Diseases of Pepper
BACTERIAL SPOT
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VEGETABLE CROPS

CORNELL COOPERATIVE EXTENSION

Bacterial Spot of Pepper

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Except for virus diseases, bacterial spot is the most important disease affecting peppers in New York. A mild case of bacterial spot causes prominent necrotic spots on leaves; a severe case can cause premature leaf drop and spotting of stems and pods that results in unmarketable fruit. Like most bacterial diseases, bacterial spot is difficult to control when frequent rains and moist conditions prevail.

Cause

Bacterial spot is caused by the bacterium *Xanthomonas campestris* pv. *vesicatoria*. The same bacterial disease affects tomato. Technically, the pathogen can be divided into three strains: a tomato strain to which all peppers are hypersensitive (express limited necrotic lesions only), a pepper strain race 1 to which all peppers are susceptible, and a pepper strain race 2 that causes a hypersensitive reaction in peppers with a specific gene for resistance. The tomato strain and pepper race 1 are distributed worldwide, but pepper race 2 is restricted to Florida and the Caribbean. The bacteria are microscopic and occur in large numbers in the affected tissues of the plant. They are rod shaped and motile (by a flagellum).

Symptoms

Necrotic spots may appear on leaves, stems, and fruits. Leaf symptoms appear first on the undersides of leaves as small water-soaked areas. These spots enlarge up to ¼ inch in diameter, turn dark brown, and are slightly raised. On the upper leaf surface the spots are depressed with a brown border around a beige center. Several lesions may coalesce, resulting in large necrotic areas, and large numbers of lesions can occur on leaf margins and tips where moisture accumulates (fig. 1). Eventually the leaves yellow and drop off, increasing the chance for sunscald (fig. 2). Spots on fruits become raised, scablike areas that make the product unmarketable (fig. 3).

Epidemiology

The disease if favored by long periods of high relative humidity (RH) with free moisture on the leaves. When inoculated plants are exposed to high RH (more than 85%) for a few hours during several days, the pathogen can produce disease symptoms. Bacteria are spread from plant to plant by splashing rain and by touching and handling wet plants. The bacteria can enter the leaf through stomata and wounds. It is important to have a protective film of copper fungicide on the plant surface so that most bacterial cells will be killed before they gain entry into the leaf or fruit. Sprays should be applied before and during periods of rain and high humidity. Sprays are not effective against bacteria inside the tissue. The most-important sources for bacterial spot are infested seed and diseased transplants. In addition, the pathogen is soilborne both on dried plant debris and, possibly, in the soil itself for at least 1 year.

Control

(1) Use disease-free seed that has been produced in western states or seed that has been hot water treated. One infested seed in 10,000 may easily result in 100% diseased plants in the field under proper conditions.

(2) Purchase only certified disease-free transplants.

(3) Practice crop rotation. Use at least 1-year rotation between tomato or pepper crops with nonhost crops.

(4) For plant beds and flats in the greenhouse, keep the house as dry as possible and avoid splashing water. Spray with fixed coppers (i.e., tribasic copper sulfate and copper hydroxide), alone or in combination with 200 ppm streptomycin (1lb/100 gal water in the copper spray), with the addition of spreader-sticker to improve the effectiveness of the spray. Streptomycin cannot be used in the field. Start field treatment as soon as disease appears, using a fixed copper plus maneb 80 WP or maneb plus zinc product to prevent secondary spread of the bacterium. The combination of copper and maneb has been shown to be more effective in controlling strains of the organism that are either sensitive or tolerant to copper alone. (See *Cornell Recommendations for Commercial Vegetable Production* for specific rates.) Adjust spray schedules according to the weather conditions. Copper fungicides may help to reduce secondary spread, but their effectiveness is limited by rainfall and dew formation.

We acknowledge photos 1 and 3 provided by A. F. Sherf.

Pepper Seed Extraction and Treatment

We do not recommend that growers save their own pepper seed. They should never save seed from hybrid varieties. The natural crossing of peppers is higher than that of tomatoes (usually less than 10% but as high as 25% in extreme cases). Isolation by distance (several hundred feet) and location upwind should be sufficient.

The flesh of mature peppers is relatively dry so that wet fermentation as used with tomato seeds is not necessary. Most of the seed exposed on the central core can be removed by cutting away the outer shell. Remember to use rubber gloves when working with hot peppers and avoid contact with your eyes. Pepper seed dries quickly when spread in a shallow layer. Do not save seed from a field known to have or suspected of having bacterial spot. Following harvest, pepper seed may be treated in one of two ways: (1) Soak the seeds for 30 minutes in a 10% solution of household bleach (0.525% sodium hypochlorite, NaOCl). (2) A hot water soak for pepper seed has long been recommended. Soak seeds at 125° F (51° C) for 30 minutes. The temperature and length of treatment are important; so monitor temperature with a good dairy or laboratory thermometer and keep the water bath agitated. The seed may be held in loosely woven cheesecloth bags not over one-half full to aid in handling. After treatment, dip the bag in cold water to stop the heat treatment. Spread the seeds out to dry and apply a protective seed-treatment fungicide such as thiram. Freshly harvested seed withstand the heat treatment better than do 1- or 2-year old seed.

Quantity discount available.

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