Walnut Hedgerow Trial on Marginal Soils

Bill Krueger, John Edstrom and Wilbur Reil
Objectives

• Evaluate potential for hedgerow English walnuts on marginal soil
• Compare performance of NCB and Paradox
• Test adaptability of Chandler and Howard to hedgerow system
• Assess effect of soil modification on growth and performance
Soils-

Approximately 30% Arbuckle series-
Class II- gravelly loam 3-6 ft over gravel

70% Kimball series-
Class III- silt or gravelly loam over clay- 12 to 36 inches
1985
5-6 ft deep
North South
10 ft center

Slip Plow
1986 Planting Nickels Estate, Arbuckle CA

- 12 X 18 north south
- Drip single line=ETo
- Chandler vs. Howard
  - Howard/Paradox field grafted 1987
- Paradox vs. NCB
- 8 tree plots, 6 replicates
- Slip plow vs. undisturbed
- Monthly N
- 400 lbs potassium sulfate, from 1991
Pruning
Years 1-3 modified central leader
Mechanical pruning-starting 4th dormant
4th-7th Hedged 4ft from trunk on both sides, topped- ½ of new growth

8th dormant on hedged annually 4 ft. from trunk on Alternate sides

Topped as needed until height was 16 ft.

Discontinued 10th dormant
Heading required longer on less vigorous trees
Due unsatisfactory growth a second Drip Line was added in 1991
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Trunk Circ cm</th>
<th>Yield lbs/Ac</th>
<th>Yield Effic. (yield/circ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC Black</td>
<td>49.4 B</td>
<td>5296 B</td>
<td>107</td>
</tr>
<tr>
<td>Paradox</td>
<td>55.1 A</td>
<td>7424 A</td>
<td>135</td>
</tr>
<tr>
<td>Howard</td>
<td>48.5 B</td>
<td>6093</td>
<td>127</td>
</tr>
<tr>
<td>Chandler</td>
<td>56.0 A</td>
<td>6627 ns</td>
<td>118</td>
</tr>
<tr>
<td>Non-Slip</td>
<td>53.8</td>
<td>6870</td>
<td>128</td>
</tr>
<tr>
<td>Slip</td>
<td>50.6</td>
<td>5849</td>
<td>116</td>
</tr>
</tbody>
</table>
Kernel Quality

• High commercial quality for all treatments
• Chandler slightly better than Howard- 2% greater edible yield, 2 pts higher RL
• Negligible differences between rootstocks
Slip Plowed 1996

roots

Clay pan
What We Learned

• High yield and quality can be achieved on soils of this type
• Paradox is critical to success on marginal soils
• Adequate irrigation soil coverage is important
• 18 ft between rows is too close—suggest 12-14 ft in row and 20-22 between rows
• Slip plowing is of questionable value under these conditions
Three year pruning cycle thought to be better for Chandler

Explanations
1. Larger trees
2. Moderate vigor at site
3. Annual alternate side hedging
Winter 2011- 25 years

Hedged every other year
Yield approximately 2 tons per acre across varieties and rootstocks
2. Howard/Paradox Hedge
14’ X 20’, planted 2001
Micro sprinklers
Winter 2011 10 Years
Orchard 3. 2008
Design and Pruning treatments

- Chandler orchard planted at 15 x 22 ft.
- Nursery budded on paradox
- March 2009 first pruning
- Treatments
  1) Heavily pruned hedgerow
  2) Minimal hedgerow/low vigor training
  3) Minimal hedgerow training
  4) No heading/pruning training

- Varieties-Tulare, Ford, Gillet (1 row each)
## Results

### Comparing average canopy PAR interception with yield

<table>
<thead>
<tr>
<th>Variety</th>
<th>Treatment</th>
<th>July 9, 2010 PAR interception (%)</th>
<th>Yield (tons/acre)</th>
<th>Yield per unit PAR intercepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chandler</td>
<td>Heavily pruned</td>
<td>17.4 b</td>
<td>0.14 c</td>
<td>0.008 c</td>
</tr>
<tr>
<td></td>
<td>Minimal/low vigor</td>
<td>22.4 ab</td>
<td>0.37 b</td>
<td>0.016 b</td>
</tr>
<tr>
<td></td>
<td>Minimally pruned</td>
<td>22.3 ab</td>
<td>0.33 b</td>
<td>0.014 b</td>
</tr>
<tr>
<td></td>
<td>No heading/pruning</td>
<td>24.1 a</td>
<td>0.73 a</td>
<td>0.030 a</td>
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<tr>
<td>Tulare</td>
<td>Heavily pruned</td>
<td>19.9 a</td>
<td>0.27 a</td>
<td>0.014 c</td>
</tr>
<tr>
<td></td>
<td>Minimally pruned</td>
<td>19.2 a</td>
<td>0.47 a</td>
<td>0.023 b</td>
</tr>
<tr>
<td></td>
<td>No heading/pruning</td>
<td>19.4 a</td>
<td>0.63 a</td>
<td>0.033 a</td>
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<tr>
<td>Forde</td>
<td>Heavily pruned</td>
<td>23.4 a</td>
<td>0.26 b</td>
<td>0.012 b</td>
</tr>
<tr>
<td></td>
<td>Minimally pruned</td>
<td>21.9 a</td>
<td>0.55 ab</td>
<td>0.024 b</td>
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<tr>
<td></td>
<td>No heading/pruning</td>
<td>23.2 a</td>
<td>0.92 a</td>
<td>0.039 a</td>
</tr>
<tr>
<td>Gillet</td>
<td>Heavily pruned</td>
<td>19.5 a</td>
<td>0.23 c</td>
<td>0.013 c</td>
</tr>
<tr>
<td></td>
<td>Minimally pruned</td>
<td>18.0 a</td>
<td>0.38 b</td>
<td>0.020 b</td>
</tr>
<tr>
<td></td>
<td>No heading/pruning</td>
<td>16.0 a</td>
<td>0.52 a</td>
<td>0.032 a</td>
</tr>
</tbody>
</table>
Walnut Pruning Field Meeting

Thursday, March 10, 2011
from 1:30– 3:30 pm in the afternoon

Location: Nickels Soil Lab, Arbuckle (map on back page) South side of Green Bay Ave. West of Wildwood.

Demonstration of pruning 3 year old hedgerows and conventional planted walnut with a look at two pruning trials for hedgerow Chandler and Howards

The workshop will be conducted by UC Farm Advisors:
Janine Hasey, Sutter & Yuba Counties; Carolyn DeBuse, Yolo & Solano Counties;
Bruce Lampinen, Pomology Specialist, UC Davis; John Edstrom, Colusa County

IN THE EVENT OF RAIN, MEETING WILL BE HELD ON MARCH 11TH 1:30-3:30 PM

Questions: Yolo UCCE OFFICE AT 530-666–8143 or look at the websites for updated information at ceyolo.ucdavis.edu or cesolano.ucdavis.edu