AFFCO "World Class Workshop", Shepparton, May 2007

Andrew Dick
Australian Fresh Fruit Company Pty Ltd (AFFCO)

Project Number: AP06017

AP06017

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the apple & pear industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of Australian Fresh Fruit Company Pty Ltd.

All expressions of opinion are not to be regarded as expressing the opinion of Horticulture Australia Ltd or any authority of the Australian Government.

The Company and the Australian Government accept no responsibility for any of the opinions or the accuracy of the information contained in this report and readers should rely upon their own enquiries in making decisions concerning their own interests.

ISBN 0 7341 1621 7

Published and distributed by:

Horticultural Australia Ltd

Level 7
179 Elizabeth Street
Sydney NSW 2000
Telephone: (02) 8295 2300
Fax: (02) 8295 2399

E-Mail: horticulture@horticulture.com.au

© Copyright 2007

affco
Australian Fresh Fruit Company
australia's leading fruit network

RECEIVED
26 OCT 2007
BY:.....

27 August 2007

Milestone Reports
Horticulture Australia Limited
Level 1
50 Carrington Street
SYDNEY NSW 2000

Dear Sir/Madam

AP06017 – AFFCO WORLD CLASS WORKSHOP 2007

Please find enclosed one bound copy of the Final report for project AP06017. An electronic copy has also been submitted.

Thank you for your support of this project.

Yours sincerely

Keryn Allan
Administration Manager

Australian Fresh Fruit Company Pty Ltd PO Box 363, Gisborne, Vic 3437 T. +61 3 5420 7444 F. +61 3 5420 7447 www.affco.com.au
ABN 18 066 904 621

FINAL REPORT

PREPARED FOR HORTICULTURE AUSTRALIA LIMITED

AP06017

AFFCO World Class Workshop 2007

Author: Andrew Dick
Australian Fresh Fruit Company Pty Ltd

AP06017
AFFCO World Class Workshop 2007

Project Coordinator: Andrew Dick
General Manager
Australian Fresh Fruit Company Pty Ltd
PO Box 363
GISBORNE VIC 3437
Ph. 03 5420 7444
Mobile 0417 357 702

Purpose of Report
To provide a report to Horticulture Australia Limited on the success of the project **AFFCO World Class Workshop 2007**.

Acknowledgement
The Australian Fresh Fruit Company Pty Ltd wishes to thank Horticulture Australia Limited and IHD Pty Ltd for their significant support for this project, and the contribution of the sponsors, hosts and speakers, without whom the Workshop would not have been a success. We also thank the working group and participants who attended the Workshop. A very big thank you to Malcolm Roach, Keryn Allan and Lisa Adamc who were the project managers and administrators of the project, in addition to the IHD team of helpers, particularly the IK Caldwell team.

Date
27 August 2007

Any recommendations contained in this publication do not necessarily represent current HAL Limited policy. No person should act on the basis of the contents of this publication, whether as to matters of act or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication

Introduction

AFFCO, in conjunction with IHD, proposed conducting a series of Workshops and an Expo in Shepparton aimed at Australian apple, pear and stonefruit growers, orchard managers and allied members. The Expo provided an interactive experience and enabled participants to see, hear and discuss new technologies and their application with national and international experts.

Our Vision: An Annual One Day - One Stop shop for new technologies

- Leading technology for growers, packers, marketers, supply chain partners, advisors, and researchers
- An initiative with a difference
- Positive environment – leading edge criteria, inexpensive to attend
- High profile event - "leading the way in difficult times"

Our Mission:

The "New Technology Expo" will provide practical examples of new technologies to growers, packing shed operators, marketers (incl. exporters), researchers, advisors, manufacturers and suppliers of a wide range of products

The Expo will show how technologies can be adopted for benefit – i.e. benefits will be visual and demonstrable

Materials and Methods

The program covered four days – two based in the Shepparton area and two based in Melbourne and environs.

Day 1

A Stonefruit Workshop was conducted at Tatura on 24 May, which involved a half-day in-house workshop followed by orchard visits.

Topics covered:

- Growing fruit in South Africa – an overview
- Soil health management – the principles
- Making it happen – the tools
- The latest in fertigation

Orchards visited were Varapodio, Plunkett and Goulburn Valley Orchards. The visits were facilitated by Marcel Veens and provided an opportunity for participants to see a focus on differing approaches to achieving profitable stonefruit production. Discussion included:

- Tree training
- Crop manipulation – dormancy breakers, thinners etc
- Tree nutrition
- Irrigation
- Fertigation techniques

A Snapshot of the South African Deciduous Fruit Industry – Dr Jim Button

Most South African exports go to the UK (25%) and Europe (43%), however increasing product is going to SE Asia which could be a concern for Australia.

Key crops grown in South Africa are grapes, apples, pears and some stonefruit. The industry has changed from having single channel export to very sudden deregulation, with a significant increase in exporters. The period after deregulation was very chaotic but now there is some semblance of organisation with Fruit South Africa coordinating deciduous citrus and sub-tropical fruit. Currently plums and nectarines appear to be achieving better returns than apples and pears on a per hectare farm income basis.

Main apples grown are Granny Smith, Golden Delicious, Gala and Red Delicious. 7% of production is Cripps Pink, however the proportion is higher for trees planted in the last three years. Biggest varieties of pears grown are Packham, Williams and Forelle (or Corella in Australia). The biggest change in pears has been the transfer to different rootstocks.

