

Seed Treatment

By

Dr. Aninda Chakraborty

Definition

Biological, Chemical, mechanical or physiological process designed to mitigate external and internal seed borne organism. Resulting in emergence of healthy seedling and subsequently healthy plants.

Or

It refers to the application of fungicides, insecticides or both or any other treatment given to seed for improving its quality either in storage or in field.

Types of Seed Treatment

A. Pre sowing seed -Treatments-treatments given to the seeds before sowing to improve the germination and vigour potential and as well as to maintain the health of the seed.

I. Chemical treatments to improve germination and vigour potential.

II. Insecticidal and fungicidal treatment.

III. Special treatments

A)Seed hardening

B) Seed fortification

C) Moist sand conditioning

D) Seed pelleting

E) Seed infusion

F) Priming

G) Fluid drilling

H) Separation of viable seeds

B) Pre storage treatments-primarily aimed towards protection against deteriorate senescence during storage

I. Halogenation

II. Antioxidant treatment

III. Seed sanitation

C) Mid storage treatments

I) Hydration – Dehydration

I. Chemical treatments to improve germination and vigour potential

Soaking / treating the seeds with nutrients vitamins and micronutrients etc.

Paddy: Seeds can be soaked in 1 % KCl solution for 12 hours to improve the germination and vigour potential.

Sorghum: Seeds could be soaked in NaCl^2 (1 %) or KH^2PO^4 (1%) for 12 hours for improving the germination and vigour potential.

Pulses : Seeds can be soaked in ZnSO^4 , MgSO^4 and MnSO^4 100 ppm solution for 4 hours to improve the germination and vigour potential.

II. Insecticidal and Fungicidal treatments

Seed may be affected by viruses, bacteria, fungi, nematodes and insects.

Benefits of the insecticidal and fungicidal treatments:

1. Prevents the spread of plant diseases
2. It protects the seed from seed rot and seedling blights.
3. It improves the seed germination
4. It provides protection from storage insects.
5. It controls the soil insects.

Seed Treatment Fungicides

Fungicides are applied to seed prior to planting to provide effective protection against many seed and soil-borne plant pathogens.

Types

Seed disinfection - Disinfection is the elimination of a pathogen which has penetrated into living cells of the seed, infected it and become established—for example, loose smut of barley and wheat.

Seed disinfestations - Disinfestation is the control of spores and other forms of pathogenic organisms found on the surface of the seed.

Seed protection - Seed protection is chemical treatment to protect the seed and young seedling from pathogenic organisms in the soil.

Seed treatment materials are usually applied to seed in one of four forms

1. Dust

Main dis-advantage is dusty condition will prevail during the seed treatment and after handling.

2. Slurry (a mixture of wettable powder in water)-

Fungicide is applied to the seed along with soap like water suspension which can be mixed with seed by using special slurry treater

3. Liquids

Volatile fungicide is applied to the seed and it throughly mixed with them

4. Planter-box formulations.

III. Special treatments

A) Seed hardening treatment

Purposes I) Drought tolerance ii) Cold tolerance

Applied to the seeds mainly to tolerate initial drought and cold. Cold tolerance treatment is given to germinated seeds, such treatments are given only to temperate crop and tree seeds.

The most important factors to be considered while seed hardening are

1. Seed : solution ratio (1:1)
2. The duration of soaking
3. Method of drying.

Chemicals used: CaCl_2 , KCl , KH_2PO_4 ,

B) Seed fortification

- Aim is to supply nutrients to seeds
- Main objective is to achieve the high vigour to overcome unfavourable soil reactions

Eg.) seed fortification with MnSO_4 @ 0.5 to 1 %. will improve oxidation - reduction potential of seeds, which ultimately leads to higher germination.

C) Moist sand conditioning

- Protinaceous seeds should not be soaked in water (e.g) soybean, etc. for these seeds, mix the seeds with moist sand @ 5 to 10% MC.



D) Seed pelleting

Nutrients are coated on the seeds

Importance

- Normally in small seeds this technique is adopted .
- By pelleting we can increase the size of seeds and we can make it free flowing one.
- Through this we can able to reduce the seed rate.
- It is also important for aerial sowing (gum arabica) in tree seeds.

Materials used : Nutrients , adhesive, filler material.

Inert materials: Lime, CaCO_3 , Chalk powder.

E) **Seed infusion**

- Infusion of nutrients and growth promoting substances with organic solvents like acetone and dichlormethane.
- organic solvents, slowly increase the chemicals in to the seed.

F) **Priming**

Controlled hydration of seeds to start early events of germination followed by drying back before radicle emergence

Types

1. Hydro priming
2. Osmotic priming
3. Matrix priming

G) Fluid drilling

- Mechanical sowing of germinated seeds.
- seeds are coated with a jelly material called guar gel.

H) **Separation of viable seeds**

This can be done in 2 ways

1. Manual separation based on radicle emergence (groundnut)
2. IDS (Incubation - Drying and Separation) method

B. Pre storage treatments

Prestorage treatments of harvest-fresh seed are primarily aimed towards protection against deteriorate senescence during storage. Seed storage which is again threatened by insect and pathogen attack, can also be taken care of by prescribed prestorage seed treatments.

i. Halogenation

ii. Antioxidant treatment

iii. Seed sanitation

C. Mid storage treatments

Seeds in storage accumulate damage to cell membranes during senescence. Mid storage seed treatments are capable of reducing the age induced damages and restoring the seed vigour to a certain extent besides, the seed viability and productivity of stored seeds are also improved.

i) Hydration – Dehydration

Soaking the low and medium vigour seeds in water with or without added chemicals usually for short durations to raise the seed moisture content to 25 – 30% and drying back the seeds to safe limits for dry storage.

The hydration – dehydration treatments

1. Should be given only to **stored seeds**.
2. Is effective in **low and medium vigour non- leguminous seeds**,
3. The **moisture equilibration and moist sand conditioning** treatments in which moisture is taken up by the seed in a slow and progressive manner, are recommended for **relatively high- vigour seeds and seeds of pulses and leguminous vegetable crops**
6. **Direct soaking of leguminous** seeds should be avoided.
7. **Would not make a seed germinable**, which has already lost viability.

Types of H-D treatments

1. Soaking-drying
2. Dipping-drying
3. Spraying-drying
4. Stepwise Hydration-drying
5. Moisture Equilibration-drying
6. Moisture Equilibration Soaking-drying
7. Moist And Conditioning-drying

SEED TREATING EQUIPMENT

1. Dust Treater
2. Slurry Seed Treater
3. Mist-O-Matic Seed Treater