

POST HARVEST HORTICULTURAL DISEASES

The diseases which develop on harvested parts of the plants like seeds, fruits and also on vegetables are the post-harvested diseases. The harvested products may get infected on the way to storage or to market or even before their final consumption. The plant parts may get infected in the field, but expression of symptoms may take place later, at any stage before final consumption.

The plant products may get infected by microorganisms and cause rotting or decaying — partially or totally. The quantity of plant products becomes reduced due to the above infection. The seeds or grains may get damaged by accumulation of toxic substance, the mycotoxin produced by the infected microorganism.

The fleshy fruits, vegetables etc., like tomato, banana, citrus, strawberries, rhizome of zinger, bulb of onion, tuber of potato etc., may get damaged. This results in reduction of quantity, quality or both of the affected parts or products as a whole.

The amount or extent of damage depends mainly on the pathogen(s) involved, on the condition of the products and the condition of storage.

The pathogens involved are mainly fungi like *Pythium*, *Phytophthora*, *Rhizopus*, *Aspergillus*, etc. and some bacteria like *Pseudomonas*, *Erwinia*, etc.

Classification of Post-Harvest Diseases:

The pathogens mainly are of two categories:

1. Field pathogen, and
2. Storage pathogen.

1. Field Pathogen:

The field pathogens are those, which cause infection during development of plants or their products before harvest.

2. Storage Pathogen:

The pathogen which causes infection during storage are the storage pathogen.

Symptoms from infection caused by the 'field pathogens' may be very inconspicuous to be noted at the time of harvest. In fleshy and/or juicy fruits and vegetables, infection by field pathogen continues to develop even after harvest.

They may become infected during storage by the same field pathogen(s) or by other pathogen(s). In seeds and grains, the disease caused by field pathogens ceases to develop further soon after harvest. But they may be infected further by the other pathogens during storage.

Types of Post-Harvest Diseases:

1. Diseases of dry, bulk materials, such as seeds and grains, and
2. Diseases of fleshy storage organs, such as vegetables (tubers, rhizomes, bulbs etc.) and fruits.

Observations of many investigators indicate that the real cause of the spoilage of vegetables and fleshy fruits in transit and also in storage are due to high moisture, high temperature, and injuries caused during marketing. Due to high moisture content and nutrient in harvested vegetables and fruits, they are vulnerable to attack by the pathogenic organisms.

Injuries of fruits and vegetables may be caused during harvesting, packing and transposition they help the pathogen to enter the host and cause damage. But the seeds and grains can be stored for long time due to low moisture content (about 12-14%), where most of the pathogens cannot grow favourably.

I. Diseases of stored seeds and foodgrains:

Field fungi, like *Alternaria*, *Fusarium*, *Cladosporium*, *Verticillium*, *Helminthosporium*, *Colletotrichum* etc., attack seeds and grains on growing crops, but are unable to grow in storage due to low relative humidity i.e., below 90%.

During storage or transit the seeds and grains are damaged by the different species of *Aspergillus* and *Penicillium*, which can grow well at a relative humidity ranges from 70-90%. *Aspergillus* and a number of other storage fungi invade the embryo of the seeds and grains and they discolour the embryo or seeds as a whole, thereby the germination percentage reduces markedly.

In addition to storage fungi, other microorganisms may grow in/or on seeds and accelerate the deterioration process. During breeding period of insects, the moisture content and temperature of seeds increase, thereby rapid growth of the pathogen takes place producing enormous number of spores.

During storage, the fungi produce mycotoxins that cause great damage to both domestic animals and human beings. The important fungi in this respect are *Aspergillus* and *Penicillium*, which produce aflatoxin and other toxins.

Most Important Toxins are:

1. Yellow Rice Toxins:

Produced in grains of rice, barley etc., by species of *Penicillium*.

2. Tremorgenic Toxins:

Produced on prepared food during storage in refrigeration or in other places and also on food produced from infected grains and/or seeds.

3. Penicillic Acid:

It is a carcinogenic substance produced by the different species of both *Aspergillus* and *Penicillium* in cereal grains.

Control:

The above-mentioned loss or damage by decay and spoilage of seeds and/or grains by storage fungi can be controlled by the following procedures:

1. Low Moisture:

The moisture content of the rooms for storage should be kept below 70%.

2. Low Temperature:

Temperature in store house should be maintained below 30°C, because most of the storage fungi can grow well at temperatures between 30°C and 55°C.

3. Ventilation:

Proper ventilation should be maintained during storage and also during holding period before sending to market.

4. Sanitation:

Proper sanitation should be maintained to keep storage products clean.

5. Use of Insecticide:

Insecticides like methyl bromide and some other fumigants are used to treat the harvested seeds, thereby they regulate the storage fungi and reduce economic loss.

6. Clean:

Clean, uninjured and properly ripened seed should be selected for storage, then only they are able to resist the action of the storage pathogen(s).

Control of Post-Harvest Diseases:

The diseases can be controlled or reduced following the preventive procedures are:

1. The fruits and vegetables should be harvested and handled carefully to avoid any injury which may facilitate the pathogen to cause infection.
2. The infected region on the vegetables should be cut off to avoid further infection during transportation and storage.
3. Storage container, warehouses etc., should be properly cleaned with CuSO_4 , formaldehyde etc. to avoid contamination.
4. The crop should be stored or transported at a temperature low enough to slow down the development of disease.
5. Proper ventilation in storage reduces the spread of further development of disease.
6. The crops should be free from Insects and other pests; thus, creation of new wounds and disease can be avoided.
7. Hot water and hot air treatment help to reduce further spread of the disease.
8. Chemical control. Post-harvest diseases may be controlled by the application of thiabendazole, dichloran etc. These chemicals help to prevent infection and suppress the development of pathogen on the host surface.

Some other chemicals, such as vapours of acetaldehyde, nitrogen chloride forming chemicals etc., are used as supplementary measures to control the post-harvest diseases during storage and transportation.