



- The Australian Newsline
Seventh Edition
August/September 1991

Talking Avocados

“A BETTER MOUSETRAP” - THE HYDRAULIC TREE INJECTOR

By R. W. Rawlins, Avocado Grower, Northern NSW.

The following is the history of the need and development of the Hydraulic Tree Injector. I am sure all avocado farmers who inject their trees can relate to my experiences.

Some three years ago whilst collecting the 60ml syringes that I had placed in my avocado trees earlier in the day, I considered the usual problems with which I was again being beset. These included:

- incomplete uptake of the solution, (in some cases the syringes were still half full.)
- dislodged syringes, with the result an unknown uptake.
- all the time expended on multiple trips to and from the trees.

Realising that there had to be a better way, I sat down and listed all the design features required of a machine to better tackle the job.

As a result, I set the following design points.

Firstly, the machine had to do the job in a lot less time with only one trip to each tree and no washing out, refilling and collecting of syringes.

Secondly, it had to do a better job than was apparent at the time of injecting.

Thirdly, it had to be cost effective

and of uncomplicated, robust, long life design.

All the other injection methods that I saw were compromises, ie. the equipment being used was never designed to do the job being asked of it. After a considerable amount of thought I came up with the basic design and built a prototype machine. A period of trial followed and after a small amount of redesign I have developed the Hydraulic Tree Injector.

The Hydraulic Tree Injector consists of a padded back frame incorporating shoulder and waist straps, a five litre reservoir tank, and a hydraulic cylinder fitted with a length of flexible hose with an injection nozzle incorporating a non-return valve (see figures (a) and (b)). All of the above components are of a robust, corrosion - resistant construction to ensure a long service life.

The design enables pressures of up to 200 psi (1 400 KPa) to be achieved, although this is rarely ever needed. The user has complete and instant control over both the pressure and the rate of injection. In practice you can tell by feel the correct rate and pressure required for each tree. This varies according to the health of the individual tree.

Once you have finished injecting there



Figure (a). The Hydraulic Tree Injector ready to be used.



Figure (b). The nozzle used on the Hydraulic Tree Injector.



is no need to return to that site and you can tell both visually and by feel that the full metered amount of solution has been injected. Personally I find this very satisfying. In practice on both of our farms we can comfortably achieve 100 injection sites an hour. Some users have reported even better results. This rate of injection makes the injector extremely cost effective and on an orchard of 750 trees the injector pays for itself in time saved alone in one season - all the other benefits are a bonus.

To date after two years of use (and many thousands of injections) we have not had to replace any components of the injectors. After this period of time I feel that the Hydraulic Tree Injector has been a success as it has achieved all the original design goals.

If any further information is sought by growers I can be contacted on 066 295-319 or C/- Kris Farm, Victoria Park Rd, ALSTONVILLE NSW 2477.

Keeping In Touch.... CONFERENCE 92 AGENDA

This is your chance to put forward topics for inclusion on the agenda for the 1992 AAGF Biennial Conference. The Organising Committee will be meeting soon to finalise the format and any suggestion you may have will be most welcome.

The conference is set down for Tuesday, 29 September 1992 to Friday, 2 October 1992 inclusive, again at Conrad/Jupiters Hotel at Broadbeach on the Gold Coast.

Please give some consideration to the topic you would like to hear about and speakers you would like to hear and let Ross Boyle know either by Ph: (07) 379 0222 or Fax: (07) 379 9283 by 30 November 1991.

DID YOU KNOW? ANVAS STATUS

Anderson's Nursery located at Duranbah, Northern NSW had been inspected and is now accredited as an ANVAS nursery following completion of paperwork by the NSW Department of Agriculture.

Throughput - Perth Market Authority July 1990-May 1991

Volume Trays	
July 1990	11 715
August 1990	13 602
September 1990	12 204
October 1990	14 111
November 1990	16 288
December 1990	14 279
January 1991	12 406
February 1991	9 337
March 1991	11 343
April 1991	9 765
May 1991	10 251



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FRUIT TREE CIRCULATION

*An edited version of an article by Jim McDonald,
California Grower, September 1990*

There has been much discussion as to the nutrient need of orchard trees and how best to manage irrigation and fertilisation practices to enhance the trees' uptake of water and minerals. In this article, Jim McDonald only considers what happens when these materials enter into the trees' circulatory systems.

Now, let's assume that nutrient levels in the soil are in good balance and adequate for your trees' needs.

After entering the receptor cells of the root hairs, the water and mineral nutrients soon find their way into the xylem vessels in the woody area of the tree trunk. In the very centre of the trunks of the older trees is located the heartwood, which consists of once - functional xylem vessels. These heartwood xylem vessels, no longer capable of transporting water and nutrients, now serve only to add structural strength to the tree.

Between the central area of heartwood and cambium, a zone of undifferentiated cells located just under the trunk bark, is the trees' sapwood which consists of functional xylem vessels and associated structures. These vessels, vast in number and minute in diameter, are tiny capillary - sized "pipelines" which carry water and mineral nutrients from the root tips to the leaves.

There appears to be general agreement among plant physiologists that the xylem vessels conduct dissolved materials according to the transpiration-cohesion-tension theory. This means that as the rapidly-transpiring leaves take water from the xylem vessels, an increased tension, or pull, occurs, which is quickly relieved by incoming water under higher turgor pressure in the xylem vessels below. Cohesion, or the strong tendency of the water molecules (with dissolved minerals) to stick together, keeps the water columns from separating as they flow up the xylem vessels. As water

is pulled out of the root hairs, increased tension encourages replenishment of water and nutrients by osmosis.

