1995 Report for project 95-KS1: Reducing Shaker Barking Injury

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Introduction

Shaker damage (barking) during almond harvest can reduce tree health and productivity, and any reasonable cultural practice to increase bark strength could be of long term economic value to growers. It is widely recognized that incorrect pad design or improper shaker operation can cause barking under most conditions, but it is also believed that as far as cultural conditions are concerned, well irrigated trees are more susceptible to barking than water stressed trees. After a number of experimental tests over the last 5 years however, neither we nor other researchers have been able to document any decrease in shaker injury with irrigation cutoff, nor have we been able to measure (with force gauges) any increase in bark strength under conditions of long or short term water stress. We have, however, consistently observed an increase in bark strength with local application of ethephon (to the trunk only). The main objective of this project was to test for the effectiveness of ethephon on reducing shaker injury.

Materials and Methods

Trees at the Paramount farm, which were scheduled for removal at the end of the season, were treated with a 500ppm ethephon solution on 14 July, 1995. A sample of both trunks and scaffolds were treated, with adjacent trunks or scaffolds serving as controls (some sprayed with water, some not sprayed at all). On 10 August, 1995, all treated and control areas were subjected to a 15 second shake with the clamping pressure set to the maximum allowable (2,000 psi), and no new lubricant was applied to the pads. The clamped areas were inspected after shaking, and the approximate area of loosened bark was measured. For some of the trees in the study, additional measurements of bark strength and plant water status had been made on 9 August. The trunks of young, nonbearing Nonpareil trees were treated in July and August, 1995, anticipating an evaluation of shaker injury to be made during the 1996 harvest.

Results and Discussion

For the mature trunks and scaffold branches the damage found was typically a loosening of the bark, with no other obvious external symptoms. Often, damage was not located directly under the clamp where the maximum pad pressure is exerted, but in the area where an intermediate pad pressure occurs (Fig. 1). The most striking pattern which was apparent in the results however, was that the trees in rows 2 and 3, which were rows which showed evidence of barking injury in previous years, had

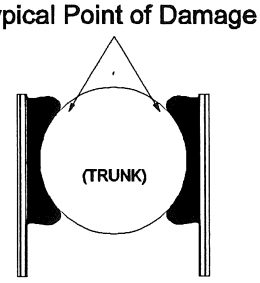

Figure 1. Diagram showing tree trunk or scaffold branch, and position most often damaged by shaker after severe shaking.

substantially more damaged area than the trees in rows 5 and 6 (Table 1).

Table 1. Summary of observations and measurements on trees exposed to severe shaking stresses.

	Rows 2 & 3		Rows 5 & 6	
	Evidence of previous years injury in 14 out of 18 trees (78%)		Evidence of previous years injury in 4 out of 19 trees (21%)	
	TREATMENT		TREATMENT	
	Control	Ethephon	Control	Ethephon
Damaged Area (in^2)	25	27	0.7	7.5
Bark Strength (PSI)	98	76	100	63
Plant Water Status (MPa)	-1.7	-1.9	-2.2	-2.3

The only factor associated with this difference was a difference in plant water status, with the trees under moderate stress (below -2 MPa) showing much less injury than the trees which were under mild stress (below -1.5 MPa). There was no consistent pattern in the measured values of bark strength, indicating that the method we have developed for this measurement my not accurately determine the net susceptibility of the bark to shaker caused injury. Another important result was the apparent lack of any effect of the ethephon treatments. This result is inconsistent with previous findings, although it is possible that the difference may be related to the fact that this is the first time that shaker damage has been reproducibly caused under experimental conditions in the field. If this is the case, then it may be necessary to further investigate the relation between water stress and barking injury, since all of the previous findings of no relation between barking injury and irrigation cutoff have reported plant water potential levels corresponding to much more stress than found in this study. Hence it may be possible to determine when shaking can begin, based on a plant indicator of stress, rather than a time since irrigation cutoff.