



# Talking Avocados



The Australian Newsline

Vol 4 Number 1

February 1993



Transplanting Avocado Trees

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## Cover Photographs

The series of photographs on the cover show trees being transplanted on the property of Mr Allan Campbell, Alston Vale.

**Front Cover: Top** - Removing an avocado tree in preparation for transplanting. **Bottom** - New orchard created from transplanted trees

**Back Cover: Top Right** - Overcrowding in the orchard prior to transplanting. **Middle Right** - Trees lopped prior to transplanting. **Bottom Right** - The original orchard fully recovered after one year, with increased lateral growth. **Top Left** - Transplanted tree showing growth after one year. **Bottom Left** - Tree developing a crop one year after transplanting.

## Calendar of Events

### February

- 10 **Richmond Branch of the NSW Avocado Association** - meeting Tropical Fruit research Station commencing 3.00 p.m.
- 11 **Coffs Harbour Branch of the NSW Avocado Association** - meeting Coffs Harbour Catholic Club commencing 7.30 p.m.
- 11 **Tweed Branch of the NSW Avocado Association** - meeting Murwillumbah Services Memorial Club commencing 6.00 p.m.
- 15 **Brunswick Branch of the NSW Avocado Association** - meeting Mullumbimby Ex Servicemen's Club commencing 4.00 p.m.
- 24 **NSW Avocado Association** - Committee meeting Ballina RSL commencing 9.00 a.m.

### March

- 31 **NSW Avocado Association** - Annual general Meeting commencing 10.00 a.m.

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All Print, South Tweed Heads

ISSN 1039-2394

This publication is distributed free to all Australian avocado growers and is available to non-growers for an annual subscription of: Australia - \$14; NZ - \$20; and other overseas countries \$24, Australian currency only.

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*Talking Avocados* is the official magazine of the Australian Avocado Growers' Federation and in conjunction with the Australian Horticultural Corporation is published four times a year (February, May, August and November).

This publication is distributed upon the understanding that the publisher is not engaged in legal, cultural or other professional advice. Opinions expressed by contributors are not necessarily those of the publisher or the Australian Avocado growers' Federation.

# AAGF Board Meeting

A meeting of the Board of the Australian Avocado Growers' Federation Inc was held at Rocklea from the 30th of November to the 2nd of December 1992. Ten Directors and the executive Officer attended. Four guests also attended.

The more significant decisions were:-

## Liaison Meeting With NZ

The AAGF Board is to keep up dialogue with the NZ avocado industry.

## Avocado Marketing Forum

An Avocado Marketing Forum has been set up, it includes members of the AAGF, AHC and avocado industry. The Forum suggested a marketing budget which is to be agreed to by the AAGF and AHC before it can be implemented. Agreement was reached on a budget for the Forum, this was then referred to the AHC.

## Communications

It was agreed that every effort should be made by Board members to pass on information to growers (hence the presence of this article).

## Birdwood Nursery Contribution to Research Fund

Two Gwen trees donated by Birdwood Nursery were sold at the Conference. Resolved to give the proceeds of \$134 to the HRDC for research.

## Review of Conference '92

To allow for smoother planning and running of future conferences it was resolved to elect the President of the AAGF in the third quarter for a term of two years. The President elect is to assume office at the conclusion of the Biennial Conference in May/June of the year following the election.

## Levy Collections

Ms Sue Spearritt joined the meeting representing the Investigations Office of the Levies Management Unit, Commonwealth Department of Primary Industries & Energy.

The following points were raised:

- Levy returns are due March, June, September and December.
- Over thirty different primary industry levies are collected.
- The levies management Unit was aware that the avocado industry was not happy with the present collections.
- The Investigations office would appreciate specific details including names and addresses of growers and market agents who were not co-operating (growers not paying and agents/merchants not collecting).
- The Gold Coast and Sunshine Coast avocado outlets had been visited. Fruit barns and most fruit and vegetable shops told the Levies Management Unit that they bought their avocados from the central markets.

- The Levies Management Unit was prepared to do any audits or work industry required, but they would be charged for it.
- Generally the big wholesalers were co-operating with the Levies Management Unit and supermarkets were providing the names and addresses of their suppliers.

## AAGF Strategic Plan

This plan was discussed and updated (for more details see Talking Avocados, Nov 1992, p10).

## Talking Avocados

The November issue was discussed, the following points being raised:

- Copies be supplied to avocado wholesalers for the first twelve months at no cost.
- That Orf Bartrop be commended for a truly excellent job.
- Confirmed the next issue to contain; Profile of a grower, resolutions of the Board, Conference notes, research from Dr Chris Rigney, and the names of elected officers.

## Promotions

Mr John Pritchard, of QFVG, joined the meeting. He outlined the promotion plan QFVG was implementing on our behalf. The Board discussed with him their individual ideas on promotion. Mr Pritchard was asked to look into promoting the use of avocados for baby food and the elderly.

## Meeting Dates

The Board meets twice per year. Resolved that three meetings per year be held with the mid year meeting being a teleconference, to reduce costs.

## Fruit Processor

A letter had been received from a fruit processor concerning levies. Resolved the processor be advised that the levies are deducted from the grower, and paid quarterly.

## Studentship Paper

A proposal for an avocado industry studentship program, in accordance with HRDC policy, was referred to the HRDC for their consideration.

## Australian Horticultural Growers' Council

Resolved to remain an affiliate of the AHGC for a further year.

## Heart Foundation Tick

Resolved to become a sub-licensee to enable the tick to be used in advertising.

## Integrated Approach to Exports Into Japan

Resolved to discuss with HRDC a QDPI suggestion that the avocado industry integrate its approach with other tropical fruits to counter the fruit fly problem and gain access to export markets such as Japan.

## Integrated Pest Management in Avocados

The Board at a research meeting in March 1992, while reviewing Project AV-201 "Integrated Pest Management", requested that a further Project on this subject be submitted for 1993/94. A submission was received and it was resolved that this submission be forwarded to the HRDC.

## Promotional Envelopes

Following the suggestion from a Mt Tamborine grower that we use promotional envelopes it was resolved that this idea be examined (promotional envelopes were available for growers to purchase some years ago but stocks have long been exhausted).

## Conference '92 Handbooks

Handbooks will be reprinted - price \$20.

## Election of Office Bearers

### President

Mr Robert Mosse - elected unopposed.

### Vice President

Mr Ross Richards - elected unopposed.

### Executive Officer/Treasurer

Member QFVG staff, currently Mr Bryson Dykes.

### Varieties Committee

Mr Don Layers, Mr Ross Richards and Mr Rod Dalton.

### Research Committee

Mr Don Layers, Ms Marion Matthews, Mr Warren Meredith, Mr Dave Duncan and Mr Ross Richards.



## LETTERS TO THE EDITOR

Dear Editor,

Quite by accident I received a copy of the November issue of Talking Avocados from the Federation's solicitor and read it with great enthusiasm. Without wishing to sound immodest I must say that, from a staff member's point of view, it made me very proud of the Federation's achievements over the years that I was Executive Officer.

Slowly (sometimes painfully so) progress was made on issues that will dramatically affect the industry's future. Whether or not everybody agrees with the decisions made is of less importance than the fact that they were made and by the industry's peak representative body. And most importantly with the maximum of investigation and debate.

I congratulate you on continuing to provide your industry with a top class publication and wish everyone associated with your wonderful product good health and happiness.

Yours Sincerely,  
Ross Boyle

# Magnets, Magic Beams And Noises

By Warren Meredith, Woolgoolga NSW

## Machine Vision

Like many other horticultural industries in Australia, the avocado industry is beset by the problem of knowing when an individual piece of fruit is mature and whether the eatable flesh which lies under the skin will be enjoyable when the consumer eats it.

This problem has been considered previously, during a Research Workshop "Avocado Industry Vision of the Future - July 1996", at which the requirements of the industry for that year were expressed as: Harvesting performance has been improved through several initiatives; maximum and minimum fruit maturity harvesting standards have been established by variety and by area; a uniform testing procedure is in place and a hand held, field maturity tester has been developed. (Talking Avocados Nov 1992 p20.)

The testing method for maturity now in use, like many others, requires the piece of fruit being tested to be destroyed in the process. Because variations in fruit quality in trays are quite marked, the test is only valid for the maturity of that piece of fruit and no other. Any imperfections found when cutting up that piece of fruit for the test may be indicative of the rest of the tray, and yet may not. Conversely, if no faults are found in the test fruit this does not always mean the rest of the fruit in the tray is satisfactory.

Avocados can have a lot wrong with them under the skin: granulation, woodiness, discoloration, air gap between seed and seed cover, stings, stem end rot, bruising and lumps. Therefore, a method of testing the maturity of each individual piece of fruit and whether the underlying flesh is sound, is needed.

Already packing line testing of individual pieces of fruit is done with melons in a test for maturity using a probe and it is understood the Japanese have developed a non intrusive test process for apples, and further applications are mentioned below.

The need for the avocado industry is, an automatic, non destructive, non intrusive method of testing each avocado on the packing line for maturity and soundness of flesh, with the automatic rejection and movement from the line of substandard fruit.

There have been a number of techniques developed of late which could help this need, such as testing using: low air pressure, low frequency vibration, electro-optical techniques, near infra-red analysis, electrical properties, nuclear magnetic resonance, X rays and gamma rays.

## Low Air Pressure

Firmness of some fruit can be determined by applying low air pressure to opposite sides of the fruit and measuring the deformity to determine the softness (maturity) of the fruit. This has been done with pears, peaches, oranges and tomatoes.

## Low Frequency Vibration

The vibrational characteristics of some fruits can be determined by their firmness. It is possible, therefore to determine the firmness (maturity) of some fruits based on their vibrational characteristics. This has been done with blueberries and similar small fruits. Similar techniques involve, as well as low frequency vibration, sonic vibration, acoustic response and ultrasonic methods.

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## Progressive thinking is the sign of a progressive industry

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## Optical Properties

This is an electro-optical technique based on the optical properties of the product. A light is shined onto the fruit and equipment measures the various forms of reflectance (fluorescence, phosphorescence and delayed-light emission) from the fruit. The results can give an indication of the quality of the fruit.

## Near Infra-red Rays

"The Magic Beam" developed by the US Department of Agriculture, is currently used for non intrusive measurement of oxygen in the blood of human patients to detect sleep apnea and for the measurement of blood sugar in diabetic patients. The ray will pass through flesh and what it detects is analysed by a computer program, developed specifically for that particular substance.

In the agricultural field this technique is used commercially for the analysis of grains, oil seeds, meats, dairy products, feed and forages.

## Electrical Properties

Numerous studies have been made to determine the electrical properties of agricultural products. Various types of moisture meters are used to test the electrical

properties of the product. Results are not yet conclusive.

## Nuclear Magnetic Resonance

Nuclear magnetic resonance is an application which works well where oil and/or water are present. Used successfully with grains and seeds, this capability to determine defects has not been fully explored for fruit and vegetables.

## X-Ray and Gamma Rays

Short wave radiations such as these can penetrate through most agricultural products. Such techniques have detected bruises in apples, split pit in peaches and granulation in oranges.

## Machine Vision

Machine vision uses various types of camera and is intended to replace human visual inspection. It can incorporate many if not all of the techniques already mentioned.

## Conclusion

To ensure the quality of avocados presented to the public, there is a requirement to eliminate any fruit which the consumer would find unacceptable.

As the industry gradually moves toward an increased use of central packing sheds, there is increased scope to use automatic means of testing and rejecting unacceptable fruit.

The examples of techniques listed above have been used commercially, in many cases, for product available in large quantities at a central location and, of course, where the costs are acceptable.

There is no indication, from the evidence available, that these techniques have been used for avocados.

As the cost of equipment reduces, and it is reducing all the time, and as research continues, then there is more reason for the Australian avocado industry to examine such techniques, to eliminate unacceptable fruit.

There seems to be a need for an R & D project to initially evaluate the latest world research to see how, in theory, non intrusive, non destructive automatic testing of avocados can possibly be done, and then the most likely avenue of research can be examined.

*Thanks to Dr Chris Rigney of the HRDC for the idea and Tony Shorter of CSIRO Division of Horticulture for the technical references.*

## Buy Australian

A brief browse of the AusBuy Guide No. 2 (published by Australian Owned Companies Association Ltd.) raises the question, What is Australian owned and/or controlled?

Certainly not products under the label of Vegemite, Cottees, Billy Tea, King Gee or Drizabone, Tip Top Bread, Kelloggs Cornflakes, Carnation and Sunshine products, Kraft and Coon cheeses, Smiths Potato chips and Findus and McCains frozen vegetables are all foreign owned.

In the Pet Food industry two foreign companies effectively dominate the market with many brands which appear to compete with each other. This is also the case with the Australian Soaps and Detergent market. The two major players are the Unilever and the Colgate Palmolive group.

There are no Australian tinned fish companies. John West and Seakist are UK. Greenseas is USA with Safcol Thailand owned. The AusBuy Guide claims that more than 70% of items sold in supermarkets are foreign owned.

### To sell more avocados in Australia, it is important to convince Australians to buy Australian

Many of the products produced by these foreign companies are in fact manufactured in Australia and no doubt carry a "Made in Australia" label. From the Australian Owned Companies Association Limited viewpoint, foreign investment is not a reward for or a gift to Australia—it is an everlasting liability passed from this generation to the next.

