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Scab-Resistant Apple Cultivars

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Apple scab is the most serious apple disease in commercial orchards and in home gardens. Economic losses are greater from this disease than from any other apple disease. Apple scab is caused by the fungus *Venturia inaequalis* (Cke.) Wint. and attacks foliage and fruit of the apple tree. Scab thrives in cool and humid conditions, like those found in the Midwest during the spring. Infection of immature apples causes heavy fruit drop, resulting in reduced yields. Infection of leaves early in the season causes severe defoliation that weakens the tree and results in poor fruit set in the next season. The presence of brownish-black scabby patches on mature fruit results in a malformed and disfigured apple. This condition lowers fruit grade quality, prohibits its fresh marketability, and, therefore, causes the greatest loss. Using some of the scabby apples for processing is possible, but it is not very profitable. Apples with scab do not store well because of rapid loss of moisture through the scabby lesions.

To prevent these losses, a grower needs to apply fungicides seven to eight times during the growing season. The increased expenses associated with fungicides, spray equipment, and labor costs warrant using an alternative approach to deal with apple scab. Planting scab-resistant apple cultivars reduces grower costs by eliminating sprays needed for controlling scab.

Early in this century, the apple fruit breeding program was initiated at the University of Illinois. During this time, hundreds of crosses were made, including crosses between small-fruited crabapple types and large-fruited apples. One cross involved *Malus floribunda* 821 and 'Rome Beauty.'

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In 1945, fruit breeders at the University of Illinois and Purdue University used two seedlings from the cross *M. floribunda* 821 x 'Rome Beauty' to begin the present scab-resistant apple breeding program. The program later included Rutgers University as well. Through these cooperative efforts, much progress has been made in breeding for scab-resistant apple cultivars. The following sections include some of the program's scab-resistant cultivars released to date.

'Prima'

'Prima,' the breeding program's first cultivar, was released in 1970. The "PRI" prefix is an acronym formed from the three universities: Purdue, Rutgers, and Illinois. The original seedling was planted in Urbana in 1958, and the tree bore first fruit in 1963. 'Prima' is an attractive, bright red fruit (yellow ground color with 80 percent red overcolor) with excellent dessert quality. It ripens about four weeks before 'Red Delicious.' The characteristic rich flavor and crisp texture is retained for a month or more when stored at 34°F(1°C). There is little tendency for the fruit to drop before maturity. The tree is spreading and vigorous and has moderate tolerance to fire blight.

'Priscilla'

'Priscilla,' the breeding program's second cultivar, was released in 1972. Its name was chosen to honor Priscilla Hovde, wife of Frederick Boyd Hovde, the seventh president of Purdue University. The original seedling was planted in Lafayette, Indiana, in 1962, and the tree bore first fruit in 1966. 'Priscilla' is a dessert quality apple that is crisp, with a pleasant aroma and flavor. The attractive fruit has light yellow ground color with a 90 percent red overcolor. Like 'Prima,' the fruit does not drop before maturity. It ripens about two weeks after 'Prima' or two weeks before "Red Delicious.' The tree is moderately spreading and vigorous and has good tolerance to fire blight and moderate tolerance to powdery mildew.

'Priam'

'Priam,' the third cultivar released from the program (1974, was named for the last king of Troy, the father of Paris. The fruit is too acidic for most American tastes so it has been released for growing in Europe (France, in particular). It is a fall dessert apple with a crisp texture and pleasant flavor. The attractive fruit has a green-yellow ground color with a 90 percent bright red overcolor. The fruit ripens a week or two before 'Red Delicious' and can be stored for three months at 35°F(2°C).

'Sir Prize'

'Sir Prize,' the fourth cultivar (1975), is the only yellow golden apple released from the program. Although it has a large attractive fruit, its thin skin and susceptibility to bruising make it unsuitable for commercial orchards, but very desirable for home gardens. It has a juicy flesh with excellent dessert quality. The original seedling was planted in Lafayette, Indiana, in 1955, and the tree bore first fruit in 1961. The tree is vigorous, produces good annual crops, and does not require thinning. 'Sir Prize' ripens at the same time as 'Golden Delicious.' 'Sir Prize' is a triploid and, therefore, has a low pollen viability.

'Jonafree'

'Jonafree,' released in 1979, is the program's fifth scab-resistant apple cultivar. The original seedling was planted in Urbana in 1965, and the tree bore first fruit in 1972. 'Jonafree' ripens at the same time as 'Jonathan' and is very similar to it in appearance and flavor. The attractive, glossy red fruit (95 percent red overcolor) has a crisp, juicy flesh. The tree is much less susceptible to fire blight and powdery mildew than is 'Jonathan.'

'Redfree'

'Redfree,' released in 1981, is the program's sixth cultivar. This apple has an attractive red color and a crisp, juicy flesh. It is a high-quality summer apple with a firm flesh and it does not drop easily from the tree. It retains its quality and firmness up to two weeks after maturity. When stored at 34°F(1°C), this apple can retain its quality up to two months. The original seedling was planted in 1966, and the tree bore first fruit in 1971. 'Redfree' matures two to three before 'Prima' and six to seven weeks before 'Red Delicious.' This apple seems to have broad climatic adaptation. The tree does not require fruit thinning. It has a semi-upright growth habit and sets good annual crops. The tree has moderate tolerance to fire blight and powdery mildew.

'MacShay'

'MacShay' was released in 1981, in cooperation with Oregon State University. This scab-resistant apple was released for Oregon growing conditions. This is a high quality, red apple (80 percent overcolor) with a juicy, fine-grained flesh. The fruit retains its quality and texture for two months or more when stored at 34°F(1°C). It ripens two weeks before 'Jonathan.' The tree is upright and vigorous and has good tolerance to powdery mildew.

Conclusion

All of the apple cultivars presented here are field immune to scab and require no fungicide sprays for this disease; they require reduced sprays for some of the other diseases mentioned. This feature reduces grower costs for both sprays and labor.

These apple cultivars can be purchased through various fruit nurseries around the United States (except for 'Priam,' which is sold mainly in France). Several scab-resistant apple cultivars will be released in the coming years and hundreds more remain under testing.

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The Tomentosa Cherry, *Prunus tomentosa* Thunb.

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Prunus tomentosa Thunb. is native to northern China, Korea, Japan, the Himalayas, and Turkestan. In North America it is known as Nanking or Hansen Bush Cherry. Professor Hansen of the South Dakota Agricultural Experiment Station was largely responsible for introducing and demonstrating the adaptability of this exotic species in America (3).

The Tomentosa Cherry is a spreading shrub to 2m high or rarely small tree (to 3m). Young branchlets are tomentose, leaves densely pubescent-tomentose (villous) beneath. Flowers with white petals, or slightly pinkish, are appearing just before leaves. Fruit is mostly light red, globular, the size of a small sour cherry, sessile or very short-stalked, slightly hairy. Its principal uses has been as an ornamental shrub.

Prunus tomentosa hybridizes with the western sand cherry, *P. besseyi*, apricot and some other *Prunus* species (2) and has been used to a limited extent in breeding programs of the Soviet Union and the United States. It has been tried as seedling rootstock for various *Prunus* species (1). Efforts have been made using it as a parent in interspecific hybridizations of clonal

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