What is the future for deciduous fruit? Apples are predicted to reduce in area/volume whereas pears and stonefruit are predicted to have a 2-5% increase in growth. The secret in future development will be to manage competition, avoid head-on competition with other exporting countries such as Chile and have very good collection of data, e.g. Dekka fruit and exchange of information on crop size and marketing as in the case of IPLA. The other development is to have managed products which are coming into South Africa. The key challenge for South Africa is managing farm land ownership, and this is a significant risk for South African growers. Some of the new technologies being used are rootstock, tree architecture, having a common maturing indexing process and certificate analysis for export.

In conclusion, this was a very good presentation which provided a good analysis of a competitor country. Lessons for Australia are:

1. We need to adopt new technology more quickly
2. We need to have a good information system
3. We must organise ourselves to have better access to rootstocks

Soil Health Management – the principles, Dr Doris Blaesing, Serve-Ag Pty Ltd
Doris' talk focussed on soil health and in particular, organic carbon, which equates to organic matter. Doris showed a slide which showed very good soil against some not so good soil, and said that is the key (particularly in drought conditions) in holding nutrients, and improving water infiltration and holding capacity.

Doris' talk was put to good effect practically, when we got the shovel out in the orchard and what she said in theory was very much the case in practice – she continuously emphasised the importance of trying to improve structure. This was well demonstrated the next day at the site of Geoffrey Thompson, where a large hole was dug and you could see the restricted root growth in an orchard where there was probably too much compaction. Where roots are no good, nutrition is inadequate. This arises from loss or organic of carbon, the decline in soil structure, increase salinity and acidification. Wherever there is an imbalance in nutrients there is a loss of yield potential.

Soil Structure, Why and How – Martin Hockey, Australian Soil Planners
Doris' talk was backed up by Martin Hockey, who is new to AFFCO Workshops. Martin went into further detail of the carbon cycle and the importance of increasing soluble calcium to improve aggregate stability in soils which have poor structure. This was a revelation for those attending.

Martin gave some good tips on how to manage soil structure, being aware of the quality of irrigation water, observing soil and how water infiltrates. Structure can be affected by increases in some nutrients such as nitrogen, the over-use of gypsum, the use of muriate of potash, and over-use of acidic forms of phosphate. Sources that help contribute to soil structure are soluble calcium, magnesium (particularly dolomitic lime, as long as the magnesium content is low), molasses, gypsum in certain circumstances and organic materials such as manure.

Martin referred a lot to calcium sources and the water solubility of calcium. He also took this argument to different nitrogen sources and phosphate sources. The key message was about calcium availability and the need to have a mix of microbial concentrations in order to ensure good nutritional balance.

This was a very good presentation, in alliance with the message from Doris Blaesing and, as indicated previously, it was seen in the orchard very clearly.

The Latest in Fertigation - Jamie McMaster, Sustainable Liquid Technology
Jamie McMaster provided a talk on fertigation. Fertigation is something not practiced by many orchards but is very important tool, particularly in drought. Consideration of the use of fertigation is to be given to injection systems, timing of applications, planning for use of fertigation and also the benefit of less manual handling.

Day 2

The AFFCO / IHD Expo, conducted on 25 May, was titled "New Technologies for the Future" and encompassed on-site demonstrations at three venues: Masalki Packing Shed, Bunbartha Fruit Packers and Geoffrey Thompson Orchards.

Each venue allowed participants to spend 2.5 hours speaking with national and international experts in their field.

Topics included:

Technologies for Crop Manipulation
- Regalis trials
- New thinning technologies
- New dormancy breaker, introduced by Australian developer

Protecting your Profits and Crop
- The trials on Surround
- Hail net options
- Frost protection options
- Other manufacturers

Maximise your application through new Spray Technologies
- The latest world best sprayer

Minimise your water use – Maximise your production efficiency
- The latest in irrigation technologies
- Fertigation options
- Monitoring technologies

Reduce your labour costs – the latest orchard equipment

Improve your logistical, storage and packing shed efficiencies
- Ripesense^{tm} - automatic sensors for fruit quantity
- Measuring firmness – the latest
- Tracking your piece of fruit
- Tracking your fruit throughout the chain
- The latest from Compak Graders
- The latest storage technologies

This was a very innovative way of delivery of new technology and involved taking people to the demonstrations, rather than people wandering around during a field day or sitting in a conference hearing a single presentation. The idea was that growers would be divided into groups and receive a number of presentations over the day as part of a small group going to different sites. The route was divided into three sites: one was a packing shed at Masalaki; another was at Geoffrey Thompson Orchard, which is mostly an apple and pear orchard; and the other site was Geoff Karl's, which is an apple and stonefruit orchard.

At the Expo site the key technologies which were looked at involved:

- Telecommunications – Telstra presented their NextG technology. This was very well received and is something to look to in the future, particularly in terms of using telephone technology for accessing data and managing the orchard
- Ozone technology, which has been developed and shown for the first time and can be put into coolrooms in a modular form

- J-Tech showed different types of measuring firmness and packing pears
- EDP showed a brand new punnet packer
- Wobelea showed some new methods of hygiene control
- CGA showed a new method of storage

In the field, the Geoffrey Thompson site was divided into 4-5 areas. One was the soil demonstration by Serve-Ag and members of the IHD group. This involved the digging of a pit and, as previously indicated, was an extremely effective demonstration of showing the practical side of the presentations given the previous day during the Stonefruit Workshop. This received the highest rating of the Expo.

