Technique and Effect of Various Seed Priming Methods

Raghunath Shukla*

Department of Seed Science and Technology,
Odisha University of Agriculture and Technology, Bhubaneswar

Corresponding Author
Raghunath Shukla
Email: raghunathshukla1999@gmail.com

OPEN ACCESS

Keywords

Germination, Seed priming, Radicle emergence, Hydro priming

How to cite this article:

Shukla, R. 2025. Technique and Effect of Various Seed Priming Methods. *Vigyan Varta* 6 (3): 224-226.

ABSTRACT

A lack of seedling emergence and a lack of stand establishment are major problems in low-rainfall regions; controlling soil texture and structure is a major problem in semi-arid regions; farmers with limited resources are often unable to properly prepare fine seedbeds for planting, which puts them at a greater disadvantage than more forward-thinking farmers; on the other hand, successful stand establishment increases competitiveness against weeds, increases drought tolerance, increases yields, and reduces the expensive and time-consuming need for re-sowing. It is well known that seed priming increases germination rates, shortens seedling emergence time, and improves stand establishment. By improving crop emergence rates, speeding up crop development, cutting down on overall crop length, and increasing productivity, this simple, affordable method of on-farm seed priming, when improved and developed with farmer participation, can greatly improve farmers' incomes. The importance of seed priming in establishing strong crop stands and successful emergence has been shown by extensive study.

INTRODUCTION

Without germination actually occurring, priming helps some metabolic processes that are necessary for germination to take place. The seeds are kept in a lag phase during priming by being submerged in a variety of solutions with

high osmotic potential, which prevents the seeds from absorbing enough water for radicle protrusion (Taylor et al., 1998). According to Parera and Cantliffe (1994), this method is frequently used to both synchronize and decrease the time between seeding and seedling emergence. Osmotic pressure and membrane contact time during priming are sufficient to allow pre-germinative metabolic processes in the seeds, which are restricted to the moments prior to radicle emergence. Techniques for encouraging desiccation tolerance and seed germination are also covered. The ideal semi-permeable membrane is shaped like a tube with a circular or polygonal cross-section, with the solution enclosed between its outer surface and a separate body that the membrane is firmly sealed to. The seeds rotate on the inner surface of the tube.

Seed priming techniques

Seed priming encompasses a range of techniques designed to enhance crop growth, emergence, and yield. Some of the commonly employed methods include hydro-priming, halo-priming, osmopriming, and hormonal priming.

Halopriming

The process of halo priming is soaking seeds in a solution that contains inorganic salts like NaCl, KNO3, CaCl2, and CaSO4. In saline soils, this method dramatically improves seed germination, seedling emergence, establishment, and total crop output, as numerous studies have shown. The effects of priming seeds with a 1 mM NaCl solution at different salinity levels of 0, 3, 6, and 9 dSm-1 during the early growth phase were evaluated. The results showed that in hot peppers under salt stress, NaCl priming improved seedling vigor and establishment more than non-primed seeds. Furthermore, it was discovered that priming with KCl and NaCl lessened the negative effects of salinity. Overall, halopriming not only promotes seed germination but also stimulates subsequent growth, ultimately leading to increased crop yields (Eleiwa, 1989).

Hydropriming

The process of hydro-priming is submerging seeds in water before planting; air-drying the seeds may or may not follow. Unfavorable environmental circumstances severely impair seed germination and seedling emergence in many agricultural regions, resulting in inadequate stand establishment and lower crop yields. Fast-germinating seedlings, on the other hand, can establish deep root systems before the topsoil dries out and creates a crust, improving crop establishment and yields. Seed priming lessens the negative effects of salinity on plant morphology. Any technique that encourages quick germination can help crops establish successfully.

Osmopriming

The process of soaking seeds in solutions containing sugar, polyethylene glycol (PEG), glycerol, sorbitol, or mannitol for a predetermined amount of time, then letting them air dry before planting, is known as osmotic conditioning, or osmo-conditioning. Sorghum (*Sorghum bicolor*) and Italian ryegrass (*Lolium multiflorum*) seeds treated with 20% PEG-8000 for two days at 10°C, for example, showed improved germination rates under a variety of stress conditions, such as salt, water stress, waterlogging, and cold stress. The seeds can be partially hydrated by the treatment solution's low water potential, which starts pre-germination metabolic processes but stops true germination (Bennett et al., 1992). These prepared seeds usually germinate quickly and evenly when they are sown.

Hormonal priming

In order to promote the growth and development of seedlings, hormonal priming entails pre-treating seeds with a variety of hormones, including kinetin, ascorbate, and salicylic acid. The combined effects of salinity stress (40, 80, 120, and 160 mM NaCl) on wheat seedlings soaked in ascorbic acid and thiamin (0.3 mM) or sodium salicylate (0.6 mM) were investigated (Al-Hakimi and Hamada, 2001). According to the study, cellulose and lignin levels in both shoots and roots decreased as NaCl concentrations rose, and soluble sugars and root pectin levels also decreased.

CONCLUSION

According to research, maize planted in the spring experiences very low temperatures in its early stages of development and very high temperatures in its later reproductive stages. Therefore, it is crucial to investigate methods that can enable spring maize to successfully emerge and flourish early in low-temperature environments. A popular commercial technique for increasing germination rates and reducing the negative impacts of both high and low temperatures is seed priming. This method works well for germination issues, especially with crops grown in less-than-ideal conditions. Numerous seed priming strategies have been developed and are being used for a wide variety of crops. The most common and successful methods are hydro-priming, halopriming, and osmopriming.

REFERENCES

Taylor AG, Allen PS, Bennett MA, Bradford KJ, Burrisand JS, Misra MK.1998.Seed enhancements. Seed Sci. Res. 8: 245-256.

Parera AC and Cantliffe DJ. 1994. Pre-sowing seed priming. Hortic. Rev. 16109-148.

Bennett M, Fritz VA, and Callan NW. 1992. Impact of seed treatments on crop stand establishment. Hort Technol. 2 345-349.

Eleiwa ME. 1989. Effect of prolonged seed soaking on the organic and mineral components of immature pods of soybeans. Egypt. J. Bot. 32 149–160

Al-Hakimi AMA and Hamada AM. 2001. Counteraction of salinity stress on wheat plants by grain soaking in ascorbic acid, thiamin or sodium salicylate. Biologia. Plantarum. 44253–261.