



The Australian Newsline

Vol 4 Number 3

Talking Avocados



August 1993



**Roger Broadley (left) And Alex Banks At The
Launch Of The Most Recent Avocado Publications**

**In this
issue**

- Review of Avocado Publications
- Seminar On Orchard Pruning
- Four Page QDPI Research Report

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Cover

Front: Roger Broadley and Alex Banks of QDPI at the launch of their most recent avocado publications (article page 8).

Back: Graham Anderson demonstrating his pruning technique using a hydraulic chainsaw attached to a cherry picker (article page 9).

Calendar of Events

August

- 16 Brunswick Branch of the NSW Avocado Association - meeting Mullumbimby Ex Servicemen's Club commencing 4.00 p.m. Proposed changes to the Constitution will be discussed.
- 19 Coffs Harbour Branch of the NSW Avocado Association - meeting Coffs Harbour Catholic Club commencing 7.30 p.m. Proposed changes to the Constitution will be discussed.

Note To Growers

Although the Levies Management Unit audits marketing agents' books, it would be helpful if Consignment Notes were to indicate that industry levies are to be deducted. Please mark your Consignment Notes — "Please deduct AHC/HRDC levies."

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From Your Federation

By Bryson Dyke, Executive Officer, AAGF Inc



The most recent meetings of your Federation on 12, 13 and 14 July 1993 were exhausting for all concerned. The meeting was held in conjunction with the Marketing Forum of the Australian Horticultural Corporation (AHC) and the statutory requirement for the AHC and the Horticultural Research & Development Corporation (HRDC) to report to industry.

To date, your Federation's ride with the AHC has not been smooth, as many of you know, due to communication problems between the AHC and the industry. Your President expressed this eloquently at the Industry Leaders Conference in Canberra.

We trust, however, that recent discussions with the Chairman and the executive of the AHC will pave the way to a more harmonious relationship in the future.

An agreed promotional budget amounting to \$337,000 has been approved. Around \$186,000 was allocated to domestic promotion including \$20,000 for the introduction of a fruit ripening program. The development of quality management in the avocado industry received \$23,000.

Following the receipt of a sub-license from AUF, the Australian avocado industry can now utilise the Heart Foundation's "tick" in all promotional activities. The use of the tick will help to dispel the misunderstanding in

our society that avocados are "fatty" and therefore high in cholesterol.

The 1994 avocado conference will be held on the Sunshine Coast in May or June. For many reasons Bundaberg was determined to be inappropriate for the type of conference that was envisaged for 1994.

Your Federation was surprised to learn of cut-backs in funding approved by the HRDC for avocado project funding in 1993/94. The project to suffer the most entitled, "Improved Management of Avocado Productivity and Quality" for which the budget has been halved. This project is seen by growers as an effective means to overcome low orchard productivity and poor fruit quality. It is commonly known as the Avoman project.

Two projects approved by the HRDC are, "Biological Control of Anthracnose of Avocados" being carried out by Dr Lindy Coates, and one dealing with salt tolerant rootstocks for riverland conditions jointly supported by the South Australian AGA and the Sunraysia AGA.

The cut-back in funding for the projects is largely due to a shortfall in actual levies collected in 1992/93. This shortfall had to be made up from 1993/94 levies.

The buzz words for the 1990s', as far as horticulture is concerned, are export and

quality. Driven from Canberra and by the domestic markets, industries to succeed will be directed down the quality path and then down the export path.

In recognition of this, the AAGF has formed a subcommittee to liaise with the AHC in the development of an appropriate quality assurance/quality management manual for use by the industry. An export policy for avocados will also be formulated.

Your Federation welcomes two new members to the Board through local association elections - Marie Karanicolos from Sunraysia and Tony Lawrence from the Tweed. Their heads are probably spinning from three days of meetings.

Also, your Federation reluctantly accepted the resignation of Don Lavers from the Atherton Tablelands. Don, a former Federation President and member for many years, will be sadly missed, especially in his capacity as the driving force behind the Federation's strategic plan.

All Federation directors are listed in the inside cover of this magazine. Please don't hesitate to give your local director a call if you have any queries, criticisms or advice on the operation of your Federation.

See you next issue.



LETTERS TO THE EDITOR

Dear Sir,

Yesterday I was given a copy of "Vine News" a publication of the Sunshine Coast Fruit Marketing Co-operative Association Ltd (vol 3 1993). In an article "Cultar® Where Is It", the chairman asserts, "a QDPI researcher admitted to me recently that there is no real research being done on avocados and that all the resources are going to mango research".

If this is so, where did the news of research project activities on page 3 come from?

I can total up over half a million resource avocado dollars per year being spent in Queensland and that total is not exhaustive.

If Cultar® looks likely to help the avocado industry then there are accepted ways to have it examined. Have any of these been tried?

The manager's report contains this statement: "Prices have generally softened during the current period due to heavier supplies hitting the market from north NSW area. Much of this fruit has been of lower quality, which has tended to drag the entire market down to a lower level."

There is no way I can say this is wrong—

unfortunately, there is no accurate mechanism for checking available to me; for the same reason, I cannot say it is true. It would be surprising if northern NSW was the only culprit.

Sir, only this week it was repeatedly mentioned at the AAGF meeting that the avocado industry must unite. Sloppy assertions, unfounded rumour, occur enough without putting them in print to possibly cause further division.

Our enemy should not be ourselves, surely we should all be flat out supplying large lines of uniform product to the consumer's complete satisfaction and reserve our competition for combating the multi million dollar promotion campaigns of the process food conglomerates?

W. Meredith
Woolgoolga
15 July 93

Dear Editor,

I would like to bring to the attention of the avocado industry a problem that volume buyers like myself experience with avocados.

I am the Chef/lessee of a restaurant and require volume supplies of avocados. Not knowing the rate of use, trays of avocados are requested from the supplier with half the fruit being ripe and the other half being

green. In this way, fruit can be selected for use at peak maturity over a longer time frame.

However, I find buying avocados is like a lottery! Some fruit are completely acceptable but from my experience, up to 70% of a tray is usually blemished. These blemishes are not apparent on the outside and cannot be detected by visual inspection. The blemishes are internal in the form of brown dots and hard lumps under the skin.

Being in the catering industry, these blemished avocados are unsaleable to diners at my restaurant. This means that because of their inconsistency, buying avocados is an expensive gamble I can no longer afford.

Whatever the cause, the industry is losing sales of its produce and a chance to allow the catering industry to introduce non-avocado eating consumers to the pleasure of the fruit.

When the industry can assure me that a high percentage of avocados purchased are usable, I will again offer them to customers. In the meantime, avocados are off the menu.

P.J. & K.A. Catering
Kepple Bay Sailing Club
Yeppoon, Qld

Address To The Industry Leaders Conference

By Robert Mosse

An Industry Leaders Conference sponsored by the Australian Horticultural Corporation (AHC) was held in Canberra on 28-30 June 1993. The Presidents of all the industries associated with the AHC were given the opportunity to address the Conference and as the avocado industry is a member of that organisation, Mr Robert Mosse, the President of the AAGF attended and addressed the Conference. His address is reproduced below:

I thought that what our chairman, Malcolm Irving, had to say at breakfast this morning, was excellent. He was, of course, speaking to the committed and it is a pity that some of our yet to be convinced growers did not hear what he had to say.

The question is why do some of our growers still need convincing? I believe the answer can be summed up in one word—attitude. There is an attitudinal problem involving both the growers and the AHC which must be solved.

I have been given exactly seven minutes in which to speak and, accordingly, I will follow my brief strictly and deal only with weaknesses, strengths and expectations.

The first reaction of one of my fellow avocado grower's on reading the AHC's request to make a submission today, was, what a nebulous task! Indeed it is. We are not privy to the AHC's primary goals or strategic planning covering the next five years. Accordingly, I felt it advisable to consult as many people as possible in the avocado industry and even some who are in the Macadamia industry and after collating their views, I have included some of my own as well.

Everyone agreed today's public presentation should not be an exercise in abject diplomacy but rather a frank and honest assessment of grower opinion. Clearly the former would be hypocritical and counter-productive and the latter perhaps painful. I make no apology for endeavouring to be frank, honest and objective. I have always supported the AHC and, over the years, my efforts have been to persuade the avocado industry to join it. However, support for the AHC does not imply, no criticism. On the contrary, the AHC must be criticised for its shortcomings if it is to become successful. But criticism should be constructive and never malicious.

I will deal first with grower perceived weaknesses of the AHC and end on a more positive note, high-lighting its obvious strengths.

You will notice, I said "Grower perceived" weaknesses because what I am about to say on the subject of weaknesses is rightly or wrongly, what growers think. It is early days yet and, therefore, some of these criticisms are not completely justified—but they nevertheless represent what growers think.

The Weaknesses

Lack Of Trust

The biggest weakness is the failure, so far, to generate trust and confidence with growers

(and even some government organisations). There is a feeling that the industry is continually having to fight against the AHC, rather than being drawn alongside as an equal partner. In simple terms, there is more a dislike of the AHC for the way it operates rather than for what it represents.

Lack Of Promotional Success To Date

The AHC has not yet matched industry successes. For example, our successful cholesterol free campaign and the attainment of the National Heart Foundation tick of accreditation.

Incorrect Focusing

The conviction that the AHC is often tempted to push those strategies which are more geared to creating image or to gaining publicity for itself rather than for the benefit of the industry.

Ivory Tower Problems

Inability to have a demonstrable empathy with each industry. The AHC seems unable to work closely enough with industries. There seems to be an isolation of the AHC and its staff from the growers and their coal face problems. Not only in terms of distance, but more especially in terms of their responses which reflect a basic lack of understanding of growers emotions and gut reactions. It is an inability to communicate at grass-roots level.

Finance

This is the major cause of most resentment. Growers do resent having their finances controlled by what, in effect, is a Trustee and the AHC is a Trustee. Growers feel that on matters financial, the AHC tends to be rather more dictatorial than consultative. Growers detect a bureaucratic attitude in approach. Unfortunately, most trustees seem to develop this attitude when handling large sums of money—it seems to go with the job—but it upsets growers, especially when they are watching that last dollar.

Staff And Management Problems

Another source of irritation is simply the way in which growers are handled. Growers see the organisation as ultimately being funded by their money and instead of being treated like shareholders in a private company, they are more often treated like tax payers trying to do battle with a government bureaucracy. This is an attitudinal problem.

There also needs to be more delegation of powers and responsibilities so that, when members of staff do meet with growers to discuss a particular issue, they must be fully briefed and have the necessary authority to make decisions. When decisions are reached, they must not be vetoed later by management. This has happened in the past and it created a very bad impression on growers who felt that the meetings had been a complete waste of time and money.

We have been invited here to attend a meeting which will last for almost two days and yet each industry leader has been given only seven

minutes in which to speak. This is insufficient time, given the expense involved in getting here and serves to highlight the fact that perhaps more time should be spent on listening and trying to understand what industry members really do think and feel. Remember Malcolm's reference, this morning, to the old Chinese saying that change represents danger and opportunity. This applies to all of us and I would include an element of pain as well.

Expectations And Strengths

The AHC has Federal government support which gives it enormous power and influence in all its dealings. For example:

1. It has access to Departmental Heads and Departmental Experts. The depth and breadth of government resources can only be accessed by a duly accredited body such as the AHC.

2. It has the backing of legislation to collect levies on a national basis.

3. It has access to External Affairs people stationed in foreign countries.

4. It has the availability of finance from both growers and the Federal Government to fund research and exploit windows of opportunity in foreign markets.

5. It virtually has automatic support from the technical and research departments of universities; other similar government organisations and research departments of private businesses.

6. The unified and collective force available to the AHC (when co-ordinating the efforts of all the industries with which it is involved) will promote local and export marketing opportunities to an extent and on a scale not previously envisaged.

7. The ability to access and examine overseas markets first hand, with the resources and backing of the Commonwealth government.

8. The ability to introduce quality assurance within the industry by gradually fostering the concept.

9. The ability to promote an industry news letter available to all growers which facilitates the transfer of technology when it becomes available.

10. (I say hopefully here!). The ability in the future to improve and control the means of obtaining accurate industry statistical data. The present system is so woefully inadequate as to be almost meaningless.

11. The ability, in due course, to establish a complete data base which will cover such things as regional production, sales figures, transportation costs, market trends and prices etc.

12. Because the AHC represents so many industries it can exercise tremendous leverage when negotiating terms with advertising or media personnel.

These are some of the many advantages and possibilities, which either now or soon will benefit growers.

Grower Profile- Keith Richards

Keith Richards, lawyer and horticulturist from Mildura in the north west of Victoria, is aged 47. Married to Jan, he has three sons the eldest being 16 and twins aged 8.

