

Deficit Irrigation Management During Hull Split

Ken Shackel
Dept. of Pomology, UC Davis

Objective

The objective of this project is to test the practicality and benefits of a plant-based deficient irrigation strategy during hull split. The expected short term benefits are: 1) water savings, 2) reduced incidence of hull rot, 3) improved harvestability, and 4) an overall reduction in the level of tree water stress during and after harvest. The potential long term benefits include increased return bloom and improved overall tree health, but such benefits may not become apparent during the course of the project.

Background

Irrigation management is a key element in almond production, and as water becomes more expensive and more politically competitive in the state, the need for reliable and cost-effective methods to manage irrigation, especially deficit irrigation, in a high acreage crop like almonds becomes more important. Previous almond board funded research by B. Teviotdale and D. Goldhamer has shown that hull rot and sticktight can both be reduced by deficit irrigation during hull split, but the best way to manage this deficit has not been determined. Deficit water management during this period is particularly difficult, because by the end of hull split, irrigation must be suspended for harvest, and hence the grower runs the risk of causing

excessive late season tree water stress, which has also been shown to be detrimental to return bloom and ultimately to almond production. A plant-based approach to deficit irrigation (midday stem water potential, "SWP") has been very successful in prunes, allowing a substantial savings in seasonal water use (typically 40%), while at the same time maintaining yields and in some cases improving fruit quality. Since the growth of the kernel (seed) is generally thought to be less sensitive to water stress than the growth of the fruit flesh in many species, it is reasonable to assume that similar or greater savings in water use can be accomplished in almond orchards without a negative impact on production. A one year study on almonds in the Bakersfield area in 1999 showed that, as expected, there were a number of potentially beneficial responses to stress during the hull split, and combining this approach with a full irrigation just prior to harvest also resulted in overall less postharvest tree water stress. The full irrigation just prior to harvest did not increase barking injury, and hence it appears that moderate water stress can be imposed during hull split without having to balance the dangers of excessive stress barking injury.

Conclusions

This was the first year of this project, and even though the only clear effects that were observed were the expected beneficial effects

of a reduction in hull rot strikes, firm conclusions about the potential benefits of hull splits Regulated Deficit Irrigation (RDI) will not be possible without further study. However, one observation that was consistent across most sites this year is that many almond growers are already managing irrigation as a deficit level, at least as measured by SWP. This is a similar result to that found in a 1993 survey of California prunes orchards, and it suggests that some form of RDI management has already been found by growers to be an effective tool in almond orchard management. With further research we should be able to identify the appropriate target levels of SWP to control hull rot and improve the economic and horticultural performance of almond orchards, and also to recommend the irrigation strategies that will accomplish these targets.