DIFFERENT METHODS OF SEED TREATMENT IN VEGETABLES

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Physical seed treatment

Considering the side effects of chemicals on ecosystem and organism, some alternative methods were evolved and are being used presently for treating seeds. These methods are:

Hot water treatment

Hot water treatment is a very age old practice to control many seed-borne diseases by using temperatures hot enough to kill the organism but not quite hot enough to kill the seed and it is still being used as a very effective alternative. This method of treating seed continue to be a standard method of pathogen elimination which is eco-friendlier and more effective compared to chemical treatments, however they can cause the loss of seed viability (Meah, 2004). Before giving the hot water treatment pre-warm loose seed in porous bag, such as cheese cloth for 10 minutes at 20° C water. Place pre-warmed seed in water bath that will hold the recommended temperature. After treatment, dip bags in cold water to stop heating action. Once seeds have cooled, spread them thinly on a paper towel to allow drying. Plant the seed as soon as it is thoroughly dry. Do not store treated seed. This treatment is suggested for eggplant, pepper, tomato, cucumber, carrot, spinach, lettuce, celery, cabbage, turnip, radish, and other crucifers. Hot water treatment can be damaging or not practical for seeds of peas, beans, cucumbers, lettuce, sweet corn, beets and some other crops (Miller and Lewis Ivey, 2005). Seeds that can be treated by hot water are listed in the Table1.

Dry Heat Treatment

Dry heat treatment (DHT) is one of the extensively used physical treatments of seeds. Hot water treatment, alternative treatment with cold and hot water, or high temperature treatment have been practiced rather extensively by growers, but not

extensively by seed companies or seed producers mainly because of the problems associated with seed soaking in water. However, dry heat treatments of high valued seeds are extensively applied to certain crops (Jang, 1998b; Kim and Lee, 2000; Kim *et al.*, 2003), especially to high-priced hybrid seeds of vegetables. Seeds safely treated with dry heat include cucurbits (watermelon, melon, cucumber, squash, gourd, and various rootstocks), solanaceous crops (tomato, pepper, eggplant, true seeds of potato), and Brassica crops (cabbages and Chinese cabbages, radishes, etc.) and other vegetables such as lettuce, spinach, and carrot (Table 1). For successful DHT gradual increases in temperature from 35° to 75°C (or maximum temperature) are important. For example, seeds are initially treated at 35°C for 24 hours followed by 50°C for 24 hours and finally by 75°C for several days.The seed-borne virus can also be partially inactivated or reduced by other methods but complete inactivation is possible only with DHT.

Aerated heat treatment

In the late 19th century, various hot humid air treatments were found to decontaminate seed from seed-borne pathogens. Hot, humid, air, or "aerated steam", treatment has been proposed as a way of avoiding the problems inherent in hot water treatment (Miller and McWhorter, 1948; Kobayashi, 1990) and as applied in a fluidized bed it has shown potential for large-scale seed sanitization in practice. Basically, the thermal treatment method used consists of two phases: The heating phase, where the seeds are heated for a certain time with air having a certain temperature and relative humidity calculated for good disinfestation, followed by a cooling phase that interrupts the treatment process before seeds are injured. The devices were constructed to permit precise control of important parameters (temperature, air humidity, treatment time, air flow and treatment and cooling durations). Hot air treatment helps in deactivating seed borne virus and pathogen.

Radiation treatment

Uses of radiation like UV radiations, gamma radiations are the not only recent advances but also it is used from many years. Radioactive irradiation has also in a few cases been reported to be successful, but has not been widely used because exposures sufficient to control pathogens often also kill the seeds. Use of radiations is not adapted by farmers due to unavailability of technology.

Chemical and biological seed treatment

Now a day's chemical seed treatment is very common and worldwide practiced due to its wide spectrum ability to control plant diseases and pests taking less time and a number of automatic treatment machineries with high level of accuracy are available which makes it less labour-intensive work (Nameth, 1998). Chemical seed treatments are fungicides or insecticides, applied to seed, to control diseases of seeds and seedlings; insecticides are used to control insect pests. Some seed treatment products are sold as combinations of fungicide and insecticide. Typically, chemical seed treatments do not offer benefits associated with root development, drought proofing or crop yield.

Seed Coating

Seed coating is one of the most useful and handy means of seed treatment. Seed handling and placement can be greatly simplified by altering seed shape. Placement of agrochemicals on the seed coating materials that regulate and improve germination greatly enhances seedling growth. Two types of seed coating are in commercial use: film coating and seed pelleting.

Film Coating-A seed coating is a substance that is applied to the seed but does not obscure its shape. Chemicals such as fungicides, insecticides, safeners, micronutrients, microorganisms, dyes, and other compounds such as plant bioregulators can be added to the coating materials. An ideal seed coating polymer should be water-soluble, with a low viscosity and a high concentration of solids, an adjustable hydrophilic-hydrophobic balance, and a capability of forming a hard film upon drying (Khan, 1992). The addition of the coating is very different from pelleting since it only represents an increase of 1-10% of the seed weight and the shape of the seed is still retained. Coated seeds have significantly improved coverage and active distribution on the seed surface. Coated seeds are shiny and attractive and therefore allow more control over sowing quality and crop and cultivar identification. Even though a slight delay in seed germination is inevitable because of the nature of film-coating materials, the use of film-coated seeds, especially vegetable seeds, has been rapidly increasing in recent years