Keith is the son of itinerant banker and during long vacations, from the age of 10 until he completed his Law degree, he worked on farms at Minyip, Red Cliffs, Horsham and Esperance. It was while doing this farm work that he got a hankering for his own "bit of dirt".

In 1976, Keith purchased an unimproved block of land on the Darling River at Palinyewah, 30 kilometres north of Wentworth. There he grew vegetables on a share farming basis for 4 years as cash crops (what a misnomer!) to finance fencing and irrigation developments.

In 1980, he changed to a perennial crop by planting 20 acres of avocados, mainly Hass, Bacon and Reed. Keith appointed

Peter Donaldson as Manager in 1980 and he is still the Manager today. Keith says that Peter is entitled to most of the credit for the development of the property.

The severe frosts of 1982 effectively destroyed 1,800 of the 2,000 avocado trees with the other 200 suffering a severe set back.

Although frustrated by the loss, Keith was not disheartened and set about replacing the lost trees. In 1983-84 all frost-damaged trees were replanted and the orchard was extended to 25 acres, the mix being Hass 30%, Bacon 10%, Reed 30%, Wurtz 10%, Sharwil 10%, and small numbers of Ryan, Rincon and Fuerte.

The original planting mainly consisted of equal numbers of Hass and Bacon, the idea being to ensure cross-pollination, with 2 rows of Hass adjoining 2 rows of Bacon, eventually thinning every second row but still retaining complementary

pollinators after thinning.

However, with Bacon not being a favoured variety in the market, subsequent plantings of the late varieties of Wurtz, Hass and Reed were made using Sharwil as the pollinator planted every fourth tree every second row.

The period from 1985 to 1990 saw a gradual increase in planted area (using emerging farm income, and more borrowings!) to a final figure of 100 acres, with a further 75 acres of citrus.

Keith tried hard to find a suitable alternative to cutting out every second Hass tree in the oldest patch but finally he had to "bite the bullet" and commenced thinning this year.

With production increasing, Keith purchased a packing plant from a Sunshine Coast grower who had joined a co-operative and no longer packed his own fruit.

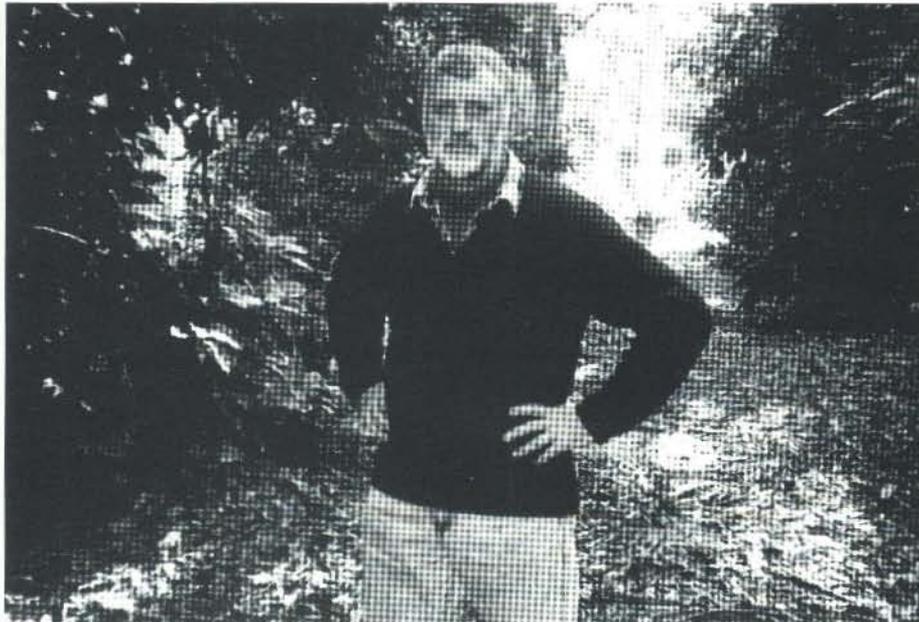
Keith packs most of the produce himself, and direct-markets about half to fruiterers in Melbourne, the balance being sold through S. Tripodi Produce in Melbourne.

Keith has been active in the industry being a member of the Sunraysia Avocado Growers Association committee from 1981 to 1991 and Secretary from 1983 to 1991.

Keith says he manages to escape from the law most Thursdays to work on the farm and also spends many a weekend there with his family.

His other interests, apart from following the kids in their social and sporting pursuits, include tennis, golf, following the fortunes of the Essendon Football Club, travel, and wine and food.

Keith believes the Avocado industry in Sunraysia has a sound future, especially with its window of opportunity to supply the summer markets when there is minimal production from the major producing areas of northern Australia.



Keith Richards in his orchard at Palinyewah

Tilt® And Avocados

For those NSW growers who have a mix of avocados and bananas, Greig Ireland (NSW Agriculture) reports he has collected samples to allow maximum residue level (MRL) data to be established to allow registration of Tilt® and oil for avocados.

These samples are being shipped to Sydney for analysis to determine the MRL.

Ciba Geigy will be doing the analysing. Although results will be the property of Ciba Geigy, it is expected they will be available for that registration in other States. Greig expects that registration or an order could be in place for the 1993/94 spraying season.

This is the result of action taken by the Coffs Harbour Branch of the NSW Avocado Association. Ed.

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World News



California Hass It

Extract from Fresh Produce Journal (UK) June 1993

This year, Californian avocados are making their mark. A bumper crop in the state and a drop in availability from South Africa has seen the Americans dramatically increase sendings to Britain.

Europe is an opportunity market for California. This year has presented the opportunity and California shippers are taking full advantage of it to move a very large crop.

Exports to the UK have been running at the rate of 200-300 tons a week since March. This rate will continue until market demand subsides or maturity of Californian fruit determines otherwise. The volume sent was around the 1,000 ton mark on 20 May. The Californians are in a strong position this year—the South African Hass crop has been particularly badly hit by drought.

The quality of the fruit arriving in Britain is, reportedly, very high. In California wet weather can create problems with anthrac-

nose but Californian senders are unanimous in their insistence on sending only the highest quality produce to the UK. This is necessary to develop the market and with such a large volume of fruit available, is not difficult to achieve. The major export variety is the Hass. This represents 85% of the crop. Californian fruit is filling the Hass niche in France, Germany and Scandinavia and that quality and size are available at very competitive prices. France had taken over 2,000 tons of Californian avocados by 20 May.

The season is expected to tail off at the end of July with the last arrivals in Britain in mid-August. Californian avocados that reach the UK come through the Panama Canal and take at least three weeks to make the journey.

The avocados are sent in controlled-atmosphere containers so that they reach their destination in the same condition as they were in when they left. When they

arrive they are taken to distributors ripening and chilling facilities.

The Californian season runs into that of Mexico and Californian companies, keen to supply their customers on a year-round basis, also supply from their southern neighbour.

Another source of Hass is Spain but Spanish Hass is currently commanding a premium price on the French market. South Africa is principally a source of green-skinned fruit such as fuerte. A large volume of Spanish Hass is going to the French market because people in Britain are not always as willing to pay the same price as the French.

The customer base for Californian avocados is quite well defined—chain-stores and catering establishments, with some interest from hoteliers. One reason for this is not all buyers appreciate that black is a sign of maturity not bad fruit.

Avocado Industry Gears Up For Heavy Volume

Extract from an article in the California Grower, April 1993

It seems like Californian avocado growers just can't get any respect from Mother Nature. Four years of adverse winter weather shortened crops and affected growers unevenly throughout northern and southern areas.

Last winter, abundant rains leached soils and triggered a flowering which has led to what is arguably the largest crop in the industry's history. Now, winter rains have slowed the early harvest to the point where the industry's ability to market the remaining crop will be severely tested.

The current official crop estimate from the California Avocado Commission is 510 million pounds.

Up until February 13, when a new series of winter storms darkened Southern California and kept picking crews out of groves again, 93 million pounds had gone to market. Allowing for 6-7 million pounds going to processed products, approximately 410 million pounds remained to be marketed over the last 37 weeks of the

season. That works out to be slightly over 11 million pounds of fruit going to market each week until the end of October.

Despite that daunting challenge, most of the industry's handlers contacted by California Grower were optimistic that this year's fruit would all find a home. One fruit company stated that the industry has the capacity to reach these numbers, but that they would be running at near maximum capacity.

Growers who have put all the necessary water, fertiliser and other cultural inputs into their groves have very strong fruit that will hold on the trees, helping to keep harvest rates in sync with marketing activities.

Two supply-side concerns in the forefront of just about everyone's thinking are the Persea Mite problem in San Diego and southern Riverside counties and growers withholding fruit from the market in expectations of better prices in the future.

If there are major outbreaks of mites as temperatures warm, some southern growers will be tempted to strip pick before defoliation leads to sunburnt fruit.

Another possibility is that growers will hold back on their harvest in hopes that prices will improve after June. Most handlers feel that price increases aren't likely, but it could result in an ever greater compression of the peak season.

Neither of those concerns are new to the industry but with so much fruit to move this spring, handlers have their collective fingers crossed for an orderly flow.

For all the handlers and the California Avocado Commission, the real key to marketing this year's crop lies on the demand side. The consumer's appetite for California avocados has grown demonstrably since the last big crop. The real question is whether retailers will make the fruit available to them at prices that encourage buying several avocados at a time, and loudly

Australian Round-up



NSW Agriculture

Earlier this year, David Peasley was appointed to the position of Program Leader (Tropical Fruits),

with NSW Agriculture. This position replaces that of Principal Horticulturist (Tropical Fruit) previously held by Mr. Fred Chalker, who has now retired.

In addition, the Department has made a number of other significant changes in the structure of its north coast services. The reorganisation is in line with current policy to maximise the use of resources and to continuing offering services to farmers.

Part of the plan involves moving officers from the traditional 'district' based advisory service into crop-oriented specialist roles. The reason for this change is the wide range of crops which are grown in the north coast area.

In the past, staff operating from a district base have serviced all crops in the district. This has led to their trying to cover all fields and issues, a practice which restricted levels of expertise on individual topics. Shifting the focus of their activity to crop specialisation will benefit farmers directly, encourage co-operation and teamwork between advisory and research staff and enhance the promotion of industry research and development (R & D).

The reorganisation will help to improve research results. With changing times, many industries are now collecting funds to apply to R & D. They need to see value for money and will invest funds where results are more likely. The department takes the view that the changed structure will enhance more efficient co-operation between researchers and advisory staff, with consequent improvements in results.

One of the more far-reaching changes extends to sharing information and resources between states. Both New South Wales and Queensland have experts in areas of interest to the other, and both will benefit from the interchange of knowledge and expertise. This approach will make savings which are not presently possible.

In practical terms the changes mean that a farmer who seeks advice on a certain subject will still contact the agricultural advisory officer or district horticulturist in the first instance. If the officer feels assistance is needed, and on major issues, such as trial work, the crop specialist will be brought into the picture. While some staff will probably have to travel longer distances to service clients, overall benefits are expected to be substantial.

The specialties have been allocated as follows:

Advisory Staff

Greg Seymour

- Hydroponics 20%
- Environmental assessment - Rural/Urban interface 30%
- Sludge application
- Pesticide application
- Cut flowers, protected cropping 10%

Ross Loebel

- Macadamias
- Passionfruit
- Pecans
- Guavas
- Mangoes
- Trees on farms (Horticulture)

Ian Atkinson

- Bananas (North), panama and bunchy top diseases
- Avocados (North)
- Nurseries (North)
- Organic production
- Pesticide use
- Papaws
- Pineapples

Greig Ireland

- Avocados (South)
- Banana pests
- Northern Tablelands- Armidale
- Potatoes 20%
- Deciduous fruits 80%
- Ornamentals (South)

Arthur Akehurst

- Bananas (South), plant protection, soils
- Post harvest, QA, erosion control
- Ornamentals (South)
- Grapes

David Stevenson

- Bananas (South), nutrition, economics
- Nashis, persimmons, kiwifruit
- Stonefruit (South)
- Citrus

John Slack

- Low chill deciduous fruits
- Citrus
- Custard apples
- Lychees
- Flying foxes
- Irrigation resource
- Disease forecasting
- Soil management practices

David Peasley will provide a technical resource for all crops. He will retain the specialty area of coffee, and represent the department on BIC and the Aust. Banana Research & Development Committee.

