Septoria Fruit and Leaf Spot of Citrus

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Historical

Septoria leaf and fruit spots have been reported from citrus growing regions throughout the world for more than 100 years. Confusion over the causal agents and the relatively minor damage due to these fungi has prevented conclusive studies on these diseases.

Causal Agent and Geographical Distribution

Table 1 illustrates the major problem in dealing with the Septoria diseases of citrus. While it is reasonably certain that at least one species of Septoria inhabits most citrus growing regions, speciation of the fungi is highly suspect and the distribution of these species is therefore unknown. The majority of the species listed in Table 1 are not well known and several of the names are probably synonyms. Septoria citri, being the most commonly heard name, may be reported from many locations where it actually does not Pugsley (1939) summed up the situation when he stated that the exist. Commonwealth Mycological Institute found it impossible to determine whether a fungus was identical to either S. citri, S. limonum, S. glaucescens, or S. "The problem must remain unsolved pending a detailed comparative depressa. study of these diseases with special reference to the host range of various pathogens." That detailed study has never been done, and little progress in dealing with the large number of similar Septoria spp. on citrus has been made since 1939.

Hosts Affected

<u>Septoria</u> spp. attack most species of citrus including <u>Citrus sinensis</u>, <u>C</u>. <u>medica</u>, <u>C</u>. <u>aurantium</u>, <u>C</u>. <u>paradisi</u>, <u>C</u>. <u>reticulata</u>, and <u>C</u>. <u>limon</u>. Lemons, however, appear to be damaged more than other citrus.

Symptoms

Fruit lesions consist of small depressions or pits 1-2 mm diameter, extending no deeper than the flaveto or oil-bearing tissue. Infection begins when the fruit is green and becomes conspicous as the fruit turns color. The bottom of the pits are light tan or buff with a narrow greenish margin which may eventually become reddish brown as the fruit matures. Many small inconspicuous <u>Septoria</u> spots can spread to form large brown to black blotches during storage. These spots can be 1 cm in diameter and are deeply sunken into the albedo. Small black pycnidia of the causal agent may be produced on the lesions. Spotting on rinds may appear in the form of tear stains.

Leaf spots can be severe, appearing as raised blister-like black spots 1-4 mm in diameter surrounded by a yellow halo. Eventually the center of the spots become necrotic, pale brown in color, and pycnidia of the fungus can usually be observed in the lesion especially after leaf drop. On occasion, the Septoria spots can result in severe leaf drop.

Epidemiology

The disease appears in moist areas and is usually more severe during periods of higher than normal rainfall. The inoculum is thought to be spread by water which splashes conidia from pycnidia which have formed in dead twigs or in dead leaves. Overhead sprinklers and low or rapidly fluctuating temperatures are thought to aggravate the disease.

Identification

The disease is readily identified as a <u>Septoria</u> disease by the symptoms and the presence of dark, spherical or oval pycnidia which give rise to sepate elongate spores. Speciation of the <u>Septoria</u> is much more difficult. Pycnidial size and spore length and septation number are used most frequently in determining the species. The characters are extremely variable and in most cases, variation within an isolate is as great as variations over the range of species. Attempts to utilize more modern taxonomic concepts such as conidiogenesis have not been made. Sutton (1980), the recognizable expert on these fungi, states, "The genus is extremely large and contains more than 2000 described taxa. So far, there has been no effort to evolve a practical system of identification and taxonomy for the genus."

Control

Control is feasible simply by applying copper fungicides or the standard Bordeaux mix (copper sulfate and lime).

Economic Importance

The disease is considered to be of minor importance in most regions. Damage to fruit can cause significant reduction in grade in the central valley of California. Leaf drop can become a problem in wet years but since most groves are sprayed with copper fungicides to control brown rot, this disease appears to be under control almost without effort. Dry California conditions probably reduce the damage to the fungus. The disease causes little if any economic damage in Florida.

Potential Hazard to the U.S.

There are two reasons this disease poses a hazard to the U.S.:

- The species of <u>Septoria</u> attacking citrus appear to be numerous but methods for accurate identification of the species are unavailable. Because speciation is so difficult, little accurate information is available on many of the species and distribution of the species is unknown. If a foreign species were to enter the U.S., it could, like many other pathogens which are inocuous under their natural conditions, develop into a more severe pathogen.
- Recent papers by Wellings (1981) and Wellings and Emmett (1978) appear to describe Septoria species which have Mycosphaerella perfect stages. Mycosphaerella species like Mycosphaerella citri, the causal agent of greasy spot, can be devistating pathogens of citrus.

Recommendation for Future Action

Strict quarantine may not be necessary for these relatively minor diseases. However, given the present state of our ignorance about these diseases, we cannot make valid recommendations. A large scale and expensive program is necessary to examine the <u>Septoria</u> species on citrus and establish their geographical distribution. After close scrutiny, it may be found that there are only a few valid species. Such studies must utilize both host range as well as morphological differentiation. Such an endeavor should include the expertise of a mycologist skilled in the taxonomy of coelomycetes such as B. C. Sutton of CMI.

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Table 1. Septoria Spots of Citrus

Causal Agent	Distribution
Septoria arethusa Penz.	Argentina, Brazil, Italy, Morocco
S. catlanei Thuem.	Canary Islands, Europe, India
S. cinerescens (Dur. & Mont.) Sacc.	Algeria, Europe
S. citri Pass.	Argentina, Australia, Brazil, Chile, Cyprus, El Salvadore, Greece, Israel,
	Italy, Mexico, New Zealand, North Africa, Singapore, South Africa, Spain, USA (California)
S. citricola	Australia
<u>S. depressa</u> McAlp.	Australia, Europe
S. flaccescens McAlp.	Australia
S. glaucescens Trab.	Algeria, Morocco, Tunisia
S. limonum Pass.	USA (California)
S. sicula Penz.	Europe
S. westraliensis McAlp.	Australia, Europe

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