LATE BLIGHT OF POTATO

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HISTORY

- Responsible for Irish Famine in early 1840s.
- The pathogen was first described by M.J. Berkeley (1846) and subsequently named *Phytophthora infestans* by Anton de Bary (1876)

OCCURENCE AND DISTRIBUTION

- Anthracnose was first described from plant specimens obtained in Germany in 1875.
- Later it was spread throughout the world.
- It has been reported in USA, European countries, Canada, Africa, Uganda, Kenya, Tanzania, Rwanda, Burundi, Ethiopia, and D.R. Congo.

ECONOMIC IMPORTANCE

- The average annual losses due to late blight have been estimated to 15% of total production in the country
- If severly effected the complete crop loss occurs.
- Reduced tuber size decreases the market value of crop

SYMPTOMS

ON LEAVES

- Late blight affects all plant parts especially leaves, stems and tubers. On leaves the initial symptoms appear as pale green water soaked spots (2-10 mm) mostly on the margin and tips
- In moist weather, spots may appear anywhere on the leaves, enlarge rapidly and turn necrotic and black killing the entire leaf instantly
- On the corresponding lower side, whitish cottony growth containing millions of sporangia forms around the dead area in a ring pattern

ON STEM

- On stem, light brown lesions develop which elongates and encircles the stem and petioles breaking them and killing the plant/leaves instantly. Stem infection is more severe under high temperature and relative humidity conditions

ON TUBERS

- The surface of the tubers has hard depressions with purplish tinge on the sides. Rusty brown discolouration of the flesh is the typical symptom
- Initially the infected tubers are hard but associated secondary pathogens may set in soft rot symptoms.

SYSTEMATIC POSITION

Kingdom : Chromista
Phylum : Heterokontophyta
Class : Oomycota
Order : Peronosporales
Family : Peronosporaceae
Genus : *Phytophthora*
Species :*Phytophthora infestans*

CAUSAL ORGANISM

- *Phytophthora infestans* is a member of oomycetes, a group of organisms sometimes referred to as the "water molds". Oomycetes are not true fungi but are more closely related to brown algae.
- The mycelium is hyaline and coenocytic (few septa), and the nuclei are diploid. Most fungi are haploid.

MODE OF SPREAD

Primary spread:

The infected seed tubers

Secondary spread

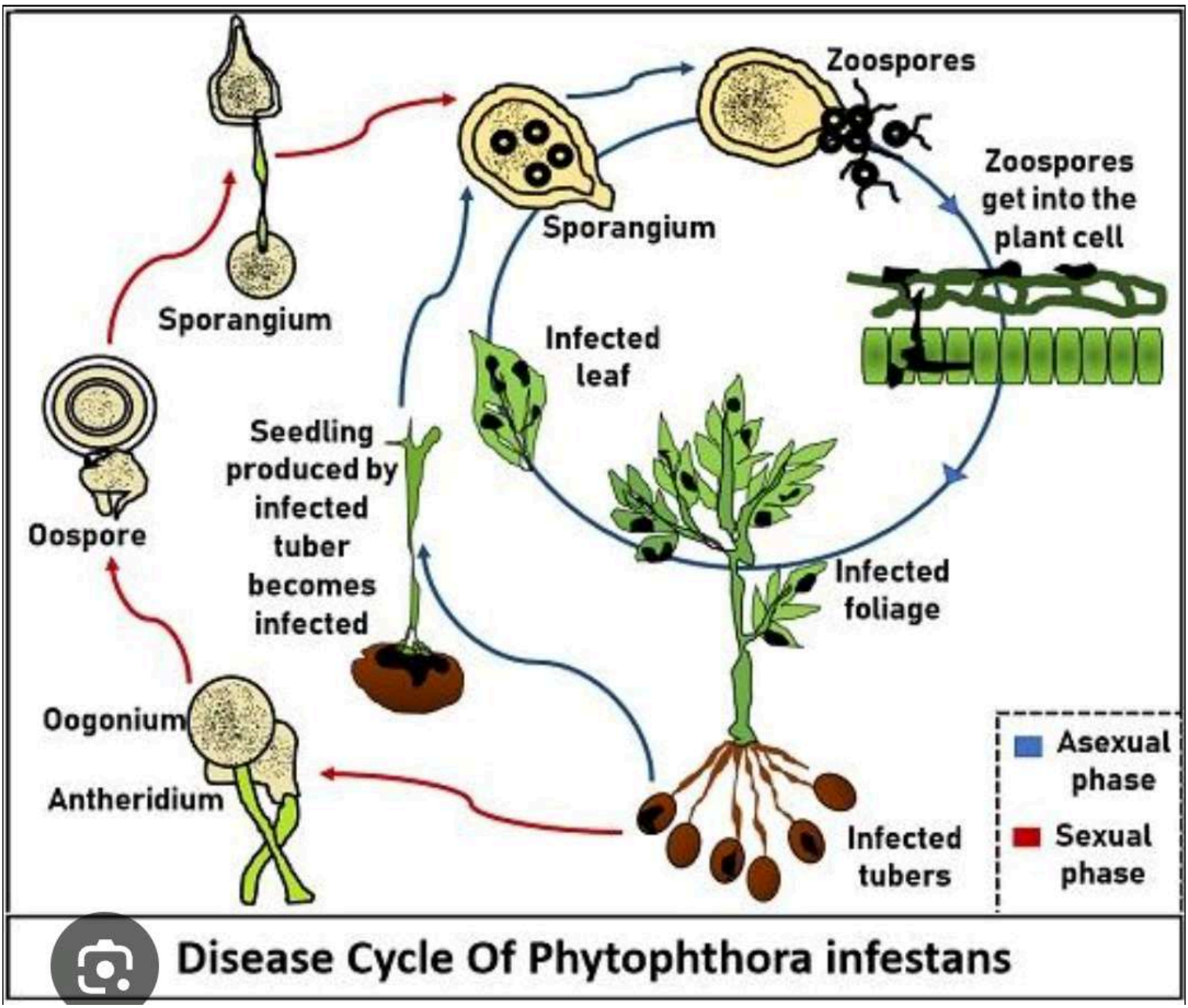
Rain splash and wind.

