

# Seed Treatment

**Prof. Mirza Hasanuzzaman**

Department of Agronomy

Sher-e-Bangla Agricultural University

[mhzsauag@yahoo.com](mailto:mhzsauag@yahoo.com)

[www.mirzahasansau.info](http://www.mirzahasansau.info)

A lecture for Level 2 Semester II students

Course: AGRO 251 (Seed Science)

# What is seed treatment?

Seed treatment refers to the application of fungicide, insecticide or other non-chemical a combination of both, to seeds so as to disinfect and disinfest them from seed-born or soil-borne pathogenic organisms and storage insect. It also increase storability and seed quality.



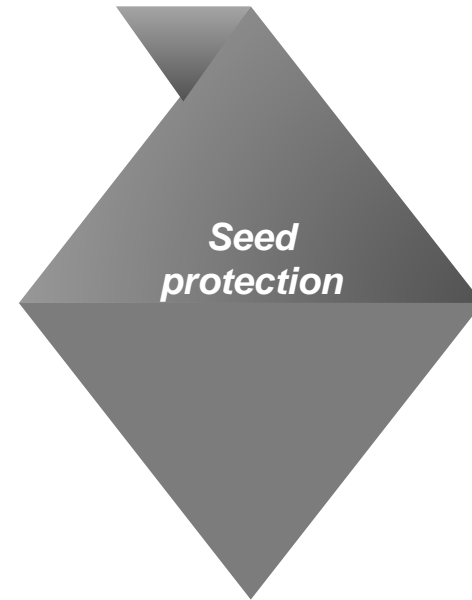
# Objectives of seed treatment

- Protection from insect pests and diseases including the storage pests.
- Breaking of dormancy (physiological dormancy).
- Improving germination/or emergence.
- Controlling soil insects
- Supply of nutrients.
- Improving seedling vigor and promoting initial crop growth.
- To reduce yield loss of a crop.

# Advantages of Seed Treatments

- It can efficiently control seed-borne pathogens.
- It can be controlled easily
- It can increase the duration of storage
- Relatively low dose of chemical is required
- It maintain the seed health

# Types of Seed Treatment



# Seed disinfection

- Seed disinfection refers to the eradication of fungal spores that have become established within the seed coat, or in more deep-seated tissues.
- For effective control, the fungicidal treatment must actually penetrate the seed in order to kill the fungus that is present.



# Seed disinfestation

- Seed disinfestation refers to the destruction of surface-borne organisms that have contaminated the seed surface but not infected the seed surface.
- Chemical dips, soaks, fungicides applied as dust, slurry or liquid have been found successful.



# Seed protection

The purpose of seed protection is to protect the seed and young seedling from organisms in the soil which might otherwise cause decay of the seed before germination.

