

An approach to the management of sub-tropical tree fruits and nuts based on an understanding of the phenological cycle

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Growers approach to the management of evergreen sub-tropical fruit, nut and vine crops has traditionally followed annual programmes. Such programmes have been developed by themselves or derived from better growers, government agencies or consultants. In the main these programmes are fairly inflexible and reflect research and development on sites which may not represent the individual grower's farm environment or indeed that operating in the given year.

Evergreens are highly responsive to the environment and this response greatly controls the performance of the tree. Patterns of growth are more complex and irregular than that normally experienced in deciduous species. Inflexible management programmes cannot react to changes in environment and the grower usually has no basis on which to make management changes.

A management concept being developed, used and promoted by horticulturists at the Maroochy Horticultural Research Station is based on a knowledge of the desired phenological cycle of consistently high performing trees. Cultural management approaches are aimed at manipulating

the crop in one's own location in an attempt to make it adhere to the desired annual cycle. The developed cycles act as basic models for guiding research programmes, transfer of information to extension officers and finally extending to growers understanding and management of their crops.

The concept involves first defining the phenological cycle in terms of the timing, relative size and duration of growth of vegetative parts, roots, flowers and fruit of high performing trees. The desired cycle is recorded and described in a graphical model. Management of water and nutrient applications, pruning, cincturing and other cultural processes are timed and varied to keep the plant within the pattern of the cycle. It has been shown that cultivars of a given species and individual plants which do not perform well stray from the desired model.

An important concept for growers to understand is that production of various parts of the plant is not only complementary but also in competition with one another. Hence good leaf development is a precursor of good fruit development, but excessive vegetative growth or growth at the wrong period can compete to its detriment. Consequently the manipulation of the vegetative pattern of growth is a major consideration of the model.

In providing an understanding of the management of the tree, the control of carbohydrate formation and its redistribution is portrayed. The role of water, nutrition, cincturing and tree health are described with respect to carbohydrate development. Patterns of plant development are considered with respect to the relative competition between vegetative root flower and fruit growth for its use. This carbohydrate management is ultimately reflected in fruit numbers, development and quality. Research similarly is being directed to monitor and correlate this management of carbohydrate with the cyclic patterns and plant performance.

Cycles have now been developed for avocado, custard apple, macadamia, and lychee and in part for guava, papaw and passionfruit. They are represented graphically in grower handouts and have been presented at a number of grower field days and industry meetings.