

TITLE

SUMMER MANAGEMENT OF FOLIAR DISEASES OF STRAWBERRY



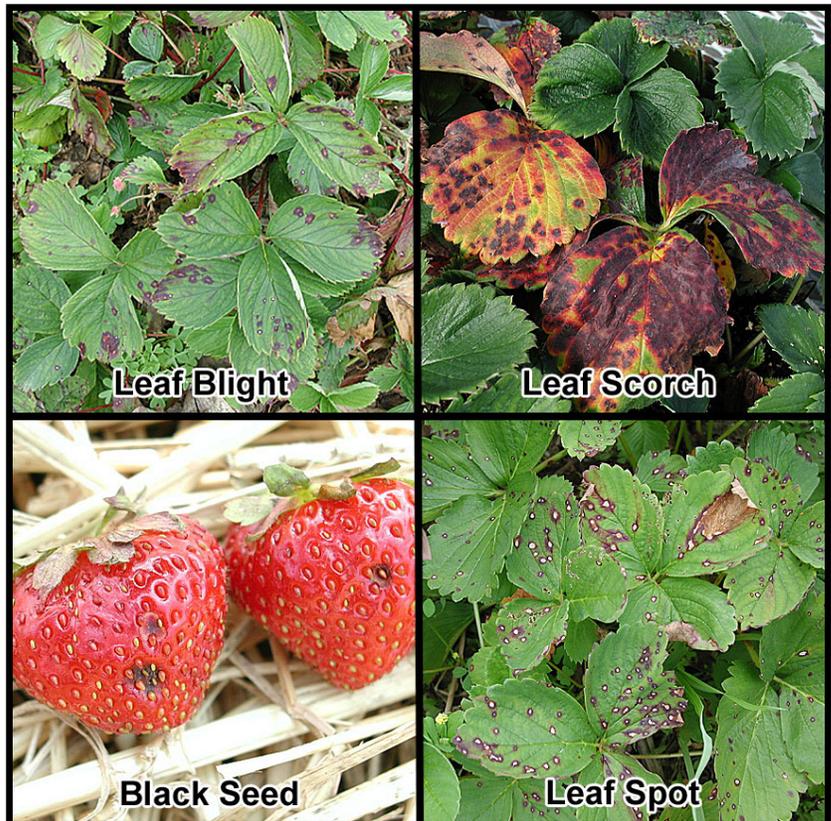
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Foliar diseases are often overlooked because most do not appear in appreciable levels until after harvest or renovation. However, serious outbreaks of any of the diseases discussed below can seriously impact the vigor, winter hardiness, and even the production of a planting. At this point, it is not well understood when is the most critical time to manage disease or how much foliar disease can a strawberry planting tolerate. Until we have a better understanding, though, we currently work under the assumption that severe infection in the summer (greater than 30% disease) is enough to impact the health of the plant and possibly result in the damage discussed above (this is based on some preliminary work done in my lab). In problem fields, I suspect that one or two well-timed fungicide applications in the summer months may be all that is needed to keep disease from reaching levels that may impact production.

Leaf spot is caused by the fungus *Mycosphaerella fragariae*. It is one of the most common and widespread diseases of cultivated strawberry. It is also the cause of black seed; a disease of the fruit that can occur when warm and wet conditions occur during bloom. Prior to the development of resistant cultivars, leaf spot was the most economically important disease of strawberry. However, since many commercially grown cultivars are not completely resistant to leaf spot, this disease is still significant on a number of cultivars including 'Honeoye', 'Idea', 'Marmolada', 'Jewel', 'Raritan', and 'Kent'.

Leaf scorch is caused by the fungus *Diplocarpon earlianum*. It is a common disease of strawberry throughout the northeast. Epidemics occur normally from August to October. Leaf scorch can markedly reduce vegetative growth, weakening plants and resulting in a sharp reduction of growth of shoots and roots, a reduction in the number and vigor of crowns, and quite possibly fruit yield. Severely infected plants may die from environmental stresses, such as heat, cold or drought. Like leaf spot, losses vary depending upon cultivar susceptibility.