Research Staff

Geoff Johns

- Water relations and bananas

Ian Vimpany

- Soils

David Huett

- Nutrition (except bananas)

Don Batten

- Plant physiology (except bananas)

Ross Fitzell

- Plant protection (except bananas)
- QDPI plant protection (bananas)

Neil Treverrow

- Pest management

John McDonald

- Pest management (except bananas)

Tim Reilly

- Crop economics

Retirements

Mr. Tim Trochoulis resigned last November as Research Horticulturist, to undertake a private consultancy. His position is currently vacant. His research projects have been reviewed and will be continued by members of the research staff.

Dr. Rob Allen has resigned as Senior Plant Pathologist to become Chief Plant Pathologist, Division of Plant Protection, QDPI at Indooroopilly in Brisbane. It is not intended to fill Dr. Allen's position.



Perth Royal Show 1993

To celebrate 150 years of fruit and vegetable growing in Western Australia, the October Perth Royal Show will be dressing up the Fresh Produce Pavilion to look like an old rural town. It will show progress from clearing to cultivation and will feature a General Store.

The display will be co-ordinated among all grower groups with each group to demonstrate their own product. Growers will be encouraged to get out from behind the counter and mingle with the crowd.

This year for the first time, there will be a competition for avocado growers. Included will be prizes for the "best tray of Hass" and the "best mixed tray". Certificates will be presented to prize winners.

1993 Crop

Due to the very heavy crop in 1992, a smaller crop is anticipated this year with estimates being down by some 10-15%. Autumn had been very dry and our annual rainfall is below average by some 130 mm. July prices for Fuerte are disappointing although premium prices have been paid for Hass from Queensland. The variation is confusing!

Information courtesy BGF Bulletin

Review Of Technical Publications

By Don Lavers, Walkamin, Queensland

Queensland Department of Primary Industries (QDPI) publication section is constantly updating their wide selection of communication material designed for an audience of producers, extensionists, researchers, students and marketers. With the addition of the two latest books released at Conference 92, people in the avocado industry now have a complete package of information on establishing an orchard as well as growing, protecting and handling the crop.

While the authors are Queenslanders and there is emphasis on the industry in Queensland, the high quality and user friendly information will have application to industry people throughout Australia and indeed, throughout the world.

Material currently available includes:

- Video: Management of Phytophthora Root Rot in Avocados. QZ 89001 (24 min) - \$35 including postage.
- Wall Chart: Protect Your Avocados - \$15 including postage.
- Book: Avocado Pests and Disorders. QI 90013 Roger Broadley, Geoff Waite, Ken Pegg, Scott Ledger and Alex Banks - \$35 plus \$4 postage.
- Book: Protect Your Avocados. QI 91031 Roger Broadley - \$23 plus \$4 postage.
- Book: Growing Avocados in Queensland. QN 92004 Alex Banks - \$10 plus \$4 postage.

To obtain any of the three books or video, contact QDPI Publications GPO Box 46, Brisbane Qld 4001, Telephone 07 239 3100, Fax 07 239 3760. The wall chart is temporarily out of print but another printing will be done if there is enough interest. For the wall chart, contact MHRS, PO Box 5083, SCMC Nambour Qld 4560, Telephone, Fax 074 412235. Postage quoted is for surface mail within Australia and there could be savings in postage if several items were ordered together. Overseas purchasers should contact QDPI to enquire about relevant postal rates.

Video and Wall Chart Review Management Of Phytophthora Root Rot In Avocados

Management Of Phytophthora Root Rot In Avocados is a professionally produced video which integrates all aspects of root rot control including chemical injection and farm management practices to rehabilitate infected orchards.

With about 200 already sold it is one of QDPI's best selling videos.

Protect Your Avocados

The colour wall chart Protect Your Avocados (100 cm x 70 cm) is decorative as well as highly informative and is ideal for the producer's office or packing shed where important decisions are made. It has a section on chemical recommendations—including trade names—for treating pests and diseases, a section giving descriptions and colour photographs of affected fruit and a section on spray rates and spray technology for high and low volume spray applications. A series of cartoons amplify safety aspects, particularly in handling chemicals and the use of protective equipment. About 450 have been sold to date.

Book Review

Avocado Pests And Disorders

Avocado Pests And Disorders covers the important diseases, insects, mites, disorders and weeds affecting avocado growing in Australia.

The four chapters of the book are easy to read and to the point. The text is followed by 121 colour photographs of affected fruit, trees and causative pests or agents. The quality of the photographs has brought international comment, one reviewer from Florida writing "The photographs alone are worth the cost of the book".

The authors have avoided making recommendations on chemicals and their application rates so the book will not date. About 1000 copies have been sold.

Protect Your Avocados

Protect Your Avocados deals with the day-to-day issues of managing and growing the crop and covers just about everything a discerning grower needs to know but has not known where to find it in print. It is a companion book to Avocado pests and disorders and tells you of the needs of the tree from planting to old age and how to develop the correct management practices so that a sustained partnership is built up between you and your orchard.

It deals with managing and handling the fruit from pollination to well after it leaves the farm gate. Of particular interest is the advice on

ordering disease free trees—preferably virus tested or indexed stock—from accredited ANVAS nurseries.

The book makes precise recommendations on watering, fertilising, pest and disease management, chemicals and their application rates and has a couple of excellent chapters on insecticide application, spray technology and safety requirements.

The book contains numerous black and white photographs. About 250 copies have been sold.

Growing Avocados

Growing Avocados is a concise and very useful book on growing the trees and handling the crop. It deals with the economics of avocado growing, managing young and old trees, how to produce fruit and package it correctly to please the consumer and keep your bank manager happy. It also gives useful industry information and contacts.

To the Grower

Avocado growers throughout Australia, aware of the industry need to become more professional, are turning to a system based approach to growing and protecting the trees and crop. This ensures that minor problems will be quickly recognised and treated to prevent them becoming major ones. Also, State governments are reducing their technical advisory services so the grower must rely more on self help and have access to sound technical information in a readily useable form.

Just as a street directory is the unseen passenger in every city car and taxicab, these five items should occupy a position on importance in the library or office of every avocado grower.



Roger Broadley with two of the reviewed books

Orchard Pruning Seminar

By Don Lavers

Only a few years ago there was general agreement in the industry that avocado trees could not be profitably pruned. If a large tree was part lopped, so the story went, a year's production was lost and by the time the tree settled back into cropping again, it was back to its former size.

High density planting, with strategic removal of every other tree to prevent crowding, was the preferred method of canopy management. This, however, did not prevent trees growing large and creating management difficulties.

Fortunately, attitudes are changing. Pruning techniques seem to be high on the management agenda at the present time.

Why, you ask, this sudden interest in orchard pruning? Is it because the mass of trees planted in the early eighties have grown beyond the reach of hydraulic picking ladders and orchard sprays? Is it because the modern concept of efficient management hinges around groves of small trees intensively planted?

To find some answers, the Atherton Tableland Avocado Growers Association included a segment on pruning in a successful seminar held for members on 13 May. The seminar was arranged to coincide with the visit of Tony Whiley and Shane Mulo to launch AVOMAN to northern growers.

Graham Anderson, who has considerable experience in renovating tired orchards, was invited as a special guest to discuss and demonstrate the method of pruning he currently employs. He was joined by Andy Walker and Tony Whiley. John Forsythe displayed a variety of hydraulic and air driven pruning tools. A commonly used tool, the pole chain saw, was connected to the hydraulics of a picking ladder for demonstration purposes.

Seventy people, including growers, their families and employees attended the afternoon program and all took an active interest in the discussions and demonstrations.

Presentation by Graham Anderson

Feral Orchards

If your orchard is over ten years old with branches meeting overhead to occlude the sky and you are considering an extension to your hydraulic ladder to pick fruit, you are probably the owner of a feral orchard. If that is the case and you are still fertilising and irrigating but no longer have control of the trees—they are growing wild. Probably much of your fruit is of poor quality because the spray is not effectively reaching the upper part of the trees.

I was disappointed with yields from my older trees but, like everybody else, put off doing anything about it. Trees continued to

grow and the problem got worse. I decided to try different types of pruning from limb removal and shortening to staghorning at various heights. It was not until I visited Israel in 1978 that I learned a method of pruning that suited my management style.

The most important thing about pruning is to understand the economic need to prevent trees becoming feral. It is necessary to choose a technique that suits the density and steepness of your orchard and to consider how pruning will affect your cash flow.

After pruning a part of my orchard, I was able to compare returns between the with the good size and quality of fruit the orchard is turning off.

Tony Whiley has the position of Senior Principal Horticulturist at the Maroochy Horticultural Research Station and enjoys a world reputation for his research in avocado physiology and culture. The study of canopy management has been a major part of his work. His technical expertise makes him a drawcard at every National Avocado Conference and he is currently technical advisor to the AAGF Varieties Committee. At present, with Alex Banks, Shane Mulo, Scott Ledger and a large number of extension officers throughout the growing states, Tony is helping to develop AVOMAN into a successful and exciting tool for the Australian avocado industry.

John Forsythe is a sales representative with Ireland Farming in Cairns who handle Afron orchard equipment and a variety of pruning tools.

pruned and unpruned sections. In the pruned section, yield of marketable fruit per tree was doubled and picking costs were reduced—75¢ per carton compared with \$1.50 in the unpruned.

As well as a higher yield, the pruned section returned a higher market price. When all costs had been considered, net returns from the pruned section were four times higher per hectare than from the unpruned section.

By keeping trees small and open, there will be maximum sun penetration and improved health of the trees and more efficient conversion of fertiliser and water into dollars. The time of the year to do it is also important, however, a healthy tree will have a good sap flow and will be less susceptible to sunburn.

Why Pruning Works

The recommended technique is first take out the centre of the tree and then take a good look at the shape and appearance of the remainder. Next look at the tree's outside growth, don't let long branches crowd into neighbours—you may need to do some shortening to round off the canopy and make space between trees. Finally, remove some limbs to allow air and sun into each segment of the tree.

Different varieties call for a different type of pruning. Hass is a tall grower and is inclined to shed lower branches so it is important to prune out the centres and keep lower branches as strong as possible.

Sharwil have soft growth on the lower parts of their limbs and this can be

Graham Anderson took over the Anderson orchard which his father John Anderson planted in 1945 and expanded this to its present 3000 avocado trees plus a sizeable planting of bananas. He learned to prune while on a Churchill Fellowship studying avocado growing in Israel, South Africa, South America and the USA (California and Florida). He was a NSW delegate to the AAGF for four years and at present is a member of the AAGF Varieties Committee and Chairman of the Tweed district branch of the NSW Avocado Association. He received the Order of Australia (AM) in 1988 for services to horticulture.

Andy Walker has been manager of the Butler orchard for eleven years. Soon after his arrival he began to experiment with different pruning techniques on both old and young trees. Both he and Ron Butler are particularly happy with the method of pruning that they have adopted. Andy believes that canopy control has a lot to do

9 converted to producing branches with strategic pruning.

Fuerte can be pruned the same as Hass except that skirting must be done to clean up limbs that go straight to the ground. Unlike Hass, Fuerte limbs will move downwards.

The major benefits in pruning are:

- Sunlight and breeze are able to enter the tree—there will be fewer insects and less fungal damage.
- There will be better spray penetration—less spray, less cost.

Presentation by Andy Walker

When I commenced the management of a property eleven years ago, the Hass were so tall the top fruit could not be reached using picking sticks on a 5 m hydraulic ladder fully extended. Obviously, something had to be done about tree height.

The first attempt was to cut off the trees at picking ladder height. Next season there was massive growth at the top of the trees and when they came into production the following season, the top fruit still could not reach. The next plan of action was to cut off 3 m plus (10 to 12 feet) from the tops of trees and to paint limbs to prevent sunburn. There was no crop on that part of the tree next season but by going back and retrimming the growth, tree height was contained and production eventually settled down.

Staghorning was tried but the young shoots were susceptible to wind and

- Better root to canopy balance—healthier tree.
- The trees will be smaller—higher picking speed and greater operator safety.
- There will be an increased bearing area—higher productivity.

Plan tree spacing with pruning in mind (4x4 or 5x5) and with the idea of removing each alternate tree and each alternate row. Begin training youngsters at year 4 and, with minimum pruning, thinning can be put off for quite a few years!

frequent breakage occurred. A staghorned stump is vulnerable to disease, as was found out when several trees in one block died of *Verticillium* wilt.

The current technique is to start shaping trees as soon as they come out of their bag, followed by a topping every year to control height. Indeed, every time a tree flushes it is given a haircut! One block of Hass was kept at the same height for 6 years.

Generally pruning should commence as soon as the fruit are off the tree. Topping reduces the next season's production but it is a reasonable trade-off against having trees out of control.

A trial of not pruning in some years had the benefit of a much higher production yield. However, drastic pruning was necessary the following year with an estimated doubling of production loss.

