Background and significance of plant diseases

Significance of Plant Disease

- Plant diseases reduce quantity and quality of plant produce
- Nearly 10% of all food production is lost to disease (30% to all pests)
- The introduction of exotic plant pathogens has caused great losses: e.g., American chestnut, sudden oak death, soybean rust
- Each year, suppression of plant disease costs billions of dollars worldwide
- Plant pathogens restrict trade
- Pathogens continually evolve
  - break resistance in host crops
  - develop insensitivity to chemicals

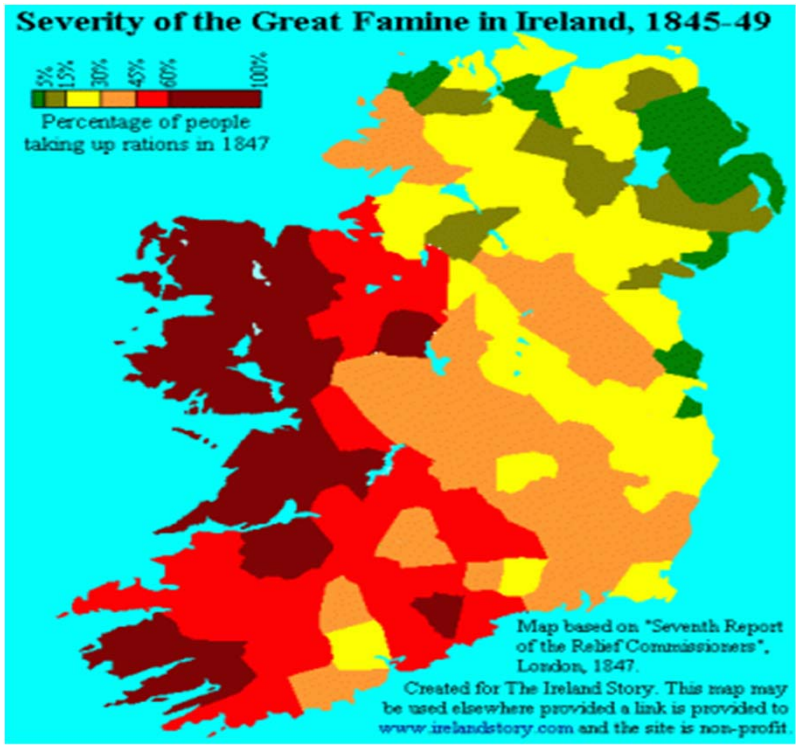
- The **Great Famine** or the **Great Hunger** was a period of mass starvation, disease, and emigration in Ireland between 1845 and 1851

- The hunger was due to destruction of the staple food crop – potato due to a disease
- The disease is known as Late Blight of potato

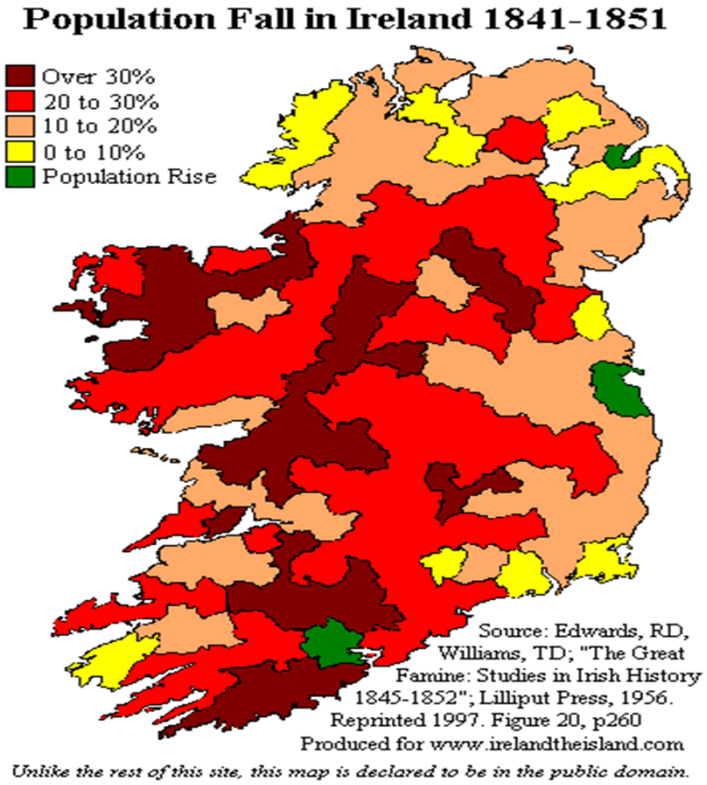
The great Irish potato famine

- The Irish famine began in 1845 and continued until 1851. More than 1 million died in 3 years as a result of hunger and diseases and much the same number emigrated to Great Britain, the United States and Australia.

