

Increasing Yield of Young Hass Avocado Trees using the Cincturing Technique

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ABSTRACT

Cincturing of two-year-old Hass avocado trees was investigated throughout several phenological stages to determine whether production could be increased. It was found that the average number of fruit per tree was statistically improved when cincturing was done during dormancy, bud break (flowering) and first flush. Cincturing done shortly after hardening of the flush resulted in a decline in tree condition.

INTRODUCTION

Girdling is a tool that has been effectively used to increase production of avocado trees (Noel, 1970; Lahav *et al*, 1971; Menzel & Paxton, 1986). The effect is possibly due to accumulation of carbohydrates and the temporary arrest of vegetative growth above the girdle (Noel, 1970).

Practical experience indicates that the removal of a band of bark (girdling) is too severe a treatment which in most cases results in decline of tree condition and lower yields in the following season. This can possibly be due to the long period it takes to bridge the gap created by the removal of a strip of bark. It is therefore recommended that girdling takes place the season prior to tree removal when thinning a orchard (Toerien & Basson, 1979).

The need exists for a less severe treatment where the positive effects of girdling can be retained without the negative impact on tree condition. This study investigates the technique of cincturing whereby a cut is made through the layer of bark to the central hardwood without the removal of any bark, thus a less severe treatment.

Hass trees after two seasons of growth usually have attained sufficient canopy size to set a reasonable crop, but the growth vigour is also usually excessive. This excessive vigorous growth gives rise to a smaller crop than expected and tree size larger than needed. It is felt that the setting of a larger crop at this stage would be beneficial to control of excessive vigour and also giving earlier returns.

MATERIALS AND METHODS

A commercial orchard of two hectares of Hass trees grafted on Duke 7 rootstock and planted in January 1991 was selected on Everdon Estate, Kwazulu/Natal.

This orchard was planted at a spacing of 5 m by 5 m, thus 400 trees per hectare. The trees in the trial section that were selected were in good health and uniform in growth and size. Cincturing was done with a sharp grafting knife and in this case a single cut was made on the main stem 300 mm. above ground level. The first treatment was done on 8 March 1993 when the trees were 2 years and 2 months old. The following treatments were at monthly intervals for the first two months and thereafter at fortnightly intervals. The treatments consisted of 10 trees each in a row, alternate rows were treated and the adjoining untreated row was utilised as control trees for every individual treatment. The treated tree lines were the same as those that would be utilised with eventual thinning of the orchard. The reason for following this layout being that in the event of severe negative reaction to treatment this will not have a permanent bearing on the orchard.

A total fruit count was done at harvest time May 1994 for every individual tree both treated and control. Phenological observations such as bud break, flower and flush were recorded weekly, in order to tie up treatment date and phenological stage.

RESULTS

Tree condition

The first treatment date (8 March 1993) resulted in the yellowing of leaves and general decline in tree condition, and one tree died. At flowering time this treatment also showed a markedly heavier flower. The second treatment (done on 30 April 1993) also led to discoloration of the leaves, but not as severe as after the first treatment. All other treatments had no detrimental effect on the tree condition that could visibly be discerned. An interesting observation was that the treatments done on 30 June 1993 and 15 July 1993 resulted in the onset and development of the first flush in spring being two weeks earlier than the control and all the other trees in the orchard.

Number of fruit

As can be seen in Figure 1 the four treatments (starting 30 May 1993 and ending 15 July 1993) all had a larger average number of fruit per tree than the corresponding control, although only the treatments done on 30 May 1993 and 15 June 1993 were statistically more than the control. This treatment date (30 May 1993) was 5 weeks after the last buds opening of the second flush (summer flush). Starting with the treatment date 15 August 1993 (also the first week of bud break) every second treatment had a higher average number of fruit than the control, and the treatment dates 15 August 1993, 15 October 1993 and 15 November 1993 had statistically more fruit than the control. Full unfolding of the flower panicle and the opening of the first flowers were seen on 4 September 1993 and at the same time the first signs of the first flush occurred.

DISCUSSIONS

It is clear that the cincturing dates of 8 March 1993 and 30 April 1993 does have a

negative effect on tree condition and can lead to the death of a vigorous young tree, without having any beneficial effect on the yield. According to Whiley and Wolstenholme (1990) the root flush follows shortly on the leaf flush, it is possible that at these two dates the cincturing resulted in a reduction of carbohydrates that were destined for the roots therefore starving the roots at a critical growth stage.

The most consistent results were obtained when cincturing was done starting 5 weeks after the second flush in the growth season as can be seen in Figure 1. As it was only two treatment dates in this dormant period that statistically gave significantly more fruit per tree, it is a rather small target to aim for if the intention is to increase production with a relative amount of certainty.

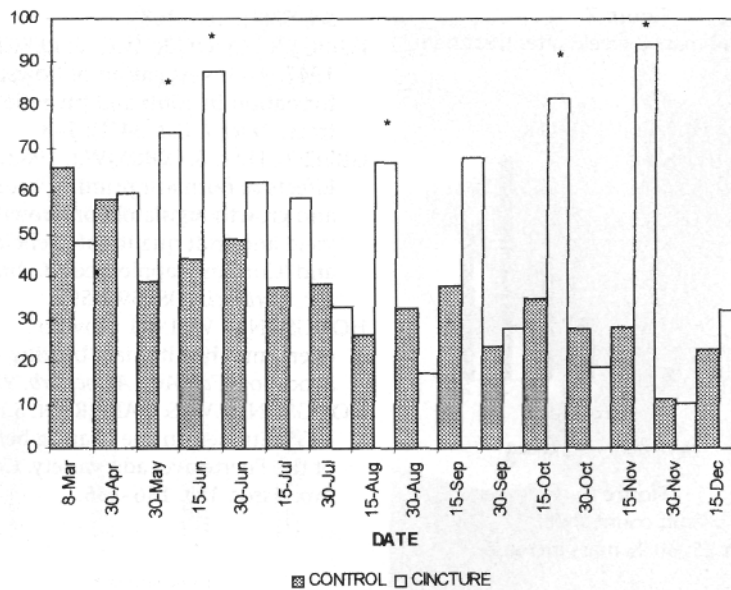


Figure 1
Average number of fruit per tree on young Hass avocado trees for different dates of cincturing.
* Denotes statistical significant (95 % level) difference from the control.

The alternating pattern of large increases in production for one treatment followed by the next treatment with no increase in production is also coupled with the location of the row in which the treatment occurred. Treatment started in the center of the orchard followed by the second treatment to the left and the third treatment to the right of the first and then the fourth treatment to the left of the second and so forth, thus giving rise to the latter treatments located further apart. A condition in this orchard is uniform in terms of aspect, gradient, climate, tree condition and soil type. No apparent difference could be found in the orchard to explain the pattern. It is however significant to note that the treatments after the onset of bud break that did give rise to a statistically higher number of fruit per tree were located in close proximity of each other. Indications thus are that under certain conditions significant increases in production can be achieved when cincturing is done after the onset of bud break. No negative effect on tree condition could be seen in this period neither were the less successful treatments

statistically lower in number of fruit per tree than the accompanying control.

It does appear that cincturing is a technique that is less severe than girdling and can be useful in increasing the production of young Hass trees. However it remains a practice that should only be done on very healthy trees and results suggest that no increase in yield will be obtained in certain instances, further research is needed to establish these conditions.

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