Incidence of Stem Pitting of Lovell Rootstock and Own-rooted ‘Redhaven’ and ‘Cresthaven’ Peach Trees

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Materials and Methods

In 1983, semi-hardwood cuttings from the tops of healthy ‘Cresthaven’ and ‘Redhaven’ peach trees were propagated by rooting (Lyons et al., 1985). Cuttings rooted in Aug. 1983 were potted in soil in the fall and held in a cold greenhouse for planting in Apr. 1984.

The test site at the Virginia Agricultural Experiment Station at Winchester had previously been planted as a peach cultivar trial with naturally infected, stem-pitted trees scattered throughout the planting. The site also had high populations of broadleaf weeds and dagger nematodes. All trees were removed, and the site was subsoiled, plowed, and disked in Fall 1982. In Spring 1983, the central one-half of the test site designated “fumigated” was planted to corn (Zea mays L.) and treated with 6-chloro-N-ethyl-N’-(methylethyl)-1,3,5-triazine-2,4-diamine (atrazine) (Aatres 4L 2.9 liters·ha⁻¹). This area was plowed and disked in Fall 1983. The fumigant Telone C-17 (74% 1,3-dichloropropene and 16.5% chloropricrin) (Dow Chemical Co., Midland, Mich.) was applied 30 cm deep at 127 liters·ha⁻¹ across the rows in an east–west direction, and 127 liters·ha⁻¹ in the north–south direction. This double-coverage, broadcast chisel application totaled 254 liters·ha⁻¹ of fumigant. The applicator was a John Blue solid shank chisel type (John Blue Co., Huntsville, Ala.) with chisels set 20 cm apart. The test areas were allowed to grow in weeds that were mowed in Spring and Summer 1983, and no herbicides were applied to the nonfumigated area. All subsoiling, plowing, and diskng was performed on the entire test site at the same time. In Spring 1984, all row middles were seeded with Kentucky 31 fescue (Festuca arundinacea Schreb.) and rye (Secale cereale L.).

In 1984, 101 ‘Cresthaven’/Lovell and 103 ‘Redhaven’ own-rooted trees were interplanted in a block by alternating own-rooted and Lovell-root trees within each of the rows. Own-rooted and Lovell trees in adjacent rows were offset across rows so that no Lovell or own-rooted trees were adjacent to each other either within or across rows. Similarly, 100 ‘Redhaven’/Lovell and 98 ‘Redhaven’ own-rooted peach trees were interplanted in another block in adjacent rows and offset across rows. The ‘Redhaven’ and ‘Cresthaven’ blocks were planted in the same replant site and were treated identically throughout the pre- and postplant periods. Half of the ‘Redhaven’ and half of the ‘Cresthaven’ were planted in fumigated areas separated by two border rows between fumigated and nonfumigated areas. Within each cultivar, own-rooted and Lovell-rooted trees were repeated every other tree as previously described.

Statistical analyses were performed using SAS for PC procedures and Chi square for determining differences in ratios of stem-pitted symptomatic trees vs. nonstem-pitted trees in the nonfumigated areas. Due to the low incidence of PSP in the fumigated areas, comparisons of own-rooted and Lovell-rooted trees were not possible.

Each year all trees were evaluated visually...
for leaf drooping, upward lengthwise curling, chlorosis, and veinal reddening in the fall. Trees showing substantial symptoms were examined for ridged and thick, spongy bark and pits or grooves in the xylem tissues below the soil line. Trees were allowed to stay in the planting until near death to provide a reservoir of virus to adjacent trees.

Results and Discussion

After 10 years, the overall incidence of stem pitting was 16% on nonfumigated soil (composite ‘Redhaven’ + ‘Cresthaven’) (Table 1). In the nonfumigated areas (all ‘Cresthaven’ + ‘Redhaven’ trees), stem-pitting incidence was significantly higher (~2.4 times) for Lovell-rooted trees than for own-rooted trees. In the fumigated soil, stem-pitting incidence was light, and differences between own-rooted and Lovell trees were too low to permit rootstock comparison (4% own-rooted vs. 1% Lovell). Five trees that died from unknown causes and two identified as having crown gall were excluded from the data set.

“Hot spots” within rows of the replant test site suggest tree-to-tree spread (Mircetich et al., 1970). Because of apparent PSP infestation, data were further analyzed considering only symptomatic trees and those trees adjacent to them. Significantly, fewer own-rooted ‘Cresthaven’ trees within rows (25%) had symptoms, compared to ‘Cresthaven’/Lovell-rooted trees (67%). In addition, 18.8% of the own-rooted ‘Redhaven’ within rows had symptoms, but 64.3% of the ‘Redhaven’/Lovell trees had symptoms. These data suggest that rooted cuttings of these cultivars may be less susceptible to natural spread of TmRSV than Lovell-rooted trees or that symptom expression may be slower or less obvious. Mircetich and Fogle (1976) found differences in expression of virus symptoms in different scion cultivars on seedling root. Despite a lower incidence of PSP on own-rooted ‘Redhaven’ and ‘Cresthaven’ compared to Lovell-rooted trees, this approach does not appear to provide the level of PSP control desired in the commercial orchard.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. trees with PSP symptoms/total trees</th>
<th>% Trees with TmRSV symptoms</th>
<th>χ² probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redhaven + Cresthaven</td>
<td></td>
<td></td>
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<tr>
<td>Own-rooted vs. Lovell-rooted</td>
<td>7/77</td>
<td>9.1</td>
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<tr>
<td>Cresthaven</td>
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<tr>
<td>Own-rooted vs. Lovell-rooted</td>
<td>4/16</td>
<td>25.0</td>
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<tr>
<td>Redhaven</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Own-rooted vs. Lovell-rooted</td>
<td>3/16</td>
<td>18.8</td>
<td>0.011</td>
</tr>
</tbody>
</table>

TmRSV = tomato ringspot virus.