## (A) Seed-coating ingredients



Binder: liquid

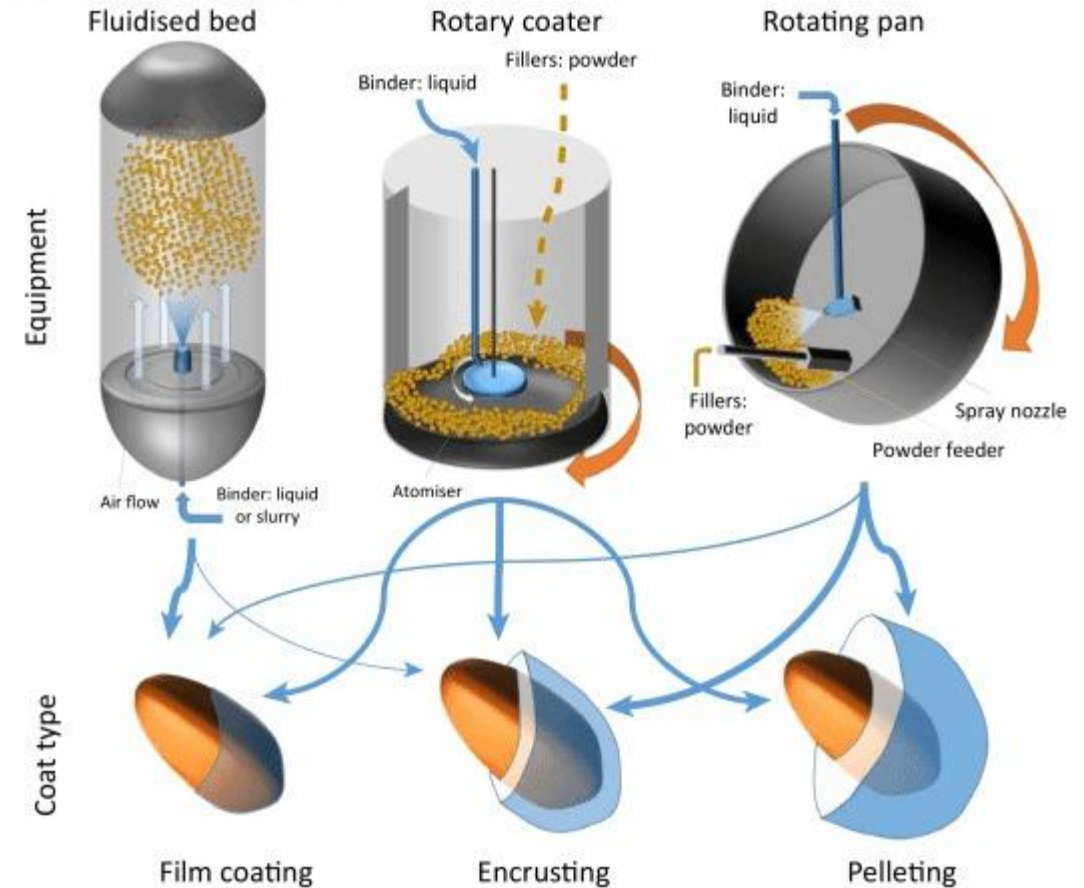


Fillers: powder

- o Protectants
- o Nutrients
- o Symbionts
- o Soil adjuvant
- o Phytoactive promoters
- o Colours and tracers

