

Apple Scab

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This NebGuide discusses the causes and various treatments for apple scab, one of the most important diseases of apples and crabapples.

Apple scab, caused by the fungus *Venturia inaequalis*, occurs worldwide wherever apples are grown. Scab is one of the most important diseases of apples and crabapples in Nebraska. Disease development is favored when wet and humid weather prevails from late April through June. The disease decreases yield, reduces fruit quality, defoliates trees, and reduces tree vigor. Nearly every year, this disease defoliates susceptible varieties of ornamental crabapple. Repeated infection reduces their aesthetic values in landscape plantings and predisposes them to further injury from other stresses.

Symptoms

The first visible symptoms generally are small, discrete olive-to-greenish-black lesions on the underside of the

leaves. Lesions are about one-fourth inch in diameter with an indefinite feathery margin. With time, the color darkens as the size of the lesions increases (*Figure 1*). Early infections tend to be on the underside of the leaf; later in the season the spots can be seen on either side. Leaves with a large number of lesions often become distorted, show dead or dying tissue, yellow, and drop prematurely from the tree. Similar lesions can appear on the leaf petiole. Lesions on the apples are superficial, and the enlarging tissues beneath them give the lesions a cracked or “scabby” appearance and misshape the fruit (*Figure 2*). Though the fruit may appear unsightly, it is safe to eat.

Host Range

V. inaequalis attacks members of the genus *Malus*. This includes varieties of apple and crabapples, including the common wild crabapples. Scab also has been reported on hawthorn (*Crataegus* spp.), mountain ash (*Sorbus* spp.), firethorn (*Pyracantha* spp.), and loquat (*Eriobotrya japonica*).



Figure 1. Apple scab symptoms on a leaf surface.

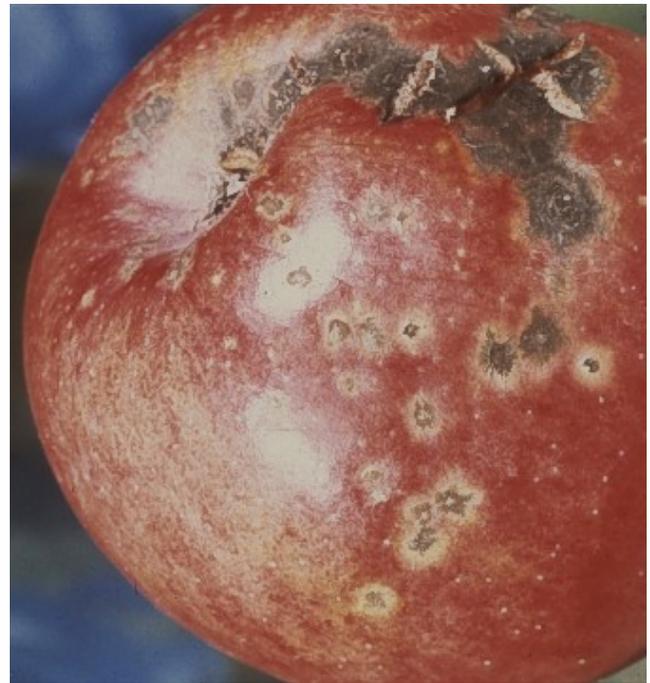


Figure 2. Apple scab on the fruit.

Table I. Reaction of selected apple cultivars to apple scab^a

<i>Very Resistant^b</i>	<i>Resistant</i>	<i>Susceptible</i>	<i>Highly Susceptible</i>
Liberty	Easy-Gro	Blushing Gold	Cortland
Prima	Enterprise	Burgundy	Jerseymac
Priscilla	Freedom	Fuji	Jonagold
Sir Prize	Gold Rush	Gala	McIntosh
	Grimes Golden	Golden Delicious	Melrose
	Jonafree	Granny Smith	Rome Beauty
	Mad-free	Honey Crisp	Winesap
	Pristine	Jonathan	
	Redfree	Lodi	
	William's Pride	Monroe	
		Paula Red	
		Red Delicious	
		Spartan	

^aFrom West Virginia University Kearneysville Tree Fruit Research and Education Center, 67 Apple Harvest Lane, Kearneysville, WV 25430, Apple Scab, *Venturia inaequalis*, by A.R. Biggs and K.D. Hickey.

^bVery Resistant = no control needed; Resistant = control needed under high disease pressure; Susceptible = control usually needed where disease is prevalent; Highly Susceptible = control always needed where disease is prevalent. These cultivars should receive first priority when control is necessary.

Disease Cycle

V. inaequalis survives the winter in fallen leaves that were infected the previous summer. In spring the fungus becomes active on the infected leaf debris in structures called pseudothecia and produces other structures called asci that contain ascospores (fungal “seeds”). The first dispersal of ascospores coincides with the first appearance of green tissue in the apple buds, commonly called “green tip.” Peak spore dispersal usually coincides with bloom. Rain helps increase spore production and dispersal. Spores that land on a susceptible leaf or fruit surface and come in contact with a droplet of water germinate and infect the host. Six to eight hours of free moisture on the leaf surface are necessary for germination and infection to occur. In 7-14 days the first disease symptom appears as a scab lesion. During late spring and early summer other spores called conidia are produced in the leaf and fruit lesions, causing secondary infections and resulting in more lesions and increased disease severity. As temperatures increase, the fungus becomes less active, resulting in few new infections during summer. A secondary fall infection cycle may occur under cool, moist conditions, but fall infections are less damaging than spring infections. However, these infections increase the production of the overwintering structures that are the main source of ascospore inoculum in spring.