Other components were a presentation on Regalis by Steve Tancred of Orchard Services. Steve is a very good presenter and the messages from the first fully commercial season of use in Australia were well received.

There was also a frost machine which was very topical given the severe frost damage in many areas of Australia last year. A brand new series of wind machines had been erected just prior to the commencement of the Expo which were demonstrated during the day.

Another demonstration was of a new sprayer and wetter from Croplands. This was of great interest to growers as use of this technology in conjunction with wetters can reduce water volume, which means that farmers can get far greater efficiency and effectiveness from sprayers.

Other areas included new irrigation devices, which also received high ratings.

The format for the presentations involved some discussion at the Geoff Karl site where there was a presentation on a new training system. This is a very professionally run orchard, and the key point from this site is the need to monitor in order to make best use of the new technology.

CropCare demonstrated the use of their dormancy breaker which is a new technology, as Dormix is just about to be registered for use in apples. The developer of the product in Australia, Glen Tucker, was one of the presenters.

In addition, at the Sumitomo site, John Wilton of Ag-First presented the range of thinning tools which are available. This is a key area in orchard management and can result in a significant increase in profitability if managed correctly.

Overall comments on the Expo was that it was one of the best field days people have been to and has significant potential for use in the future. The feedback sheets showed that people really appreciated the structure of the day and also the fact that it was leading edge. This is a must, and consideration should be given to whether this is an event which is carried out annually or bi-annually.

Day 3

The final aspect of the workshop program involved the half-day Post Harvest Workshop which was conducted in Melbourne on 26 May.

Topics covered:

- The South African fruit industry
- A study to significantly improve packhouse efficiency
- Getting it right in the orchard, but ignore post harvest at your peril
- Maximise the benefits of Smartfresh
- The future in Global Trade Identification Numbers – GS1

Colin Little was one of the keynote presenters, following Dr Jim Button, who gave a similar talk to that given at the Stonefruit Workshop, but focussed more on pomefruit and stonefruit. Many of the messages were the same and it was well delivered.

Orcharding aspects that affect the post harvest quality of apples – Colin Little

Colin Little's report indicated that you cannot talk about post harvest without focussing on things which happen in the orchard that affect post harvest. The message was the same – the importance of soil structure, management, mineral profile, pH, root growth which all have an impact on the outcome of fruit in post harvest. He referred to looking at the tree growth cycle in terms of the break of the dormancy, time before bloom and harvest. This was particularly so in the case of internal browning, where some of the risk factors are known to include the time after bloom and the time 50 days prior to harvest. Even though they are in-field issues they have a greater implication on post harvest.

Once all the work has been done in the orchard a very important part in relation to post harvest is measuring maturity at picking time. This then determines how fruit can be treated in storage and the grower needs to decide whether the product is put into c.a, or c.a and Smartfresh, the treatment, and how product is sanitised. Colin identified issues which had jeopardised the long term viability of the Australian pomefruit industry, including frost, drought, smoke, hail, cracking, and even cultivar version, bird damage and fighting bureaucracy. The point was that post harvest is very important, but so are other factors.

From pilot program to commercial success 2005-2007 – Nick Sanders, Agrofresh

Nick presented the key aspects of Smartfresh and its commercial introduction, and said no-one would have thought its introduction would have occurred so quickly. The key message was that Smartfresh is a management tool but is not a short cut on quality, cooling and all the principles of correct storage and handling. Other aspects in regard to Smartfresh are use on other products such as plums, kiwifruit, avocado, mango and bananas, and they are subject to commercial and market evaluation. This provided a very good update on Smartfresh.

Landguard^{tm} to assist with post harvest management – Kate Dawson, Landguard

A short talk was then given on a product called Landguard^{tm}, which is designed to assist post harvest management. Landguard^{tm} works by breaking down mrls through enzymes and this has been showed to make quite a difference with products such as Carbendazim.

In a post harvest situation Landguard^{tm} ZIM-A can have an effect on reducing carbendazim metabolites. Current and future targets of this product include organophosphates, synthetic pyrethroids, and some herbicides and fungicides such as Strobilurins and Carbendazim. This was very appropriate talk, particularly as with the Pink Lady export program, where mrls may become a real impediment to export.

GS1 DataBar – Stuart Abbott, J-Tech Systems
Stuart indicated what the GS1 DataBar is – a method of containing data which makes it easier to have a check-out that by using the barcode information is more traceable, with a company index and a product index. The benefits of GS1 are improved accuracy at check-out, increased speed at check-out, reduced shrinkage as a result of better stock management, traceability and greater ease of management of product recall, and category management.

Where to from here? This will be implemented from 1 January 2010 and could have an effect on graphics, but will be almost a must in terms of what global retailers want.