FAVOURABLE CONDITIONS

- Fungal growth : 16-20^0 C
- Spore production : 18-22^0 C
- Spore germination (indirect) : 14^0 C
- Infection and disease development : 7.2-26.6^0 C

HOST RANGE

- Potato
- Tomato



Disease Cycle Of Phytophthora infestans

CULTURAL MANAGEMENT

- Removal of infected plant debris.
- Using diseased free seeds.
- Giving adequate plant spacing.
- Avoid overhead irrigation.

CHEMICAL MANAGEMENT

- A spray schedule of minimum of four fungicide spray recommended.
- I spray: As a prophylactic measure, spray the crop with contact fungicides like mancozeb 75%WP (0.2%), propineb 70% WP (0.2%) or chlorothalonil (0.2%) as soon as the weather conditions become congenial for late blight
- II spray: As soon as the disease is noticed in the field, apply any of the systemic fungicides *viz*., cymoxanil-based or dimethomorph-based or fenamidone-based (0.3%) fungicides
- III spray: Apply contact fungicides viz. mancozeb (0.2%), propineb (0.2%) or chlorothalonil (0.2%) after 8-10 days of 2nd application of fungicides
- IV spray: Apply systemic fungicides or contact fungicides as mentioned above depending on disease severity and weather conditions

BIOLOGICAL MANAGEMENT

The leaf extracts from onions, garlic, *Malustoringo*, *Reynoutria japonica* and *Rheum coreanum* revealed positive inhibition of mycelial growth of *P. infestans*. *M. toringo* extracts strongly inhibited *P. infestans* and was effective in managing late blight

Bacillus subtilis (B5–0.25%) + *Trichoderma viride* (TV-0.7%) was applied before disease appearance

HOST RESISTANCE

- Host resistance is the best option for management of late blight of and it is eco-friendly in nature.
- CPRI has released varieties having moderate to high degree of resistance to late blight for cultivation both for plains and hills. Some of them are Kufri Giriraj, K. Shailja, K. Himalini and K. Himsona (for hills) and K. Pukhraj, K. Anand, K. Sutlej, K. Badshah, K. Arun, K. Jawahar, K. Chipsona-1, K. Chipsona-2, K. Chipsona-3 and K. Frysona (for plains). Advanced hybrid MS/99–1871 derived from cross PH/F-1045 X MS/82–638 has been released for commercial cultivation under the name Kufri Garima.