Summary and Concluding Remarks

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Understanding canopy development in any crop is paramount to achieving optimum efficiency through improved management. In perennial crops, such as apple, there is a seasonal and a lifetime canopy development pattern that may be influenced genetically, by environmental factors, or by horticultural techniques.

Measuring the canopy of such a complex system requires the components to be identified and segregated into functional units such as shoots and spurs, and then the units must be subdivided into functional types such as watersprouts, vegetative shoots, bourse shoots, shoot leaves, and spur leaves. The total number of such units and the ratio of vegetative to fruiting structures determines the yield efficiency.

Modifications to canopy architecture, such as pruning, training, and application of growth regulators to control vegetative growth, are designed to improve light penetration, thereby increasing the overall fruit bearing potential and improving yield and fruit quality. Thus, light interception becomes the main factor influencing tree productivity. As a result, models of tree efficiency may best be expressed on the basis of yield per unit canopy light interception.

Computer models may help the horticulturist simulate canopy design modifications and study the interactions between a multitude of variables that are difficult to integrate conceptually. In addition, three-dimensional computer-aided design programs may be an approach whereby light distribution patterns can be evaluated for different designs. Computer simulations of canopy growth, measurement, and design modification may be of value in the future.