symposium on Seed, Transplant and Stand Establishment of Horticultural Crops 2009;898:31-38.
5. Khan HA, Ayub CM, Pervez MA, Bilal RM, Shahid MA, Ziaf K. Effect of seed priming with NaCl on salinity tolerance of hot pepper (*Capsicum annuum* L.) at seedling stage. Soil Environ 2009;28(1):81-87.
6. Kanwar R, Mehta DK. Studies on solid matrix priming of seeds in bitter gourd (*Momordica charantia* L.). Journal of Applied and Natural Science 2017;9(1):395-401.
7. Liptay A, Zariffa N. Testing the morphological aspects of polyethylene glycol-primed tomato seeds with proportional odds analysis. Hort Science 1993;28(9):881-883.
8. Mehta DK, Thakur C, Thakur KS, Thakur S. Effect of solid matrix priming of seed on emergence, growth and yield of cucumber. Green Farming 2013;4(3):364-366.
9. Mahmood A, Turgay OC, Farooq M, Hayat R. Seed biopriming with plant growth promoting rhizobacteria: a review. FEMS microbiology ecology 2016, 92(8).
10. Muhammad Saeed Saleem, Muhammad Sajid, Zaheer Ahmed, Saeed Ahmed, Nazeer Ahmed, Muhammad Shahid Ul Islam. Effect of Seed Soaking On Seed Germination and Growth of Bitter Gourd Cultivars 2014.
11. Mal D, Verma J, Levan A, Reddy MR, Avinash AV, Velaga PK. Seed priming in vegetable crops. International Journal of Current Microbiology and Applied Sciences 2019;8(6):868-74.
12. Nascimento WM. Muskmelon seed germination and seedling development in response to seed priming. Scientia Agricola 2003;60(1):71-75.
13. Nascimento WM, Aragão FASD. Muskmelon seed priming in relation to seed vigor. Scientia Agricola 2004;61(1):114-117.
14. Nagamani S, Basu S, Singh S, Lal SK, Behera TK, Chakrabarty SK *et al.* Effect of plant growth regulators on sex expression, fruit setting, seed yield and quality in the parental lines for hybrid seed production in bitter gourd (*Momordica charantia*). Indian Journal of Agricultural Sciences 2015;85(9):1185-91.
15. Pandita VK, Nagarajan S. Improvement in emergence of bittergourd (*Momordica charantia* L.) seedlings by presowing treatments. Indian Journal of Horticulture 2004;61(3):280-281.
16. Rakshit A, Singh HB, Sen A (Eds.). Nutrient use efficiency: from basics to advances. New Delhi: Springer 2015, 417.
17. Shahi-Gharahlar A, Farhoudi R, Teixeira da Silva JA. Influence of snake melon (*Cucumis melo* var. flexuosus) seed priming on seedling emergence and seedling electrolyte leakage under salinity. Seed Science and Biotechnology 2010;4(1):15-18.
18. Sowmya HM, Kolakar SS, Nadukeri S, Lakshmana D, Srinivasa V, Jakkeral SA. Influence of seed priming with gibberlic acid on antidiabatic vine-bitter gourd (*Momordica charantia* L.) Genotypes 2018.
19. Saini R, Rai PK, Bara BM, Sahu P, Anjer T, Kumar R. Effect of different seed priming treatments and its duration on seedling characters of Bitter gourd (*Momordica charantia* L.). Journal of Pharmacognosy and Phytochemistry 2017;6(5):848-850.
20. Segarra G, Casanova E, Bellido D, Odena MA, Oliveira E, Trillas I. Proteome, salicylic acid, and jasmonic acid changes in cucumber plants inoculated with Trichoderma asperellum strain T34. Proteomics 2007;7(21):3943-3952.
21. Sher A, Sarwar T, Nawaz A, Ijaz M, Sattar A, Ahmad S. Methods of Seed Priming. In Priming and Pretreatment of Seeds and Seedlings Springer, Singapore 2019, 1-10.