Presentation by Tony Whiley

For an avocado grower, the skill in maintaining a viable operation lies in the effective management of the orchard canopy. This revolves around two functions—maximising the interception of solar energy and balancing growth between roots, shoots and fruits.

Apart from the obvious function of holding the fruit in place, the canopy harnesses solar energy creating the power-house for growth of the tree and its crop. Despite some growers preconceptions, it is not the water and fertiliser that are given to trees that provide the main building blocks for yield. While these are important in the total picture, it is the products that are made in leaves from the interaction of sunlight and atmospheric carbon dioxide that provide 95% of the dry matter component of fruit.

Turning the irrigation on when it's dry and throwing out the occasional dose of NPK may give a warm inner glow of satisfaction but the full potential from these

efforts may not be realised if the tree canopy is not in top shape.

There are said to be two certainties in life—death and taxes! For avocado growers a third certainty can be added—if your trees don't grow they won't produce.

The summer flush is essential for two purposes. It is required to provide canopy to help with filling the existing crop and to provide flowering sites for the next season. Hence the tree grows and increases in size.

This type of system does not lend itself to the detailed pruning that can be successfully carried out in other fruit crops. With avocados, a bearing surface on the tree that has not been pruned must be retained. What then are the options?

The Californian System

The Californian system of high density planting to maximise light interception early in the life of the orchard, followed by strategic removal of trees to prevent orchard crowding, has been successfully

Currently a trial is being done involving training at year 2 and 3 but at this stage it is too early to make comment on the benefits.

Pruning does not reduce crop load excessively. There may be a reduction the first year, particularly if the pruning is a heavy one, but the tree soon settles down. Pruning may stimulate some flushing so, to avoid excessive growth, it is best to carry out the operation after bud initiation has occurred, i.e., from May onwards.



Graham Anderson, Tony Whiley and Shane Mulo at the pruning seminar

followed by committed growers in Australia.

This plan relies on limited interference to individual tree canopies by removing whole trees once adjacent canopies begin competing for light. If tree removal is correctly timed, the system gives increasing production for the life of the orchard. This is reached when the remaining trees become too large to manage—about 12 years in subtropical Australia. At this point, orchards can be stumped and allowed to re-grow or trees ripped out and the site replanted. The choice depends on individual financial circumstances.

The Anderson System

The Anderson system provides an alternative method of managing the orchard canopy. In developing this technique, Graham has achieved the principles of maximising light interception with minimal interference of the bearing surface retained in the tree. However, application of the Anderson system will sacrifice some

bearing surface of each tree. The trade off is that:

- a. the tree size can be reasonably contained; and
- b. higher tree density can be managed in the orchard for a longer period.

Based on Graham's figures, the economic rational of the Anderson system cannot be disputed. There is no doubt there is greater grower skill required in following the Anderson technique compared to the Californian technique. This should not be seen as a deterrent but taken more positively as a challenge. Following the Anderson system, the time of pruning will obviously need to be considered with respect to the end result. It will be related to harvest time as the crop needs to be cleared

before the operation starts. However, in north Queensland when the early maturing fruit is taken off in February and April, pruning is probably best delayed until summer growth has ceased (May/June). The amount that can be successfully removed at each pruning time may vary between cultivars and districts. A certain degree of trial and error will be required to adapt and modify the system to particular conditions.

Tree Health Concerns With Pruning

It is unlikely that trees with symptoms of Phytophthora root rot will need pruning. However, if they are being considered for major lopping they should be trunk in-

jected with phosphonate 2-3 weeks before pruning. This will provide protection for the root system during the recovery phase.

In some environments, avocados are susceptible to infection by the wood-rotting fungi (*Basidiomycetes*) that are indigenous to the subtropical rainforests. The fungi can travel by airborne spores that germinate on cut surfaces and invade the wood. To prevent this type of infection, always make major cuts on an angle so they drain off rain-water. Treat the cut surface with copper oxychloride (or a similar formulation) mixed as a water slurry. Once dry, apply a water-base paint to seal the wound.

Do You Know

ANVAS Accreditation Applications Due

Applications for ANVAS accreditation for 1994 are now being called.

If you wish to become an ANVAS Nursery for 1994, please supply the Registrar, Roslyn Stark, ANVAS, c/- QFVG, G.P.O. Box 19, Brisbane Markets Qld 4106, (Phone 07 213 2482, Fax 07 213 2438) with the following information:

Name of nurseryman

Postal address

Location of nursery if not above

Estimated nursery production of avocado trees for the calendar year 1994
(This estimate is confidential and is for administrative purposes only)

You should also sign and date the statement - **I hereby apply for accreditation in the Avocado Nursery Voluntary Accreditation Scheme and agree to abide by its guidelines.**

An inspection will be arranged by a Departmental officer.

Fees remain the same as they were for 1993, that is a levy of 10¢ for every avocado tree in the nursery on the date of the inspection.

The application must be returned by 22 October 1993.

Up-to-date information on Australian weather is now available on your fax machine. The Bureau of Meteorology has made this service available through the Telecom INFOFAX system. To obtain a free copy of the latest directory of Bureau products on Infifax, put your fax machine in poll receive mode and dial 019 725 001. For those that do not have a poll receive

mode, dial the number without paper in the feeder and after the connection is made, push the 'Start' button.

Some areas do not have access to 019 numbers in which case dial 008 808 096. If all else fails, ring the FaxStream Support Centre on 008 033 479.

The directory indicates the services supplied and their cost.

Erratum

In the May addition, gremlins managed to corrupt Table 1 in the article on page 11 "Long Term Storage Of Avocados". The Table below corrects the discrepancies and should be read in conjunction with the article.

Table 1. Effect of storage temperature and time on "Hass" avocado skin colour at removal, and flesh quality and chilling injury at ripeness.

Storage Temp (°C)	Weeks in storage	Skin Colour (at removal from storage)	Flesh Quality (after ripening at 22°C)	Chilling Injury Symptoms
8	1	Green	Good	None
	2	Green	Good	None
	3	Mixture of green and breaking	Good	None
	4	Changing or dark purple	Good for harder fruit, poor for other	Grey pulp, vascular browning, failure of skin to darken
5	1	Green	Good	None
	2	Green	Good	None
	3	Green	Good	None
	4	Green mostly, only very few changing colour	Mostly good, with some slight injury	Small spots of grey pulp, vascular browning, failure of skin to darken
2	1	Green	Good	None
	2	Green	Good	None
	3	Green	Good	None

Marketing and Promotion

LEMONADE 10¢



Avocado growers are usually good at cultivating and growing their produce. Sufficient literature is available (see Special feature page 8) to help growers to decide the best management system to raise, nurture and harvest the fruit and where there are gaps in knowledge, departmental officers are available for consultation. Besides these sources of information, neighbouring growers, especially those with large holdings, can usually be relied upon to help the new grower or one with a small holding.

Scientists are urged to provide more information to assist the production of avocados and therefore, one could say that the cultural and harvesting needs of a grower are well catered for and any shortfall in this area is usually the fault of the grower.

Marketing

Having grown and harvested the crop, the grower is then faced with the task of marketing the fruits of his or her labours. Indeed, growers are encouraged to participate actively in this enterprise. How often have you heard the call for growers to talk to their market agents, visit the markets, negotiate terms and consign wisely. One hears of growers visiting a central market only to be completely confused by the pace of the procedures of buying and selling—coming away more confused than ever.

Where are the manuals on marketing avocados? Where is the research to determine the best marketing method? Where are the helpful departmental officers? Where is the marketing expert that can give assistance?

Yes, growers are good at growing but are they good at marketing?

Promotion

Some growers maintain that promotion is a waste of time and money. A common cry of these growers is "my avocado returns before a promotion were the same as those received after the promotion". While often this may be true, a closer examination

usually reveals that market throughput in the area has gone up with more avocados being sold.

Coca-Cola spends millions of dollars on promotion each year. Would they spend this money if they did not expect to get some return? Do they expect to see the price of a can of coke rise just because they advertised in the area? No, their promotional plan is to have the name "Coca-Cola" to the fore on advertising hoardings, in magazines and on television so that a thirsty customer will think of coke before the name of some competitive drink. Thus their aim is to increase throughput. Coca-Cola is well aware that if each can rates a profit of 10 cents, by doubling throughput profits are doubled.

In the case of avocados, where supply and demand dominate the mechanism for setting the price, increasing throughput, or in other words consumption, prices either increase as demand outstrips supply or holds steady if the increase in demand equals the increase in supply. Can those growers who maintain that promotion is a waste of money honestly say that the returns that they have been receiving over the years have not fallen? Perhaps it was the lack of organised promotion that cause the fall?

Over recent years nobody can deny that supply has increased. If demand had kept pace, prices may have remained stable.

How to Promote?

Of course the big question is how can a grower promote his or her avocados?

Promotion is an expensive business. The idea is to convince people to eat avocados so the more people that a promotion reaches the greater the chance that the aim will be achieved.

Without exception, it is not really practical for a grower to run a promotional campaign alone. A group of growers need to get together to be able to afford a worthwhile promotion or better still the avocado industry as a whole. The larger the promotion

the more expensive it is and the more chance it has of convincing consumers to eat avocados.

What Sort of Promotion?

The next question is what sort of promotion should be attempted? Billboards, TV, women's magazines, instore demonstrations, what is the answer?

Once again, is the grower meant to be an expert on promotion as well as cultivating and marketing? Hardly!

How is it Done?

Go to any large business and ask them how they market their product and how they run a promotional campaign. The answer will be, we employ professional marketers and people who are experts at promotion. Would not the avocado industry be wise to follow suit? However, if the industry were to follow this line, how would it know if the experts employed were achieving the goal? What guidance should the industry give the experts? Oh, so many questions.

The Answers

The answers to these questions should be forthcoming from the industry—**that you**. This magazine is willing to run a forum on marketing and promotion. Whether you are a grower, a wholesaler, a retailer or just a consumer, **write in and let the others in the industry know your thoughts on these two important subjects**. It can be one line, one sentence, one paragraph or one page, **lets hear from you**.

Comments should be addressed to the Editor, Talking Avocados, 61 Clives Circuit, Currumbin Qld 4223 (Fax 075 986434) and timed to reach this address by 15 September. Please include your name and address with your submission, however, you may indicate if you wish your comments to be identified by initials and district only or published anonymously. The Forum will commence in the November edition of this magazine.

Downgrading And Detention Rules In NSW Explained

By Chris Cope, Supervising Agricultural Inspector at Sydney's Flemington markets. From BGF Bulletin, February 1993

Section 18A of the Plant Diseases Act 1924 provides for the legal enforcement of labelling and quality standards for fruit and vegetables.

When fruit and vegetables do not comply with a legal requirement, a detention notice is issued to the person in possession and control of the produce. In the case of produce consigned through an agent the notice is issued to the agent as the grower's representative.

The notice requires the person in possession to refrain from selling or disposing of the produce until:

- it conforms with the legal requirements;
- a fee is paid, and
- the notice is cancelled.

Option Given

In all cases the recipient of the notice is given an option to either 're-sort and re-pack' the produce so that it conforms to the

Regulation, or to deliver the produce to the Department of Agriculture pound for disposal.

Often produce is surrendered to the Department of Agriculture by agents because it would cost more to 're-sort and re-pack' than the salvageable produce is worth on the selling floor.

Growers should be aware that agents act on their behalf. Agents make the decision as to what must be done to comply with a detention notice.

If growers wish to direct any form of action following the issue of a detention notice on their produce, they should instruct their agents to notify them immediately a detention notice is issued.

Formal Notice

When NSW Agriculture inspectors order any action, a formal written notice is always issued.

A fee of one dollar per package is charged when produce is not marked with any description, where an incorrect or incomplete trade description is given, or where produce does not conform to the stated class and requires re-marking or downgrading. In a case where an agent chooses to 're-sort and re-pack' a fee of \$0.25 per package is charged for the produce to be re-inspected and released for sale. No charge is made for unsaleable produce delivered for disposal.

All produce disposed of by the Department is done under strict supervision approved of by the NSW Chamber of Fruit and Vegetables.

It is the policy of the Department to assist growers wherever possible with the marketing of their produce. Growers requiring further information can contact the Supervising Agricultural Inspector at P.O. Box 139 Flemington Markets, or telephone (02) 7643311.

Increase In Packaging Breaches

Growers have been urged to pay more attention to their packaging following a large number of complaints in the Brisbane Market. Recent visits by officers of the Department of Consumer Affairs' Trade Measurement Branch to the Rocklea markets, have revealed a large number of breaches of the Trade Measurement legislation.

These breaches include; short measure (i.e. weight or count) packages of fruit; failure to mark packages (i.e. cartons etc.) with a weight or count, statement of the contents, and name and address of packer.

