

## Post harvest diseases of potato



### List of diseases

- Dry rot - *Fusarium solani*
- Potato wart - *Synchytrium endobioticum*
- Scab - *Streptomyces Scabies*
- Silver scurf - *Spondyocladium atrovirens*
- Brown rot - *Ralstonia solanacearum*
- Black Leg - *Erwinia carotovora*
- Late blight - *Phytophthora infestans*
- Sclerotium rot - *Sclerotium rolfsii*

**Dry rot**  
*F. solani* var. *coeruleum*



- Dry dark spots appear on the skin which later becomes sunken and wrinkled with irregular concentric rings
- Spots shrinks and bursts out
- Internal tissue becomes brown and shrunken with cavities filled with numerous white tufts of mycelium
- Rotting progress into whole tuber which loses much of water and become dry hard, shriveled and light in weight



**Fungus**

Several *Fusarium* spp. have been associated with potato dry rot.

The most frequent and devastating of these species are *F. sambucinum*, *F. solani* and *F. oxysporum*, depending on the geographic location and the season.

- Mycelium – branched, septate
- Hyphae break through the skin and form pustules on the surface
- Pustule – closely interwoven hyphae which give rise to branched conidiophores bearing conidia

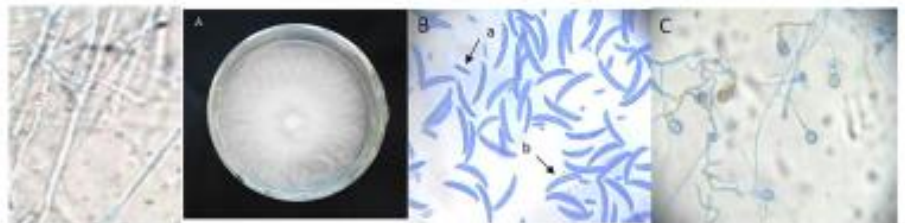


**Mode of spread and survival**

- Contaminated soil - main source
- Fusarium dry rot is both seed and soil-borne
- Mycelium, conidia and chlamydospores - present in the soil
- Conidia floating in the air or found on the floor and walls of stores infect injured tubers

**Epidemiology**

- Temp -15 to 25°C
- RH - 50%



### Management

- Plant only certified seed
- Avoid injuries to tubers
- Potatoes should be dried thoroughly and then stored in a cool place
- To speed the curative process, hold tubers at 10 to 16°C with good ventilation and a RH of at least 95% for the first 2 to 3 weeks of storage
- Chemical seed treatment (Tops MZ, Maxim MZ)

### Potato wart *Synchytrium endobioticum*

Potato wart is an important and serious disease of cultivated potato

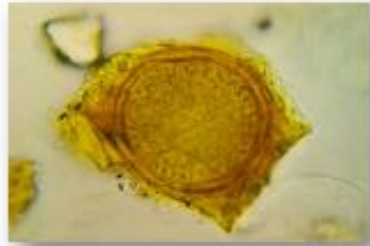
#### Symptoms

- As small white granular swellings on the eyes
- Remain minute or may become as large as the tuber
- Soft, pulpy, white to begin & become black later



## Fungus

- Do not develop any mycelium
- Produce summer sporangia – thin walled
- Sporangia release zoospores which attack the tubers



Live resting (winter) sporangium  
of *S. endobioticum*.

## Mode of survival and spread

- Resting spores - viable in soil for 20 - 25 years
- Withstand passage through the intestines of cattle
- Spread - contaminated manure, soil, infected seed tubers

## Epidemiology

- Temp - 17 to 120°C
- Presence of oxygen and nitrates in soil favours the germination of sporangia

## Management

- Resistant cultivars
- Steam sterilization of soil
- Soil treatment – mercuric chloride and formalin 5%
- The European and Mediterranean Plant Protection Organization (EPPO) lists *Synchytrium endobioticum* as an A2 quarantine pest

## Scab Bacteria *Streptomyces scabies*

### Symptoms:

- Shallow scab – corky tissue which arises from abnormal proliferation of the cells of the periderm of the tuber
- Lesions vary in size and shape and darker than the healthy skin
- Corky lesions 1 to 3mm deep and darker than shallow lesions
- Actinomycete attacks young tubers at a early stage of development