The body claims that all Australians pay the price for foreign ownership, often a high price, always for ever and the price can only be paid with foreign currency. It is true that foreign companies re-invest profits back into Australia but this ultimately only defers and increases the liability. It is like deferring the mortgage payment on a house or farm—it eventually costs more.

Where does this leave the ordinary Australian who is becoming more and more aware of imports and their impact on Australian jobs and economy? In a bit of a dilemma. If you "Buy Australian" you are at least preserving Australian jobs but better still if "Buy Australian" from "Australian Owned Companies" you not only preserve Australian jobs but you also help to retain Australian ownership of its resources.

### They May Look Dinki-di But They Are Certainly Not True Blue

The Australian Owned Companies Association Limited publishes an AusBuy Guide to help you buy from Australian owned companies and to buy Australian made products.

The AusBuy Guide is now in its second edition. AusBuy Guide No. 1 listed the following well known products which are foreign owned and/or controlled.

Product Name	Ultimate Owner	Product Name	Ultimate Owner
Vegemite	USA	Drizabone	UK
Aspro	USA	Rosella	UK
Cottees	USA	Bundaberg Rum	UK
Bushells Tea	UK	Kiwi Bootpolish	USA
Billy Tea	UK	Henry Jones/IXL	USA

AusBuy Guide No. 2 has listed the following well known names which are now foreign owned.

Life Savers	Swiss	Fountain	Japan
Minties	Swiss	RM Gow	USA
Jaffas	Swiss	Selleys	USA
Fantales	Swiss	Sidchrome	USA
Speedo	UK	W A Flick	UK
King Gee	USA	Violet Crumble	Swiss
Shellys	USA	Coolabah Wine	France

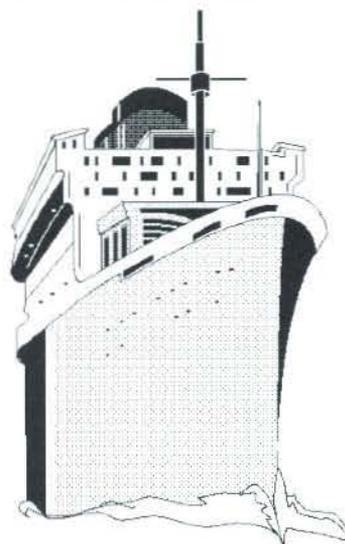
However there are still some famous Australian names which are still Australian.

Akubra Hats	R M Williams
Baxter Boots	Aeroplane Jellies
Wattyl Paints	Hills Hoists
Done Art & Design	Oroton
Capilano Honey	

The Australian wine industry was almost exclusively Australian but, like other strategic industries is being taken over. These are some of the foreign owned labels:

Orland	Montrose
Saxonvale	Coolabah
Wyndham Estate	Morris
Jacob's Creek	Gramps
Craigmoor	Ludlows
Mountarrow	Andrew Garrett
Saltram	Mamre Brook
Stonyfell Metala	Willow Brook
Richmond Grove	Domaine Chandon

\*This is an extract from AusBuy Guide No. 2 and a full copy may be obtained by sending a Stamped Self Addressed Envelope to PO Box 440, Rydalmere, NSW, 2116.



These articles by courtesy of the Bundaberg Region Horticultural, Magazine December 1992

## The Imports Flood

The Australian Bureau of Statistics recently released its Merchandise Imports Report for 1991-1992 which showed the imports of fruit and vegetables rose by 22.5% over the previous twelve month figures. The rise represented a movement from \$382.7 million to \$469.1 million. On closer inspection of these figures it shows considerable increases in some areas.

Imports of frozen vegetables and mixtures of vegetables increased by \$6.6 million while fresh berries imports rose by \$1.9 million to \$11.4 million.

The ongoing problems of the pineapple industry are reflected by the prepared and preserved pineapples increasing by \$9.1 million to \$16.2 million.

After a record high of \$41.0 million in 1988/89, unfermented orange juice dropped to \$8.2 million in 1989/90 and \$9.4 million in 1990/91. However for 1991/92, this figure has climbed again to \$23.2 million. Also unfermented apple juice has increased over the past year by a staggering 125%. This percentage represents an increase of \$7.7 million to \$13.4 million.

Since 1989 the imports of fruit and vegetable has increased by 25% while the overall imports of primary industry imports for the same period had increased by some 16.8%. This represents a movement in 1989 from \$1.926 billion to \$2.250 billion. Although imports of fruit and vegetables declined in 1992 over the 1990 figures there has been, and continues to be, a trend of increasing imports. This flood ultimately impacts on the domestic production and prices.

# Avocado Usage And Attitudes Of Children

From a survey conducted in 1990 by M. Tak, Marketing Services Branch, Queensland Department of Primary Industries

## Introduction

This study was one of several that formed the basis of the project; "Development of a Strategic marketing Plan for the Avocado Industry". It was developed following a previous Australian Avocado Bicentennial Conference where delegates voted marketing as the area of most concern to them at that stage of the industry's development. The research data from these studies was used in the development of current industry promotion campaigns, and the data collected was combined with the other market analysis to provide the basis for the strategic marketing plan which was presented to the National Avocado Conference in July, 1990.

One of the conclusions of the surveys of general consumers in capital cities was that a high percentage of children did not like avocados. Consequently, it was decided to include a special study of children's usage of, and attitudes to, avocados in the research program.

## Research Objectives

The objectives of the research were to:

- discover children's perceptions of the taste of avocados;
- discover the most popular ways of preparing avocados to appeal to the eating habits of children; and
- discover children's general perception of avocados.

## Methodology

The objectives of the study were to investigate the attitudes and perceptions of children to avocados. Because these attitudes and perceptions are not well understood it was not possible to conduct a larger scale survey of children at that stage. Consequently, it was decided to obtain detailed information on these matters from a small sample of children using the focus group technique.

The advantage of this technique is that it allows consumers themselves to express their attitudes towards products. However, it is normally not possible to use focus groups to get a representative view of the whole population.

Four groups of five high-school students in years 7 to 12 were formed with the purpose of stimulating a discussion about avocados in each group. The high schools were selected from two different income areas in Brisbane.

To get a good response from these focus group interviews, the following program was used:

- an introduction to the Marketing Services Branch, QDPI was given;
- information was presented on the history and varieties of avocados and where they are grown;
- a taste test was held and opinions after tasting avocados prepared in different ways was recorded, with more detailed information about taste preferences being noted; and
- a group discussion about the taste test was held to discover popular areas for promotion of the avocado to children.

## Focus Group Formation

The four focus groups were formed as follows:

**Group 1** Five female year 11 students from a low income area in Brisbane.

**Group 2** Three male and two female year 9 students from the same low income area as group 1.

**Group 3** A mixed year 8 and year 12 group of three male and two female students from a high income area in Brisbane.

**Group 4** A mixed year 7 and 9 group of four females and one male from the same high income areas as group 3.

The students were randomly selected by the home economist of the schools. Some students had eaten avocados before and the others tasted their first avocado.

## Results

The results of the focus group discussions are presented here. It is emphasised again that these results may not represent the views of the entire population of children.

In each of the four groups of five children, two or three had eaten an avocado before. This distribution is in line with the results of the Brisbane consumer survey. They eat avocados on toast, as part of a dip, in a salad or sometimes in a dessert. None of the children were pressured by their parents to eat avocados. Some who tried avocado for the first time during the taste test really liked the taste.

To get a feeling for children's reactions towards the different recipes, the following are their major reactions:

### Avocado on biscuit

**Group 1** No salt and pepper? Tastes like nothing (2x)\*. Cracker overrules. Taste like water. Taste like butter. You can't compare it with anything.

**Group 2** Nice taste. Nutty after-taste. Taste like nothing. Like soft texture.

**Group 3** Like it. It is like thick cream - very nice. Not a strong flavour. Nice soft. I only like it with biscuit, don't like it on its own.

**Group 4** Nice taste, first time I've eaten it. Tastes like water, a bit bland. Nice taste. Unique taste. Not much flavour. I don't really like it. Nice and soft taste. Bland taste, but is OK.

### Avocado as a part of a dip

**Group 1** Nice. Nice if you add something. I like it. It is OK.

**Group 2** I like the taste (3x)\*. I can taste the added lemon and cucumber.

**Group 3** It looks like mixed grass. I prefer avocado on its own. I like the dip. It's not bad. Add some fruit. Better than first one (avocado on biscuit).

**Group 4** Better than bland. Still yak! It still got a smooth taste. Still nice. I prefer the dip. Nicer than the first one.

### Avocado as part of a fruit cocktail

**Group 1** I don't taste avocado (2x)\*. Avocado is a bit harder than the banana. This is an original way to consume avocado. This is expensive when out of season.

**Group 2** I Like the whole lot. It is good. It tastes well with the cream.

**Group 3** The passionfruit is nice. Avocado is like the banana, nice and soft. Avocado flavour doesn't have a big influence. First you get first the banana taste and then an avocado after-taste (2x)\*. Avocado goes a bit sour.

**Group 4** I prefer the dip. I don't like this. It is a bit sour. Better than the dip.

### Group preferences

In the final discussion, after tasting the three different recipes, the children were asked to indicate their favourite recipe.

**Group 1** This group had only two avocado consumers. It was somewhat difficult for the non consumers to indicate their most preferred recipe, but overall the dip was by far the most preferred.

**Group 2** One boy in this group ate his first avocado and really liked the taste. None of the children found the avocado on biscuit the favourite way to consume an avocado. Avocado as part of a dip was most popular and the fruit cocktail was second.

**Group 3** Surprisingly, avocado on a biscuit was most popular in this group. They said that avocado on a biscuit was the best way to appreciate the avocado taste. ➤ 7

\* Indicates number of similar replies

# Australian Round-up



For some years, the Brunswick Branch of the NSW Avocado Association has staged their own avocado promotion demonstrating the cooking potential of the avocado. It is held in conjunction with the Mullumbumby Chincogan Fiesta on the second Saturday in September.

The promotion involves the sale of "Avocado Croquettes" which are prepared beforehand by Ned Cooke the chef at the nearby "Willows" restaurant. Ned, along with his helpers, prepares some 3,000 plus of these delicious morsels using approximately 12 tray of ripe avocados.

The croquettes are the size and shape of golf balls with the major ingredient being avocado with various flavours being added, such as oyster, curry etc.

A stall is set up at the same spot every year where power is generously supplied to a two basket deep fryer by the "Empire" Cafe.

The croquettes are cooked in either olive or vegetable oil for about two minutes. They are sold on a small aluminium plate, three for \$1.

Naturally the stall is manned voluntarily by growers and their families. Available also are recipes, pamphlets, posters and other promotional material.

Unlimited quantities of free samples of sliced avocado are also on hand. After meeting expenses, any profit is donated to one of the local charities via the Chincogan Fiesta Committee.

6 ➤ Avocado as part of a fruit cocktail was the second most popular way.

**Group 4** For this group the special texture of the dip made avocado as part of a dip the most popular way. Avocado on a biscuit was the second most popular way and none were very keen on avocado as part of a fruit cocktail.

## Conclusions

Further research involving large numbers of children would be required to obtain statistically reliable information on the attitudes to, and use of, avocados by children. However, the following conclusions maybe drawn from the children interviewed in this study.

Several children found it hard to describe the taste of avocados. Their descriptions included; taste like nothing, taste like water and nutty after-taste. The nutty after-taste

## Weather Watch

Because of the normally bountiful and even spread of rainfall during a year on the north coast of NSW, many growers felt that they had no need to install irrigation equipment. However, some growers are now having to re-think their position because 1992 has proved to be a very dry year.

Crop yields are down in some areas and isolated hail storms have destroyed some fruit.

Perhaps with the lessening of the El Nino effect, more normal weather patterns will return.



The Victorian Department of Food and Agriculture has tightened up its requirements for the entry of fruit fly host produce. The major changes are that declarations and treatments are now required all year, egg fruit no longer require treatment for Victoria and Inspectors will be checking more closely for consignment codes.

The changes have come about because Queensland fruit fly has been detected in some consignments of produce and there was a need to match treated produce with the declarations which cover it.

Anybody sending Queensland fruit fly host produce to Victoria must be registered.

Registration may be for pre-harvest treatments of tomatoes (including cherry tomatoes), capsicums (including chillies) and citrus, as well as apples and pears or post-harvest treatments of all Queensland fruit fly host produce or green harvest declarations for tomatoes, bananas, pawpaws, babaco and black sapote.

is probably the only comparable taste description with other products. Like other consumers, children probably have to try avocado a few times before they can form a firm opinion about the taste. Some effort may be needed to get used to the taste and the texture. However, the interviews suggested that it may be possible to change some negative attitudes towards taste and texture.

Avocado is still regarded by many people as an unusual fruit. Consequently, many parents may not encourage, or provide the opportunity, for their children to eat avocado. Therefore, promotion of avocado consumption by children in such situations may be facilitated by the promotion of recipes using avocados in common food preparations, e.g. in dips which are now probably very commonly eaten and popular with children. This view is supported by the fact

Any growers who are not registered and wish to send produce to Victoria should contact their local DPI office and apply for registration of their facilities and authorisation to sign the declaration forms to accompany the consignment.

