Wounds in Peach Trees

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ABSTRACT

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Fifty-six disks cut at random from the stumps of 880 Elberta peach trees (*Prunus persica*) showed evidence of 131 wounds. The trees had been pulled because of poor production. Discolored and decayed wood associated with the wounds was compartmentalized according to the CODIT (compartmentalization of decay in trees) model for tree decay. Disks with a high percentage of infected area had narrower widths of sapwood than did disks with a low percentage of infected area.

Commercial peach (*Prunus persica* (L.) Batsch) trees usually have a short life. Peach trees in the southeastern United States may live only 5–7 yr (1). Many contributing biotic and abiotic factors are involved (4,7). A peach tree that lives 25 yr is considered old (4).

The purposes of this study were to assess the injury caused by wound-associated discolored and decayed wood in Elberta peach trees in one orchard and to determine whether the CODIT (compartmentalization of decay in trees) model (5) for tree decay was applicable to peach.

MATERIALS AND METHODS

The Jefferson Orchard near Kearneysville, WV, planted 39 rows of approximately 2,200 Elberta peach trees in 1958. The trees were fertilized annually beginning in 1970 with either ammonium nitrate, 2,500–3,600 lb/acre (2,230–3,211.2 kg/ha); urea, 2,300–2,500 lb/acre (2,051.6–2,230 kg/ha); or calcium nitrate, 3,200–5,400 lb/acre (2,854.4–4,816.8 kg/ha). Fruit yields from 1969 to 1980 were 11,283, 4,142, 20,453, 7,098, 12,858, 13,289, 5,719, 10,138, 7,257, 6,868, 5,069, and 2,466 bu, respectively. Trees were pulled: 8 rows, 1977; 7 rows, 1978; 8 rows, 1979, and 16 rows of approximately 880 trees in September 1980. In November 1980, 56 disks approximately 10 cm thick were cut at random from the top of the remaining butt sections of the 880 trees pulled in September 1980.

Disks were sanded smooth and the following data were recorded: diameter at 6, 11, and 23 yr; area of disk; area of discolored wood; area of decayed wood; area of uninfected wood; ratio of disk

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area to uninfected wood; average width of sapwood (three measurements); number of sapwood rings (counts on two radii); number of wounds; and age of wounds. The special protective tissue—the barrier zone (6)—that forms after wounding was studied on 10 samples. The wood area containing the barrier zones was shaved with a razor blade and examined under a stereomicroscope at ×30 to determine anatomical features and position in or between growth rings.

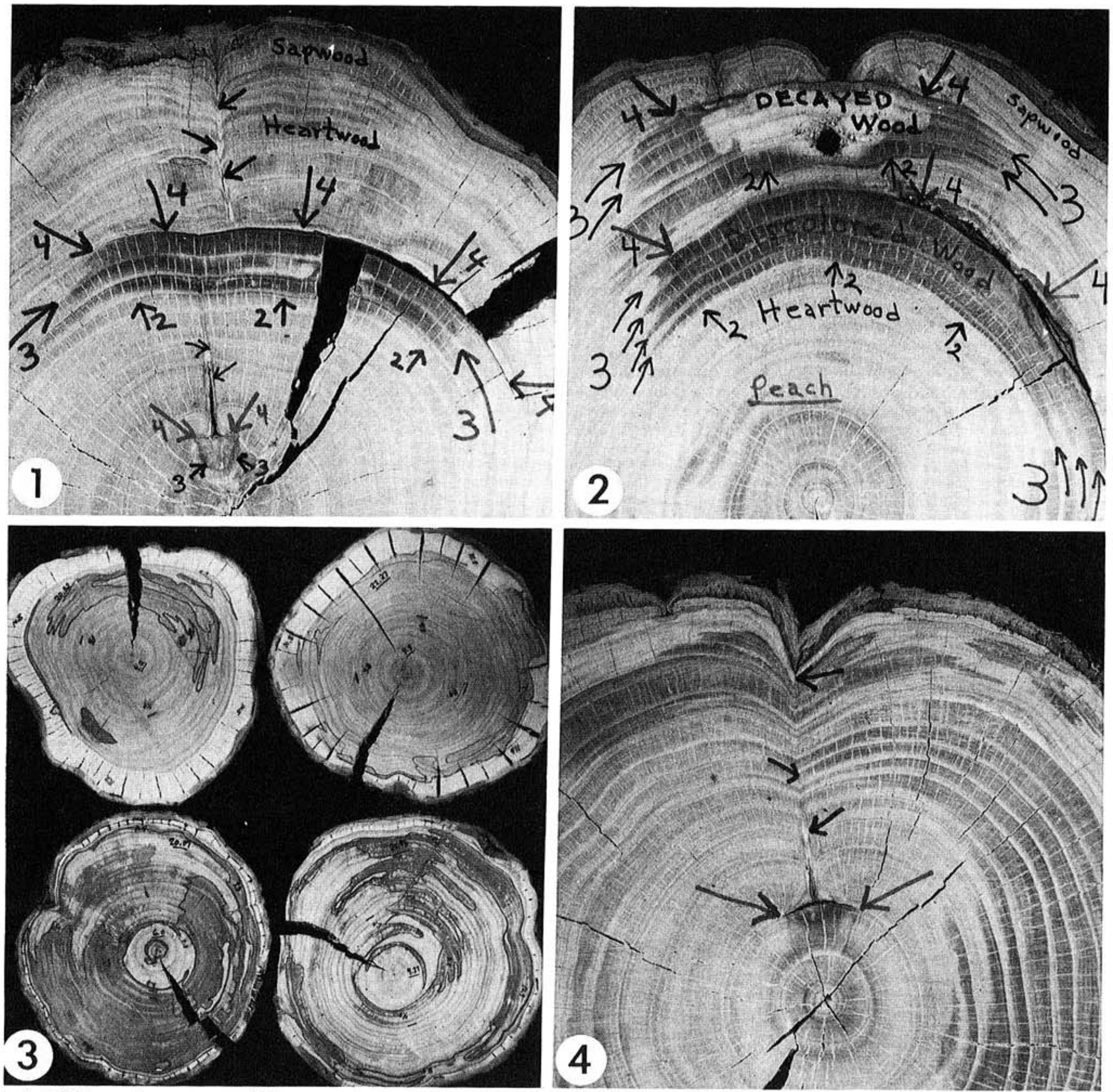
Weather records indicated a severe cold period in the winter of 1968 with a record low of −17 C on 2 January. In 1976, there were extreme highs and lows in late winter followed by extended cold periods in early spring.

