



University of Idaho
College of Agriculture
Cooperative Extension Service
Agricultural Experiment Station

LIBRARY
OCT 3 1 1974
UNIVERSITY OF IDAHO

Control of Early Blight Of Potato in Eastern And Southeastern Idaho

Dexter R. Douglas and Jay G. Garner

Early blight is the most common annually occurring foliar disease of potatoes in Idaho. The disease is caused by the fungus *Alternaria Solani*, which survives the winter on dead potato refuse in the field. Initial infection each season results from windblown spores that originate from this refuse. The disease is then spread to other plants and fields via airborne spores released from the developing lesions on current season plants.

The incidence and severity of early blight have increased in recent years. This increase can be attributed largely to the rapid and continuing expansion of sprinkler irrigation. Application of water by sprinkler places free moisture on the potato plant foliage at frequent intervals and for several hours at each irrigation. This free moisture provides an ideal microclimate within the potato vine canopy for optimum blight development.

Symptoms

Early blight produces dark brown to black colored lesions on leaves and stems. Lesions first appear as small specks and gradually increase in size, sometimes exceeding one-half inch in diameter. The lesions are generally irregular in shape. Some may be angular because they border larger veins or the midvein of the leaflet. Ordinarily a series of concentric rings are formed within the lesion, paralleling its outside border (Fig. 1). A yellow-colored area may form around the lesion, caused by alternaric acid, a toxic substance produced by the organism. It spreads outward from the lesion when free moisture is present and climatic conditions are favorable and often will kill a large portion of the leaflet.

The older leaves — those nearest the ground — become infected first. The first lesions will be noticed



Fig. 1. Early blight lesion with characteristic concentric rings.

Fig. 2. Typical early blight stem lesions.



3
322

about the last week of June, but no buildup or spread (secondary infection) will normally be observed until mid-July. Stem infection will not become apparent until later, about August 1, and will not show at all unless the disease is becoming established in the field. Stem lesions are a definite indication of early blight buildup within a field (Fig. 2).

Control

Early blight foliar infection can be controlled by relatively few applications of fungicide if the initial application is properly timed. Timing is directly related to secondary infection — when the disease starts to buildup within the field — and to the maturity of the growing potato plant.

Research has shown (Tables 1 and 2) that a series of fungicide applications beginning in late June and continuing through the season was no more effective for controlling early blight than few applications starting at the proper time. Application schedules that began early but failed to continue into the latter part of the season (July 25 - August 20) were also not effective. Initial (primary) infection apparently is of little significance in the overall control of early blight in eastern and southcentral Idaho.

Proper timing of the first fungicide application will vary somewhat between eastern and southcentral Idaho, primarily because of environmental differences. The southcentral area has a higher daily mean temperature and longer growing season. Potatoes are planted earlier, and the plants reach a state of maturity conducive to

secondary infection and buildup of the disease about a week to 10 days earlier than in the eastern area.

The recommended spray schedule for both areas is given in Table 3. This schedule refers to perennial and non-perennial blight areas. A perennial blight area has early blight in proportions that require control measures every year — for example, the Fort Hall area. A non-perennial blight area has blight some years but not always. However, areas or fields, even within a perennial area, will have different levels of infection and must be treated on an individual basis. The grower is responsible for being aware of his own disease situation.

Factors That Enhance Blight Development

Any condition, cultural or environmental, that places the growing plant under stress during the critical blight season of July 20 to August 15 will increase the chances of early blight buildup. For example, inadequate fertilizer, moisture stress caused by inadequate irrigation and early dying caused by *Verticillium* wilt all tend to hasten maturity and make the growing plant more susceptible to early blight infection.

Tuber Infection

Tuber blight is also caused by *Alternaria solani* and can be an important problem some years. The relationship between severity of foliar infection in a field and tuber infection has not been determined. However, inoculum for tuber infection undoubtedly results from foliar lesions. Research on tuber infection control is presently being conducted.

Table 1. Foliage infection and yield evaluations of early blight trial in eastern Idaho, 1972.

Application schedules	Foliage* % leaflets infected	Yield		
		Under 4 oz. %	U.S. No. 1 wt.	Total wt.
Two applications: June 29, July 11	65	23	286 a**	406 ab
Three applications: July 11 and 24; Aug. 4	31	19	295 ab	416 ab
Three applications: July 24; Aug. 4 and 16	47	17	318 b	429 b
Six applications: June 29; July 11 and 24; Aug. 4, 16, and 28	24	15	294 ab	432 b
Control (no treatment)	90	22	270 a	386 a

* Field evaluations made August 31.

