

Scab-immune apple varieties for new orchards

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In a wet-climate area such as western Oregon, apple scab is the apple disease that requires the greatest number of fungicidal sprays for control. Apple scab is caused by the fungus *Venturia inaequalis*, which attacks the young leaves and fruit as they develop in spring and early summer.

Susceptible apple varieties may be defoliated by apple scab in seasons with long rainy periods. The surface of fruits of scab-susceptible varieties may be covered with olive or dark brown spots that distort their shape, lead to fruit cracking, and—in general—destroy the value of the fruit.

Controlling apple scab with protectant fungicides means applying sprays at prepink, pink, and calyx stages, and at first and second cover spray. Additional sprays may be needed during wet years. This procedure can have its problems:

- During the early growth stages, periods without rain may be too short to apply a fungicide to a large orchard.
- Sprays to control apple scab may constitute 10% or more of the total cost of production.
- Many of the fungicides that have been used to control apple scab may be lost because of the reregistration process. The newer systemic fungicides cost more than the older materials.

For growers starting new orchards, an alternative to using fungicides is to plant scab-immune varieties.

Some of the scab-immune varieties are not resistant to another disease, powdery mildew, caused by the



One of the largest scab-immune apples, Freedom has very short stems.

fungus *Podosphaera leucotricha*. This disease occurs somewhat less commonly and can be controlled with fewer fungicide sprays.

If the variety has shown only a low amount of powdery mildew, you can also control it by promptly removing infected parts through pruning.

Origin of scab-immune varieties

Most apple varieties immune to apple scab resulted from hybridization with a crabapple clone, and they contain a single gene for resistance to the disease.

In the United States, breeding for apple scab resistance began in Illinois in 1943. Breeding in the United States and Canada has resulted in release of 12 named varieties and nearly 30 advanced selections for testing in numerous locations.

Since 1985, Oregon State University has tested eight of the scab-immune varieties, plus Chehalis, a chance seedling resistant (but perhaps not immune) to apple scab. They were grown at Corvallis on two

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Table 1.—Characteristics of some apple varieties immune to apple scab

Variety	Mildew ^a	Fruit size	Fruit color	Maturity season	Comments
Redfree	Moderate	Medium-small	Red	Late August	Sweet, crisp
Chehalis	Low	Medium-large	Yellow	Late August	Pick before full yellow or soft
Prima	Low	Medium-large	Red	Early September	Bitter pit
Priscilla	Low	Small	Part red	Mid-September	Good flavor
Nova Easy					
Gro	None	Medium	Dull red	Mid-September	Good flavor
Sir Prize	Low	Medium-large	Yellow	Late September	Soft
Jonafree	Low	Small	Part red	Late September	Too tart
McShay	Low	Medium	Part red	Mid-September	Poor keeper
Liberty	Moderate	Medium	Red	Early October	Best flavor; very firm
Freedom	Moderate	Medium	Part red	Early October	Good flavor; poor keeper
MacFree	High	Medium	Part red	Mid-October	Mediocre

^a Refers to the extent of mildew infestation observed in the plot at Corvallis.

rootstocks, dwarfing M26 and semidwarfing M7.

From planting until present, the trees received no fungicide applications. None of these varieties has shown symptoms of the disease, despite weather that has been conducive to apple-scab infection. Nearby trees of susceptible varieties have become infected with apple scab. Certain of the scab-immune apples have been infected with powdery mildew.

Table 1 summarizes some facts about those varieties tested at Corvallis.

Descriptions of varieties

These descriptions are based on observations made in Oregon's Willamette Valley. In different climates, these same varieties might perform differently.

Redfree

Redfree is a small to medium, nearly round apple with red blush and stripes on all surfaces of the skin exposed to sunlight. There are no noticeable calyx lobes, and the basin is small. Fruit finish is smooth and attractive with little tendency to sunburn.

Fruits mature in mid- to late August at Corvallis. Fruit are moderately firm, sweet, mild, rather insipid, crisp, and juicy. Redfree is the earliest maturing scab-immune red apple

with acceptable dessert quality.

Yield is fairly light, which is typical for many early-maturing varieties. There is little preharvest drop. The trees do not have blind wood; they have wide-angled crotches and enough (but not excessive) branching.

Branches are not especially thick and they tend to produce shoots near the end of the previous year's growth. Full bloom was 1 to 4 days later than red Delicious. A moderate to moderately large crop, which was thinner by hand but not chemically, cropping was light to moderate.

Chehalis

Chehalis is a large, round-truncate yellow apple with no red blush. The dots (lenticels) on the fruit skin tend to be corky when the spring has been rainy. Splashes of russet may occur near the calyx end.

