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# APPLE SCAB

## A Disease of Apple and Crabapple

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Without question, the most common and aesthetically damaging disease of apples and crab apples in South Dakota is apple scab. Susceptible varieties can be defoliated by midsummer in severe years.

Cool, wet conditions in May and June favor early disease development. Under those conditions, both leaf and fruit infections can occur. In severe cases of early infection, there may be fruit drop. Early defoliation weakens trees and increases the likelihood of winter injury or injury from other pests. Infected fruits are blemished and often severely deformed.

While a single season of apple scab does not seriously harm apple trees, heavy defoliation causes the trees to be less attractive, reduces growth and yield, and increases susceptibility to winter injury, predisposing the trees to other pests.

### SYMPTOMS

Initial symptoms develop after favorable weather following bud break. In the spring, spots (lesions) first appear on the lower leaf surface, the side first exposed to fungal



**Fig 1.** Typical apple scab leaf lesions. Note: The tan colored lesions are frog-eye leafspot, a different disease that is associated with black rot cankers on the branch. Apple scab causes diffuse lesions such as on the center leaf that is yellowing.



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**Fig 2.** Lesions closely associated with leaf veins. **A.** Upper leaf surface. **B.** Lower leaf surface.

spores as buds open. Initially, the lesions are usually small, velvety, olive green in color, and have diffuse margins. On some crabapple varieties, infections may be reddish in color.

As the spots age, the lesions become darker and develop a more distinct margin (Fig 1). Lesions often concentrate near to and along the mid-vein of the leaf, where moisture may remain longer into the day (Fig 2). Under heavy infections, leaves may become slightly misshapen and drop in the early summer.

Often it is the first leaves produced that have the heaviest infections, leading to yellowing and leaf drop that generally begins in June. Highly susceptible varieties of apple or crabapple may be severely defoliated by mid to late summer (Fig 3).

Fruit symptoms are more distinctive than those found on leaves. The margins of the spots are more obvious on the fruit and the lesions become black and “scabby” or “corky” with age (Fig 4). While the scabs are unsightly, they are only superficial. Badly



**Fig 3.** Apple scab can cause severe defoliation in susceptible varieties. **A.** The susceptible cultivar Red Splendor crabapple is a widely planted ornamental in South Dakota that can often defoliate under severe disease pressure. **B.** Even resistant varieties can lose leaves to apple scab. Yellowed leaves dropping in mid-season are often caused by apple scab.

infected fruit may become deformed or cracked and may fall before reaching full size. On early infected fruit, the scabs may be somewhat pitted or depressed below the skin surface.

## DISEASE DEVELOPMENT & SPREAD

Apple scab is caused by the fungus *Venturia inaequalis*. The fungus survives the winter in infected leaves that have fallen under the tree. In early spring fungal fruiting bodies appear as round black pimple-like structures that develop on the infected leaves from the previous year. Spores (ascospores) are released from these structures during cool rainy periods in April, May, and June and are blown by wind or splashed by rain to new growth on nearby trees where they start new infections.

After 9 to 17 days, the initial infections have developed and a different kind of spore is produced. This secondary (conidia) or summer spore stage causes further infections throughout summer and early fall. As infected leaves drop, the cycle begins again.



**Fig 4.** Lesions of apple scab on apple fruit. **A.** Lesions on edible apple fruit. **B.** Lesions on Red Splendor crabapple fruit.

Because a film of water on leaves and fruit is required for infection to occur, apple scab is most severe during years with frequent spring rains.

## MANAGEMENT

1. **Choose varieties that are resistant or immune.** This is the optimal solution. Choosing an apple variety is a decision that you will live with for 20 years. Make a wise and informed decision to control the most common diseases of apple and crabapple in South Dakota.

There are several apple varieties that are totally resistant to scab. You are strongly encouraged to consider using these resistant varieties to minimize the need for fungicide applications around the home.

- a. Scab resistant **apple** varieties adapted to South Dakota include Freedom, Haralson, Honeycrisp, Sweet Sixteen,

Wolf River, and Liberty. They have been tested in Minnesota and the Dakotas and have shown sufficient hardiness for our area. Prima, Priscilla, Sir Prize, Jonafree, Enterprise, Goldrush, Redfree, Pristine, Williams Pride, Novamac, and Nova Easygro are other varieties with resistance that may be adapted. Golden Delicious and Jonathan are moderately susceptible. McIntosh, Cortland, Red Delicious, Fireside, State Fair, Zestar, and Rome Beauty are all very susceptible to scab. All other varieties, including most commercially grown varieties are susceptible to scab to varying degrees.

- b) Lists of scab resistant **ornamental crabapples** are available from many nurseries and garden centers. Some of the many crabapples with both excellent scab resistance and superior horticultural characteristics for South Dakota include Anne E, Bob White, Centennial, Dolgo, Machurian, Molten Lava, Ormiston Roy, Prairiefire, Professor Sprenger, Robinson, Red Jewel, Sargent, Sentinel, Strawberry Parfait, and Sugar Tyme.

