THE EFFECT OF CROWN GALL ON TREE GROWTH AND PRODUCTIVITY 2000

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ABSTRACT

A study conducted in 1997, one year after planting, evaluating trunk cross sectional growth of crown gall infected trees showed that the trees with crown gall infecting more than seventy five percent of the trunk’s circumference were visibly stunted and showed a severe reduction in trunk growth from 1996-1997. Because surgical removal of galls of this proportion would require girdling nearly one hundred percent of the trunk’s circumference, these trees were replaced. In 1997 trees with galls infecting less than seventy five percent of the trunk circumference had no reduction in trunk cross sectional growth.

In 2000, 5 years after planting, from trees that had galls successfully removed (those with less than seventy-five percent of the trunk infected) there was no statistical difference between those trees and trees that were never infected by crown gall in terms of yield or trunk growth.

In 2000, from trees that had that were left untreated (those with less than seventy five percent of the trunk infected) there was no statistical difference between those trees and trees that were never infected by crown gall in terms of yield or trunk growth.

The success of surgically removing galls was very good in cases where the area infected with crown gall was completely exposed and the gall was completely extracted. Surgical removal was not successful where the gall was not fully exposed. Crown gall infection must be completely exposed to insure successful treatment. Treating galls with heat was evaluated this year and proved to be more effective in overall gall control.

OBJECTIVES

One goal of this study is to determine the effect of crown gall infection on trunk growth and yield of Chandler walnuts on paradox rootstock where the galls were successfully surgically removed. Another goal is to examine the effect of crown gall infection on growth and yield of “76-80” walnut trees on paradox rootstock in which the galls were left untreated. The degree of success of removal of galls using various techniques is the third goal of this study.

PROCEDURES

All trees on Paradox rootstock were examined for crown gall infection in 1997 in this five-acre variety trial. Trees were grouped into four categories: (1) no crown gall infection, (2) crown gall infection up to 25 percent of the trunk circumference, (3) crown gall infection up to 50 percent of the trunk circumference, and (4) crown gall infection up to 75 percent of the trunk circumference. “76-80” trees on Paradox rootstock were left untreated. Chandler trees on Paradox rootstock were treated. Five single tree replicates in each category were evaluated. Yield and trunk cross sectional
area (TCSA) were measured as pounds of nuts per tree and TCSA 10 cm below the graft union, respectively.

Surgical removal followed by chemical treatment was used to eradicate galls in 1999. Trees were then evaluated three months after treatment for gall re-growth. This year (2000) galls that were removed surgically in 1999 were evaluated. If any re-growth occurred the gall was removed and treated with heat, from a propane torch. Trees were then evaluated again three months later. If re-growth was found then another heat treatment was applied.

RESULTS

In 2000 there was no significant difference at the 5% level of significance in TCSA or yield from trees that were treated for various size galls and trees that had no galls (Graphs 1 and 3). Since 1997 the TCSA at 10 cm below the union of the trees with the galls removed has increased at approximately the same rate as the trees with no galls (Graph 2).

Trees with crown gall girdling between 50 and 75 percent of the trunk circumference were statistically smaller than trees with no galls at the 10% level of significance. There was a statistical difference between the TCSA of trees with no galls and trees with galls of smaller categories (Graph 4). The difference in TCSA between the four categories appears to be widening with time (Graph 5).

There appears to be a direct relationship between gall size and trunk growth.

Trees with galls covering between 50-75% of the trunk had a significantly smaller yield than did trees with no galls at the 5% level of significance (Graph 6).

Gall removal with heat began in the summer of 1999. This year trees with surgically removed galls and trees with heat treated galls were evaluated in late spring. Any re-growth that was found was treated with heat. The overall evaluation of the two treatments found that the heat treatment was approximately seventeen percent more effective than the traditional surgical method (Graph 9).

DISCUSSION

Crown gall infection has had no significant affect on trunk growth or yield of trees when the galls were removed in the second year. Where galls were not removed there was a significant yield and TCSA difference between the trees with no galls and those with galls covering from 50-75% of the crown. This suggests that prompt gall removal is important, particularly on large galls. Removal of galls could take one - two hours at a cost of up to $30 per tree. This cost can easily be recovered in one or two years with the additional yield gained. The long-term effect of not treating crown gall infection is not fully known but severe infection may affect the longevity of an orchard. It is suspected that untreated crown gall infection could make trees more susceptible to root rots and blow over problems. For successful surgical removal of galls, the entire gall should be exposed and isolated from healthy tissue with at least a one-inch margin of uninfected tissue around the gall. When using heat, treating around the margin of where the infected gall was removed is the key to the control.