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FRUIT SET AND YIELD IN 'HASS' CAN BE INCREASED BY SHIFTING THE TIME OF BLOOM OR PROPER TIMING OF NITROGEN FERTILIZATION

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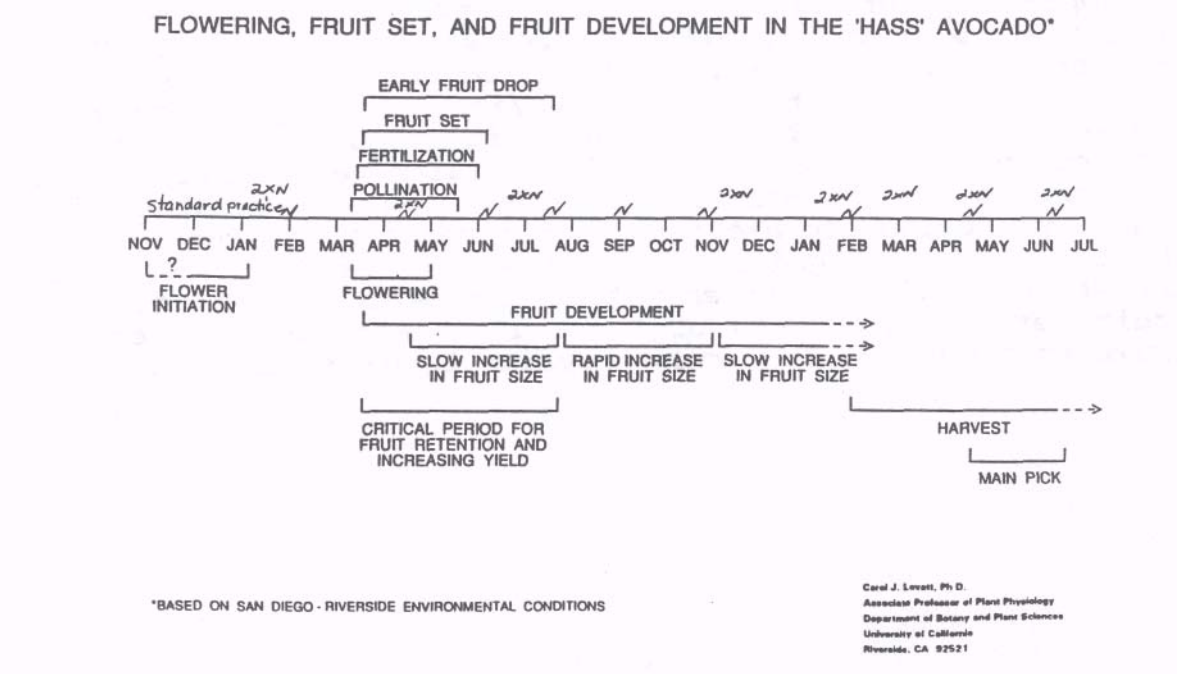
The time at which flowering occurs determines when fruit set occurs. Currently, fruit set is predominantly at a time of low root activity, reduced transpiration, low photosynthesis and low temperatures, which negatively impact flower opening, pollination, fertilization and fruit set. As bloom progresses, there is increased competition with new developing vegetative shoots at a time when the roots are still inactive so that competition for water and mineral nutrients, especially nitrogen which is required in larger amounts than other nutrients, becomes more intense. Singularly and in combination, these factors reduce fruit set and yield. The main objective of the project is to improve fruit set and yield in 'Hass' avocado using two approaches.

The first is to determine the optimal timing of nitrogen fertilization with the goal of identifying those application dates which increase flowering and/or fruit set and yield without a reduction in fruit size. To determine the optimal time of nitrogen fertilization, all trees and the control treatment received 150 lbs N as ammonium nitrate applied to the soil at a rate of 25 lbs N per acre in late October-early November; late January-early February; mid-April, June, mid-July, and late August-early September. In addition, some trees received an additional 25 lbs N as ammonium nitrate per acre in (i) November, (ii) early January, (iii) February, (iv) mid-April or (v) June. Figure 1 illustrates the relationship between key physiological events and the timing of the 25 lbs N per acre (N) or 50 lbs N per acre (2xN) fertilizer application rates. There are 20 individual tree replicates per treatment (6 treatments).



The results of the first year's field study support the hypothesis that some application dates are better than others for maximizing yield (Table 1). Harvest data for the second year of the field study are not available yet. A size pick of about 1/3 of the fruit on the trees has been completed, the rest of the fruit remains to be harvested.

Effect of 50 lbs N (as Ammonium Nitrate) at Key Times in the Phenology of the 'Hass' Avocado

Double nitrogen treatment date	Lbs fruit per tree	
mid-January	83	BC
mid-February	60	C
mid-April	194	A
mid-June	88	BC
mid-November	156	AB
Control	104	ABC

Values followed by different letters are significantly different at $p<0.05$.

Control trees received 25 lbs ammonium nitrate late January-early February, mid-April, mid-June, mid-July, late August-early September, and late October-early November.

The second approach to increase fruit set and yield is by shifting the time of bloom by spraying trees with GA3 during flower initiation (4 to 8 weeks before the beginning of bloom) to delay bloom sufficiently (4 to 8 weeks) so that it will not coincide with root growth and maturation of the spring flush. As part of this project, the anatomical feature

characterizing the point in development at which the bud is irreversible committed to flowering and cannot be reverted to a vegetative shoot is being determined. This information is critical for identifying the optimal time to spray GA in the field to delay flowering, i.e. the GA must be applied prior to irreversible commitment to flowering. GA sprays have been applied to trees induced to flower in response to low temperature under controlled environmental conditions and in the field. A very exciting response to the GA sprays was the dramatic shift in the timing of the development of the vegetative flush relative to that of the flowers in indeterminate inflorescences. GA treatment caused precocious development of the vegetative flush. This shift may be of significant advantage as it is likely that the leaves will be sources rather than sinks at the time of fruit set. The success of these inflorescences in setting fruit that survive to harvest remains to be determined.