When registered, a number is allocated and this number must be placed on each package and on the declaration form accompanying the consignment.

These declaration forms may only be signed by a person whose names and signature appeared on the registration application form. The declaration forms must be completed in triplicate. The original is delivered to the wholesaler with the consignment note, the duplicate put in an envelope and attached to a package in the consignment and the triplicate retained by you for your records.

The consignment code is required to match the consignment to the declaration form.

The consignment code may be a number, a letter or any other distinguishable mark and must be on each carton and the declaration form. Also the consignment code must be different for each consignment until sufficient time has elapsed that there will be no duplication.

Victorian inspectors will only accept pallet loads where the registered number and consignment code are marked on the outer carton only.

For further information on these changes as well as pre-harvest and post-harvest treatments contact your local DPI office.

that avocado as part of a dip was the most popular recipe tested in this study. Initial exposure to avocado in dips could result in subsequent interest by children in consuming avocados in other ways.

## Recommendations

As a result of the study, the recommendations are:

- a large sample size survey should be conducted to obtain statistically reliable information on the attitudes to, and use of, avocados by children;
- to improve children's perception of avocados, promotion in schools should be undertaken; and
- to improve children's avocado consumption, recipes which make it easy for them to get used to the taste and texture of avocados should be promoted.

# Transplant Of Trees Lifts Crop Potential

*From Successful Horticulture, November-December 1992*

During a visit to avocado farms in the United States last year, Allan Campbell realised he had a problem to solve when he got back home.

Trees in some of the orchards he saw in California had grown so close together the only way they could reach sunlight was by going straight up. He described what he saw as a 'cathedral' syndrome—rows and rows of trees with exposed trunks like pillars inside a church.

This lack of sunlight penetration had resulted in poor fruiting, headaches for pickers and potential damage through exposure to high winds. In some of the American

orchards, growers were eliminating trees or pruning them back to achieve greater sun exposure—vital for growth of new wood. Mr Campbell could see that some of his own avocado trees back at Alston Vale on the NSW far north coast, were going down the same track\*.

Mr Campbell was in the US for the world avocado congress and had the chance to inspect avocado farms in California, Mexico and Guatemala. What he saw made him soon realise what had to be done—start removing trees so the branches on those remaining would grow outwards instead of up.

The trees had been planted in a diamond shaped orchard seven years ago in rows seven metres apart with six metres between the trees. The decision was made to pull out every second rows on the diagonal and replant them on another site.

Now, Mr Campbell was dealing with seven year old trees that had been in production for three years, so they were well established. Some were as tall as 7.6 metres.

After the trees ear-marked for removal had been harvested of their crop, the chain saw moved in and they were cut back to a height of 1.8 metres\*. The new sites for them were prepared by digging a hole 0.6 metres deep and 2.7 metres across, the same size as for the excavation in the removal process. Twenty four hours before the transplant, the holes were saturated with water so that they would not dry out quickly when the trees were positioned and soil replaced. Mr Campbell described this as avoiding a 'blotting paper' effect. The new rows were hilled to maximise drainage.

An excavator, hired at \$80 an hour, loosened the soil one metre from the trunk of each tree and 1.5 metres out. The roots were loosened by moving the blade backwards and forwards in the hole\*. The excavator then lifted the trees out from underneath and onto transport with the aid of a sling tied to the limbs.

Mr Campbell estimated the trees were out of the ground from nine to 19 minutes. Lime wash was applied to the chainsaw marks, trunk and limbs for sunburn and weather protection. The new sites were treated for root stimulus and for protection against *phytophthora cinnamoni* (root rot).

The transplanting of 210 trees took place in September-October last year and only two failed to survive the operation. Human error was the reason\*.

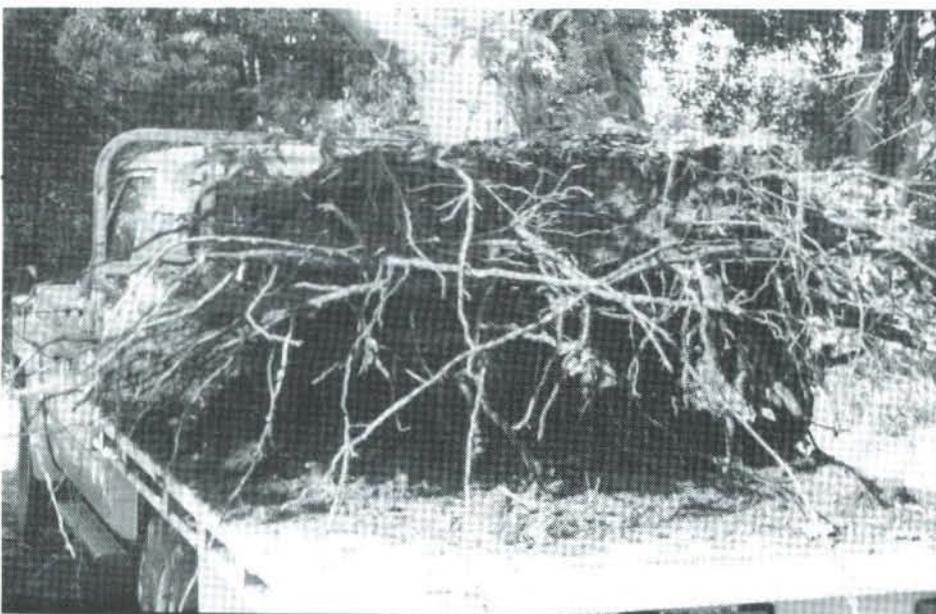
Within six weeks new shoots had appeared and a year later they are flowering and should start to bear a light crop next year\*. Normal production is expected in three years and by normal Mr Campbell means an average of 32 trays, or 208 kg of fruit per tree. This is based on what they were yielding before removal.

Each tree cost an average of \$42 to remove and re-plant, only slightly more than establishing a new orchard with nursery trees, with the added benefit of having the

\* See photograph on either the front or back cover. A description of each photograph is given at the top of page 2.



**Loading one of the avocado trees onto the back of a flat-top truck**



**Transporting a tree from the old orchard to the new**



Lowering a tree into a prepared planting hole using a front-end loader

trees coming into full production much sooner. The amount of \$42 covers all costs from hire of equipment, labour costs, ground preparation, fuel, to planning and administration costs.

The trees in the old orchard, now free of competition for water and nutrients and with the added sunlight, have made great

progress with strong lateral growth. The limbs have adopted a more horizontal than a vertical growth pattern which will simplify harvesting\*.

Mr Campbell has more than 2500 avocado trees at Alston Vale. Some of the Fuerte varieties are being 're-worked' to the Hass variety. This will give the orchard



Using a chainsaw to remove a damaged limb. The damage was caused by the lifting sling.

more later producing trees and hence, a marketing advantage.

## Fightback For Avocado Growers

By John Bradford, MP, Federal Member for McPherson

The Coalition's Fightback package contains many new initiatives and reforms designed to bring about positive change for the nation. Without a doubt our tax reform measures, and in particular the GST, have attracted the most interest.

While it is very difficult to calculate, to the dollar, how avocado growers will benefit there are some very clear advantages for the man on the land in the Fightback package.

Treasury documents show that just three of the current hidden taxes - payroll tax, wholesale sales tax and fuel excise, add \$20 billion to business costs in Australia. Agriculture's share of that \$20 billion is \$1025 million. That is an average of \$8,000 per farm.

While most farmers do not pay these directly, the cost of them is built into all the products they buy. Your fertiliser, chemicals, packing boxes, farm machinery, transport, irrigation equipment etc. all have an inbuilt component to cover these taxes.

The Coalition's plan is to remove these taxes from business to make them more competitive. The money to cover the loss of these taxes will come from a Goods and

Services tax which will apply to most goods and services (although basic foods, including fresh produce, will be exempt).

However, the GST paid by those in business, including farmers, will be fully refundable. This guarantees the complete removal of all taxes and reduces the cost of the inputs purchased by growers.

For example, fuel excise of 26 cents a litre will be abolished and in its place a 15% GST or about 7 cents a litre will be applied. However, if the petrol or other fuel is used for business purposes even the 7 cents will be fully refunded!

Currently growers must pay the full 26 cents excise and can only get a refund on diesel. Only four-wheel drive vehicles are now exempt from sales tax. However, under the GST system no matter what type of car or truck you use in your business the GST paid will be fully refunded.

Any agricultural business with a gross turnover of more than \$50,000 will be required to register with the tax office and will be issued with a GST number. Registered businesses will be required to file a simple return form for each reporting period. The grower can choose to operate

under reporting periods of one, three or six months. Enterprises which have regular cash expenditure may choose to work with monthly or three-monthly reporting periods.

Working out how much you have to remit to the tax office is a simple calculation. Tables 1 & 2 show the process for an orchardist who lodges his returns with the Tax Office every three months.

All tax paid on business inputs attracts a credit equal to the tax paid. This is subtracted from GST collected on sales to get the total amount which must be remitted to the tax office or which will be rebated by the Tax Office where GST paid exceeds GST collected.

All growers paying or collecting GST will need to keep supporting records in the form of invoices. Whatever documentation is used now in such cases can easily be adapted for GST purposes to include GST details.

As food is now zero rated, growers who sell direct to the consumer will not collect GST, but simply claim back what they have spent each month. If growers sell to a wholesaler or retailer they will collect 15%

when they sell the product and it will be the retailer who claims it back from the Government.

It is important to remember that the 15% GST is not "compounded" or added on at each stage, because at each stage the business who pays it can claim it back—this includes the GST paid on fruit and vegetables by the grocer, supermarket or restaurateur.

By acting as tax collectors, producers are able to improve their cash position and gain the short term advantage of having a pool of money earning interest.

It is not expected that the GST will affect the prices growers get for their produce. First, GST will not apply on food so prices will not go up. Secondly, it should be remembered that disposable incomes of all Australians will increase. People will have much more money to spend because of income tax cuts, rises in pensions and unemployment benefits, and huge increases in family allowance.

The GST on other goods and services is expected to result in only a 2.1% CPI increase, so people will be more than compensated for this with the income tax cuts and other benefit increases.

Farmers will also benefit from the changes to fringe benefits tax and capital gains tax, and new depreciation allowances. The Coalition will maintain tax averaging provisions.

Farmers and country people will benefit from our increases to family allowance and we will raise the Isolated Children's Boarding Allowance to \$2,500 and there will be no assets test for the Assistance for Isolated Children Scheme. There will also be significant improvements in the health and education systems.

While it is difficult to calculate the whole effect of all the Fightback reforms on individual growers, independent consultant ACIL developed a computer software package to undertake the calculations and

then undertook a study of four different groups of farmers. These studies found that Queensland beef producers stood to gain 29%.

ACIL then made the software available to the National Farmers Federation for other groups. The cane growers have undertaken a study, which although not yet released, is said to be showing savings of about \$4,000 per farm.

The 1992 figures from a typical avocado farm were input into the computer and the result is shown at the bottom of this page under the heading "What Does The GST Mean In Real Terms?".

While many individuals will benefit from the Fightback reforms, it is also important to keep the "bigger picture" in mind. Fightback is all about restoring growth and confidence in the Australian economy. The Coalition's goal is to create a better future for our kids and grandkids by making Australia a prosperous nation once again.

Table 1.		Input Tax (paid)	Output Tax (collected)
April	Sell 850 trays of avocados through agent at wholesale market for \$14.70/tray (\$12,500), plus \$1875 GST Pay agent's commission @ 10% of \$12,500 = \$1250, plus \$188 GST	\$188	\$1875
May	Sell 300 trays of avocados for \$12/tray (\$3600), plus \$540 GST Pay agent's commission @ 10% of \$3600 = \$360, plus \$54 GST Buy chemicals for \$1500, plus \$225 GST	\$54 \$225	\$540
June	Buy office computer and software for \$4500, plus \$675 GST	\$675	
July	TOTAL SALES: \$16,100 Plus 15% GST collected: TOTAL PURCHASES: \$7610 Plus 15% GST paid: Add up "Input Tax" and "Output Tax" columns. Work out the difference (\$2415 - \$1142 = \$1273 to be paid to the Taxation Office).	\$1142	\$2415

Table 2.		Input Tax (paid)	Output Tax (collected)
July	Buy 490 grafted trees for planting at \$8.50/tree (\$4160), plus \$624 GST. First advance payment from packing company at \$75/bin for 100 bins delivered (\$7500), plus \$1125 GST.	\$624	\$1125
August	Pay pruning contractor \$16,000 (1600 trees @ \$10/tree, plus \$2400 GST.	\$2400	
September	Buy crop sprays for \$2000, plus \$300 GST. Pay telephone account of \$800, plus \$120 GST.	\$300 \$120	
October	TOTAL SALES: \$7500 Plus 15% GST collected: TOTAL PURCHASES: \$22,960 Plus 15% GST paid: Add up "Input Tax" and "Output Tax" columns and work out the difference: (\$3444 - \$1125 = \$2319 to be rebated to grower by the Tax Office).	\$3444	\$1125

## What Does The GST Mean In Real Terms?

On a typical farm of 30 ha growing some 2200 avocado, 200 mango and 500 custard apples trees, on a gross income of \$250,000 the savings as a result of the introduction of a GST would be about \$5500 over the current tax system.

