

CHARACTERISTICS AND MANAGEMENT OF PEACH AND APPLE TREE CROWNS

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ABSTRACT

This presentation in the symposium on tree crown form and function addressed horticultural practices which modify fruit tree crowns to facilitate orchard operations and to increase yield efficiency. The effects of cultural practices on hormone relations were considered. Unmanaged apple and peach trees can grow undesirably large so that fruit is borne high from the ground on the outer part of the crown and self-shading can decrease yield efficiency. Fruit trees can be managed with plant growth regulators (PGRs), training, size-controlling rootstock, and root restriction to reduce tree size and self-shading (7).

Application of PGRs such as Prohexadione-calcium can prevent excessive shoot growth and maintain size control in apple crowns by inhibiting gibberellin biosynthesis (3). Training also will reduce tree size and decrease self shading, but pruning can remove apical dominance by reducing auxin concentrations and rapid regrowth (e.g. water sprouts) from axillary or latent buds can occur (12). In apple, dwarfing rootstocks have been demonstrated to reduce auxin in cambial sap and in movement through the scion/rootstock graft (5, 6) and to reduce cytokinin concentration in xylem exudates (4) although other physiological processes, such as reduced hydraulic conductivity, may contribute to the dwarfing effect (1). Peach tree crown size and form can be modified when root systems are restricted by deficit irrigation, physical barriers, or by roots of competing plants. Crown growth may decrease allometrically with reduced root growth (14) but reduced growth may also be associated with stress induced hormones such as abscisic acid and with inhibited cytokinin production (8, 9).

There is tremendous diversity in apple and peach tree crowns and hormones were suggested to play a role in the diverse tree architectures that could be selected in breeding programs (10, 13). Recent research has demonstrated quantitative differences in auxin and cytokinin concentrations in different growth habits of peach trees (11). Trees with less sylleptic branching and more upright growth had high auxin concentrations as the growing season progressed and low cytokinin-to-auxin ratios throughout the season. The effects of cultural practices on endogenous hormone concentrations of peach and apple trees with different growth habits are virtually unknown. Significant progress is being achieved to discover genes that affect morphological traits and to include them in breeding programs for fruit crops (2). Cultural practices which affect tree form will likely have to be adapted to new genotypes and endogenous hormones may be an important link for crown management by both genetic and cultural techniques.

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