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# LATE BLIGHT OF POTATO

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Late blight is one of the oldest established diseases of the potato. It was first imported in the United States about 1842, and three years later spread throughout the northern potato-producing sections of the United States and Canada. Until recent years the most severe occurrence of the late blight in Michigan was in 1915 when the crop loss in this state was estimated at $4,000,000. The disease has appeared sporadically since then, especially in the potato-producing areas of the Upper Peninsula. In the Lower Peninsula, a few areas were affected in 1938 and still more in 1939. In 1940, the disease was prevalent throughout Michigan, causing severe losses through early death of

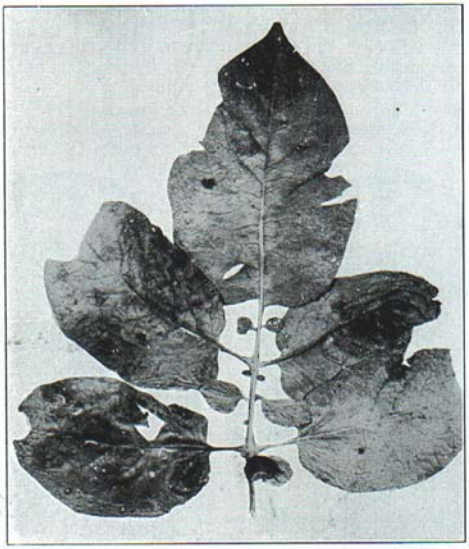

Fig. 1. Under side of blighted potato leaf showing water-soaked spots. From these spots the cobwebby growth of the causal fungus develops.

blighted vines and further losses because of some rotting of the tubers in the field and more serious rotting in pits and storage.

Late blight can be controlled through planting blight-free seed and early and thorough protection of the potato plant by bordeaux spray and copper-lime dust.

## SIGNS OF THE DISEASE

First signs of late blight noticeable to the grower appear on the upper foliage of the plant usually about blossoming time or shortly after. At this time small brownish, purplish or black areas are seen on the leaflet (Fig. 1) or sometimes on the leaf stalk or stem of the plant. Although the lower leaves are usually the first affected the grower may not see the symptoms until the disease appears on the upper foliage.

Affected areas show a water-soaked margin, indicating that the blight fungus is invading new tissue. The tissue of this zone in turn becomes blackened and dies. Bright weather following infection of the leaves causes them to shrivel and curl and if such leaves are not examined closely the symptoms may be mistaken for leaf hopper injury. If the weather remains moist, affected leaves decay and give off the characteristic odor associated with late blight.

In wet weather, the fungus appears, usually, in the spots on the under side of the affected leaf, as a fine moldy growth. Spores of the fungus are produced on this moldy growth and are spread by rain and wind for considerable distances. Under wet weather conditions entire fields may become blighted within a few days.

On the tuber late blight first appears as a small purplish or brownish discoloration of the skin (Fig. 2). Later, the flesh beneath this spot

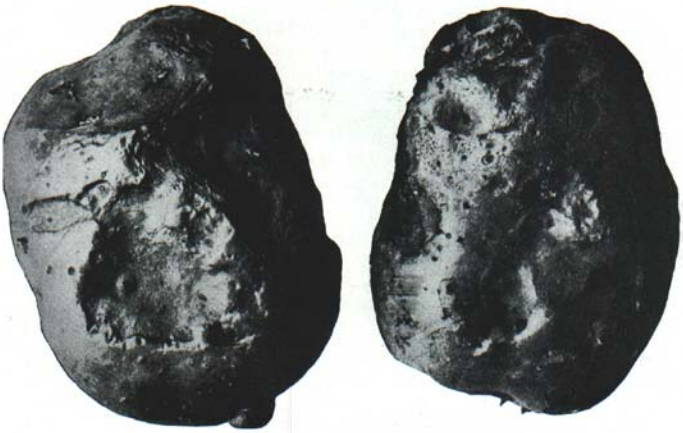

Fig. 2. Sunken areas on tubers indicate late blight rot.

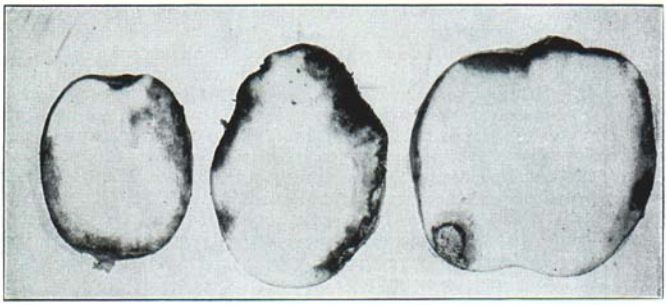

Fig. 3. Penetration of the late blight rot into the flesh of the tuber.

takes on a brownish color and the affected area spreads (Fig. 3). Usually the blighted spot becomes sunken, owing to the death and drying-out of the underlying tissue. If wet weather persists, the whole tuber softens and, aided by soft rot bacteria, turns into a foul, rotten mass. Under dry, cool conditions of soil or storage, affected tubers decay slowly with a dry rot.

