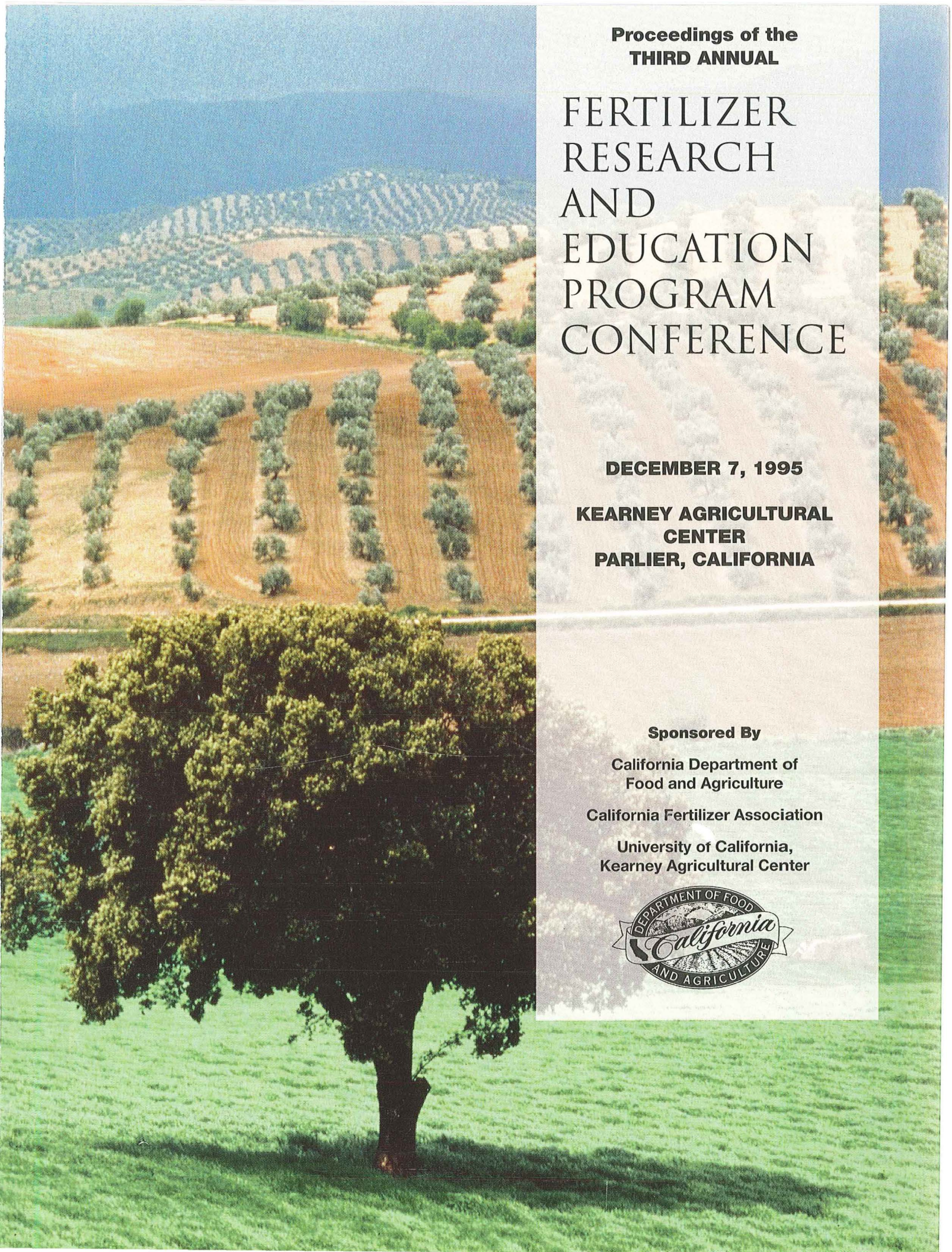

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AVOCADO GROWERS CAN REDUCE NITRATE GROUNDWATER POLLUTION AND INCREASE YIELD AND PROFIT

Project Leader:

Carol J. Lovatt
UC-Riverside
Botany and Plant Sciences
(909) 787-4663

Cooperator:

Christopher D. Taylor
Limoneira Company
Santa Paula, CA

OBJECTIVES

The goal of this research project is to reduce the amount of nitrate entering the groundwater and the amount of boron added to soils from avocado production by providing avocado growers with an economically viable alternative to the use of soil-applied nitrate and/or boron.