Management

There are several approaches to managing scab. Each offers some degree of success when used individually, but the best long-term management involves integrating multiple tactics.

Resistant Varieties

Apples: *Table I* shows the disease reactions of apple varieties to scab. Although varieties vary in their susceptibility to *V. inaequalis*, no cultivated commercial variety has sufficient resistance to eliminate the occasional need for chemical spray.

Crabapples: The crabapple varieties listed in *Table II* are reported to be resistant or moderately resistant to scab.

Table II. Crabapple cultivars resistant to apple scab.

<i>Red Flowering</i>	<i>Pink Flowering</i>	<i>White Flowering</i>
Adams	Jewelberry	Andirondack
Basketong	Louisa	Amberina
Centurion	Pink Satin	Autumn Glory
Indian Summer	Profusion	Centennial
Makamik	Red Splendor	Chestnut
Prairiefire	Silver Moon	Christmas Holly
Red Baron	Tea	Donald Wyman
		Molten Lava
		Ormiston Roy
		Professor Sprenger
		Redbud
		Red Jewel
		Sargent
		Sinai Fire
		Sugar Tyme
		Weeping Siberian

Table III. Fungicides^a available for managing apple scab.

<i>Ingredient</i>	<i>Trade Name</i>	<i>Edible Apple</i>	<i>Ornamental Apple</i>	<i>Commercial (C)/ Homeowner (H) Use</i>
Azoxystrobin	Heritage (Syngenta Crop Protection)	No	Yes ^b	C
<i>Bacillus subtilis</i>	Serenade Garden Disease Control Concentrate (AgraQuest Inc.)	Yes	No	H
Boscalid	Pristine (BASF Corporation)	Yes	Yes	C
Captan	Captan (Bonide Products Inc. & Arysta LifeScience)	Yes	No	C
	Complete Fruit Tree Spray (Bonide Products Inc.)	Yes	No	H
	Gordon's Liquid Fruit Tree Spray (PBI/Gordon Corporation) ^c	Yes	No	H
Chlorothalonil	Pegasus DF (Phoenix Environmental Care LLC)	No	Yes	C
	Prosolutions Thalonil 6L (Agrilience LLC)	No	Yes	C
Copper Hydroxide	Dupont Kocide (E I DuPont De Nemours & Company)	Yes	No	C
Kresoxim-methyl	Sovran (BASF Corporation)	Yes	Yes	C
Mancozeb	Dithane (Dow AgroSciences)	Yes	Yes	C
	Fore 80WP Rainshield (Dow AgroSciences)	No	Yes	C
Mancozeb + Myclobutanil	Clevis (Prokoz Inc.)	Yes	No	C
Maneb	Maneb 75DF (United Phosphorous Inc.)	Yes	No	C
Manganese	Penncozeb (United Phosphorous Inc.)	Yes	Yes	C
Myclobutanil	Nova 40W (Dow AgroSciences)	Yes	No	C
	Rally 40 WSP (Dow AgroSciences)	Yes	No	C
Potassium salts	Alude Systemic Fungicide (Cleary Chemical Company)	Yes	Yes	C
Propiconazole	Banner Maxx (Syngenta Crop Protection)	No	Yes	C
	Bonide Fung-Onil Lawn and Garden Disease Control RTS (Bonide Products Inc.)	No	Yes	H
Sulfur	Thiolux Jet (Syngenta Crop Protection)	Yes	No	C
Thiophanate-methyl	Topsin (United Phosphorous Inc.)	Yes	No	C
Triflumizole	Procure 480SC (Chemtura Corporation)	Yes	No	C

^aThis list is presented for information only and no endorsement is intended for products listed nor criticism meant for products not listed. Consult the product label for specific application rates and plant growth stage. Read the label carefully before application.

^bSome species of crabapple can be damaged by this product; carefully read the product label before application.

^cProduct also contains an insecticide.

Sanitation — Cultural Control

Rake and remove leaves in autumn or winter. Either destroy or thoroughly compost the leaves. This will reduce the number of spores that can start the disease cycle the next year. When using sprinklers to irrigate the turf in summer, water early in the morning so turf and trees stay wet for less than four hours. This helps reduce disease activity on both the turf and landscape plants.

Chemical Control

Regular, well-timed fungicide sprays have proven to be the most commercially practical means of controlling scab for

susceptible trees, but the first line of defense is to consider scab-resistant apples and crabapples.

Preventing early infection of apple scab is the most critical step toward successful control of later leaf and fruit infections. For apples, fungicide applications can be made as early as the green tip growth stage (*Table IV*) and continued until petal drop. For crabapples, typically one to two fungicide applications starting at green tip are necessary. Sprays are only necessary if the weather is rainy. The list of fungicides in *Table III* is a guide. Observe all label precautions. Regardless of the fungicide used, effective control depends on the timeliness and repetition of applications and the degree of coverage obtained on both upper and lower leaf surfaces.

Table IV. Fruit tree growth stage description.

<i>Growth Stage</i>	<i>Description</i>
Dormant	Absence of growth in fall, winter or spring.
Silver Tip	Swollen buds become noticeable and silvery fuzzy leaf tissue begins to emerge from the tip of the bud.
Green Tip	Green leaf tissue is visible at the tip of the bud.
Tight Cluster	The spur leaves have folded back exposing the flower cluster inside the bud.
Pink/Pre-Bloom	The flower buds have grown enough to expose the petals of the flowers.
King Bloom	The center “King Bloom” has opened.
Full Bloom	Eighty percent or more of the flowers on the tree are open.
Petal Drop/Fall	Last petals have fallen from blossoms.

This publication has been peer reviewed.

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