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Improving Fruit Set and Yield of the 'Hass' Avocado with Potassium Phosphate or Potassium Phosphite Applied **During Bloom**

Continuing Project; Year 3 of 4

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Benefit to the Industry

At the end of this research, we will be able to tell avocado growers the optimal potassium and phosphorus fertilizer formulation(s), best application technique (soil vs. foliar), and a time of application based on the phenology of the tree to use to increase fruit size, cumulative yield and reduce alternate bearing.

Objectives

The main objective of this project is to improve yield in the 'Hass' avocado by supplying nutrients that might be limiting during fruit set due to competition between individual setting fruit and between setting fruit and developing vegetative shoots at the time they are most needed but are not adequately supplied by the roots or from reserves in the leaves or branches.

In this project we are compare the efficacy of applying potassium phosphate versus potassium phosphite to the canopy of 'Hass' avocado trees during bloom to increase yield and net return to the grower in comparison to trees receiving potassium phosphate or potassium phosphite to the soil via irrigation.

Experimental Plan and Design

The research orchard is located in Somis, California. The trees are 11-yr-old 'Hass' avocado on Duke 7 rootstock. The experimental design is randomized complete block with 20 individual tree replicates per treatment. All treatments are being applied at the

cauliflower stage of inflorescence development. This stage of inflorescence development was determined by Salazar-Garcia et al. (1998) to be the time of gametogenesis, i.e., pollen, ovule, and egg formation and confirmed through field research to be the optimal time to apply foliar nutrients (Jaganath and Lovatt, 1995) to improve fruit set.

Treatments are the following: (1) control; (2) phosphourous acid based fertilizer, 0-28-26, at 2.86 quarts/acre to the soil; (3) phosphoric acid based fertilizer, 3-18-18, at a rate of 4.44 quarts/acre to the soil; (4) foliar-applied phsophorous acid based fertilizer, 0-28-26, at a rate of 2.86 quarts/acre; and *(5)* foliar-applied phosphoric acid, 3-18-18, at a rate of 4.44 quarts/acre. All treatments are applied at rates that provide the same amount of P and K per treatment (1.6 Ibs $P_2O_5$and 1.6 Ibs K_2O per acre). We also tested soil and foliar applications of potassium phosphite, 4-30-8, keeping the N and P levels similar to the potassium phosphate, 3-18-18. Foliar applications are made with a "Herbie" sprayer to simulate helicopter application.

Forty spring flush leaves from non-fruiting terminals are collected at chest height around each data tree in September for nutrient analysis. The leaves are immediately stored on ice, taken to UCR, washed thoroughly, oven-dried, ground and sent to Fruit Growers' Laboratories for analysis of potassium, phosphate and/or phosphite, and all other nutrients, to make sure no other essential nutrients are limiting.

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

All data will analyzed for significance at P(0.05 by analysis of variance and repeated measure analysis using SAS.

Summary

We have leaf analyses and yield and fruit quality data for one harvest. The treatments had no significant effect at the 5% level on leaf nutrient status, fruit quality, fruit size or yield. However, total kg fruit per tree and total number of fruit per tree were both numerically higher for trees receiving foliar applied potassium phosphate (3-18-18) or foliar applied potassium phosphite (4-30-8 or 0-28-26) than the control trees. The yields of the trees receiving soil-applied fertilizers were lower. Trees receiving foliar potassium phosphate (3-18-18) or foliar potassium phosphite (4-30-8) produced more fruit (based on both kg/tree and number of fruit per tree) of packing carton size 60 and 48 compared to the other treatments. Trees receiving foliar applied potassium phosphite (4-30-8 or 0-28-26) produced more fruit (based on both kg/tree and number of fruit per tree) of packing carton size 40 and 36 compared to other treatments.

Remember that this is only one year of yield data, it remains to be determined if the trends will be repeated and lead to statistically significant results in future years.