

GIRDLING OF HASS AVOCADO TREES TO INCREASE FRUIT YIELD AND INCOME IN “OFF” YEARS IN A CALIFORNIA COASTAL VALLEY

R. McNeil¹ and G. Parsons¹

¹**Cal Poly State University. Horticulture and Crop Science Department.
San Luis Obispo, CA, USA 93407. E-mail: rmcneil@calpoly.edu**

ABSTRACT

Sixteen trees each of mature Hass avocado trees were treated with three 2 cm (.5 in) girdling treatments prior to two light bloom springs resulting in “off” year crops: 1. A December girdle, 2. A February girdle, 3. An ungirdled control. One-third of the limbs were girdled on each tree, changing limbs each treatment year. December girdles were performed in 1995 and 1997. February girdles were performed in 1996 and 1998. Fruit number data was taken for three seasons, two “off” years (1997 and 1999) after girdling and one “on” year (1998) without girdling.

The December girdling time averaged 111 more fruit per tree than the control trees for the three years of the study. The February girdling time averaged 80 more fruit per tree than the control trees for the three years. Fruit size was slightly smaller for both December and February girdled trees for the 1999 crop.

INTRODUCTION

The avocado industry is a large economic factor for many nations. Unsatisfactory bearing habits of the avocado tree have always been a major problem for the avocado grower. Avocado trees are alternate bearers, so 1-3 poor crops (lag crops) may follow a heavy crop. As production costs increase (especially water) there is a growing need to maximize production in these lag crops.

Girdling has been practiced to increase productivity in many fruit trees, including the avocado. It is a simple process of cutting through and removing the bark in a two cm diameter circular pattern around one third of the limbs per year. This is usually recommended in November or December in California (McNeil, 2001). The removal of the bark prevents carbohydrates from going down the tree to the roots. These carbohydrates are then used by the upper portion of the tree to increase fruit set.

The main objective of this research was to determine if girdling could reduce alternate bearing of Hass avocado trees, by increasing the crop in the lag (“off”) crop year.

MATERIAL AND METHODS

Forty-eight Hass avocado trees were randomly chosen. Three treatments were given to the trees. One third of the trees were girdled in December 1995 and 1997, one third were girdled in February 1996 and 1998, and the other third were left alone (control).

The girdling process started by choosing one limb from each tree that appeared to support approximately one third of the tree’s vegetation. On some trees with larger numbers of branches, two limbs were chosen. A double bladed girdle knife was used to cut through the bark, down to the wood, in a strip about two cm (one half inch) wide. The cut was made completely around the limb.

The trees were then placed into groups of three, forming a randomized block with sixteen replications. The objective was to put trees with similar amounts of vegetative growth and numbers of current fruit in the same group. There is believed to be a direct correlation between the amount of vegetative growth and the crop size, so by grouping the trees like this we could eliminate a possible bias.

The total number of fruit per tree and per limb were counted for three seasons, two “off” years (1997 and 1999) after girdling and one “on” year (1998) without girdling.

Five templates were made of approximate size to weight ratios to measure the fruit size of the 1999 crop. This was done by weighing a 4 ounce, 6 ounce, 8 ounce, 10 ounce, and 12 ounce avocado. These six avocados were then traced onto cardboard. These templates were then used to determine the approximate weight of randomly chosen avocados. Thirty fruit from each tree were randomly selected to be used as a sample population. On the girdled trees 10 fruit were randomly selected from the girdled portion of the tree and remaining 20 fruit were chosen from the rest of ungirdled portion of the tree. On the ungirdled control trees 10 fruit were randomly chosen from the one third portion of the tree that was predetermined to have similar position, size, and fruit numbers as the corresponding girdled limb on the girdled tree. The remaining 20 fruit were chosen randomly from the remaining two thirds of the tree.

RESULTS AND DISCUSSION

The 1997 crop, as a result of girdling, showed that the trees girdled on December 15, 1995 and February 17, 1996 averaged more fruit per tree than the ungirdled trees (Table 1). The 1998 crop, not girdled, was a high yield crop as predicted. The trees that had been girdled in previous years again had higher numbers of fruit per tree. The previously ungirdled trees averaged less fruit per tree than both the December and February girdle. The 1999 crop, as a result of girdling, showed that the trees girdled on December 6, 1997 averaged more fruit per tree than the ungirdled but the trees girdled on February 13, 1998 averaged less than the ungirdled.

The December girdle averaged 111 more fruit per tree than the ungirdled trees for the three years of the study (Table 1). The February girdle averaged about 80 more fruit per tree than the ungirdled trees for the three years of the study. The size/weight results for the 1999 crop are as follows (Table 1). Girdled trees had slightly smaller fruit than control trees for the 1999 crop. Size wasn’t measured for the 1997 and 1998 crops.

CONCLUSION

The main purpose of this study was to determine if the practice of girdling would have a positive effect on the production of the Hass avocados in their lag ("off") years. Girdling in both December and February did induce larger overall (total) crops for the three years of the study. The December girdle was the most effective treatment for the three years of the study followed by the February girdle, and lastly the ungirdled trees. The December girdle time increased the crop in both "off" crop years (1997 and 1999) and even in the "on" crop year (1998). The February girdle time increased the crop one "off" year (1997) and the "on" year (1998).

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Table 1

Total fruit counts per tree for the three seasons of the girdling study

Seasons Ungirdled		December 1995 & 1997 Girdle	February 1996 & 1998 Girdle
1997	7.5	33.7	39.0
1998	335.6	398.8	435.3
1999	178.0	199.6	126.6
Total	521.1	632.1	600.9
Average			
Fruit Size			
(1999)	218.8 gm (7.72 oz)	203.5 gm (7.18 oz)	196.7 gm (6.94 oz)