PP154

UF UNIVERSITY of FLORIDA
IFAS Extension

Greasy Spot[1]

L.W. Timmer, P.D. Roberts, K.R. Chung and Alka Bhatia[2]

Greasy spot is caused by the fungus *Mycosphaerella citri* Whiteside. This disease can cause serious premature defoliation during the fall and winter on all varieties grown for both the fresh and processed markets.

Based on field observations, lemons and tangelos have been considered the most susceptible. On the same basis, grapefruit are more susceptible than round oranges and Valencia oranges generally show less greasy spot than Pineapple or Hamlin oranges. The disease is usually less severe on tangerines, Temples, and Murcotts.

Symptoms

Leaf symptoms first appear as a yellow mottle on the under surface of the leaves. Growth of hypha inside the leaf tissue causes cellular swelling resulting in blister formation on the lower leaf surface and produces yellow to brown spots. Later, the swollen tissue starts to collapse and turn brown (Figure 1) and eventually the brown or black symptoms become clearly visible on the upper side of the diseased leaves as well (Figure 2). Infected leaves often drop before the lesions develop a dark greasy appearance, especially if infection occurs close to the abscission zones near the leaf petiole. Symptoms occur much earlier on susceptible varieties such as lemons and grapefruit than on Valencia oranges and tangerines. Lesions on oranges and tangerines tend to be more raised, constricted and darker (Figure 3) than those for grapefruit (Figure 1) and lemons. Greasy spot may occur as early as November, but in some years, the disease is not evident until January.

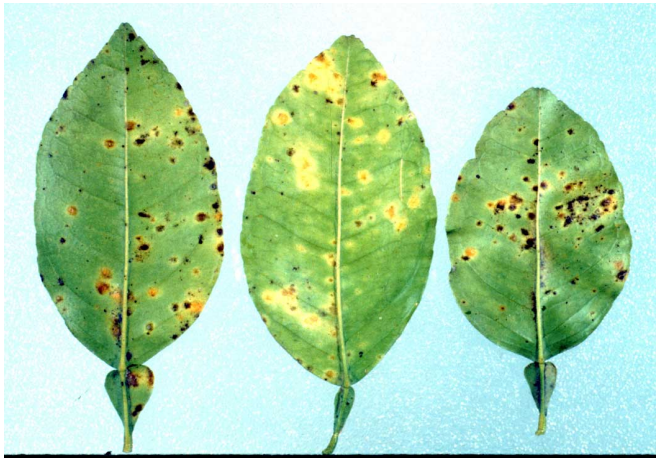

Figure 1. Greasy spot symptoms on grapefruit leaves.

1. This document is PP154, one of a series of the Plant Pathology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date July 2001. Revised December 2001. Reviewed May 2008. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.

2. L.W. Timmer, Professor, Citrus Research & Education Center, Lake Alfred, Florida; P.D. Roberts, Assistant Professor, Southwest Florida Research & Education Center, Immokalee, Florida; K.R. Chung, Assistant Professor; and A. Bhatia, Senior Biological Scientist, Citrus Research & Education Center, Lake Alfred, Florida; Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

Figure 2. Greasy spot symptoms on the upper and lower leaf surfaces.

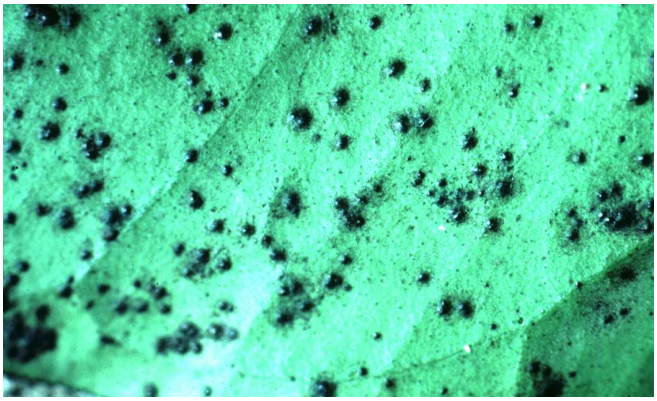

Figure 3. Small dark lesions typical of those on oranges and tangerines suffering from greasy spot.