To understand how rapidly water and mineral nutrients flow through the xylem vessels, from the soil to the leaves, consider this. On a hot summer day, a full-sized avocado tree may transpire as much as 150 litres of water (not counting evaporative losses), and most of this loss will take place over the approximately 12 daylight hours. This means that, on average, about 12 litres of water and nutrients per hour will pass through any fixed point on the tree trunk. (The mineral nutrient content will be very low; practically all of the material flowing up the xylem vessels will be water.)

Photosynthesis, the means by which water and aerial carbon dioxide combine to produce simple sugars which by elaboration develop into the more - complex carbohydrates that make up the tree and its crop, has already been alluded to. Now, we have to consider how the resulting photosynthates get from the leaves, where they originate, to all other parts of the tree.

Transport of photosynthates takes place in the phloem vessels which, like the xylem vessels, extend essentially from the tips of the leaves to the root tips. In woody plants, like orchard trees, phloem vessels are located in the bark between the periderm and the cambial layer that separates the bark from the wood. Structurally, the phloem vessels - often called sieve tubes - are quite different from the simpler xylem vessels.

At intervals down the length of each sieve tube are structures called sieve plates. In these plates are holes through which pass strands called plasmodesmata. Adjacent to the sieve tubes are companion cells which permit lateral movement of materials into and out of the sieve tubes.

Pressure required to force the flow of photosynthates from the leaves to other parts of the tree begins in the leaf cell parenchyma, where osmotic pressure develops forcing water and carbohydrates from the leaves into the sieve tubes. This phenomenon is referred to as pressure flow.

From older leaves, photosynthates moves in the sieve tubes through branches, stems and twigs in the direction of younger leaves and developing fruit. In addition, they are carried downward in sieve tubes to the root tips. Included along with these photosynthates are not only sugars, but also nitrogen-containing materials such as amino acids, vitamins, and other substances taken from the protoplasm of leaf cells. Sugars and starches carried in the sieve tube stream are capable of being stored until needed for respiration (consumed to produce energy) or for their eventual conversion into the various plant structures.

To a botanist, the trees' real plant food is the carbohydrate material manufactured in the leaves, not the "plant food" bagged and labelled as such in the garden supply stores. The materials we apply as fertilisers serve only to provide the mineral nutrients required to make the manufacture of plant food possible.

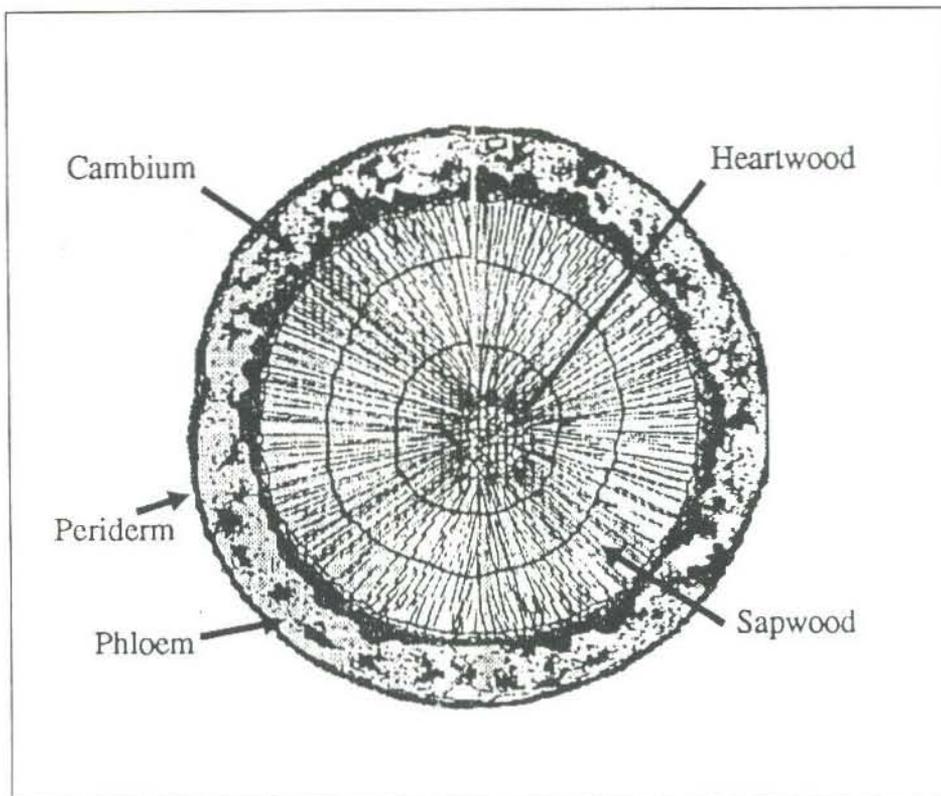
Now, what practical significance does this have for a tree farmer? Obviously, since the phloem vessels (sieve tubes) are in the thin layer of bark that surrounds all woody parts of the tree - that is, the larger roots, branches, twigs and, of course, the trunks they are quite vulnerable to injury if the bark is damaged or destroyed (girdled).

When bark loss occurs, some or all of the included phloem vessels will be severed, causing either the growing branch tips (and fruit if any) and/or root tips to be either partially or totally deprived of nourishment.



It is the farmer's or grove manager's job, then, to make sure that nothing happens to cause bark girdling or loss resulting from any of the following events: fire damage, herbicide drift, mechanical injury, sunburning due to inadequate irrigation, chewing by rodents, stacking of manures or mulches next to the trunks, deliberate girdling of lower trunk bark to induce fruit to set, and disease infestations (collar rot, gummosis, etc.)

In summary, your trees' vascular systems will do their job well if you apply generous irrigations, use leaf and soil analysis to ensure that your trees are getting a balanced and adequate diet of mineral nutrients, avoid preventable disease infestations, and prevent injury to your trees through accident or oversight.



Keeping in Touch....

