Management of Late Blight Disease of Potato: An Integrated Approach

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Late blight caused by *Phytophthora infestans* (Mont de Barry) is a widespread, serious, and devastating disease of potato in the world also in Bangladesh. Worldwide losses due to late blight are estimated to exceed $6.7 billion annually and thus the pathogen is regarded as a threat to global food security (Sheikh, 2019). Late blight was responsible for the worst ever famine Irish potato famine during 1844-45 (Mercure, 1998). Fungicides cannot be used alone for effective control of late blight but must be used as one tool in an integrated management strategy. Adjustment of planting time and density, crop rotation, and restriction of irrigation may be effective. The use of resistant variety is the least expensive, easiest, safest, and one of the effective means of controlling the blight. The forecast system which plays an important role in Integrated Disease Management (IDM) is used to predict the probable outbreak of disease.

Late blight symptoms appear on potato leaves initially as pale green, water-soaked spots, often beginning at leaf tips or edges (Draper et al., 1994). Circular or irregular leaf lesions are often surrounded by a pale yellowish-green border that merges with the healthy tissue. Lesions enlarge rapidly and turn dark brown to purplish-black. During periods of high humidity and leaf wetness, cottony white mold growth is usually visible on lower leaf surfaces at the edges of lesions. Infected areas on stems appear brown to black and entire vines may be killed in a very short spell when moist weather persists. Tuber symptoms are characterized by irregular reddish-brown staining of the tissue immediately below the potato skin.

**Integrated Disease Management**

*Use of healthy seed*

Only disease-free seed should be used. Seed harvested from a field infected by late blight in the previous cropping season should be avoided. The infected tubers should be removed and buried in the soil. Late blight symptoms are easy to be identified in cut-pieces where bronzing of the flesh can be seen easily.

*Resistant cultivars*

Using resistant cultivars will reduce the chances of infection and slow the pathogen growth rate if some infections develop. Select varieties that have a moderate to the high degree of resistance to late blight. For example, ‘BARI Alu 46 (LB-7)’ and ‘BARI Alu 53(LB-6)’.

*Cultural methods*

They are employed to reduce/eliminate the initial inoculum of late blight pathogen from the seed tubers/field and to check further spread of the disease.

Important cultural methods include:

1. Selection of well-drained soils for potato cultivation.
2. Avoid planting in fields or areas of fields that cannot be easily sprayed with fungicide.
3. Increase the spacing of plants to reduce canopy density.
4. Control weed hosts, such as hairy nightshade.
5. Carefully manage irrigation to avoid increasing disease risk through prolonged periods of wetness.
6. High ridging to avoid the exposure of infected tubers serving as the primary source of the disease. Besides, it also helps in the reduction of tuber infection.
7. As soon as the weather conditions become congenial for late blight, irrigation should be stopped wherever applicable. Only light irrigation may be given later if required.
8. Identify and destroy hot spots of infection in a field to reduce the production and spread of spores.
9. Destroy and remove the haulms from the field when the disease severity reaches > 80% to avoid tuber infection.

Figure 1. Typical symptom of late blight of potato showing dark brown to purplish-black lesion with cottony white mold growth

Biological Control
The bio-control activity of *Trichoderma viride* and *Pseudomonas fluorescens* against *Phytophthora infestans* under greenhouse conditions was found effective (Zegeye et al., 2011).

Forecasting Techniques and Scouting Systems
To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts and disease forecasting programs should be used to identify periods conducive to disease development.
Scout fields regularly to detect early if there is any disease in the field and other sources of disease. Wind protected areas of the field, near treeline or in low areas of the field often stay moist longer and should be monitored.

Chemical control
Early in the season, the lowest labeled rate of protectant fungicide will provide protection and thus prevent a rapid epidemic. Fungicide should be applied either at an appropriate regular interval for the
production area or adjusted on the basis of weather. A spray schedule of a minimum of four fungicide sprays is recommended. However, the number of sprays may be increased or decreased depending on disease pressure.

**INTEGRATED DISEASE MANAGEMENT OF LATE BLIGHT OF POTATO**

**Use of Disease Free Tuber**  
E.g. Seed tuber collected from BARI, BADC or certified seed from private company.

**Using Resistant Variety**  
E.g. RARI Alu 46, BARI Alu 53 & BARI Alu 77

**Bio Control Agents**  
E.g. *Trichoderma viride* and *Pseudomonas fluorescens*  
(In greenhouse condition)

**Cultural Control**  
E.g. regular scouting, weeding, proper sanitation, increased spacing, high ridging, proper soil drainage.

**Forecasting**  
E.g. Regular weather report from Bangladesh Meteorological Department and forecasting message MOA.

**Late Blight of Potato**

**Fungicide Spray**  
1st Spray: Mancozeb 75% WP (0.2%), Propineb 70% WP (0.2%) as soon as the weather conditions become congenial for late blight.  
2nd spray: Metalaxyl-based (0.25%) or Cymoxanil-based (0.3%) fungicides as soon as the disease is noticed in the field.  
3rd spray: Mancozeb (0.2%) or Chlorothalonil (0.2%) after 8-10 days of 2nd spray.

**Figure 2. An IDM model for late blight of potato**

**Conclusion**  
Successful management of late blight depends on an integration of the following practices: removing sources of the pathogen by eliminating cull potatoes and planting only healthy seed tubers, using resistant cultivars, scouting locations where late blight might appear first, using a forecasting system to gain an early warning of weather favourable to the disease and to adjust the frequency of fungicide application or the intensity of scouting; and using appropriate protectant or systemic fungicides.

**References**  