### Actinomycete

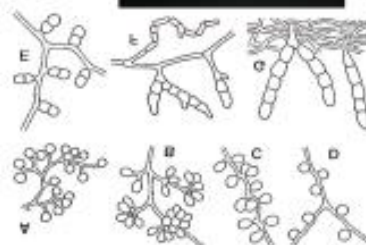
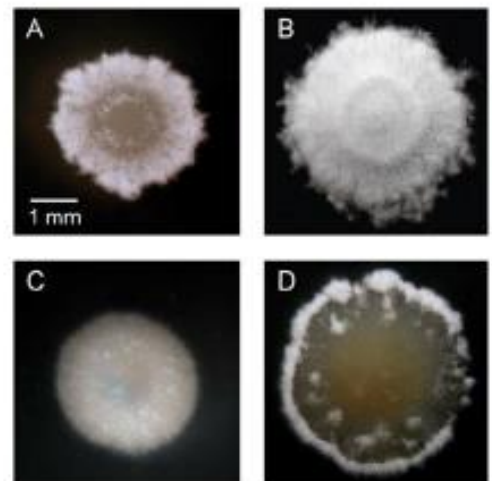
### Gram positive bacteria

### Produce spores

- Conidia – produced by formation of septa, which contract to form narrow necks between the cells
- Conidia- cylindrical and hyaline

### Mode of spread and survival

- Affects cabbage, carrot, eggplant, onion, radish
- Contaminated soil and infected tubers - source of infection
- Pathogen may survive passage through digestive tract of animals and hence it may spread with farm yard manure





**Favourable condition:**

- Severe in neutral or alkaline soils. Disease increases with increase in alkalinity
- Warm and dry soil conditions, increase the incidence

**Mode of spread:**

- Soil borne, and spread through seed tubers, wind, water
- Also spread through digestive tract of animals

**Control measures:**

- Use disease free planting materials
- Decrease the soil pH level. Below 5.2 the disease is suppressed
- Soil application of PCNB (30kg/ha) at the time of planting
- Green manuring before planting – effectively reduce disease incidence
- Seed treatment - mercuric chloride 0.1 %
- Varieties - Menominee, Russet Rural, Sebago

**Silver scurf**  
*Spondyocladium atrovirens*

- Lesions - brown, slightly depressed and circular with fimbriate margins
- Dotted with minute black specks or sclerotia of the pathogen
- Organism invades only the cork cells which are destroyed and slough off forming a 'scurf'



Brown Lesions



Black dotted specks



Silver scurf

**Fungus**

- Hyphae – septate, branched, hyaline and become brown with age
- Conidia- dark brown, club shaped, thick walled
- Hyphae form minute sclerotia

**Survival:**

Pathogen live from season to season on the affected tubers and in the soil

**Spread:**

Spread from diseased to healthy tubers in storage

**Management**

- Use of disease free seed material
- Seed treatment- mercuric chloride 0.1% for 30 min



Figure 4. A magnified picture of the conidiophore showing the conidia (spores).

## Brown rot *Ralstonia solanacearum*

Cause significant yield losses, through the rotting of tubers  
Affects tomatoes and the weeds (Race 3)

- Leaf- turns bronze colour, shrivel and die
- Vascular system of stem, root, stolon and tuber turns brown
- **Ring disease** - brown ring in the tuber due to discolouration of vascular bundles
- Whitish bacterial exudate oozes from the vascular system of cut stems and cut tubers



### Casual organism

- Gram negative, rod shaped bacteria, polar flagellum
- Forms no spores and capsules
- Is a quarantine organism in Europe and considered a bioterrorist organism in the United States



### Mode of spread and survival

- Soil-borne
- colonises the xylem, causing bacterial wilt and brown rot
- Infected soil and seed tubers - source of infection
- Decay plant parts release masses of bacteria in the soil - viable from season to season
- Infection through wounds in roots which spread through vascular system into the stem
- It survives well in water and in many different soil types and on alternative hosts like weeds.





### Epidemiology

- Soil temp - 25 to 35°C
- Moisture - 50 %
- Optimum pH - 6.2 to 6.6

### Management

- Use disease free propagation materials (seed, cuttings, tubers)
- Disinfect cutting knives and tools
- Control root rot nematodes as the wounds they make on roots help the bacteria to infect the crop
- Crop rotation - potato-wheat
- High degree of resistance - clones



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