



VERTICILLIUM WILT OF MINT

Verticillium wilt, caused by the fungus *Verticillium dahliae*, is a very serious disease of mint. The disease has been reported from most of mint growing areas in the worlds. *V. dahliae* has a wide host range. There are several strains of this pathogen and each strain varies in its ability to attack different host plants. Individual strains can infect surface cells of roots of nearly all plants but that doesn't mean it can thrive on all plants. Strains better suited to infect an individual host grow internally in the plant and reproduce at higher levels. Aggressive strains that infect mint and cause wilting and plant death reproduce at very high levels within mint. Certain asymptomatic hosts of this pathogen (e.g., strawberry) may allow modest reproduction of the fungus. Strains more specialized on other crops (e.g., potatoes) usually do not attack mint, although exceptions may occur. Native spearmint (*Mentha spicata*) has been reported resistant to *V. dahliae*.

SYMPTOMS

The first symptoms of wilt disease on mint consist of yellowing, twisting, and curling of the upper leaves.

The distance between leaves on the stem becomes shortened, resulting in a bunching of the upper leaves, and the whole plant becomes stunted. As the disease progresses, the lower leaves die and drop. Eventually, the whole plant becomes defoliated and the aboveground parts may die. When infected stems are split open the water conducting tissue (xylem) has a light brown to black discoloration, in contrast to the greenish-white color of healthy stems. The darkening is more pronounced at the point where leaves are attached to the stem. With flowering or other stresses plants may die too rapidly for these symptoms to be observed. Patterns of diseased plants and pathogens often are aggregated. Positive identification of wilt can be made only by isolating the causal fungus in the laboratory.

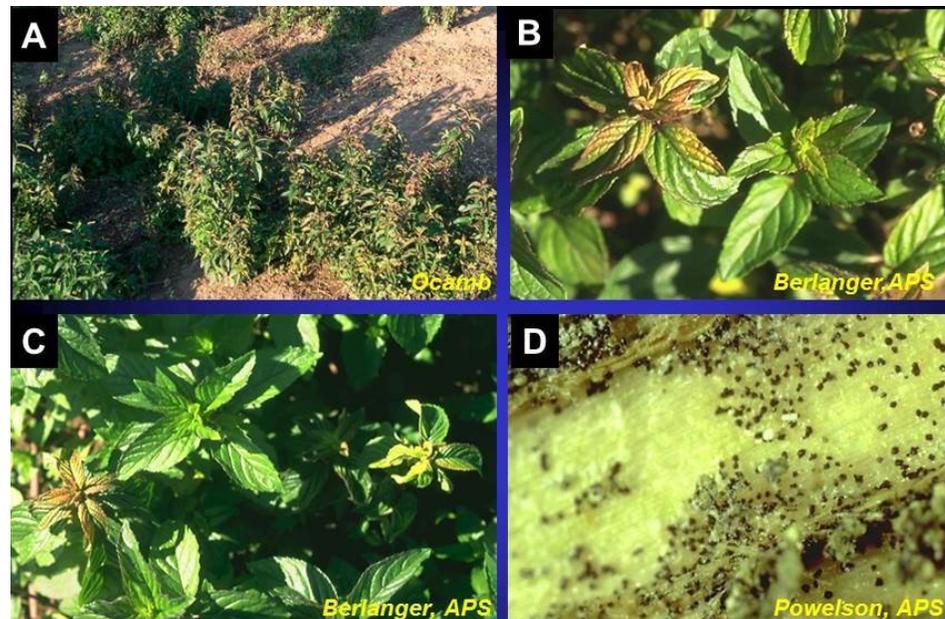


Figure 1. Verticillium wilt of peppermint, caused by Verticillium dahliae. A, peppermint plants with Verticillium wilt; B, infected plants with reddish leaves; C, infected plants with necrotic leaves; and D, microsclerotia of V. dahliae.

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DISEASE CYCLES

Verticillium dahliae is a vascular wilt pathogen. Verticillium wilt is a monocyclic disease where initial inoculum is responsible for incidence of the disease in the current growing season and secondary inoculum does not contribute to the spread of the disease. Initial inoculum of *V. dahliae* consists of microsclerotia (hardened fungal bodies), which are pinhead size and barely visible. Microsclerotia are produced internally in the plant and are released into the soil when the infected plant material decomposes. Microsclerotia are then easily moved by any activity that moves soil or water from location to location. For example, microsclerotia are moved in soil during tillage operations, on equipment as it moves from field to field, and on shoes. The fungus infects roots, moves to xylem vessels of host plants and can produce conidia (spores) in or on hosts tissues. Conidia are not a major source of spread of *V. dahliae*. Because the fungus can survive and reproduce on a wide range of host plants, any movement of infected plant material (particularly roots) can spread the fungus. A major source of *V. dahliae* is infected mint rhizomes used as planting material. Wilt incidence increases with increasing soil populations of *V. dahliae* microsclerotia. Mint is a perennial crop and Verticillium wilt increases annually within mint fields.

