

Improving Fruit Set and Yield of 'Hass' Avocado with a Bloom Application of Potassium Phosphate or Potassium Phosphite Alone or in Combination with Boron or Urea

Carol J. Lovatt

Associate Professor, Department of Botany and Plant Sciences, University of California, Riverside, California

Introduction

Flowering and fruit set of the 'Hass' avocado occur predominantly at a time of low root activity, reduced transpiration, low photosynthesis, and low temperatures which negatively impact flower opening, pollination, fertilization, and fruit set. As bloom progresses, there is increased competition with new developing vegetative shoots at a time when roots are still inactive so the competition for water and mineral nutrients becomes more intense. Singularly and in combination, these factors reduce fruit set.

The main objective of this project is to improve fruit set and yield in the 'Hass' avocado by supplying nutrients that might be limiting pollen tube growth, ovule viability, fruit set, and yield directly to the developing flowers at the time they are most needed but are not adequately supplied by the roots. The specific objectives are: *(i)* to test in a well-replicated field trial the results of preliminary research suggesting that a single application of urea or boron to the canopy during early bloom of the 'Hass' avocado will increase yield and net return to the grower over untreated control trees at the 5% level in combination with potassium phosphate or potassium phosphite; and *(ii)* to determine if canopy-applied potassium phosphate or potassium phosphite are beneficial singularly in avocado production; and *(iii)* to disseminate the results of this research to avocado growers through talks to growers and publications in grower magazines and the California Avocado Society Yearbook.

The project will determine the efficacy of canopy applications of potassium phosphate or potassium phosphite alone or in combination with low biuret urea or boron during early bloom to increase yield and net dollar return of the 'Hass' avocado. In addition, the project will demonstrate whether or not foliar application of N, P, K, and B is a more cost-effective management strategy than making a spring application of these nutrients to the soil. In addition, our research might provide an alternative to using boron canopy sprays in orchards that have high levels of boron in the leaves.

Procedures

To save money, this experiment is being conducted at the same two sites employed in the boron/urea trial: one owned by Limoneira Co. in Santa Paula, California, and one owned by Agrispec in Rancho California, California. These treatments serve as the controls to determine if potassium phosphate and potassium phosphite alone or in combination with boron or urea are superior in increasing yield than boron or urea.

Trees will receive a canopy spray of 30 g Solubor in 4 gallons of water/tree (all 4 gallons will be applied to the bloom and foliage to thoroughly cover the tree) or 475 ml Unocal PLUS in 4 gallons of water/tree in combination with potassium phosphate at Limoneira in Santa Paula or potassium phosphite at Agrispec in Rancho California, both at a rate of 30 g P_2O_5 and 20.4 g K_2O per tree. In addition, a set of trees will receive only the potassium phosphate or potassium phosphite, respectively.

Forty spring flush leaves from non-fruiting terminals will be collected at chest height around each data tree in September for nutrient analysis. The leaves will be immediately stored on ice, taken to UCR, washed thoroughly, oven-dried, ground, and sent to Albion Laboratories for analysis of total nitrogen and boron.

Harvest data will include total lbs. of fruit/tree and the weight of 100 randomly selected fruit/tree, which will be used to calculate packout per tree, evaluation of internal fruit quality, and a cost/benefit analysis of each treatment.

Progress

The project is on schedule. Leaf analyses for the two sites have been completed but not statistically analyzed. The Rancho California site will be harvested the first week of April, 1995, the Santa Paula site in July, 1995. The canopy applications for year two of this project have already been made at Rancho California, where the bloom is more advanced, and will most likely be made at the Santa Paula site the first week of April, 1995, depending on the weather.

We will need to combine the phosphate versus phosphite treatments at one site next year. We are looking for a grower cooperator.