



# Disease Cycle

*Venturia inaequalis* overwinters in fallen infected leaves on the ground. Throughout the winter the fungus remains as immature pseudothecia (fungal reproductive structures). As the conditions become favorable in the spring, the pseudothecia mature and produce ascospores (analogous to seeds). These ascospores are the source of the primary infection. Once the ascospores are mature, a period of moderate temperatures and rainfall will trigger the ascospores to be forcefully ejected into the air currents where they may be carried to susceptible tissue. With optimal temperature and leaf wetness the spores will infect the tissues if the leaves are unprotected.

The fungus grows in the tissue and produces secondary spores termed conidia (analogous to seeds). These conidia infect the tissue and produce brown to olive-brown lesions covered with more conidia. When the conidia are mature they can be blown or knocked from the infected tissue surface and start a new secondary infection cycle. The fungus overwinters in the fallen leaves and is activated again in the spring to produce pseudothecia and ascospores which initiate the cycle again.

## Control

### Cultural Control

Since the apple scab fungus relies on early season maturation of the pseudothecia and leaf wetness for infection, many of the cultural controls are targeted to stop maturation of spores and decrease periods of leaf wetness.

Some cultivars are resistant and will influence the severity of disease. Varieties known to be resistant include: Akane, Liberty, and Prima. Those with some resistance include: Jonagold, Macoun, Red Delicious, Rome Beauty, Jonathan, and Granny Smith.

Apply 5% Urea to fallen foliage to increase the speed of microbial decomposition of the leaves.

Flail-mow fallen foliage after leaf drop or early in the spring as soon after the snow melts as possible.

Avoid wetting the foliage when irrigating lawn or groundcover. Irrigate in the morning so the sun will reduce the amount of time the leaves are wet.

Prune trees to open up canopy to allow good air circulation and reduce amount of time leaves are wet.

### Chemical Controls

Fungicides used for control of Apple Scab are either preventive and/or curative (kickback). Preventive fungicides must be applied before an infection period, whereas those fungicides that are curative should be applied after an infection period but must be within the time period (kick back) suggested by the manufacturer. A tank mixture of preventive and curative fungicides should

be used after an infection period. Determining infection periods is essential for deciding on a spray program. It is often more effective and economical to use preventive fungicides. Leaf wetness and temperature relationships have been used to determine these infection periods for many years and are a major component of current IPM techniques for applying pesticides only when necessary. Table 1 has simplified leaf wetness and temperature infection period values.

### Registered Chemicals: Preventive

Captan 50 WP — at 4 to 8 lb/A in 200-400 gallons of water. Do not apply more than 64 lb/A/year. May be applied up to the day of harvest. Do not use with oils, lime, or alkaline materials. For home use, Captan (5%) at 1 lb/10 gal water. 4-day re-entry.

Mancozeb — 6lb/A prebloom; 3lb/A bloom through postbloom. Do not apply more than 21 lb/A/year.

Polyram 80 DF — 2 lb/A in 300 gallons of water. Spray on a 7-10 day schedule beginning at 1/4" green tip. 1 lb/A can be applied post bloom for scab control. Do not apply within 77 days of harvest.

Wettable Sulfur (92%) — 6-8 lbs/100 gal water. Do not use with oils, may cause damage. Consult label before application.

Lime sulfur (29%) — at 1 to 6 lb/100 gal water. May injure fruit on 'Delicious' apples. Polysul and Sulf-R-Spray (both 29% lime sulfur) are registered for home use. 48 hr re-entry.

Vanguard WG — Prebloom 5 oz/A. Begin at green tip and continue on a 7-10 day schedule when the product is used alone. If product is used in a tank mix, apply 3 oz/A. Pink, bloom, and post bloom, apply as a tank mix at 3 oz/A with a recommended protectant fungicide. Vanguard offers protective as well as 48 hours of post infection (curative) control. Do not apply more than 22 oz /A of Vanguard per growing season. Do not apply within 72 days of harvest

Sovran — 1.0-1.6 oz/100 gal water applied as a preventative spray beginning at 1/2 inch green tip and repeated at 10-14 day intervals. Sovran provides post-infection activity up to 96 hrs. 30 day pre harvest interval with a maximum of 25.6 oz/A/season.

### Curative

Procure — 2-4 oz/100 gal water. Begin spraying at 1/2" green with a 7-10 day spray schedule. As an eradicant, apply 3-4 oz/100 gals of water within 72 hrs of the infection period.

Rally 40 W — 1.25-2 oz/100gal water beginning at pink and through postbloom. Apply 2.0 oz/100 gal water within 96 hours of infection period for kick-back effect.

Rubigan EC — 3-4 oz/100 gal water on a 7-10 day spray schedule. Apply 3-4 oz/100 gal water within 96 hours post infection period and again 7 days later for kick-back effect.

Syllit 65 WP — 1-2 lbs/A on a 5-7 day spray schedule. Apply 3 lbs/A within 36 hours post infection period for kick-back effect.

Flint — 2.0-2.5 oz/A on a 7-10 day spray schedule. Use higher rates when disease pressure is severe. Provides 100 hours of kick back effect.

**Table 1**

<b>Temperature (F)</b>	<b>Minimum hours leaf wetness for infection period to occur.</b>
34	41
36	35
37	30
39	28
41	21
43	18
45	15
46	13
48	12
50	11
52	9
54	8
55	8
57	7
59	7
61-75	6
77	8

Information in Table 1 courtesy of D.M. Gadoury & R.C. Seem.

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