Active ingredients

## (B) Seed-coating mechanisms





# **Agents for Seed Treatment**

**A. Chemical treatment**

**B. Non-chemical treatment**

**C. Seed treatment involving physical factors**

**D. Special treatments**

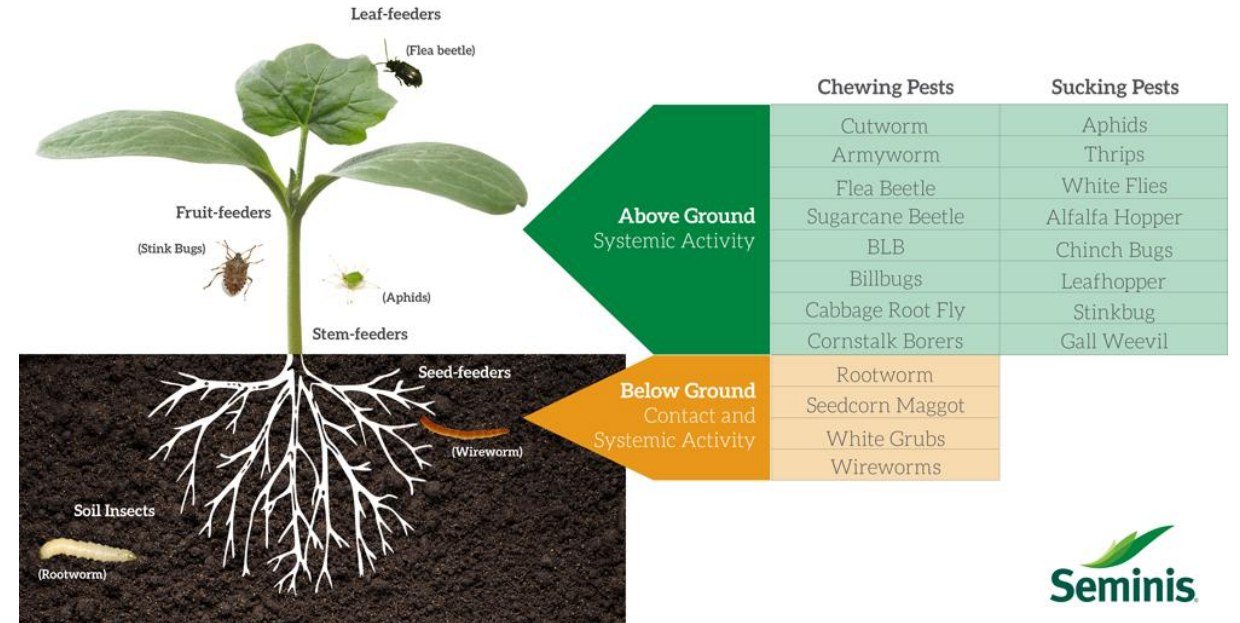
# Fungicides

- Fungicidal seed treatment may be divided into three categories, depending on the nature and purpose of the treatment.



# Insecticides

- Insecticides are often applied to seed to control or reduce insect damage to seed during storage and to a lesser degree to prevent damage from such insects as wire worms and seed corn maggots in the soil.



# Bioagents

- Seeds are treated with preidentified beneficial bioagents to protect the seed and supplement the nutrients.
- Use of bioagent for seed treatment is ecologically sound and biologically sustainable.
- It is an essential component of organic farming.
- Seeds are mixed with adhering agents and specific biological strains in appropriate proportions followed by surface drying.

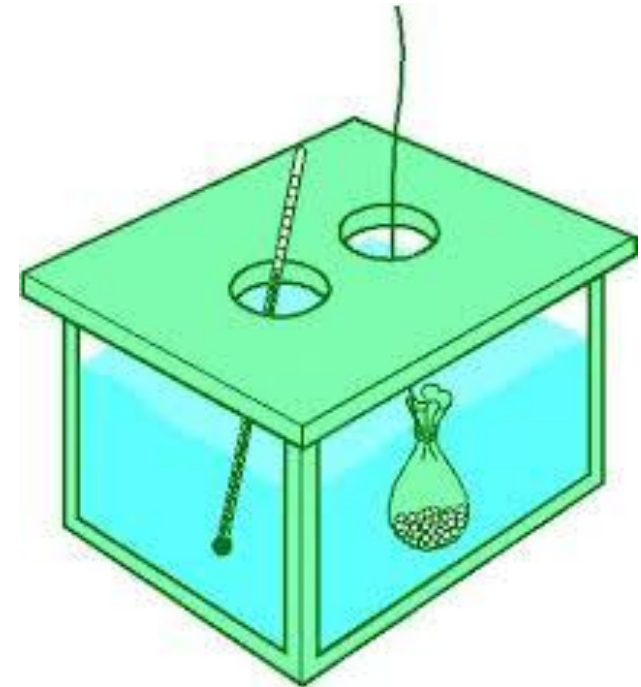


The success of protection by bioagents invariably depends on -

- The potential of biological agent
- The number of propagules applied to the seed
- The application of technology
- The concurrent inhibition of other microbes in the application process

