

Nitrogen Fertilization Strategies to Increase Yield of the 'Hass' Avocado

Continuing Project; Year 2 of 6

Carol J. Lovatt
Department of Botany and Plant Sciences,
UC Riverside

Cooperating Personnel: John Grether, Grether Farming Company, Somis, CA

Benefit to the Industry

The research will identify dates for the application of nitrogen fertilizer that will increase cumulative yield and a nitrogen fertilization schedule that will reduce alternate bearing yet maximize cumulative yield. The research results will increase our knowledge of nitrogen fertilization relative to the physiology of flowering, fruit set, vegetative shoot growth, and alternate bearing. This will provide practical approaches for improving fruit set and yield while reducing the potential for nitrate pollution of the groundwater and evening out alternate bearing.

Objectives

The objectives are to 1) increase fruit set and yield of the 'Hass' avocado without reducing fruit size or quality, and 2) test a strategy of nitrogen fertilization to even out alternate bearing, yet maximize cumulative yield for each two-year cycle.

The research tests the efficacy of nitrogen fertilization strategies to increase yield over a standard practice (control) of supplying nitrogen to the soil in small doses spread out over 5 application dates at the rate of 25 lbs nitrogen as ammonium nitrate/acre in late October to early November, late January to early February, mid-April, mid-July, and late August to early September. The treatments are as follows:

- 1) double nitrogen in April for all years of the study,
- 2) double nitrogen in November for all years of the study,
- 3) double nitrogen in both April and November (no nitrogen in February or June) for all years of the study,
- 4) double nitrogen in November going into an "on" year and April for the "off" year,

- 5) double nitrogen in August/September for all years of the study,
- 6) double nitrogen in April for "off years and 3X nitrogen in "on" years,
- 7) double nitrogen in April for "off years and 3X nitrogen in "on" years applied FOLIARLY,
- 8) control as described above, and
- 9) control, standard fertilization practice of Grether Farming Company.

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

Summary

In an attempt to reduce potential pollution of the groundwater from nitrate, it has been recommended that growers apply nitrogen fertilizer to the soil in several small doses spread out over the year. This strategy ignores tree phenology and the possibility that the tree needs more nitrogen at some times of the year than others. Because of lack of basic information on the impact of supplying nitrogen in small doses throughout the year, we undertook, at CAC's request, a 4-yr-long study to determine the positive or negative impact of supplying extra nitrogen to 'Hass' avocado trees during key times in the phenology of the tree. The results of this study clearly showed specific times when nitrogen should not be applied to the tree (mid-February and mid-June) and the times when extra nitrogen increased yield (mid-April and mid-November). The double application of nitrogen in November yielded 201 lbs more fruit per tree over the 4 years. The double application of nitrogen in mid-April yielded an increase of 133 lbs more fruit per tree over the 4 years.

The results of our previous research raised two questions: 1) Would a strategy combining double doses of nitrogen fertilization in April and November result in added increases in yield? or 2) Would a pattern that alternates the double nitrogen fertilization in April and November between "off and "on" years be more effective? In addition, recent results of our research on regulation of flowering suggest that an August/September double dose of nitrogen may enhance flowering and fruit set. Last, but not least, we need to replicate this research in another orchard to determine its general validity for California. In July this year, we will harvest our first crop since initializing our research.