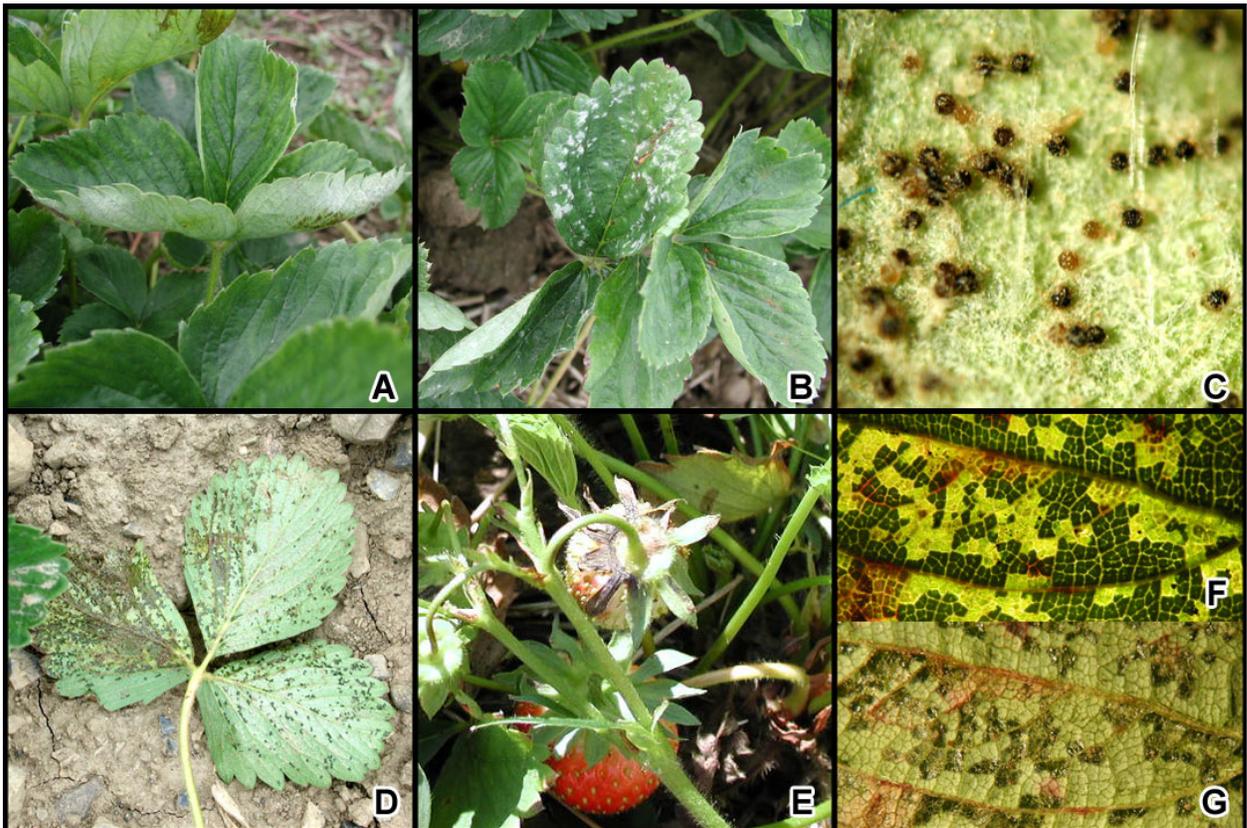
Leaf blight is caused by the fungus *Phomopsis obscurans*. The disease affects primarily older foliage in late summer and, like leaf scorch, can result in reduced plant vigor and yield in the following season. (It also can cause severe defoliation in nursery production areas in the southeastern US.) Leaf blight is particularly destructive to slow-growing or weak plants. In the Northeast, it seldom damages young, runner plants, and rarely attacks the fruit like it does in the South. The spread of *P. obscurans* is favored by frequent



rains, overhead irrigation, and heavy dews. Little spread occurs during hot, dry weather in the summer, although symptoms may continue to develop during this period.

