

Susceptibility of Certain Disease Resistant Apple Cultivars and Selections to Powdery Mildew (*Podosphaera leucotricha*) in a Cool, Humid Climate

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Abstract

Apple cultivars and selections have been developed with high resistance or immunity to apple scab (*Venturia inaequalis*), but cultivar resistance to powdery mildew (*Podosphaera leucotricha*) varies widely, from resistant to highly susceptible. An evaluation to screen scab-resistant and immune apple clones for mildew resistance was conducted in 1995 and 1996 on a test orchard in Mount Vernon, WA. The cultivars ‘Bramley’s Seedling,’ ‘Enterprise,’ and ‘Prima,’ and 25 numbered selections indicated very good resistance to infection by powdery mildew.

Introduction

A test planting of disease resistant/immune apples was established at the Mount Vernon research station in 1990. It consisted of 3 trees each of 40 different cultivars and selections, from several breeding programs. Additions were made in 1991-92 and in 1994. An evaluation of mildew susceptibility was taken May 24, 1995, and at that time 56 cultivars and selections were rated. In 1996 another mildew evaluation was taken in this planting, on two successive dates: May 16 (1) and June 10 (2), 1996. This covered 47 cultivars and selections; some of the selections rated the previous year had been eliminated from trial in the interim, and varieties which were newly planted in 1995 were added. Most of the ratings covered two or more trees per variety/selection (see Table 1), but in some instances the rating represents only one tree.

The rating system was as follows: 1 = clean, no visible sign of powdery mildew; 2 = mild, few strikes proportional to number of shoot tips; 3 = moderate, 50% of shoot tips affected; 4 = severe, many strikes; and 5 = all shoot tips affected. Numbers represent the average for all trees of each cultivar/selection.

Table 1. Susceptibility to powdery mildew (*Podosphaera leucotricha*) of certain apple cultivars and selections.

Cultivar/Selection	#Trees ²	Mildew Ratings					Cum. Rating ³
		1995	1996(1)	1996(2)	1997(1)	1997(2)	
Coop 40	3	new	1	1	3.7	2.7	
Coop 41	3	new	1	1	2	2.6	
Coop 43	0/1/1		new	new	1	1	1.00*
PSER-11T-27	3/0/0	1					1.00*
Bramley’s Seedling	1	1	1	1	2	2	
P15R-3T-86	3	1	1	1	1	1	1.00

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NY 75441-67	3/2	1.3	1	1	2	2	
Prima	2	1	1	2	2	2	
Coop 29	2	1	1	2	1.5	1.5	
NY 61343-1	2	1.5	1	1	2	2.5	
PWR-11T-128	2/6/6	1.5	1	1	1	1.3	
NY 65707-19	2/2/3	1.5	1	1	1.7	1.7	
HER-10T-108	3/0/0	1.3					1.30*
NY 75413-30	5	1.2	1	2	2	2	
NY 74840-1	3	1.3	1	2	1.7	1.7	
HCR-14T-125	3/0/0	1.5					1.50*
HER-4T-20	2/0/0	1.5					1.50*
NY 73334-57	2/0/0	1.5					1.50*
Coop 42	1/1/3	new	1	2	2	2	
PAR-12T-101	2/4/5	1.5	1	2	2	1.8	
Enterprise	2/2/4	1	2	2	2	2	
HWR-19T-18	1/3/3	1	1	3	1.7	2	
NY 74828-12	2	1	2	2	2	2	
OSU 31-19	2	1	1	3	2.5	2.5	
NY 66325-139	3	1.7	2	1	2.3	2	
CMR-2T-13	3/0/0	1.7					1.70*
NY 73334-35	2	1.5	2	2	2	2	
Pristine	0/2/3		new	new	2	2	
NY 66305-139	1	1	3	2	3	3	
PAR-4T-215	3	1.3	3	2	2.3	2	
HER-3T-139	1/0/3	2			1.7	1.7	
HER-4T-16	0/1/1	new	1	3	2	3	
NY 61345-2	3/2/5	2	2	2	2.6	3	
Redfree	2	1	3	3	2.5	2	
Dayton	2	2	2	2	2	2.5	
Florina	1	2	2	2	3	2	