To help resolve this problem the Department of Consumer Affairs has developed the following guidelines which will assist growers to comply with the legislation.

Marking Weight/Count on Package

Every package (e.g. cardboard carton, mesh bag etc.) must be clearly marked with the following information:

- the correct net weight of the fruit or vegetables contained in the package (e.g. 20 kg; Wt. 20 kg etc.); or
- if the fruit or vegetables are normally packed and sold by count, the correct number of items of fruit or vegetable contained in the package (e.g. Quantity 10, Qty 10 etc.).

The minimum height of these markings is dependent on the maximum dimension

(i.e. length, breadth or height) of the package as follows:

Maximum dimension package	Minimum height of markings
120 mm or under	2.0 mm
120 mm but not over 320 mm	2.5 mm
Over 320 mm but not over 360 mm	3.3 mm
Over 360 mm	4.8 mm

Marking Of Name And Address Of Packer

Packages containing fresh fruit and vegetables must be marked with the name and address of the packer or the person on whose behalf they were packed. These markings must be readily visible and legible and of sufficient detail to enable the person named to be identified and located (i.e. name and street address). Example:

A.B. & C.D. GROWER
92 TOMATO ROAD
EVERYTOWN QLD 4999

An address in the form of a post office box number is unacceptable. However, it can be included as additional information.

Short Measure (weight or count)

Fruit and vegetables that are packed by weight must be packed by net weight. This means that the weight marked on the package is the weight of the actual fruit or vegetables contained in the package excluding the weight of the package and any

other packaging material. Short weight can be avoided by:

- ensuring that sufficient allowance is made for the package and any other packaging material when weighing the fruit and vegetables during packing;
- over packing sufficiently to allow for any possible moisture loss in the fruit or vegetables (fruit and vegetables lose moisture as they mature). Packages must maintain their marked weight right through to their final sale;
- using a suitably approved and certified scale to weigh the packages. Just filling up a carton and estimating the weight often leads to a short weight.

When packing fruit and vegetables by count the package must contain the correct number of fruit or vegetables as marked on the package.

Penalties

Fines of up to \$20,000 for an individual and \$100,000 for a company may be imposed for a breach of the short measure provisions of the Trade Measurement legislation. The maximum fine for failure to mark the measurement and name and address of packer on a package is \$10,000 for an individual and \$50,000 for a company.

From Queensland Fruit and Vegetable News, 17 June 1993

AVOMAN NEWS

By Alex Banks, for the AVOMAN project team



The AVOMAN project team, key growers and productivity group members have been involved in a range of activities since the last edition of Talking Avocados. These activities are starting to provide information which will be used in the developing AVOMAN package. If you have not seen AVOMAN yet or participated in one of the productivity groups then contact me at Nambour DPI (074-412211) so that you can become involved.

Development of AVOMAN

At present the AVOMAN computer software consists of a starting screen that allows you to choose the section of the package you want to use. Development of two sections, AVOGRO and AVOREC, has started.

AVOGRO presents the growth cycle and will indicate management activities to carry out in relation to the stage of growth. A feature of AVOGRO will be the ability to select your region and variety and the program will draw the predicted growth pattern of trees.

AVOREC allows growers to record management activities and tree observations. It will be the data base which other components of AVOMAN such as AVOGRO will use to give specific recommendations for a grower's orchard.

Many growers throughout Queensland have had the opportunity to see how the computer package is shaping up. Shane Mulo, our computer programmer, has been taken on the road by Tony Whiley (to north Queensland) and by Alex Banks (to Sunshine Coast groups) to demonstrate the software and answer grower's questions. Copies of the software have also been sent to all project team members who will demonstrate it to the productivity groups co-operating in the project.

Recording Sheets And Training For AVOREC

Good farm records of activities, inputs and returns are the key to making AVOMAN work for you. Record keeping is often viewed as a time-consuming chore with little or no real benefit. However this won't be the case with AVOMAN because growers are involved in deciding what needs to be recorded. They also have a say in how information is recorded. This is all aimed at making record keeping as practical and efficient as possible.

At present, project team members are designing recording sheets to cover various orchard operations (e.g. yields/growth stages/fertilising/pest control). As these become available they will be presented to key growers and productivity groups through training days. Feedback from these groups will be sought before a final recording package is made available to the industry generally. You can expect to see these recording sheets appearing through the second half of this year. The project team aim to have AVOREC in place to start storing grower's records on computer by May next year.

Market Surveys of Fruit Quality

Following the successful quality survey of the wholesale market and retail shops in Sydney in February by 'Shepard Australia' growers, a second survey was conducted in May by Scott Ledger, Terry Campbell and Alex Banks. The survey found Fuerte, Sharwil, Hass and Wurtz (as well as minor varieties) from northern NSW to north Queensland in plentiful supply. The results of these surveys make interesting reading and raise questions as to how industry can best spend its promotional funds to increase avocado consumption.

By the time this edition of Talking Avocados gets to you, a further quality survey will have been conducted in Brisbane in July. This is being arranged as part of the AHC/HRDC reporting to AAGF and industry generally. On Tuesday 13 July, growers from northern NSW to Bundaberg will be taken to the Brisbane wholesale markets to speak with agents. Growers will then be broken up into several smaller groups and taken to various Brisbane suburbs to speak with retailers about how they handle avocados in their shops. Fruit will be purchased from these shops and brought back to QFVG where it will be assessed for internal quality. Each group will report on what they have found and the results collated. This information together with the results of the Sydney quality surveys will be discussed with AHC

To capitalise on AVOMAN, growers should consider computerisation

During their report to industry in the afternoon.

Two further surveys of Sydney are planned for early August and October this year. The trips are a tremendous opportunity to see first hand the problems agents, retailers and consumers have in handling and buying your fruit. It is a great learning experience and a chance to rub shoulders with growers from other regions. Watch the AVOMAN reports in forthcoming editions for notices about these events.

Fertilising Workshops

Return of leaf and soil analysis results raises the regular questions of what fertilisers should be applied to meet tree needs. The three productivity groups, Glasshouse Mountains, Nambour and Tamborine organised workshops to help growers interpret their analyses by sharing results from previous fertilising. Each group also invited special guest speakers from companies involved in supply of fertilisers (e.g. Incitec, Kanes Rural Supplies) to join in the discussions.

Some interesting results were uncovered. For example, Nambour group members found that most had been able to raise leaf boron to optimum levels after several years of deficiency. Extra spring applications of boron combined with good soil organic matter levels (2-4% organic carbon) and healthier root systems were the main reasons. The need to spread boron evenly over root systems was also highlighted. Some Glasshouse Mountain growers discovered a trend to increasing soil pH in spite of the fact that no liming materials had been used for several years. While no answer can be given for this observation at present, the fact that several growers have a similar result means that their management programs can be compared and hopefully a reason for the result found.

Growers found the workshops of great benefit although for most of us, interpretation of leaf and soil analysis and the development of fertilising programs still remains in the realm of high level soil and plant chemistry. One of the benefits that the AVOMAN software will give us is that it will handle these analysis results and provide specific recommendations for each grower. It will also allow groups of growers to more easily compare their nutrition programs and see where advances can be made.

Avocado Retail Survey Discovers Quality Problems

By Scott Ledger, Queensland Department of Primary Industries

A series of retail surveys being conducted in Sydney is discovering that the internal quality of avocados is often less than desirable. Problems with anthracnose, stem end rot and bruising are common, particularly in the Hass variety.

The retail surveys are part of the AVOMAN project and are aimed at identifying why consumer dissatisfaction with avocado quality is high. Four surveys are planned for the 1993 season with the first two having been already completed.

The dates of the first two surveys were 26, 27 February and 20, 21 May. Eight suburbs in Sydney were visited and fruit sampled from 21 and 24 shops, respectively. At each shop 20 sound ripe fruit were selected from the retail shelf and cut into thin slices to assess internal quality. Fruit that were obviously unsound were not sampled.

A summary of the two surveys is presented in the Tables. The major internal problems identified in both surveys have

been anthracnose, stem end rot and bruising. More problems were found in Hass than green skin varieties. The dark skin colour of Hass makes it difficult to see problems such as anthracnose and stem end rot.

Judging the ripeness of Hass is difficult for the consumer. Skin colouring and softening are often out of synchronisation. Some Hass that are fully coloured have been found to be still hard while other fruit are only partially coloured and soft. Some coloured fruit feel sprung but are eating-ripe inside. The end result is that by the time Hass is fully coloured and soft to feel, the flesh is often over-ripe. This accentuates problems with anthracnose and stem end rot.

With green skin varieties, anthracnose and stem end rot are obvious and the retailers usually remove the fruit from display and either discard them or sell them as specials in bags. It is not surprising that they prefer to handle Hass, but the problem

is not overcome by transferring it to the consumer.

Internal bruising is not obvious even in the green skin varieties. The retailers are therefore not aware of the damage. The only damage they see is the pressure marks on the green skin varieties from the consumer squeezing the fruit. The internal bruising is most likely occurring when sprung-to-ripe fruit are handled between the wholesale market and the retail shelf.

From the two surveys, it was discovered that retailing ripe fruit is not an easy task. The retailers know that they must have near-ripe fruit on display if they want to sell avocados, but they are also aware that the consumer can cause pressure damage when trying to find the "right" avocado to buy.

The next two surveys are planned for early August and mid October. It will be interesting to see what they discover. Keep watching Talking Avocados for further updates.

Table 1. Avocado internal quality - Sydney retail survey number 1, 26/27 February 1993

Variety	No of lots sampled	Fruit Acceptability (% of fruit)		
		Unacceptable	Minor Problems	No Defects
Hass	11	41	29	30
Reed	5	11	47	42
Shepard	8	12	26	62
All varieties	24	25	32	43

Table 2. Avocado internal quality - Sydney retail survey number 2, 20/21 May 1993

Variety	No of lots sampled	Fruit Acceptability (% of fruit)		
		Unacceptable	Minor Problems	No Defects
Fuerte	13	7	28	65
Sharwil	4	11	21	68
Hass	7	34	26	40
Wurtz	2	0	70	30
All varieties	26	14	30	56

FREE AVOCADO QUALITY CHECKS

The South Australian Avocado Growers Association require the supply of one tonne of avocados for promotional purposes at the Royal Adelaide Show. Avocados will be distributed by volunteers to more than 70,000 grateful people who attend the

Show from 3-11 September.

In the past, fruit quality has been recorded for use by Scott Ledger of the QDPI. This year, a market quality check will be made on some fruit and details will be forwarded to supplying growers and packing sheds. At last

some positive feed-back!

If you wish to avail yourself of this service (Hass variety only), please contact Ross Richards on 08 853178 to arrange delivery dates to H.L. Banana Pty Ltd who will pre-ripen the fruit and deliver it to the Show.



Avocado Promotions 1993/94 & 1994/95

Avocado Promotions are to enter a new phase following the Avocado Marketing Forum held in Brisbane on 12 July. The National Avocado Marketing Committee, convened by the AHC included key producers, wholesalers and retailers within the Avocado Industry.

John McKay, AHC Marketing Manager said the objective of the marketing forum is to recommend to the AHC and to the AAGF the National Marketing Strategies for domestic and export markets.

The marketing forum was presented (by the AHC) with a proposal to introduce an "Avocado RIPE Campaign" similar to the California "Ripe for Tonight" program.

At the previous marketing forum in 1992, marketers had set an objective to increase in-store promotions and develop an avocado ripe promotion. During 1992/93 Queensland Fruit and Vegetables Growers (QFVG) were contracted by the AHC to undertake promotions for the avocado industry including in-store promotions.

Avocado Ripe Campaign - It's Time!

During 1993/94 the AHC is proposing to build the foundations to launch a full "Avocado Ripe Campaign" in 1994/95.

The proposal for the campaign is based on research results and advice from the Avocado Marketing Forum. In 1990 a consumer study undertaken by the Horticultural Research and Development Corporation indicated that more than twice as many consumers want ripe fruit than want hard avocados.

These results were backed by a 1992 California Avocado Commission report which indicated that "Ripe outsells unripe by 2:1" and that sales increase by as much as 30% when ripe fruit is available. During the forum, participants heard from a national retailer who confirmed turnover increased when ripe fruit was available.

The proposal for 1993/94 is to run a pilot campaign to analyse results, sales, procedures and problems. However before the pilot can commence, procedures such as sourcing fruit, ripening procedures, who, where and how it is ripened need to be

resolved. Display material also has to be produced before the pilot can commence. The aim of the pilot program is to resolve any problems prior to a national campaign commencing in 1994/95.

QFVG 1993/94 Promotions

QFVG are to continue to be contracted to the AHC to undertake the 1993/94 promotions for the Avocado Industry.

