

## DISEASE RESISTANT APPLES

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**Disease Resistant Apple Varieties – Over 1325 apple varieties listed** for apple scab, powdery mildew and fireblight disease resistance.

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Nature, in its infinite wisdom has developed disease resistant fruit. Humans have begun to make crosses to develop disease resistant apples. It is wise to plant disease-resistant cultivars of fruit or nut species. This is especially valid for home orchardists, where the close proximity of many plants may aid in the spread of disease. Add this to the toxicity of sprays around your home; it is wise to select disease resistant plants.

### HOW SCAB-RESISTANT APPLES WERE DEVELOPED

The origin of human crossed scab-resistant apples dates from 1907 when Charles S. Crandall started an apple-breeding program at the University of Illinois. He wanted to explore the potential of various species of *Malus* as breeding material. He collected many crabapple-like species and crossed them with commercial apples. Crandall never released any cultivars; in fact, he wasn't even looking for scab-resistant apples. In 1943, Fred Hugh, who was evaluating Crandall's work, came upon an interesting phenomenon. An unusually cold, wet spring resulted in a severe scab epidemic that defoliated many unsprayed trees in Crandall's collection. But some of Crandall's trees were scab free. Hugh found that the scab free trees, along with an equal number of scabby seedlings, came from a cross between one particular selection of an ornamental crabapple (*Malus floribunda*) and Rome Beauty. The proportion—half scabby seedlings and half scab-free seedlings—suggested a single scab-resistant gene was present.

Since then, breeders have repeatedly crossed scab-resistant apples with commercial cultivars - an approach known as backcrossing - to produce high quality, resistant apples. At the same time, breeders continued to select for tolerance for and resistance to the other apple diseases.

In 1948, a cooperative apple breeding program among Purdue University, Rutgers University and University of Illinois. Over the next 47 years, researchers have made over 3,500 crosses, evaluation over 400,000 seedlings and selected 2,200 scab-resistant apples. The New York Agricultural Experiment Station at Geneva New York developed an independent program, as did breeders worldwide. More than 53 scab-resistant varieties from eight countries, including ten from the U.S., have been released

Some 90 resistant cultivars have been released carrying one scab resistance gene from *M. floribunda* or *M. floribunda* '821' (Vf). Today, several scab resistant genes have been identified. Vf-resistance gene from *Malus floribunda* (Crandall's work), Vm from *M. micromalus*, Vr from *M. pumila* 'R 12 740 7A,' and Va from 'Antonovka.' Most scab resistant apple varieties contain the Vf gene and some are losing resistance and becoming scab infected. Apple breeders are now incorporating more than one scab resistant gene in the their breeding programs. These resistant varieties are termed digenic or polygenic.

## MAJOR APPLE DISEASE

**APPLE SCAB** (*Venturia inaequalis*): Is a fungus, which thrives in moist climates, causing damage to, leaves, shoots and fruits. It is worse on poorly drained soils or where excessive nitrogen has been used. The spores live on fallen leaves and have sexual reproduction during the winter. Therefore, all leaves should be removed from the home orchard. Winter sprays do not control apple scab.

**APPLE POWDERY MILDEW** (*Podosphaera leucotricha*): Is a fungus preferring warm, dry conditions and causes significant damage to leaves and shoots. It will also cause russeting on fruit. It is worse where soils are low in organic matter or nutrients.

**FIREBLIGHT** (*Erwinia galligena*): A bacterium that causes dieback of shoots and branches, and can kill trees rapidly. Rare in the Willamette Valley of Oregon, but may appear during a hot summer.

The following chart lists known apple cultivars, which show resistance to one or more of the major diseases. Abbreviations used are:

r = resistant  
 vr = very resistant  
 s = susceptible  
 vs = very susceptible

CULTIVAR	SCAB	MILDEW	FIREBLIGHT
'Acadian Queen'	r	r	r
'Ace Spur Delicious'		vr	vr
'Acey Mac'	s	vr	vr
'Acklam Russet'	r	-	-
'Acme'	r	-	-

'Adam'			vr
'Adams' (Crab)	r	-	vr
'Adams Apple'	r	-	-
'Adams' Pearmain'	r	vr	vr
'Adanac'	-	-	r
'Adirondack' (Crab)	vr	vr	vr
'Ahra'	r	-	-
'Ahrista'	r	-	-
'Aivania'	-	-	r
'Akane'	r	r	r
'Akibae'	s	r	-
'Alameda'	-	-	vr
'Alba'	-	-	vr
'Alexander'	r	s	s
'Alexis' (Crab)	-	r	r
'Alfriston'	r	r	-
'Alka'	r	-	-
'Alkmene'	r	-	vr
'All Doer' (Cider)	r	-	-
'Allington Pippin'	r	-	-
'Allington Pippin Sport'	r	-	-
'Almey'	-	-	r (blossom)
'Alnarp'	r	-	-
'Alpha 68A'	-	-	r
'Alpha 68B'	-	-	vr
'Amasya #3'	-	-	r
'Amberina' (Crab)	r	-	-
'Ambrosia'	r	r	r
'Amelia'	-	-	r (blossom)
'American Golden Russet'	r	-	-
'Amri'	-	-	vr
'Amur Naliv'	-	-	r
'Ancuta'	r	-	-
'Anderson Red Delicious'	-	vr	vr
'Anisim'	-	-	vr
'Angold'	r (slightly)	-	s
'Ann Trio'	-	-	vr
'Annie Elizabeth'	r	r	-
'Anoka'	-	-	r
'Antonovka Monasir'	-	-	vr
'Apelsinoe'	r	-	-
'Ard Cairn Russet'	r	-	-
'Ariane'®	r	r	r



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