Cost figures for the various expenditures such as fuel, chemicals, packing materials, labour, machinery, maintenance etc. along with income earned from selling output from the farm were input into the computer at the NSW Farmers Association at their Sydney offices and the ACIL software program let loose.

The following calculations do not include savings from the removal of wholesale sales tax because of data limitations and other savings from reforms of Government input suppliers such as AOTC.

Assumptions were made that the value of capital equipment excluding land was \$245,000 and operating costs excluding depreciation and own labour were \$170,000.

Some of the savings that were apparent under the GST are:

Tariff savings on input <sup>1</sup>	850
Payroll tax on indirect input	1000
Inwards freight - no road usage charge	900
with road usage charge <sup>2</sup>	450
Outwards freight - no road usage charge	2800
with road usage charge <sup>2</sup>	1400
Total saving	\$5500

As can be seen, on a profit of \$80,000, a saving of \$5,500 under a GST system represents a profit increase of 7%.

<sup>1</sup> Only includes additional reductions in tariff proposed by Coalition for motor vehicles, textiles, clothing and footwear industries compared to current Government policy.

<sup>2</sup> Structure and level of new road user charges is being considered by current Government and the Coalition are awaiting Government decisions before determining policy.

# Have You Had Trouble Establishing Avocado Trees?

By Peter Young, Senior Consultant/Owner Birdwood Nursery

Just about every grower experiences troubles from time to time establishing Avocado trees.

Why is it that in some years young trees establish with a minimum of effort while in other years heavy losses can be experienced? Importantly, it is possible to have 100% successful establishment every year but growers must follow four important rules during planting and the critical 20 weeks after planting.

1. Rootrot proof trees before planting.
2. Correct day to day irrigation/water management.
3. Proper planting out procedure.
4. Guard against hot and/or cold weather extremes.

## Rootrot Proof Trees Before Planting

Our experience has shown early *Phytophthora* and/or *Phthium* rootrots account for over 95% of losses or stunted tree growth during early field establishment in all avocado districts throughout Australia.

By rootrot proofing clean, healthy nursery trees before planting most establishment problems will be eliminated. The procedure also acts as a good insurance to ensure:

- a. rapid root development into surrounding soil;
- b. maximise use of applied water and nutrients; and
- c. greater resistance to stress with plants more able to cope with extremes in weather conditions.

The steps to rootrot proof your young trees is as follows:

### Step 1

Phosphonate fungicides such as Aliette and MDKP 20% give best results as a direct pot drench just before planting. We have found 5 ml of MDKP 20% mixed in 260 ml of water is best. Any more than 250 ml of liquid per plant will run out the bottom of the planter bag and is wasted.

### Step 2

In replant situations or in areas where rootrot activity is suspected or in new soil situations adjoining established plantings or where surface/dam water is used below existing orchards, use 25 g Ridomil 'G' to 5 square metres immediately after planting before application of surface mulches.

### Step 3

Use foliar sprays of Phosphonate fungicide at 6-8 week intervals for up to 9 months following planting or until trees are big enough to inject, e.g. MDKP 20% at 5 ml/l and thoroughly spray each tree to the point of runoff.

**IMPORTANT** Only healthy trees with active growth and young green leaves will properly absorb sufficient Phosphonate for adequate protection. Try and coincide foliar sprays towards the end of leaf growth flushes.

## Correct Day To Day Irrigation/water Management

It takes an avocado tree 12-20 weeks (3-5 months) to make sufficient secondary root growth into the surrounding soil to be fully established.

**It sounds easy but  
correctly planting a  
tree makes all the  
difference**

Soil moisture content is a very poor guide to young plant water requirements during this period. You must check in the original potting media to determine frequency of watering and how much to apply.

Place a sprinkler low down beside the trunk of the tree so that it receives 3-5 litres of water, more or less, direct on the rootball and immediate soil area.

Watering an area any more than 0.5 square metres around the tree is a waste of water and of little benefit to the tree until it is at least 6-9 months old.

Plants may need to be watered every day in hot weather or only once per week in cool weather.

The larger and healthier the nursery avocado tree, the greater will be its water requirement during establishment.

## Proper Planting Out Procedure

Minimal root disturbance during planting out is the key to reducing transplant shock of the young tree. The best method we have found is:

- a. Dig your planting hole with a shovel about 5-6 cm wider than the planter

bag, lay the plant on its side, cut the bottom off the planter bag.

- b. Look at the roots at the bottom of the container and cut the taproot just above the elbow if it has 'benched' and grown at right angles to follow the bottom of the container. Don't touch or tease out any roots.
- c. Place the plant in the planting hole so that the pot surface is only 2-3 cm lower than the field soil. Slip the sleeve up to and around the plant stem.
- d. Place the soil around the rootball 10-15 cm at a time and compact to eliminate air pockets.
- e. Build a basin 40 cm in diameter around the plant to hold at least 10 litres of water.
- f. Hand water or run irrigation to deliver 10-20 litres of water, depending on dryness of surrounding soil. If the planter bag sleeve is left around the plant stem, the mini sprinkler can be placed inside for 4-6 weeks for direct rootball watering.

**NOTE** Site preparation should be carried out at least 6 months prior to planting. This is another important topic and too detailed to cover here. This topic will be the subject of a future article.

## Guard Against Hot And/or Cold Weather Extremes

Choose the planting time carefully for your growing district. In frost free areas, the best time to plant is from March to July.

If damaging frosts are likely, then plant as soon as possible after the last frost, usually from late September-mid November.

Avoid planting after mid November-March. If you do plant during this period, be prepared to monitor establishment period water requirements twice per day and don't count on having much time off during the Christmas holidays. It only takes a plant's rootball 1-2 hours to dry out completely which may cause tree death or at least severe setback.

**IMPORTANT** Phosphonate recommendations in this article apply to ANVAS avocado nursery trees only where chemicals are not used during the nursery production cycle. Toxicity problems may result if non ANVAS nursery trees have been previously treated with rootrot control chemicals.



## AHC Calls On The Industry Commission To Urgently Address Horticulture Inquiry Terms Of Reference

The Australian Horticultural Corporation (AHC) has called on the Industry Commission inquiring into Horticulture, to urgently address the inquiry's terms of reference for Horticulture's future development and realisation of its potential.

That potential identified by the Horticultural Policy Council includes a five-fold increase in export to \$3 billion, by the end of the decade with major benefits flowing to regional development and employment.

Speaking at public hearings in Melbourne, AHC Managing Director, John Baker said the Commission had undertaken a review without providing assessments, conclusions or recommendations.

"Most importantly the structure and 'culture' of horticulture has not been addressed."

Mr Baker said the draft report does not, as required by the terms of reference:

- examine the production and cost structure of the industry,
- assess the methods used by selected other countries to support horticultural exports,
- identify structural and other issues which in comparison with overseas producers affect the competitiveness of Australian producers in overseas markets,
- report on international and regulatory factors subject to influence by Governments in Australia which are impeding

the development of an internationally competitive industry and horticultural exports.

- advise on courses of action which will raise overall economic efficiency of this industry, and
- assess the effectiveness of the AHC in increasing international competitiveness of the Australian horticultural industry.

Mr Baker said there was also a lack of analysis or recommendations on the effectiveness and improved utilisation of more than \$100 million per annum contributed to horticulture by the Commonwealth and State Governments, and industry.

"Instead the Commission has focused its recommendations on the smallest recipient, the AHC, which receives \$1.2 million per year from Government, funding 20 per cent of its operations and how it (the AHC) can be reduced further and constrained in its operational effectiveness," said Mr Baker.

In his address in Sydney, the AHC's Chairman, Malcolm Irving, said the Corporation did not accept the draft findings that there were no institutional or regulatory impediments to the horticultural industries continuing development.

In previous reports to the Inquiry, the AHC had emphasised it was the structure and "culture" of horticulture which continues to impede the development of an internationally competitive industry including:

- the extreme geographical dispersion of most horticultural industry sectors,
- the small scale of production of most growers,
- the under capitalised packaging/distribution systems,
- the lack of export orientation, and
- the propensity for agri-politics to overshadow the priorities of the industry sector associations

In its submissions to the Inquiry, the AHC indicated a growth potential for the horticultural industry, in aggregate, of at least 10% by value per annum.

"Unlike the Commission, the AHC believes that this potential growth is not going to occur 'spontaneously'," said Mr Irving.

Mr Irving said the Commission's final report should rectify the obvious shortcomings in the draft report. It should provide a positive document, including recommendations of actions which will raise the economic efficiency and consequent export competitiveness of the Australian horticultural industry.

In earlier submissions to the Industry Commission, there was general industry support for the AHC's programs covering strategic planning, quality, shipping, market access, market intelligence on behalf of all of horticulture, together with the specific programs developed and implemented in consultation with the eight specific participating industries.

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## Honey Industry Joins Australian Horticultural Corporation

The Australian Honey Industry officially joined the Australian Horticultural Corporation (AHC) on 1 January 1993 combining with the AHC's existing industries representing apples, pears, citrus, nashi, macadamias, avocados, chestnuts and dried fruits.

The Australian Honey Industry produces approximately 25,000 tonnes of honey each year with exports varying from 8,000 to 14,000 tonnes, depending on production, going to more than 30 countries. The value of honey exports exceeds Aust\$14 million.

The main export markets for bulk honey are the U.K., Germany and other EC countries.

There is a trend to higher value pre-packed honey and currently the main markets for pre-packed honey are South East Asia and the Arabian Gulf. Other exports include Beeswax valued at Aust\$1.3 million.

Previously the marketing and export activities of the Australian Honey Industry were co-ordinated under the Australian Honey Board, established in 1962. However to facilitate the operational change-over to the AHC, the business name "Australian Honey Bureau" has been established and the Bureau will operate from the AHC's Sydney Offices.

There are approximately 800 full-time commercial apiarists in Australia and several thou-

sand part-time and hobby apiarists.

### CROP POLLINATION SERVICES

With the Honey Industry joining the AHC, the industry will now be in a better position to promote its crop pollination services to the fruit and vegetable industry.

A significant number of apiarists provide professional bee pollination services for horticultural crops including avocados. For more information contact the Australian Honey Bureau c/o Australian Horticultural Corporation ph. (02) 357 7000, fax (02) 356 3661.



## South East Asia: A Key Market For Exports

Recent research by the Australian Horticultural Corporation (AHC) shows that Australia's image as a "clean, fresh, natural" country gives it a distinct advantage in South East Asia as a supplier of fresh fruit and food products. Along with the fact that Asian countries are recording some of the world's highest economic growth rates, the region offers great potential for Australian exports of fresh produce.

However John McKay, AHC's Marketing Manager said Australia's window of opportunity is closing in Asia as other Southern Hemisphere fruit suppliers, such as New Zealand and South American countries increase their activities.

Mr McKay said "there is an urgent need to build Australia's profile with Asian consumers and promote the clean fresh image of Australian food products".

"Not only has Australia targeted the Asian region for increased trade, so have other countries," said Mr McKay.

While Australia has distinct advantages as a supplier of food products the research

showed there are disturbing stereotypes of Australian people as anti-Asian, arrogant, loud, rough and sloppy.

Mr McKay said these stereotypes hinder the development of business relationships so Australia needs to change this image.

Commissioned by the AHC on behalf of the Australian Citrus Growers Federation, qualitative research was undertaken in Singapore, Malaysia, and Hong Kong in September 1992 to identify changes in consumer attitudes towards Australia, particularly as a supplier of fruits, and to test concepts for branding of fruits in the Asian market.

The research showed that as a country, Australia generated positive perceptions as a holiday destination where the life-style is relaxed. Associations to the beach, sunshine, farms, orchards, open space and beautiful, natural scenery were prevalent. As a country attracting many immigrants, Australia is seen as a land of plenty, with much potential and opportunities.

These positive perceptions of Australia as a country translated into attitudes of Australian food as clean, fresh and good tasting.

As a result of the research the AHC is working with the Australian horticultural industries to evaluate the benefits and opportunities for the development of fruit exports. This will allow advertising and promotion at consumer level in overseas markets to build a preference for Australian fruits.

The Australian Horticultural Corporation is part of the clean food export committee on the Federal Government's new Agri-Food Council which aims to take full advantage of Australia's reputation as a "clean" food producer.

The AHC also works with a number of organisations to maintain Australia's image as a supplier of safe and wholesome fresh fruit and vegetables by addressing food safety and quality assurance issues. This includes research into the integration of chemical and biological pest control methods.

## Crop Forecasting Developments Benefit AHC Members

The need for more accurate forecasting of production is becoming an issue in horticultural industries as the need to develop domestic and export marketing plans becomes an integral part of Australian agriculture.

The Australian Apple & Pear Growers Association (AAPGA) and the Australian Citrus Growers Federation (ACGF) are taking the initiative to improve their crop forecasting and the benefits are likely to flow on to other members of the Australian Horticultural Corporation.

