YIELD PERFORMANCE OF OWN ROOTED CHANDLER VS CHANDLER ON PARADOX ROOTSTOCK

Janine Hasey, Becky Westerdahl, Jim Yeager, Joe Conant

ABSTRACT

A trial planted in 1991 comparing micro propagated ‘Chandler’ to those conventionally grafted onto seedling Paradox rootstock suggests the commercial feasibility of growing this English cultivar on its own roots. Own-rooted English walnut trees may have potential in areas where commonly used rootstocks (*J. hindsii* and *J. hindsii* x *J. regia*) are undesirable because of hypersensitivity to cherry leafroll virus. In 1999 as in previous years, own-rooted ‘Chandler’ had significantly greater trunk circumference and yield than did ‘Chandler’ on Paradox rootstock. Own-rooted ‘Chandler’ yielded two times more than ‘Chandler’ on Paradox rootstock despite growth problems due to lesion nematode on some trees. The relationship between nematode populations and their effect on growth and yields will continue to be investigated. Although six trees on Paradox rootstock have crown gall, no infections have been found on own-rooted trees.

OBJECTIVES

To compare the performance of micro propagated ‘Chandler’ on its own root vs. ‘Chandler’ grafted on Paradox rootstock.

PROCEDURES

In 1991, a trial comparing micro propagated ‘Chandler’ to nursery grafted ‘Chandler’ on Paradox rootstock was initiated in Sutter County. The treatments are: 1) ‘Chandler’ on own root, and 2) ‘Chandler’ on Paradox rootstock. There are twenty single tree replicates per treatment in a randomized complete block design spaced at 25’ x 25’. Own-rooted trees have had little pruning since the third leaf. Poorly growing own-rooted trees and those on Paradox have been pruned to stimulate growth. Evaluations were made on trunk circumference, yield and nut quality. Trunks were measured at 24 inches above the ground.

Based on finding root lesion nematode in an own rooted tree with dieback in October 1998, soil samples were taken periodically and submitted for nematode analysis. For two of the sampling dates, soil with roots were also submitted for *Phytophthora* analysis. Soil cores to a depth of 24 inches were taken midway between the tree trunk and the dripline. Selected healthy and stunted trees were sampled in December 1998 and in March and June, 1999. In July 1999, every tree was sampled for nematodes.

RESULTS AND DISCUSSION

The trunk circumference and trunk cross sectional area were significantly greater for the own-rooted ‘Chandler’ compared to ‘Chandler’ on Paradox in 1995 through 1999 when measured at 24 inches
above the ground (Table 1). Yields have been significantly higher in own-rooted ‘Chandler’ from 1995 through 1999 (Table 2). Yield efficiency was significantly higher in own-rooted ‘Chandler’ from 1995 through 1997 (Table 2). Although yield in the own-rooted trees has been two or three times greater than trees on Paradox rootstock, there was a high amount of variability among individual tree yields. The non-significant yield efficiency in 1998 and 1999 is due to this yield variability. There were no significant differences in nut quality (Table 3).

Most of the own-rooted trees are extremely vigorous but during the past two seasons, one own-rooted tree has been dying back, two others have lacked vigor, and two are small trees. These trees had very low yields. Also, there continues to be some very poorly performing trees on Paradox seedling. Six trees on Paradox rootstock have crown gall; to date, no crown gall has been found on own-rooted trees.

Root and soil samples submitted were negative for Phytophthora. However, lesion nematodes (Pratylenchus vulnus) were present in the roots and in high numbers in the soil from dying and stunted own-rooted trees. Additionally, some healthy own-rooted trees have high populations of lesion nematodes. Results of the July root and soil samples showed higher average populations of lesion nematodes in the soil and roots for own-rooted trees compared to those on Paradox rootstock (Table 4). Nematode populations and their effect on growth and yields will continue to be investigated.

Own-rooted trees continue to out perform the Chandler on Paradox rootstock. Yields for own-rooted trees were two times greater despite two years of lesion nematode problems on some own-rooted trees. This trial needs to be continued for several more years to determine the full extent that lesion nematodes or other problems may have on own-rooted trees.

ACKNOWLEDGMENTS

We are grateful to Joe Conant of the Whitney Warren Ranch for his assistance and continued cooperation on this project.

Table 1. Trunk Circumference (cm) for 1996-99 measured at 24 inches and 1997-99 Trunk Cross Sectional Area (TCSA)

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<tbody>
<tr>
<td>OWN-ROOTED</td>
<td>50.0 a</td>
<td>59.8 a</td>
<td>64.3 a</td>
<td>68.1 a</td>
<td>294 a</td>
<td>340 a</td>
<td>381 a</td>
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<tr>
<td>ON PARADOX</td>
<td>32.7 b</td>
<td>37.9 b</td>
<td>41.4 b</td>
<td>45.1 b</td>
<td>123 b</td>
<td>146 b</td>
<td>173 b</td>
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Means followed by the same letter in a column are not significantly different (LSD P ≤ 0.05)
Table 2. Yield in lbs./Tree from 1995-99 and 1997-99 Yield Efficiency (YE)

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<tbody>
<tr>
<td>OWN-ROOTED</td>
<td>23.9</td>
<td>51.6</td>
<td>95.2</td>
<td>64.2</td>
<td>92.4</td>
<td>.317 a</td>
<td>.175 a</td>
<td>.234 a</td>
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<tr>
<td>ON PARADOX</td>
<td>9.3 b</td>
<td>17.5 b</td>
<td>31.4 b</td>
<td>22.3 b</td>
<td>43.7 b</td>
<td>.241 b</td>
<td>.138 a</td>
<td>.257 a</td>
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Means followed by the same letter in a column are not significantly different (LSD P < 0.05)

Table 3. 1998-99 Nut Quality

<table>
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<tr>
<th>TREATMENT</th>
<th>1998</th>
<th>1999</th>
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<tbody>
<tr>
<td></td>
<td>%Large Nuts</td>
<td>%Light Kernels</td>
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<tr>
<td>OWN-ROOTED</td>
<td>65.3 a</td>
<td>44.0 a</td>
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<tr>
<td>ON PARADOX</td>
<td>67.8 a</td>
<td>42.5 a</td>
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Means followed by the same letter in a column are not significantly different (LSD P < 0.05)

Table 4. Average number of Lesion Nematodes (*Pratylenchus vulnus*) from July 29, 1999 sampling.

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>#/LITER OF SOIL</th>
<th>#/GRAM OF ROOT</th>
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</thead>
<tbody>
<tr>
<td>OWN-ROOTED</td>
<td>5,278</td>
<td>161.7</td>
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<td>ON PARADOX</td>
<td>2,303</td>
<td>40.9</td>
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