Mal Secco of Citrus

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Historical

Mal Secco, meaning dry disease, was first recognized on the Greek islands of Chios and Paros in 1904. It spread to Sicily by 1918 and then rapidly throughout the Mediterranean area. Its distribution is still expanding since it reached Spain as recently as 1978.

Causal Agent and Distribution

Mal Secco is caused by Phoma tracheiphila Petri (Kanc. & Chik.) formerly known as Deuterophoma tracheiphila. The disease appears to be confined at present to Mediterranean areas. It is known from Greece, Sicily, Cyprus, Italy, Turkey, Israel, Syria, Lebanon, Russia, Algeria, Tunisia, and Spain.

Hosts Affected

All citrus species and hybrids and some closely related genera in the family Rutaceae are affected by Mal Secco. Eureka lemon, rough lemon, Rangpur lime, Bearss lime, Sour orange, citron, and Savage citrange are very susceptible. Sweet orange, Monachello and Santa Teresa lemons, citrus volkameriana, grapefruit and Palermo mandarin proved to have a high degree of resistance.

Symptoms

The most common symptom of the disease is a sudden wilting and drying of leaves and twigs, often on one side or section of the tree. Symptoms may appear in only a few branches, then spread to larger branches, and finally to the stem and the whole tree may die within a year or two. Young freshly emerging leaves are chlorotic in the spring.

A slanting cut through young green branches reveals internal symptoms consisting of a pinkish or reddish discoloration of the wood. At later stages, this discoloration changes, in succession, to rusty orange, brown, and black. Less virulent strains of the pathogen result in lighter staining in the wood. Following death of the woody tissue, the fungus invades the bark causing it to become a lead gray color. Dark pycnidia appear in these areas. Fruit on diseased branches are readily invaded and may show some vascular discoloration without external lesions.

Epidemiology

Infections under field conditions arise from pycnidiospores liberated from pycnidia which are produced on dead twigs, leaves, or fruit under conditions of high humidity. Germination requires 40 hrs. of moist conditions at 15-16°C. Germ tubes enter leaf tissue through the stomata. However, the most severe infections occur through wounds such as those made by wind, hail, cultivation, or fertilization. Since the disease spreads upward through the vascular tissue much faster than it does downward, root infections and stem
Infections are usually lethal whereas leaf infections are of less consequence. Windblown rain and low temperature aggravate the disease. Primary infection normally takes place between November and February during the rainy season when the plant is partially dormant. Symptoms appear the following spring.

Identification

Identification of Mal Secco is fairly straightforward. Symptoms are distinct. In addition, wood infected with Phoma tracheiphila shows a pink or yellow-green discoloration in 1% NaOH or KOH. The fungus itself is characterized by the presence of brown or black pycnidia 30-105 μm in diam. with a neck 40-50 μm long. The small bacillus-shaped spores are 1.0-4.0 μm long by 0.8-1.5 μm wide.

Control

Control measures to date are unsatisfactory. Resistant rootstocks should be used where feasible. Deep cultivation, fertilization, and other cultural practices which could wound trees during the infection period should be avoided. Fallen leaves and trunk debris should be removed and burned to reduce inoculum. Diseased shoots and branches should be pruned during the summer. This removes the organism and prevents spread through the vascular system as well as removing inoculum for the next season. Control can also be gained by spraying with copper fungicides or benomyl during the infection period.

Economic Importance

Mal Secco is a highly destructive disease and citrus orchards have been severely damaged wherever the disease occurs.

Potential Hazard to the U.S.

This disease is ideally suited to a climate like that in southern California. If introduced, it is fairly certain to cause severe damage throughout U.S. citrus growing regions.

Recommendations for Future Action

Mal Secco represents an extreme hazard to U.S. citrus. All possible precautions should be made to prevent introduction of this organism into the U.S. A contingency plan of action should be developed in the event that Mal Secco should become established in the U.S.
References