Greasy spot infection on fruit produces pinpoint black specks which occur between the oil glands (Figures 4, 5, 6). On grapefruit, larger and coalescent specks are sometimes produced giving rise to greasy spot rind blotch (pink pitting). Another serious aspect of greasy spot rind infection is that living cells adjacent to the specks often retain a green color for much longer than normal. Ethylene degreening treatment usually fails to color up the affected areas satisfactorily.

Disease Cycle

The dropping of leaves infected with greasy spot generally follows a seasonal pattern. Relatively few leaves drop during the summer and fall. Beginning in

Figure 4. Greasy spot rind blotch on grapefruit.

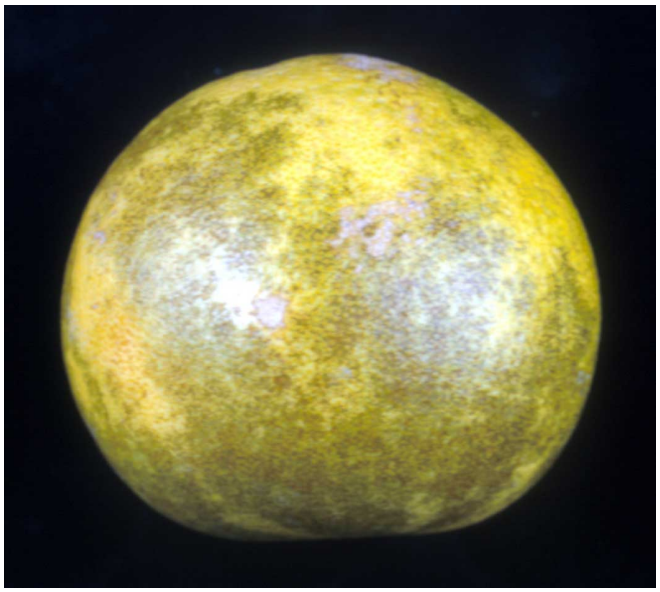

Figure 5. Close-up of rind blotch on grapefruit.

the winter, leaf drop proceeds at an increasingly rapid rate, leading to maximum accumulation of leaf litter on the grove floor by April or May. Because rainfall during the winter and early spring is infrequent and temperatures are low, fallen leaves decompose slowly at this time of year. More rapid decomposition begins as temperatures rise from April to June and is usually complete by late July. Following the onset of more frequent rainfall in May and June, spore development on the fallen leaves is hastened, and the inoculum potential becomes heaviest during those months. This is also the time when climatic conditions are most favorable for infection. Spore release slows down as

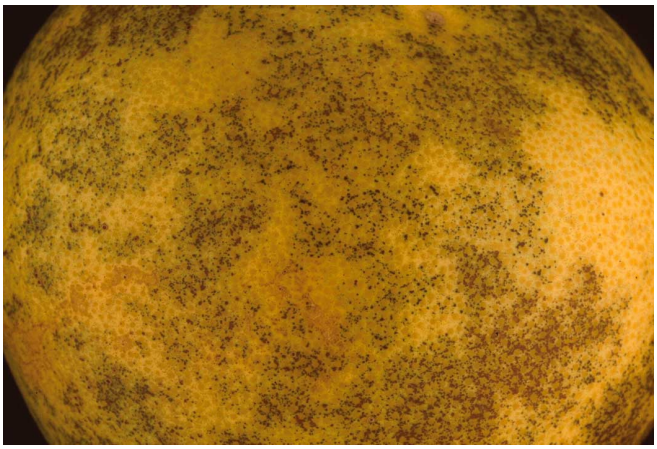

Figure 6. Individual rind blotch lesions between oil glands on grapefruit.

the leaf litter decomposes. Infested leaf litter begins to release spores when wetted by rain, irrigation, or heavy dew. The spores are ejected high enough above the substrate for them to be carried into the tree canopy by air currents. Spores are dispersed widely and can be easily carried several hundred yards from the source.

Relative humidities above 90% are essential for ascospore germination and germ tube growth. The rate of germ tube growth, which is a key factor in determining the amount of infection, is six times as fast at 77°F (25°C) as at 59°F (15°C). Sufficiently long periods of leaf wetting (6 hours) or high humidity with temperatures high enough to permit leaf penetration, occur almost nightly from June to early October, but are less frequent at other times of the year. Little infection occurs from December through February, but at least some occurs in most other months. Leaves are susceptible to infection throughout their life.

