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CONTROLLING POTATO DISEASES

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There are several general methods which aid in prevention of the majority of serious Colorado potato diseases. Roughly, these methods can be summarized as follows: (1) Use of certified seed or the best seed available, (2) treatment of seed with recommended materials, (3) use of a disinfected knife in cutting seed, (4) employment of proper cultural practices, (5) roguing diseased plants, (6) use of spray or dust fungicides, (7) avoidance of excessive injury to tubers during harvest, and (8) proper storage.

In the following pages are listed the majority of serious Colorado potato diseases. In each case a description of the disease and the recommended control measures are given.

How to Identify Potato Diseases and What to Do About Them

Symptoms

Control

RHIZOCTONIA

Often causes watery soft-rot of sprouts before emerging from ground. Yellowing and purpling of leaves, and rolling of upper leaves. Aerial-tubers and enlarged nodes common on stems. Dry reddish-brown lesions on stems below ground and on stolons and roots. Whitish mold growth may occur on stems for short distance above ground. Many small tubers common, and tubers usually show the black dirt-like fruiting bodies scattered over surface.

- Over-winters on tubers and in soil.
1. Treat seed pieces each season either with acid-mercury, or with Semesan Bel (dip method).
 2. Use potatoes in 5-year crop rotation.
 3. Delay planting until soil is thoroughly warmed; shallow depth of planting will help.

Colo. Agric. Exp. Sta. Bul. 446*

SCAB

Rough, more or less round, corky, scabby, brown spot, sometimes slightly raised, and as often the same type of spots form pits 1/4 to 1/2 inch deep. These lesions are scattered irregularly over surface of tuber. Infection may also be manifested by surface netting or russetting of tuber.

1. Treat seed pieces with Semesan Bel (dip method).
2. Long crop rotation.
3. Prevent contamination of soil by not planting untreated infected seed pieces.
4. Russet Burbank, Russet Rural and some of the new varieties are partly resistant to scab.

Colo. Agric. Exp. Sta. Bul. 446,

*All Colorado bulletins listed here will be sent to the grower on request.

Symptoms

Control

WILT

(Fusarium solani var. eumartii)

Wilting of plants may be sudden or slow, followed by death. Plants from infected seed are stunted. Irregular small, brown patches, dead spots between the veins of the leaf and a characteristic bronzing of the leaf are characteristics of the disease. Wilting and death follows. Woody cylinder and vascular area of lower part of stems turn a deep brown. Roots usually show a dry decay. Tubers may show brown vascular discoloration at stem end late in the season.

1. Practice long crop rotations.
2. Plant only certified seed.
3. Avoid over-irrigation of soil. Colo. Agric. Exp. Sta. Bul. 446; Penn. Agric. Exp. Sta. Circ. 218.

WILT

(Fusarium oxysporium)

Wilting of vine and pale yellow color. Vascular and woody cylinder areas become brown. Roots usually decay. Tubers may or may not show brown discoloration of vascular ring.

Same as eumartii wilt.

EARLY-BLIGHT

Typical dark-brown, more or less circular spots (1/8 to 1/2 inch in diameter), which show concentric rings, similar to a target board. When numerous, they may kill the leaves. Develops best in warm, damp weather. Small, round, sunken, shallow, corky spots, with purplish, raised margins appear on tubers 10 days to 2 weeks after storage.

Difficult to control but the following practices will reduce injury.

1. Crop rotation is an important factor.
2. Either spray with Yellow Cuprocide 1 1/2 lb. to 1 lb. Emulsifier B 1956 spreader per 100 gal. water, or spray with Bordeaux mixture (4-4-50) 125 gal. per acre. Dust with either Yellow Cuprocide or copper oxychloride dusts. Apply 30 lb. per acre and at 10- to 12-day intervals. Begin spraying or dusting when the disease first appears. Colo. Agric. Exp. Sta. Bul. 446; Oreg. Exp. Sta. Circ. 127; Penn. Agric. Exp. Sta. Circ. 218; Idaho Ext. Ser. Bul. 137; U.S.D.A. Misc. Pub. No. 98.

LATE-BLIGHT

Affects all parts of the plant. During hot, dry seasons it rarely appears, but in cool, wet seasons it may cause serious losses. Dark-green to black, water-soaked areas on under side of leaves. They enlarge rapidly until whole leaf is involved. White, downy mold may appear on under side of

The mold organism which causes late blight overwinters in affected tubers.

