EVALUATION OF ETHEPHON FOR WALNUT FLOWER AND NUT REMOVAL

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ABSTRACT

The ability to remove the pistillate bloom and young nuts from precocious lateral-bearing cultivars during the first several years in the orchard may be useful both in reducing competition with shoot growth and eliminating potential blackline infection sites. Ethephon applied as Ethrel at 2 pts or 4 pts/100 gal water will provide complete pistillate flower removal at full bloom or within several weeks following full bloom. Significant but incomplete flower removal occurred when 1/2 pt or 1 pt Ethrel/100 gal water was applied. Some phytotoxicity and reduced seasonal growth occurred with all Ethrel treatments which negated any increase in vigor attributed to reduced nut competition with vegetative growth. Hand removal of nuts did stimulate significant gains in vegetative growth but may be limited by labor costs.

OBJECTIVES

The high early yield of precocious, lateral-bearing walnut cultivars such as 'Howard' can cause two potential problems. One is reduced tree growth resulting in tree training difficulties and stunting particularly on poor soils. The other potential problem is early exposure to blackline pollen while infection sites (the pistillate flowers) are very near the graft union. Elimination of pistillate flowers during the first few years of tree establishment should reduce both problems.

In 1985, tree growth regulators (NAA, gibberellin and ethephon) were tested for pistillate flower removal potential and phytotoxic effects. Only ethephon looked promising and further testing was conducted in 1986 with 2 or 4 pints of Ethrel per 100 gallons of water applied to young 'Howard' and 'Pedro' trees at 3 1/2 weeks after full bloom. The higher rate caused excessive phytotoxicity while the lower rate resulted in only slight to moderate phytotoxicity. Both treatments resulted in complete nut removal. Growth was reduced with both treatments compared to the check and trees where the nuts were removed by hand.

In 1987, Ethrel was applied following full bloom and at full bloom. All treatments resulted in incomplete nut removal and reduced vigor.

The objective of the tests in 1988 was to determine if earlier treatments would result in less phytotoxicity and improved vigor versus later treatments.

PROCEDURES

Four Ethrel treatments were applied to young 'Howard' trees in a commercial walnut orchard north of Hollister. Each treatment was replicated five times. All treatments were applied by compressed air sprayer to the point of runoff.
(approximately 1/3 gallon per tree depending upon size). The treatments were as follows:

Treatment 1 - Check  
Treatment 2 - Nuts removed by hand  
Treatment 3 - Ethrel 1/2 pt/100 gal water at 1 week following full bloom  
Treatment 4 - Ethrel 1 pt/100 gal water at 1 week following full bloom  
Treatment 5 - Ethrel 1/2 pt/100 gal water at 3 weeks following full bloom  
Treatment 6 - Ethrel 1 pt/100 gal water at 3 weeks following full bloom

Full bloom for pistillate flowers was estimated to be April 22, 1988. The one week following full bloom spray was applied April 29, 1988 and the three weeks following full bloom spray was applied May 12, 1988. Evaluations were made for nut removal, foliar toxicity and seasonal growth. Nut removal was based on actual counts of dropped nuts, foliar toxicity by a foliar visual survey and seasonal growth utilizing a scale of 5 = very vigorous and 1 = little or no growth.

RESULTS

<table>
<thead>
<tr>
<th>Rate</th>
<th>Timing</th>
<th>Phytotoxicity</th>
<th>% Nut Removal</th>
<th>Seasonal Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1</td>
<td>Check</td>
<td>--</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Treatment 2</td>
<td>Hand Removal</td>
<td>FB+1wk</td>
<td>None</td>
<td>100</td>
</tr>
<tr>
<td>Treatment 3</td>
<td>1/2 pt</td>
<td>FB+1wk</td>
<td>None</td>
<td>75</td>
</tr>
<tr>
<td>Treatment 4</td>
<td>1 pt</td>
<td>FB+1wk</td>
<td>Slight</td>
<td>79</td>
</tr>
<tr>
<td>Treatment 5</td>
<td>1/2 pt</td>
<td>FB+3wks</td>
<td>None</td>
<td>55</td>
</tr>
<tr>
<td>Treatment 6</td>
<td>1 pt</td>
<td>FB+3wks</td>
<td>Slight</td>
<td>100</td>
</tr>
</tbody>
</table>

All treatments were rated on May 25, 1988 for nut removal and phytotoxicity. Seasonal growth was rated on December 13, 1988. The mean number of nuts removed by hand from treatment 2 was 172 nuts per tree. The age of the trees varied from 1 to 4 years following grafting but each replicate consisted of equal sized trees.

CONCLUSIONS

Ethephon shows promise as a nut and pistillate flower removal agent when applied shortly after full bloom of the pistillate flowers. Nut removal is complete at 2 or 4 pts Ethrel/100 gal water (1986 data). Only partial removal is achieved in most instances at 1/2 pt or 1 pt Ethrel/100 gal water (1987, 1988 data). Growth is inhibited by all Ethrel treatments and this severely limits the usefulness of Ethrel since this negates any beneficial growth stimulation resulting from nut removal. Ethephon sprays may have some potential in landscaping situations where nut removal is desired to prevent staining of walkways and other fixtures and reduced vegetative growth is not detrimental.

Nut removal by hand consistently resulted in increased vegetative shoot growth and appears to be the best approach to nut removal. However, labor costs may limit its usefulness in actual practice.