QFVG's promotional campaign will include:

- in-store demonstrations in Brisbane, Sydney and Melbourne;
- magazine advertising during July, August, September, April and May;
- public relations activity;
- point of sale leaflets and mobiles; and
- Infant/baby promotions.

Point-of-sale leaflets will reinforce the campaign's theme by outlining to consumers how to tell when avocados are ripe, including photos of different varieties and detailing their availability throughout the year.

Advertisements promoting avocados are to appear in The Australian Women's Weekly, New Idea, New Woman, House and Garden, Australian Magazine, The Good Weekend and Better Homes and Gardens.

The promotions to the infant market will include a leaflet on "Your baby deserves all the goodness of avocados" with a secondary message emphasising the ease of preparation.

Quality Management Video

What are the costs and benefits of quality management? How do I get started? What are the documentation requirements? How long does it take?

A video featuring interviews with leading exponents of quality management in Australia was launched at the AHC's Horticultural Industry Leaders Conference and is aimed at answering these and other questions on quality management in horticulture. Growers, packers, exporters and retailers discuss, profitability, commitment, staff involvement, documentation and certification.

The 18-minute video is aimed at explaining why companies in the horticultural industry are developing quality management systems and interviews outline the practical experiences of those currently implementing quality management systems.

Specially designed as an introduction to quality management, this video is invaluable for companies starting on the quality journey who wish to familiarise their staff with quality processes.

Available for \$15 per copy plus \$4 postage from the Australian Horticultural Corporation.*

The video is perfect for training, staff awareness and motivation and is ideal for

use by teachers, students and consultants wishing to examine the key issues associated with quality management in horticulture.



John Baker, Managing Director AHC (left) handing a copy of the video to Senator Nick Sherry, Chairman Horticultural Task Force



Horticultural Industry Leaders Conference

The inaugural Horticultural Industry Leaders Conference held in Canberra in late June by the Australian Horticultural Corporation (AHC) was rated a success by industry leaders as they came together as an Australian Industry for the first time.

John Baker, the Managing Director of the AHC, said that many delegates had commented on how valuable the conference was in bringing the industry leaders together to focus on key issues affecting the Australian horticultural industry over the next five years.

The Horticultural Industry Leaders Conference had provided:

- the first opportunity to meet other horticultural industry leaders;

- a forum to exchange industry ideas/problems/solutions;
- an opportunity to meet government officials;
- a clearer understanding of the AHC and its activities;
- a good program with a diverse range of topics and information; and
- a focus on the customer and consumer, quality and market access.

In opening the conference, Senator Nick Sherry, Parliamentary Secretary to the Minister for Primary Industries and Energy, and Chairman of the Horticultural Task Force said he believed it was critically important that the industry recognised that the next 5 years will determine its long term future and present the last opportunity for the industry to achieve its full potential as a long term sustainable, export oriented and internationally competitive industry.

Senator Sherry said that the Government sees the major issues faced by the horticultural sector as value adding, international orientation and sustainable development involving the protection of

the resource base for future generations.

In opening the conference, Senator Sherry commended the AHC for organising the conference and bringing the horticultural industry leaders together.

A bound copy of the speeches from the Horticultural Industry Leaders Conference is available at \$30 per copy including postage from the AHC.*

Topics covered include;

- trends in retailing in Australia and the international market;
- waterfront reform and its impact on shipping services;
- developments in packaging and palletisation;
- brand marketing in the food industry;
- marketing programs for Australian industry and international markets;
- market access and developments in south east and east Asia;
- Australia's changing demographics; and
- results of the HPC International Competitiveness Study.

New Product Manager

Bart Gannon has been appointed as AHC Product Manager to the Avocado industry. His responsibilities will include:

- Ensuring the establishment of ongoing industry strategic marketing plans and marketing priorities for implementation by the AHC.
- Development, implementation and monitoring of product marketing plans.
- Management of product marketing forums.
- Communication and liaison.

He has recently returned from 2 years in the UK and prior to this managed his own marketing consultancy specialising in marketing planning and skills training for small to medium sized companies with clients in ornamental horticulture, leisure, entertainment, engineering and agricultural chemicals. His experience includes 16 years in agricultural chemicals.

Bart is looking forward to the challenge of encouraging consumption in the domestic market and expanding export markets for the avocado industry.

* Australian Horticultural Corporation, Level 14, 100 William Street, Sydney 2001. ph. (02) 357 7000, Fax (02) 356 3661.



Robert Mosse, President AAGF (left) with Jack Sumich, AHC Board Member

LMU Work To Plug Leaks

By Rob Suggett, Editor Market Place News

The FEDS of DPIE's Levies Management Unit (LMU) are getting pretty fair dinkum in rigorously seeking out the origins of the dreaded "levy leakage" these days.

And they have the legal power to do so.

Melbourne wholesaler Alex Mitchell of Austral Produce tells us he had a call from investigators while he was away in Queensland. He suggested an appointment for a routine audit on his return.

They couldn't wait. The LMU promptly got a search warrant and raided the premises, seizing his documents, which they can hold for up to 60 days.

Aha, we thought. Dramatic stuff. Could this be the start of a "series of raids" type story?

Not so. "It's fairly routine," LMU assistant manager Ed Treharne told us. They have to look at the books of various people to ensure they are deducting payments

under Section 7 of the Levies and Charges Collection Act 1991.

"We normally go along and try to talk to an operator," he said. "Some don't like to assist at all, so we go and get a search warrant. Documents are seized and receipts are issued for these."

In most cases, it's a matter of LMU people doing on-premises audits, as they are doing among Melbourne wholesalers at present. We're told checks are going on in all eastern states markets.

The increased activity follows concerns among a number of commodity groups that not all promotional and development levies are being collected. It's upset their budgets.

Every dollar missed is a dollar (or \$2 in the case of research) not spent on essential work for the good of all sectors of the industry.

Making An Avocado Fruit: Energy Expensive But Mineral Cheap!

By Nigel Wolstenholme, Dept of Horticultural Science, University of Natal, Pietermaritzburg.

Introduction

We all know that the avocado is a relatively low-yielding crop. An "average" grower probably only averages 10 or 12 t/ha, and a very good grower 20 t/ha. Compare this with an average citrus or apple grower who should achieve 40t/ha and a very good grower with more than twice this yield.

I have given several talks and written ad nauseam on the explanations for the avocado's seemingly poor performance. Part of the reason is that the avocado fruit is "energy expensive" for the tree to make. The developing fruit take a lot of "energy" out of the rest of the tree, particularly the photosynthesising leaf factory and stored carbohydrate reserves.

However, fruit growth demands other compounds in addition to the accumulation of energy substances (the latter a "reward" for the dispersers of the seed). These include mineral elements from the soil, plant growth hormones, a wide range of other metabolites in low concentrations and not least, plenty of water.

In this article I will concentrate only on the energy and mineral element composition of avocado fruit. We will see that our energy expensive fruit is paradoxically "mineral cheap", at least in its demands on the soil. What is the explanation, and how does this impact on management?

Energy Compounds In Avocado Fruit

The energy content in a mature fruit can be calculated from its heat of combustion (calorific value), or from its average composition on a fresh mass basis. Composition, as in dietary tables, is expressed as the percentage of water, total carbohydrates, protein, fat (or oil), and ash. Table 1 gives typical figures for an avocado (17% oil content) as compared to two sugar storing fruit.

Of the components in Table 1, only carbohydrate (CHO), protein and fat contribute to the fruits' energy (calorific) value. We know from dietary tables that the calorific values for every one gram are 4.0 kilocalories (kcal) for carbohydrate, 3.95 for protein, and 9.3 for fat or oil. These figures are multiplied by 4.184 to convert to the more modern unit called the kilojoule (kj).

It is apparent that weight for weight, oil has more than twice the calorific value of carbohydrate or protein. Note that even at only 17% oil content, avocado flesh has

about 30 to 60 times the oil concentration of an apple or orange. Small wonder that avocado fruit are energy expensive to produce. Nut crops, with some 70% oil in the kernel, are far worse in this respect, depending on kernel percentage, breeding etc. Average in-shell pecan yields are only around 1 tonne per ha, and walnuts two to three times higher.

The above exercise is based on fruit composition at maturity. Fruit, however, takes months to grow and mature, and much energy is used up in supporting this growth. These respiration losses can amount to one-third to over half the incoming carbohydrate energy from leaf photosynthesis. Photosynthesis provides the carbon skeletons which are the basis of life. About 90 to 95% of the dry mass of a plant comes from carbon compounds initially "fixed" from carbon dioxide and water in photosynthesis.

Mineral Content Of Avocado Fruit

Table 1 shows that 1.2% of the flesh mass of an avocado fruit is ash. Ash comes from mineral elements taken from the soil. Of the 16 essential nutrients for plant growth, 13 are true soil minerals. These include the major elements nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sodium (Na), and sulphur (S). Trace elements taken up in much smaller amounts include zinc (Zn), boron (B), iron (Fe) and copper (Cu). The three "non-soil mineral elements are carbon (C), hydrogen (H) and oxygen O₂, which come from carbon dioxide (CO₂) and water (H₂O) two substances which are truly the basis of life through photosynthesis.

All these essentials elements are found in fruit. Those supplied by the soil are not inexhaustible. That is why we top up the soil nutrient pool with fertilisers when stores run low. Large amounts of soil

nutrient elements may have to be taken up to support growth of roots, trunk, framework branches, leaves, flowers and fruit, but tree vegetative growth soon stabilises and much smaller replacement increments of vegetative growth are needed in mature trees. Furthermore, leaves, twigs and roots die and their minerals are partially recycled. The tree framework hoards nutrients temporarily taking them out of the soil store but there is also within-tree recirculation of most minerals.

Only the harvested fruit (plus their minerals) are "exported" from the orchard, and therefore constitute a loss. So if we know how much of each mineral is lost in this way, we have a pretty good basis for replacing them in fertilisation. There are also losses in runoff and drainage water.

Comparing the removal of some soil mineral elements by the fruit of avocados and oranges, for the same yield (10 t/ha) much smaller amounts of N, P, K, Ca, Na, Zn and B are removed by avocados. For Ca, it is 12 times less, for P and Zn four times less, for K three times less, and for N more than two times less. Interestingly, the fruit of the avocado contains slightly higher concentrations than oranges of Mg, and two and a half times more S. Have we neglected sulphur in avocado nutrition?

The average orange grower averages at least 3 to 4 times more t/ha than an avocado grower and therefore, would be exporting 3 to 4 times more mineral nutrients from his orchard. Oranges do not have a reputation for being particularly "hard on the soil"—certainly nothing like bananas, apples or pineapples, which need heavy fertilisation for consistently high yields.

Conclusion

It is clear that although avocado fruit are energy-expensive on the tree's carbon resources, paradoxically they are rather

Table 1. Composition of whole avocado fruit compared to Valencia orange and apple.

	%	%	%	%	%	Million Kj per tonne
	H ₂ O	Protein	Fat	CHO	Ash	
Avocado: flesh	73.6	2.2	17.0	6.0	1.2	7983
seed	50.3	2.5	1.1	44.8	1.3	8339
whole	67.8	2.3	13.1	15.7	1.2	8072
Orange: whole	82.3	1.3	0.3	15.5	0.6	2925
Apple: whole	84.8	0.2	0.6	14.1	0.3	2628

"cheapskates" on the soil's mineral resources. The mineral cheapness of avocado fruit reflects their composition, the relatively low yield per ha and the fact that a comparatively small proportion of the tree's assimilates are partitioned to the economic end product, the fruit. Furthermore, oils and carbohydrates are simply variations on a theme of arranging C, H, and O₂ molecules in long chains. We get these three elements "free" from the atmosphere (CO₂) and from water. Proteins admittedly contain N and sometimes S and other elements but again they are essentially carbon skeletons with plenty of O₂ and H. So the contribution of soil supplied minerals to the composition of avocado fruit seems to be somewhat downplayed.

Management implications of the high energy needs of growing fruit revolves around sufficient leaf factory and stored

CHO reserves to meet these demands. Firstly, the area of healthy well-lit leaves per ha must be maximised and maintained, i.e. the leaf fruit ratio must be adequate to maintain consistency of bearing and of fruit quality. Critical periods must be recognised in the phenological cycle. Healthy root growth at the correct times must be encouraged. Late hanging of fruit raises energy needs, so that the yield trade-off must be balanced by economic gain.

Mineral cheapness of avocado fruit implies a lower fertiliser bill than for most fruit crops. Growers faced with all the other hassles of growing this interesting crop can at least console themselves that in this respect they are much better off than their citrus or apple counterparts. It is true that usually they still have to apply some N, P, K, Ca, Zn and B at specified critical periods but leaf analysis will warn them

against unjustified "luxury" or "insurance policy" fertiliser applications, which in today's climate are tantamount to a financial death-wish. Certainly also, a 20 tonne crop is a very different proposition to a 10 or 12 tonne crop in terms of mineral export.