1. Plant late-blight-free seed.
2. Spray plants with 4-4-50 Bordeaux Mixture or Yellow Cuprocide. Use 1 1/2 lb. Yellow Cuprocide with 1 lb. Emulsifier B-1956 spreader to 100 gal. water. Yellow Cuprocide

LATE-BLIGHT (cont)

leaves. Dark-brown to black lesions on stem, branches, and leaf stems. On tubers, late blight appears as irregular, discolored areas that may become sunken. When cut, infected tubers show a reddish-brown rot which is moist at first but soon becomes dry. Secondary organisms may enter and cause foul, odorous soft-rot. This type of infection is commonly found associated with late-blight-infected tubers in storage.

- dust or copper oxychloride dust, to which has been added either 5 lb. Vatsol K, or 1 lb. Vatsol OS sticker, brought to 100 lb. with Cherokee Clay has given good results in some states. Apply 30 lbs. of the dust per acre, and make 3 applications at weekly intervals beginning at first appearance of the disease. Spray or dust after each heavy rain.
3. If possible, harvest blight-infected crops during dry period.
 4. In storage, a temperature of 36 to 40 degrees F, and good ventilation must be maintained.
- Mich. Ext. Bul. 226; U.S.D.A. Far. Bul. 1367 F.

RING-ROT
(bacterial)

Leaves first show wilting or flagging of leaflets during hot days. Later, leaves may either roll upward at edges or show dead areas with yellowish margins. Finally leaves become permanently wilted, die, and turn brown. Stems usually rigid, although leaf stems and end of main stem may wilt, shrivel, and turn brown. Lower end of main stem shows various stages of brownish discoloration to complete rotting.

Tubers at first show a faint, yellowish discoloration of vascular ring at stem end.

Later the invaded tissue becomes a distinct yellow to brown. At this stage the pith area can be easily separated from the outer tissue at the ring, and rotted tissue can usually be squeezed out. At this stage secondary organisms may cause complete rotting of the tubers. Sometimes the inside of tubers are completely rotted with a thin outside normal appearing hull.

1. Plant only certified seed.
2. Treat whole seed either with Semesan Bel or acid mercury. Cut-seed may also be treated immediately after cutting with Semesan Bel. Drain and dry before planting.
3. Cut seed with power-driven rotary-knife. Disinfect rotary-knife with:
 - (1) B-K (chlorine solution) 4,000 parts per million. With a 5-gal. rotary-knife vat, change the chlorine solution in the morning and at noon.
 - (2) Mercuric chloride 2 oz. per 7 gal. water. With a 5-gal. rotary-knife vat, change the solution every morning and it will be good for 25 to 30 sacks of potatoes or about 1 day.
 - (3) Use boiling water. Water must be at boiling point when knife is in use. Employ either an electric or gasoline heating unit.
4. Avoid use of picker planters.
5. Avoid mechanical injury of tubers.
6. Disinfect used sacks by steam method for 30 min., or until all sacks have been thoroughly steamed. Mark all disinfected used sacks.
7. Spray bins with copper sulphate or B-K solutions.
8. Disinfect graders, diggers, and planters with strong B-K solution.

Colo. Ext. Ser. Pl. Dis. News Vol.

3 No. 1, 1940; Colo. Exp. Sta.

Press Bul. 94; Mich. Ext. Bul. 227;

Rep. Am. Potato Jour. Vol. 18, No. 2, 1940;

Maine Ext. Bul. 286; Minn. Ext. Folder 95.

Symptoms

Control

BLACK-LEG

Causes a greenish-brown to black soft-rot of stems near or below ground line and yellowing of foliage. In cool, wet seasons the disease often involves the entire plant. May cause a black soft-rot of tubers which continues to develop in storage.

1. Use certified seed.
 2. Plant seed as soon as possible after cutting (the seed corn maggot which spreads the disease is busy laying eggs at planting time.)
 3. Use 5-year crop rotation.
- Colo. Agric. Exp. Sta. Bul. 446;
 Penn. Agric. Exp. Sta. Circ. 218;
 Idaho Ext. Ser. Bul. 137; U.S.D.A.
 Misc. Pub. No. 98; Wash. Ext. Ser.
 Bul. 191 (revised)

MILD MOSAIC

(Virus)

Leaves show irregular light and dark-green areas, or mottling, which is usually accompanied with slight crinkling. The crinkling often causes the edges of leaf to become wavy. Whole plant slightly dwarfed. Yield of infected plants reduced about one-third compared to normal plant. Tubers are excellent type.