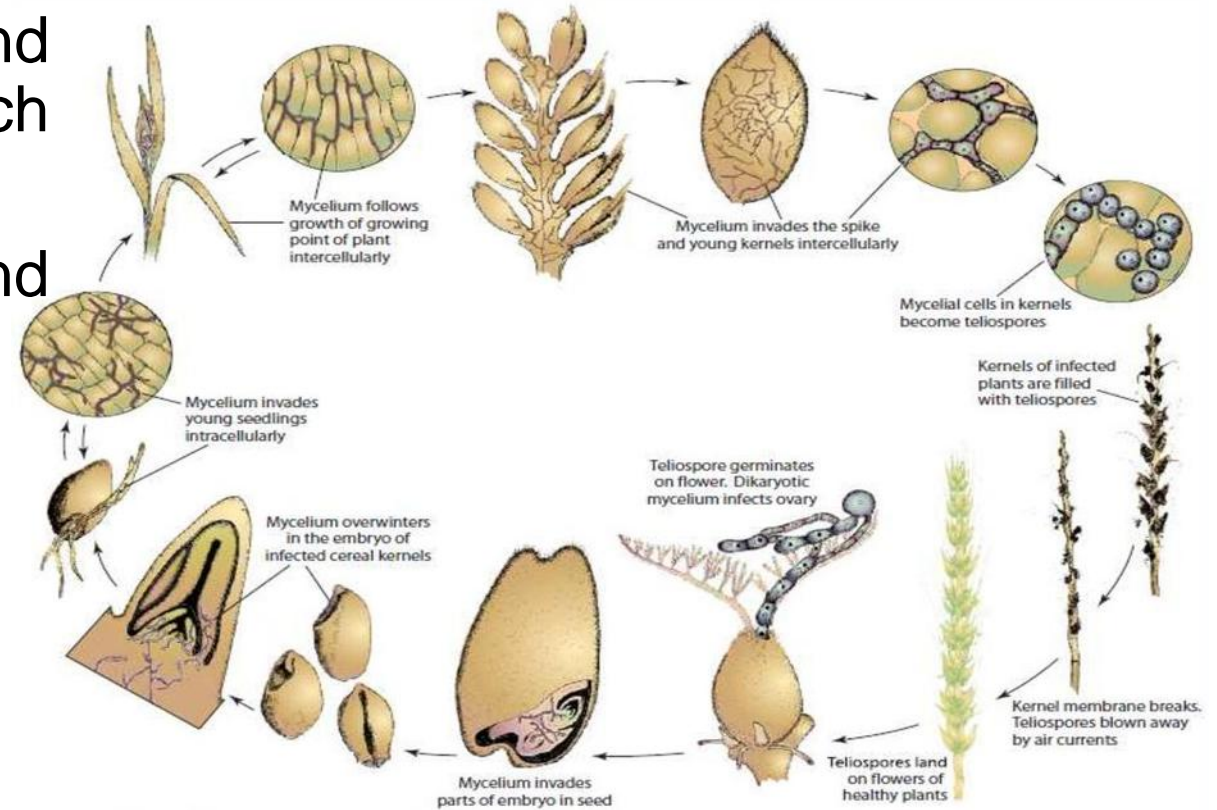
# Hot Water Treatment

- The seeds are dipped for specific period of time in hot water to a particular **temperature safe to embryo** and deleterious to the associated pathogen.
- This method is useful for low volume high value seeds.
- **Spores** or bacteria that are attached to seeds can be killed by soaking the seeds in hot water.
- Use water of exactly **50°C and soak the seeds for 30 minutes.**
  - Hot Water **Immersion** Treatment
  - **Steam** Treatments
  - Forced **Hot Air**



# Solar energy treatment

- The seeds are soaked in water and exposed to sun for 6-8 hours which control loose smut of wheat.
- It activates the dormant mycelium and destroyed by heat.



# Cold treatment

Seed treatment by cold plasma (80W) on the resistance of tomato to *Ralstonia solanacearum* (bacterial wilt).