The AAPGA recently recommended a more objective approach to crop forecasting in light of concerns that current forecasts are of doubtful accuracy. With increasing tree removals and plantings, the task is magnifying in difficulty, but the need to accurately predict production trends is vitally important to the industry.

A preliminary review of various local and international options has led the AAPGA to recommend a system of district or state crop forecasting committees, preferably as an adjunct to existing production-related committees, associations or groups.

Guidelines will be developed including tree selection criteria (variety, rootstock, soil type, etc.), practical aspects of observations and common format documentation. A

major challenge will be the collection of accurate census type information from all production areas. The citrus industry has partly progressed in this direction but a recent ACGF meeting requested AHC input in co-ordination of the various regions. While some Citrus Marketing Boards have developed good group forecasting procedures, all areas need to be involved. Consistent methods are also required to provide comparable information which is regularly updated.

## India - No Market For Fruit & Vegetables

In response to questions from the AHC, the Australian Trade Commissioner in India has indicated that there are virtually no opportunities in the Indian Market at the present time for the importation of Australian fresh fruit and vegetables.

The Indian government maintains a highly restrictive import policy for agricultural products. Only essential foodstuffs in short supply (wheat and grain legumes) are generally permitted entry. India has a surplus of fruit and vegetables and is attempting to develop exports of various lines.

## Horticultural Statistics Working Group

In March 1992 the AHC took over the chairmanship of the Horticultural Statistics Working Group from the Horticultural Policy Council. The Working Group includes members from the Australian Bureau of Statistics and aims to identify the deficiencies in existing horticultural statistics, assess the types of statistics that are required to meet future needs and consider strategies and approaches which will overcome these deficiencies.

To December 1992, progress has included the development of two agricultural form types for use in 1993 for use by businesses with horticultural classes and those without, a proposal for a cutflower/nursery supplement to be used in 1993 and the review of various industry statistics collections forms to rationalise the number of them.

The two agricultural forms developed for use in 1993 are currently being field tested to identify any problems and are expected to result in improved statistics for Horticulture.

# World News



## Research In America: 1986-1991

Information taken from a report to the American Industry Affairs Committee by H. Leonard Francis, Co-ordinator for the Production Research Committee of the California Avocado Society

### Root Rot

#### *Phytophthora cinnamomi*

The major objective of this research was to find a resistant or tolerant enough rootstock to grow in "root rot soil." G755 rootstock, now called 'Martin Grande', was declared resistant to *P. cinnamomi* in 1984, yet performance on this stock has been only moderate to good. Although the use of Ridomil or Aliette for the first two years increased performance by 30-50%, much of the success was in integrating practices that by themselves were only moderately successful: use of Ridomil, or even Terrazole, as well as Aliette; mounding replants; incorporating organic matter with the soil; close control of irrigation. These techniques allowed continued use of Duke 1 rootstock. There are now other very tolerant or resistant clonal rootstocks: Thomas, Barr-Duke, and Torn Canyon.

Trunk injections are the most effective use of Aliette. This technique came from Australia and South Africa, however, a more successful program for injection is needed. Phosphorous acid is the main ingredient in Aliette and it has been determined that phosphorous acid is also used by the avocado tree as a fertiliser.

**Biological Control of Root Rot** Several organisms, taken from root rot infected soils show excellent control of root rot in the laboratory and greenhouse. After successfully increasing the population of two of the most promising organisms, the project is now being moved to the field.

**Breeding Programs** The rootstock and breeding program has been successful with the potential of many future varieties.

The 1317 seedlings from the initial breeding block were screened, and 59 selections with high resistance were retained. Parentages were determined, and crosses of Barr-Duke and Thomas and several with Torn Canyon gave exceptional resistance. These are all selections cloned by the etiolation propagation technique.

With so many highly resistant stocks, there are sufficient selections to try them under various field conditions for their tolerance of salinity, suitability to sandy or clay or high-lime soils, etc. Many of the selections are already out in field trials.

### Crown Rot

#### *Phytophthora citricola*

Because researchers were asked always to consider *P. citricola* when researching *P. cinnamomi*, a great deal has been learned about *citricola*. A partial host list was established: apple, citrus, hops, maple, eucalyptus, tomato, hibiscus, rhododendron, rose, syringa, and walnut. Unfortunately, stocks most tolerant to root rot are sensitive to *citricola*, especially Thomas with Barr-Duke and G755 also being sensitive. Duke 1 is quite tolerant. Because of its combination tolerance to *P. cinnamomi* and *P. citricola*, Duke 1 is probably the best rootstock when used with proper cultural techniques.

More than one strain of *citricola* has been found; one being very virulent. All new selections for root rot resistance must be fully screened for *citricola* resistance.

### Weed Control

With the advent of the loss of simazine, research has shown Goal to be very effective, and it is now registered in America for avocados. Devronal is also registered and is quite effective.

### Molecular Genetics

Genetic determinations of the main avocado varieties has been established which allows seedlings of unknown origin to be analysed to determine their parentage providing their parents are any of the major varieties. This has significance in cross pollination and the potential for breeding or genetically engineering root rot resistance or other desirable traits.

### Variety Breeding

The Gwen is the success of the breeding program, even though it was patented in 1981. Production and fruit quality continue to be the advantages of Gwen, although commercial growers have had major disappointments with production and fruit drop that were not apparent in test plots. There is a need to find what factors make these test plots so much more successful than industry plantings. Gwen still out-produces Hass by as much as fourfold at the test plots where even Hass has decent production.

There are 70,000 seedlings being evaluated as a result of the breeding program. One of the successes is Bob Lamb 122, it is a late market, heavy producer of excellent quality. It looks like a Hass, but it is from a Gwen mother. The Regal is another selection of interest, it is purplish-black, with the shape of a Bacon but with a smooth-thick peel. It is late season and produces well.

### Biological Control of Insect Pests

**Greenhouse Thrips** Five years ago, the major concern of the avocado industry was greenhouse thrips. Scientists investigated an insect from Australia, *Thripobius*, that showed a desire for thrips. The parasitic wasp was imported in 1986 and a rearing technique was established, with controlled releases in late 1988. Although continued observation is necessary, *Thripobius* appears to be a great success. It does reduce thrips populations and has been observed to over-winter, although not always. There is already commercial availability of *Thripobius*. If releases are made soon enough, there is no reason to use chemical control for greenhouse thrips.

### Amorbia and Omnivorous Looper

*Amorbia cuneana* and the Omnivorous looper are the major worm pests. A parasite, *Trichogramma platneri*, has been found which is specific for these two worms. A trapping technique to help growers determine when to release *T. platneri* has been perfected. The fact that *T. platneri* parasitises both of the worms and that traps are available for both pests allows concurrent monitoring and control. Again, no chemical control is necessary if proper monitoring is done. Avocados are one of the very few commercial crops that does not have to be spray for insects or mites.

### Long Time Storage of Hass

During 1987, the industry fully realised the importance of exporting avocados. The most efficient method of shipment is by boat to the Orient and Europe, but boats are slow. Research to find a controlled atmosphere that would allow for longer shipping time has been successful with a controlled atmosphere of 2.5% CO<sub>2</sub> maintaining firmness of Hass for nine weeks.

## Avocado Groves Convert To Flowers

Around the American county of San Diego, avocado and citrus farmers are looking for new crops to try to get more dollars per acre from their land. One trend has been a conversion of citrus and avocado groves to ornamental crops.

Six years of drought have taken a major toll on avocado and citrus growers, and over that period of time a number of them have eliminated all or part of their groves to plant ornamental crops that they believe will use less water. Most of the converted land has been planted in Australian varieties of plants, including eucalyptus, protea, waxflowers and leptos, all relatively drought tolerant crops.

Current agricultural production in San Diego County is over \$1 billion annually. Of this, about half of the dollar volume is ornamentals, representing the highest dollar volume for any single agricultural crop.

The largest amount of acreage, however, is still citrus and avocado.

According to Mike Mellano of Mellano & Company, one of the county's largest flower growers and shippers, there is less water used with the growing of some

ornamental crops. Most of the other production costs are higher with ornamentals, however the gross income per acre on a well run ranch is higher with flowers.

Mellano is looking at the very viable possibility of using reclaimed water in his flower business, an alternative that is being tested, but has not yet proven successful with avocado and citrus groves.

Mellano & Company currently farms about 250 acres of land. All of this land is within the Oceanside Water District which is currently developing a major water reclamation project that will be helpful to the ornamental farmers within that district.

## Free Trade Between North America and Mexico

While most of the American horticultural industry is generally supportive of the North American Free Trade Agreement, there is genuine concern about its impact on specific segments of California agriculture. Some commodities will have good opportunities to expand agricultural exports to Mexico, and some have already benefited. However, there is also the

potential that other crops will face a loss in the market place.

Specifically, avocado growers will continue to be protected as long as there is a truly scientific basis for believing the avocado seed weevil, which infests certain areas of Mexico, is a threat to American growers.

If it has been demonstrated that the Mexican State of Sonora is currently free of the seed weevil. Growers want to make sure that avocados infested with the seed weevil have not been mixed with pest free avocados for shipment to California. Until such assurances can be given, California growers are justified in calling for a quarantine of all Mexican avocados.

## PRIX MARKING SYSTEMS

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# Information Is Only Part Of The Story

*From a paper presented at the 1992 Avocado Conference by T. Campbell, Extension Horticulturist, QDPI, Mareeba*

The avocado industry is concerned about the lack of adoption of new innovations and management practices. An early theme for this conference was that a lot of the technology developed for the Australian avocado industry was not being fully utilised. The initial request for papers asked contributors to ram home the messages to improve adoption. The industries' concern is shared by many rural industries and funding bodies. This is hardly surprising since a lot of resources have been invested in research and development and there will be no returns to this investment if the technology is not being used by the majority of the industry.

This paper examines the level of adoption of the information and technology developed for the avocado industry. In examining causes for poor adoption of some technology it will be argued that it is not just the communication of information that is at fault rather it may be the way the information was developed and promoted. The paper will also identify ways to improve the adoption of new information and has implications for those conducting research and development and for growers who use the results of the R&D to improve avocado productivity and profitability.

## How Good Has Been The Adoption Of New Information?

No empirical studies have been undertaken to determine the level of adoption of innovations by the avocado industry so this discussion relies on the gut feelings of district extension horticulturists. Three innovations were chosen to determine the level of technology adoption by the avocado industry. Each of these issues represents a large commitment of resources by researchers and new opportunities for the industry.

### Ripe For Tonight

Ripe for tonight was the theme for a campaign to ripen avocados using ethylene gas and controlled temperatures. Controlled temperatures give a 'window of opportunity' where the fruit will ripen but fruit diseases are not encouraged. Ethylene gas gives greater control and evenness of ripening. Used together retailers are able to provide consumers with ripe fruit which they prefer.

This technology/information has been promoted to the industry for over six years. Scott Ledger suggests there has been poor adoption. In the Brisbane market he estimates that less than 40% of consignments are ripened and this has occurred only in the last 12 months with two wholesalers

installing ripening rooms. The adoption rate in Sydney has been less than Brisbane while wholesalers in the Melbourne market have recognised the benefits of controlling temperature for disease control, but not the use of ethylene.

Ledger identifies several problems with the adoption of this technology. Firstly there has been no concerted effort to promote a package of information to the people most critical to the adoption of the technology. An information package should have been developed for wholesalers detailing the advantages of using ripening to improve their business. The disadvantages for a wholesaler are easier to identify. Ripening fruit gives the wholesaler limited options for storage and less potential to hold fruit over to get better prices.

Scott Ledger suggests that it is the recent demands by some chain buyers for ripened fruit that has motivated wholesalers into fruit ripening.

### Marketing Study

The Marketing studies described at the last national conference produced a vast amount of market intelligence resulting from studies of consumer attitudes and experiences with avocados in the three major markets. Again there has been little evidence of adoption of the marketing messages developed from these studies amongst growers.

The overwhelming amount and complexity of the information and the lack of a clear unique solution to the problems identified probably made the information very difficult to use.

An informal study of growers in north Queensland revealed that no one had read the reports. Another failing with the adoption of this information is that there is simply no mechanism to use this valuable information except for some generic promotion of avocados. With no co-ordinated marketing of avocados or even a strong regional marketing group able to use the information then much of the information remains unusable.

### Tree Injection

Tree injection for phytophthora control is a much more positive story. The technology has received widespread adoption throughout the industry since the work of Pegg and Whitley. Banks estimates that between 70-80% of mature orchards in south Queensland are injected.

The high level of adoption of this technology reflects the problems growers were experiencing with the root rot and the concerted promotion of trial results by the research team, the chemical company and extension workers such as Marie Piccone. This promotion concentrated not just on the problem and the results possible but also demonstrated effective means of chemical injections. Adoption has been helped by the development of more effective injection techniques by growers.

However the injection is in danger of being rejected by growers. Banks reports a collective groan whenever tree injection is discussed at grower meetings.

Growers appear to be concentrating the injections only on trees with visible root rot symptoms and are suggesting that the labour cost of tree injection is a major problem.

Growers are also concerned about the apparent damage associated with injection holes. In north Queensland many large plantations are rejecting the tree injection technology because of problems with cost and difficulty of arranging labour for limited time periods when the trees can be injected. Growers are seeking and trialing alternative application techniques. The continued high priority allocated to root rot control in grower surveys suggests that many growers do not view tree injection as a long term disease control strategy.