AVOCADO PLANNING WORKSHOP

*John Baker, Managing Director,
Australian Horticultural Corporation.*

The Australian Horticultural Corporation has worked with members of your Executive in planning a strategic planning workshop for the Avocado Industry.

By way of background, the AHC and the Federation have held discussions over the past two years in relation to participation by the Avocado Industry in the Corporation. The Federation, at its May meeting, accepted the suggestion that a strategic planning workshop be held, leading to identification of what role the AHC may play in meeting the industry's marketing needs.

Derek Bone and John Baker from the Corporation, worked with your President and Secretary in planning the workshop which was held in Brisbane on 30 September and 1 October, utilising the services of Phil Herd of Corporate Plans Pty Ltd as workshop leader.

One of the most challenging tasks was the selection of people to

participate in the workshop. The organisers wanted to ensure that the different components of the industry (growers, wholesalers, retailers and exporters) were represented by the participants in a cost-effective way. People were selected for the contribution they could make and certainly not because of their state-of-origin or industry membership. If large numbers of people had been included, along with the other participants, the size of the workshop would have restricted its effectiveness.

The format of the workshop in summary was as follows:

CURRENT INDUSTRY SITUATION
(STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS)

VISION FOR THE INDUSTRY

INDUSTRY OBJECTIVES

STRATEGIES TO ACHIEVE THE OBJECTIVES AND THE VISION

Documentation is being distributed to the AAGF in advance of the Annual General Meeting in November. This will give the AAGF the opportunity to identify what role the AHC has in implementing the identified strategies and provide background information in helping establish whether the industry should participate in the AHC.

New Zealand Tour 1993

The Australian Avocado Grower's Association is considering conducting a Grower's Tour to New Zealand in 1993. Please contact Ross Boyle on (07) 379 0222 if you are interested or want more details.



Keeping In Touch....

OPPORTUNITY TO EXPORT TO NEW ZEALAND

"Growers who have maintained the registered status of their indexed orchards, will soon have the opportunity to export avocados to New Zealand," stated Don Lavers, Chairman of the AAGF Varieties Committee, after the recent meeting of the committee.

"AQIS have prepared draft standards to cover these exports, and are awaiting ratification by the authorities in New Zealand" he said.

These will require participating growers to be registered by AQIS. They must follow an approved pest control program and keep an adequate pest control diary. Fruit must be sourced from indexed farms or blocks that have been correctly maintained and inspected. The Sunblotch Viroid (SBV) free fruit must be kept identifiable and in isolation during the packing operation.

Packing houses will be registered by AQIS and will be required to maintain certain standards, to prevent mixing with other fruit.

Fruit from approved fruit fly free areas will require appropriate certification. Avocados from other

areas will require a certificate to cover EDB fumigation.

Mr Lavers emphasised that these standards were still at the draft stage and there may still be changes before exports could begin. Growers seeking further information should contact :-

● Philip Hood, AQIS Export Centre, Senior Inspector, Brisbane.
Ph: 07 8608504.

OR

● John Dean, AQIS, Canberra.
Ph: 062 2725152.

If growers have not had an inspection of their registered blocks recently, and would like assurance that their registered status has been maintained they should write to:

Ms Roslyn Stark
Registrar, AAGF Varieties
Committee,
C/- COD, PO Box 19,
BRISBANE MARKETS Q 4106

"The Federation strongly urges growers who are considering planting, to purchase indexed trees

from their ANVAS Nursery and pay the small inspection fee for their registration," said Mr Lavers. "This not only ensures that the trees are free of SBV and Phytophthora Root Rot but gives access to export markets where SBV freedom is important".

"A block can continue to be registered provided that it is isolated from non-registered blocks, clean utensils and tools are used in the block and only registered material is used for replacements and grafting within the blocks".

New Registrar

Mr Lavers said "The Varieties Committee welcomed Roslyn Stark the new Registrar." She had been associated with the administration of the ANVAS scheme for some time and would make a worthy successor to Mark Panitz who has moved to other duties within COD.

The Varieties Committee thanks Mark for the work he has done for the committee over a number of years.

'TARGET 90 CONCERNS'

Ian Coombes, Department of Primary Industries and Energy, Canberra.

I have recently learnt that concerns remain within the Federation about the outcome of the Target 90 project.

This was the name given to an activity funded by the Marketing Skills Program which is administrated by this Department. The program was established to assist in the development of export marketing skills amongst participants in the agricultural, timber and fishery industries.

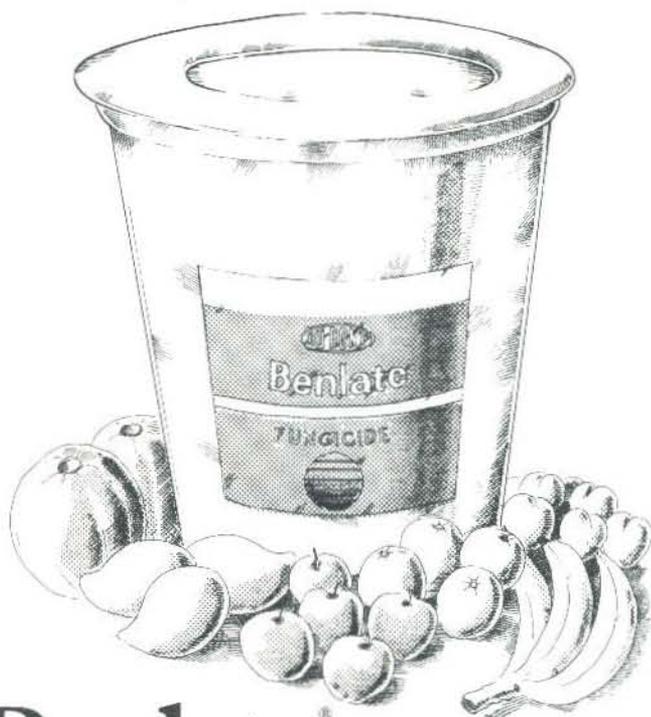
I can say immediately that we

consider the avocado project to have been a notable success. I believe John Kerin also saw it in that light. John Dorrian told me that Mr Kerin maintained his interest and visited his shed two weeks before he moved to Treasury, to see quality assurance procedures in operation. I understand that the Queensland Department of Primary Industries also sees it as a success.