(a) Cultivated in non-treated water

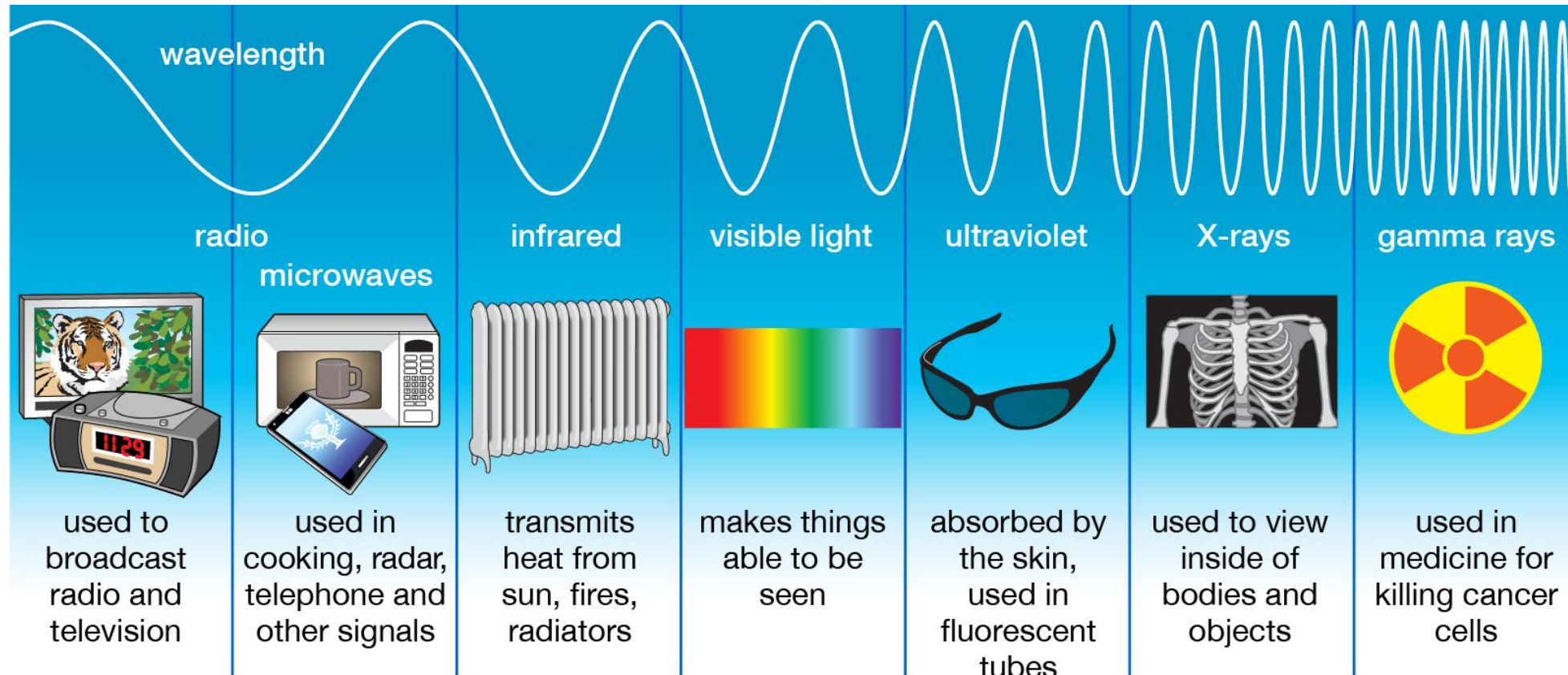
(b) Cultivated in plasma-treated water





# Irradiation

- Gamma, UV, X-ray and laser can be used to control seedborne pathogens.
- UV-C radiation to reduce seedborne anthracnose (*Colletotrichum acutatum*) from Andean lupin (*Lupinus mutabilis*).



# Methods of Seed Treatment

- Seed Dressing
- Slurry Treatment
- Dust Treatment
- Wet Treatment
- Seed Coating
- Pelleting
- Seed dipping
- Osmotic priming

## Seed Dressing

- The most common method of seed treatment. The seed is dressed with either a dry formulation or wet treated with a slurry or liquid formulation. Dressings are applied both on-farm and industrially.



