West Virginia University
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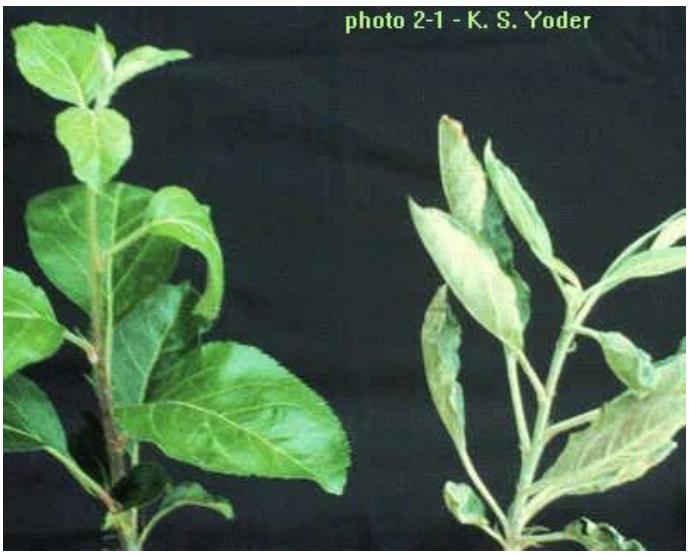
Extension Service
West Virginia University

Powdery Mildew

Podosphaera leucotricha

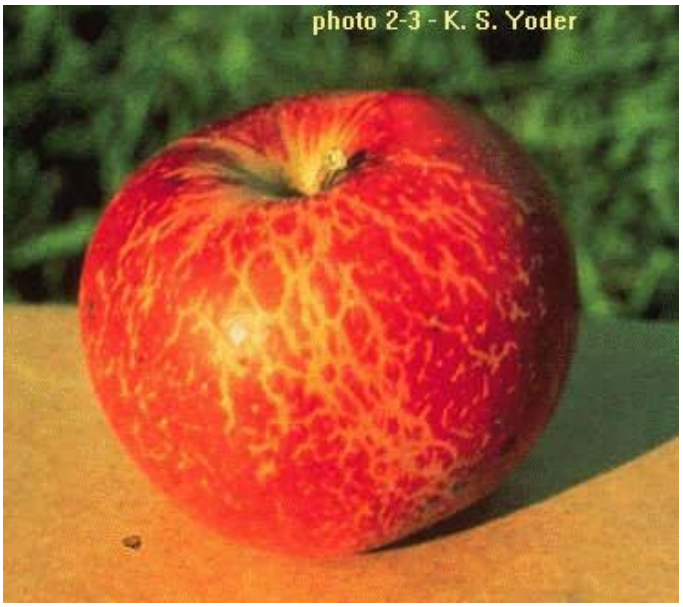
I. Introduction: Powdery mildew can be a persistent disease of susceptible apple cultivars throughout the mid-Atlantic region. It is the only fungal apple disease that is capable of infecting without wetting from rain or dew. Mildew severity and the need for control measures are related to cultivar susceptibility and intended fruit market.

II. Symptoms: Powdery mildew causes whitish lesions on curled or longitudinally folded leaves (photo 2-1), stunted whitish-gray twig growth evident on dormant shoots (photo 2-2), and fruit russeting (photo 2-3). Economic damage occurs in the form of aborted blossoms (photo 2-4), reduced fruit finish quality, reduced vigor, poor return bloom and yield of bearing trees, and stunted growth and poor form of nonbearing trees.



III. Disease Cycle: The mildew fungus overwinters mainly as mycelium in dormant blossom and shoot buds produced and infected the previous growing season. Conidia are produced and released from the unfolding leaves as they emerge from infected buds at about tight cluster stage. Conidia germinate in the high relative humidity usually available on the leaf surface at 50 to 77 F (10-25 C) with an optimum of 66 to 72 F (19-22 C). Germination does not occur in free moisture. Early-season mildew development is affected more by temperature than by relative humidity. Abundant sporulation from overwintering

shoots and secondary lesions on young foliage leads to a rapid buildup of inoculum. Secondary infection cycles may continue until susceptible tissue is no longer available. Since leaves are most susceptible soon after emergence, infection of new leaves may occur as long as shoot growth continues. Fruit infection occurs from pink to bloom. Overwintering buds are infected soon after bud initiation. Heavily infected shoots and buds are low in vigor and lack winter hardiness, resulting in a reduction of primary inoculum at temperatures below -11 F (-24 C). This phenomenon has been more commonly observed in other areas with lower winter temperatures than those commonly experienced in the mid-Atlantic region.



IV. Monitoring: While pruning, note whitened terminal shoots (photo 2-2) as an indicator of potential inoculum pressure. This may not be the actual inoculum situation, however, because some mildewed buds do not survive the winter while others which appeared to be healthy emerge with primary infection. Inspect ten shoots per tree and record the number that are infected.

From prebloom through fruit set, on larger bearing trees, count the number of emerging primary infections on shoots (photo 2-1) and blossom clusters (photo 2-4) on ten trees per five acres (2 ha). A total of one to ten and greater than ten primary infections represent moderate and high levels of risk, respectively, for fruit, leaf, and shoot infection. Because of potential chronic yield effects, action thresholds for fresh and processing market blocks are identical. On smaller nonbearing trees, record the number of primary infections on 25 trees per five acres (2 ha). Moderate and high risk levels for leaf and shoot infection on nonbearing trees are the same as those cited above.

During mid-season (3 to 9 weeks post bloom), monitor secondary infection by determining the percent of leaves with infection on ten terminal shoots on each sample tree. Twenty percent leaf infection indicates a weakness in the control program, a high level of risk for fruit and bud infection, and a recurrent problem with chronic yield reductions in subsequent years. If there is late season growth, determine the percent of leaves with infection on ten terminal shoots on each sample tree. Twenty percent leaf infection indicates a weakness in the control program, a high level of risk for fruit and bud infection, and a recurrent problem with chronic yield reductions in subsequent years.

V. Management: Where mildew-susceptible cultivars are grown, include a mildewcide in the scab program to control both diseases. The DMI fungicides are effective against both diseases. Begin sprays at tight cluster and continue until terminal growth stops. Early season sprays (tight cluster to petal fall) are essential if mildew is to be managed successfully. Lower rates of fungicides on a 7-day schedule are more effective than higher rates of fungicides on a 10-day schedule.

Online References

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