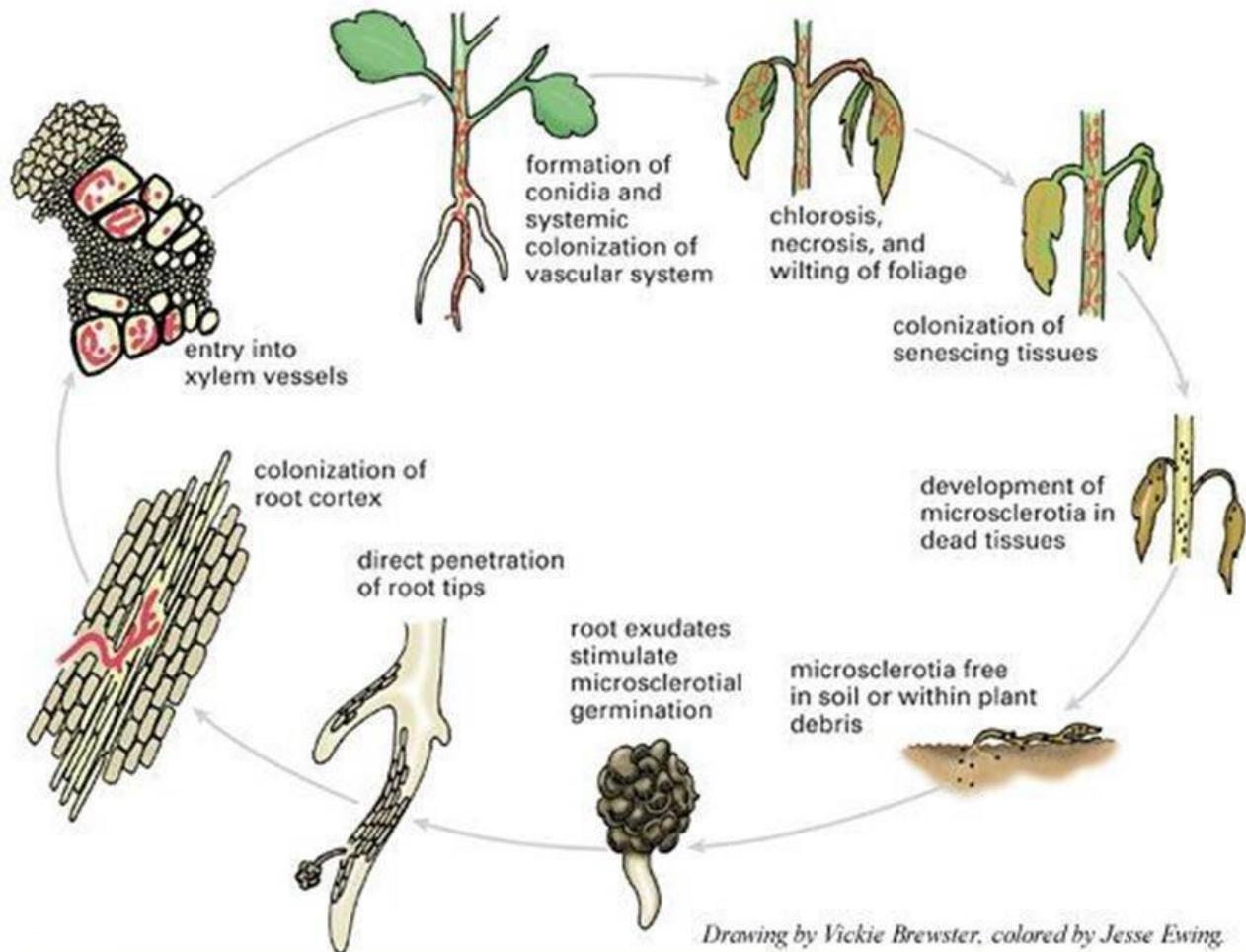


Figure 2. Disease cycle of *Verticillium* wilt. (Photo courtesy the American Phytopathological Society).

DISEASE MANAGEMENT

Verticillium wilt of mint can be managed by planting resistant cultivars, cultural practices, and soil fumigation. Native spearmint is relatively resistant, but Scotch spearmint and Black Mitcham peppermint are susceptible. Redefined Murray Mitcham is moderately resistant. Peppermint cultivar are susceptible.

Cultural practices include using pathogen-free rootstock, crop rotation, avoiding introduction of *V. dahliae* to the production site, and fall-burning to destroy microsclerotia of the pathogen. Keys to managing mint wilt is using only rootstock certified to be free of *V. dahliae* and eliminating field-to-field movement of microsclerotia and infected plant material. This includes cleaning all equipment and vehicles entering mint fields and cleaning shoes of people moving from field to field. Washing rubber or plastic boots with a 10% bleach solution or covering leather boots with disposable plastic shoe covers can prevent spread of *V. dahliae*. Using tillage for weed control in infested fields should be avoided because tillage can move microsclerotia within fields, which can create new infestations. Crop rotations for 5 years or longer with grasses and grain crops can reduce density of pathogen population. Grass hays (orchardgrass, fescue, or timothy), sudangrass, corn, cereals, alfalfa, onion, and garlic have been reported desirable rotation crop choices for managing Verticillium wilt of mint. Mint should not be rotated with potato or strawberry. Microsclerotia of *V. dahliae* can be destroyed by fall burning (flaming) that could otherwise overwinter. Fall burning is commonly done shortly after harvest. Fall burning can cause injury to stands, so fields where *V. dahliae* is not present should not be fall-burned.

Verticillium dahliae can be controlled by soil fumigation, but this treatment should be decided based on the amount of wilt in the last peppermint crop and the number of years since the last peppermint crop that the field has been in crops other than mint. Fumigation of field with Telone II, Telone C-17, or Vapam HL has been reported effective for control of *V. dahliae* in the soil. Soil fumigation, along with cultural control methods, help to more effectively control Verticillium wilt.