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Early Blight of Potato
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EARLY BLIGHT

of potato

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Early blight of potato is present almost everywhere in Michigan and in varying degrees of severity almost every year. The name early blight is not exactly correct, as the disease becomes severe toward the end of the growing period. It is, in reality, an old age disease appearing in severity on vines which are approaching maturity after the tuber crop has been formed. Yield reductions approximating 50 bushels per acre are not uncommon because of foliage destruction by this fungus.

SYMPTOMS

On leaves and stems, early blight produces brown colored lesions. These lesions are small, measuring from one-eighth inch and seldom become greater than one-half inch across. On older leaves they may be abundant but seldom develop on the younger leaves. Lesions are irregular in shape and may have somewhat angular borders because they are often limited by the larger veins of the leaf. Within the lesion ordinarily a series of concentric lines are formed more or less paralleling the outline of the lesion. Lesions may have a narrow yellowish border and may coalesce to kill a large portion of the leaf. Apparently, a toxic substance is produced which causes the leaves to become yellowish between the lesions and which causes infected leaves to drop prematurely. Stem lesions are generally shallow and do not cause much damage.

On the tuber, lesions are more or less irregular in shape, at first dark colored but not sunken, and later the lesion becomes somewhat sunken. The characteristic color ranges from a slate black to a brownish-black. The tissue is firm and hard and somewhat leathery in texture. Ordinarily, early blight lesions on the tuber remain hard and dry, and little or no wet rot occurs in storage.

Early blight lesions are sometimes invaded by *Fusarium* tuber rot fungi. This is particularly true in



Early blight lesions on leaves are irregular in shape, and often limited by the larger veins. Note the concentric lines in the larger lesion.

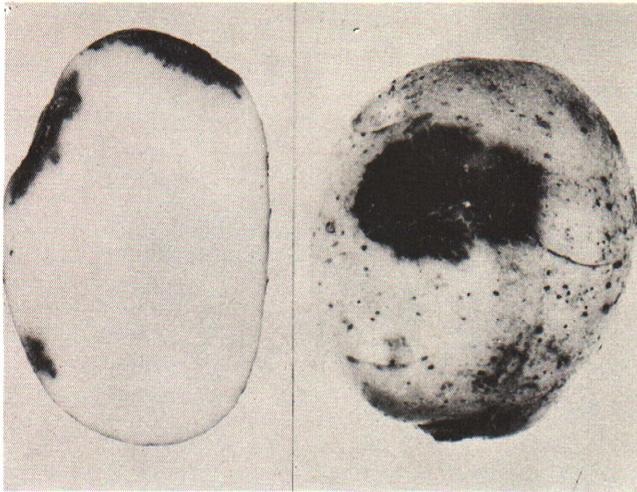


Spores of *Alternaria solani*. Top — mature club shaped multi-celled spore. Bottom — each cell of the spore is capable of germinating, by forming germ tubes. For control, it is necessary to kill the germinating spore before the germ tube penetrates the leaf.

storages where relative humidity is high. The lesion is soft and watery and the underlying tissue is usually light colored and relatively soft and firm.

CAUSAL ORGANISM

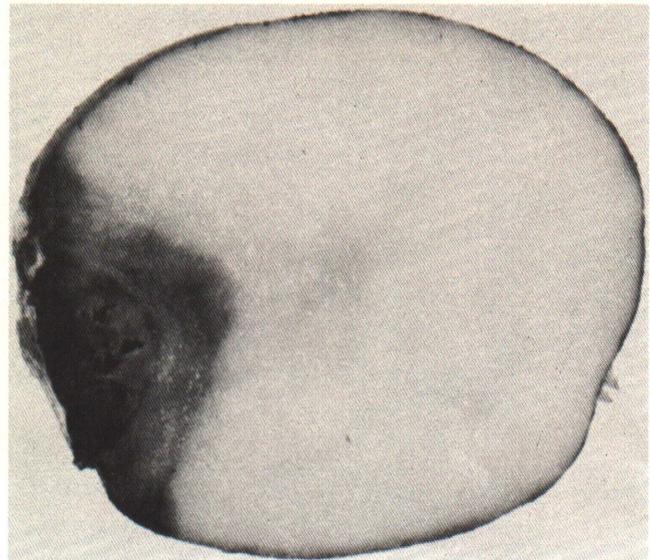
The causal organism is a fungus, *Alternaria solani* (E. and M.) Jones and Grout. This fungus is air-borne and serves to spread the disease from plant to plant or from field to field. Spores are produced on dead and dying leaves and vines of both potato and tomato. Such spores infect leaves and stems of tomato and potato plants as well as potato tubers. Infection of



Internal View

External View

Early blight lesions on tubers are dark brown to black and leathery in texture.

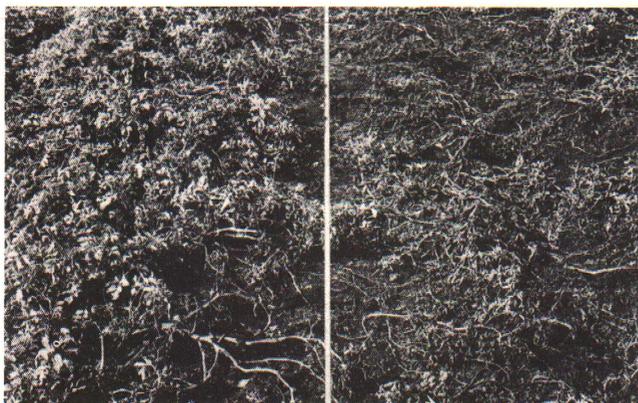


Tuber symptoms typical of early blight infection which has been followed later by *Fusarium tuber rot*.

potato vines occurs within a matter of 12 hours. Thus, even short periods during which the vines may be damp, as during evening dews or rains, are sufficient to permit the fungus to establish itself in leaves.

DISEASE CYCLE

The fungus is carried over the winter on dead, infected vines of potato and tomato in the field. Ordinarily, short rotations are sufficient to prevent excessively heavy infection early in the season. Infection of leaves and vines results from wind blown spores. Disease on leaves and stems becomes severe toward the end of the growing season. Infection of tubers often occurs at harvest through wounds. However, tuber infection may be established through unwounded surfaces. Lesions on tubers develop rather slowly and may not appear in severity until toward the middle or end of the storage period.



SPRAYED

UNSPRAYED

Early blight infection of vines in the field. Left, protected by dithiocarbamate fungicide spray; right, not protected.

The disease is severe on senescent vines, therefore early varieties become severely diseased earlier than do late varieties. Probably there is no inherent resistance in late varieties but since they mature later, the disease may not develop because vines are often prematurely killed either by frost or by commercial vine killers. Late varieties still develop extensive early blight without proper fungicide protection.

CONTROL

The disease is best controlled by thorough and frequent applications of foliage fungicides. Coverage should be complete and the selection of fungicide is important. The copper fungicides are not effective in early blight control. For that reason the dithiocarbamates (zineb, maneb, the new compounds, Manzate D, Dithane M-45, etc.) and other organic fungicides such as Polyram and Difolatan are recommended. Any of these compounds may be used alone or in combination with copper fungicides for the control of both early blight and late blight. Since the organic compounds do not remain active on foliage for long periods of time, applications should be repeated every seven to ten days.

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

One variety of potato, Onaway, is particularly susceptible to early blight tuber infection. Storage of this variety presents problems. *In handling seed, bruises should be avoided.* Probably a large portion of early blight infection of tubers of this variety occurs during grading and shipment. For this reason, movement of seed late in the storage period should be avoided. Dithiocarbamate foliage spray should be used throughout the growing season in seed fields.