

EFFECTS OF PRUNING ON AUXIN AND CYTOKININ LEVELS AND SUBSEQUENT SHOOT REGROWTH AMONG DIFFERENT GROWTH HABITS OF PEACH

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ABSTRACT

Peach tree (*Prunus persica* (L.) Batch) growth habits that have vertical branches and narrow crowns (Pillar growth habit) are being developed for high density plantings. Previous research indicated that shoots of Pillar contained higher auxin concentrations than did Standard trees. High auxin levels may contribute to strong apical dominance and high auxin/cytokinin ratios in Pillar shoots may contribute to reduced sylleptic growth. It was hypothesized that pruning may differentially affect the hormonal and the branch patterns in these growth habits.

Pillar (KV479) peach scion was obtained from the breeding program at the Appalachian Fruit Research Station and budded to one-year-old 'Lovell' rootstock. Standard ('Harrow Beauty') trees budded to 'Lovell' rootstock also were planted at the Station in Dec. 1998. There were three main effects: growth habit type (Pillar and Standard), pruning (pruned and unpruned), and crown position (upper and lower crown in Pillar and upper crown in Standard). Response variables were length, weight, number and length of lateral branches, and auxin and cytokinin concentrations in current year shoots. Auxin was measured by GC-MS and cytokinins were measured by LC-MS using stable isotopes as internal standards. Measurements were collected in April, May, June, and July of 2003.

Auxin concentrations appeared to be related to shoot growth vigor as well as growth habit. Auxin concentrations were highest in current year shoots of pruned trees and particularly in the top crown of trees with the Pillar growth habit. The auxin to cytokinin concentration was generally greater in current year shoots of Pillar than of Standard trees but significant branch growth occurred in Pillar trees between 58 and 87 days after bud break. This branch growth, despite the high auxin to cytokinin ratio suggests that resource availability (e.g. light) had a coordinate effect with hormones on fruit tree branch growth. The branch growth in the upper crown of Pillar trees most often developed from the oldest, proximal buds on current year shoots. In vigorously growing shoots the proximal buds may have been released from apical dominance due to the distance from the apical meristem.

Pruning may have affected hormone ratios in the current year shoots of the pruned trees by invigorating growth and stimulating auxin production at rates that were specific to the growth habit. Auxin concentrations in current year shoots in both Pillar and Standard peach trees increased as a result of pruning other branches in the crown. However, pruning did not affect cytokinin concentrations. Pruning stimulated growth of the main stem and branches in the upper crown of Pillar more than in Standard trees. Pillar trees consistently produced more auxin than Standard trees. The results therefore suggest that pruning may stimulate growth and branching, even in Pillar trees despite the increase in auxin concentrations in current year shoots.

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