Powdery mildew is caused by the fungus *Sphaerotheca macularis*. Disease severity is most pronounced in areas that experience high humidity and moderate temperatures through the growing season, such as the coastal and Great Lakes regions of the US. Like most of the foliar diseases mentioned, severe outbreaks of powdery mildew can weaken plants leading to an increase in winter-injury and a reduction in yield. The disease has been prevalent after renovation in plantings at Geneva for the past few years.

Angular leaf spot is caused by the bacterium *Xanthomonas campestris* pv. *fragariae*. In New York, it doesn't appear that this disease is as widespread as the ones discussed thus far. The disease severely affects the foliage, and often attacks the calyx (i.e., the sepals on fruit) or the crown of the plant. In a planting of Kent at Geneva, the angular leaf spot pathogen was isolated from a number of fruit calyxes showing the symptoms of "brown cap". How prevalent this symptom is across NY, and whether its cause is due primarily to this organism or a secondary invader has yet to be determined. Nonetheless, the disease is often left uncontrolled (mainly because there are no real control options) and, seemingly, this has little impact on the planting the following year.



Powdery mildew on the **A**, underside and **B**, upper side of a leaf surface. **C**, The minute "cleistothecia" that form on the underside of powdery mildew affected leaves in autumn. Angular leaf spot on **D**, the underside of a leaf and **E**, on the calyx ("black cap"). Angular leaf spot as it appears on a leaf via **F**, transmitted and **G**, reflected light.

Management of foliar diseases: Once regrowth begins after renovation, there are a number of options growers have to effectively manage foliar disease. Nova 40W is labeled for control of leaf spot, leaf blight, and powdery mildew and is a very effective against these diseases; I have not seen data to support its efficacy against leaf scorch. Applications should begin when disease

appears and continue on a 14 to 21 day schedule or, better, when conditions favor disease development. Often, the first application can wait until after harvest. If disease pressure was serious prior to renovation, growers should make a note to consider beginning treatment before renovation next year. If repeated applications are necessary, it is recommended that Nova 40W be alternated with a tank mix of Topsin-M plus Captan.

If anthracnose fruit rot was (or has been) a problem, growers should use a fungicide that also has activity against this disease, such as Captan or Abound. The fungus is capable of attacking the petioles of young leaves as they emerge after renovation. Fungicide applications at this time serve to protect the leaves from attack and reduce the pathogen population that can overwinter and cause outbreaks next season. Abound has good activity against anthracnose and powdery mildew. In trials conducted in Ohio, Abound was shown to have excellent activity against leaf blight as well. Captan will have good to excellent activity against anthracnose as long as coverage is maintained.

Fixed copper products are the only real option for managing angular leaf spot. Copper can be applied on 14-21 day schedule, but growers should be aware that as few as 3 successive applications of copper can result in phytotoxicity on some varieties, quite possibly doing more damage than disease itself. The collective experience of many small fruit pathologists in the Northeast is that treatment is often not necessary, as this disease can appear in epidemic from one year but often not the next.

Lastly, a number of cultural practices can be used to help manage disease. New plantings should be established in sites with light, well-drained soil, with good air circulation and full exposure to the sun. In matted-row systems, runner plants should be carefully spaced when filling rows and the entire planting should be kept free of weeds to improve air circulation and reduce drying time for leaves. Removing and burning all debris at renovation (after harvest) helps to reduce overwintering inoculum of all leaf pathogens.

(Reprinted from: New York Berry News, [Vol. 3 No. 7, July 14, 2004](#). Original printing in: [The Vegetable and Small Fruit Gazette, Vol 9 No 4, April 2005](#))