NY 66305-289	3	1.7	2	3	2.3	2.7	
Novamac	4	1.3	3	3	2.8	2.5	
Nova EasyGro	3	2	2	3	2.3	2.3	
Shay	2	2	2	3	2	2	
KIR-11T-86	1	1	3	4	4	5	
CLR-13T-49	3/0	2.3					2.30*
NY 75414-1	3	1.7	3	3	2	2	
CLR-12T-161	2/0	2.5					2.50*
Coop 25	2/0	2.5					2.50*
HER-3T-175	2/0	2.5					2.50*
HFR-22T-173	2/0	2.5					2.50*
Liberty	2	1.5	3	4	2.5	3.5	
CMR-4T-18	2	2	3	3	3	3	
Gold Rush	3	2	3	3	2.7	3.3	
TNR-10T-11	3/3/6	2	3	3	2.5	3	
CLR-20T-30	1/3/3	3	2	3	2.7	2.3	
PAR-14T-238	3/3/2	2.7	3	3	2.5	3	
Coop 27	5/3	3	3	3	3.7	3.3	
Coop 28	3/4/5	3	3	3	2.8	3	
PSWR-11T-48	1/2/4	3	3	3	1.8	2.3	
Williams' Pride	4	3.3	3	3	3	3.3	
Chehalis	3/2	3	3	4	4	4	
Jonafree	2	3	4	4	4	4	
CLR-13T-45	3/0/0	3.7					3.70*
Coop 39	3/1/4	3.7	4	4	2.3	2.5	
CQR-10T-17	4/1/1	4	4	5	3	4	

²Number of trees = trees in planting at time of evaluation; where two or more numbers are shown, first number is for 1995, second for 1996, third for 1997 evaluation.

³Cumulative rating = both 1996 ratings averaged, that result averaged with 1995.

*Rating based on one year only

Discussion

The selections, and most of the cultivars, in this trial originated in various breeding programs aimed at developing disease resistance, with the emphasis on immunity to apple scab, *Venturia inaequalis* (2). Two of the cultivars originated as seedlings that demonstrated resistance to apple

scab in field conditions. 'Bramley's Seedling' was discovered in England in the early 1800s (1809-1813) where it became a well-known culinary apple (4), and 'Chehalis' was discovered in Washington state and introduced in 1962(1). However, scab immunity does not necessarily equate with resistance to other diseases such as powdery mildew (3). The evaluation of susceptibility to other diseases, such as powdery mildew, provides an additional factor in determining a cultivar's suitability, or a selection's potential to be introduced.

Any of the cultivars and selections with a cumulative rating below a 2 has shown very good resistance to mildew infection. 'Bramley's Seedling' and 'P15R-3T-86' received a clean rating for powdery mildew both in 1995 and on the two dates in 1996. The selection 'NY 75441-67' rated nearly as high. All of these can be considered as highly mildew resistant. They include the cultivars 'Enterprise' and 'Prima,' and a number of selections. As newly planted trees, 'Coop 40' and 'Coop 41' were not rated in 1995, but the clean rating they received in 1996 puts them also on the list of promising selections.

Ratings from 2 to 3 could be classed as moderately susceptible to powdery mildew. While in some years these would not show much sign of disease, in most seasons they would probably require control measures. This category includes the cultivars 'Redfree,' 'Dayton,' 'Florina,' 'Novamac,' 'Nova EasyGro,' 'Shay,' 'Liberty,' and 'Gold Rush.' Selections with ratings at this level are not prime candidates in areas where powdery mildew infection is prevalent.

Ratings of 3 or higher are quite susceptible to powdery mildew and may show symptoms even in years when disease pressure is not high. Even though immune to scab, they will still require stringent control measures for powdery mildew. This includes several selections and the cultivars 'Williams'Pride,' 'Chehalis,' and 'Jonafree.'

Literature Cited

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