** Means within the same column with the same letter are not significantly different from each other at the 5% probability level.

Fungicides

Several name brand chemicals are available. Bravo, Difolatan, Dithane M-45, Duter, Maneb, Polyram and others have provided good control. Proper application and coverage are necessary for any fungicide to be effective.

Application

Application rate — Follow recommended rate for each individual manufacturer. Rates vary between name brand fungicides.

Coverage — The plant must be covered as completely as possible for a control program to be successful. This is especially true with early blight because the infection starts on the lower leaves and progresses upward. The lower, underneath foliage must be covered. Adding spreader-sticker materials to spray materials is helpful in attaining maximum leaf coverage. Some fungicides

already contain these additives. For those that don't, use the spreader-sticker suggested by the manufacturer.

Application Equipment

Ground sprayer — Apply 30 gallons of water per acre at 80 to 90 p.s.i. using cone-type disks in nozzles spaced 12 inches apart. Drop nozzles are not necessary.

Side-delivery air sprayer — Apply 30 gallons of water per acre.

Airplane — Insist on 8 to 10 gallons of water per acre. Many applicators try to get by with less.

Sprinkler systems — Preliminary research at the University of Idaho's Research and Extension Center at Aberdeen indicates that applying fungicides through sprinkler irrigation systems may provide adequate control of early blight. No recommendations are now available.

Trade names are used in this publication only to identify chemicals as they are known in the market place. This does not imply endorsement by the University of Idaho or USDA to the exclusion of other products that may also be available.

Table 2. Foliage infection and yield evaluation of early blight trail in southcentral Idaho, 1973.

Application Schedules	Foliage* % leaflets infected	Under 4 oz. %	Yield U.S. No. 1 wt.	Total wt.
Three applications: June 28; July 10 and 23	55	25	199 a**	277 ab
Four applications: July 10 and 23; Aug. 3 and 16	33	17	258 b	322 c
Three applications: July 23; Aug. 3 and 16	48	19	242 b	306 bc
Three applications: July 10 and 23; Aug. 3	38	27	204 a	300 bc
Six applications: June 28; July 10 and 23; Aug. 3, 16, and 28	35	14	263 b	317 c
Control (no treatment)	70	22	197 a	263 a

* Field evaluations made August 28.

** Means within the same column with the same letter are not significantly different from each other at the 5% probability level.

Table 3. Recommended fungicide application schedule for eastern and southcentral Idaho to control early blight.

<i>Perennial Early Blight Areas</i>	Eastern	Southcentral
First application	July 20 to 23	July 8 to 10
Second application	10-10 days later	10-12 days later
Third application	10-12 days later	10-12 days later
Fourth application	None	10-12 days later

Non-Perennial Area

1. Do not spray until blight lesions appear on leaflets above the lower 1/3 of the plant.
 2. If first spray is near date of that of a perennial area, then follow perennial schedule.
 3. If first spray is near August 1, follow with another 10 to 12 days later.
 4. If first spray is near August 10, check closely to determine if another application is necessary.
 5. If buildup develops after August 15, do not spray in eastern Idaho. Depending on when harvest is to start, one spray might be applied in southcentral Idaho.
-

PESTICIDE RESIDUES. These recommendations are based on information currently available. If followed carefully, residues should not exceed the tolerance established for any particular chemical. To avoid excessive residues, follow recommendations carefully with respect to dosage levels, number of applications and minimum interval between application and harvest.

REMEMBER: Read the label directions thoroughly before preparing and applying pesticides. Numerous commercially prepared mixtures contain insecticides as well as fungicides.

The grower is responsible for residues on his crops and problems caused by drift from his property to other properties or crops.

THE AUTHORS — Dexter R. Douglas is research plant pathologist, Western Region, USDA, ARS, headquartered at the College of Agriculture Research and Extension Center, Aberdeen. Jay G. Garner is extension potato specialist, headquartered at Blackfoot.

*Published and Distributed in Furtherance of the Acts of May 8 and June 30, 1914,
by the University of Idaho Cooperative Extension Service, James L. Graves,
Director; and the U.S. Department of Agriculture, Cooperating.*