

Plant Diseases



Irish Potato Scab

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Scab is a disease of Irish potatoes characterized by scab-like surface lesions on tubers. Scab reduces tuber quality, having little effect on yield. However, deep lesions increase the waste in peeling. Scab may cause increased rot of potatoes in storage, because rot-causing organisms can easily infect the scabbed areas of tubers.

Scab is caused by the actinomycete *Streptomyces scabies*, which may be thought of as a filamentous bacterium. This pathogen usually becomes established in soil that is continuously planted to Irish potatoes. Scab also affects beets, radishes, turnips and other fleshy-rooted crops.

Symptoms

Symptoms of scab infection are found only on belowground plant parts. Tuber lesions can be raised, tan to brown, corky growths of varying sizes. This is referred to as russet scab. Pitted scab lesions are sunken and dark brown or almost black (see photo). Underground stems and stolons may also bear brown to tan lesions.

Disease Cycle

The pathogen, *S. scabies*, overwinters in infected plant tissue such as tubers and roots, and perhaps in other plant tissues. It is commonly introduced into fields on infected seed potatoes, and will survive in the soil indefinitely. Because the organism can survive passage through the digestive tract of animals, manure used to fertilize fields can also serve as a source of the pathogen. Movement also occurs through infested soil adhering to farm implements, drainage water and wind-blown soil.

Following penetration of the tuber, the pathogen causes a few layers of cells to die, and the pathogen lives off the dead cells. The living cells surrounding the lesion are stimulated to



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produce several layers of cork cells that isolate the pathogen and several plant cells. The cork cell layers are pushed outward and sloughed off, creating the need for a new cork layer. Pitted scab lesions are caused by a repetition of this action. The depth of the lesion seems to depend on the variety, soil conditions and on the invasion of scab lesions by other organisms, including insects.

Conditions Favoring Scab Development

It is important to understand the factors affecting scab development. The degree to which a susceptible potato variety suffers from scab depends heavily on environmental conditions. Conditions that enhance scab development include:

1. **Alkaline soil.** Scab severity increases as the soil pH increases above 5.5. A higher pH increases the availability of calcium, which causes the tubers to be more susceptible to scab infection. Also, the scab organism apparently survives better at a high pH.

2. **A high calcium:phosphorus ratio.** Scab development is greatly affected by the soil fertility levels under which the tuber is grown. The most important elements affecting scab development are calcium and phosphorus. Calcium ions apparently cause the cells of the potato peel to be more susceptible to scab infection, whereas phosphorus ions may neutralize the calcium ions.

3. **Hot, dry weather.** Scab is usually more severe if hot, dry weather occurs during tuber formation.

4. **Continuous planting of Irish potatoes.** The scab organism tends to increase and become difficult to control when susceptible varieties are continuously planted in the same soil.

Control

1. The most dependable means of scab control is the planting of resistant varieties. Varieties with resistance to scab include Dark Red Norland, Kennebec, Superior, Norchip and Atlantic. Commonly planted varieties that are not resistant are Red Pontiac, Katahdin and Yukon Gold.
2. Plant scab-free seed pieces. Fungicides for seed-piece treatment only suppress the disease; they do not rid the potatoes of the pathogen.
3. Rotations to crops other than fleshy-rooted crops are very helpful in controlling scab. The longer the interval between potato crops, the greater the reduction of the scab inoculum. Try to control pigweed and other fleshy-rooted weeds, which can harbor the scab organism.
4. A soil pH of 5.5 or below is often recommended for suppression of scab. However, keep in mind that excessively low pH levels will detract from plant performance. They will also limit the choice of crops to be used in rotation with potatoes, because very few crops can tolerate such a low pH. Applications of sulfur or acid-forming fertilizers will lower the pH.
5. The nitrogen, phosphorus and potassium level of scab-infested soil should be kept high. Acid-forming nitrogen fertilizers, such as ammonium sulfate and diammonium phosphate, are more effective in reducing scab than ammonium nitrate. Avoid calcium-containing fertilizers. Do not apply manure to potato soils.
6. Maintain adequate soil moisture during the time of tuber formation and growth (tuber initiation starts 4-6 weeks after planting). Avoid overwatering, as it may cause rotting or poor plant growth

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