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Management of Early and Late Blight of Potato

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Potato (*Solanum tuberosum* L.) is an important vegetable crop, grown in many parts of the world. Early blight and late blight; two serious diseases of potato, are reported throughout the world. The terms "early" and "late" indicated that the relative time of their appearance in the field. Both diseases are caused by fungal pathogens namely; *Alternaria solani* and *Phytophthora infestans*. The diseases not cause only loss of yields but also reduce the quality of the crops.

Early Blight

Early blight of potato is caused by a fungal pathogen *Alternaria solani*; it is destructive disease in several states, causes heavy yield loss. The disease affects leaves, stems and tubers as well as it reduces size and quality of tubers. Premature defoliation may lead to considerable reduction in yield. The disease can also be severe on tomatoes, and can occur on other solanaceous crops and weeds.

Disease Symptoms:

The initial symptoms of early blight appear as small, circular or irregular, dark-brown to black spots on the lower leaves. At later stage these spots enlarge size and spread all over the plant parts. The spots develop with concentric rings looks like target board pattern. Spots may also develop on the tubers -- these spots are sunken or raised with a definite margin. The internal tuber tissues are brown to purple in color, some time with a yellowish margin.

Disease Cycle:

The fungus survives either on potato tubers or as infected crop residue either in the soil. The concentration of initial or primary inoculum from these reservoirs is usually low. The primary infection can occur from months November and early December, when frequent rains or dews occur and daytime temperatures remain near 22-25 °C. The fungus spores can penetrate the leaf surface directly through the epidermal cells and spots begin appearing within 3-4 days. The secondary spread takes place by wind-borne conidia between plants to plant and fields to fields.

Disease Management:

- Eradicate and destroy weeds and volunteer solanaceous crop plants.
- Use only disease free seeds for sowing.
- Crop rotation with non-susceptible crops at least 2-3 years.
- Maintain proper spacing between plants to plants and row to row.
- Avoid sprinkler or other overhead irrigation.
- Use optimum dose of fertilizers.
- Harvest when skin is mature to avoid infection of tubers.
- Spray the solution of Mancozeb 75 WP + 10 g urea per liter of water at 15 days interval when symptoms start or apply copper fungicides at early stage of disease infection.

Late Blight

Late blight of potato is also known as potato blight. This disease was responsible for the Irish famine in the 1843-45. The organism can also infect some other members of the solanaceous crops. The pathogen was first described by M. J. Berkeley and subsequently named *Phytophthora infestans* by Anton de Bary. The disease can infect and destroy the leaves, stems and tubers of potato plants. The average annual losses due to late blight have been reported about 35% of total production in the country.

Disease Symptoms:

The first appearance of the disease is seen in the month of January. Small, dead, and brownish to purplish black lesions on the tips and margins of the leaflets shows at initial stage of the infection. Under favorable conditions (12–18°C temperature and more than 80% RH) the lesions rapidly increase in size and cover the whole surface of the leaf. The blighted leaves become curl and shrivel in dry weather and under moist conditions they decay and emit a characteristic odor. In the infected plant tubers get also infected. When the tuber is cut and open, there is a tan-brown, dry, granular rot appearance may be seen. Such infected tubers get easily rot in storage under warm or humid conditions.

Disease Cycle:

The pathogen survives with infected tubers between season to season on infected potato tubers as in the storage or in the soil after harvest. Infected tubers that are planted or other volunteer plants that survive the winter may be sources of the pathogen for primary infection. The pathogen is favored to high moisture and cool to moderate temperatures. Night temperatures of 11°C to 15°C and day temperatures of 16°C to 20°C are most favorable for disease development. Rain, dew and overhead sprinkler irrigation provide the water necessary for pathogen infection and development.

Disease Management:

- Destroy infected plant debris and other volunteer plants.
- Select disease free seed tubers for sowing.
- Do not mix seed lots with infected tubers because cutting can transmit late blight.
- Treat the tubers with suitable fungicides.
- Avoid nighttime and flood irrigation.
- Select resistance variety such as Kufri Anand, Kufri Badshah, Kufri Arun, Kufri Himsona, Kufri Lalit, Kufri Pukhraj, Kufri Sadabahar, Kufri Sutlej for cultivation.
- Apply foliar fungicides application to overcome disease severity. Once late blight is start, only foliar fungicide applications can manage this infection in the field.
- Spray Dithane M-45 or Dithane Z-78 @ 2.5 kg/1000 liters of water per hectare. It should be repeated at 10-12 days interval.

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