Occurrence and Distribution of Stem Pitting of Sweet Cherry Trees in Washington

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ABSTRACT

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Trunk pitting was observed on nearly 20% of 22,586 trees examined in 12 commercial sweet cherry (*Prunus avium* L.) orchards located throughout central Washington. Pitted trees were found among all varieties examined, but reduced tree vigor was associated with severe pitting symptoms only for trees with Montmorency (*P. cerasus* L.) interstocks. In five foundation and mother block plantings maintained by Washington State Nursery Improvement Program, only 1.7% of 1,726 trees exhibited wood pitting. The incidence of pitting was lower in commercial plantings established with certified trees than in similar plantings established with uncertified trees.

Stem pitting diseases of sweet cherry (*Prunus avium* L.) trees have been reported in British Columbia (2–4), California (7), Maryland (5), and Pennsylvania (8). In each area the primary symptom was longitudinal depressions (pits) in the surface of the woody cylinder of either the rootstock or scion variety or both. Other symptoms such as thick, spongy bark (7), ridges and furrows in the trunk (8), cambial necrosis (5,6), necrotic streaking in the wood (2,4), gumming (4), sparse growth (8), and general decline of trees (7,8) have also been associated with trunk pitting. In some (5,7,8) but not all (4) cases, the disease syndrome in sweet cherry trees appeared quite similar to that associated with the stem pitting disease of peach trees (6).

In random surveys made during 1975 and 1976, we observed a few trees in Washington sweet cherry orchards that had moderate to severe pitting on the main trunk near ground level. Occasionally the bark from a severely pitted tree was nearly twice as thick as bark from adjacent nonpitted trees and somewhat spongy in texture. However, the association of trunk pitting, thick bark and unthrifty tree growth was highly inconsistent. Various degrees of stem pitting were frequent on trees that otherwise appeared normal.

To determine the incidence and distribution of the trunk pitting symptom, we surveyed all trees in 12 commercial orchards located in the cherry-growing region of central Washington. In addition, we examined all trees in the foundation and mother blocks maintained by the Washington State Nursery Improvement Program (WSNIP). This report describes the results of this survey.

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MATERIALS AND METHODS

The 12 commercial orchards were located throughout the Yakima Valley and Columbia Basin regions of central Washington. Orchards were selected on the basis of location, tree age, varieties, and owner cooperation. Observations were made by removing a 7.5-cm triangular bark patch from the trunk near ground level and recording the degree of pitting in the exposed woody cylinder. Pitting was rated as mild (one to three small pits), intermediate (up to 15–20 simple pits), or severe (numerous pits). Each tree was also observed for growth and foliar symptoms. All tree wounds were sealed with an asphalt paint after readings were made.

Insofar as could be established, all trees surveyed were propagated on either Mahaleb (*P. mahaleb* L.) or Mazzard (*P.*

Table 1. Incidence and severity of stem-pitting symptoms in 10 cherry varieties

Variety	Trees examined (no.)	Trees pitted (%)	Pitted trees (%)		
			Mild	Intermediate	Severe
Montmorency (interstock)	946	53	34	23	43
Black Tartarian	229	50	30	20	50
Rainier	425	22	69	24	7
Bing	16,979	19	81	15	4
Black Republican	1,092	19	90	9	1
Chinook	155	15	74	22	4
Lambert	1,131	14	94	4	2
Van	694	11	76	16	8
Royal Ann (=Napoleon)	791	3.5	86	10	4
Hardy Giant	156	1.3	100	0	0

Table 2. Incidence and severity of stem-pitting symptoms in Bing cherry trees grouped by age and nursery practice

Age (yr)	Trees examined (no.)	Trees pitted (%)	Pitted trees (%)		
			Mild	Intermediate	Severe
Uncertified[a]					
5–12	3,147	15	68	22	10
15–25	12,526	21	83	14	3
30–40	409	14	84	12	4
Certified[b]					
8–10	885	4	70	27	3

[a] Nursery trees produced without regard to known virus content.
[b] Nursery trees produced from virus-tested sources in accordance with regulations promulgated by Washington State Department of Agriculture.

avium L.) rootstocks. Because of inadequate grower's records or changes in ownership, the specific rootstock for every tree could not be determined. Preliminary surveys indicated that little if any pitting occurred in the rootstocks and was generally mild where it occurred. Consequently, the data presented are for the scion portions of the trees only. Where trees contained interstocks, the data are recorded with the appropriate variety.