Fruit that are fully exposed to the sun in very hot weather tend to sunburn and may develop water core (a translucence of the cortex that often leads to internal breakdown).

Because of its low acid content and crisp, juicy flesh, Chehalis can be picked from mid- to late August. Once the skin is fully yellow, it acquires an unpleasant greasy texture, and the flesh is quite soft. The fruit are easily damaged by rough handling.

Full bloom of Chehalis is about 3 days after red Delicious. It produces many branches on the central axis. Branches are somewhat stiff and

upright, branching freely near the end of a year's growth. This habit gives a bushy tree with few openings between branches. Lower limbs tend to be thick and strong.

Chehalis tends to be moderately slow to begin production, and it tends to be a light cropper in most years. Powdery mildew has rarely been seen on Chehalis.

Prima

Prima is a medium to large, truncate-conical red apple that matures in early September. The skin has an abundance of bright striped and blushed red color over light greenish-yellow undercolor. It has a pleasant perfume aroma. The flesh is moderately firm, tart/sweet, and crisp. It makes good apple sauce. It doesn't hold up very well in cold storage.

Large Prima fruits often have bitter pit, a physiological disorder of the fruit manifested by dark, sunken spots on the skin and brown corky spots in the flesh under the skin. The flesh is yellowish, slightly coarse, but with good flavor when still crisp.

Full bloom of Prima occurs about 3 days before red Delicious. On a tree trained to a central axis, crotch angles are wide, and limbs are spreading. The branches tend to be thin; they form shoots readily near the end of the previous season's growth, and they bend downward under the weight of a crop. Branches tend to have a moderate amount of bare or "blind" wood.

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Prima is fairly precocious but only moderately productive. After a moderately large crop, which was thinned by hand but not chemically, a light crop was set. Prima has not shown any powdery mildew.

Priscilla

Priscilla is a small to medium red apple that matures in mid-September. The flesh is firm, sometimes tough, crisp, sweet/tart, flavorful. However, the fruit is poorly colored and not very attractive. Its shape is roundish-conic, sometimes slightly ribbed, and with moderately prominent calyx lobes.

Priscilla's color is broad splashes of dull red over dull green. It stores well and hasn't been noticeably prone to physiological disorders. In a taste test after storage, Priscilla was rated equal to Golden Delicious.

Priscilla's tree tends to be somewhat sparsely branched with a fair amount of bare wood on the limbs and trunk. It tends to become tall quickly and to bend over when cropping. Priscilla crops lightly.

Nova Easy Gro

Nova Easy Gro is a medium-size round apple with splashes and

speckles of dull red over dull greenish yellow, overlaid by a waxy bloom. The fruit don't sunburn easily, but they turn orange on the sides exposed to sun during hot weather.

There are no noticeable calyx lobes, and shape is quite regular. Well-exposed fruit may be fully colored, but color tends to be highly variable.

This apple is not very attractive. Nova Easy Gro matures in mid- to late September. It's firm and has a high sugar content. The flesh is crisp and juicy, with a mild flavor superior to many scab-immune varieties. It "tastes better than it looks."

Full bloom of Nova Easy Gro occurs with red Delicious. After a moderately large crop, which was thinned by hand but not chemically, a light to moderate crop was set. There has been little preharvest drop.

On a tree trained to a central axis, crotch angles are wide, and limbs are spreading. Branches tend to be thin, they form shoots readily near the end of the previous season's growth and bend downward under the weight of a crop.

Nova Easy Gro has a light to moderate amount of bare wood. It's precocious, fairly productive, and hasn't shown symptoms of powdery mildew.

Sir Prize

Sir Prize is a medium to large, long, truncate yellow apple with large calyx lobes and long stems. There may be a slight blush on some fruits. The fruit don't sunburn easily.

Sir Prize matures in late September. It has a high sugar content. The flesh is crisp and juicy, with a tart flavor, especially when slightly immature. Because it becomes soft on the tree when fully mature and shows bruises due to rough handling, it's not suitable for shipping.

Full bloom of Sir Prize occurs a few days after red Delicious. After a light crop, which was not thinned, a very light crop was set. It's not very productive.

There has been little preharvest drop. On a tree trained to a central axis, crotch angles are wide, and limbs are thin and spreading. Branches form shoots readily near the end of the previous season's

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- **Read** the pesticide label—even if you've used the pesticide before. **Follow** closely the instructions on the label (and any other directions you have).
- **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.



Liberty is well-adapted to central axis training.

growth and bend downward under the weight of a crop. It has little blind wood.