22. Thirusenduraselvi D, Jerlin R. Osmopriming of seeds to improve the performance of bitter gourd cv. co-

1. International Journal of Plant Sciences (Muzaffarnagar) 2009;4(1):182-187.
23. Thirusenduraselvi D, Jerlin R. Effect of pre-germination treatments on the emergence percentage of bitter gourd cv. CO 1 seeds. Tropical Agricultural Research and Extension 2010, 10.
24. Yibchok-Anun S, Adisakwattana S, Yao CY, Sangvanich P, Roengsumran S, Hsu WH. Slow acting protein extract from fruit pulp of Momordica charantia with insulin secretagogue and insulinomimetic activities. Biological and Pharmaceutical Bulletin 2006;29(6):1126-1131.
25. Sivritepe N, Sivritepe HO, Eris A. The effects of NaCl priming on salt tolerance in melon seedlings grown under saline conditions. Scientia horticulturae 2003;97(3-4):229-237.
26. Hemal Fonseka H, Fonseka RM. Studies on deterioration and germination of bitter gourd seed (*Momordica charantia* L.) during storage. In V International Symposium on Seed, Transplant and Stand Establishment of Horticultural Crops 2009;898:31-38.
27. Roy NK, Srivastava AK. Effect of presoaking seed treatment on germination and amylase activity of wheat (*Triticum aestivum*) under salt stress conditions. Barley and Wheat Newsletter 1999.
28. Khan HA, Ayub CM, Pervez MA, Bilal RM, Shahid MA, Ziaf K. Effect of seed priming with NaCl on salinity tolerance of hot pepper (*Capsicum annuum* L.) at seedling stage. Soil Environ 2009;28(1):81-87.
29. Rakshit A, Singh HB, Sen A (Eds.). Nutrient use efficiency: from basics to advances. New Delhi: Springer 2015, 417.
30. Mondal S, Bose B. An impact of seed priming on disease resistance: A review. In Microbial diversity and biotechnology in food security Springer, New Delhi 2014, 193-203.
31. Paparella S, Araújo SS, Rossi G, Wijayasinghe M, Carbonera D, Balestrazzi A. Seed priming: state of the art and new perspectives. Plant cell reports 2015;34(8):1281-1293.
32. Raj AB, Raj SK. Seed priming: An approach towards agricultural sustainability. Journal of Applied and Natural Science 2019;11(1):227-234.
33. Kanwar R, Mehta DK, Lal M. Effect of seed priming on physiological parameters of aged and non-aged seeds of bitter gourd, *Momordica charantia* L. International Journal of Farm Sciences 2014;4(3):24-32.
34. Miniraj N, Prasanna KP, Peter KV. Bitter Gourd Mornordicu App. Genetic Improvement of Vegetable Plants. [M] 1993.
35. Choudhary DK, Johri BN, Prakash A. Volatiles as priming agents that initiate plant growth and defence responses. Current Science 2008, 595-604.
36. Mehta DK, Kanwar HS, Thakur AK, Thakur KS. Influence of organicseed priming on germination and seedling quality in bell pepper (*Capsicum annuum* L.). Journal of Hill Agriculture 2010;1(1):85-87.
37. Mehta DK, Kanwar HS, Thakur AK, Thakur S, Thakur KS. Standardization of seed hydro-priming duration in bitter gourd, *Momordica charantia* L. International Journal of Bio-resource and Stress Management 2014;5(1):98-101.
38. Tania SS, Hossain MM, Hossain MA. Effects of hydropriming on seed germination, seedling growth and yield of bitter gourd. Journal of the Bangladesh Agricultural University 2019;17(3):281-287.
39. Lin JM, Sung JM. Pre-sowing treatments for improving emergence of bitter gourd seedlings under optimal and sub-optimal temperatures (No. Research) 2001.
40. Farooq M, Tabassum R, Afzal I. Enhancing the performance of direct seeded fine rice by seed priming. Plant Production Science 2006;9(4):446-456.