1. Introduction.

The avocado (Persea americana Mill.) is the only Persea species of horticultural importance. Although indigenous to the tropics of Central America, the avocado is now widely grown in subtropical and Mediterranean regions (Ahmed and Barmore, 1980). Avocado trees are evergreen. Their reproductive strategy is based upon the production of many thousands of perfect flowers in order to produce relatively few, single-seeded fruit. Percentage fruit-set is inherently low, and fruit yields generally alternate between a heavy crop one year and a light crop the next. Compounding the economic cost of variable fruit yields is the high cost of harvesting fruit from trees that may be up to 10 m tall. Industry objectives, therefore, are to produce consistent yields from smaller trees. To achieve this requires a basic understanding of tree growth and how this growth may be manipulated to optimise fruit yields.

Growth in some tropical fruit trees, including avocado, has been studied using the "phenological cycling approach to tree productivity", recently outlined by Cull (1986), and proposed for avocado by Whiley et al. (1988b) and Wolstenholme and Whiley (1989). It is a whole tree approach that separates physiological factors limiting productivity into two groups: those which limit maximum allocation of carbohydrate to productivity mass; and those, such as insect pests and plant diseases, that constrain the normal function of the plant. The rhythmical pattern of shoot growth and hence leaf area generation, and factors responsible for alternate bearing, can limit allocation of carbohydrate to productivity mass. The phenological cycling approach separates analysis of these into two stages. The first considers endogenous factors, and involves detailed phenological observations to establish the "normal" growth patterns determining productivity; the second involves exogenous factors and research that manipulates these productivity determinants.

A structured research strategy, similar to that promoted in the phenological cycling approach, has been adopted in this project. An architectural analysis of avocado tree growth has been made, and used as a framework to compare modular growth in a range of Persea species and cultivars, and to assess the effects of various canopy manipulations on tree productivity.

Different taxonomic classifications have been suggested for Persea. The

treatment of Kopp (1966) has been adhered to here, although Scora and Bergh (1990) have recently suggested modifications to this.