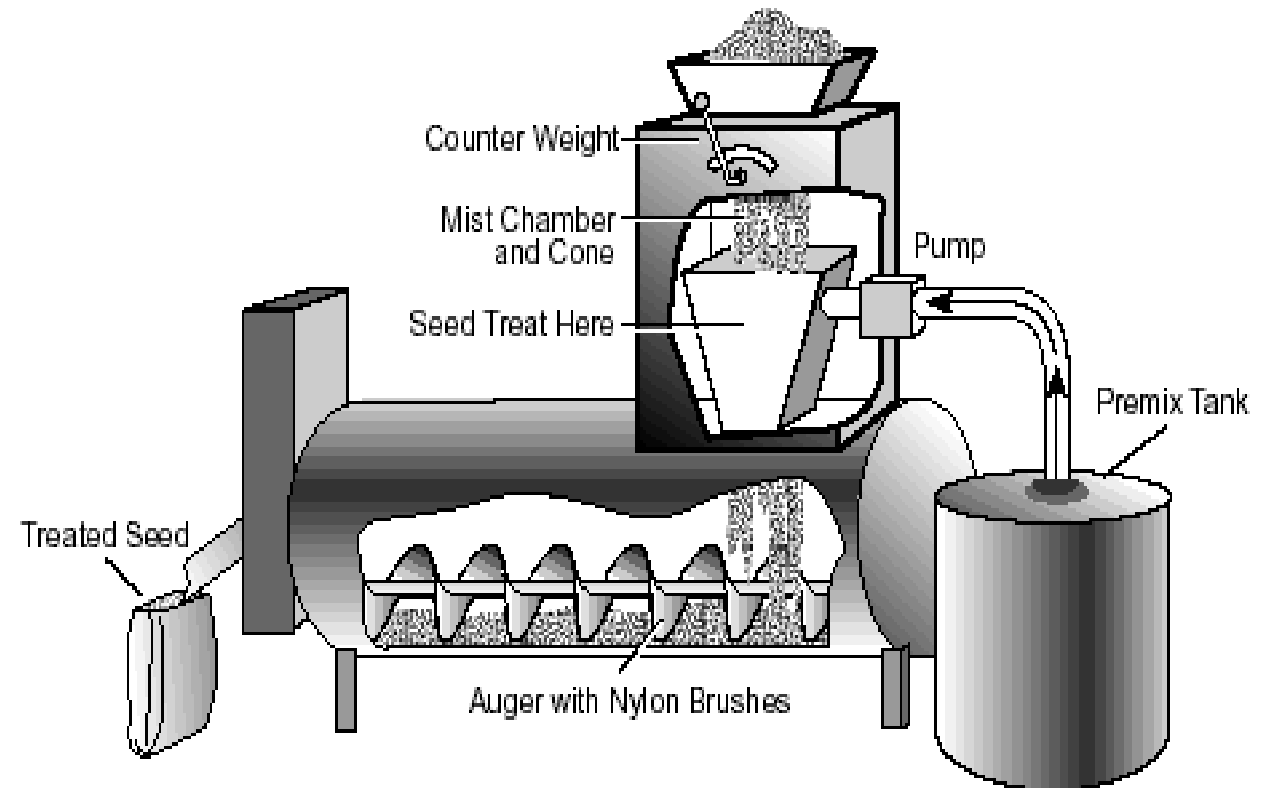
# Slurry Treatment

- Slurry is prepared by mixing the chemicals with water.
- The required quantity of the chemical is automatically mixed with the specified quantity of the seeds before bagging.
- Dipping of seeds/seedlings in slurry. e.g., rice seedlings are dipped in phosphate slurry.



# Slurry Seed Treater

- The slurry treatment principle involves suspension of wettable powder treatment material in water.
- The treatment material applied as slurry is accurately metered through a sample mechanism composed of a slurry cup and seed dump pan.
- The cup introduces a given amount of slurry with each dump of seed into a mixing chamber where seed are blended.



