

AVOCADO FIELD GRAFTING ANEW

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Abstract

Successful field grafting has long been a necessity for viable avocado industries worldwide. However, except in the most extraordinary cases, the techniques used are arduous, expensive and problematic in the long-term. The authors describe an alternative grafting method and compare it with traditional California practices. The merits and disadvantages of each are detailed.

1. Introduction

Every year "new" methods of grafting are authored in most of our fruit grower annual journals. When one reads closely in these reports one finds not so much what is new, but what is either old and otherwise forgotten or, old and now newly embellished. So, it is with this perspective that the authors address "anew" a grafting topic possibly practiced before the beginnings of commercial avocado commerce.

The topic of avocado grafting has been fairly well addressed in previous articles (Martin, 1992; Whitsell, et al., 1989), and most localities have worked out their technical requirements for success. But, as avocado breeders optimistic regarding the future of new and alternative varieties (Bergh, 1987; Bergh and Lahav, 1993; Bergh and Martin, 1992), it is likely that top-grafting of avocado will become an ever increasing and important component of our cultural requirements. Therefore, it is necessary that topworking become as cost-effective and horticulturally efficient as possible.

2. Traditional topworking

Generally, professional grafters are hired. Scion budwood is cut and inserted into stumped-backed trees in spring. The graft method is widely referred to as the bark- graft. Later the successful graft is securely tied and staked for several years.

3. Traditional topworking problems

The hired professional grafter relieves the orchard owner of any number of critical technical difficulties and decisions (e. g. quality and availability of budwood, appropriate timing for both trees and weather, etc.). Therefore, the owner's work begins after topworking, with after-care. Typically, grafted trees will "prefer" not to regrow through the graft-wound, therefore sucker control becomes the first order of business. In California, it is common that just as graft growth begins summer heat soon follows. Summer temperatures will slow the progress of young, developing grafts. Therefore, stump painting is required. By summer's end, successful grafts

need staking for protection from fall winds. If all is well with work and weather the new graft should be of a suitable size to sustain moderately cold winters, otherwise winter protection is in order. But, this description of events doesn't always follow. The success of each step is built on the quality of the previous step. Any problem will impact the performance and response of the following step-- in other words, there is very little room for error.

4. The alternative

The success of the grafting approach described below relies exclusively on planning and active preparation. The physical act of grafting becomes almost secondary to the preparation. Traditionally, graft preparation is thought of as cutting the trees a few days before the arrival of the propagator; the grafter is then left to make the final "clean" cut. The alternative method, herein called 'spring-green-bark', requires similar tree cutting; the difference is the grafting work is performed 6-10 months later. Admittedly, at first glance, the lag time between the stumping cuts and the grafting seems contrary to efficiency, but looking at the strength and weakness of each method may reveal a different picture. (Table 1.)

Continuing the preparation topic: When preparing for future grafting the first consideration is the timing of the major tree cuts. Obviously, the crop will need to be harvested, after this one will need to look at a calendar to determine where the plant sugars are concentrated. Ideally, one would prefer to harvest early in the year and cut soon after; this will optimize winter-stored sugars for strong regrowth. Otherwise, cutting in late spring or summer removes the top of the tree where the bulk of the plants sugars have moved for peak summer activity (Figure 1.). Once cut, and the irrigation capped (until strong regrowth resumes), management of the regrowth is the order of the day. It is important to promote the regrowth through one centrally located, firmly attached shoot rather than allowing numerous shoots to emerge. This method of regrowth is exactly the procedure followed for training a central-leader (Martin, 1991), except the quality of the regrown shoot need not be the same when used for grafting e.g. one may decide not to stake a shoot selected for grafting, and shaping of the shoot may not be required if it is to be cut and grafted at a later date.

The most ideal time for topworking in California is after the danger of frost; late winter through early spring. Grafting at this time is beneficial in several ways: 1. Allows graft a longer season of growth the first critical year, 2. Plant sugars stored for winter dormancy are most efficiently captured for vigorous spring growth, 3. Early spring weather is the most favorable for rapid tender growth, 4. Graftwood is the most ideal during this time. Traditional grafting work does not adequately allow for work at this early date because the cambium tissue typically is not actively separating until later in spring.

