

MANIPULATION OF VEGETATIVE-REPRODUCTIVE GROWTH IN 'HASS' AVOCADO WITH PACLOBUTRAZOL

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ABSTRACT

The avocado tree has been relatively less researched than deciduous fruit trees. Two aspects not well understood are assimilate partitioning and the effect of chemically manipulating the vegetative reproductive balance at critical times, using paclobutrazol. Field and pot trials were used to investigate these issues.

Potted 'Hass' trees on 'Duke 7' rootstocks were destructively harvested 111 days after treatment with paclobutrazol soil drenches using concentrations of 0,31, 0,625, 1,25 g ai m⁻² canopy silhouette. Growth was significantly decreased, less branching occurred, leaves were smaller and assimilate partitioning tended to shift from shoots to roots. Starch accumulated mainly in stems. An Electron Microscope study showed starch-packed chloroplasts in leaves from treated trees. Leaf chlorophyll concentration increased and K decreased as paclobutrazol concentration increased. N levels were high in all treatments. Gibberellin concentrations at the time of harvest showed no trends. Precocious flowering and fruit set occurred in some trees, in spite of their small size and lack of complexity.

Six-year-old 'Hass' orchard trees entering an "on" bearing season, were used to evaluate the effect of three times and four concentrations of paclobutrazol foliar sprays during the flowering/spring growth phase. Individual fruit mass from treated trees was greater than control fruit mass. Fruit were rounder and more of the desirably larger count 14 fruit were obtained.

Final yield improved with 1000 and 2000 mg l⁻¹ ai rates and the earliest spray. The proportion of undersized fruit from the latest sprayed trees increased. No treatment differences in ripening, physiological fruit disorders or trends in mineral element concentrations of fruit flesh were found.

Timing of paclobutrazol foliar sprays does not appear to be as critical as initially supposed, but should coincide with the correct phenological stage eg., to temporarily reduce the competitive effect on fruit set of vigorous terminal vegetative bud outgrowth in spring. Concentrations ranging from 1000 to 3000 mg l⁻¹ ai should be used in a similar future trial, which should also have a minimum of 10 trees per replication and be conducted over a minimum of 2 years.

In conclusion, paclobutrazol acts via its ability to reduce assimilate partitioning to shoot and leaf growth by controlling vigorous vegetative growth. In the absence of excess vigour, paclobutrazol has limited application. This was seen in the significant results obtained in the pot trial where growth of the vigorous young trees was controlled, and the inconclusive results in the field trial, where the trees bore 'capacity' crops and therefore did not have vigour to control. Grower ability to judge crop load in relation to potentially excessive vegetative growth at critical periods is a pre-requisite to successful field use of paclobutrazol foliar sprays.