The greasy spot fungus enters host tissue only through stomata. On citrus leaves the stomata are present only on the lower leaf surfaces. A high concentration of fungus-penetrated stomata is required to induce a lesion. Penetration occurs mostly from May through September.

A special feature of greasy spot that has a major impact on the infection process and consequently the timing of chemical control, is the ability of this fungus to grow and survive for several weeks as a branching growth stage on the leaf surface (Figure 7). This growth increases the chances that a sufficient number of penetrations through nearby stomata will occur and develop into visible lesions. Thus, host penetration can continue even after the leaf litter supply of spores is depleted. High relative humidity and high temperature are required for spore germination and the subsequent fungal growth on the leaf surface. Optimum germination and growth occur between 77°F (25°C) to 86°F (30°C) in the presence of free water or near 100% relative humidity. In Florida, these conditions occur almost nightly from June to September. Growth of the fungus on the leaf surface is supported by nutrients excreted from the host, by honeydew, and decomposing insects.

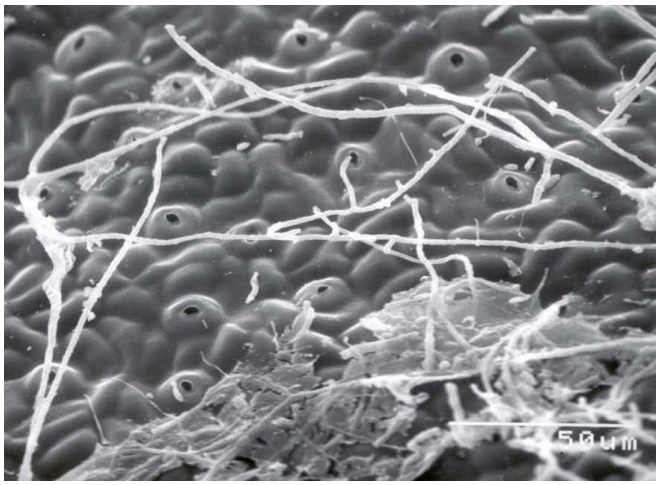

Figure 7. Scanning electron micrograph of epiphytic growth of *Mycosphaerella citri* on leaves.

Management Guidelines

Greasy spot must be controlled on all varieties of citrus. The variety and disease history of the grove determines the choice of materials and the number of applications. The best time to assess disease severity is to observe canopy density and premature leaf drop during February prior to the emergence of the spring flush. Decisions on materials for control, method of application, and timing should be made at this time for the next spray program. A single fungicide application made from mid-May to mid-July is usually sufficient for economic control of greasy spot in the northern and central citrus areas. Two sprays, one in June and one in August, are often needed on the east coast and in southwest Florida. The second application should be made to protect any summer growth flush that emerged after the first treatment.

Due to the superficial growth of the fungus on the surface of the leaf and the long period of time (2 to 3 weeks) for deep penetration by the fungus, the single application not only protects the leaf from future infections but also kills the superficial fungus growth already present. As infection only occurs through the lower leaf surface, good spray distribution on this area is essential for good control.

Host infection begins with the penetration of the stomatal chamber and that occurs primarily when weather conditions are favorable. Thus timing of chemical control should be aimed at this stage of the life cycle, rather than timed according to spore release.

To control greasy spot in commercial citrus groves, petroleum oil at the rate of 5-10 gallons per acre is generally applied. Petroleum oils do not reduce spore germination or hyphal growth, but do reduce penetration. Greasy spot is also reduced by oil sprays applied long after the fungus has penetrated the leaf tissue. The main action of oil is to reduce greasy spot by preventing or delaying the development of symptoms, even when the pathogen is already established deeply in the host.

An oil spray may be adequate for greasy spot control on Valencia oranges, Temples, Murcotts, and tangerines. A recommended fungicide is often required on the more susceptible varieties such as Hamlin and Pineapple oranges, and on grapefruit. Petroleum oil sprays alone are usually inadequate for control of greasy spot rind blotch. When greasy spot rind blotch is a problem on fresh market grapefruit, fungicides need to be applied especially in late summer (late July to early September).

Maximum response from a recommended commercial fungicide treatment for controlling greasy spot requires more timely spraying than with oil. For fungicides recommended for greasy spot control, see the *Florida Citrus Pest Management Guide*.