

## THE EFFECT OF GIRDLING THE AVOCADO

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Certain varieties of otherwise excellent avocados are losing popularity on account of the habit of not coming into bearing as early and as promptly as is desirable for a commercial fruit. Various growers have attempted to overcome this difficulty by ringing or girdling. I have been asked to collect, digest, and present the results so far secured.

### Scientific Consideration

In the first place, it is well for us to consider the girdled branch from the standpoint of plant physiology.

Dr. Jacques Loeb of the Rockefeller Institute for Medical Research in New York City, working on the general problem of regeneration of tissues in animals and plants, has brought to light new facts in regard to plant growth which have a wide practical application to the propagation, pruning and girdling of trees. To state the matter in a few words, Dr. Loeb has found out that every growing tip of twig or shoot is continually giving off a certain substance which, for lack of a better name, he calls an "inhibitor," which flows downward toward the root. This substance represses, slows up, or prevents the growth of buds on the main stem by which it passes. The path followed by this substance is the bark just outside of the cambium.

The dormant buds at the leaf bases situated some distance down the stem are prevented from all growing out as soon as they are formed by being continually repressed by this downward stream of inhibitors from the growing tips. If it were not for this, all the buds on a branch would immediately grow out, taking all the sap as it passed by them; there would be nothing left for the tips and growth in height could not occur. This discovery explains why tip buds which are farthest from the root grow the fastest. They are able to grow because they are at the apex, and there is nothing beyond them sending down an inhibiting substance.

As soon as we accustom ourselves to this new idea of a downward stream of growth inhibitors, we are in a position, to understand why, when we girdle an avocado limb, the region immediately back of the girdle gives rise to several vigorous suckers. It is because the dormant buds near the cut are freed from the repressing effect of inhibitors, and inasmuch as the sap channels are large and abundant, the new shoots are extra vigorous. We can now better understand why, in top-budding avocado trees it is usually better to girdle the limbs above the buds than to cut them off entirely. The girdle relieves the bud from inhibitors and allows it to spring into normal growth; whereas if we cut the limb off entirely, the bud is sometimes drowned out by the excess of sap.

The effect of girdling a limb therefore is to permit the growth of suckers immediately behind the girdle which appropriate a part of the raw sap, thus checking the vigor of

growth beyond the girdle. At the same time, the elaborated sap coming from the leaves, transported through the bark, is checked by the girdle and soon reaches a concentration which forces a rapid formation of blossoms and fruits.

### **Practical Results**

Turning now from the field of plant physiology to actual results in the orchard, we find that girdling avocados does throw them into bearing. The testimony is unanimous on this point. I will have time to cite only a few of the large number of growers who have been good enough to answer my letters.

Mr. J. M. Elliott girdled a lot of Taft limbs in October. These limbs all bore from ten to twenty fruits each with nothing on the remainder of the tree. This year he has girdled a much larger number.

On October 24, 1918, Mr. Whedon girdled 65 Taft trees. The following summer he sold 234 fruits from the girdled trees, and none from those not girdled. It is interesting to note that even the next year the old girdles showed results, and in 1921 the Tafts bore 120 fruits while those not girdled are still bearing nothing.

Mr. Wm. Hertrich girdled 25 seedling trees with the result that 75% of them blossomed and set fruit. At the ranch of Mr. Geo. D. Hoffman at El Mirador, Mr. Dolman has gotten good results from girdling and is continuing the work in an experimental way.

Dr. Keller girdled one branch of a three year old Linda with the result that the branch matured 38 fruits while only 2 were borne on the rest of the tree. Mr. Rideout and a number of others have had very similar results. Mr. Knight varies the process by using a binding wire instead of cutting out a girdle. His results show some variation depending on the time the wire was left on. Mr. Spinks uses the girdle extensively in propagating and top-working trees, but not for fruit production.

While practically every man who has girdled in October has gotten fruit, a good many seem to think the procedure is dangerous on the ground that the limbs may be weakened and break at the scar. No one cites instances of actual loss by breakage, and I am inclined to the opinion that this fear is not justified. Where the cut extends just through the bark and is quickly healed over, the branch should not be weakened to any extent.

### **Conclusions**

Girdling is inexpensive and brings big results. It has not yet been shown to be attended with serious damage to the trees. The best time is October. The best width of girdle varies with varieties from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch. Suckers arising behind the girdle should not be removed too soon.

By way of suggestion I would like to point out that more experiments should be made on root pruning. If a tree like the Taft persists in wasting its substance in riotous living and refuses to take life seriously, might not a vigorous root pruning furnish a sufficient check to vegetative growth to produce results without the scarring incident to girdling?

In closing I wish to thank the many avocado growers who, in response to my letters, went to such pains to write me of their results. To them belongs the credit of any value which may attach to this paper.