Lean Supply Chains – John McBride, Invetech
They say the best is always saved until last, and John McBride provided a fascinating description of lean thinking. and how the concept of lean supply chains can have real application in orchards and packing sheds. For example, John referred to three car manufacturers (General Motors, Toyota and Ford). Toyota have a profit of $2,000 per car whereas GMH have a $1,300 loss and Ford a $284 loss. The point is that through lean thinking, which is what Toyota practice, they can obtain far greater efficiency and have less waste through managing the process of the whole supply chain.

Many photographs were displayed showing the before and after of lean thinking principles, and demonstrated the point better than any theoretical paper could have done. This was a well presented report, extremely well received and is a topic that people were asking if it could be followed up. It is recommended that some form of project be developed in this area and the costing area.

Day 4
An optional orchard tour was conducted on 27 May. The following orchards were visited:

- Montague Orchards, Narre Warren – future orchards site
- Atlanta Orchards, Moorooduc

Results
There were approximately 200 attendees at the Expo (including 160 paying visitors), with 60 attending the Stonefruit and Post Harvest Workshops, and 37 attending the Orchard tours. It is envisaged that attendance at the Workshops and Expo will foster further cooperation in the Australian fruit industry.

Conclusion
In conclusion, the Expo and Workshops were well attended and achieved the objective of increased attendance over the previous year.

In terms of the bigger picture, there is certainly a great need to have the industry consider how best to meet future challenges in terms of supply chain management, marketing arrangements and how to add value to the products they are marketing. It is recommended that investigations be carried out as to whether a 3-year project be developed to make this a truly superb annual event.

APPENDIX 1

AFFCO WORLD CLASS WORKSHOP PROGRAM

In partnership with IHD Pty Ltd

INCORPORATING AFFCO / IHD EXPO 2007

When:	Thursday 24 May Friday 25 May Saturday 26 May Sunday 27 May
Where:	24 & 25 May: Goulburn Valley/ Shepparton 26 May: Hilton on the Park, East Melbourne 27 May: Southern Victoria
Who should attend:	Apple, Pear and Stonefruit growers, orchard managers and allied members
Benefits of attendance:	Attend the NEW AFFCO/ IHD Expo Be at the forefront of new technologies Interact with other leading growers, packers & industry figures from around Australia

PROGRAM

Stonefruit Workshop **Thursday 24 May**	**DPI Tatura and Orchards**
9.30 am	Coffee and Registration
10.00 am – 12 pm	Stonefruit Workshop: In house DPI Tatura ➢ Growing fruit in South Africa – overview (Dr Jim Button) ➢ Soil health management - the principles (Dr Doris Blaesing) ➢ Making it happen – the tools (Martin Hockey – Australian Soil Planners) ➢ The latest in fertigation (Jamie McMaster) (before or after lunch)
1.00-5.00 pm	Orchard visits ➢ Varapodio Orchards ➢ Plunkett Orchards ➢ Goulburn Valley Orchards *Facilitated by Marcel Veens* - *Focus on differing approaches to achieving profitable stonefruit production* - *Discussion to include:* - *Tree training* - *Crop manipulation – dormancy breakers, thinners etc* - *Tree nutrition* - *Irrigation* - *Fertigation techniques* ***Who should attend: Growers, managers and key orchard staff from stonefruit orchards. Consultants, advisors, key horticultural staff and researchers.***
7 for 7.30	Informal dinner at Spaghetti Hollow 247 Wyndham St Shepparton VIC 3630 ph: (03) 5821 0771 Welcome from Bas Van Den Ende

AFFCO/IHD Expo **Friday 25 May**	**Shepparton**
9am – 5pm Bus takes those attending to 2 venues Time spent 2.5 hours at each venue	New Technologies for the Future ***Technologies for Crop Manipulation*** - *Regalis trials – facilitated by Steve Tancred* - *New thinning technologies (Sumitomo) – facilitated by John Wilton* - *New Dormancy breaker – Cropcare – introduced by Australian developer* ***Protecting your profits and Crop*** - *The trials on Surround – AgNova* - *Hail net options – Netpro* - *Frost protection options* - *Other manufacturers* ***Maximise your application through New Spray Technologies*** *- The latest world best sprayer from Croplands* ***Minimise your water Use – Maximise Your Production efficiency*** - *The latest in irrigation technologies from Netafim and Plastro* - *Fertigation options* - *Monitoring technologies* ***Reduce your labour costs – the latest Orchard equipment*** - *EDP* ***Improve your logistical, storage and packing shed efficiencies*** - *Ripesense tm – automatic sensors for fruit qty)* - *Measuring firmness – the latest) J-Tech* - *Tracking your piece of fruit – hot off the press)* - *Chep – tracking your fruit throughout the chain – RFID* - *The latest from Compak Graders* - *The latest storage technologies – CTA Australia* ***Who should attend: Growers, managers and key orchard staff from apple, pear, stonefruit & cherries orchards. Consultants, advisors, key horticultural staff and researchers.***

