

# Strawberry Leaf Spot

Cathy Heidenreich and Bill Turechek

Introduction - Leaf spot is one of the most common and widespread diseases of strawberry. *Mycosphaerella fragariae* is also the cause of black seed disease of strawberry fruit, which occurs occasionally in North America where *Mycosphaerella* leaf spot is present. Prior to the development of resistant cultivars and improved control programs, leaf spot was the most economically important strawberry disease.

## Symptoms

**Leaves:** Leaf symptoms vary with strawberry cultivar, strain of the fungus causing disease, and environmental conditions. Leaf lesions or "spots" are small and round (3-8 mm diameter), dark purple to reddish in color, and are found on the upper leaf surfaces. The center of the spots becomes tan to gray to almost white over time, while the broad margins remain dark purple. Lesion centers on younger leaves stay light brown, with a definite reddish purple to rusty brown margin. Numerous spots may coalesce and cause death of the leaf. Large, spreading lesions that involve large portions of the leaflet are formed on some highly susceptible cultivars; the centers of which remain light brown. In warm humid weather, atypical solid rusty brown lesions without purple borders or light colored centers may form on young leaves. Lesions are evident on the undersurface of the leaf but are less intense in color, appearing as indistinct tan or bluish areas.



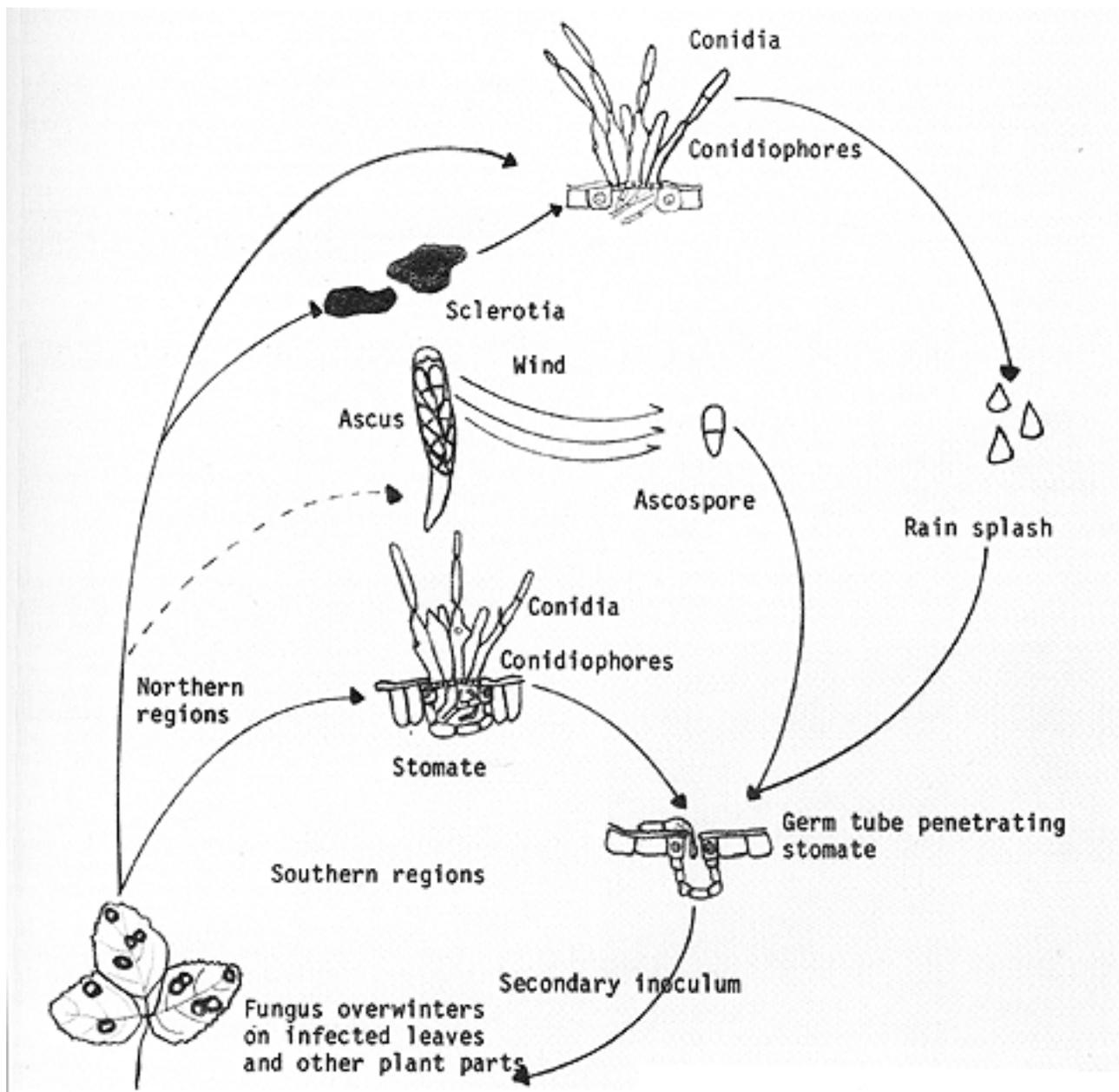
Typical foliar symptoms of leaf spot on strawberry leaves (Fig. 1). Black seed symptoms on 'Idea' strawberry fruit (Fig. 2)