These are just three examples taken from previous avocado workshops where information has not received the widespread or long-term adoption anticipated by researchers or the industry which sponsored the work.

These examples and many others suggest that development of information is only part of the story and there are many other factors which influence its adoption and industry development. There are lessons to be learnt on how we undertake our research and development to improve the usefulness of the information, and lessons for the avocado industry, which may need to work harder to use the information available to improve farm profitability.

## Lessons For Research And Development

Problems exist with information transfer for the avocado industry and the rapid adoption of new technologies. To ensure the adoption of information there has to be greater attention to appropriate technologies, the diffusion of innovations and the avocado production and marketing system.

## Technology Must Be Appropriate!

Avocados are now a mature industry. In a new or rapidly expanding industry, growers are often hungry for new information, are very willing to adopt it. They have a greater reliance on external groups such as QDPI for information. As an industry matures the need to change is much more difficult to recognise. Financial, social, practical and time constraints make it difficult for a grower to either seek, or adopt, improved farm practices.

In the avocado industry much greater attention must be paid to helping growers recognise problems on their own farms. The benefits, particularly financial benefits, of a change of practice must be more clearly demonstrated. In this situation demonstration plots and financial models are much more important to help develop the desire for change.

Some information is given to growers in the "raw" form. Greater effort should be taken in developing techniques so that growers can readily adopt the information into their own farming system. The adoption of tree injection was greatly improved once a farmer developed an improved injector.

Those involved in R&D should be facilitating these developments and promoting them to the industry. There should be greater emphasis on decision making packages and practical demonstrations which help growers learn how to use new information.

Attention must be paid to ensuring that the industry has the means to adopt new technology. Labour availability particularly on small family farms and the high cost of labour on large farms is a major constraint to adoption of new innovations. Much of the marketing information developed for growers now appears inappropriate because growers are not large enough or organised enough to use it.

An appropriate technology is one which growers want to use, know how to use and have the means to use.

## Technology Transfer

It has been long accepted that information transfers rapidly from one farmer to the next and that new technology is rapidly diffused through the rural community. Using this model the promoters of a new technology actively interact with innovators or industry leaders to develop and test new techniques believing that the rest of the industry will rapidly follow.

This concept is fine for simple technologies where the results are easily observed and replicated. However in avocados the technologies now being required by industry

are complex, difficult to implement and the results not easily seen.

Also the avocado industry is a competitive one and information of real commercial benefit is slow to pass from grower to grower. In other industries emphasis in dealing just with innovative farmers has seen the development of technologies that are just inappropriate to the majority of growers.

To rely on spontaneous diffusion for the transfer of innovations does not seem appropriate for the avocado industry. A much more active communication plan is needed for widespread adoption of a technology and the information may need to be refined and communicated in a different way for each group in an industry.

## Look At The System

For new technologies to be used effectively by an industry, the information cannot be viewed in isolation, it must be integrated into the production marketing and social system of the industry. Promoting a change in the ripening system of avocados will not be successful if the fruit wholesalers can only see the disadvantages of the system and lose their control of marketing the product. Before a technology is developed and promoted its effect on the system should be investigated to ensure that all constraints to its adoption are addressed.

## Lessons For The Industry

The overall lesson for the industry is that there is a lot of information that potentially can improve the productivity and profitability of avocado farming. However information often needs modifying, may be complex and difficult to use, and is not always well communicated to growers.

The industry has already taken a number of initiatives to overcome these problems. It sponsors conferences, it has an industry newsletter and has co-operated with HRDC to identify industry problems and sponsor projects which address these needs. However, the challenge still remains to get a lot of information adopted by the industry.

Avocado growers may need to follow the example of other industries such as the mango and tobacco industries which have been able to improve the demand for new information and the adoption of technologies through the use of farmer groups. The participation of growers in these groups has improved the technology available to them because they have been able to define their real information needs and how they want the information presented. In small groups growers have been able to discuss new technology, discuss its usefulness and find ways to overcome constraints to adoption.

Many horticultural groups though do not reflect these advantages. Often they are char-

acterised by poor member participation and a feeling of frustration rather than achievement. The challenge for avocado growers will be to form successful groups to get the advantages which groups can offer.

Successful groups have clearly defined goals and are structured to allow good communication and participation. One grower group in north Queensland, Shepard Australia has been trying to guarantee its success. As a group, members have identified their goals (to develop crop forecasting, quality management, improved advertising and promotion, a united approach to marketing, communication between growers to improve productivity particularly fruit size).

Encouraging every members' participation and commitment is more difficult to achieve, but is just as important for helping a group achieve its objective. Shepard Australia has tried to make their group work better by learning from previous good and bad experiences with groups.

A set of ground rules were developed by the group at their first meeting—follow a constructive line, no negative attitudes. Meetings should be on time and not go over time—2 hr max. No small group or individual to dominate the meeting—a three minute time limit on all speakers. The Chairman should have a good control of meeting and stick to agenda. The whole group should be involved. Action is important. Minutes should be sent to group members within a few days of meetings with reminders of who promised to do what.

The Shepard group has benefited from the experience of group facilitators who help involve members and who can use structured processes to identify problems for group action.

This attention to improving group processes is important. In horticultural marketing co-operatives it is interesting to note that as many fail because of poor communication between members and low member participation, as for economic reasons.

## Conclusion

Information is indeed only part of the story but by improving its supply and increasing the demand for it we will see improvements in the Australian avocado industry. The information from research and development groups can be improved by ensuring that the information is appropriate, that it reaches growers in a way that they can use it and that consideration is given to the whole system of production and marketing. Avocado growers also have a responsibility to participate in the development of new technology. Effective grower groups can be formed to facilitate the adoption of good innovations.

# Understanding Growth In The Avocado Tree For Improved Management Decisions

From a paper presented at the 1992 Avocado Conference by A.W Whitley, Senior Principal Horticulturist, Maroochy Horticultural Research Station, Nambour

## Introduction

Environmental conditions due to locality and/or seasonal variability exert the most powerful effect on tree performance. As orchard managers we do have the ability to reduce the impact of those factors which limit yield and our success in this area is largely determined by how well we understand the complexities of tree growth.

The avocado tree is a dynamic system integrating the seasonal activities of root, shoot and fruit growth. Ultimate fruit yield can not be divorced from root and shoot growth activity which must be maintained in balance.

During the annual growth cycle, events occur which have a critical impact on yield. Identifying these events and targeting them for intensive management has the potential to improve yield and fruit quality. This article examines seasonal growth patterns and identifies key events where management can enhance the productivity of the tree.

## Understanding Tree Growth

### Physiology

The consequences of the rainforest evolution of avocado are a shallow, relatively inefficient root system with few root hairs and poor water uptake and conductance. Under sub-optimal soil moisture conditions, excessive water stress may develop in trees resulting in fruit loss during critical stages of development. The roots are also highly susceptible to water-logging and usually die following a short exposure to anaerobic conditions.

Growth in the tree is vegetatively biased, no doubt a feature which assists in competing for light in rainforest canopies. Leaves are adapted to function in shade reaching their photosynthetic saturation point at about 25% of full sunlight. Shoot growth is synchronised in major flushes resulting in a composite canopy with leaves of varying age and efficiency.

Compared with other subtropical and tropical evergreen trees, the life of avocado leaves is short at about 12 months. They have the capacity to store significant quantities of carbohydrates and minerals which are recycled during periods of demand. New shoot growth in spring takes about 40 days to reach the sink/source transition point thus directly compete for resources

with developing fruit during a critical stage of establishment.

Normal flowering in avocado trees is prolific contributing 8% to the total dry matter production of the tree over a full growth cycle. The large number of flowers produced each season (can be in excess of a million) is thought to compensate for the complex but inefficient floral biology, which has evolved to encourage cross-pollination to maintain heterogeneity of the species.

The floral mechanism during flowering is sensitive to temperature and responses vary among cultivars. Flowering increases the effective surface area contributing to water loss from the tree and there is a preferential loss of water from the reproductive organs compared with leaves.

The flowering/pollination process is also sensitive to boron deficiency which occurs in most areas in Australia growing avocados. A shortage of this nutrient reduces the viability of pollen thus reducing fruit set opportunities and leads to misshapen fruit. Orchard yield initially depends on successful floral initiation, flowering, pollination and fruit set and failure in any of these processes has an irreversible and detrimental impact on production which cannot be alleviated by subsequent cultural practices during that season.

### Phenology

Phenology describes the cyclic patterns of growth which occur in trees on an annual

basis. It also gives the opportunity to recognise competitive interactions between the various components of the tree. With most evergreen trees including avocado, strong environmental stimuli synchronise growth and flowering and there is no physiological dormant period.

A typical annual growth cycle of vegetative and reproductive organs of an avocado tree has previously been described (Figure 1). It shows two major vegetative flushes (periods of shoot extension) in a full growth season, each followed by a period of enhanced root growth.

The first vegetative flush begins in spring towards the end of flowering, while the second period of shoot growth occurs over the summer months.

Reproductive growth begins after a short period of semi-dormancy in the tree with flower bud development, anthesis and fruit set (Figure 1).

Flowering is a major event in the avocado tree's phenology, demanding non-structural carbohydrates from current photo-assimilation or storage and mobile nutrients (nitrogen) from leaves. Immediately following fruit set, there is a period of fruit drop. This coincides with the beginning of spring shoot growth.

Phenological modelling of the crop provides a tool which can be effectively used by both researchers and growers. For the researcher it assists in the clarification of the interactive relationships between the

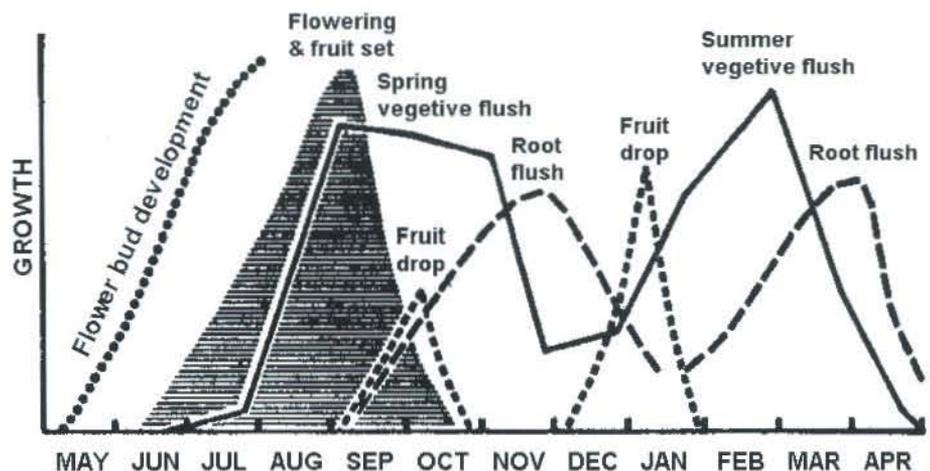


Figure 1. The annual growth cycle in avocados. Growth events are dependent on each other, but all complete for tree resources. Management of this cycle leads to improved fruit yields.

different organs of the tree, and for the grower it defines the time of management inputs on an orchard requirement basis.

While the sequence of biological events in the model remain unchanged under normal conditions, considerable variation occurs along the time scale (horizontal axis) and in the magnitude of the growth response (vertical axis). The time scale is largely an environmental variable and with few exceptions, as crop managers, we can have little influence on changing this scale.

The largest variations in the time of growth events occur between districts however, significant variations between cultivars occur within an orchard, e.g. the flowering times of 'Fuerte' and 'Hass'.

There is potential to influence the magnitude of growth (vertical axis) through applied management strategies. Of particular interest is the control and manipulation of vegetative growth to promote higher sustainable fruit production.

## Management For Higher Yield

Understanding the physiology and phenology of the tree provides the basis for the development and application of yield and fruit quality enhancing management strategies.

## Flowering

Temperature, water, boron status and crop load are the four key environmental and physiological factors which will determine the success of flowering with respect to subsequent fruit set under most conditions. There is little opportunity to modify temperatures in the orchard. However,

mismanagement of irrigation and boron nutrition and late-hung heavy crops can negatively impact on flowering.

Most plants flower in response to stress and the avocado is no exception. Poor irrigation management, particularly during the summer months, often leads to early floral induction and subsequently early flowering when temperatures are less conducive to fruit set. Similarly, nutritional stress such as boron or nitrogen deficiency will advance flowering by as much as 6-8 weeks which in the cooler production areas will lead to crop failure.

Phytophthora root rot is an additional factor in stress management of the avocado. Root depletion through the activities of this disease will lead to water and nutrient stress in the tree thereby inducing early flowering. Hence, control of this disease during the summer is paramount if yield potential is to be achieved in the subsequent season. Chloride toxicity through inappropriate rootstocks and poor quality water will also induce stress in trees and promote early flowering.

In healthy well managed trees, crop load can have the reverse effect and delay flowering. In particular, trees on which the crop has been late-hung may have their flowering delayed by 2-3 weeks thus advantaging fruit set due to warmer temperatures. However, this is a precarious management strategy as miscalculation of the crop size and time of harvest can result in complete failure of the flowering event.