Severity of The Great Famine in Ireland



Population fall in Ireland due to The **Great Famine**



Famine Deaths

South West Ulster was the hardest hit during the Irish Famine.

42%
Percentage of population of Cavan who died

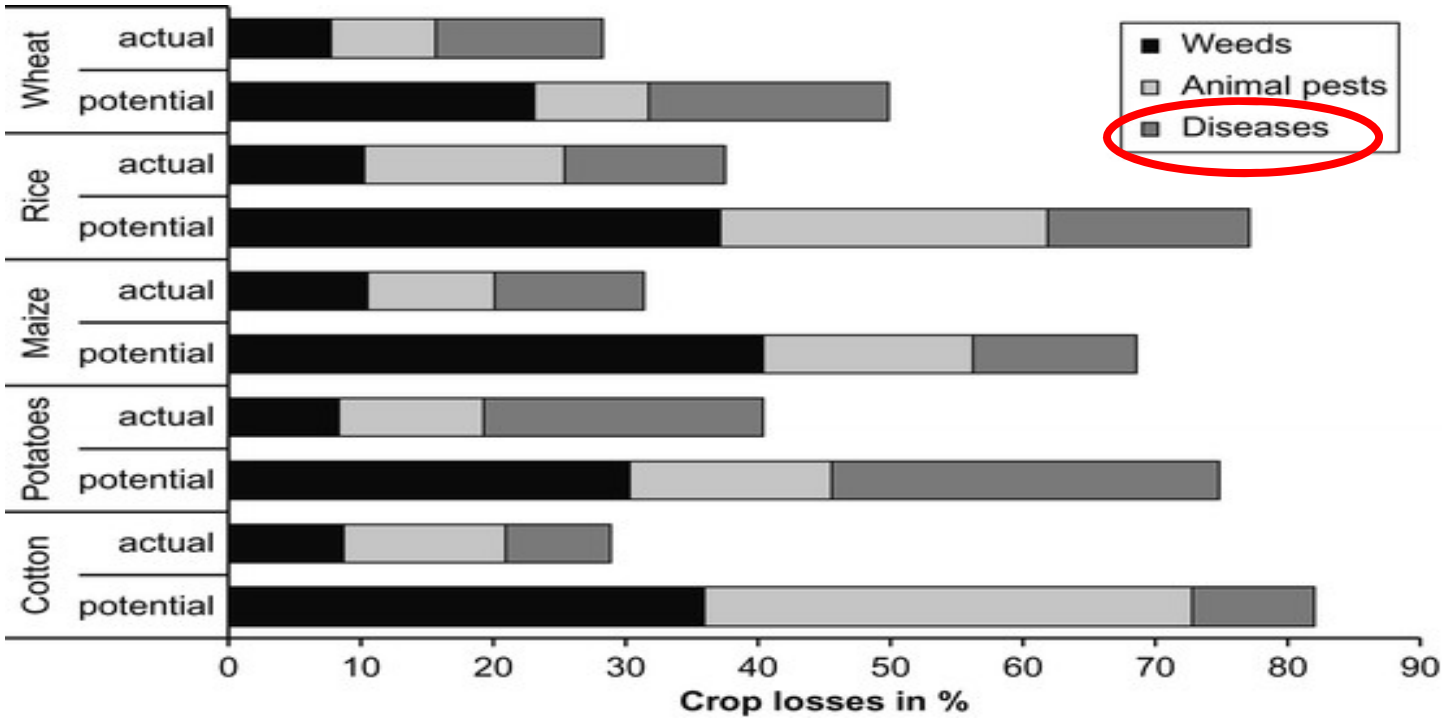
29%
Percentage of population of Fermanagh who died

28%
Percentage of population of Monaghan who died

- This led to systematic studies on the causal agent of the disease and Anton de Bary in 1861 established that the causal agent is a fungus later identified to be *Phytophthora infestans*
- This is the beginning of development of the branch plant pathology in plant science.