Marketing Skills Program funding is generally provided on contract to marketing centres in tertiary education institutions or to consultants who have

demonstrated ability in the field, to carry out specific activities with industry groups.

In most cases the group is from a particular industry, but beyond that members of the group feel that they can work together in some way to develop a targeted strategic marketing effort in exporting. In most if not all cases, the approach taken is different to what has gone before. Because it is new, rarely can a whole industry agree at once to be involved.



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Anthrachnose (*Colletotrichum* sp) in Avocados is a serious disease that affects fruit finish and reduces shelf life. These factors contribute to affecting growers nett returns.

The economic climate is affecting farmers as much as anyone else in Australia and as a result, growers must look to maximising returns where possible. History and common sense prove that in tough times, only the higher quality produce maintains value and profitability.

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These were some of the thoughts that drove arrangements on avocados. The project was contracted through the University of Queensland under Professor Ken Tucker. The project champion, Stewart Penny, came from the Sunshine Coast Fruit Marketing Co-operative at Nambour. It is probably fair to say that within the Co-operative there were differences of view. However, John Dorrian (avocado grower at Childers) and Ted Mackedie (avocado grower and packer at Mareeba) also decided that they would adopt the approach and co-operate between themselves into export markets to ensure orders were satisfied.

The quality assurance procedures developed with Federal funding from the Innovative Agricultural Marketing Program by the Queensland Department of Primary Industries and private consultants for this avocado export activity were the first developed for horticulture in Queensland. The Department has advised me that it was tremendously important for Horticulture. It made a major shift forward in the sophistication of approach to exporting. Other industries have now started to develop quality assurance schemes as a result.

The quality assurance scheme for avocados is there for use by other industry participants, under adequate safeguard commitments by such groups or individuals to ensure that it maintains its integrity. A failure in practice on any quality assurance scheme may degrade all Australian quality assurance schemes in the eyes of foreign buyers. Quality assurance schemes are intellectual property and will be treated as such by the people involved in their development.

John Dorrian and Ted Mackedie chose to export by air and achieved exports of close to \$500 000 in the first year. The Co-operative planned to export by sea. Controlled atmosphere issues have not yet been satisfactorily resolved so they were not able to get product away by sea.

We consider \$500 000 of new

exports in the first year, which involved the establishment of new training relationships, on the basis of establishment of quality assurance procedures where none had existed before, to be an excellent return on the investment of \$167 500. There were additional contributions made by the University of Queensland and the Queensland Department of Primary Industries. John Dorrian and Ted Mackedie put about \$20 000 of their own money into follow up visits to Europe as well. The lack of shipments by sea were a disappointment of course.

Additionally, there is no question that the mango project under the Marketing Skills Program, which has established a new marketing company (Australian Mango Export Ltd) for producers in all growing regions benefited greatly from the avocado project.

John Dorrian, Ted Mackedie, and others, participated in a 'Quality Assurance In Action' tour to New Zealand to see quality assurance in the kiwifruit, apple, avocado and persimmon industries. They then put a good deal of their own time into informing the mango industry of what they had learnt. After about \$600 000 in new exports in their first season, Australian Mango Exports are firming up arrangements for exports of \$2.5m to \$3m in their second season.

John Dorrian shipped about \$190 000 of avocados by air in this last season. There was a lack of supply of export fruit by growers to Ted Mackedie this year because of the relatively good domestic price. On top of that the cyclonic season caused much of the fruit to be unsuitable for export so Ted passed his supply opportunities to John.

This co-operative approach is very important as the export links do need to be maintained. Retailers and wholesalers in the importing country have to be competitive and maintain their own businesses. They want a reliable supply relationship so they know where they stand and can do their marketing effectively.

As the business world becomes more sophisticated we are finding, through contacts in a number of industries under the Programme, an increasing need to keep in mind our performance in making business 'easy' for the importers. Otherwise the Americans or other competitors will be more attractive business partners to the importers.

So as not to expose Australian producers too heavily to the 'highs and lows' of the international market in comparison with the domestic market it is often sound to commit a portion of a grower's crop to export each year. Some years the export price will be better than domestic and other years it may not, but we need to keep a reliable presence in the market.

QANTAS and other freighters also look for a stable, regular relationship with exporters, which can also be beneficial to growers.

This second season after the project was started, the Sunshine Coast Fruit Marketing Co-operative decided to use air freight because the controlled atmosphere sea freight problems have still not been resolved.

Work is continuing on controlled atmosphere storage. The QDPI is increasing the period of storage achievable, and BHP have a new membrane technology which the company is interested in bringing into production if they can identify adequate demand for it. Other work is proceeding on a unit which may be put into a standard refrigerated container.

Exports to the value of \$375 000 were sent to Asian destinations by the Co-operative this season. Excellent returns were achieved from this steady weekly shipment arrangement. Further orders could not be met because of drought conditions. The crop was down by perhaps 50% because of the difficult season in South Queensland.

Samples have been sent to England and they were very favourably received. Discussions are under way on arrangements which may



precipitate exports to the United Kingdom next season.

About 5% of the Co-operative's crop was exported and estimates based on the development of trading relations indicate that about 10% of the crop may be exported next season. Brand establishment in the markets and extension of markets will be factors influencing the volumes sent.

New Zealand growers have visited the Co-operative to look over the

operation, as have representatives of NSW grower groups. The NSW growers are understood to be discussing whether a similar set of administrative, quality assurance, and packing arrangements would suit them.