## Reproductive: Vegetative Competition

The success of fruiting during the first 60 days following flowering, depends on the availability of photo-assimilates from storage and current photosynthesis (mature summer flush leaves) and the time for transition from sink to source of the spring shoot growth. However, while initially competitive, spring shoot growth is necessary for the secondary development of avocado fruit.

It has been shown that with severe retardation of spring shoot growth of 'Hass' using Cultar sprays at flowering, fruit yield was reduced compared with other treatments which gave lesser growth suppression. Similar results are reported from mechanical shoot tipping and removal studies with avocados and apples.

Foliar applications of Cultar sprayed at mid-anthesis, reduce spring shoot growth. This results in higher yields and greater fruit size in 'Hass'. Time of spraying is critical in relation to the developing vegetative buds and the concentration chosen will either increase fruit size (without loss in yield) or increase yield (without increase in fruit size).

## Conclusions

The physiological processes of the tree provide an understanding of the mechanisms associated with growth and development. The integration of this information with tree phenology provides a foundation for the development of management strategies to enhance fruit production in the avocado.

# Discount Farm Course For RSL Members

Members of the Queensland Branch of the Returned and Services League of Australia (RSL) have the opportunity to enrol in a course of Farm Business Management at a substantial discount.

The course at the Rural Management Development Centre (RMDC) at the Queensland University of Technology which normally costs \$750 per year, is being offered at \$500. This offer, valid for the two year duration of the course, is being made to assist producers, who are current financial members of the RSL, who have a genuine desire to improve their business management, while trying to cope with the effects of the current downturn in the rural economy.

Producers from all parts of Queensland have attended the course in past years which is specifically designed for practising primary producers.

The RMDC course program will show grazier and farmer students how to prepare their own plans for their own business. These plans aim to prepare the operation for the fluctuating fortunes of the future through a thorough analysis of the farm business itself and the environment in which it is operating.

The course will have a high practical element and show how theory can be used to improve the outlook for farm business. It offers joint enrolment, that is husband and wife, or any other family combination; there are no pre-course requirements, no age limit; assignment work is related to your own property; no exams; personal visits to your farm by tutors; flexible study periods and non-compulsory residential sessions.

The RMDC course program is not only a very practical approach to educating farmers for business, it has now been tested over

nine years and the experiences of the farmers who have undertaken the course are now part of the program.

The Centre has now opened enrolments for 1993. Further information may be obtained from Ray De Vere on 07 864 2756, or write to RMDC, GPO Box 2434, BRISBANE QLD 4001. Please quote your Sub Branch in your enquiry.

# Monitoring - A Management Tool

A paper presented at the 1992 Avocado Conference by C. Bunt and M.F. Piccone, Piccone Horticultural Consultancy, Townsville, Queensland

**'Monitoring - A device used to check, observe or record the operation of a system'.**

## Why Should We Monitor?

Monitoring is a key component in successful management. The flow of inter-linked processes that begins in orchard establishment and ends in successfully providing customers with the product and service they require should all be subject to careful analysis.

If your primary objective is to grow and market avocados to your best advantage, then each process in the growing - harvesting - packing - marketing chain needs to be carefully scrutinised.

As producers-packers-marketers, whatever—you are constantly having to make decisions that have an effect on the profitability of your business. In order to make good decisions more often, you will need accurate information. You will not only need data that relates to the current situation, but also on the likely or actual changes to that situation or process that your decision will bring. Sound management is all about planning your actions, implementing them, checking or monitoring the effectiveness of those actions and taking corrective action as necessary. Improvements or changes need to be measured if you are to put a 'dollar value' to their effectiveness.

The days of 'gut feeling' management are numbered. Systematic gathering of accurate information and careful analysis of that information leads to greater control. Greater control leads to increased efficiencies, therefore lower costs and increased profits.

## What Should We Monitor?

Essentially every activity that may have a bearing on the success of your business should be monitored. In practice the best method is usually to think of the system as a chain of linked segments and tackle each accordingly.

Some examples of what to monitor might include:

### Field Activities

- Climatic activity; rainfall etc.
- Insect activity, be they pests or predators
- Disease incidence.
- Nutrient levels in the soil and the trees.
- Soil water content.
- Bee activity during flowering.
- The effectiveness of pest and disease controls.
- Efficiency of labour - labour costs.
- Crop loadings - crop estimates on a per variety, per block, per grade standard basis.
- Fruit development - maturity levels.

- Harvesting efficiency, e.g. cleanness of picking.
- The crop life cycle.

### Packing Shed

- The efficiency or otherwise of packing equipment.
- Competence of staff - training needed.
- Fruit quality on arrival at the shed.
- The quality of packed product.
- Defect or reject analyses e.g. predominant defects.
- Labour costs e.g. trays per employee per hour.
- Reject percentages; per block - per grower.
- Time and motion studies, efficiency of the shed layout.

### Post-harvest Distribution

- Fruit pulp temperatures prior to, during and after transport.
- Handling efficiencies e.g. time in distribution.
- Potential losses to quality - e.g. post-harvest rots, packaging deterioration, bruising of fruit during transport, efficiency of ripening rooms.
- Requirements of customers, e.g. pack types, delivery schedules, documentation, degree of ripeness.
- Potential losses of control, e.g. unreliability of suppliers, a breakdown in product identification.

### Marketing

- Canvassing of customer requirements re presentation, optimum sizes etc.
- Customer reaction to innovations, new varieties, promotions.
- Fruit quality maintenance in the retail outlets.
- Performance of agents, wholesalers, retailers etc. in maximising your returns.

There would be many more processes or segments that you might add, depending on the nature of your business. When deciding what to monitor, flow-chart all the processes in a sequential manner and nominate the risks or potential for improvement for each. Then decide on an appropriate monitoring technique.

## How To Monitor

There are some general 'rules' on how to monitor. These include;

- Always document the monitoring result. It may be a simple note in your diary or you might use a proforma such as a

Quality Control Record sheet. Regardless, stick to the adage "if it isn't written down it didn't happen".

- If the monitoring involves a specific technique or skill, for instance analysis of leaf and soil samples then the person involved must be thoroughly trained and competent in that technique.
- Wherever possible quantify a result. Use statistical techniques as opposed to "guesstimates". Be objective in your interpretations, not subjective.
- As a manager using this information, ensure you are conversant with the techniques employed in gaining it. The value of your subsequent decision making depends upon it.
- Make sure any data is 'user friendly' and easily retrievable. Be comprehensive but avoid 'wordy' documents. Keep it simple.
- Know when to stop. If the practical or commercial significance of the information is negligible, don't collect it in the first place, or discontinue the monitoring.
- If any equipment is being used, e.g. scales, temperature probes, ensure it is working correctly and properly calibrated.

## Decision Making As A Result Of Monitoring

Within each process or activity, there is likely to be a link to an ideal that meets your business goals or expectations.

For example:

- To achieve a certain number of trays per tree.
- To produce fruit suitable for a particular market.
- To have a maximum time from harvest to packing of twenty four hours.
- To keep your packing costs to "x" number of cents per tray, and so on...

The interpretation you place on any monitoring result and any subsequent actions must reflect your goals, be they short, medium or long term.

When a problem has been uncovered as a result of monitoring always look to the cause of the problem, not just the symptoms. Also, always quantify and define the extent of the problem. Once that is done you can go about solving it.

An example might be overgrading in a packhouse, i.e. too many good fruit in the

reject bins. A common enough problem with a simple enough solution.... perhaps. In truth there may have been several reasons for the overgrading, each could be monitored separately.

- Are the sorters fully conversant with what is acceptable fruit or what is not?
- Do they all know the grade standards?
- Does the shed have any written standards or do they 'change' with the market?
- Can the sorters be expected to 'read your mind' if the standards change?
- Have they received adequate training in grade standard interpretation?
- Has the communication from the sorting supervisor been effective?
- Is the light on the sorting table adequate for good decision making by the sorters?
- Is the machine running too quickly, can they cope?
- Are the sorters stationed correctly?

- Are there too many sorters for the percentage packout, have they been "looking for work"?
- What is the actual percentage of good fruit in the reject bin, is it really unacceptable or are you setting unrealistic goals for your staff?
- Is there one particular defect causing confusion?
- Are all the sorters overgrading or is the problem with one sorter only?

If there is more than one cause, prioritise them. The corrective action should take into account the extent of the problem. Don't under or over-react. Always follow up your decision and actions with further monitoring to see if it has been appropriate.

When a potential improvement has been defined evaluate the potential costs versus the potential gain. Decide then whether it is worth pursuing. Monitoring is equally about refining existing processes and

systems. Problem solving is just part of the benefit.

### Summary

Monitoring in all its guises is an integral part of business management. In isolation it is of very limited value, it is but part of this management cycle of planning - implementation - monitoring and improving.

The key to successful monitoring is to always consider the 'big picture', that is the aims and goals of your overall business operation. Don't be afraid to delegate monitoring duties. As a manager your time is often better spent actioning the decisions made as a result of the information gathered.

Successful, profitable avocado production requires a great deal of effort and a range of specialist skills. I urge you to use monitoring as a management tool to increase your profitability through increased control.

## Fertilising To Maximise Fruit Production

*Paper presented at the 1992 Avocado Conference by A.G. Banks, Senior Extension Horticulturist DPI, Maroochy Horticultural Research Station*

### The Importance Of Correct Fertilising

All crops require careful management of nutrition for efficient and economical productivity. In avocados, the aim of fertilising is to find the balance between tree growth and fruit production. Avocados need to grow (that is produce leaves and wood) to produce a crop. However, if that growth is not carefully managed, fruit production will not be maximised and trees will grow too big too fast. Fertiliser applications must also be timed in relation to the cycle of crop growth so that growth occurs at the right time.

The balance between growth and fruit will vary with different cultivars and in different areas of Australia. For example, we all know the problems of small fruit size in Hass. This problem is worse in warmer, northern climates than in elevated, cooler areas. This problem is not so nearly pronounced in cultivars such as Fuerte or Sharwil. The reason for these differences is related to the balance between the amount of growth required to fill the number of fruit set. Fertilising can be used to manage this balance.

Fruit quality is also strongly affected by nutrition. Deficiencies result in deformed fruit, poor storage and shelf life and variable ripening. Breakdown from fruit rots is also more likely to occur. Deficiencies may arise from insufficient application of nutrients or may be related to excessive growth

being stimulated at the wrong time leaving the developing fruit without sufficient nutrients.

### Are All Nutrients Equally Important In Avocados?

While a range of nutrients are necessary for growth and productivity, nutrients do vary in the way they affect trees. Nutrients can be broken up into two groups.

#### Non Manipulating Nutrients

Phosphorus, potassium, calcium, magnesium, boron, zinc and the other trace elements are all non manipulating nutrients. This means that if they are present in the tree within an optimum range, they will have no effect on how much growth occurs.

#### Nitrogen - The Manipulating Nutrient

In contrast to all other nutrients, if nitrogen is applied to a tree, and there is adequate water and warm temperatures, the tree will be stimulated to grow vegetatively. It can be seen that nitrogen is a powerful tool available to the grower which allows him to manipulate the growth of trees. If used wisely, it can promote growth and enhance fruit production. However, used incorrectly, it can disrupt flowering and fruit set, reduce fruit quality and lead to over vigorous growth and rapid increases in tree size.

### How Do I Apply Nitrogen To Get The Right Amount Of Growth?

There are three aspects that must be considered when applying nitrogen. These are when should it be applied, how much should be used, and in what form should it be applied. Lets consider these in turn.

#### When Should Nitrogen Be Applied?

The article on page 18 described two major growth flushes in spring and summer. For most cultivars growing in most regions, nitrogen should be applied to stimulate the summer leaf flush and not the spring leaf flush. The summer leaf flush fills the developing fruit, builds up reserves for next season's flowering and supports the initial stages of fruit set until the next spring leaf flush matures. If the spring leaf flush is stimulated by nitrogen applications it will compete with any flowering and fruit set occurring at the same time and poor cropping will result.

Where small fruit size is a problem, applications of nitrogen at flowering can assist the old summer leaves which have come through winter to continue to support flowering and fruit set. These applications will also give more spring growth which in turn will be better able to fill the fruit that is set. However it must be realised that extra spring growth will be at the expense of some fruit set (ie. some fruit will be shed) and the

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22 ►

extra growth will lead to trees becoming larger, sooner. Spring applications of nitrogen should not be necessary in temperate and cooler growing areas.

First applications are best made after the second major fruit drop has passed. Applications which stimulate late spring growth will increase the second fruit drop. Difficulties arise when the fruit drop is delayed or late thus delaying fertiliser applications. In cooler areas this can lead to late applications of nitrogen which promote flushing in autumn when early frosts can be a problem. In this case it is important to apply the last nitrogen fertilisers in time to allow trees to harden off before frosts are likely to occur.

The number of applications depends on soil type and climate. In sandy soils or in regions with high summer rainfall, it is best to apply nitrogen in several small amounts. This minimises losses due to leaching. Applications should be made fortnightly to monthly. Fertigation is suited to these situations. In heavier clay soils or where rainfall is less, fewer applications can be made. Traditionally, 40% of the total is applied in late January, 40% is applied about a month later with a final 20% applied towards the end of March. As indicated above, care should be taken, where frosts are a problem, that the final nitrogen application is not made too late.

