

New Powdery Mildew Resistant Sweet Cherry

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Abstract

'PMR-1' is a sweet cherry (*Prunus avium* L.) selection from the Washington State University stone fruit breeding program which shows a very high degree of powdery mildew resistance. It is productive and bears black, very firm and long-stemmed fruit of medium size.

'PMR-1' is a sweet cherry (*Prunus avium* L.) selection from Washington State University's stone fruit breeding program which appears to be highly resistant to powdery mildew [*Podosphaera clandestina* (Wallr.) de Bary]. This cherry, whose parentage is unknown, was first observed in the greenhouse in the 1977-1978 season as the only mildew-free seedling among many. It was transplanted to the field amidst several other cultivars and selections in 1978 where it has remained free of mildew, while the other cultivars have shown signs of the disease. Its fruit is black, very firm, long-stemmed and medium sized. 'PMR-1' ripens with 'Bing' and has good desert quality. The tree is large, upright-spreading, vigorous and productive.

In 1991 and 1992, the quality of fruit harvested from 'PMR-1' was compared to 'Bing,' the dominant cultivar of the Pacific Northwest cherry industry. The powdery mildew resistance associated with 'PMR-1' was tested in comparison with 'Bing' in a greenhouse test.

Material and Methods

Mildew inoculations were accomplished using a composite of isolates that were allowed to spread naturally in a glass greenhouse (95% relative humidity and 25 C). The inoculum source was 10 mildew-diseased trees each of the sweet cherries 'Bing,' 'Van' and 'Lambert,' and of the sour cherry (*Prunus cerasus* L.) 'Montmorency.' These recently budded source trees had been inoculated just after bud break with air containing about 1000 *P. clandestina* spores per cm³.

Two months later, 10 one-month-old trees each of 'PMR-1' and 'Bing' were placed adjacent to one another on a greenhouse bench surrounded by the mildew source trees. After "natural spread" was allowed to occur from the source to the test trees for one month, the number of *P. clandestina* colonies on the upper 10 expanded leaves on each tree was counted.

During the 1991 and 1992 seasons, 100 fruit from one 'PMR-1' (13 years old) and two 'Bing' (10 years old) trees were harvested when dark red (BC comparator #33). These fruit were weighed and analyzed for firmness (momentum transfer generator, expressed in dimensionless MTG units) and soluble solids. Data from all trees and years were averaged.

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Table 1. Number of mildew colonies on expanded leaves of cherry trees after exposure to air containing *Podosphaera clandestine* spores.

Tree Group	Cultivar	No. of leaves observed per tree	Avg. number of colonies per tree
Source trees	Bing	25	328
	Van	25	286
	Lambert	25	160
	Montmorency	25	320
Test trees	Bing	10	200
	PMR-1	10	0

Results and Discussion

Over 200 colonies developed on most of the source trees with 90 to 95% of the leaf surface being covered by mycelia. No mildew colonies were observed on any of the 'PMR-1' trees, while the adjacent 'Bing' trees were severely infected with mildew (Table 1).

Although there was considerable variation in dates of maturity between years, the average harvest date for 'PMR-1' and 'Bing' for 1991 and 1992 was similar. Despite the fact that slight flavor differences between 'PMR-1' and 'Bing' were discernable, average fruit weight, firmness and soluble solids for 'PMR-1' cherries were near

Table 2. Average of maturity dates and of fruit quality parameters for samples of 100 sweet cherries harvested from Bing and PMR-1 trees during 1991 and 1992.

Cultivar	Harvest date	Color*	Size (g)	Firmness**	Soluble solids
PMR-1	June 22	4.0	7.7	886	21
Bing	June 23	4.0	9.1	705	17.4

*Color scale where 4.0 = BC comparator #33.

**MTG dimensionless units.

the commercial standards of 'Bing' (Table 2).

Climatic conditions appropriate for stone fruit production often favor the development of powdery mildew disease (1). The disease is controlled predominantly by timely applications of suitable fungicides. As a cherry genotype resistant to *P. clandestina*, 'PMR-1' offers an alternative to chemical control. Although foliage resistance to mildew development does not necessarily indicate similar resistance in the fruit, no mildew has been observed on fruit of field-grown trees of 'PMR-1.' Even if the fruit were highly susceptible to *P. clandestina* colonization, the lack of available inoculum from the leaves would reduce considerably the risk of fruit infection.

'PMR-1' was substantially more resistant to foliar powdery mildew disease than the commercial sweet cherry cultivars in both greenhouse and field observations. This resistance and the selection's fruit quality suggest 'PMR-1' would be favorably suited for use as a low-maintenance cherry tree for residential areas and as a gene donor in disease resistance breeding programs.

The mechanism of 'PMR-1's' resistance to *P. clandestina* has not been determined.

Literature Cited

1. Ogawa, J. M. and English, H. 1991. *Diseases of Temperate Zone Tree Fruit and Nut Crops*. Univ. of California, Div. of Agric. and Nat. Resources, Oakland, CA. Publication 3345. 461 pp.

Mid-Atlantic Fruit Testers Association Processors Committee

The Mid-Atlantic Fruti Testing Association has a committee made up of various processors from the region. This group meets together twice a year. Their purpose has been to develop a system whereby new varieties could be tested and rated for various characteristics (i.e., firmness, color, brix, and texture) when processed into

slices or sauce. Growers often ask the question as to which of the new varieties they should be planting. It is evident from this data that the processors so far feel that Fuji and Idared show promise as processing apples. More information on these and other varieties will be forthcoming as this season's testing is conducted.

OVERALL RATING

Processor	York	Fuji	Braeburn	Liberty	Idared	Gala
SAUCE						
B	--	--	--	--	--	--
C	****	****	**	+	**	+
D	****	****	****	**	***	**
E	--	--	**	--	--	+
SLICES						
A	****	**	**	+	****	+
C	****	****	**	+	**	+
D	**	**	**	+	**	+
E	--	--	**	+	**	+

OVERALL RATING KEY

- **** Four Stars = Definitely a good commercial risk
- *** Three Stars = Proving to be a good risk
- ** Two Stars = Worthy of recommendation
- * One Star = No longer recommended for trial
- + = Not adequately tested yet

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