The specific objectives are to:

1. Test in a well replicated field trial the results of preliminary research suggesting that a single application of urea to the canopy during early bloom will increase yield and net return to the grower over untreated control trees at the 5% level and will significantly increase yield over trees receiving canopy applications of boron;
2. Determine if nitrogen applied to the canopy during expansion of the spring flush leaves (approximately May 30) increases yield alone and/or in combination with the bloom canopy application of urea;
3. Determine if canopy applications of urea during bloom or during leaf expansion of the spring flush can replace part of the nitrogen annually applied to the soil in avocado production; and
4. Disseminate the results of this research to avocado growers through talks to growers and publications in grower magazines and the California Avocado Society Yearbook.

DESCRIPTION

Treatments were applied to 16 individual tree replicates per treatment in a randomized block design. The trees are mature, healthy commercially-producing 'Hass' avocados on Duke 7 rootstocks at a site owned by Limoneira Co. in Santa Paula, CA. During year-one, voucher specimens were collected to insure that trees could be treated at the same stage of flower development in each subsequent year. At pre-bloom (cauliflower stage), trees received a canopy spray of 30 g Solubor (Solubor is 20.5% boron) in 4 gallons of water/tree (all 4 gallons were applied to the bloom and foliage to thoroughly cover the tree), 475 ml Unocal PLUS in 4 gallons of water per tree or 30 g Solubor plus 475 ml Unocal PLUS in 4 gallons of water per tree. In addition, two sets of trees received a foliar application of Unocal PLUS at the rate of 475 ml in 4 gallons of water per tree when the spring flush leaves were two thirds fully expanded, alone or in combination with a prior bloom application of Unocal PLUS. Forty spring flush leaves from non-fruiting terminals were collected at chest height around each data tree in September. In addition, leaves were collected just before the spring flush urea application and one week after the application. The leaves were immediately stored on ice, taken to UCR, washed thoroughly, oven-dried, ground and sent to the laboratory for analysis of total nitrogen and boron. Harvest data included total lbs of fruit/tree and the weight of 100 randomly selected individual fruit per tree, which were used to calculate packout per tree, evaluation of internal fruit quality, and a cost-benefit analysis of each treatment.

RESULTS AND CONCLUSIONS

The harvest for the first year of this field experiment was May 31-June 1, 1995. No treatment significantly increased the weight of fruit per tree at the 5% level. The bloom spray of low-biuret urea increased the number of larger fruit, those of packinghouse sizes 40 and 36, compared to all other treatments at P=0.06. There were no significant differences in the number of fruit in any other size category. While not statistically different at the 5% level, foliar application of urea to the canopy at bloom in combination with a second application to the spring flush (May) resulted in an average of 3 additional packing cartons (24 lbs or 10.9 kg) of fruit per tree: compare 223 kg fruit per tree to 187 for the control. Application of low-biuret urea to only the spring flush increased yield by 11 kg fruit per tree compared to the control. The boron spray at bloom resulted in the lowest yield, 164 kg fruit per tree. Leaf analyses have not yet been completed. There were no negative effects from any treatment on internal fruit quality.

No conclusions can be drawn at this time. The research needs to be replicated for several years and at a minimum during an "off" year. The potential of bloom and/or foliar applications of nitrogen to increase yield and/or size is promising but requires further investigation. At this point, only the increase in the number of larger-sized fruit (packinghouse sizes 40 and 36) with the bloom application of low-biuret urea approaches statistical significance (P=0.06).