RESULTS

The 24 disks that contained more than 75% uninfected wood had a mean sapwood width of 1.32 cm ± 0.16, and the 17 disks that had less than 25% uninfected wood had a mean sapwood width of 0.44 cm ± 0.09. The intermediate group of 15 disks had a mean sapwood width of 0.76 cm ± 0.19.

Every disk had evidence of at least one wound. Some disks had evidence of four wounds. Wound ages ranged from 1 to 20 yr. There were five major wounding periods: 1959, 10 wounds; 1962, 24 wounds; 1968, 40 wounds; 1973, 15 wounds; and 1976, 35 wounds. There was evidence of 131 wounds on the 56 disks.

The discolored and decayed wood in the disks was compartmentalized according to the CODIT model for tree decay (5) (Fig. 1). Multiple columns of discolored and decayed wood were common (Fig. 2). The determination that the CODIT model was applicable for peach was based on disk samples that were cut through obvious wounds (Fig.



Figs. 1–4. Disks cut from stumps of Elberta peach trees in a West Virginia orchard: **(1)** Compartmentalization of a 2- and 11-yr-old wound. Numbers refer to the CODIT (compartmentalization of decay in trees) model; wall 2 resists inner spread, wall 3 resists lateral spread, and wall 4 separates wood present at the time of wounding from wood that formed later. Wall 1, not shown, resists vertical spread of infection. Small arrows show internal radial seams that formed after the callus closed the wounds. The disk cracked inward from near the center of the 11-yr-old wound and outward from the edge of the wound. This is a typical cracking pattern. **(2)** Multiple columns of discolored and decayed wood. Compartmentalization occurs in heartwood. Note the sound heartwood between the two columns of defect. Included bark to the left of the inner wood suggests that the injury was caused by sudden cold. **(3)** Four disks of the same diameter but with different amounts of sapwood. Disks with a high percentage of uninfected wood had wide bands of sapwood. **(4)** Radial seam associated with small wound. The seam may split out to form so-called frost cracks. Wounds start the cracks.

2). The discolored and decayed wood associated with the wounds was walled off by a barrier zone (wall 4 of the CODIT model). Anatomy of the barrier zone was like barrier zones in other species of deciduous hardwoods (2,3). That the barrier zones were at the beginning of the growth rings indicates that the trees were wounded during the dormant period. The included bark in some of the 1968 wounds is typical of cold injury when the bark may remain in place (Fig. 2).

The disk areas were fairly uniform, even among disks that had wide bands of sapwood and those that had very narrow bands (Fig. 3). There was no significant correlation between number of sapwood rings and percentage of uninfected wood in the disks. Sapwood rings varied from 1 to 9 per disk. On the same disk, there was great variation in the number of sapwood rings at different positions.

Large dead areas, typical of those associated with root rots as they advance upward to the trunk, were noted on 34 of the disks. Compartmentalization of the dead areas indicated that they developed in the last 2–4 yr. These dead areas were in addition to the 131 wounds recorded on the disks. Observations in the orchard indicated that many roots were rotted and that the dead areas associated with the roots had spread upward to the trunk. Sporophores of *Coriolus versicolor* (L. ex Fr.) Quél. were on many of these disks.

Diameter growth of the trees for the first 6 yr averaged 10 cm. At 11 yr, the average diameter was 17 cm, and at 23 yr it was 25 cm.

Internal radial shake lines, characteristic of those associated with so-called frost cracks, were associated with many small wounds on young trees (Fig. 4).

DISCUSSION

Approximately 64% of the disk wounds during a 25-yr period were inflicted in the winters of 1968 and 1976.

The measurements show that there were many deep wounds in the trees before there was evidence of root rots in the most current growth rings. The first severe wounding period was 1968, but there were already many small wounds in the trees before that time. Growth rate began to decrease after 1970 in spite of the intensive fertilization program. In 1973 and 1976, more severe wounds occurred.

The results show that the CODIT model is applicable to peach and that wounds have an effect on sapwood width.

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