As I said at the beginning, we feel the project has been successful.

There is potential for a much higher level of success if arrangements to co-ordinate supply to markets under

a quality scheme are investigated by growers in other regions. An important aspect of these arrangements is that exporters work together to maximise Australian returns by strategic marketing rather than compete against one another on price.

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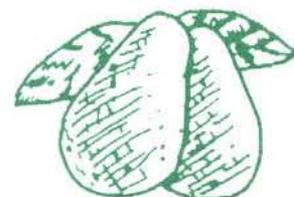
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This is the growers paper and reflects their views and opinions; it does not necessarily represent the policies or views of the President, Committee or the members of the AAGF.



AVOCADO RING NECK - THE NUTRIENT CONNECTION?

T. Trochoulis,

Special Research Horticulturist, TFRS Alstonville, NSW

INTRODUCTION

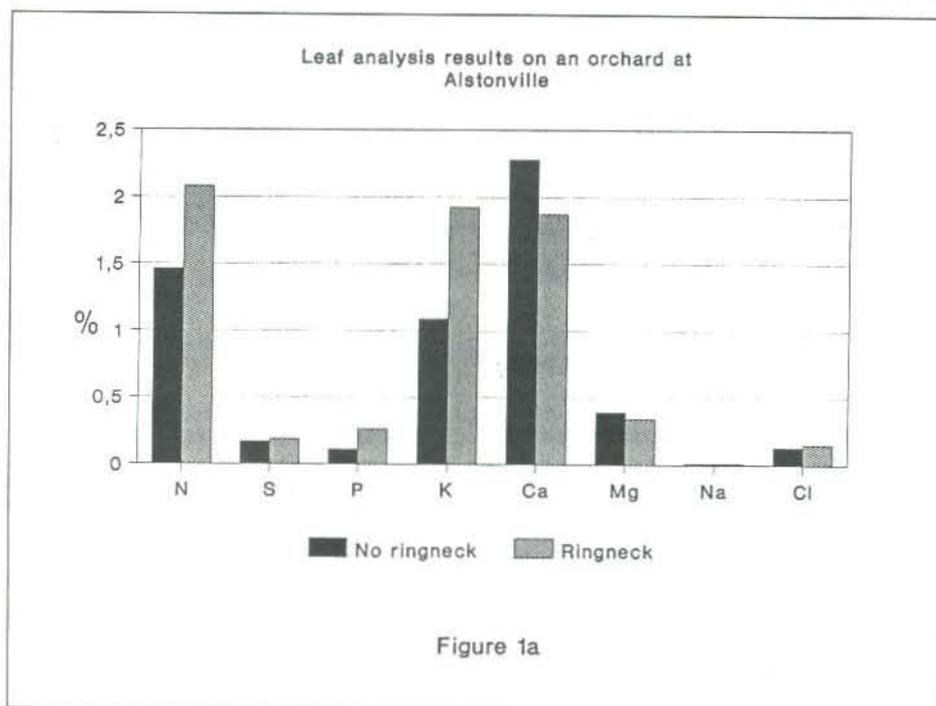
Ring neck is prevalent in both New South Wales and Queensland avocado orchards (Whiley *et al.*, 1986). The disorder, the development of corky lesions on the fruit stem, was first described by Coit (1928). Hass (1936) related ring neck to high chlorine levels in pedicels. Toerien (1979) related ring neck to nutrient imbalances while Engelbrecht (1981) suggested that ring neck was caused by water stress during fruit development. Whiley *et al.* (1986) showed a correlation between ring neck and internal water deficit caused by *Phytophthora* root rot.

OBSERVATIONS AT GROWER PROPERTY, ALSTONVILLE

A spot check was taken on 12-year-old Hass trees growing in an orchard at Alstonville in northern New South Wales with ring neck. About 50 leaves were collected - from twigs which also carried fruit - from 15 trees with and without ring neck in November 1986. A soil sample had previously been taken in April 1986. The irrigation management at this site was good, providing full undertree coverage with the capacity to apply 45mm in 5 days (during heatwave conditions).

LEAF AND SOIL ANALYSIS DATA

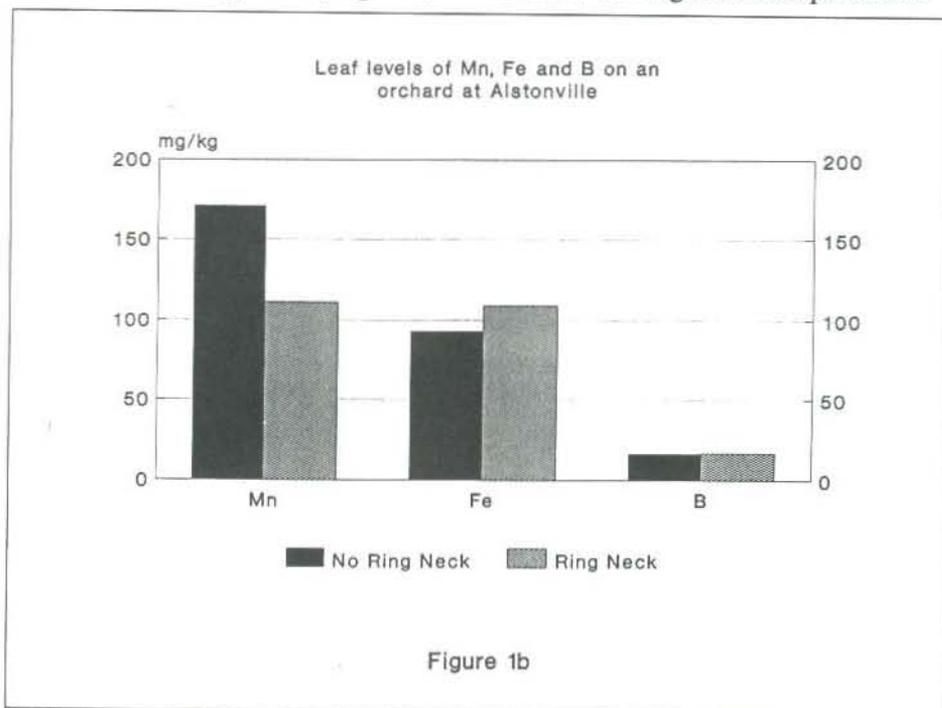
The data from the leaf analysis are presented in Figures 1(a) and (b). Leaves near fruit with ring neck from the same trees had almost twice as much potassium compared to leaves near fruit without ring neck. If the ratio of magnesium to potassium is considered this is about 1:3 for the no ring neck fruit compared to 1:6 for the ring neck fruit. The level of nitrogen is low for both lots of