- The amount of treatment material applied is adjusted by the slurry concentration and the size of the slurry cup or bucket. As the dump pan fills, a point is reached where it over balances the counterweight and dumps into the mixing chamber. Thus, one cup of slurry is added with each dump of seed.
- The mixing chamber is fitted with an auger type agitator that mixes and moves seed to the bagging end of the chamber. The speed of the auger is important because at slow speeds more uniform distribution is obtained.
- Slurry tanks have 15 to 35 gallon capacities, depending on the size of the treater. They are equipped with agitators that mix the slurry in the tank and keep it suspended during operation. It is important that the powder be thoroughly suspended in water before treating. If the treater has been idle for any period of time, sediment in the bottom of the slurry cups must be cleaned out.
- The proper size slurry cup must be used. Most machines now have cups with ports and rubber plugs for 15 cc, 23 cc, and 46 cc quantities. Some users prefer to mix the slurry in an auxiliary tank and then transfer to the slurry chamber as needed.

## Dust Treatment

- Treatment of seed with powder form of fungicides.



## **Wet Treatment**

- Treatment of seed with liquids/liquid solutions.



# Seed Coating

- A special binder is used with a formulation to enhance adherence to the seed.
- Coatings require advanced treatment technology.



# Pelleting

Pelleting is a technique used as a protectant against soil organisms, soil pests and as a repellent against birds and rodents.



# Seed dipping

- It involves the dipping of the seed or propagules in a chemical solution for a specified period prior to sowing.
- For example- seed dipping Dithan M45 control late blight of potato.

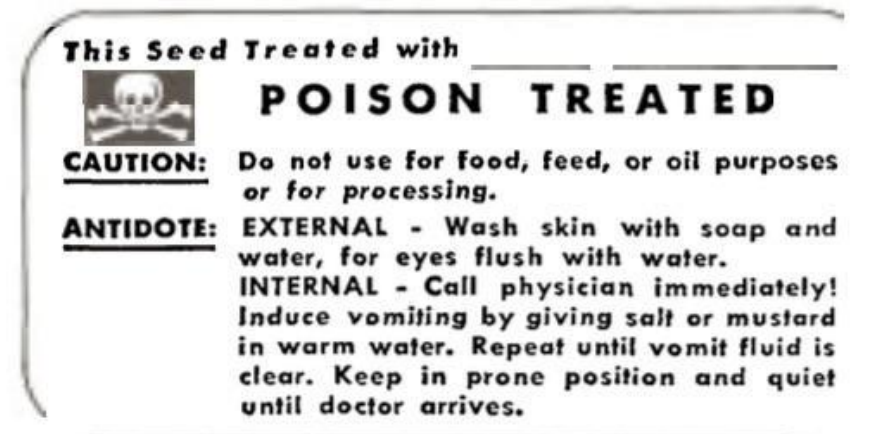


## **Ideal Chemical Seed Treatment**

- be harmless to the seed;
- be stable for relatively long periods of time before planting;
- give an even coating to seed, adhere well, without giving an unattractive appearance;
- be relatively inexpensive; and
- be registered for the intended use.

# Labeling treated seed

1. A word or statement in type no smaller than **8 points** indicating that the seed has been treated.
  2. The commonly accepted, coined, chemical or abbreviated chemical (generic) and name of the applied substance and rate of application.
  3. A **caution statement** if the substance used in such treatment in the amount remaining with seed is harmful to humans or other vertebrate animals.
  4. Seed treated with a "**restricted use**" toxic substance shall be labeled to show a statement such as "**poison treated**" in red. In addition, the label shall show a representation of a skull and crossbones.
  5. Seed treated with a "**general use**" or low toxicity substance, if the amount remaining with the seed is harmful to humans or other vertebrate animals, shall be labeled to show a caution statement in type no smaller than 8 points, such as "**Do Not Use for Food, Feed, or Oil.**"
- In addition, the label may contain additional information; such as, (a) purpose of treatment, (b) antidotes, (c) safety precautions, and d) procedure to follow in case of an accident