While widely planted in South Dakota, the varieties Hopa, Radiant, Red Splendor, Spring Snow (a fruitless variety), and Vanguard are very susceptible to apple scab.

2. **Use cultural practices such as sanitation** by raking and destroying fallen leaves. Fallen leaves harbor the scab fungus; sanitation will reduce the number of spores that can start the disease cycle the next year. Raking early, **before** the leaves become brittle and break into tiny fragments that are difficult—if not impossible—to remove by raking, will improve the success of this sanitation practice.

Pruning apple trees in late winter to maintain an open canopy will allow better air circulation, faster drying conditions, and better penetration of spray materials.

Cultural approaches are always more successful during dry years. In wet seasons, more aggressive controls may be needed, including chemical controls. Further reducing stress on the planting will minimize the effects of the additional stress caused by the disease itself.

3. **Use chemical controls to prevent infections** of apple scab during wet years or years where high humidity leads to frequent dew periods. Not many fungicides offer acceptable levels of curative control, so minimizing infections is important.

Timing is important. The most critical time to apply fungicides for scab control is early, from April to early June. Early infection is the most damaging to fruit-bearing trees. When there is risk of disease, apple trees should be sprayed on a regular schedule starting shortly after bud break, when 1/2 inch of green leaf tissue is visible.

Continue spraying on a 7 to 10 day schedule until petal fall. Use the shorter interval during wet weather. After petal fall, if dry weather persists, a 10- to 14-day spray schedule is usually adequate for control of scab.

**NOTE:** Protectant fungicides produce a barrier to infection, much like a protective layer of “paint” on the leaf surface. While some fungicides may be weathered off the leaf by rain, it is more important to apply fungicides prior to rainy weather, rather than after, to provide protection during the period when infection is most likely to occur. Systemic fungicides are not so prone to “weathering.”

Two readily available fungicides for apple scab control on apples are captan (sold as generically named Captan) and myclobutanil (sold as Immunox and other brands). In some areas fungicides containing thiophanate-methyl may be available. Both thiophanate-methyl and myclobutanil should only be used in alternation with captan to delay the emergence of variants of the apple scab fungus that are resistant to thiophanate-methyl.

On ornamental crabapples, any of several brands of “multi-purpose fungicide” containing the active ingredient chlorothalonil may also be used. See SDSU Extension FS934, *Managing Plant Diseases in the Home Garden*, for the most current rates of labeled fungicides. Product labels will provide full details on use rates and reapplication intervals.

Neem oil and sulfur are also labeled for use, but while they offer an organic alternative, they are unproven in the control of apple scab. Similarly, while Bordeaux mixture is labeled, it is not usually considered effective.

Multi-purpose fruit tree sprays generally contain a fungicide, but be sure to check the label for fungicide included and frequency of use. Fungicide rates in the mix may be unacceptably low. Early in the season, fungicides are likely to be needed more frequently than insecticides.

Avoid spraying with multi-purpose sprays during bloom as they are harmful to the honeybees that pollinate the apple blooms. In general, applying only the product needed for a given problem is the better approach.

4. Practice **integrated disease management**. The need for fungicides will be influenced by the susceptibility of the apple or crabapple variety and weather conditions, since rainy weather or moisture are required on plant surfaces for infection by the fungus.

The following fungicide active ingredients are labeled for use on apple and crabapple. Many brand names may contain these active ingredients. Be sure to check current labels for product uses.

#### **Apple**

- Captan (many products)
- Copper products (many products)
- Lime sulfur (many products)
- Neem oil (many products)
- Sulfur (many products)

#### **Crabapple**

- Chlorothalonil (many products)
- Myclobutanil (Schultz Fungicide Plus Concentrate, Spectracide Immunox, Spectracide Immunox Plus Insect and Disease Multi-Purpose Concentrate)
- Neem oil (many products)
- Propiconazole (Ferti-lome Liquid Systemic Fungicide)
- Tebuconazole (Bayer Advanced Disease Control for Roses, Flowers and Shrubs Concentrate)

Late season fungicide applications may be necessary to prevent pin-point scab infections (a pitting symptom) and various fruit rots. If long wet periods occur between mid-August and harvest, fungicide applications should continue until the pre-harvest interval is reached. Wet periods lasting 2–3 days during mid-August, 3–4 days in late August or early September, and 6–7 days during the second half of September favor fruit infection. Fungicides should be applied either ahead of or during the latter half of such prolonged wet periods. The pre-harvest interval for apple scab fungicides ranges from 0–14 days.

Product brands are listed only for reader convenience and are not intended as an endorsement. Other efficacious and acceptable products may be available in local areas.

FS934, *Managing Plant Diseases in the Home Garden*, is updated regularly and contains a list of the most current products registered in South Dakota for apple scab control.