TITLE: Determination if a Rootstock more Tolerant of Nematodes, a Winter Cover Crop, or a Standard Chemical Treatment Will Improve Tree Growth and Production in English Walnuts and Control Root Lesion Nematode (Pratylenchus vulnus).

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SUMMARY: In a young walnut orchard planted on black walnut rootstock, and stunted as a result of root lesion nematode feeding treatments are being applied in an effort to invigorate tree growth and/or significantly reduce the nematode population. Treatments began in 1989 and include: (1) Spring grafting two paradox seedlings to the existing trees trunk ("inarched"); (2) application of Nemacur 3 nematocide; (3) fall planting of a barley cover crop; (4) untreated. Paradox seedlings were used because of their tolerance of root lesion nematodes. Barley was used because it is thought to have some nematocidal activity.

Nematode samples collected in the spring and summer do not indicate any significant reduction in the presence of root lesion nematodes. Although it may be too soon to evaluate, there is no difference in tree vigor between treatment as measured by increases in trunk circumference from May 1989 to November 1990. The "inarched" treatment is expected to eventually show increased vigor however it will probably take one or two more years to be realized.

OBJECTIVES AND JUSTIFICATION: The overall objective of this research is to see if an organic or a chemical treatment will reduce the root lesion nematode population in the soil and improve tree performance and production or if, the organic approach of supplementing the existing rootstock by "inarching" root lesion nematode resistant, paradox rootstock will overcome the presence of nematodes and improve tree performance and production.
Currently there is no recommendation for correcting stunted poor producing walnut trees caused by feeding of root lesion nematode. Yet this is a common problem of new walnut orchards planted on sites previously occupied by walnuts. If any one of these three treatments show promise, it will be of value to the industry.

METHODS: In a walnut orchard planted on Northern California Black Walnut rootstock and stunted from feeding by root lesion nematode establish the following four treatments on 27 different trees: (1) "Inarch" each black walnut rootstock with two paradox seedlings. (2) Apply nemacur 3 nematocide in the spring of 1989 and 90. (3) Plant a barley cover crop in the fall of 1989 and 90. (4) Untreated check.

The paradox seedlings were inarched in May 1989. Nemacur 3 was applied in a 15 foot band on each tree side at the rate of 5.7 gallons/acre in June 1989 and May 1990. Immediately after application, the soil was disced and flood irrigated. The barley cover crop was planted at the rate of 200 pounds/acre in October 1989 and 1990 and disced under the following April.

Treatments are being evaluated by soil analysis for the presence of root lesion nematodes taken before and three months after nemacur 3 applications and by trunk circumference increase since increases in trunk circumference relates to overall increase in tree vigor. Trunk circumference measurements are taken one meter above ground.

If significant increases in trunk growth are observed tree production data will be collected and analyzed.

RESULTS AND DISCUSSION: The table shows there is no evidence at this time that any treatment has caused an increase in tree vigor as measured by increases in trunk circumference between the beginning of the trial (May 1989) and the most recent measurement (Nov. 1990). Also neither the nematocide or the barley cover crop significantly reduced the number of root lesion nematodes in the soil. There may be some indication that the Nemacur 3 slightly reduced the nematode population. Contrary to previous suspicions, the barley cover crop appears to have no effect on root lesion nematodes and the paradox rootstock, as expected, has no effect on the nematode population.

The lack of any significant reduction of root lesion nematodes as a result of two Nemacur 3 applications and one barley cover crop treatment is disappointing. Additional nematode samples will be evaluated in 1991 after the barley treatment has had its second application.
The lack of a significant difference in trunk circumference between treatments is not surprising at this time. The paradox seedling used for inarching have increased in circumference as has the area on the tree trunk just above the inarch. So far this has not resulted in larger trunks one meter above the ground. The general trend, however, is encouraging. It is anticipated that this non-chemical treatment will result in increased tree vigor, however, it will probably take one or two more growing seasons for this to be observed.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
<th>Appl. Date</th>
<th>CM Trunk Circ Inc.</th>
<th>Root Lesion</th>
<th>Nema./1000cc Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Paradox Inarch</td>
<td>2/tree</td>
<td>5/89</td>
<td>5.8 A</td>
<td>689 A</td>
<td>728 A</td>
</tr>
<tr>
<td>2. Nemacur 3</td>
<td>6.7 G/A</td>
<td>6/89; 5/90</td>
<td>5.3 A</td>
<td>456 A</td>
<td>400 A</td>
</tr>
<tr>
<td>3. Barley</td>
<td>200 lbs/A</td>
<td>10/89; 10/90</td>
<td>5.2 A</td>
<td>1,406 B</td>
<td>906 A</td>
</tr>
<tr>
<td>4. Untreated</td>
<td>-</td>
<td>-</td>
<td>5.4 A</td>
<td>728 A</td>
<td>528 A</td>
</tr>
</tbody>
</table>