"Post Harvest" Workshop **Saturday 26 May**	**Hilton on the Park** **Wellington Parade** **East Melbourne**
8.30 am	Registration and coffee
9 – 9.35	Presentation to Industry - AFFCO's vision of the future and new 3-Year Plan – John Lawrenson and Andrew Dick
9.45 – 1.30 with coffee break	Presentations to include: The South African deciduous fruit industry – Jim Button A study to significantly improve packhouse efficiency – DPI Victoria – Oliver Sergeant, Price Waterhouse Coopers Getting it right in the Orchard but ignore post harvest at your peril – Colin Little and TBA Maximise the benefits of Smartfresh - various The future in Global Trade Identification Numbers –GS1 – Stuart Abbott, J-Tech ***Who should attend: Growers, managers and key orchard staff from apple, pear, stonefruit & cherries orchards. Consultants, advisors, key horticultural staff and researchers.***
7.00 pm - midnight	**AFFCO Granny Smith Ball** Hilton on the Park Wellington Parade East Melbourne 3 Roll of Honour Presentations ***Who should attend: Growers, managers and key orchard staff from apple, pear, stonefruit & cherries orchards. Consultants, advisors, key horticultural staff and researchers.***

Orchard Tours **Sunday 27 May**	
Depart 10am	Orchard Tour Visit Future Orchards site, Montague Orchards – 1 hour Arrive at Atlanta Orchards – BBQ lunch and winery tour Orchard visits – 1 hour Return to Melbourne by 5pm latest

AFFCO & IHD cannot be held liable for the accuracy of information presented at workshops. Attendees should make their own commercial decision on information that has been presented. We cannot guarantee that all speakers will be present. Please note that speakers may change

STONEFRUIT WORKSHOP, TATURA & ORCHARD VISITS, 24 MAY

Topic/Speaker	Jim Button		Martin Hockey		Doris Blaesing		Jamie McMas		Varapodio Orc		Plunkett Orch		GV Orchard	
	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy
NC					5	2.5	4	2	5	3	5	3	5	3
	3		3		5		4		3		3		3	
Tom Price	5	5	2	2	3	3			3	3	3	3	3	3
Mark Silm					4	4	4	4	3	4	4	4	4	4
Gavin Plummer	3	3	5	4	5	4	3	4	3	3	3	3	3	4
John Wilton	5	5	5	4		5	1	1	4		3	4	5	5
Patrick Milovitch	4	5	5	5	5	5	4	4	5	5	5	5	5	5
Gerard Schefer	2	2		3		3			3	3	2	3	3	3
Anthony Plummer	2	4	4	4	4	3	4	4	3	3	3	3	3	4
Robyn Clubb	2	4	5	4	5	5	4	5	4	4	4	4	4	4
Dean Smithers	1	1	5	5	5	5	3	5	3	3	3	3	3	3
James Penberthy	4	4	5	5	5	5	3	2	4	4	3	3	3	3
Andrew Smith	2	2	5	5	5	5	4	4	4	4	4	4	4	4
Alan Smith	3	4	5	5	5	5	4	3	3	3	4	3	5	4
Bill Aumann	4	4	5	4	5	4	4	5	3	3	3	3	4	4
Geoff (Flemmings)	2	4	5	4	5		4	4	3	3	3	3	3	3
Glenn Ellis	2	5			5	5	5	5	3	5	3	5	5	5
Brian Cumming	2	4	3	3	5	2	5	4	3	3	3	3	3	3
Chris Peters	3.5	4.5	5	5	5	5	5	3.5	4	4	4	4	5	5
(Seven Hill)	3	4	5	4	3	3	3	3	3	3	2	3	5	5
Mat Earle	3	3	5	5	5	5	3	3	4	4	4	4	4	4
	1	1	5	5	5	5	5	3	2	4	2	4	4	5
Angus Crawford	4	5	5	5	4	3	3	3	2	2	4	5	4	4
Peter Nethery	1	5	3	3	5	5	3	3	2	3	2	3	2	4
Gerard Alampi	5	5	5	5	5	5	5	5	2	4	4	4	4	4
Angelo Emmi	5	4	5	4	5	5	5	5	3	4	3	4	3	4
Vince Hewson					5	5	3	3	3		3		3	
Doug Brown	3	3	5	5	4	4	1	2	2	2	2	3	3	3
Graham Nicol				5				4		4		4		4
Henry Schneider	4	5	5	3	5	5	5	5	5	5	5	5	5	5
Greg Bennett	3	4	5	5	5	5	4	4	4	4	4	4	4	4
Kevin Tyndall	3	4	4	5	4	4	3	4	3	3	3	3	3	3
	3	3	5	5	3	3	3	3	4	4	4	4	3	3
Gavin Kerr	2	5	5	5	5	5	1	1	3	5	3	5	3	5
Jamie McMaster	1	4	5	5	5	5			5	5	4	5	5	5
	4	4	5	4	5	4	4	4	4	4	4	4	4	4
Glen Tucker	3	4	3	2	3	4	3	3	4	5	3	3	3	3

Ben Darbyshire	3	4	5	5	4	5	2	3						
Jim Button			5	5	5	5	5	5	4	4	4	4	4	4
	2	3	4	4	4	4	3	3	4	4	3	3	3	3
Martin Hockey	3	5			4	4	2	2	1	3	1	3	1	3
Doris Blaesing	3	5	5	3			3	5	5	5	5	5	5	5
James Turtle	4	4	5	5	4	4	4	4	4	4	4	4	5	5
John Rogers	5	5	3	5	5	5	1	1	5	5	5	5	5	5
FA Frustar, Austria	2	2		3		3			3	3	2	3	3	3
Tim Ring	3	4	5	5	4	5	3	3	3	3	4	4	4	4
David Richards	2	4	3	4	3	5	3	4	3	3	3	3	3	3
Kevin ??		3		4		4		3		5		5		5
Patrick Press	2	4	2	4	3	5	2	3	4	4	3	4	3	4
Barry Kerr	2	2	5	5	4	4	2	2	3	3	3	3	3	3
	2.9	3.8	4.5	4.3	4.5	4.3	3.4	3.5	3.4	3.7	3.4	3.7	3.7	3.9