Jonafree

Jonafree is a small round apple with a red blush on all exposed surfaces. There are no noticeable calyx lobes, and shape is quite regular. Well-exposed fruit may be fully colored, but color tends to be highly variable. When fully mature, the skin may have a greasy feel.

This apple is only moderately attractive. Jonafree matures in early October. It's firm and has a high sugar content. The flesh is hard and juicy with a tart flavor. It was rated well below Golden Delicious in a taste comparison with stored fruit.

Full bloom of Jonafree occurs with red Delicious. After a moderately large crop, which was thinned by hand but not chemically, bloom has been sparse. Jonafree is precocious but not very productive. There has been little preharvest drop.

On a tree trained to a central axis, crotch angles are wide, and limbs are spreading. Branches tend to be thin, form shoots readily near the end of the previous season's growth, bear fruit on the ends of shoots, and bend downward under the weight of a crop.

Jonafree has a moderate amount of bare wood. It hasn't shown symptoms of powdery mildew.

McShay

McShay is a medium to large, round-conic apple with bright red blush over a greenish-yellow undercolor. It has a moderately large amount of waxy bloom. It has no noticeable calyx lobes, and shape is regular. Stems are fairly short. Well-exposed fruit may be fully colored, but color tends to be highly variable.

McShay can be very attractive. It matures in late September. It's only moderately firm and doesn't have a high sugar content. The flesh varies from crisp to soft. Because these observations were made on fruit from the first, very light crop, it seems likely that McShay's fruit quality will be rated more highly in future years.

On a tree trained to a central axis, branches are numerous, crotch angles are narrow, and limbs are upright. Branches tend to be thin, and they don't form shoots readily near the end of the previous season's growth. McShay doesn't have bare wood and isn't precocious. It's too early to rate its productivity. Full bloom is a few days later than red Delicious.

Liberty

Liberty is a small to medium, round-conical apple with a red blush over greenish-yellow overlaid by a waxy bloom. The fruit don't sunburn easily.

There are no noticeable calyx lobes, and shape is quite regular. Well-exposed fruit may be fully colored, but shaded fruit are not. Liberty is fairly attractive. It matures in late September to early October. It's very firm and has a high sugar content.

The flesh is crisp and juicy, with a flavor superior to many scab-immune

varieties. In several taste tests, Liberty's flavor has been rated equal to that of Empire (a new scab-susceptible variety with excellent flavor), and superior to that of red Delicious.

Full bloom of Liberty occurs a day or two before red Delicious. After a moderately large crop, which was thinned by hand but not chemically, bloom has been ample. There has been little preharvest drop.

On a tree trained to a central axis, crotch angles are moderately wide, and limbs are moderately spreading. Branches tend to be thin, to form one or two shoots near the end of the previous season's growth, and to bend downward under the weight of a crop.

Liberty doesn't have much bare wood. It's precocious, productive, and susceptible to powdery mildew, but it doesn't become as extensively infected as Jonathan or MacFree.

Because of its regular production and excellent fruit quality, Liberty is the most promising late variety in our scab-immune collection.

Freedom

Freedom is a medium-size, round apple with red stripes over yellow.

The fruit don't sunburn easily. There are no noticeable calyx lobes, and shape is quite regular. Well-exposed fruit may be fairly well colored, but shaded fruit are not.

It matures in late September to early October, and it has a high sugar content. The flesh is firm, crisp, and juicy at harvest time, but it tends to break down in storage. Severe russetting has been noted where the stem end presses against the shoot, due to the fruit's very short stems.

Full bloom of Freedom occurs a few days after red Delicious. After a very large crop, which was thinned by hand but not chemically, there was no bloom on the M7-rooted trees, but a good fruit set on the M26-rooted trees. There has been little preharvest drop.

On a tree trained to a central axis, crotch angles are moderately wide, and limbs are moderately spreading. Branches tend to be thin, to form one or two shoots near the end of the previous season's growth, and to bend downward under the weight of a crop.

Freedom doesn't have much bare wood. It's precocious, productive, and susceptible to powdery mildew, but it doesn't become as extensively infected as Jonathan or MacFree.

MacFree

MacFree fruits mature in mid- to late October. They're small to medium, not well colored, and of poor quality. Although the tree is resistant to apple scab, it's highly susceptible to powdery mildew. I don't suggest that you plant this variety.

Summary

Anyone who wishes to grow apples with a relatively low chemical input should plant only scab-immune varieties. Early, midseason, and late-maturing scab-immune varieties are available.

If you successfully control powdery mildew by pruning, you won't need any fungicide sprays during the growing season to produce attractive, disease-free fruit.

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