

# Disease-Resistant Apple Cultivars

Disease infection is a major limitation to growing apples in Missouri. The common diseases include apple scab, cedar apple rust and powdery mildew. With increasing concerns about pesticides, several breeders have focused on the development of apple cultivars that are resistant to the major diseases. Apple growers who don't have the time, equipment or desire to apply fungicides may wish to plant disease-resistant varieties.

## Common apple diseases

Before planting, it is helpful to know the prevalent diseases that infect apples grown in your area so that cultivars with resistance to these diseases can be selected for planting.

### Apple scab

Because apple scab is the most widely distributed disease, breeders concentrated on developing scab immunity before targeting any of the other diseases. Apple scab is caused by a fungus that infects the fruit and the foliage of trees under cool, humid conditions in spring. Young, velvety brown lesions can be seen on the underside of leaves. With time, individual lesions may coalesce and infect both the upper and lower leaf surfaces. A severe infection of the leaves can cause premature defoliation, which reduces tree growth and yield. Scab lesions on the fruit are brown and corky. As the fruit enlarges, it may grow unevenly, resulting in misshapen, cracked fruit. Fruit losses from apple scab can be severe on susceptible varieties. However, all the cultivars listed in Table 1 at the end of this document are immune to this disease.

### Cedar apple rust

Because plantings of eastern red cedar (*Juniperus virginiana*) are widespread in Missouri, cedar apple rust is another common disease in the state. Eastern red cedar serves as an alternate host to the disease. Under rainy conditions in spring, galls on the cedar branches



Sketch by Barbara Barkwell Long

produce orange, gelatinous horns that release spores. Wind can carry the spores as far as a mile to infect the young leaves and blossoms of apple trees. After infection, the orange-brown lesions appear on the upper sides of the foliage or on fruit.

On susceptible varieties, cedar apple rust can cause defoliation and loss of fruit quality. Although the apple cultivars listed in the table are scab-immune, some of the varieties, such as Dayton, Goldrush, Jonafree, Prima and Sir Prize, are susceptible to cedar apple rust. These varieties should be avoided in areas where cedar apple rust is prevalent.

### Fire blight

Fire blight is a devastating bacterial disease that occurs sporadically in most parts of Missouri. This disease infects blossoms, fruit, branches and leaves. The infected tissue appears black, as if scorched by fire, and is often accompanied by clear or milky ooze. The "shepherd's crook" symptom, in which the shoot tips are bent over, is the most easily recognized evidence of the disease. Whole branches or trees may

#### Credits

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**Table 1. Disease-resistant apples.**

Variety	Ripening date	Color	Fruit size	Taste	Uses
Dayton	Aug. 20	Bright, shiny red over yellow	Large	Mildly tart, less acid than Jonathan	Cooking, fresh
Enterprise	Oct. 10	Medium red over yellow	Medium to large	Mild, sub-acid, spicy	Cooking, fresh
Freedom	Sept. 10	Bright red stripe over yellow	Medium to large	Sub-acid	Cooking, processing
Goldrush	Oct. 25	Yellow	Large	Sprightly acid	Cooking, fresh
Jonafree	Sept. 1	Medium red over yellow	Medium to small	Mildly tart, less acid than Jonathan	Fresh
Liberty	Sept. 5	Red semi-stripe	Medium	Moderately tart	All purpose
Nova Easygro	Sept. 5	Red stripe	Medium	Slightly sweet	Cooking, fresh, processing
Novamac	Aug. 25	Medium red stripe	Medium	Sub-acid, similar to McIntosh	Fresh
Prima	Aug. 15	Red over yellow	Medium	Mildly sub-acid	Cooking, fresh
Priscilla	Sept. 1	Red over yellow	Medium	Sweet with licorice	Fresh
Pristine	July 25	Yellow	Medium to large	Moderately tart	Fresh
Redfree	Aug. 5	Medium red	Medium	Slightly sweet, low acidity	Cooking, fresh
Sir Prize	Sept. 20	Yellow	Large	Sub-acid, aromatic	Cooking, fresh
Trent	Oct. 25	Red blushed over light green	Medium to large	Sub-acid, less acid than McIntosh	Fresh, processing
William's Pride	July 30	Dark red purple	Medium	Sub-acid, slightly spicy	Cooking, fresh

