

**EARLY BLIGHT OF POTATO**

**Causal organism:** *Alternaria solani*

**Order:** Moniliales

**Family:** Dematiaceae

**Symptoms:** The initial symptoms appear in the form of small, isolated scattered pale brown spots on leaves with deep greenish-blue fungal growth. The lower leaves are attacked first and then the disease progresses upwards. In the necrotic tissue, concentric rings develop, which give a target board effect. There is usually a narrow chlorotic zone around the spots fading into normal green. In case of severe infection, the leaves are shriveled and fall down. The stem lesions often girdle it and cause “Collar-rot” in young seedling plants leading to collapse of branches or entire above ground portion. On tubers the affected region is darker than the healthy area and the lesion soon shrinks slightly as dry, corky rot develops.

**Disease Cycle:** Mycelium and conidia can survive in plant debris and on seed tubers. The conidia germinate in moist weather and cause primary infection directly or through stomata, first on lower and then on upper leaves. The secondary infection takes place through conidia carried by wind, water or insects.

**Epidemiology:** The optimum temperature for conidial germination is 28-30°C. If season starts with abundant moisture and frequent rains, disease becomes serious, followed by warm and dry weather, which is unfavorable for the host but helps rapid disease development. Weaker plants are more susceptible.

**Control**

- 1- Crop rotation and field sanitation is a rational measure to avoid primary infection from spores that have survived from previous crop.
- 2- Fungicidal sprays starting from 30 days after sowing at an interval of 10-21 days (depending upon the intensity of disease). For this purpose Dithane M-45 (0.6%), Daconil (0.3%), Acrobat MZ, Ridomil Gold MZ, Banko (0.2 – 0.25%) can be used.
- 3- Proper fertilization of the crop to maintain the plant vigour.

**LATE BLIGHT OF POTATO****Occurrence and Importance:**

Potato is a native of Andes (South America), where this disease occurred in endemic form. The disease was recorded simultaneously in Europe and North America in 1830. It became very well established in Europe by 1842 and was one of the important causes of the great Irish famine in 1845 and 1846. It invaded the sub-continent between 1870 and 1880. This is extremely destructive to tomato and eggplant and many other Solanaceous hosts except pepper. It may bring about as much as 10-15 percent losses to world production of potatoes during certain years.

**Causal organism:** *Phytophthora infestans*

**Order:** Peronosporales

**Family:** Pythiaceae

**Symptoms:** The disease manifests itself only after the blossoming period. The first symptoms appear in the form of brown dead spots or extended necrotic areas more frequently until the leaves are killed. These blighted areas first appear as faded green patches, which soon turn to brownish black lesions not delimited in size. These lesions enlarge rapidly under favorable weather. They appear on tips and margins of the leaves and spread downwards or inwards. In moist weather, entire leaf may be killed in 1-4 days, while in dry weather, infection advances slowly and affected areas curl and shrivel and the spots are restricted in size and look hard, easily breaking away. On lower surface of leaves, a whitish or grayish mildew growth appears on the surface of lesions where pale and purplish tissues merge. This contains Sporangiophore and sporangia, which grow out through stomata.

Tubers are also affected in the field, having dry or wet rot according to the moisture and temperature prevailing at that time. There is brown to purple discoloration of skin followed by brownish dry rot, which extends about ½" below the skin.

**Disease Cycle:** Fungus survives mostly as persistent mycelium in the infected tubers, but it may overwinter in soil as well. This mycelium grows up in the stem and produces sporangia and zoospores on small dwarf shoots. The secondary infection starts from these spores. Infection takes place epidermis of leaves and stem either through stomata or directly. Tuber infection occurs through eyes, lenticels or wounds. Susceptibility of eyes and resistance of lenticels increases with storage and maturity of tubers. Spores from blighted leaves are washed down to soil and cause tuber infection.

**Epidemiology:** Chances of epidemic development of disease are the maximum when unusually cool weather combined with abundant moisture prevails at the time of sporangial formation. Conidia are formed at a minimum relative humidity of 91 % (optimum = 100 percent) and a temperature range of 3-26°C (optimum = 18-22°C). The conidia formed at 15°C and optimum temperature for zoospores formation is 12°C. Cool moist nights are thus required to provide most rapid buildup of inoculum and are the most favorable for the formation and germination of zoospores. It is possible to make an accurate forecast of the disease if accurate meteorological data are available and current weather trends are known. For example, in Holland they have worked out the following four criteria necessary for the occurrence of late blight epidemics:

Night temperature below the dew point for about four hours or more.

Night temperature not more than 10°C.

Mean cloudiness not below 0.8 on the following day.

Rainfall of at least 0.1 mm on the following day.

Very fortunately, in plains of Pakistan, the weather conditions are unfavorable for the development of epidemics. But in the hills, sometimes, temperature and moisture conditions are favorable and therefore, late blight epidemics may occur in certain years.

**Control:**

- 1- Seed tubers should be obtained from areas where disease does not occur.
- 2- Use of resistant varieties: All the commercial varieties within the species *Solanum tuberosum* are susceptible. However, *Solanum demissum*, a species from Mexico is highly resistant. Hybridization of this variety with commercial types has been tried with good results. e.g. Cord
- 3- Foliage spraying is the most satisfactory control method. Bordeaux mixture and some new fungicides such as Acrobat MZ, Ridomil Gold MZ and Banko (0.2 – 0.25%) give good results.
- 4- General Sanitary Measures, killing and removing of foliage a few days before actual digging of potatoes is beneficial in reducing chances of tuber infection.

Early Blight	Late blight
High temperature and low moisture is required	Reverse in this case
Appears early in season	Reverse in this case
Appears in Plains	Appears in Hilly areas
Caused by a higher fungus	Caused by a lower fungus