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Managing Phytophthora Diseases on Squash and Pepper

Background

Phytophthora blight, crown rot, and fruit rot are serious problems on cucurbit and solanaceous vegetables in the eastern half of the United States. Intensive vegetable cropping, short crop rotations, center-pivot irrigation, and heavy rainfall can lead to outbreaks of Phytophthora blight.

In South Carolina, Phytophthora diseases occur on vegetables in all parts of the state in clay, loam, and sandy soils. The disease occurs most often on summer squash and peppers, which are some of the most susceptible crops. Fruit rot on watermelon and pumpkin have been serious in some fields.

Symptoms

On summer squashes, the first symptom is usually a soft rot in the crown of the plant that quickly leads to wilting and collapse. Root rot is usually not seen. Fruit are very susceptible to a soft rot that starts as large, circular, tan, beige, or salmon spots. Fruit rot may develop post-harvest.

On peppers, Phytophthora blight often begins with a dry, corky canker on the main stem at the soil line. Roots may turn chocolate brown and rot. Branch points turn black. Airborne spores spread or splash to fruit and to other plants in the field. Infected fruit are covered with a thin, dense layer of white mold.

The Pathogen

The "water mold" or fungus-like microorganism that causes Phytophthora blight is *Phytophthora capsici*, named after *Capsicum* (pepper), the first host on which it was found. This organism is actually a type of algae that has adapted to living in and on plants.

Phytophthora produces two types of spores: sporangia and oospores. Sporangia are short-lived spores that are spread by wind or water. Oospores are for long-term survival in soil and are moved with soil or running water.

The main source of the pathogen is infested soil. The pathogen remains in infested soil for many years. Other sources are surface water (ponds and streams) and infested crop debris, particularly cull piles with rotten fruit. The pathogen can be introduced to noninfested ("clean") fields by irrigating with contaminated water.

Phytophthora is only active in waterlogged soils. Wet soil triggers oospores to germinate and produce sporangia, which germinate and produce swimming spores. The swimming spores come in contact with plant tissues and disease begins.

Management

There are five options to reduce the occurrence and severity of Phytophthora diseases: water management, crop rotation, soil management, resistance (in pepper only), and fungicides. Use as many of these practices as possible for the best control.

Water Management

Because *Phytophthora capsici* needs wet soil to be active, use every technique possible to improve soil drainage. Subsoil and use raised beds for all crops. Remember to cut water furrows across plastic-mulched raised beds. Consider land leveling, but avoid moving soil in fields already infested.

Do not plant low areas in fields, because disease probably will start there. Use caution with water-wheel transplanters so planting holes are not punched too deeply. This will create a small area where water will collect and provide ideal conditions for disease development. Use wells instead of ponds, streams, or rivers as sources of irrigation water.

Crop Rotation

All cucurbits (squash, pumpkin, cucumber, melon, and watermelon) and solanaceous vegetables (pepper, tomato, and eggplant) are susceptible. *Phytophthora capsici* attacks fruit of all susceptible crops and the crowns of summer squash, pumpkin, and pepper. Lima bean and snap bean also are susceptible to this pathogen.

Always rotate to a nonhost crop after cropping any susceptible vegetable. Do not crop summer squash or pepper in the same field. Crop rotation will not eliminate the pathogen from infested soil. However, crop rotation will keep the pathogen from increasing.

Soil management

Use plastic or organic mulches to act as a physical barrier between infested soil and fruit. Enter noninfested fields before entering infested fields. Power-wash soil from machinery after working in infested fields. On small acreages, remove diseased and rotting fruit to prevent build-up of the pathogen.

Resistance

Bell pepper cultivars 'Paladin,' 'Aristotle,' 'Revolution' and 'Declaration' are moderately resistant to Phytophthora blight. Other management practices should still be used when these cultivars are grown to slow disease and lengthen the harvest period. Under certain growing conditions, these cultivars may show "silver skin," a blistering of the skin of the fruit that is a type of cosmetic damage that lowers fruit quality.

Fungicides

Fungicides are not a "cure-all" for Phytophthora diseases. They do not work well against this disease once symptoms appear. Fungicides should be used preventively, but disease still may occur in treated fields.

Ridomil Gold is no longer labeled or recommended because *P. capsici* becomes resistant to this fungicide relatively quickly. Resistant isolates were found in four fields in South Carolina in which Ridomil-containing fungicides had been applied, as well as in many other states. It is likely that resistant isolates remain resistant for many years.

The recommended fungicides are a rotation of Presidio and Revus. Presidio is very effective against crown rot when it is applied through drip irrigation. Both must be tank-mixed with another fungicide to prevent resistance. Presidio can be tank-mixed with mancozeb, chlorothalonil, copper, or potassium phosphite. Revus should be mixed with copper.

Alternative fungicides, which should be used preventatively only, are Tanos on pepper and tomato and Forum on cucurbits. Resistance to Ranman has been found in the southeastern U.S., so this fungicide is not recommended.

Recommendations

If you have:	Water management	Crop rotation	Soil management	Resistant cultivars	Fungicides
Infested fields	☑	☑	☑	☑	☑
Noninfested fields on infested farm	☑	☑	☑	☑	☑
Noninfested farm	☑	☑	☑		

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