

LATE BLIGHT

of potato

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Late blight is very spectacular disease of potatoes and tomatoes developing on the vines at any time during the growing season. It develops with rapidity on foliage, and tubers become diseased either while still in the ground or in storage. This disease, which destroyed the major food supply of a large portion of the population in Ireland and Great Britain, was responsible for the famine occurring between 1845 and 1850 and stimulated, in part, migration from Ireland and the British Isles to this country.

SYMPTOMS

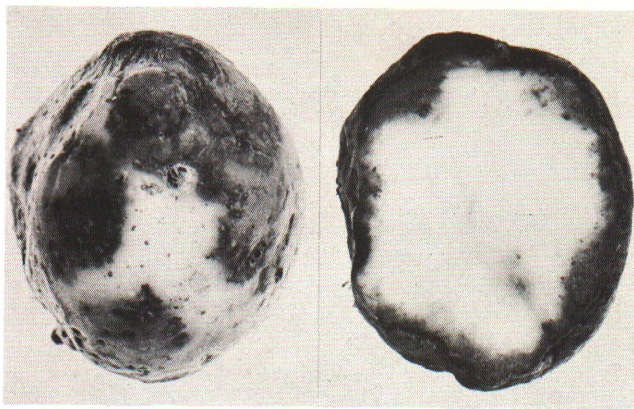
Late blight develops in severity any time during the growth or storage of potatoes. In the field, the first symptom is a brown to black collapse of the tissue of stems and leaves. Lesions expand so rapidly that occasionally the effect of general burning of the vine is simulated. It is ordinarily during such times that late blight is recognized by the grower. However, lesions on which large numbers of spores are found probably have been present on the vines for at least a week or two and the disease has been building up in severity. Lesions usually occur first on the lower leaves, which are more or less protected from drying out. Lesions are rather circular in shape, not delimited by the veins of the leaf and are brown if dry or black if damp. Often a pale yellowish green zone surrounds rapidly expanding lesions. Decaying potato foliage produces a characteristic odor. This odor is often noticed in fields where late blight is developing rapidly.

On the surface of the leaf, ordinarily on the under-surface, a sparse white mold-like growth is evident, particularly following periods of moist weather. This sparse, white mold-like growth is very diagnostic for late blight. It should not be confused, however, with *Botrytis* blight, which produces yellowish spore masses.

Above — Late blight on potato leaf. Below — Sparse white mold of the late blight fungus on the lower leaf surface.



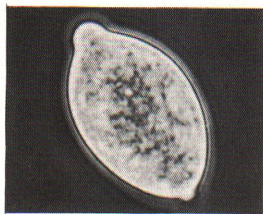
On tubers, the disease is characterized by more or less irregular lesions which are, at first, rather firm, brick red in color, and penetrate to varying depths into the tuber. The line of demarcation between healthy and diseased tissue is not clear. Soft rots follow late blight tuber infection rather promptly. Infected tubers break down in the field before harvest or break down in storage after harvest.



Left - Late blight infected potato tuber showing dark brownish external discoloration. Right - Late blight in potato tuber tissue showing reddish-brown discoloration penetrating to various depths.

CAUSAL ORGANISM

Late blight is caused by a fungus, *Phytophthora infestans* (Mont.) de Bary. The fungus spores are relatively short-lived and are rapidly killed during periods of hot, dry weather. The spores which are produced in abundance on infected leaves and occasionally on infected tubers, are carried by air currents to other potatoes in the vicinity. Survival of these spores is dependent upon periods of high relative humidity. Infection of foliage and of tubers is rapid and wounds are not required.



Above - Spore of *Phytophthora infestans*. Right - Late blight fungus in potato stem with dead tissue at the top. Living fungus is deep inside the stem.



DISEASE CYCLE

Spread of late blight is accomplished by spores which are either wind-borne or spread from plant to plant by splashing water. Since the spores are readily killed under dry conditions, late blight spreads primarily during periods of moist, cool weather. Because of the close relationship between damp, cool weather and late blight severity, forecasting of late blight epidemics may in the future be attempted. At present, however, the method has not been generally effective in the United States.

Tuber infection is accomplished by washing of spores through soil onto the tubers and infection follows in the soil. In addition to this, tubers may be infected by air-borne spores during the harvesting operation. When this happens, tuber rot develops in storage even though the crop appeared healthy when placed in storage. Late blight is carried over from

year to year by infected tubers in storage. Although most infected tubers rot in storage or soon after planting, it is unlikely that planting infected tubers as seed in the field may start a late blight epidemic. A major source of late blight inoculum in the early part of the season undoubtedly originates from potatoes which sprout in cull piles. In such piles, late blight infected tubers may be present in large quantities and thus if even a few spores are produced they are under extremely favorable conditions for establishment of late blight. Large numbers of spores are produced on infected plants growing in the cull pile. Such spores are then blown into fields and infection of foliage follows.

CONTROL

Cull piles should be destroyed and infected cull seed should not be permitted to sprout.

Late blight is best controlled on the foliage of potatoes by the use of fungicides such as those containing copper, the dithiocarbamates, which include *zineb*, *maneb*, and *Dithane M-45*, and the new organic fungicide *Polyram* and *Difolatan*. Efficiency of control depends upon thorough and frequent coverage of the vines, particularly the undergrowth and the lower surfaces of the leaves. New growth must be protected if late blight is present. Once late blight is established in the vines, it is very difficult to control unless the weather becomes hot and dry.

For complete chemical recommendations, see the current revision of MSU Extension Bulletin 312, "Chemical Control of Insects and Diseases on Commercial Vegetables."

Improper use of overhead irrigation is often an important factor in spread of late blight. Avoid frequent light applications of water, which maintain high humidity in the foliage.

Vines should be thoroughly killed and at least one week be allowed before harvest operations are begun. Thus late blight spores from the vines in the field will have died.

If tubers have been infected in the field, vines should be killed and ten days to two weeks be allowed for infected tubers to become visibly infected or to rot prior to harvest.

Tubers should be dry when placed in storage and if late blight is believed probable, they should be further dried by forcing air through storages soon after harvest. When tubers have been infected and rot is developing in storage, much can be accomplished by forced draft ventilation in preventing spread from tuber to tuber and the accompanying wet rot in storage.

Resistant varieties of potatoes have been developed, particularly for certain races of the fungus. At present, it is not sufficient to rely on varietal resistance for late blight control. A program of protective fungicide application should be followed throughout the season, particularly when environmental conditions favor late blight. Certain varieties have a so-called field resistance which is undoubtedly of importance, particularly during mild infections. The *Sebago* is one such variety.