Walnut Blight
Xanthomonas arboricola pv. *juglandis*

Hosts: Walnut (*Juglans* spp.). All walnuts are susceptible, but Persian walnut (*Juglans regia*) is the most susceptible.

Disease common name: Walnut blight.

Pathogen: *Xanthomonas arboricola* pv. *juglandis*; syn.: *Xanthomonas campestris* pv. *juglandis* and *Xanthomonas juglandis*.

Disease Cycle

Inoculum: Primary inoculum comes from buds and possibly old stem infections.

Transmission: Bacteria are spread by rain, insects, and wind-blown pollen from infected staminate florets and other infested or infected plant parts.

Infection: The pathogen enters green plant parts through stomata when free water is present. Wounds, such as those made by the walnut husk fly or codling moth and from broken trichomes, are important portals of entry. The force of raindrops may drive the pathogen into natural openings in plant tissues, as occurs with other foliar bacterial diseases. Flowers are usually infected soon after they appear in the spring, even before the stigmas are receptive to pollen. This is a disease of new growth and nuts. Disease development is favored by wet periods around flowering time. Occasionally, infection occurs in late summer when the fruit is nearing harvest.

Symptoms and signs: Symptoms are first seen as small, water-soaked spots on leaves and young nuts (nutlets). Later, leaves become somewhat deformed as a result of lesions, which is a characteristic sign of infection (Fig. 1). Generally, the spots enlarge, turn dark brown, and then turn black and necrotic on all infected parts of the tree. Severe infection results in a blighted appearance of branches and twigs with the majority of nuts and leaflets becoming infected (Fig. 2). Infected nuts develop black, slightly sunken lesions at the flower end (end blight) (Fig. 3); more lesions may develop on the sides of nuts as they mature (side blight) (Fig. 3), depending upon the weather. The disease reaches the interior of nuts, especially when infection occurs on young nutlets (Fig. 4). Diseased nuts fall prematurely. Catkins are very susceptible to the disease and often exhibit many black lesions (Fig. 5). Shoots develop black lesions and coalesce, forming black streaks (Fig. 6).

Survival: The bacterium overwinters primarily in symptomless dormant buds. Populations of the pathogen on and in buds vary substantially, from an undetectable level to more than a million colony-forming units per bud. The incidence of bud infestation may differ among orchards, affecting nearly all buds in some orchards and only a few buds in others. The pathogen is occasionally detected in twig lesions but is not usually recovered from such lesions the next spring. Survival needs further investigation.

Disease Management

Control depends on the application of protective sprays (fixed coppers, Bordeaux mixtures, and copper-based products mixed with mancozeb) early in the season and on newly developing nuts. In orchards with histories of walnut blight damage, protective treatments are often applied at 7- to 10-day intervals during prolonged wet springs. In areas or years with less intensive rainfall, spray intervals may be substantially reduced. Weather reports can help with spray timing. The first application usually occurs when the first pistillate flowers emerge.

References

Bradbury, J. F. 1986. Guide to Plant Pathogenic Bacteria. CAB International, Slough, U.K.

Teviotdale, B. L., Michailides, T. J., and Pscheidt, J. W., eds. 2002. Compendium of Nut Crop Diseases in Temperate Zones. American Phytopathological Society, St. Paul, MN.

Figure1. Symptoms on leaf and young nutlets. Note malformation of the leaf. (Courtesy M. Schroth)

Figure 2. Severely blighted walnut foliage. (Courtesy M. Schroth)

Figure 3. Nuts with lesions on stylar ends and sides. (Courtesy B. Teviotdale)

Figure 4. Infected kernels with severe decay. (Courtesy B. Teviotdale)

Figure 5. Note different levels of infection on walnut catkins, with the most severely infected one on the right. (Courtesy M. Schroth)

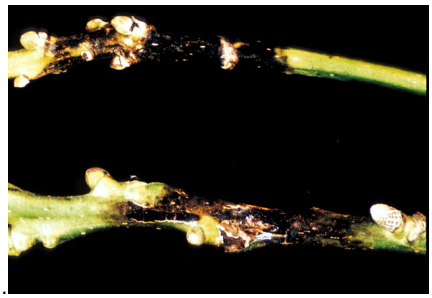

Figure 6. Infection of young shoots with black discoloration of stems. (Courtesy M. Schroth)