**Leaf stems (petioles), runners, fruit stalks (pedicels), berry caps (calyxes):** Symptoms are almost identical to those on leaves, except for fruit. Only young tender plant parts are infected by this pathogen.

**Fruit:** Superficial black spots (6 mm in diameter) form on ripe berries under moist conditions. These spots surround groups of seeds (achenes) on the fruit surface. The surrounding tissue becomes brownish black, hard and leathery. The pulp beneath the infected area also becomes discolored, however, no general decay of the infected berry occurs. Usually only 1-2 spots occur on a berry but some may have as many as 8-10 "black-seed". Symptoms are most conspicuous on white, unripe fruit and on ripe fruit of light colored cultivars. Economic losses in this case are due to unattractiveness of "black seed" spots on fruit, rather than fruit rot.

Signs (visible presence of the pathogen) - Later in the season, dark specks (sclerotia and/or perithecia) may be seen in older lesions.

Disease cycle - In the south, perithecia and sclerotia are absent. Spores (conidia), are produced in small dark fruiting bodies (pseudothecia) within leaf lesions, and serve as inoculum. In this instance infection is a continuous process with older lesions producing conidia to infect young leaves during each season. Conidia landing on leaf surfaces produce germ tubes which penetrate through natural leaf openings (stomata) on upper and lower surfaces of leaves. New conidia are produced on clusters (fascicles) of conidiophores which grow out through stomata. These are carried to new leaves by rain splash, and the disease cycle begins again.



**Disease cycle of *Mycosphaerella fragariae* - reprinted from: Compendium of Strawberry Diseases, APS Press, 1984.**

In northern growing regions, the life cycle is somewhat different. Three sources of primary inoculum may be present: conidia overwintering on living leaves, conidia from overwintering sclerotia, and ascospores. Abundant conidia, produced in early summer on lesions on both upper and lower leaf surfaces and lesions on other plant parts, are spread primarily by water splash. High rainfall can lead to disease of epidemic proportions. Sclerotia are produced profusely on during the winter on dead infected leaves. These may also produce abundant conidia in the spring. Conidia also develop on occasion from the bases (apices) of perithecia. Perithecia are produced primarily on upper surfaces of overwintered leaves. Forcibly discharged ascospores, from these perithecia are wind disseminated. It is not known if these serve as an important source of primary inoculum, but they are most probably a means by

which genetically different strains of the fungus may travel long distances. *M. fragariae* establishes in the stigma at the time of flowering and then grows to the achene. From there it infects surrounding berry (receptacle) tissue. Conidia produced in leaf infections are probably the primary inoculum source for fruit infections.

Conditions favoring Infection - Leaf spot may reach economic threshold levels, provided young leaves and inoculum are present, under conditions of high temperature and long period of leaf wetness. Research results show most severe infection of young leaves to occur during periods of leaf wetness from 12 to 96 hours, when temperatures fall in the range of 59-68 °F. This data suggests fungicide treatments should be applied in early spring, and after renovation of plantings if inoculum was present.

Disease Management - Plant in light, well drained soil with good air circulation and exposure. Choose disease resistant cultivars suitable for your location [Appendix of Strawberry Cultivar Disease Resistance](#). Plant only disease free plants purchased from reliable nurseries. Apply nitrogen fertilizers only at renovation to reduce succulent new leaf tissue which is more susceptible. Carefully space runner plants in matted-row culture and control weeds in all plantings to improve air circulation and reduce drying time for leaves. Remove older or infected leaves before setting runners in new plantings. Removing and burning all debris at renovation (after harvest) helps to reduce overwintering inoculum of leaf pathogens. If leaf diseases are a problem in the planting, follow a fungicide spray schedule recommended for control of leaf diseases and fruit rots to aid in control. Thoroughly cover all above ground plant parts with spray, especially undersides of leaves. For more information on fungicide programs see "Pest Management Guidelines for Commercial Small Fruit Production" . Check product labels for timing and rates of application for products.

## Reference List

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