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LATE BLIGHT OF POTATOES

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Late blight first appears as dark green, irregular spots which soon die and become brown or black.



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Agricultural Extension Service
U. S. DEPARTMENT OF AGRICULTURE

HOW IT
LOOKS

LATE BLIGHT DISEASE

HOW IT
ACTS



BLIGHT ON LEAVES—Late blight appears on the leaves of potatoes as dark green, irregular spots. In moist weather these grow rapidly, the centers of the spots die and turn brown or black, and sometimes on the lower sides of the leaves a ring of white mildew forms around the dead center areas. The stems may be affected and under humid conditions the entire vine may be killed and blackened in a couple of days. Early in the season blight spots are usually found on the lower and inner leaves because these stay wet longest.



BLIGHT ON TUBERS—Infected tubers have irregular areas of brown or purplish skin with brown flesh underneath about a half-inch deep. At first the affected tissue is dry and firm, but the blight rot is often followed by soft rots that rapidly destroy the tuber. Some blighted tubers rot in the field, especially in low wet spots. Others break down in storage, usually soon after harvest, when the weather is warm. In tubers with no soft rot, the typical dry blight rot will develop slowly, the affected areas becoming slightly sunken late in the storage season.

Cause and Spread of Late Blight

Diseased seed—Late blight is caused by a fungus (*Phytophthora infestans*) which overwinters in infected tubers. A few such tubers may survive in protected places in the field and produce volunteer plants in the spring. However, most of the blight infection comes originally from infected tubers that are planted in the field or from potatoes hauled to dumps after freezing weather ends.

Wind-borne infection—When infected tubers sprout, the fungus grows on the vines and the spores can be blown to other fields. Even if a field is planted with disease-free seed it may become infected in periods of humid weather by the spores blown from plantings several miles away.

Cool, moist weather favors blight—Blight develops best during seasons of moderate temperatures and high humidity. Frequent light, misty rains, heavy dews, and temperatures between 50° and 85° F. constitute typical "blight weather." Short, heavy rains followed by temperatures above 90° F. do not favor the disease. Long, hot dry periods will check it completely.

The cool, moist conditions provided under a heavy vine growth may often keep the disease alive through relatively long periods of fairly hot, dry days ready to break out in epidemic form later in the season when drizzling rains and cool days are more frequent.

See Inside for Methods of Late Blight Control

SPRAYING

SPRAYING for late blight should start about July, or earlier in some areas, and should be repeated every 10 to 14 days until the potatoes are ripe or frost is expected. When the weather appears favorable for blight, it might be advisable to spray once a week. Good coverage of plants is very important when spraying for blight. The sprayer should develop 250 to 350 pounds pressure and the spray boom should have at least three nozzles to the row. These should be adjusted and set frequently to insure efficient coverage. When the plants are small, the side nozzles can be set quite close and the top nozzle plugged with a piece of paper inside the spray disk. As the plants grow, the side nozzles should be set farther from the rows so that the cone of spray will extend from the ground line to the tops. Sprayer nozzles should be taken apart and cleaned at regular intervals. Spray deposit and foreign matter often plug the nozzle screens or distort the spray. As bordeaux mixture under high pressure gradually enlarges the holes in the disks, new disks must be put in after each 65 or 75 acres. A hard metal disk claimed to wear longer recently came on the market.

Tips on Sprayer Problems

Potato growers sometimes run into confusing problems in regard to maintaining sprayer pressure. The following suggestions from one of the leading sprayer manufacturers may help:

Some causes for no pressure: 1. Air leak in suction piping—drain plug may be missing. 2. Air leak in suction hose. 3. Frost crack in pump base on intake piping. 4. Completely clogged suction—clogged filter strainer. 5. Plungers too worn and dry, will not draw. 6. Valves too worn, will not hold. 7. Air lock in valves—release air to correct.

Causes for drop in pressure when nozzles are turned on and overflow is working: 1. Dirt under valve ball. 2. Worn parts in top valve of pressure regulator. 3. Stem set too high under ball.

Causes for drop in pressure when nozzles are turned on and overflow stops: 1. Worn out nozzle disks. 2. Leaking release valve on pipe leading into tank. 3. Clogged suction line—clogged filter strainer. 4. Worn pump plunger packing. 5. Worn valves—valve gaskets missing. 6. Engine speed below normal.

Recommended Control Practices

1. Plant disease-free seed.
2. Prevent sprouts on potato dumps.
3. Spray or dust with copper fungicides.

Use blight-free seed—Use seed as nearly blight-free as possible. When seed from a blight area must be used, sort seed carefully to eliminate infected tubers. Seed treatment will not control blight.

Blight-free seed is no insurance against some blight loss, but it usually delays its progress enough to make the use of fungicides more effective.

Prevent infection from potato dumps—Blight-infected potatoes left on refuse dumps in the spring after freezing weather are sources of infection for neighboring potato fields. Often these dump piles become covered with a heavy growth of plants which is ideal for blight development. Bury refuse potatoes deep enough to prevent growth or use chemical sprays to prevent sprout development.

Delay harvest till plants are mature—If late blight has become established over a field, it should not be harvested until all plants are completely dead and dry. Green plants produce large numbers of spores which get on the tubers during digging, causing them to develop late blight rot. In wet weather, spores may be washed into the soil and cause tuber rot, but this damage is generally much less than that from digging when plants are green.



