

Identification and Control of Fungal Diseases in Landscape Ornamentals

Jim Downer

University of California Cooperative Extension, 669 county Square Drive, Suite 100,
Ventura California 93003

The first step toward disease control is recognition of the disease presence and identification of the causal agent. Once the causal agent or pathogen is identified, a control strategy can then be developed. However, I agree with Westcott (1971) who states that “plant pathologists can tell you what a disease is but seldom what to do about it except to remove the diseased parts...”. Sadly, many fungal diseases once recognized have few control options; thus many disease strategies are preventative in nature. Plant autopsies are common in the disease diagnosis business. The logic is, that if we can figure out what killed or injured our plants, perhaps we can prevent the occurrence in the future. Thus the bulk of this presentation will focus on recognition of landscape diseases common to Southern California gardens. Where a good control strategy is known it will be mentioned.

Plant disease was defined by the late Professor H.H. Whetzel as follows; “Disease in plants is an injurious physiological process, caused by the continued irritation of a primary causal factor, exhibited through abnormal cellular activity and expressed in characteristic pathological conditions called symptoms.” The causal factor can be either a living organism (biotic cause) or an environmental condition (abiotic cause). Injury due to environmental causes differs from disease in being only a transient irritation of a causal factor. Diseases by their nature are chronic, ongoing, and take time to develop (Agrios, 1997).

For diagnostic purposes it is important to distinguish between symptoms (plant responses) and signs (parts of the causal agent). Common symptoms are wilting; yellowing, browning or death (necrosis) of plant parts; cankers (sunken lesions on plant stems); stunting; spots; etc. Signs include mycelium (collective term for fungal threads or hyphae), spores, and fungal fruiting bodies such as mushrooms, pycnidia, perithecia, etc. Based on the observation of symptoms and signs, a presumptive diagnosis can be made. However, a final diagnosis may require culture of the causal agent and identification of its spores in vitro. Sometimes, sporulation of fungi can be induced by placing the specimen in a moist chamber to allow development of fruiting bodies.

Diseases occur on all plant parts which accounts for the many different disease categories which have been devised by plant pathologists to describe plant abnormalities. The following categories are not inclusive of all kinds of disease problems but typify the majority of diseases that can occur in Southern California landscapes.

ROOT ROTS

Root rots occur on virtually all landscape plants, monocotyledons and dicotyledons, gymnosperms and angiosperms, mosses, ferns, etc. There are very few plants that are immune. The majority of the root rots are caused by fungi in the Oomycetes class of fungi. *Phytophthora cinnamomi* Rands is the cause of many root rot diseases of angiosperms, and conifers, but not of many monocotyledonous (grass) plants (Erwin

and Ribeiro, 1995). Many flowering trees are susceptible especially camphor, oak, Monterey pine, avocado, and camellia. There are over 50 recognized species of *Phytophthora* worldwide that attack many kinds of plants. California native plants such as *Fremontodendron californicum* (Tor.) Cov. are often susceptible to *P. cinnamomi* when grown in gardens.

Monocots are not exempt from root rots and are in fact plagued by them. *Pythium* spp. are frequent destroyers of bentgrass golf greens and other turfgrasses. *Pythium* spp. are also closely related to *Phytophthora* spp. yet have a different host range. They are more commonly found on nonwoody hosts.

The Oomycota, including *Pythium* and *Phytophthora*, are unique fungi which are dependant on an aquatic environment for proliferation of their swimming zoospores. Reduction or prevention of over-wet conditions will help to reduce disease losses. The acylalanine fungicides (Subdue® or Ridomil®) and the phosphonate fungicide Aliette® can provide good control of water molds.

Another pathogen-causing root rot to many plants is *Armillaria mellea* (Vahl:Fr) P. Kumm. This is a mushroom-forming member of the Basidiomycetes group that causes root rot and wood decay in a number of plants. Interestingly, *A. mellea* also attacks bamboo, *Agave* spp., *Crassula* spp., *Begonia*, palm and a number other nonwoody plants. There are no fungicidal controls. Drying out affected tissues is often a recommended practice as the fungus proliferates in moist conditions; however, it is not always an effective control once the pathogen has taken hold of its host. There are no fungicidal controls available for *Armillaria* root rot.