Comments:

Value: good, networking: important
Value: very good
Value: very beneficial
Value: minimum value as apple grower, apart from fertigation and soils. Networking: good to meet new people in all sorts of fruits
Value: good, Networking: very good, many new contacts
Value: excellent, Networking: very important
Value: very good, Networking: good to talk about and discuss matters from different sides
Value: soil biology aspect was very informative and fertigation, Networking: fantastic to meet different industry people from other states and countries
Good to see how other types of fruit are managed and tools that are used
Value: excellent day, good varied program, Networking: very good
Value: excellent, very thought provoking, Networking: good exchange of ideas & opportunity to make new contacts
Value: enjoyable day, Networking: important part of day
Value: very valuable
Value: overall very informative and valuable to my current education
Value: more variety needed for those who have attended in previous years
Value: good program, Networking: excellent
Value: very informative, especially re soil structure and data collections, Networking: met people who will be important to me
Value: very good, new concepts to take home and act upon, Networking: excellent, new ideas for upcoming season
Networking: great chance to interact and network
Value: very good, Networking: excellent
Value: fair, networking: very important as I operate in an area where there are no other growers
Value: very informative and interesting, Networking: very good
Value: extremely helpful on experiencing differing things, Networking: very valuable to help make a future in orchards
Value: good to hear from professionals, focused talks, Networking: excellent
Value: good interaction, Networking: longer lunch and a cuppa would assist networking
Value: well presented and very relevant, Networking: this is the most valuable in these gatherings
Value: good mix of presentations, interesting topics, Networking: average
Value: very valuable, but prefer you keep suppliers out of Workshop and leave them until Expo, Networking: good mix of people
Value: great discussion, rigorous debate, Networking: excellent
Value: good, but most topics of moderate relevance to my business, Networking: good
Value: 80%
Value: very well arranged and conducted, Networking: excellent
Value: worthwhile to hear grower's comments, Networking: very good
Value: excellent to see variation in management styles & approaches, Networking: discussions provide excellent feedback/great opportunities
Value: excellent program, Networking: great to hear comment from growers
Value: very good
Value: Martin Hockey was excellent, Networking: very good
Value: useful in helping understand the growing systems, Networking: very good
Value: valuable for generating more ideas, new product systems & what is important to grower, Networking: Not that great due to lack of time
Value: very interesting day, Networking: limited, as different contacts in QLD
Value: very good, Networking: very good

Suggestions for future workshops:

Early summer when fruit can be seen on trees
Split into work groups from different areas
Name tags and district would be interesting
Portable loud speaker in orchards, little people to the front
Name tags
Drought strategies for stonefruit
Keep pounding on basics, even better if you can show on-farm trial work or methodology
More information the better, perhaps some handouts of speaker notes
Have a mixed variety workshop focus
Theory of pruning, OFM and brown rot
More on economics - GM
More international visitors from other growing regions
Ensure drinks are taken with buses
Arms length nutrient/soil studies
Soil preparation, replanting logically, what have you learnt? Question, good summary
Present some case studies - Calcium plot trials on to demonstrate
Do more work on mulches and OM retention
Soils, crop information, export opportunities
Soil chemistry, some science to back up claims
Wider range of topics
Better information on venues beforehand
More diverse orchards
As much grower involvement in topics as possible, get a person from another industry to present on a relevant topic
Go back to some sights and follow up on comments made
Irrigation systems
New crop protection offering 2008
More info about topics, start and finish times
Name tags for participants, introduce all of the people at the beginning of the day

