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Processing and Storage of Vegetable Seeds

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Seed processing:

In its common usage in India, seed processing refers to all the steps necessary for preparation of harvested seed for marketing namely handling, drying, shelling, preconditioning, cleaning, size grading, treating and packaging etc.

Seed drying:

Drying of seed lots i.e., lower down the seed moisture content to safe moisture limits, is very important to maintain seed viability and vigour. Other advantages of seed drying are:

- Permit long term storage
- Permits more efficient use of land and man power
- Permits seeds men to sell a better-quality product

The drying of seeds is done by the following method:

- Sun drying
- Forced air drying

a. **Sun drying:** Seed moisture content in reduced in the field before harvest and later by sun drying on threshing floor. Main advantage is that it requires no additional risk of weather damage and increased likelihood of mechanical admixtures.

b. **Forced air drying:** In this system, air (natural or heated) is forced into the seed. The air passing through the damp seeds picks up water. The evaporation cools the air or seed. The heat necessary for evaporating the water comes from temperature drop of the air. There are three methods with forced air drying.

   ✓ Natural air drying – Natural air is used

   ✓ Drying with supplement heat – Small quantities of heat to raise temperature about 10-20^{0}F for reducing relative humidity are provided so that drying can take place.

   ✓ Heated air drying – drying air is heated considerably as much as by 110^{0}F.

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Seed cleaning and upgrading:

Seeds of different species and insert matter widely differ with regards to physical properties. Length, width, shape, weight and surface texture differences are quite common in crop species.

1. **Pre-cleaning of seed:** Process refers to operation like shelling, de-bearding etc. or any similar operations which prepare the seed for basic seed cleaning. Pre- cleaning is the removal of particles such as trash, stone from the crop seed as well as removal of particles lighter in weight and smaller in size than crop seed. No pre-cleaning is usually required on hand harvested and winnowed seed lots. Most common equipment's used in these operations are Scalpers, Debearders, Huller Scarifiers and Pebble Mills.
2. **Basic seed cleaning:** It refers to actual cleaning and grading of seeds. Unlike pre cleaning/preconditioning, which may or may not be required, basic seed cleaning is an essential process in the seed cleaning operations. Basic seed cleaning is done over an air screen machine, commonly referred to as air screen cleaner in which separation of undesirable seed and material from desirable seeds is done on the basis of differences in seed size and weight.
3. **Upgrading the quality of cleaned seed:** The various processing operations conducted after basic cleaning to further improve the seed quality are regarded as upgrading operations. Choice of upgrading operation, however, shall depend upon the type of contaminants, or by very precise size grading.

Seed treatment:

Seed treatment refers to the application of fungicide, insecticide, or a combination of both, to seeds so as to disinfect and disinfest them from soil borne or seed borne pathogenic organisms and storage insects. It also refers the subjecting of seeds to solar energy exposure, immersion in conditioned water etc.

Benefits of seed treatment:

- Prevention of spread of plant disease
- Protection from seed rot and seedling blight
- Improve germination
- Protection from storage insects

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- Controlling soil insects

Types of seed treatment:

- **Seed disinfection:** It refers to eradication of fungal spores that have become established within the seed coat, or in more deep-seated tissues. Fungicidal treatment gives effective control
- **Seed disinfestations:** It refers to the destruction of surface born 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:** It protects the seed and young seedling from organisms in the soil which might otherwise cause decay of the seed before germination.

Thiram and captain as dry dressing are most common for seed treatment in vegetable crop seeds.

Seed Packaging and Handling:

After completion of treatment, seeds are packaged into containers of specified net weight. Packaging consists of the following operations:

1. Filling of seed bags to an exact weight
2. Placing leaflets in the seed bags regarding improved cultivation practices
3. Attaching labels, certification tags on the seed bags and sewing of bags.
4. Storage/shipment of seed bags

Seed storage:

The seeds are considered to be in storage from the moment they reach physiological maturity until they germinate, or until they are thrown away because they are dead or otherwise worthless. Entire storage period can be conveniently divide into following stages:

1. Storage on plants
2. Harvest, until processed and stored in a warehouse
3. In storages(warehouses)
4. In transit (rail wagons, trucks, carts, railways, sheds etc.)
5. In retail stores
6. On the user's farm

Factors affecting seed longevity in storage:

1. Kind/variety of seed

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2. Initial seed quality
3. Moisture content
4. Relative humidity and temperature during storage
5. Provenance
6. Effects of fluctuating environmental conditions on viability
7. Special effect of extreme conditions on viability
8. Oxygen pressure
9. Effects of storage conditions on the activity of organisms associated with seeds in storage e.g., bacteria, fungi, mites, insects, rodents, birds.

General principles:

1. Storage conditions should be dry and cool
2. Effective storage pest control
3. Proper sanitation in seed stores
4. Before placing seeds into storage, they should be dried to safe moisture limits appropriate for the storage system.