Healthy plants at left had four applications of bordeaux mixture. Dead plants at right were untreated.

4. Delay harvest of blighted fields.
5. Sort carefully and store properly.
6. Use resistant varieties.

Sorting potatoes from a blighted field—Harvesting should be done in good drying weather and pickers should gather only the potatoes that look sound. Mature, dry potatoes may be taken directly to the winter storage and re-sorted carefully before they are put into bins. If the potatoes are wet or injured by field frost it may be preferable to pit them in the field for a couple of weeks and then sort out the rotted tubers before taking the crop to winter storage. Do not cover pits with potato vines.

Storage—In a cool, dry, well-ventilated storage building there should be little danger of late blight spreading among the tubers. The danger is greater in moist, poorly ventilated structures and in bins containing field-frosted potatoes. Best storage temperatures are between 38° and 40° F.

Resistant varieties—Several new seedling varieties of potatoes have some resistance to late blight, but so far only the Sebago is available in any quantity. It should be useful in areas where late varieties can be grown. While not immune to blight, Sebago foliage will stay green long after other varieties have been killed, and the tubers are highly resistant to late blight rot.



Sebago variety on left is resistant. Red Warba variety on right is susceptible.

DUSTING

ALTHOUGH spraying will at times give somewhat better results than a copper dust, dusting would simplify the job in hilly country or on soggy ground. Dusting also has advantages where water must be hauled long distances, or where acreage is large. Recent experiments at University Farm indicate that copper dusts compare favorably with bordeaux mixture in the control of leafhoppers and flea beetles.

Copper lime dust (20-80) is prepared by mixing 30 pounds of monohydrated copper sulfate with 12½ pounds of hydrated lime. When a poison is necessary for chewing insects, a 20-20-60 mixture is used. In this mixture, 50 pounds of lime, 17 pounds of monohydrated copper sulfate, and 17 pounds of calcium arsenate are mixed. Ready-mixed dust can usually be obtained. Copper lime dust should be kept in airtight containers.

Low-soluble copper dusts are now available on most markets. These are prepared by mixing a copper compound, such as yellow copper oxide, basic copper sulfate, tribasic copper sulfate, and similar compounds, with a dust filler. Such mixtures keep better in storage than copper lime dust. Application rates vary with copper content of the dust.

A 100-gallon tank of 4-4-50 bordeaux mixture contains about 8 pounds of copper sulfate or 2 pounds of metallic copper. If used at 100 gallons per acre, each acre gets 2 pounds of metallic copper. To equal this application of copper, it will take 40 pounds per acre of 5 per cent metallic copper dust, 33 pounds of 6 per cent dust, 28½ pounds of 7 per cent dust, or 25 pounds of 8 per cent dust. Preliminary observations indicate that with an efficient duster good results may be obtained from lighter applications.

Dusts should be applied at the same intervals as recommended for sprays. To avoid waste apply dust when the wind is not blowing. Many prefer to dust at night or in the early morning when the leaves are moist and the air is still. Copper lime dust should always be applied to moist plants since moisture is necessary to change it to bordeaux mixture, after which it sticks to the foliage better. Operators of dusters should wear some sort of mask to avoid inhaling the dust. Most efficient dusters have two nozzles to the row and these must be set far enough from the row and at the proper angle to cover the plants between the two fan-shaped dust clouds. When dusting season is over, remove all remaining dust from the machine and wipe surface with oiled rags.

Homemade Bordeaux Mixture

BORDEAUX mixture is one of the oldest and best of the copper fungicides used on potatoes. It effectively controls early and late blight as well as reduces injury from flea beetles and leafhoppers. Material cost is somewhat less than with dusting, but more labor is required. A 4-4-50 bordeaux mixture is 4 pounds of copper sulfate, 4 pounds of hydrated lime, and 50 gallons of water.

Use a good grade of fresh finishing lime, and powdered copper sulfate. To fill a 100-gallon tank, place 8 pounds of powdered copper sulfate in a sieve at the top of the sprayer tank and then run enough water through the sieve to fill the tank about 90 per cent full. The copper sulfate will dissolve and run into the tank with the water. Then add 3 or 4 gallons of water to 8 pounds of lime in a pail and stir well. Strain the lime water into the tank through a loose mesh cotton bag, but never through the sieve used for copper sulfate. Stir the mixture thoroughly while adding the lime water. Power sprayers should have agitators running while being filled. If poison is needed for chewing insects, mix 4 to 6 pounds of calcium arsenate with water and add this to the bordeaux and then more water to fill the tank.

If copper sulfate crystals are used instead of powder, make a stock solution, using one pound of crystals for each gallon of water. Put the water in a wooden barrel and hang the crystals in a burlap sack just below the surface of the water. In 4 or 5 hours the crystals will be dissolved and the solution will keep indefinitely. When using stock solution, stir it well and use one gallon for each pound of copper sulfate in the recommended formula.

OTHER COPPER COMPOUNDS

Low-soluble copper compounds such as yellow copper oxide, basic copper sulfate, tri-basic copper sulfate, and similar compounds are now available under various trade names. They compare favorably with bordeaux mixture in the control of blight, are easy to use, and cost about the same. These compounds vary in copper content, so follow directions of manufacturers in preparing sprays.

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