

INTEGRATED MANAGEMENT OF AVOCADOS

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After many years of research by many scientists such as Dr. Isaac Adato, Dr. Stefan Kohne, Dr. Nigel Wolstenholme and Dr. Tony Whiley, plant growth regulators (PGRs) are used commercially today in many places of the world. Initial commercial results varied with some successes and some failures. The yield and fruit size was increased and the fruit shape improved. 'Hass' trees and fruit responded exceptionally well.

On the negative side, trees declined with *Phytophthora* and alternate bearing was accentuated. Opportunistic soil applications with collar drenches lead to long term problems and residual action for years.

Commercial yields in South Africa and Australia are regarded as very low and the national average varies between 3 and 6 Tons/Ha. Well-managed orchards yields 20 Tons/ Ha and more under professional management. Overcrowded orchards are a common sight in most avocado producing countries and can be regarded as a major limiting factor.

Conventional production practices can be divided into four general areas:

1. *Phytophthora* management
2. Irrigation Management
3. Fertilizer management
4. Reserve management

When the conventional production factors are in balance and managed optimally, we can increase the production considerably. Two additional factors that have the potential to increase yields are Fruitset Management with PGRs and Canopy Management in the classical pyramid shaped hedgerow.

Fruitset management

PGRs reduce the growth and competition of the terminal growth at a critical stage and increase the survival potential of the small fruitlets. The timing of the PGR spray is important and influence on the number of fruit, fruit size and shape. Generally one application is enough and only in special circumstances will it be necessary for two or more sprays. (*Editors' note: At the current time the use of plant growth regulators are NOT approved for this use in California. CAC/PRC is currently funding research examining the potential of PGRs for California avocados.*)

Overdosing will cause stunting of the trees and growth will be retarded too much. Tree condition will also deteriorate. Obviously an under dosage will give sub optimal results. The application should be done in such a way that the young and green growth of the trees is targeted to get optimal absorption in the critical parts of the trees. Poor and unprofessional application techniques could lead to negative effects. Lignin in the hard wood of the trees will absorb and store the PGR. Release at an undetermined time could be dangerous from a phenological point of view. The volume of application is specific and can help to maintain good results over many seasons. Too high or low volumes of spray will lead to poor results.

Canopy management

The evolution of canopy management was difficult, slow and expensive and it took many years to develop. Variations on the basic models are numerous and form the basis for long

debates amongst growers and scientists. Many growers find cutting trees the most difficult cultural practice to perform correctly and on time. The pruning is seldom done on time and normally done too late.

Three evolutionary stages in the development of the hedgerow system can be identified.

Stage 1. Initially individual limb management was used to manage growth and to supply light to the orchards. Girdling can be associated and factors like windows and rejuvenation forms part of the culture. Some of the manipulation systems give very good yields, but can be regarded as labor intensive. Cultivars like 'Ettinger' and 'Reed' are treated very successfully by limb management on a commercial scale.

Stage 2. This was followed by a long era of tree manipulation and tree removal. Trees were planted 5 by 5m then thinned diagonally to 7 by 7 m then to 10 by 10 m and then to 14 by 14 m. High density plantings were managed by this system and it was practiced until very recently. Good yields were produced but the result of unrestricted growth is that the trees become too big. I believed that tree manipulation and removal was the most economical system for South African conditions. I then did experimental and commercial shaping and canopy management and saw the amazing results of the hedgerow.

Stage 3. The evolution of the hedgerow is exciting and in my opinion the greatest development in avocados for many years. Dr. Isaac Adato from Israel played a major role in the development of hedging as a successful system. Experimental and commercial pruning into hedgerows proved to be highly successful in Israel, South Africa and Australia. The commercial success of projects is such that yields increased dramatically and are stabilized. Alternate bearing was reduced and constant high yields are produced on a commercial scale.

The critical factor was the development of the concept to shape the trees in winter after harvest. Management is done in summer by cutting the spring growth and controlling the re-growth strategically with a PGR. For this process hedging must be done precisely and the timing and control of re-growth is regarded as critical factors. It is important to produce fruiting wood for the next crop and utmost care should be taken to make the correct decisions. The hedgerow makes mechanization possible and the development should be seen as a process and not as an event.

I believe that within the next 10 years, the most successful growers will adapt their orchards to the hedge row system in one form or another.

The integrated management approach

Consistent high yields of quality avocados of the desired fruit size and shape can be produced through the integrated management system. This means that trees should be healthy, well irrigated and fertilized, and with a good exposure to light in a hedgerow management system. Such orchards will benefit from PGR treatments. Both Paclobutrazole and Uniconazole will give good results under ideal production conditions. The choice of PGR will be an economic choice in the future and the results will be primarily dependent on the management of an integrated system.

Summary

The integrated management system has the potential to increase low commercial avocado yields to much higher levels. All limiting factors should be addressed and then hedging and PGR treatments could be used very profitably. Good management will produce good crops.