POST HARVEST WORKSHOP, 26 MAY

Topic/Speaker	Jim Button		John McBride		Stuart Abbott		Colin Little		Nick Sanders		Kate Dawson		JL/ARD	
	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy
Nick Sanders	3	5	5	5	5	5	5	5	5	5	3	4		
	2	4	4	4	1	1	3	3	5	4	3	4	3	3
	3	4	4	3	1	1	4	5	3	2	4	3	1	3
Mark DiGyz			4	5	4	4	4	4			3	3	3	3
Jim Button			5	5	3	3	5	4	4	4	3	5		
Glen Fahey			4	4	3	3	5	4			3	4		
	5	5	5	5	4	4	5	5	5	5	4	4	5	5
Peter Gray	5	5	5	5	3	4	5	5	5	5	4	5		5
Des Muir	5	4					5	5						
Sue Finger	3	3	5	5	3	3	3	3	3	3	4	5		
David Finger	3	5	5	5	3	3	5	4	4	2	4	5	3	3
Neil Collins	2	3					4	4	3	2	5	5		
Tony Sayle	4	5	5	4	5	5	5	4	5	3	5	4		
John Rogers	5	5	3	5	2	4	5	5	5	5	3	4		
Stuart Abbott	2	5	4	4	5	5	3	3	2	3	1	3	4	4
Maurie Lyster	5	5	5	5	3	3	5	5	4	4	3	3		
Neil Offner	5	5	5	5	5	5	5	5	4	4	5	5	5	5
Patrick Ulloa	3	4	5	5	5	4	3	5	3	3	5	5	3	4
Geoff Brooke	2	4	3	3	3	3	5	5	5	5	4	5		
Geoff Bliss	5	5	5	5	2	4	5	5	5	5	4	4	5	5
Harvey Giblett	3	4	5	5	4	3	5	5	4	3	4	4	3	3
	4	5	5	5	2	3	2	3	3	2	4	3	3	3
Trevor Ranford	4	4	4	4	3	3	4	4	3	4	5	4		
John Wilton	5	5	4	4	1	3	4	3	4	4	4	5	1	3
Andrew McNab	1	5	5	5	5	5	1	1	2	1	5	5	5	5
Peter Hemphill	3	5	5	5	3	4	4	5	4	4	4	4	4	5
Marcel Veens	4	4	5	2	2	2	3	4	2	3	4	4	3	3
Philip Pullar	5	4	5	4	4	3	5	4	5	5	3	4	4	4
Ben Darbyshire	3	5	5	5	1	4	4	4	5	4	5	5		
Steve Dilley	4	5	5	4	3	3	5	5	4	2	3	4	3	4
	4	4	5	4	4	3	5	5	5	3	5	5		
Henry Schneider	5	4	3	3	1	2	5	4	1	3	1	3		
Terry Burgi	3	5	5	4			5	4	4	4	5	4	4	
Vince Hewson			5	5	3	4	3	3			2	3	4	4
Coolstorage Tech	2	4	5	5	1	4	3	5	5	5	2	4		
	3.6	4.5	4.6	4.4	3.0	3.4	4.2	4.2	3.9	3.6	3.7	4.1	3.5	3.9

Comments:

Value: excellent, Networking: good
Value: most valuable for new opportunities, Networking: excellent
Value: a well put together program, well presented speakers and exhibitors
Value: very good, good mix of topics and speakers
Value: these workshops offer everybody a greater insight into many issues, Networking: great opportunity
Value: very good, Networking: not much due to time constraints
Value: worthwhile
Value: great value, Networking: very high
Value: very useful & interesting, Networking: a top priority & excellent opportunity
Value: fantastic morning, Networking: extremely valuable opportunity
Value: very valuable, Networking: very valuable
Value: very well done, Networking: excellent
Value: very good, Networking: always useful
Value: too much indoors, need to be outside, Networking: good
Value: good mix of topics
Value: good, Networking: very good
Value: 2nd half was great
Value: excellent, innovative, Networking: very good
Value: good selection of speakers
Value: got a bit long, but all good, Networking: medium, wasn't meant to be interactive, rather instructional
Value: excellent presentations & stimulating speakers, Networking: very good
Value: pleased I made the effort to attend, Networking: excellent
Value: thought provoking
Value: very good, Networking: very good

Suggestions for future workshops:

Broaden offer, demo projects
Have more than one and more focused workshops.
Try to encourage more participation
More of the John McBride & Kate Dawson talks
Ended up rushed due to speakers over-running time, merge with Field Day the day before
More time for discussion
More of the lateral thought process (i.e. Invetech)
Retain the innovative leaders and their suggestions
Automation, sensing technology
Keep closer to shed location
Agenda with more speaker info
Same format, but more breaks for networking
Keep up the farm visits
Keep on pushing the future challenges, bring in more outside thinking (John McBride)
More field days, same format as at Masalki, think outside the square