1. Plant only certified seed.
 2. Field roguing.
- Colo. Agric. Exp. Sta. Bul. 446;
 Idaho Ext. Ser. Bul. 137; Penn.
 Agric. Exp. Sta. Circ. 218; U.S.D.A.
 Far. Bul. 544.

CRINKLE MOSAIC

(Virus)

Appears as an exaggerated form of mild mosaic. Symptoms of mild and crinkle mosaic blend into each other. Leaf mottling more distinct and light areas more numerous with crinkle mosaic. Under high temperature and intense light conditions mottling of leaves is masked. Yields of infected plants are reduced to about 50 percent of that of healthy plants.

See control for mild mosaic.
 Idaho Ext. Bul. 137.

RUGOSE MOSAIC

(Virus)

Leaves very much mottled, much more than for either mild, or crinkle mosaic. Plants from infected tubers dwarfed. Some of the veins on under side of leaves may be killed, and the dead veins appear like threads through the leaves. Tissue between veins dies in irregular spots. In severe cases the lower leaves die and fall off stem. In current-season infection, dead veins and dead spots of the leaves may appear in upper portion of the vine. Affected plants die prematurely. Yields are reduced about 75 percent in infected plants.

See control for mild mosaic.
 Jour. Agric. Res. Vol. 25, No. 2,
 1923, & Vol. 47, No. 1, 1933;
 Idaho Ext. Bul. 137.

Symptoms

Control

LEAFROLL

(Virus)

No mottling of leaves. Outstanding symptom is rolling upward of the edges of the leaves along the midrib, giving a "rabbit ear" shape. This rolling is generally more noticeable in lower leaves. Leaves become brittle and rattle when shaken. Diseased plants lighter green than healthy ones and somewhat reduced in size. Tubers sometimes show net necrosis. Yields reduced from 50 to 75 percent of normal.

See control for mild mosaic.
U.S.D.A. Far. Bul. No. 1436;
N. Y. Agric. Exp. Sta. (Geneva) Tech. Bul. 171; Colo. Agric. Exp. Sta. Bul. 446; Pa. Agric. Exp. Sta. Circ. 218; Idaho Ext. Bul. 137.

SPINDLE TUBER

(Virus)

Tubers elongated and pointed at both ends. Top growth erect and may be stunted. Under non-irrigated conditions all symptoms may be masked. Yield reductions from 40 to 70 percent of healthy plants.

1. Use hot-water-disinfected cutting knife.
2. See control of mild mosaic.
U.S.D.A. Far. Bul. 1436 & Misc. Pub. 98; Colo. Agric. Exp. Sta. Bul. 446; Idaho Ext. Bul. 137.

WITCHES BROOM

(Virus)

Plants generally show very bushy, thread-like, stunted stems. Each tuber produces many of such sprouts. Leaves reduced in size, rounded, and smaller than healthy ones. Tubers production increased in number and decreased in size. Stolons may grow some distance with small tubers which appear chain-like on the stolon.

See control for mild mosaic.
Colo. Agric. Exp. Sta. Bul. 446.
Idaho Ext. Bul. 137.

CALICO

(Virus)

Leaf symptoms easily detected by large yellow to white irregular-shaped spots. Crinkling and dwarfing are entirely lacking.

See control for mild mosaic.
Idaho Ext. Bul. 137.

GIANT-HILL

(Virus)

Plants assume coarse, rank growth which is more noticeable as they approach maturity. Plants remain green after first frost. Yield slightly increased as is size of tubers. Tubers are often cracked and rough.

See control for mild mosaic.
Colo. Agric. Exp. Sta. Bul. 446;
Idaho Ext. Bul. 137.

SPUD NOTES - INDEX for 1943.

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4.--Storage house design and management--A.D. Edgar.
6.--Hits and Misses--A. M. Binkley
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- 3.--Cooking quality tests on potatoes--W. E. Pyke.
- 4.--Shipping washed potatoes from central Nebraska and northeastern Colorado during July and August 1942--A. D. Edgar.

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- 2.--More about late blight--W. A. Kreutzer and John G. McLean.
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The foregoing index to 1943 Spud Notes is printed in the hope that you have saved your old copies. Many of the articles will be as useful in 1953 as they were in 1943. If you don't have one or several of the issues, we will gladly send them to you. The January and February issues are out of print, but a penny post-card addressed to the Horticulture Department, C. S. C., Fort Collins, will get you any or all of the other copies.

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