WALNUT VARIETY TRIAL AND SELECTION BLOCK AT CALIFORNIA STATE UNIVERSITY FARM-CHICO: 1998

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ABSTRACT

A five acre variety trial on paradox rootstock was evaluated for trunk cross sectional area (TCSA) and yield in this three year old orchard. In terms of yield (mean dry pounds nuts/tree), grafted Chandler and “76-80”trees had the highest yields but were not statistically different from each other. Tulare yielded significantly less than the other two varieties. Evaluation of scion TCSA’s showed that Tulare and Chandler had significantly larger trunk areas than 76-80. Yield and trunk cross sectional area for the pollenizer varieties were compared in a separate evaluation. McFeely on Northern California (N.C.) black walnut rootstock appears to have an incompatibility problem. A third study evaluates “selections” from the University of California Walnut Breeding Program against the performance of standard commercial varieties. This “selection block” was started in 1997 with the planting of selections “87-186” and “87-187” and the standard varieties Payne, Hartley, Vina, and Chandler. In the selection block, twenty new paradox rootstocks were planted in the winter of 1998 and four trees of each of the following new selections were fall budded for future evaluation: Livermore, 90-27-21, 90-27-23, 90-31-10, 90-96-3.

OBJECTIVES

The objectives of the five acre variety trial is to evaluate yield, quality, tree growth, and performance until the orchard is well into full production. Also, as new varieties become available, they will be added to this variety block for evaluation.

The objective of the section block is to introduce promising new selections and evaluate them for approximately six years, comparing them to standard varieties planted in the selection block. After approximately six years, the selection will be either discarded or introduced into the variety block for long term evaluation.

PROCEDURES

Variety and Selection Blocks: Five acres of grafted trees on paradox rootstock were planted in a Vina clay loam soil at the California State University Farm, Chico in the spring of 1996. The site has primarily been dry farmed with crops such as oat hay and safflower. The site had no previous walnut history and preparation of the site did not
include fumigation. The soil was ripped to six feet in two directions and trees were
planted at a 30x30 foot spacing. The following three treatments were replicated four
times. Each replicate in the variety trial is an average of approximately 12 trees. Three
pollenizer selections were planted on paradox and N.C. black rootstock. Due to the
relatively small number of pollenizers in the orchard, they were analyzed separately from
the variety trial using single trees as replicates (6 single tree replicates per variety). Trees
in the selection block, all grafted on paradox rootstock, were compared using four single
tree replicates for each selection.

**Variety Trial Treatments:**
1) Tulare
2) Chandler
3) 76-80

**Pollenizer Treatments:**
1) Franquette-paradox
2) Franquette-N.C. black
3) Cisco-paradox
4) Cisco-N.C. black
5) McFeely-paradox
6) McFeely-N.C. black

**Selection Block Treatments:**
1) Hartley
2) Vina
3) Payne
4) Chandler
5) 87-187
6) 87-186

Trunk (scion) measurements were taken 20 cm above the graft union. Yield, nut quality
and TCSA data was collected from the variety comparison; yield and TCSA data was
collected from the pollenizer comparison and TCSA data was collected from the selection
block.

RESULTS

**Variety Block**

**Main Variety Comparison:**
Yield is expressed as dry pounds per tree and is shown in Table 1. Although yield was
low in these 3 year old trees, Chandler and 76-80 had twice the yield as Tulare and was
significantly greater than Tulare. Tulare and Chandler had the largest TCSA and were
not significantly different from one another. Tulare’s TCSA was significantly larger than
76-80 while Chandler's TCSA was not significantly greater than 76-80. Quality data has been taken but will not be available until 1999.

**Pollenizer Comparison:**
Since there were very few nuts produced on the pollenezers, the yield is presented as nuts per tree (Table 2). Cisco on paradox produced significantly more nuts than Cisco on N.C. black and the other two pollenizers on paradox or N.C. black rootstock. All other pollenizers on paradox or N.C. black rootstock had statistically the same nut production.

The TCSA of the pollenizers (Table 2) indicated only a significant difference between pollenizers on paradox and pollenizers on N.C. black rootstock. Although not significantly different, McFeely on N.C. black rootstock is consistently a very small stunted tree. This may indicate an incompatibility problem between this variety and this rootstock.

**Selection Block:**

Although there is no statistical difference between these two year old selections (Table 3), the TCSA of Hartley, which has the smallest TCSA, is half that of Payne, which has the largest TCSA.

**DISCUSSION**

Due to the young age of these trees, no conclusions can be drawn at this time. It is interesting that Tulare, although the fastest growing tree based on TCSA, has the lightest production of the three varieties under evaluation. Also, McFeely on N.C. black rootstock is very stunted which may suggest an incompatibility between this variety and this rootstock.

**Table 1 (Variety Comparison)**

<table>
<thead>
<tr>
<th>Variety or Selection</th>
<th>Mean Yield (Dry lbs./tree)</th>
<th>Mean TCSA (cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chandler</td>
<td>1.475 A</td>
<td>42.158 B</td>
</tr>
<tr>
<td>Tulare</td>
<td>0.760 B</td>
<td>48.075 A</td>
</tr>
<tr>
<td>76-80</td>
<td>1.447 A</td>
<td>34.232 C</td>
</tr>
</tbody>
</table>

Means not followed by the same letter are significantly different at the 5% level by Duncan's Multiple Range Test For Mean Separation.
### Table 2 (Pollenizer Variety Comparison)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Mean Yield (# of nuts/tree)</th>
<th>Mean TCSA (cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco Paradox</td>
<td>56.0 A</td>
<td>34.94 A</td>
</tr>
<tr>
<td>Cisco N.C. Black</td>
<td>12.5 B</td>
<td>12.16 B</td>
</tr>
<tr>
<td>McFeely Paradox</td>
<td>5.8 B</td>
<td>32.10 A</td>
</tr>
<tr>
<td>Franquette Paradox</td>
<td>5.0 B</td>
<td>27.45 A</td>
</tr>
<tr>
<td>Franquette N.C. Black</td>
<td>.33 B</td>
<td>11.52 B</td>
</tr>
<tr>
<td>McFeely N.C. Black</td>
<td>.00 B</td>
<td>5.81 B</td>
</tr>
</tbody>
</table>

Means not followed by the same letter are significantly different at the 5 % level by Duncan’s Multiple Range Test For Mean Separation.

### Table 3 (Selection Block)

<table>
<thead>
<tr>
<th>Variety or Selection</th>
<th>Mean TCSA (cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payne</td>
<td>25.57 A</td>
</tr>
<tr>
<td>87-186</td>
<td>24.67 A</td>
</tr>
<tr>
<td>Chandler</td>
<td>23.55 A</td>
</tr>
<tr>
<td>Vina</td>
<td>21.78 A</td>
</tr>
<tr>
<td>87-187</td>
<td>17.34 A</td>
</tr>
<tr>
<td>Hartley</td>
<td>13.08 A</td>
</tr>
</tbody>
</table>

Means not followed by the same letter are significantly different at the 5 % level by Duncan’s Multiple Range Test For Mean Separation.