## CAUSE OF LATE BLIGHT

Because late blight follows wet weather conditions, many growers think of the disease as being caused by weather conditions. In reality, late blight of potato is caused by one of the water mold fungi known as *Phytophthora infestans*. This fungus thrives best under moist conditions. It does not develop rapidly in bright sunlight.

Spores of the late blight fungus germinate readily at temperatures of 40°-50° F. and in water, either rain or dew. Investigators have shown that blight infection follows when for a period of 8 hours the temperature does not exceed 73° F. and humidity is 97 per cent or greater, followed by temperatures for one hour at 48°-65° F. and two hours at 70° F. with the leaves wet. These three conditions must be present before infection can take place. In ordinary years there is a break in the series of moisture-temperature conditions which accounts for lack of blight in certain wet periods of the potato-growing season.

## DEVELOPMENT OF LATE BLIGHT

The late blight fungus lives over winter only in infected potato tubers. It does not live from year to year in the soil. Each year there are sufficient late blight-infected potatoes planted to insure a blight epidemic if weather conditions remain favorable throughout the growing season.

From the infected seed the blight fungus grows on the young shoot. If enough moisture is present, it grows along the young plant above ground, infecting the lower leaves. Wind and splashing rain spread the fungi to the upper leaves of the plant. Here additional spores are produced and these are blown about the field. Under favorable moisture and temperature conditions they infect leaves and stems until large areas in the entire field are blighted. Late blight sometimes does not develop above ground, owing to insufficient surface soil moisture, but affects the developing tubers. In such conditions blighted tubers may be found under vines showing no late blight.

From the blighted vines, the spores are washed into the hill. Sandy soil acts somewhat as a filter, often preventing the spores from reaching the tubers. During prolonged periods of rain, however, potatoes in sandy soils may develop tuber rot.

Many potato fields, with partly blighted vines, are dug while the late blight fungus is producing spores. In running the vines over the digger, blight spores are scattered upon tubers. The freshly dug tubers are picked up moist and taken immediately to storage or placed in pits without drying. Under such conditions late blight may develop on the stored tubers. Piling blighted vines on potatoes in pits allows the spores to be washed in upon the tubers and blight rot usually follows rapidly.

## CONTROL

Potato late blight can be controlled by planting blight-free seed and protecting the plants with a copper fungicide.

Potatoes in storage suspected of having late blight should be sorted carefully for seed stock. Sorting should be done in good light. Small, inconspicuous blight spots cannot be detected in dim light. Blighted cull potatoes should be buried deeply if not fed to farm animals. Late blight in the field often starts from blighted tubers in the cull pile.

Late-planted potatoes usually are more seriously damaged by late blight. Late varieties should be planted early to insure a full set of tubers before late blight damages the vines.

At present there is no variety of seed stock, resistant to the disease, that is available in commercial quantities. The Sebago variety, although showing considerable resistance, is not now available.

Spraying or dusting with a copper fungicide is the only means of protecting the plants against late blight infection. Applications of spray or dust should begin when the plants are 4 inches high. Keep the vines covered with spray or dust until danger of late blight is past. Applications must be made as often as weather conditions make it necessary to re-cover the vines. An application every 7 days or more often may be required. Spray with bordeaux mixture 8-12-100, using an average of 125 to 150 gallons per acre each application. Frequent applications of this standard mixture are better than heavier dosages at longer intervals.

Dusting, although usually not so effective as spraying, often is a practical means of late blight control; this is especially true in the case of small fields or those far from adequate water supply. Dusting machines are available in hand, traction and power models.

For dusting, use 20 pounds of monohydrated copper sulphate mixed with 80 pounds of hydrated lime. Do not use the ordinary powdered form of blue vitriol or copper sulphate used in making bordeaux mixture to make the dust. This dust can be home-mixed or obtained ready-mixed from dealers. Apply an average of 35 pounds of dust per acre each application. Under severe blight conditions dosage may be increased to 50 pounds per acre.

Both spray and dust materials are protectants and to be effective must be applied before late blight infection occurs.

If the field is blighted, dig the potatoes during bright weather after all vines are dead and allow tubers to dry before storing or placing in pits. Store in cool dry storage with good ventilation. For winter storage maintain temperature at 36° to 40° F.

Do not pile blighted vines on the potato pits. This usually results in rapid rotting of the potatoes.

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