### How Much Nitrogen Should Be Applied?

Tables giving recommended amounts of nitrogen have been published by most government extension agencies. For example DPI's "Growing Avocados" handbook recommends a total of 150 g of urea for 6 m diameter trees. These amounts assume healthy trees carrying an average crop load. If crop load is heavy and/or tree vigour is lacking and/or previous leaf analysis indicates a deficiency of nitrogen, then amounts of fertiliser should be increased. Observations on Sunshine Coast orchards indicate that amounts can be increased by 30 to 100% if fruit set is heavy enough. Conversely, if crop load is light, or trees are becoming excessively vigorous with high leaf nitrogen levels, then be prepared to reduce the amount of fertiliser applied.

An important part of varying fertiliser rates is to keep good records of how much was applied and what yields were achieved. In this way a picture of tree response can be built up and used for deciding on fertiliser rates in future.

### What Fertiliser Form Should I Use To Apply Nitrogen?

Observations suggest that the easiest and most economical way to apply nitrogen is with urea. It is inexpensive, moves rapidly into the root zone and is quickly taken up

and used by trees. The ammonium form of nitrogen in urea does not stimulate root rot activity. Urea lends itself to application through irrigation systems (fertigation).

Mixed fertilisers can be used and should contain a balance between nitrogen and potassium of about 1:1. When deciding whether to use mixed fertilisers, check soil phosphorus levels.

Often soil phosphorus levels are high leading to chemical unavailability of zinc. It is suggested that unless phosphorus is needed, it is better to use urea rather than mixed fertilisers.

Organic fertilisers offer the benefit of adding organic matter as well as nutrients. Their use is definitely recommended in young trees and in rehabilitating sick trees. However, the breakdown rate of organic fertilisers cannot be predicted and the danger is that if nitrogen continues to be released in association with warm, moist conditions in late autumn or winter, excessive vegetative growth may be stimulated at the expense of flowering and fruit set. For this reason, nitrogen containing organic fertilisers are generally not recommended for use with healthy bearing trees.

### Boron And Zinc - The Problem Trace Elements

Many growers have trouble increasing the levels of boron and zinc nutrients in trees. Boron is important in pollination and early fruit development. A deficiency leads to the characteristic 'hooked' shape of fruit. Zinc is associated with growth areas of trees and a deficiency results in leaf yellowing and a round fruit shape.

The difficulties start with the fact that avocados take up almost all of these nutrients through the root system. Very little uptake occurs through the thick waxy cuticle layer on leaves. Diseased root systems cannot take up nutrients easily which makes control of root rot extremely important if deficiencies of these nutrients are to be overcome.

#### Boron

Leaf levels should be optimum before flowers are initiated in late autumn. Therefore, boron is applied during late summer and early autumn. If leaf levels are deficient or in the lower range of optimum (40-60 mg/kg), two applications should be given; one in February and one in late March.

Solubor (4 g/m<sup>2</sup>) or Borax (8 g/m<sup>2</sup>) is spread evenly over the root zone. If leaf levels are 60-80 mg/kg, only one application is necessary.

Leaf analyses are taken at the end of the summer growth period (usually April in southern Qld). If a boron deficiency is detected at this time, a foliar spray of Solubor (1 g/L) is applied immediately. Follow up in spring with a soil application of Solubor or Borax at the rate given above.

#### Zinc

High soil phosphorus and organic matter levels lead to a chemical unavailability of zinc.

Caution should be exercised in deciding whether to use mixed fertilisers which contain phosphorus. Do not apply super phosphate unless soil phosphorus levels are less than 60 mg/kg. High levels of soil organic matter are beneficial to avocado roots so this poses a problem in ensuring zinc uptake. Applying zinc in a narrow band around the driplines of trees is one way of saturating the soil sites and overcoming the problem. Zinc sulphate heptahydrate is applied at 25 g/m<sup>2</sup> in spring. An alternative to soil applications is the injection of zinc nitrate into trees in the same way that potassium phosphonate is injected for root rot. A quick boost for deficient trees can be obtained by foliar sprays with zinc sulphate heptahydrate mixed at 1 g/L. These are applied in early spring once young leaves have emerged.

### Should I Apply Lime Or Dolomite Each Year To Trees?

Good levels of soil calcium (5 meq/100 g = 2000 g/kg) are beneficial in promoting strong root growth. Good calcium levels in trees (1-3%) are important in ensuring proper development of fruit in the first 30 days of fruit set, and leads to good internal



fruit quality at harvest. However care must be taken in deciding how to apply calcium.

Root rot fungus activity is reduced when soil pH is acidic. This benefit must be balanced against the effect of low soil pH on availability of some nutrients. A good compromise is to adjust soil pH to 5.5 unless soil manganese levels are above 40 mg/kg. In this case soil pH should be raised to 6-6.5.

The addition of lime or dolomite will increase soil pH. If this is continued for too long, soil pH will become too high leading to increased problems with root rot. Leaf and soil analysis should be used to decide if calcium needs to be applied, and the soil analysis used to decide if an adjustment should be made to pH. Gypsum can be used where calcium is required but a change in pH is not needed.

### Conclusion

Nutrition plays an important role in deciding how productive your trees are going to be. Nitrogen is a powerful tool which can be used to maximise fruiting, but just as easily can ruin a trees potential. An efficient fertiliser program can be developed by careful evaluation of what nutrients are needed and applying these at the correct time in relation to the trees cycle of growth.

# A Suggested HRDC And AAGF Studentship Program

### Background

In the HRDC Corporate Plan, mention is made of the need for a studentship plan or similar. The following is a suggested plan, adopted from one, in another industry, which has been running for many years.

### Purpose

The primary aim of this award is to allow colleges, universities and similar tertiary institutions to support students in work on a final year major paper concerning the avocado industry. The intention is for such students to be attracted to horticultural research and give them a lead into, and interest in, the avocado industry.

### Requirements

The sponsoring institution is to place each student, supported through this program, in an environment where any of the culture, harvesting, packing, treatment, transport, marketing, physiology, diseases and pests of the avocado and the avocado tree, are, or can be, studied. The actual paper on which the student is to work must be avocado industry related. The program is to occur in the last year of study prior to the awarding of a degree or similar, in the

student's discipline. It is expected that one student will be chosen by each sponsoring institution. It is the responsibility of the sponsoring institution to develop a didactic program for the students supported by this award.

### Method

The HRDC, in accordance with its policy of awarding studentships, together with the AAGF, will provide an overall total of \$1000 per student from levy raised funds including the matching Commonwealth grant. These funds shall be supplied to the institutions of the successful students.

These funds will be supplied to allow each student to obtain reference material, communicate, travel (with accommodation if necessary), cover any other related costs and produce a paper published to a high standard. At least three copies of the completed paper are to be lodged with the HRDC as well as any copies required by current State and Federal statutory requirements.

### Applications

Applications may be submitted by academic institutions and not by individual

students. The application should consist of a covering letter signed by the principal lecturer requesting support, plus an application of no more than five A4 pages. The application should provide details of the course, scope of the paper, resources available, time available and expected needs of the student. Five copies of the application should be submitted to:

The Grant Administrator, HRDC, Level 14, 100 William Street, Sydney, NSW, 2011,

Please attach any consent forms and appropriate approval forms from your Institutional Review Board or similar body.

This program is available only to sponsoring institutions in Australia and applications must be in English.

### Conclusion

The above is a suggestion only. Because of the small number of HRDC staff available, the onus is on the academic institutions to make the application. Those applications can then be handled in exactly the same way as research bids, and possibly conform to the same dates.

## Agreement With Woolworths On Collection Of Levies

*From Bundaberg Region Horticultural, Magazine December 1992*

Woolworths have agreed to assist Queensland Fruit & Vegetable Growers (QFVG) to collect levies on produce sold directly to its supermarkets.

QFVG Board Member, Mr Col Wedemeyer, said the agreement had been reached with Woolworths executives at a recent meeting in Sydney.

The General Manager of Supermarkets, Mr John Brunton and the National Produce Merchandise Manager, Mr Peter Pokorny, informed QFVG that Woolworths itself was not in the position to collect levies at this stage.

"However, corporate headquarters has already directed State General Managers to provide relevant details on a quarterly basis.

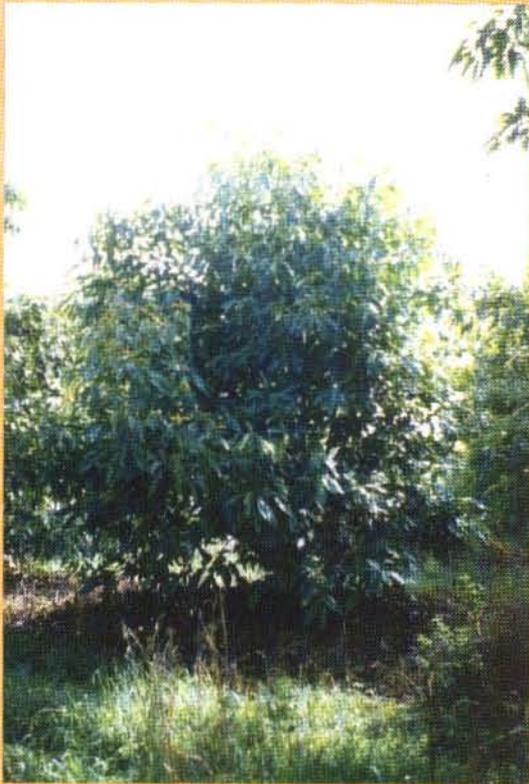
Woolworths has strongly indicated their support for the activities funded by the levies, especially advertising and promotional campaigns.

"QFVG will continue to provide Woolworths with details of its advertising so that the supermarket giant can co-ordinate its marketing campaigns."

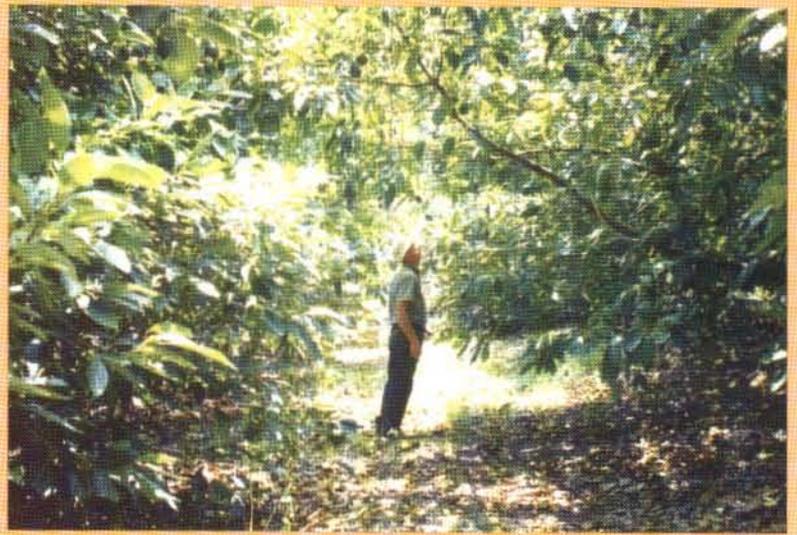
Mr Wedemeyer said that QFVG had thanked Woolworths for its co-operation in making the levies system more equitable.

"Many growers were dissatisfied that they had to pay levies when sending produce to market while others could avoid payment by supplying fruit and vegetables directly to large retailers.

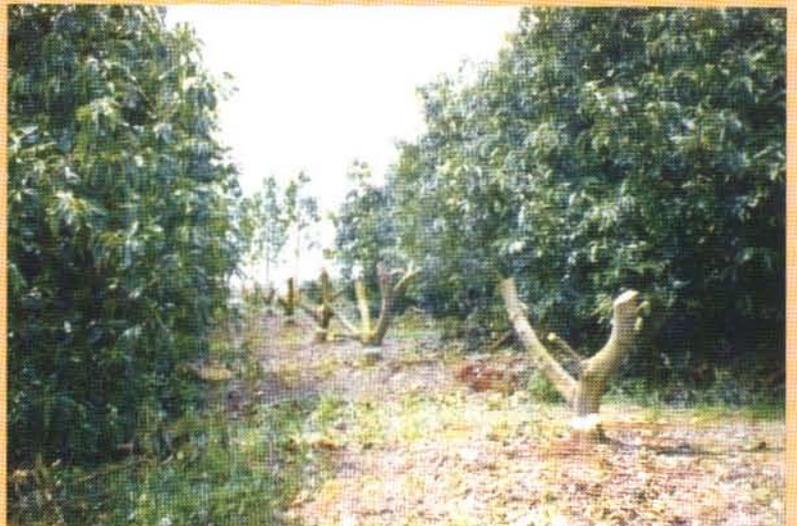
This hole has now, to a large extent, been plugged with the resulting revenue to be used for the benefit of "Queensland's fruit and vegetable growing industry", Mr Wedemeyer said.



**New Tree One Year on**



**Overcrowding in Old Plantation**



**Preparing Trees for Removal**



**Fruit Set One Year On**



**Lateral Growth in Old Plantation**