RESULTS

Incidence and distribution of cherry stem pitting. Pitting was observed on the trunks of 19.9% of 22,586 trees in commercial sweet cherry orchards but in only 1.7% of 1,726 trees in the WSNIP foundation and mother blocks. In commercial orchards the incidence of trunk pitting and the range of symptom severity depended to some extent on the variety (Table 1). Approximately 50% of the Montmorency (*P. cerasus* L.) interstocks and the Black Tartarian trees had definite pitting; about two-thirds of these had intermediate or severe symptoms. At the other extreme, only 2 of 156 Hardy Giant trees had pitting; both were rated mild. For the remaining seven varieties, the incidence of pitting ranged from 3.5 to 22%, with a few trees of each variety expressing severe pitting.

In the WSNIP foundation and mother blocks, of 25 seed source trees with mild wood pitting, 15 were Mazzard and 10 were Mahaleb. Twenty-four of these trees were in one orchard. The five pitted scion source trees included two Rainier trees and one tree each of Black Tartarian, Van and *P. serrulata* Lindl. 'Shogiestsu.' None of 112 Bing trees in the WSNIP blocks exhibited pitting symptoms.

Bing is the principal sweet cherry variety grown throughout central Washington. Consequently, 75% of the 22,586 commercial orchard trees examined were of this variety (Table 1). For uncertified Bing trees, age had no apparent influence on either the incidence or severity of symptoms (Table 2). The incidence of pitting was noticeably less, however, in plantings established with Washington certified nursery trees than in similar plantings established with uncertified trees. Yet, for those trees with pitting symptoms, the distribution of trees within the severity classes was generally the same regardless of certification status (Table 2).

Location of orchards had no influence on the incidence and severity of pitting in uncertified Bing plantings. Orchard maps prepared from survey data showed no apparent pattern to the distribution of stem pitted trees within orchards.

DISCUSSION

None of the pitted trees exhibited severe branch, leaf, or fruit symptoms similar to those associated with the graft-transmissible xylem aberration disease of sweet cherry trees in British Columbia (2–4). Furthermore, none of the trees had the severe trunk furrowing, ridging, and tree decline associated with stem pitting in Pennsylvania (8). In one of the 12 orchards, however, one-third of the trees had been propagated with Montmorency interstocks. Many of these trees had severe pitting and honeycombing in the Montmorency portion. In this orchard poor tree growth was consistently associated with severe pitting of the interstock.

In 11 of the 12 commercial orchards, trees consisted mainly of scion varieties propagated on either Mazzard or Mahaleb rootstocks. Although some trees had moderate to severe pitting on the trunk of scion varieties, there was no consistent correlation between the severity of pitting and reduced tree vigor. In this respect the stem pitting disorder in Washington resembled Prunus stem pitting (PSP) as described for trees on Mazzard and Mahaleb rootstocks in California (7). Stockton Morello (*P. cerasus* L.), a rootstock that exhibited severe wood pitting and necrosis in California and was generally associated with declining trees, is not used in Washington.

Although there are similarities between the stem pitting disorders in Washington and California, we observed definite trunk pitting on several Royal Ann (=Napoleon) and Mazzard trees. Napoleon was considered a symptomless carrier of PSP in California, but pitting was observed on Mazzard in only one orchard (7).

An agent associated with PSP in California was graft-transmitted from pitted cherry trees to various *Prunus* spp. Graft-inoculation experiments have thus far failed to demonstrate transmission of a similar agent from pitted cherry trees in Washington. Although the etiology of this disorder has not yet been established, it is of interest to note the possible role of the WSNIP in reducing distribution of stem-pitted trees. All trees in the foundation and mother blocks derive from source trees that had been indexed 10–12 yr earlier for all viruses then known to infect sweet cherry trees. Many of these source trees were obtained from the IR-2 Interregional Deciduous Tree Fruit Repository (1). Although the transmissible nature of PSP (7) had not been demonstrated when these plantings were established, apparently most of the virus-tested source trees were also free from the PSP agent. The data in Table 2 suggest that use of certified nursery trees can substantially reduce the initial incidence of stem pitting.

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