leaves, particularly the no ring neck fruit. However these leaves were about 9 - 12 months old and would be expected to have low nitrogen. Under normal circumstances leaves would be sampled in March from spring flush leaves 5 - 6 months old.

Calcium levels were lower in leaves near fruit with ring neck symptoms

and higher for the leaves near healthy fruit within the same tree at Alstonville (Figure 1(a)). In South Africa the same observation was made between blocks of trees with and without ring neck. It appears that there are gradients of nutrient supply within trees and when nutrient supply in the soil is limiting, such as an magnesium to potassium





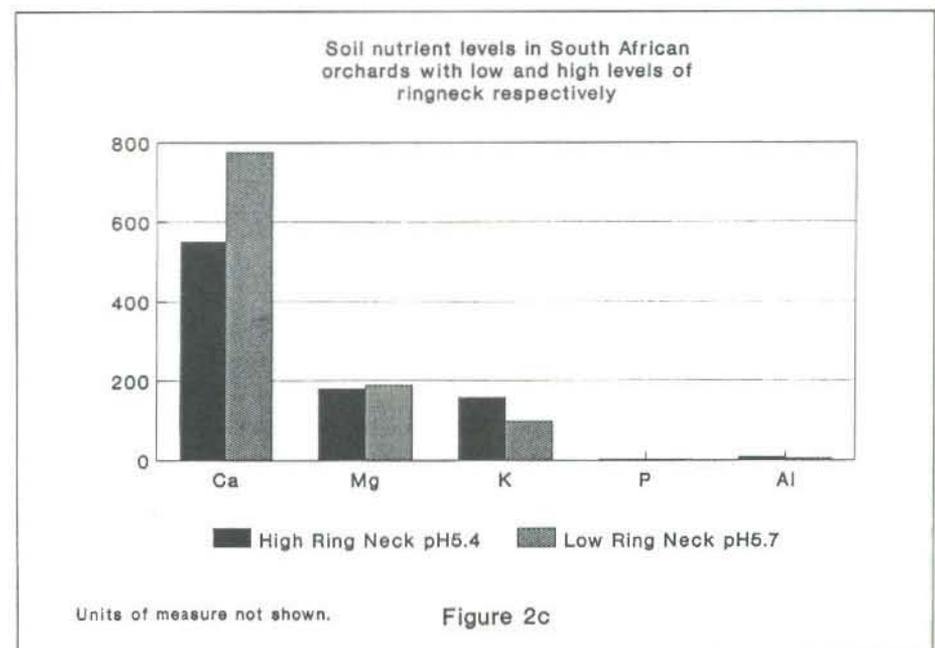
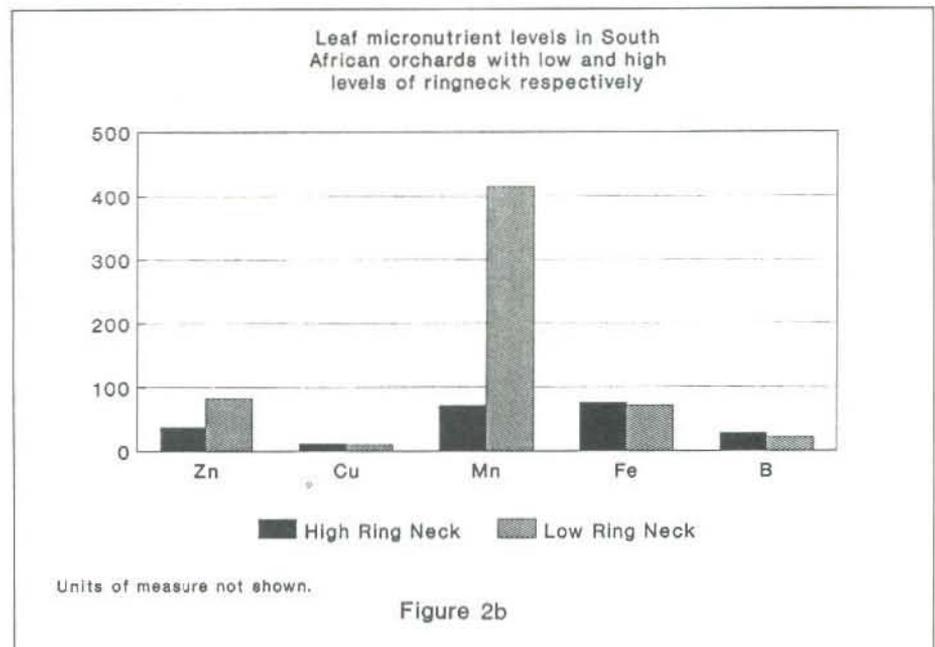
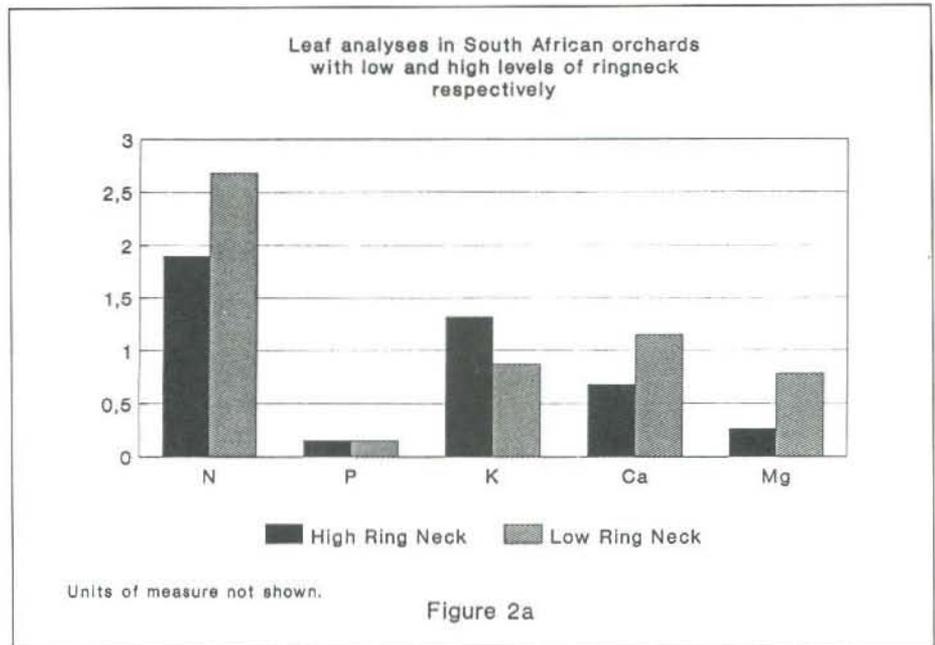
imbalance, then the resulting imbalance in the tree is reflected in a disorder such as ring neck.