Grafting the prepared shoot is technically simple, allowing the owner or management to perform the task at the appropriate time of the year. The ideal graft would consist of selecting a 6- 10 cm diameter shoot, cutting at a right angle 10- 15 cm above the point of emergence from the trunk, and then inserting a 1-2 cm diameter budstick using any standard bark-graft method (Whitsell, et al., 1989). Materials for the work are inexpensive and easy to come by: Hand-saw, sharp knife, plastic wrap tape, asphalt "tar", and 'Parafilm' scion wrap. The work can be completed rapidly with an extremely high rate of success. The graft growth is rapid; timed with spring flush. Healing of the grafted shoot is also rapid, resulting in a strong union of scion and shoot. The early shoot dominance of the graft reduces sucker- shoot competition-- one removal of competitive spring flush reduces most of the problem.

It may be an optimistic opinion of the authors regarding the future of new varieties (Martin, 1993), but if they are to play an important future role, it is likely that growers will topwork, rather than planting new trees. The alternative spring green-bark topworking system is especially suited for new varieties for several reasons: 1. Many of the high-yielding new varieties have smaller branch size and diameters than the standard "Hass"; 2. The limited availability of budwood material of new varieties will require using smaller-diameter material than would otherwise be acceptable, for traditional grafting.

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Table 1 - Comparison of commercial topworking methods in California.

	<u>Traditional Bark-Graft</u>	<u>Spring Green-Bark Graft</u>
Skills Required	expert	amateur
% Success	75-95	95-100
Trees Per Day	60-80	150-300
Start Time	mid-April to mid-May	mid- Feb
Budwood Required	large-diameter (stored 2-3 months)	medium-diameter (stored 0-1 month)
Tool Technology	moderate to sophisticated	simple
Graft Attachment	vulnerable to breakage	complete attachment rarely weak
After - Care	substantial suckering & staking	minor suckering simple staking
New Varieties	* poorly suited	well suited
Preparation	little	**significant

* limited available budwood is mostly small-diameter, & often new varieties are precocious and require strongly attached grafts.

**more preparation can both save as well as cost money- the savings may come either as reduction of water or through light improvement resulting in improved yield.

RELATIVE REGROWTH RATE

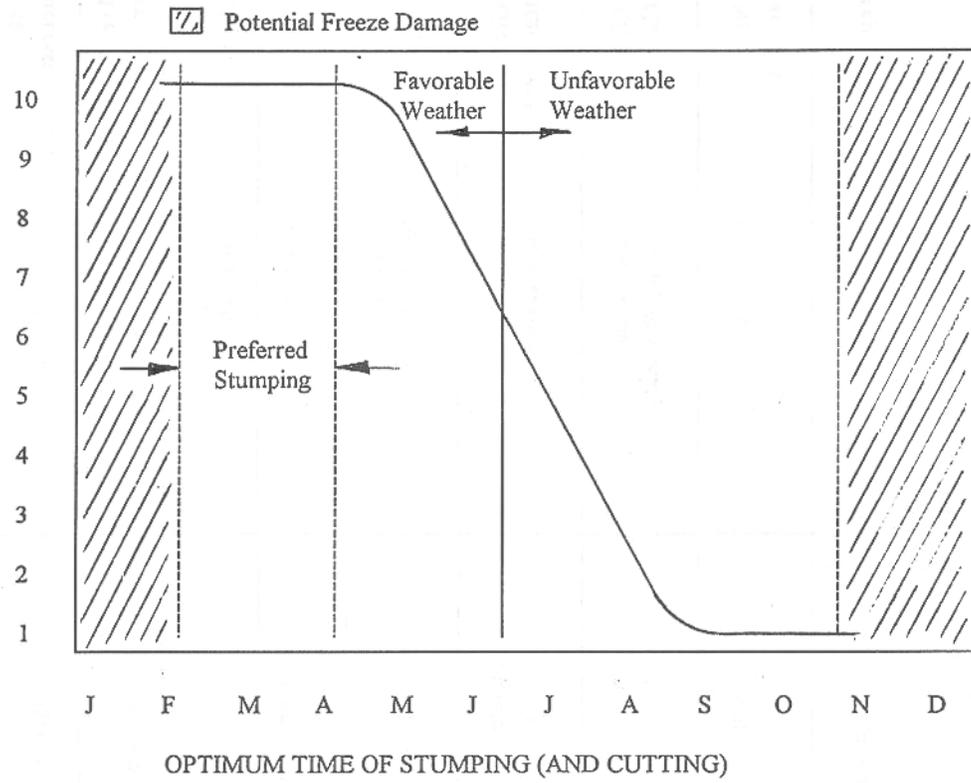


Figure 1. Stumping dates vs. regrowth.