\*Ratings: 1 = very resistant; 2 = resistant; 3 = moderately resistant; 4 = susceptible

Storage length	Resistance ratings*				Tree growth habit	Comments
	Apple scab	Cedar apple rust	Fire blight	Powdery mildew		
4 weeks	1	3	2	3	Semi-vigorous, spreading	Sometimes prone to bitter-pit
6 months	1	2	2	3	Moderate to high vigor	Best flavor after 1 month storage
3 months	1	2	2	2	Vigorous, spreading	Good pollinator for Liberty
7 months	1	4	3	2	Moderate vigor, slightly upright, almost a spur type	Fruit appears similar to Golden Delicious
2 months	1	3	3	3	Moderately vigorous, may have some bare wood	Similar to Jonathan in appearance, not prone to Jonathan spot
5 months	1	1	2	2	Vigorous, spreading	One of the best disease-resistant cultivars, a McIntosh-like fruit
2 months	1	1	2	2	Moderately vigorous, spreading	Developed in Nova Scotia
3 months	1	1	2	3	Vigorous, upright and spreading	Susceptible to pre-harvest drop, developed in Nova Scotia
3 weeks	1	4	3	2	Semi-vigorous, spreading	Prone to bitter-pit, susceptible to winter injury
2 months	1	1	2	3	Moderately vigorous, thin branched	Fruit cracking when overmature
6 weeks	1	2	3	2	Moderately vigorous, spreading, wide crotch angles	Less susceptible to bruising than Lodi
1 month	1	1	3	3	Vigorous, spreading, wide crotch angles	Some bare wood on limbs
6 months	1	3	4	2	Vigorous, spreading	Not a good pollinizer for other varieties, thin skin, bruises easily
6 months	1	2	3	2	Moderately vigorous, slightly upright	Susceptible to bitter-pit, from Ontario
6 weeks	1	1	2	2	Vigorous, spreading, large tree size	Not recommended on a MM.111 rootstock due to bitter-pit, prone to water core

(continued from page 1)

be lost after fire blight infection. Temperatures greater than 65 degrees F and moisture favor fire blight infection. Enterprise and Liberty are two cultivars that have very good resistance to fire blight, while Sir Prize is susceptible to the disease.

### **Powdery mildew**

Powdery mildew is caused by a fungus that infects blossoms, fruit and leaves. Whitish, felt-like patches can be seen on the underside of foliage. Infected floral buds open five to eight days later than healthy ones. Later, the developing fruit often exhibits russetting, which appears as brown, corky netting on the surface of the small apples. Powdery mildew infection favors cool temperatures and high humidity. Apple varieties such as Dayton, Enterprise, Jonafree, Novamac and Redfree should be avoided in areas where powdery mildew is most likely to occur.

## **Summer diseases and insects**

Although some apple cultivars have resistance to some apple diseases, they are still susceptible to summer diseases, such as fly speck and sooty blotch, and to insect pests. Fly speck and sooty blotch occur together on the fruit surface under warm, humid weather conditions. Fly speck is identified by distinct groups of tiny, shiny black spots. Sooty blotch appears as olive green to black smudges. Both of these diseases are superficial blemishes that can usually be removed from the surface of the apple with mild scrubbing. In contrast to the summer diseases, trapping, mating disruption or insecticide application will be necessary to control insect pests on the disease-resistant apple cultivars.

### **Also from MU Extension Publications**

G6020 *Fire Blight*

G6022 *Apple Cultivars and Their Uses*

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