



The Fungal Diseases of Annual and Perennial Crops: Challenging National Food and Nutritional Surety

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India's food grain production, which was 82 million tons in 1960-61, reached to about 271.37 million tons in 2018-19. The population, which was 439 million in 1960, rose to 1369 million in 2019. In India, quite 250 million people don't have adequate food despite comfortable food and exchange assets and high growth in GDP. The troubles of declining land, water and labour energy engaged in agriculture have impacts on predictable food demands for growing population. Cereals, pulses, tubers, vegetables and fruits are essential that supply food and nutritional requirements. Of these crop plants are vulnerable to diseases both in field and post-harvest. Worldwide, these diseases are liable for loss of 10% of worldwide food production. Per annum, 30% of crops are lost in India thanks to pests and diseases. The crop loss thanks to pest and diseases is estimated to be Rs. 90, 000 crores annually. Among all these, fungal foliar diseases are economically important. Overall, the foremost important fungal foliar diseases are Late and Early blight, *Alternaria* leaf spot, and *Septoria* leaf spot, Tan spot, Powdery mildew, Downey mildew, Leaf rust, Leaf blotch, Anthracnose. Fungal foliar diseases are more severe within the tropical country like India, where congenial humidity and regular warm temperatures are the norm.

Economic losses due to foliar diseases

- Rice is caused by the *Ascomycetes* fungus *Pyricularia oryzae* (teleomorph *Magnaporthe grisea*), causing rice blast, and leading to losses of 10% to 30% of the crop per annum.
- Further cereals also are caused by *P. oryzae* or the related species *P. setariae*; these include ragi. Such an attack has serious consequences in India where ragi is a crucial food security crop.
- Rusts are emerging as major production constraints in wheat, beans, soybeans, grapes, fig and sugarcane.
- Members of the downy mildews like *Peronosclerospora*, *Peronospora*, *Pseudoperonospora*, *Plasmopara*, *Sclerophthora* and *Sclerospora* regularly cause severe diseases on a spread of crops that include maize, sorghum, bulrush millet, onion, soybean, cucurbits, and grapes.
- The *Phytophthora* belong to *Stramenopila* and *P. infestans* is probably its most notorious species, causing losses up to 100% on potato and tomato crops and incurring heavy fungicidal costs for control measures.

Foliar diseases caused by fungal pathogens can threaten the food surety

Some examples

- potato mold, caused by *Phytophthora infestans*, in Ireland during the 1840s was liable for death of 1,000,000 people out of starvation and quite 1.5 million people migrated.

Immigration of a highly virulent isolate of *P. infestans* from Mexico, favorable weather for epidemic development, lack of resistance within the potato and dependence of Irish population on potato for nourishment are the explanations for this disaster.

- There are other disasters caused by foliar diseases like the good Bengal Famine of 1943 in India. Within the Great Bengal famine, 2 million people die thanks to the high dependence of most of the population on one crop, rice, which was caused by the fungus *Cochliobolus miyabeanus* caused brown spot of rice.
- Highly virulent *Puccinia graminis* fungus race Ug99 discovered in Africa has the potential to famine if antagonistic efforts aren't taken to get new sorts of resistance and other management strategies before the pathogen spreads to India.

Major foliar pathogens

- *Alternaria spp* cause serious blight diseases on tomato, potato, cauliflower, cabbage, onion, carrot, coriander, mustard, sunflower and seed species. *Anthraco* caused by *Colletotrichum spp* may be a serious production restriction in chilli, yam, grape, mango, black pepper and cardamom and also known to infect quite 25 hosts of field and horticultural crops.
- *Cercospora* is an economically important pathogen in cereals, pulses, vegetables, and peanut, banana and Horticultural crops.



Need for New Initiative on Foliar Diseases

- To develop leading edge technologies across crops and countries, which might improve the Understanding about the foliar disease?
- To make eco-friendly and sustainable technologies.
- To develop integrated disease management correspondence.
- To extend crop productivity, because it is economical, eco-friendly and suitable for Indian farming systems where agricultural assets are relatively small.
- The practice of intercropping of varied crops is common.

References

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