Perhaps one final point. The fact that an avocado crop exports relatively small amounts of minerals per ha per annum does not imply that individual pieces of fruit are poor sources of minerals. The opposite is true. Mass for mass, avocado fruit flesh is perhaps the most nutritious and balanced of all fleshy fruit and this includes minerals. At the recent World Avocado Congress, Bob Bergh spoke of the avocado's exceptional nutrient density. Each fruit is in reality a package of nutrition. This is made possible by producing a comparatively small number of fruit per ha.

Mulching Practices in Avocado Orchards

By M. Matava, Agronomist, Ag-Service, Visa, California - from California Avocado Society Inc. 1991 Yearbook

Avocado production, for the past several decades, has relied primarily on the use of chemical fertilisers to supply the necessary nutrients for optimum production. These man-made fertilisers rapidly replaced animal manures and mulches as the main source of nutrients due to their low cost and ease of application.

Although these materials adequately meet the chemical needs of the plants, little attention was given to the biological and physical phases of the soil. As every avocado grower knows, the feeder root systems of avocado trees are very shallow and tend to localise in the upper portion of the soil profile which is designated by soil scientists as the 'A' horizon and contains the greatest amounts of soil organic matter.

Most of our San Diego County avocado soils are composed primarily of decomposed granite which contains less than 1% organic matter. Avocado trees, however, are subtropical trees and are well adapted to soils containing 10% and higher organic matter.

A healthy root system is evidenced by large cream-coloured feeder roots immediately below the leaf mulch layer. Moving further into the soil profile, the soil becomes less organic, and fewer feeder roots are found even six inches below the soil surface.

Trees not receiving adequate irrigation have a thick layer of fallen leaves that are not readily decomposing. The trees have leaves that are limp and tip-burned and fruit that is small and drops prematurely. When the leaf mulch is brushed away, few feeder roots are found beneath the surface,

and those roots tend to be darkened and shrivelled. No amount of fertiliser, either chemical or organic, will improve this condition until sufficient water is applied.

Fortunately, as an orchard matures, the natural leaf drop eventually breaks down, supplying a constant source of organic material. Although eventually a thick humus layer will form in a healthy orchard, there is evidence that this can be enhanced through the use of a variety of organic products other than traditional animal manures.

Locally (in San Diego County), sanitary districts are looking for ways to use digested sludge which was traditionally deposited in landfill sites. Currently, the Encina sludge plant in north San Diego County produces 27,000 tons of digested sludge per year. Landfill sites now require at least 50% solids in sludge for disposal. As the digested sludge is only 15% solids, other outlets for disposal must be found.

The Fallbrook Sanitation district mixes the sludge with green yard waste and composts thoroughly to destroy human pathogens. It also produces a product which uses special composting worms to break down the material to make a fine, uniform mulch.

Spent mushroom compost has also been used successfully. This material is a combination of straw, manure, gypsum, lime, peat moss, and cottonseed meal. It is thoroughly mixed and broken down during the mushroom growing process.

All these products, which contain manures, have high levels of salts, which can cause premature leaf and fruit drop.

Application should be made during the winter months when the trees are in a state of quiescence. This allows excess salts to be flushed from the root zone before the trees are actively growing in the spring.

Although the initial salt levels are high, four to six inches of water is usually sufficient to reduce the salts in the soil extract to an acceptable level. This can be done with irrigation water if no rain occurs. If there is any doubt that the soil has been completely leached, it is advisable to test the soil for excess salts.

In addition to the benefits of adding chemical nutrients, recent research has focused on the use of organic material to help control plant pathogens, such as Phytophthora, in replant situations. Preliminary results of research done, by John Menge, of the University of California at Riverside, and Gary Bender, San Diego County farm advisor, have been promising. Future replant recommendations may include the use of organic matter to help provide beneficial micro-organisms for increased viability.

Although organic materials may prove to be beneficial to both avocado production and the environment, care should be taken to use these products properly. No fertiliser or mulch will replace consistent and appropriate farm management practices.

This paper is the author's condensed reconstruction of an address presented at the annual meeting of the California Avocado Society held in Ventura, September 28, 1991.

Report Into Avocado Research Maroochy Horticultural Research Station

The Maroochy Horticultural Research Station (MHRS) has recently issued its report No 6 summarising research being carried out by their scientists. Part of that report, involves six progress reports and two summaries of projects on avocados. This article has taken extracts from those reports and summaries and reproduced them on this and the next three pages. The summaries are the last two articles (p 23).

It should be noted that none of these projects involves the use of growers' research levies collected on behalf of the HRDC, all financing is from other sources.

Copies of the full report are available from DPI Publications, QDPI, GPO Box 46, Brisbane Qld 4001. Cost of the report is \$35 plus \$4 postage and handling. Besides avocados, the report covers research on banana, citrus, custard apple, lychee,

macadamia, mango, pawpaw, passion-fruit, persimmon, pineapple, stonefruit and strawberries.

Because the research reports involve several scientists, the location of each is listed here in alphabetical order.

P.A. **Anderson** - Ministry of Agriculture and Fisheries, Kerikeri, New Zealand.

P.A. **Hargreaves** - Agricultural Chemistry, DPI, Meiers Road, Indooroopilly, Qld, 4068.

R.R. **Kohli** - Indian Institute for Horticultural Research, Bangalore, India.

P.W. **Langdon** - Maroochy Horticultural Research Station, P.O. Box 5083, SCMC, Nambour Qld, 4560.

S.P. **Lara** - University of Florida, IFAS, Tropical Research and Education Center, 18905 S.W. 280 Street, Homestead, Florida 33090.

K.G. **Pegg** - Division of Plant Protection, Meiers Road, Indooroopilly, Qld, 4068.

L. **Ruddle** - Agricultural Chemistry, DPI, Meiers Road, Indooroopilly, Qld, 4068.

J.B. **Saranah** - Maroochy Horticultural Research Station, P.O. Box 5083, SCMC, Nambour Qld, 4560.

Bruce **Schaffer** - University of Florida, IFAS, Tropical Research and Education Center, 18905 S.W. 280 Street, Homestead, Florida 33090.

G.K. **Waite** - Maroochy Horticultural Research Station, P.O. Box 5083, SCMC, Nambour Qld, 4560.

A.W. **Whiley** - Maroochy Horticultural Research Station, P.O. Box 5083, SCMC, Nambour Qld, 4560.

B.N. **Wolstenholme** - Department of Horticultural Science, University of Natal, Pietermaritzburg 3200, South Africa.

Partitioning Of (¹⁴C)-Photosynthate In Avocado Trees As Influenced By Shoot Age

Researchers - A.W. Whiley and Bruce Schaffer

Introduction

Most tropical and subtropical tree fruits are poorly selected, and are often in the early stages of domestication. Furthermore, the emphasis has been on fruit quality and ease of management rather than efficient productivity. In particular, the polyaxial terminal-fruited species (viz. avocado, mango and lychee) tend to be large but low yielding trees. On closer examination this is seen to be due to their vegetative bias resulting in high allocation of dry matter to shoot growth.

A better understanding is needed of the control of carbon allocation in evergreen subtropical and tropical tree crops. The timing of phenological development phases of roots, shoots, flowering and fruiting relative to changing source and sink strengths, needs in-depth study on a wide range of evergreen species under different environmental conditions. This study examines the changing relationships in sink strengths in avocado trees.

Materials and Methods

Leaves of new shoots of potted avocado (*Persea americana* var. *americana* cv. Simmonds) trees trained to a central leader, were irradiated with ¹⁴C at different stages of shoot maturity. In one group of plants, the oldest leaf of the newly growing shoot was irradiated with ¹⁴C 18 days after

bud-break when this leaf was judged photosynthetically competent.

In another group of plants a similar leaf was irradiated with ¹⁴C 36 days after bud-break when all leaves on the shoot were fully expanded and the youngest leaf was photosynthetically competent. In each case, 16 days after irradiation the respective plants were harvested, separated into leaf, stem and root components dried, weighed and oxidised. The percentage ¹⁴C in these components in each treatment was then determined.

Results

There were no significant differences between treatments in ¹⁴C recovered from the irradiated leaves, old shoots and old leaves. However, significant differences between treatments were found in ¹⁴C recovered in new shoots, new leaves and roots. Trees where leaves were irradiated at the beginning of shoot development retained a greater percentage of ¹⁴C in the new shoot and leaves than those treated when shoots were fully developed. In the latter trees a greater percentage of the total ¹⁴C recovered (approximately 5 times more) had been translocated to the roots.

Commercial Implications

The fixation of atmospheric carbon dioxide through photosynthetic activity is the fundamental process of growth and productivity of crops. Yield gains are largely

attained through our ability to divert greater quantities of photosynthates into the economic product, viz. avocado fruit. By understanding the seasonal and developmental interactions in trees with respect to distribution of their photo-assimilates we are in a stronger position to develop management strategies which favour greater fruiting or assist with other cultural procedures.

Information from this research was used to develop more effective injection of phosphonate fungicides for the control of Phytophthora root rot.

Previous studies had shown that the distribution of phosphonate in the tree was dependent on the current sink strengths at the time of injection, i.e. organs that were growing fastest accumulated the most phosphonate. To control Phytophthora root rot critical concentrations of phosphonate must be present in the un-suberised roots. Hence, targeting with phosphonate injections when the trees roots are the favoured recipient of assimilates should be the most effective strategy [see 'Effect of time of injection on phosphonate concentration in roots of avocado (*Persea americana* Mill) trees' in this report].

Funding Source

University of Florida and the Queensland Department of Primary Industries (QDPI).

Effects Of Age On Net CO₂ Exchange Of Avocado Leaves

Researchers - Bruce Schaffer, A.W. Whiley and R.R. Kohli

Introduction

Growth of avocado trees is characterised by periodic vegetative flushes resulting in a canopy of leaves of varying ages. In addition, leaves are relatively short-lived compared to that of other subtropical tree species. It has been shown with other plants that as leaves expand net photosynthesis increases, reaching a peak at about the time that the leaf reaches full size.

Since fruiting is determined by seasonal photosynthetic efficiency, determining the effect of leaf age on net photosynthetic characteristics of avocado leaves should provide valuable information, assisting in the management of avocado canopies for maximum photosynthetic efficiency and yield. The purpose of this study was to determine the effects of leaf age on CO₂ exchange characteristics of avocado leaves.

Materials and Methods

Avocado trees cv. Peterson (West Indian ecological race) planted at the University

of Florida's Tropical Research and Education Center, Homestead, Florida were used in this experiment. All trees were on 'Waldin' seedling rootstocks and were 12-14 years old at the beginning of the experiment. Immediately after vegetative buds opened, 5 leaves per tree were tagged on 5 randomly selected trees for measurements of leaf area and net CO₂ assimilation.

Leaf area was measured every 3 days from 7 days after bud-break until leaves stopped expanding (28 days after bud-break). Net CO₂ assimilation (net photosynthesis) was determined at four-day intervals from 14 days after budbreak until 42 days after budbreak, then at approximately seven-day intervals until 100 days after budbreak.

Results

The rate of leaf expansion was linear until 28 days after bud-break, after which time there was no further increase in leaf size. Net CO₂ assimilation increased as

leaves aged until about 60 days after bud-break. After that time, net CO₂ assimilation began to decline.

Commercial Implications

A basic understanding of leaf physiology is required to assist in the development of strategies for managing both avocado tree and orchard canopies.

This study provides preliminary information on the ability of individual leaves to convert atmospheric carbon dioxide into a 'food source' as they grow and mature. It also defines when leaves change from importers of carbon products to net exporters thus contributing fruit and root growth.

From the basis of this research we can look more closely at the relationships between leaf and fruit growth and the opportunities for manipulation towards greater productivity.

Funding Source

University of Florida and the QDPI.

Pheromone Studies Of Ivy Leafroller And Orange Fruitborer In Avocados

Researcher - G.K. Waite

Introduction

The ivy leafroller (*Cryptoptila immersana*) and to a lesser extent the orange fruitborer (*Isotenes miserana*) are pests of avocados (*Persea americana* Mill) in south-east Queensland. Control of leafrollers is often difficult to achieve since they shelter amongst rolled and webbed leaves and may inflict severe damage on fruit.

By the time they reach the stage where they become obvious and require control the larvae are also large and more difficult to kill. In order to time sprays more effectively, a suitable monitoring procedure is

required. The use of pheromone traps may provide a way of determining flight activity of moths so that potential larval infestations can be predicted and appropriate control measures taken.