# Schedule for Seed Treatment

Crop	Name of chemical	Rate (kg per ton of seed)
Rice	Ceresan wet 2.15%	6.0
Wheat	Agrosan GN 1% Dust or Thiram 75% WDP	2.5 or 1.0
Oats	Agrosan GN 1% Dust	2.5
Sorghum	Thiram 75% WDP	0.85
Blackgram	Thiram 75% WDP dust	2.5
Grasspea	Agrosan GN 1% Dust	2.5
Lentil	Agrosan GN 1% Dust	2.5
Pigeonpea	Thiram 75% WDP	7.5
Soybean	Captan 75% dust and Thiram 75% dust	3.0 and 1:1
Mustard	Agrosan GN 1% dust	2.5
Groundnut	Captan 75% dust and Thiram 75% WDP	2.15 or 0.125
Sesame	Agrosan GN 1% dust	2.5
Sunflower	Thiram 75% dust	2.5
Cotton	Captan 75% dust	2.5
Jute	Captan 75% WDP	0.80
Sunnhemp	Thiram 75% WDP	0.75
Sugar beet	Thiram 75% dust	2.5

# Limitations of seed treatments

- **Accidental poisoning.** Treated seed looks like food to some animals. Hungry livestock that find carelessly handled treated seed will probably eat it. Birds, like pheasants or quail, may consume spilled treated seed. Even young children may find and eat improperly stored treated seed.
- **Limited dose capacity.** The amount of pesticide that can be applied is limited by how much will actually stick to the seed.
- **Limited duration of protection.** The duration of protection is often short due to the relatively small amount of chemical applied to the seed, dilution of the chemical as the plant grows, and breakdown of the chemical.
- **Limited shelf life of treated seed.** Producing excess treated seed is undesirable because the shelf life of treated seed may be limited. Surplus treated seed cannot be sold for grain.
- **Phytotoxicity:** A few seed treatments are partly phytotoxic and when applied at high rates it may result in lower germination and/or stunting may occur if application rates are not carefully controlled. Cracked, sprouted, and scuffed seeds may be particularly susceptible to toxic effects. A few seed treatments may reduce the length of the sprout and, therefore, affect the choice of planting depth.
- **Worker exposure.** In the course of treating and handling large volumes of seed, workers may be exposed to seed treatment chemicals as aerosols. Some, such as thiram, are irritating when inhaled.

# Precautions in seed treatment

- Use appropriate recommended chemicals for crop, pathogens and diseases. Use precise doses. Lower rates may not give adequate control, whereas higher rates may cause seed injury. Therefore, care must also be taken to treat seed at the correct dosage rate; applying too much or too little material can be as damaging as never treating at all.
- Most products used in the treatment of seeds are harmful to humans, but they can also be harmful to seeds. Extreme care is required to ensure that treated seed is never used as human or animal food.
- Regardless of the product, use of protective clothing, gloves, an approved chemical respirator and goggles are recommended.
- To minimize this possibility, treated seed should be clearly labeled as being dangerous, if consumed. The temptation to use unsold treated seed for human or animal feed can be avoided if care is taken to treat only the quantity for which sales are assured.





- Combinations of some fungicidal and insecticidal seed treatments can be toxic to the seed. It is important to read the label carefully before mixing insecticides with fungicides.
- **Treated seed should never be used as food.** In addition, equipment such as augers and trucks used to deliver grain to elevators should not be contaminated by treated grain.
- Seed with very high moisture content is very susceptible to injury when treated with some of the concentrated liquid products.
- Never use chemical of expiry date for seed treatment.
- **First treat the seed with fungicide, thereafter insecticide and finally with *Rhizobium*. This sequence be followed whenever recommendation is made.**