COMPARISON OF NO HEDGING, MECHANICAL SKIRTING AND MECHANICAL HEDGING TO MANAGE A HEDGEROW HOWARD ORCHARD AT MATURITY

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ABSTRACT

Orchards that are planted in a hedgerow configuration eventually require some type of canopy management to allow safe machinery access down the drive row. The orchard age when this occurs varies depending on tree spacing, variety, orchard vigor, rootstock, etc. The Howard on Paradox orchard described here is the same orchard where a pruned versus unpruned trial took place from 2003 to 2010 (see Lampinen et.al, 2010). By 2010 the yields for all pruned and unpruned treatments were similar, as was midday canopy light interception, so the current trial was overlaid over the previous trial with individual rows serving as the treatment unit.

OBJECTIVES

The objective of the current study was to test different methods of managing a mature hedgerow Howard planting. The goal was to provide safe access for machinery down the drive row with minimal impacts on yield and or quality. An unhedged control was left to provide a reference to how much yield impact was occurring as a result of the mechanical treatments.

PROCEDURES

Site description - The orchard is located at Nickels Soil Laboratory in Colusa County and is a Howard walnut on Paradox seedling rootstock planted at a 14’ x 21’ spacing. The orchard was planted in 2002. The orchard averaged about 3.1 to 3.4 tons per acre of production for the 2008-2010 seasons.

Hedging and skirting treatments - The hedging and skirting were performed on 4/18/11. Treatments were imposed on row middles from 33 to 47 trees in length. There were five replications of each of three treatments. No hedging or pruning was done on the unhedged treatment. The skirting treatment consisted of an approximately 45 degree angle cut from near the tree trunk to about 8 feet in height as shown in Fig. 1. Width of the bottom of the hedging cut was about 5 feet with an approximately 7 degree angle in towards the tree at the top of the cut as shown in Fig. 1. The trees were already leafing out by this date and this delayed hedging (rather than dormant hedging) may have impacted results.
RESULTS AND DISCUSSION

Fresh pruning weight was significantly greater for the hedging treatment as compared to the skiriting treatment (Table 1). However, because of the limited tree size as a result of the hedgerow planting configuration, there was not a lot of material removed by either treatment. Both the skiriting and hedging treatments made passage of traffic through the orchard significantly easier than in the unhedged treatment.

Table 1. Fresh pruning weight, midday canopy PAR interception and yield by treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fresh pruning weight (kg/acre)</th>
<th>Midday PAR interception October 2010</th>
<th>Midday PAR interception October 2011</th>
<th>2011 yield (tons/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1- unhedged</td>
<td>0 c</td>
<td>69.9 a</td>
<td>78.0 a</td>
<td>2.86 ab</td>
</tr>
<tr>
<td>T2- skirted</td>
<td>82.3 b</td>
<td>69.1 a</td>
<td>74.4 ab</td>
<td>3.07 a</td>
</tr>
<tr>
<td>T3- hedged</td>
<td>467.5 a</td>
<td>70.2 a</td>
<td>68.1 b</td>
<td>2.62 b</td>
</tr>
</tbody>
</table>

Regrowth following skiriting was very minor, likely because the cuts that were made were largely in positions that were shaded and hence there was inadequate light to promote rapid regrowth (Fig. 2). Regrowth following the hedging cut was also not as vigorous as expected (Fig 2). The lack of vigorous growth response may have been due to the late date the cuts were performed (4/18/11) and also might have been influenced by an unusually cool and cloudy May-June in 2011.

Measurement of midday canopy light interception taken in the fall of 2010 suggested that there were no significant differences among treatments before hedging treatments were imposed (Table 1). The mechanical skiriting did not result in a significant decrease in midday canopy PAR interception whereas the mechanical hedging did result in a significant difference (Table 1; Fig. 3).

There were minimal impacts of any of the treatments on yield. The only significant difference in yield was significantly higher yield for the skirted treatment compared to the hedged treatment (Table 1). There were no significant treatment differences in nut size (data not shown).

There were minor treatment effects on quality with a tendency towards lighter nuts in the unhedged treatment (Table 2). Reflected light index was significantly higher for the unhedged treatment compared to the hedged treatment (Table 2).

Table 2. Walnut quality attributes by treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Extralight (%)</th>
<th>Light (%)</th>
<th>Light amber (%)</th>
<th>Amber (%)</th>
<th>Reflected light index</th>
<th>Relative value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unheded</td>
<td>38.7 a</td>
<td>49.4 a</td>
<td>11.6 b</td>
<td>0.3 a</td>
<td>53.8 a</td>
<td>88.3 a</td>
</tr>
<tr>
<td>Skirted</td>
<td>35.7 a</td>
<td>48.0 a</td>
<td>15.9 a</td>
<td>0.3 a</td>
<td>53.0 ab</td>
<td>85.9 a</td>
</tr>
<tr>
<td>Hedged</td>
<td>34.8 a</td>
<td>49.4 a</td>
<td>14.8 a</td>
<td>1.6 a</td>
<td>52.0 b</td>
<td>84.9 a</td>
</tr>
</tbody>
</table>
PRELIMINARY CONCLUSIONS

Both hedging and skirting worked well to improve access for equipment down the drive rows. Treatment impacts on yield were limited with the unhedged treatment showing similar yields to both the skirted and hedged treatments. Treatment impacts on quality were minor with the only significant impact being a higher reflected light index in the unhedged compared to the hedged treatment. Since midday canopy light interception was 10% lower in the mechanically hedged treatment compared to the unhedged treatment in October 2011, it is likely there will be treatment related yield differences in 2012. The treatments will continue to be followed in 2012 but no new skirting or hedging will be done.

REFERENCES


Fig. 1. Photos showing pattern for unhedged (left), skirted (middle) and hedged (right) on April 18, 2011. Unhedged had no pruning in 2011, skirted was cut at a 45 degree angle from about 2 to 8 feet as shown, mechanically hedged was cut at 8 degree angle as shown.
Fig. 2. Typical regrowth for unhedged (left), skirted (middle) and hedged (right) treatments as of Sept. 22, 2011.

Fig. 3. Midday canopy photosynthetically active radiation interception over the 2011 season by treatment. Initial measurement on May 1, 2011 was done before skirting and hedging treatments were imposed and on that date light interception by unhedged, skirted and hedged were 49.3%, 53.8%, and 56.3% respectively. Unhedged treatment intercepted significantly more light than hedged on all dates after hedging was completed.