



Seed Treatment Essential for Disease Control

(* Asha Yadav and Shiv Kumar Yadav)

Research Scholar, Department of Plant Pathology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur, Rajasthan, India

*Corresponding Author's email: ashayadav599@gmail.com

The United Nations (2019) expects that the global population may possibly reach 9.7 billion by 2050. Global agriculture will face major challenges to improve its production by at least 50% to ensure global food security in sustainable ways (Searchinger et al., 2019). Seeds play a crucial role in promoting food security: almost 90% of the world's food crops are grown from seeds (Dongyu, 2021). Therefore, sowing healthy, high quality seeds is essential to secure crop yields and food production (Moumni et al., 2020; Kumar & Gupta, 2020). Many pathogens, including fungi, bacteria, viruses and nematodes, which are responsible for important diseases in several crops, occur on and in seeds (Agarwal & Sinclair, 1996; ISTA Reference Pest List, 2022; ISTA, 2022a, b, c). The association between seed and pathogen is an important means for pathogen dispersal on a large scale. Seed association is one common strategy for pathogen survival (Denancé & Grimault, 2022). Important seedborne pathogens include, among many examples, the fungus *Urocystis tritici* that can cause more than 50% yield reduction in wheat (Tao et al., 2014), the bacterium *Xanthomonas campestris* pv. *campestris*, responsible for yield losses that can reach 50 to 60% in *Brassica* spp. (Singh et al., 2018), and *Stagonosporopsis cucurbitacearum*, which has caused 15 to 50% yield losses of cucurbit production under warm and humid environments (Keinath et al., 1995). Knowledge of the transmission and localisation of pathogens in seeds is required to reduce seedborne inoculum (Maruthachalam et al., 2013; Zhang et al., 2018). The use of seed certified disease-free or seeds that are certified to have contamination levels below a given threshold is often recommended as a primary management strategy (Murolo et al., 2022).

Seed Treatment

Seed treatments, in broad terms, are the application of biological, physical and chemical agents and techniques to seed that provide protection to seeds and plants and improve the establishment of healthy crops. This brochure deals with the application of chemical agents.

History

The earliest seed dressings were of organo-mercurials used to control pests such as oat smut and bunt of wheat. These were available from the 1930s but were ineffective on *Pythium* and *Fusarium* species which are pathogens of many crops including cotton, maize and soya. Thiram was therefore developed as a seed treatment in the 1940s to extend the spectrum of diseases that could be controlled.^[6] In 1949 ICI commercialised a seed treatment with trade name Mergamma A, containing 1% mercury and 20% lindane, an early example of a product designed to protect the seed from both fungal and insect attack.

The Role of Seed Treatment

Diseases and pests affecting crops can have devastating consequences in agricultural and horticultural production if not properly managed. Breeding is an excellent tool to build

resistances against pests and diseases in the plants. However, breeding alone does not address all of the agronomic challenges, therefore crop protection products are often needed and used for good crop management. These crop protection products can be applied during the growth of the crop but can also be added to the seed as a seed treatment. Seed treatments have played and are still playing a significant role in the history of mankind, in staving off hunger and starvation by improving the establishment of healthy crops.

Different Types of Seed Treatments

There are many types of commercial seed treatments available today. Depending on the need of the specific crops, farmers can pick a single or a combination of multiple seed treatments with chemicals or biological agents. Here are the different types of seed treatment -

Fungicides

- Seeds are especially vulnerable to fungi in the early stages of growth and some fungi can be hard to combat on their own seed treatment can provide them protection and prevent fungal diseases.

Insecticides

- Pests are another concern that farmers have to factor in while looking at the early stages of growth. Many insects target seeds and can damage them before they even germinate.
- Insecticide seed treatments can provide protection against such pests with the added benefit of having a lower concentration of chemicals than the pesticides applied to fully-grown crops.

- **Microbial inoculants**

seed treatment products that can stimulate plant growth, promote soil biodiversity, and even address specific issues such as nitrogen fixation in legumes. With this beneficial microorganisms are delivered directly to the area where the plant interacts with the soil, which encourages growth.

Plant Growth Regulators

- With plant growth regulators, seeds have additional assistance for germination and an enhanced tolerance for stresses during the critical early stages of growth. This seed treatment for germination is also helpful when seeds have to germinate in tough conditions.

Fertilizers

- Fertilizer seed treatments are another type of seed treatment that helps with plant growth. Seed treatments with biofertilizers can enhance fertilizer performance or supply micronutrients to the soil to enrich the growth environment for the seeds.

Different methods of seed treatment

- **Dry treatment:** Mixing the seed with pesticides/nutrients in powder form.
- **Wet treatment:** Soaking the seeds in a pesticide/nutrient solution in liquid form.
- **Slurry treatment:** Seeds/seedlings are dipped in slurry. Rice seedlings, for example, are immersed in phosphate slurry.
- **Pelleting:** It is the process of coating seed with enough seed ingredients to make the seeds larger, heavier, and consistent in size for sowing using seed drills. Pesticide pelleting is used to protect soil organisms and pests, as well as to repel birds, ants, and rodents.

References

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