

## ANGULAR LEAF SPOT OF CUCURBITS

Angular leaf spot of cucurbit crops, caused by the bacterium *Pseudomonas syringae* pv. *lachrymans*, is widespread and particularly damaging in Illinois after extended and frequent summer rains, especially when temperatures are between 75° and 82°F (23° to 28°C). The disease is more severe on cucumber, Zucchini squash, and honeydew melon but it also can infect muskmelon, cantaloupe, watermelon, other squashes, pumpkins, various gourds, vegetable marrow, West Indian gherkin, and bryonopsis. Losses in processing cucumbers can exceed 50 percent in wet seasons where control measures are not practiced.

### Symptoms

Small, round to irregular, water-soaked spots appear on infected cucumber leaves. The spots expand until they are limited by larger veins, which give the spots an angular appearance. The spots on the upper leaf surfaces turn whitish gray to brown and die (Figure 1). On the lower leaf surfaces, the lesions are gummy and shiny. As these spots dry they shrink and commonly tear away from the healthy portions of the leaf, leaving large irregular holes (Figure 2). Therefore, infected foliage appears ragged and yellowish. Young, fully expanded leaves are more susceptible than older leaves. Under humid conditions, water-soaked spots are covered with a white exudate. The exudate dries to form a thin white crust on or adjacent to the spots under the leaf surface.



Figure 1. Angular leaf spot of cucumber.



Figure 2. Closeup of cucumber leaf infected by angular leaf spot.

On squash the brown leaf spots vary in size and are surrounded by a yellow halo. The tissue next to the halo may be water-soaked, especially on the lower leaf surfaces following damp weather.

On watermelon the leaf spots begin as small, usually circular, dark lesions surrounded by a yellow halo.

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Further information on diseases of cucurbits can be obtained by contacting Mohammad Babadoost, Extension Specialist of Fruit and Vegetable Diseases, Department of Crop Sciences, University of Illinois at Urbana.

The center of the lesions may be white. The enlarging spots become angular and can involve entire lobes or even larger areas of a leaf.

The nearly circular, water-soaked spots on ripening cucumber fruit are much smaller than those on the foliage (Figure 3). When the infected tissue dies, the centers of the lesions become chalky white and may crack open. Infected fruit is frequently invaded by secondary fungi and bacteria. This fruit breaks down to form a slimy, foul smelling rot. Lesions may develop after harvest when the fruit is in transit or storage. Droplets of bacterial ooze frequently appear at infection sites on leaves, stems, petioles, and fruit in very humid weather. The droplets dry to form a whitish crust. Fruits infected when they are young can become deformed and curved.



Figure 3. Early symptoms of angular root spot.

## Disease Cycle

The *Pseudomonas* bacterium is a seedborne pathogen. The pathogen can overwinter in infested crop residues. Upon germination of seed, the cotyledons become infected. The bacterium multiplies in the intercellular space of leaves and colonizes leaf surfaces. During warm rainy weather or sprinkler irrigation, the bacteria are splashed from infested seedlings to the foliage of healthy plants and later to the fruit. The bacteria are carried from plant to plant by splashing rain, by insects, on the hands and arms of pickers, and on farm machinery. Windblown sandy soil containing infested debris and irrigation water contaminated with the bacterium are effective in spreading the disease. If bacteria reaches the developing seed, they can infect the seed coat.

The presence of free moisture on the foliage and fruit is essential for infection to occur. Infection and disease development are promoted by water-soaking of leaves which follows extended periods of rainfall, high relative humidity (95 percent or above), and a combination of warm, moist soil and cool nights followed by warm days. Two weeks of dry weather will stop disease development but a high temperature of 98°F (36°C) for 5 days will not. High nitrogen levels result in more severe disease.

## Control

1. Plant certified, disease-free seed grown in a semiarid area of the western United States. Seed from infested crops should never be saved. Treatment of cucurbit seed for 20 minutes with water at 122°F (50°C) containing various acidic organic chemicals reduces the number of bacteria in the seed but does not entirely eliminate them.
2. Do not grow cucurbits in the same field or garden area more than once every 3 or 4 years. Rotate with other vegetables, flowers, or small fruits. Avoid fields that receive run-off water from nearby cucurbit fields.
3. Avoid cultivating, harvesting, or otherwise handling plants when they are wet. Limit the use of overhead irrigation and excessive levels of nitrogen fertilization.

4. Apply a suggested bactericide (fixed copper) spray in combination with an organic fungicide starting early in the season before leaf symptoms appear. The fixed copper and organic fungicide are usually tank-mixed at half the labeled rates and applied at weekly intervals.
5. Resistance or tolerance to angular leaf spot is available in cucumbers. Consult current seed catalogs and trade publications for that information.
6. Where feasible, cleanly plow under or collect and burn crop debris immediately after harvest.
7. Minimize harvest wounds on slicing cucumbers by cutting rather than tearing the stems from the fruit. Use harvest containers that are smooth and flexible.
8. Control cucumber beetles and other insects by following a regular spray program.

*Information concerning spray programs, suggested cultivars, and fertilizer use is available at your nearest Extension office and in the Illinois Homeowner's Guide to Pest Management, which is revised annually.*