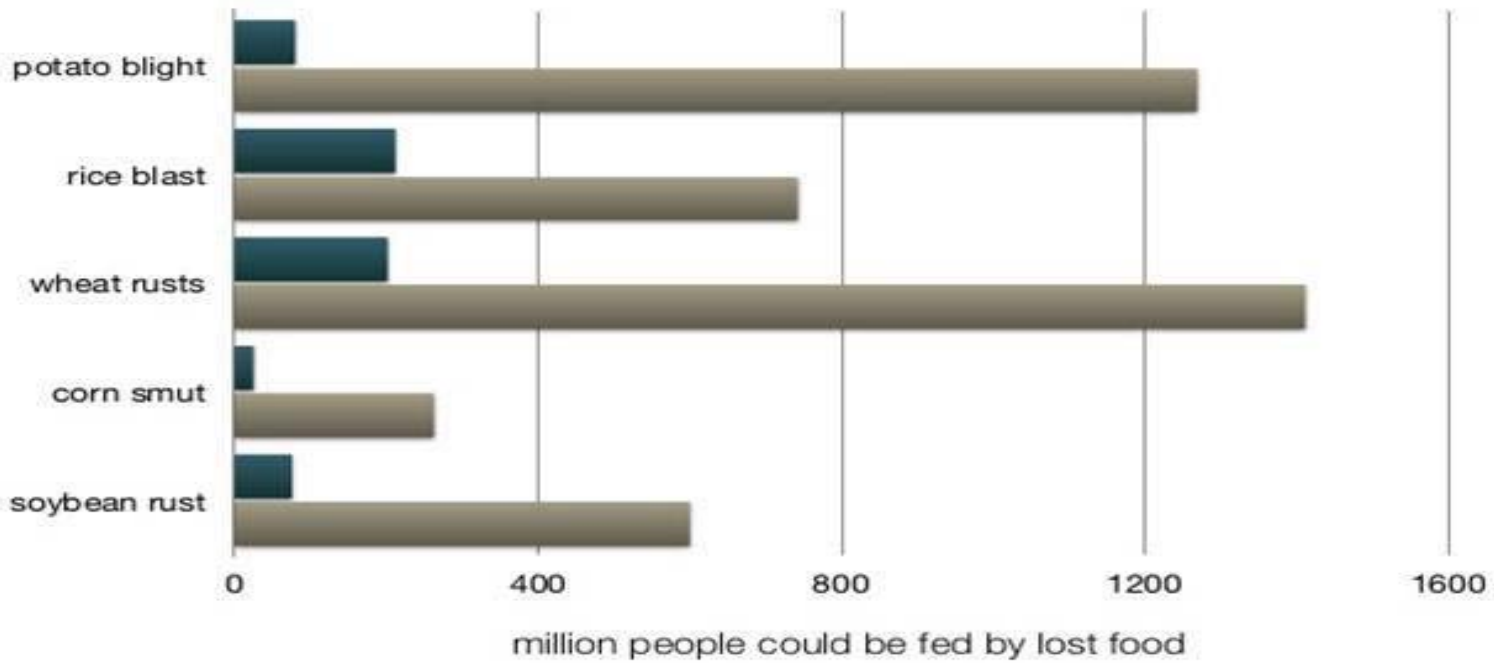
Bengal Famine - in India

- Period 1943–44
- Total deaths Current est. 2.1 million


Wheat
Rice
Maize
Potatoes
Cotton
actual
potential
Weeds
Animal pests
Diseases
0
10
20
30
40
50
60
70
80
90
Crop losses in %

Major fungal organisms posing threats to plant species currently

Rice (*Oryza sativa*); *Magnaporthe grisea* species complex on 50 grasses and sedge species, including wheat and barley	***Magnaporthe oryzae* (Ascomycota)** 	**Rice blast disease in 85 countries, causing 10-35% loss of harvest. Global blast population structure determined by deployment of seeds with inbred rice-specific and altered pathogen demographics.**
Wheat (*Triticum aestivum*); 28 *Puccinia graminis* f. sp. *tritici* species, but *P. graminis* is found on 365 cereal or grass species	***Puccinia graminis* (Basidiomycota)** 	**Wheat stem rust is present on six continents. Population structure is determined by deployment of RSR cultivars and long-distance spread of aeciospores. Strain Ug99 poses a notable threat to resistant wheat varieties, causing up to 100% crop loss.**



Crop losses due to fungal/oomycete diseases

TOTAL: Could feed 596 – 4,287 million mouths *per annum***