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Target Spot of Several Vegetable Crops[1]

Ken Pernezny and Gary W. Simone[2]

Target Spot is the name often used for vegetable diseases caused by the fungus *Corynespora cassiicola*. It is a relatively "new" disease in Florida, being first reported on cucumber from the Immokalee area in 1967.

The name target spot derives from the ringed or bull's eye appearance that is sometimes seen in lesions caused by *C. cassiicola*. However, concentric rings are not always readily apparent in target spot lesions, and not all lesions with concentric ringing are caused by *C. cassiicola*. It is often necessary to examine suspected target spot lesions for the characteristic spores of the causal fungus to ensure that a correct diagnosis is made. The pathogen can be induced to sporulate from diseased tissue after incubation in a high humidity chamber for 24-48 hours. In some cases, growth of *C. cassiicola* from pieces of suspect tissue on agar media in the laboratory is needed to verify that target spot is indeed the problem.

THE PATHOGEN

Historically, *C. cassiicola* has had numerous other names including some in the genera *Helminthosporium* and *Cercospora*. The fungus belongs to the class "Fungi Imperfecti" (Deuteromycontina), and as this name suggests, only an imperfect or asexual stage is known to exist. The vegetative stage consists of a branched, pale to mid-brown colored mycelium. The individual fungal strands are typically septate (having crosswalls) and give rise to spore-bearing structures (conidiophores) with as many as nine cylindrical cells per stalk (see Plate 1A). The asexual spores (conidia) borne from these conidiophores are variable in size, shape, and color. Conidia may be borne singly or in chains, they may be club-shaped to cylindrical and straight or curved, and range in color from a pale olive to a dark brown. The diagnostic feature of *Corynespora* under the dissecting microscope is the iridescent appearance of the conidiophores. Under the compound microscope, the conidia will contain from 4-20 pseudo-crosswalls (pseudosepta) that appear to divide the spore but do not extend to the outer spore walls (see Plate 1B). The base (the widest part) of the conidium also has a characteristic protruding peg (hilum) that can aid in identification.

Plant tissue from the field may support little superficial fungal growth on the tissue since *C. cassiicola* grows largely intercellularly in the plant.

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2. Ken Pernezny, Professor, Plant Pathology, Everglades Research and Education Center, IFAS, University of Florida, Belle Glade, FL 33430; Gary W. Simone, Associate Professor, Plant Pathology, IFAS, Univeristy of Florida, Gainesville, FL 32611.

The term "plates," where used in this document, refers to color photographs that can be displayed on screen from CD-ROM. These photographs are not included in the printed document.

Plate 1A.

Plate 1B.

Normally, the tissue should be incubated in a high humidity chamber to induce sporulation or cultured on an agar medium for isolation and fungus identification.

SURVIVAL AND SPREAD

The *Corynespora* pathogen has several means for survival and spread in the field. It may survive up to 2 years in crop debris. The wide host range of this fungus also contributes to survival of the fungus in Florida. Strains of *Corynespora* from different hosts have been found often but not always to be cross infective to other hosts. *Corynespora* has been proven to be seedborne in soybean, but seedborne survival in vegetable crops is not known at this time. The primary means of field spread is by air-disseminated conidia that have a primary release period in midmorning. Greatest disease severity from *Corynespora* appears to occur in seasonal periods when temperature is approximately 28°C (82°F).

SYMPTOMS

The number of host plants attacked by *C. cassiicola* totals over sixty species, with new hosts reported on a regular basis. This pathogen has worldwide distribution. In Florida, the fungus is known to attack such diverse crops as papaya, passion-vine, soybean and such common ornamentals as *Aphelandra* sp., *Ficus* spp., *Hydrangea* sp., and *Ligustrum* spp. Among the vegetable crops, *C. cassiicola* infects pepper, cowpea, cantaloupe (muskmelon), yellow squash, and KY type snap beans. Target spot is a particular problem on cucumbers and tomatoes in Florida.

On cucumbers, the disease starts as small, yellow leaf flecks that gradually enlarge to about 1 cm (0.4 in) across and become angular. Individual mature lesions are very light tan with a thin brown margin (Plate 2). Lesions may coalesce, with the development of large circular areas of dead tissue which dry and tear out. Small, elongate target spot lesions may occasionally occur on cucumber petioles and stems. Target spot, especially in the early stages, is difficult to distinguish from angular leafspot and downy mildew, two common foliar diseases of cucumber. In late stages, the disease can be confused easily with anthracnose of cucumber. Again, readers are encouraged to seek microscopic examination of lesions for signs of specific pathogens in order to make the proper diagnosis.

Plate 2.

On tomato leaves, the disease first appears as small necrotic lesions with light brown centers and dark margins. Some varieties show a pronounced yellow halo around these leaf spots. Later, somewhat circular lesions about 1 cm in diameter develop with sunken tan to light brown centers. Individual lesions often coalesce and cause a general blighting of leaves (Plate 3). Symptoms also occur on flower and fruit stalks and stems.

Plate 3.

On tomato fruit, a succession of symptoms is observed. Small, brown, slightly sunken flecks are observed first (Plate 4A). As fruits mature and the disease progresses, lesions become larger and darker. Coalescence of lesions result in large pitted areas (Plate 4B). Advanced disease on fruit appears as large and deeply sunken lesions, often with visible dark gray to black growth of the fungus in the center (Plate 4C). A recessed zone of healthy looking tissue

will usually surround the zone covered with fungal growth.

Plate 4A.

Plate 4B.

Plate 4C.

In artificial inoculation trials conducted at the Tropical Research and Education Center in Homestead, very slight wounding (as from fine sand particles abrading the fruit surface) was essential for reproduction of the fruit symptoms observed in the field. It is likely that windblown sand is important in outbreaks of target spot on tomato fruit in the field.

Target spot symptoms, especially in the early stages, can be readily confused with two other tomato diseases, bacterial spot and early blight. Again, microscopic examinations of tissue samples for spores of the Corynespora fungus may be needed for proper disease identification.

Target spot is a recent discovery on snap beans. So far, observations are limited to KY type beans (beans with a pod similar to a pole bean, but with plant growth similar to a bush bean). Leaf spots appear primarily on lower leaves. The spots are relatively large and have distinct bull's eye patterns (Plate 5).

Plate 5.

CONTROL

Use of plant resistance in cucumber to control target spot has been a long-standing control practice in Europe for over 15 years. Plant resistance to this fungus has also been documented in soybean and tomato. Due to the sporadic occurrence of target spot in Florida, however, breeding efforts for vegetable cultivars have not concentrated on this particular pathogen.

Currently, target spot is controlled primarily by periodic applications of protectant fungicides. Because of frequent changes in pesticide registrations, currently recommended fungicides can be identified by the University of Florida Cooperative Extension Service or the *Plant Disease Control Guide*. It should be noted that tank-mix sprays of copper fungicides and maneb do not provide acceptable levels of target spot control. In the past, several outbreaks of target spot of tomato have been correlated with frequent use of copper/maneb tank-mixes, primarily for bacterial spot control, to the almost total exclusion of other fungicides. Correct diagnosis of the cause of tomato foliar lesions obviously is needed if proper fungicide choices are to be made.