Results

Pheromone dispensers placed in sticky traps and located within avocado orchards have caught significant numbers of moths, enabling prediction on several occasions as to when eggs would be laid and larvae hatching. Collaborating CSIRO biochemists are continuing research to refine the pheromone blend to make it more efficient

and the latest blends are currently being tested. Several seasons of trapping will be necessary to accumulate sufficient data to enable accurate predictions for leafroller control.

Commercial Implications

Instead of ad hoc decisions being made as to when to apply sprays, growers should be able to time their applications better, reducing costs and obtaining more efficient control.

Funding Source

QDPI.

Determination Of Photosynthetic Activity Of Avocado Fruit From Set To Maturity

Researchers - A.W. Whiley, Bruce Schaffer, and S.P. Lara

Introduction

Avocado yields are relatively low compared to those of other fleshy fruit crops. This is primarily because of the high energy cost of producing oil-bearing fruit. Many fruit have been shown to have a photo-synthetic component, during part or all of their development, which contributes to their own growth.

Avocado fruit are green skinned from fruit set to maturity and have the potential to fix carbon through the photosynthetic mechanism. This study investigates the

photosynthetic activity of this fruit during its growth and development.

Materials and Methods

Avocado trees cv. Booth-8 planted at the University of Florida, Tropical Research and Education Center, Homestead, Florida were used in this experiment. All trees were on 'Waldin' or 'Lula' seedling rootstocks and were about 35 years old at the beginning of the experiment. From 3 weeks after anthesis (early April, 1989) to fruit maturity (mid-September, 1989), light and dark carbon dioxide (CO₂) fluxes and dry weight were determined at

fourteen-day intervals for 3 fruit on each of 5 trees.

Statistical models comparing fruit dry weight to fruit CO₂ fluxes in the light and dark were constructed. Net photosynthesis (expressed on a dry weight per fruit basis) was determined from the difference between net fruit CO₂ exchange in the light and net fruit CO₂ exchange in the dark.

Results

Fruit were shown to contribute to their own carbon economy through a positive photosynthetic component even though

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21 the total CO₂ exchange from the fruit resulted in a net loss of carbon, i.e. respiratory losses of CO₂ were higher than photosynthetic fixation. The difference between CO₂ exchange of fruit in the dark and light decreased as fruit weight increased (fruit weight data not presented). Therefore, fruit photosynthesis expressed on a fruit dry weight basis decreased with fruit growth.

Commercial Implications

Carbohydrate source and distribution studies in fruit trees is giving basic information on the potential productivity of these crops. This approach also identifies where opportunities exist to manipulate trees for higher yields. This study has given fundamental information on relative sources of carbon products for developing avocado fruit. From this type of research

we can develop a total picture of carbohydrate production and distribution in the whole avocado tree. This leads to a better interpretation of results from applied cultural treatments and increases our ability to devise effective strategies for the management of avocados.

Funding Source

University of Florida and the QDPI.

Pyrethroid Sprays For Control Of Avocado Pests

Researcher - G. K. Waite

Introduction

The two major pests of avocados in southern Queensland are fruitspotting bugs (*Amblypelta* spp.) and ivy leafroller (*Cryptoptila immersana*). Many growers feel that currently recommended and registered controls for these pests are not effective and would prefer to use one of the synthetic pyrethroids, which have been shown to give excellent control. However, secondary pest problems are a real danger when these chemicals are used and additional sprays of toxic insecticides are required to control them.

The effect of the synthetic pyrethroid deltamethrin (Decis®) on the avocado pest complex was investigated at MHRS during 1988-89 and is continuing.

Results

Excellent control of fruit-spotting bugs was achieved when it was used at fortnightly intervals. Ivy leafroller has never infested avocados at this site so no data was collected for this species. Latania scale infestation of fruit increased from virtually zero in 1987-88. Fuerte were more heavily infested than Hass and at the end of the season had heavy scale infestations on twigs and branches. Parasites were recorded in scale on both varieties but at very low levels.

Tea red spider mite numbers increased during March but by mid-May had declined to negligible levels. Predatory activity at this time was zero but heavy rainfall during the period probably washed many mites off leaves.

The continued use of pyrethroid sprays in this orchard is expected to precipitate an explosion of latania scale on fruit from the increasing colonies present on the wood of the trees.

Commercial implications

Good control of spotting bug, fruit fly and caterpillar pests can be obtained with synthetic pyrethroid sprays but there is an under-lying threat from latania scale and tea red spider mite which multiply to damaging levels due to the disruption of their natural enemies. Corrective sprays for scale may not provide the level of control required commercially.

Funding source

QDPI.

Effect Of Time Of Injection On Phosphonate Concentration In Roots Of Avocado (*Persea americana* Mill) Trees

Researchers - A.W. Whiley, P.A. Hargreaves, K.G. Pegg, L. Ruddle, J.B. Saranah and P.W. Langdon

Introduction

Phosphonate trunk injections of avocado trees have proved to be a very effective treatment for controlling Phytophthora root rot of avocados. As a result of this research, injection times have been recommended for early spring and early summer prior to the two major root flushes which occur in avocado trees.

With increasing chemical and labour costs and a return to productive orchards, the question of frequency and efficiency of treatment to maintain tree health has arisen. This study examines the relationship of timing of trunk injections to the changing sink/source strengths and the concentration of phosphonate in the roots.

Materials and Methods

Healthy, fruiting 12 year old Hass trees, which had never been treated with phosphonate fungicides, were selected for the experiment. Three trees were injected with 20% potassium phosphonate at 15 ml m diameter of trunk canopy immediately

following the completion of flowering (4/10/88) and another group of 3 trees were injected with the same product and rate when the spring flush had matured (15/12/88). With each group of 3 trees an additional tree was selected and monitored as an untreated control.

Spring flush leaves and root samples were collected from all trees for phosphonate analysis immediately prior to treatment and then subsequently at 2, 4, 8, 16 and 32 days after trunk injection.

Phosphonate residues in leaf and root tissues were then analysed.

Results

Phosphonate was detected in leaves and roots of all trees (2.5 mg kg⁻¹) prior to injecting the trees. Although these trees had never been treated with phosphonate fungicides the orchard had been regularly sprayed for weed control with glyphosate (Roundup®) a phosphonate salt. It is possible that the residues found in the trees came from this source. However, there is no evidence in the

literature to indicate degradation of glyphosate to phosphonate. During the period of sampling phosphonate concentrations in the leaves and roots of the untreated trees remained below 0.5 mg kg⁻¹.

Phosphonate concentrations in the spring flush leaves climbed rapidly following both injection times. However, the highest leaf concentrations of phosphonate were measured following the earlier injection time. Leaf phosphonate concentrations in both treatments began declining approximately 10 days after injecting trees.

Phosphonate concentrations in the roots did not rise as rapidly after injection as in the leaves. Root phosphonate levels were particularly low in the treatment where injections were given immediately following flowering, reaching a maximum concentration of 6.6 mg kg⁻¹ (a similar result was found in 1989). However, where trees were injected at spring flush maturity, the root phosphonate concentrations rose to about 30 mg kg⁻¹.

Commercial Implications

Our results show that the timing of trunk injections of phosphonate fungicides in healthy trees, for the protection against *Phytophthora* root rot, can substantially influence the concentration of phosphonate in the roots.

Uptake of phosphonate from trunk injections is through the xylem (the tissue carrying water from the roots to the leaves). Hence the rapid rise of phosphonate concentrations in the leaves following injection. However, redistribution of phosphonate from the leaves to the roots is via the phloem (the bark tissue which moves photo-assimilates, i.e. the sugars produced in the leaves of the tree to the fruit, roots and other areas of the tree to provide energy and materials for growth).

We are not aware of any evidence that phosphonate is a metabolite in avocado trees but translocation in phloem tissues is most likely to be via the mass flow of assimilates. Developing spring shoots are net importers of assimilates thus accounting for the relatively low export of phosphonate to the roots from the post-flowering injection. However, once leaves mature they become net exporters of assimilates and rapidly translocate phosphonate to other growth areas in the tree, e.g. roots.

By strategically timing the trunk injection of phosphonates into avocado trees the efficiency of translocation of the fungicide to the roots can be increased by about 300%. This more effective use of fungicide will be of considerable economic benefit to producers requiring a root rot management program.

In subtropical Australia, disease pressure is greatest during the summer months when soil temperatures and moisture are optimum for the growth and development of the pathogen. Injections of phosphonate fungicides at either the maturity of spring shoot growth and/or during the mid summer months will give protection to the tree during this critical period.

Further research is required to more closely define the minimum concentration required to protect roots in relation to the complex pathogen/host interactions.

Funding Source

Other Fruits Sectional Group Committee of the Queensland Fruit and Vegetable Growers and the Rural Industries Research and Development Corporation.

Correction Of Zinc And Boron Deficiencies And Control Of *Phytophthora* Root Rot Of Avocados By Trunk Injection

Researchers - A.W. Whiley, K.G. Pegg, J.B. Saranah and P.W. Langdon

Summary

Phosphonate at 3 concentrations (7.5, 10 and 20%) was injected into the trunks of avocado (*Persea americana* Mill.) trees showing advanced symptoms of canopy decline caused by *Phytophthora* root rot. All formulations of phosphonate and potassium phosphonate, including the lower rates of the 7.5 and 10% treatments, successfully controlled root rot resulting in improved tree health. The 7.5% concentration of phosphonate permitted the formulation of chemically compatible mixtures containing zinc and boron which, when trunk injected increased the concentrations of these nutrients in mature summer grown leaves.

Phosphonate formulations containing 17% zinc chelate or 10% zinc nitrate, injected twice during a growing season at 15 mL/m of canopy diameter, increased leaf zinc concentrations above the critical level of 30 mg/kg DM. However, the inclusion of zinc chelate in formulations substantially increased the time of uptake of the injection compared with the formulation containing zinc nitrate.

Phosphonate formulations with 0.9% boron, injected twice during a growing season at 15 mL/m of canopy diameter, improved leaf boron concentrations but failed to reach the critical threshold concentration of 50 mg/kg DM.

Commercial Implications

The successful control of *Phytophthora* root rot of avocado trees with lower rates of phosphonate or potassium phosphonate fungicides (7.5 and 10% compared with the registered concentration of 20%) gives growers a cheaper disease control/prevention program. The formulation of zinc salts with this fungicide allows the effective correction of deficiencies of this nutrient in avocado trees.

Funding Source

Other Fruits Sectional Group Committee of the Queensland Fruit and Vegetable Growers and the Rural Industries Research and Development Corporation.

Effect Of Root Temperatures on Growth Of Two Avocado Rootstock Cultivars

Researchers - A.W. Whiley, B.N. Wolstenholme, J.B. Saranah & P.A. Anderson

Summary

Non-grafted, cloned avocado plants (*Persea americana* Mill.) of the Mexican (cv Duke 7) and Guatemalan (cv Velvick) ecological races were grown for twelve weeks in sunlit growth rooms with root temperatures controlled at 13, 18, 23 and 28°C. Air temperatures in the rooms were profiled between 28°C day maximum (1500 h) and 18°C night minimum (0600 h).

Root dry mass at the root temperature of 13°C was lower than at 18, 23 and 28°C. There was no significant difference in root dry mass between the two cultivars at any of the root temperatures. Shoot dry mass was greatest at 18, 23 and 28°C with a significant reduction at 13°C. At the root temperatures

of 13 and 23°C cv Velvick produced greater shoot growth than cv Duke 7.

Leaf xylem water potential (ψ_L) became more negative and stomatal conductance (g_s) fell during the day regardless of root temperature. However, at all root temperatures the ψ_L of cv Duke 7 was more negative than cv Velvick at 1400 h, and at 13°C the g_s of cv Duke 7 fell more rapidly during the morning than cv Velvick.

Commercial Implications

The success of avocado production over a diverse climatic range is undoubtedly due to the different tolerances of the three ecological races of this species. This diversity is being utilised in the selection of elite rootstocks for different environmental and soil conditions. To date, most research has been in developing

Phytophthora root rot resistant rootstocks. Unfortunately, little attention has been given to other physiological and horticultural features which can effect the productivity of these rootstocks. Our study has shown how the water relations of rootstocks respond differently to soil temperature potentially affecting tree productivity.

Rootstocks may also effect fruit quality as is the case with citrus. These factors should be considered in future rootstock development in avocado before the commitment to extensive commercial planting is made.

Funding Source

Other Fruits Sectional Group Committee of the Queensland Fruit and Vegetable Growers and the Rural Industries Research and Development Corporation.



**Graham Anderson Demonstrating his Pruning
Technique Using A Hydraulic Chainsaw**