Root rots are also very destructive to seedlings of many plants. *Rhizoctonia solani* Kühn is a basidiomycete fungus that often causes damping off of seedlings. It has no spores but does survive in soil with hardened masses of hyphae called sclerotia. *Rhizoctonia* diseases are often diseases of nursery stock and can be controlled by soil pasteurization and sanitation.

CANKER DISEASES

Cankers are necrotic spots on stems of woody plants. They enlarge in size and the necrotic tissues as they coalesce kill the stem they are formed on. This leads to symptoms of wilt, yellowing, flagging, and dieback. The most common canker disease in Southern California is cypress canker caused by *Seiridium cardinale* (W. Wagener) Sutton & I.Gibson. It occurs on many ornamental cypress plants but *Cupressocyparis leylandii* (A.B. Jacks. & Dallim.) Dallim. & A.B. Jacks. is the most susceptible cultivated cypress I have seen in southern California. This disease is such a problem in landscapes that nurseries should refrain from growing and selling Leyland cypress.

WILT DISEASES

Wilt diseases are most often caused by species of *Verticillium* and *Fusarium*. *Verticillium albo-atrum* Reinke & Berthier is sometimes found in Brazilian pepper causing characteristic vascular discoloration of the xylem of newly formed wood. *Fusarium oxysporum* Schlechtend.:Fr. causes the wilt disease of palms in the *Phoenix* genus. This is a common and devastating disease in California spread by humans and their pruning equipment. A most famous wilt disease is Dutch elm disease, but this is not common to Southern California.

FOLIAR DISEASES

Leaf diseases are commonly caused by a variety of fungi which infect the epidermis of ornamental plants. These fungi are encouraged by moisture especially leaf wetness (except for powdery mildews). There are a number of anthracnose fungi, leaf spot fungi, and blight fungi that occur on many kinds of ornamental plants. In many cases, changing from sprinkler irrigation to drip irrigation will prevent these diseases which spread in droplets of splashed water. *Entomosporium mespili* (DC) Sacc is a fungus that commonly infects the foliage of plants in the rose family. It can completely defoliate Indian hawthorne when cultivated under sprinkler irrigation. Many fungi cause anthracnose diseases (diseases of foliage and small twigs) of elm, sycamore, pear, and oak. Symptoms of affected foliage typically follow the veins on infected leaves. *Apiognomonia veneta* (Sacc. & Speg.) Hohn. and *A. errabunda* (Roberge) Hohn. commonly infect California sycamore and coast live oak in southern California landscapes. Although not serious enough to warrant control measures (McCain, 1988), anthracnose fungi can cause dramatic defoliation of affected trees.

These are but a few examples of fungi and their effects on ornamental plants. Many more examples are catalogued by Sinclair et al. (1987) and Westcott (1971). There are also many fungal diseases which have not yet been discovered or understood. Diseases of unknown etiology continue to perplex pathologists and as we grow new and different ornamental plants we will necessarily cultivate their fungal pathogens that may also be new to science.

3

LITERATURE CITED

- Agrios, G.N.** 1997. Plant Pathology 4th ed Academic Press Ltd London
- Erwin, D.C.** and **O.K. Ribeiro.** 1996 *Phytophthora* diseases worldwide Amer Phytopathological Soc Press, St Paul
- McCain, A.H.** 1988 Foliage and branch diseases of landscape trees Cooperative Extension Univ Cal Div. Agric Nat Resources Leaflet #2616
- Sinclair, W.A., H.H. Lyon,** and **W.T. Johnson.** 1987 Diseases of trees and shrubs Cornell University Press Ithaca, N Y
- Westcott, C.** 1971 Plant Disease Handbook 3rd ed Van Nostrand Reinhold Company, New York