Calcium uptake is strongly associated with water intake by roots (Kirkby, 1979). Every effort should be made to give avocados adequate water. This may affect the accumulation of calcium in the developing fruit and the ultimate storage life of the fruit. Although boron has been applied by the grower the leaf levels were in the deficient range (Goodall *et al.*, 1965). Soil analysis taken in April, 1986 (Table 1) showed the exchangeable potassium in the soil to be adequate while the magnesium level was about one third of the normal level (CFL standards).

Leaf analysis data from South Africa sampled in March showed a magnesium to potassium ratio of 1:5 for trees which showed a high incidence of ring neck and about a 1:1 ratio for fruit from trees with a low incidence of ring neck (Fig 2a). Fruit affected by severe ring neck in South Africa was growing in soil which had about 60% more potassium in the soil solution compared to the low ring neck fruit (Fig 2c).

DISCUSSION

The data from Alstonville and South Africa (Toerien, 1979) do have a common association between high potassium and low magnesium in both leaf and soil analysis and ring neck. The moderate fertility site at the Research Station had a higher proportion of magnesium to potassium and was in line with fertiliser recommendations for avocados. It is possible that nutrient imbalances do exacerbate the ring neck problem and the ratio of magnesium to potassium is important. More data however is needed. One of the objectives of this article is to alert growers to factors which may contribute to ring neck. Growers should not lose sight of the importance of the relationship established between ring neck and water stress by Whiley *et al.* (1986). Even in a well irrigated orchard, hot weather conditions may cause internal water deficits which can





predispose fruit to ring neck. From January onwards observations for the first signs of the disorder should be made. Assuming that irrigation practice is optimal and fungicides are used to reduce the effects of Phytophthora root rot if the disorder appears it would be advisable to check leaf and soil analysis in March - April.

RING NECK SYMPTOMS

The symptoms of ring neck are exhibited by a corky lesion at the junction of the pedicel and peduncle or the attachment between the pedicel and fruit. It can occur from January to December in Hass fruit and January to July in Fuerte fruit depending on locality and severity of the problem.

STEPS TO REDUCE RING NECK

1. Ensure that irrigation emitters cover the whole root area and apply enough water to replenish the soil moisture deficit caused by evapotranspiration over a weekly period for mature trees. Tensiometers can be used as a guide to when to start

and finish irrigation applications.

2. Minimise Phytophthora root rot by applying fungicides and organic materials.
3. Take leaf analysis yearly in March - April and soil analysis every three years. Apply fertilisers to achieve approximate soil nutrient levels suggested in Table 2. If ring neck is severe applications of foliar Magnesium sulphate (epsom salts) or a mixture of Magnesium sulphate and calcium nitrate can be tried on one or two trees to test the response. Uptake will be greater during periods of intense flushing when the leaf cuticle is less developed.

Acknowledgement: I wish to thank Mr C. Leon for use of data from 'Tzana Farm', Alstonville

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Table 1. Soil analysis of site at Alstonville sampled 24/4/86 compared to moderate fertility site TFRS Alstonville (courtesy Dr D. O. Huett) and 'ideal' level (CFL).

	Alstonville Orchard	TFRS	CFL Ideal Level
pH	5.0	5.4	5.5
Organic carbon (%)	3.7	3.7	5.0
Nitrate N (mg/kg)	13.6	14.0	25.0
Sulfur (mg/kg)	163.7	71.4	50.0
P - BSES (mg/kg)	99.0+	18	80
K (meq/100g)	0.69	1.26	0.75
Ca (meq/100g)	2.97	2.72	5.0
Mg (meq/100g)	0.52	2.34	1.6
Na (meq/100g)	0.09	0.07	?
Cl (mg/kg)	20.0	20.0	?
Conductivity (ms/cm)	0.08	0.07	?
Cu (mg/kg)	49.0	1.6	10.0
Zn (mg/kg)	44.8	5.1	?
Mn (mg/kg)	17.0	43.0	?
Fe (mg/kg)	129.0	92.0	?
B (mg/kg)	0.1	0.1	?
Al (mg/kg)	46.0	10.0	?

