WALNUT WINTER KILL EXPERIMENT

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ABSTRACT

Winter kill in walnuts usually occurs in the late fall or early winter on young vigorous walnut trees that continue to grow late in the fall. If on the first or second night in the fall when frost occurs the temperature drops to about 28°F or lower trees that are not hardened properly can sustain injury. Damage has the appearance of sunburn and will occur mainly on the south or west sides of the tree. White latex paint has been used to prevent sunburn on trees for many years.

A replicated experiment was established to compare the effect of painting the trunk to about 7 feet with white latex paint with unpainted trees. Approximately half (46%) of the trees that were not painted showed some damage to the tree. Thirty six percent of the trees showed damage on the trunk below 6.5 feet height. The trees that were painted 8 days following the freeze only had damage to 18% of the trees. Only 8% of the trees had damage that extended below 6.5 feet on the trunk.

These trials demonstrated that painting the trunks and scaffolds on walnut trees shortly after the trees were injured from suspected winter kill can prevent some damage and reduce the severity of damage.

OBJECTIVES

Winter kill in walnuts usually occurs in the late fall or early winter on young vigorous walnut trees that continue to grow late in the fall. The tissue seems not to be fully hardened. It can also occur to trees that are very dry even though the growth of the trees was terminated well before fall. We normally recommend that irrigations occur until sometime in September and then be stopped to allow sufficient time for all growth to stop and the terminal to harden before late October. In mid to late October an irrigation can then be applied that will provide moisture to the tree, keep the leaves from becoming too dry and drooping, and prevent winter kill from occurring. The tree will not start to grow in late October if it was properly hardened. The leaves will continue to provide tree nutrition and the trunk and roots continue to expand even after the terminal growth has stopped.

If temperatures below 32 degrees F. decrease gradually in the fall with a few nights at 32 or slightly below the tree seems to become acclimated and able to then withstand temperatures in the low 20’s or below. If on the first or second night in the fall that frost occurs the temperature drops to about 28 or lower trees that are not hardened properly can sustain injury. The first injury noted is a slight darkening of the cambial tissue on some of the small to medium size wood. It is necessary to cut through the bark to note the damage. As the winter progresses the bark takes on a darker color. This has the appearance of sunburn and will occur mainly on the south or west sides of the tree limbs. Limbs slanted to get more direct exposure to the sun rays are more damaged. Even with winter temperature highs in the 60’s damage gradually becomes more
pronounced. By spring when the trees leaf out some of the branches are completely dry and
deal. Other branches and the trunk generally leaf out with the buds on the north and east leafing
out higher on the trunk than on the side facing the sun.

New plantings primarily of Chandler, Howard and Tulare have been impacted the past few years
by winter kill. These varieties may be more susceptible or perhaps farmers are trying to
maximize growth of the young trees by fertilizing and irrigating late in the fall. I believe that
both may be involved. All three varieties are late leafing. Tulare is the most vigorous variety of
the three and seems to grow very vigorously late into the fall. It has been reported more seriously
damaged by winter kill than the other two varieties. I have seen serious damage on all three
varieties.

White latex paint has been used to prevent sunburn on trees for many years. I have been told that
it may help on winter kill but have not seen it reported or seen data to prove that it is beneficial.
Also if it is beneficial, does it need to be painted on before the frost or can it be applied after the
event. These experiments were conducted to evaluate if white paint applied to the trunk after the
winter kill event may provide some control.

Approximately half (46%) of the trees that were not painted showed some damage to the tree.
Thirty six percent of the trees showed damage on the trunk below 6.5 feet height. The trees that
were painted 8 days following the freeze only had damage to 18% of the trees. Only 8% of the
trees had damage that extended below 6.5 feet on the trunk. There was fewer trees damaged that
were painted even though most of the trees were 10 to 12 feet tall and the painting only extended
to 7 feet.

PROcedures

On the morning of November 13, 2000 the temperature in several local walnut orchards dropped
to 26 degrees F. The previous night there was a light frost but there had been no freezing
weather before the 13th. Two days following the freeze darkening cambium tissue was seen on
some of the trees in some young orchards. A replicated experiment was established to compare
the effect of painting the trunk to about 7 feet with white latex paint with unpainted trees. The
two year old Tulare orchard was grafted on Northern California Black walnut rootstock. Approximately half of the trees had not reached 6 feet the first year and were cut back to 4
healthy buds the preceding winter. In 2000 these trees grew vigorously reaching a height of 10 to
12 feet. These trees were selected for the trial. Ten replicates of 5 trees per replicate were painted
with white paint on November 20. A comparable number of trees were left unpainted although
they had been painted to about 3 feet the previous spring. The old paint was becoming faded. On
June 6, 2001 trees were then evaluated for the number of trees that had winter kill injury on the
tree, the length of the winter kill injury that occurred below 7 feet, and the number of trees that
had damage below 6.5 feet. It was noticed that many of the painted trees had some damage
above the area painted but that the damage stopped where the tree was painted or with 0.5 feet of
the painted area.
RESULTS

Fifty trees were evaluated for winter kill in each treatment. The Painted treatment had the trunks painted on November 20 approximately 8 days following the freeze.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% trees damaged</th>
<th>Average length of damage below 7 ft.</th>
<th>% trees with damage to trunk below 6.5 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painted</td>
<td>18 % *</td>
<td>0.16 *</td>
<td>8 % *</td>
</tr>
<tr>
<td>Unpainted</td>
<td>46</td>
<td>0.93</td>
<td>36</td>
</tr>
</tbody>
</table>

* significant at Fisher’s L.S.D. 0.05

Approximately half (46%) of the trees that were not painted showed some damage to the tree. Thirty six percent of the trees showed damage on the trunk below 6.5 feet height. The trees that were painted 8 days following the freeze only had damage to 18% of the trees. Only 8% of the trees had damage that extended below 6.5 feet on the trunk. There was fewer trees damaged that were painted even though most of the trees were 10 to 12 feet tall and the painting only extended to 7 feet. The amount of damage below 7 feet was also much more severe on the unpainted trees with an average of almost 1 foot (0.93) per tree damaged below the 7 foot height compared to 0.16 foot for the painted trees.

The painting provided “control” to many of the trees even though being applied after the freeze. I said “control” even though in reality the damage must have occurred on the night of the low temperature. I would speculate that cells were damaged or ruptured on that night. As the winter progressed these injured cells leaked moisture that caused desiccation and then death of the cells. Painting the tree reduced the temperature thus reduced some moisture loss. It also may have sealed some of the surface and reduced the moisture loss.

Painting to 7 feet seemed to give some added protection to the central leader even though the leader was taller than 7 feet and the top was left unpainted. While the trees in the experiment were actually 2 years old, they had been cut back severely the previous winter and the trunk retrained. They were comparable to good to excellent 1 year old grafted trees.

From these trials painting the trunks and possibly the scaffolds on walnut trees shortly after the trees were injured from suspected winter kill temperatures may prevent damage or reduce the severity of damage. It is speculated that the injury may occur on the night the low temperature occurred. Warmer temperatures and sunshine occurring during winter may desiccate the damaged cells causing death. The paint may reduce this drying and allow the cells to repair and continue to function. The paint was applied a week following the freeze. Painting the tree earlier may or may not have given better protection. Observations throughout the winter showed that the bark on the unpainted trees became darker and showed more injury as winter progressed. Probably the benefit from the paint would decrease the longer the application was delayed following the freeze event.