Table 2. Avocado fertilisation for red basaltic soils. (Adapted from Allen, 1985)

Nutrient	Desirable level	Fertiliser to apply
Ca	3000mg/kg	Gypsum up to 10t/ha when pH at 5.5 Lime or dolomite if pH below 5.5
P	90mg/kg (Colwell test)	Superphosphate 400kg/ha
Mg	600mg/kg	Use dolomite or granomag depending on pH
K	40mg/kg	Use potassium sulphate or potassium nitrate. Potassium chloride should be used sparingly if Phytophthora root rot is not a problem
N	2.0% - Fuerte 2.0 - 2.4% - Hass	Use according to variety (more for Hass) and crop load to achieve an optimum level



PLANS FOR THE INDUSTRY

By Don Lavers - Delegate Australian Avocado Growers Federation (AAGF),
Chairman of Varieties Committee and Chairman of the Research sub-committee.

Planning has never been high on the agenda of the Avocado Industry and for that matter any of the Australian Horticultural Industries. But things are changing. That is why the two recent workshops are important milestones in the Avocado Industry's determination to become stronger, and more commercially viable.

The first of these, a research and development (R&D) workshop organised jointly by the Horticultural Research and Development Corporation (HRDC) and the Federation, was held at the QDPI training centre, Bribie Island, in August. It looked at the industry today, the desirable goals of five years down the track and how research could help achieve these goals.

The industry has now joined the HRDC. Growers throughout Australia have commenced paying three cents per tray or \$5.00 per ton of bulk fruit, which, with HRDC subsidy will generate an estimated \$150 000 towards important research programs.

The second in the series, a strategic planning workshop was jointly organised by the Australian Horticultural Corporation, (AHC) and the Federation and was held in Brisbane at the end of September. It also put the industry under the microscope. Its vision for the future concentrated on industry organisation, marketing and product distribution in addition to providing strategic planning. It was intended to furnish the background to enable the industry to make a decision as to whether it should join the AHC. This decision will be taken at the Federation meeting to be held in November.

At both workshops, Phil Herd and Zoe Wheat of Corporate Plans, Sydney acted as facilitators.

Research and Development

Members attending the R&D workshop, found a lot of strengths in the Avocado Industry today, but an even more impressive list of weaknesses that could, and should be rectified. Their vision statement included strategies to:-

- Increase exports to 10% of total production to take advantage of the window in Europe, and to take fruit off the domestic market during the peak supply period in winter.
- Extend the season in an endeavour to maintain an even supply of avocados

throughout the year.

- Increase production of marketable fruit from the present average of 8 tonnes per hectare to a target of 14 tonnes per hectare, by assisting growers to be more efficient, more viable and more professional.
- Improve the quality of product going to the consumer by better selection of varieties and better handling.
- Expand the use of quality assurance (QA) so that all export fruit and a large part of the fruit supplying the domestic market could be sourced from QA packing sheds. There are only three sheds in Queensland involved in QA at present.

The workshop gave propertities to types of research that would help to achieve this vision. Pest and disease control, quality assurance, root stock evaluation, fertilisers and plant nutrition headed the list.

It became apparent that in all areas of growing, packing, transporting, and handling there is a vast amount of technical information that is not being utilised by the industry. A strong plea was made to make this information more accessible through technology transfer and communication. A data base was recommended in a form that could be easily accessed along with a total management package to aid farm management and assist record keeping.

Strategic Industry Plan

There was plenty of room for improvement in industry organisation according to the industry planning workshop. The workshop saw the need for a dynamic approach at the national level to improve grower efficiency in producing a quality product and to improve skills in marketing to ensure returns that will guarantee a viable industry. Their vision included:-

- A peak body along the lines of the Californian Avocado Commission that would streamline industry statistics and crop forecasting and would design a marketing philosophy, a national advertising promotion and a public relations program.
- Growers uniting together in marketing groups to sell their product under fewer labels, and so increasing their marketing power. It was envisaged that the Australian crop should be handled by less than 20 marketing or packing groups.
- Around-the-year supply of fruit with

fewer varieties and sprung or ripe fruit available to consumers and retailers.

- A select group of accredited wholesalers, and a training program for retailers and produce department handlers.
- Improved market research.
- Improved handling, transportation, and distribution systems that will contribute to better product quality.
- At least one viable processed value added product.

Where to from here

In developing a R&D plan and a strategic industry plan, we have taken the first step on the road to becoming a progressive and commercially mature industry. We are grateful to the people who gave their time to help in this process.

Chris Rigney of the HRDC
Wholesalers: Rob Robson, Damian George

Retailers: Barry Ross
John Baker and Derek Bone of the AHC Federation members, growers and nursery men

Federation Secretary: Ross Boyle
QDPI: Calvin Winks, Tony Whitley and Scott Ledger

NSWDA: Tim Trochoulis
and a large number of technical people, and staff of COD.

They all made an important and valuable contribution.

The next steps will be to put plans into the action mode so the correct industry organisation is operating, research is delivering what the industry wants, and market research and national promotion are 'tooled' for expanding quality production.

A most important step will be to obtain the full co-operation of growers, packers, wholesalers and retailers to support the concept of a united industry aiming to reach its full potential.

Growers in particular will need to see that fewer labels, regular lines of consistent product, allied with sound marketing strategies will not only sell more fruit but will mean more dollars in their pockets. If they take a long term approach as they will when they have confidence in the future of the industry, they will agree that 20 marketing groups makes more sense than 1200 growers in competition with each other.

Let's hope we will remember 1991 as a starting year of important and beneficial changes to the industry.