EXPO, 25 MAY

Topic/Speaker	IHD Group		Croplands		Airmaster		Nufarm		Water Dyn		Bas Van		Sumitomo		Cropcare		Ozone		Jtech		Telstra		CTA		EDP		Wobelea	
	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy	Imp	Enjoy
Wayne McPaul		3		3		3		3		3		3		3		3		3		3		3		3		3		3
P Milovitch	5	5	5	5	5	5	5	5	5	5	5	4	5	4	5	4	5	4	4	4	4	4	4	4	4	4	4	4
Gavin Kerr	5	3	4	3	3	3	5	5	5	5	5	5	5	5	5	3	5	0	2	0	2							
	4	3	4	4	5	5	4	4	3	3	5	5	4	2	3	3	4	3	4	3	5	4	5	4	5	3	5	3
Dean Smithers	5	5	5	5	5	5	2	2	4	4	4	4	5	5	3	3	3	3	4	4	2	2	5	5	5	5	5	5
Robyn Clubb	5	5	4	3	4	3	3	2	3	1	3	5	3	4	1	2	2	3	1	3	0	3	0	3	2	3	1	3
	5	5	2	3	1	4	5	5	5	5	1	5	5	5	1	3	1	3										
Richard Guthrie	4	4	5	5	1	4	5	5	4	4	5	5	4	4	4	5	2	2	2	2	2	2	2	2	4	4	2	2
G Coventry	4	4	4	4	4	4	4	4	3	3	4	4	1	1	2	2	3	3	4	4	4	4	4	4	4	4	3	3
Batlow	5	5	3	3	3	3	5	5	3	2	3	5	4	4	3	3	3	3	3	4	2	4	3	3	3	3	3	3
Warren Duffy	5	4	5	3	3	3	5	5	5	3	3	4	3	4	3	4	3	4	5	4	2	4	5	4	5	4	5	4
Brian Cumming	5	5	5	2	1	3	1	3	3	3	5	4	5	5	3	3	2	3	2	3	5	4	2	3	2	3	4	3
David Finger	4	5	4	4	3	3	5	4	4	5	5	3	4	3	2	3	3	3	2	4	4	4	2	2	4	3	3	3
Sue Finger	5	5	4	4	3	4	5	5	5	5	3	3	4	4	3	3	5	3	3	3	4	4	3	3	3	3	3	3
	3	4	4	4	3	4	4	5			5	5	4	4	2	2	1	1	1		3	3			5	5	1	1
	5	4	2	4	3	4	4	4	4	4	5	5	5	5	3	5	2	4	2	4	2	4	2	4	2	4	3	4
	5	5	5	5	2	5	3	5	5	5	4	4	4	4	4	4	5	5	5	3	5	5	5	5	5	5	5	5
Mark Silm	4	4	4	4	4	4	4	4			5	5	5	5	3	3	3	2	4	3	3	3	4	4	4	4	4	4
			4	3	1	4	5	3	4	3	4	3	5	4	4	3	2	2	3	3	2	2	2	3	3	3	2	3
Vince Hewson	5	5	3	3	1	4	5	5			2	2	3	3	3	3	3	3	2	2	3	3			2	2		
	4	4	5	4	1	4	1	4	4	4	3	4	3	4	4	4	1	4	2	4	3	4	3	4	4	4	4	4
	5	4	5	4	4	4	5	4	5	4	5	4	5	4	5	4	4	3	4	3	4	3	4	3	4	3	5	3
Ben Darbyshire	5		3		0		5		3				5		4		4		2		5		5		1			
	5	4	4	4	5	5	5	5	5	5	5	5	5	5	3	5	1	4	0	3	0	3	5	5	3	5	3	3
Robert Leeves	4	4	5	4	3	4	4	3	4	5	5	4	4	3	4	3	3	3	3	4	3	4	4	4	3	4	4	3
David ??	3	5	5	3	2	5	5	5	3	3	3	3	5	2	3	3	1	3	1	4	2	3	4	4	4	3	1	3
B Rhones	4		4			1	4		5		5		4		3		3		4		3		4		3		4	
Dennis Duffy	5	4	4	5			5	5	5	4	4	4	5	4	2	3	4	4	5	3	4	5	4	4	4	4	4	4
Toby McKinnon	3	4	4	5	2	3	5	5	4	3	4	5	5	2	3	3	2		2	1	4	2	5	4	4	2	3	2
Garry Byrne	4	4	5	5	2	4	3	4	4	4	5	5	5	4	3	4	4	4	3	4	3	3	3	4	4	4	4	4
Reg Baldwin	5	5	5	5	1	3	4	4	5	5	5	5	5	5	2	4												
Doug Brown	4	4	4	3	2	3	2	3	4	4	3	3	4	2	1	2	0		0	1	3		0		0		0	
	5	4	5	5	5	3	5	4	4	3	5	5	3	5	2	3	2	3	2	4	3	3	3	2	4	4	4	2
Tom Price	4	5	3	3	5	5	3	3	4	4	4	4	3	3	4	4			5	5	4	4			5	5	2	2
Alan Smith	4	4	3	3	4	3	3	3	5	5	4	4	4	3	4	3			4	4	4	4			5	5	2	2
	5	5	3	3	4	5	5	5	4	5	5	3	5	5	4	3	2	5	4	5	2	4	2	3	4	3	3	3
Alan Upton	3	4	3	4	2	4	2	5	2	3	3	4	3	3	3	3	2	3	3	3	3	4	4	4	3	4	3	3
Bob Sanders	4	4	4	4	4	4	4	4	4	4	5	5	4	4	3	3	3	3	4	4	4	4	4	4	4	4	3	3
	4	5	3	4	1	4	4	4	4	4	4	3	3	3	2	4	1	2	2	3	3	4	1	2	4	3	3	3
Karl Durham	4	4	4	4	4	4	4	4	3	3	4	4	2	2	2	2	2	2	4	4	4	4	3	3	3	3	3	3
	4	2	3	2	5	2	5	3	4	2	3	1	4	2	2	2	1	1	2	2	2	2	3	2	3	3	2	2
	3	4	4	4	3	4	4	4	4	3	3	4	4	4	3	4	3	3	4	4	3	3	4	4	3	4	4	4
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	1	1	4	4	3	3	4	4	3	3
	3	4	4	4	3	4	4	4	3	3	3	3	4	2	2	3	1	3	2	4	2	4	4	4	3	4	2	3
	4.3	4.2	4.0	3.8	2.9	3.8	4.0	4.1	4.0	3.7	4.0	4.0	4.1	3.6	3.0	3.2	2.6	3.0	2.8	3.2	3.1	3.5	3.3	3.5	3.5	3.7	3.1	3.1

Suggestions for future Expos

Break up into smaller working groups from different areas for informal discussions
More hands on with apple trees
Speakers need a definite message - quick and precise - a couple waffled on
More expos
Allocate groups on registration
Name tags with home town would be useful
Allocate more time
Need more detail of locations and more/better group organisation
More practical demos than static
Whatever changes in the industry, i.e. Smartfresh
Closer look at soil biology

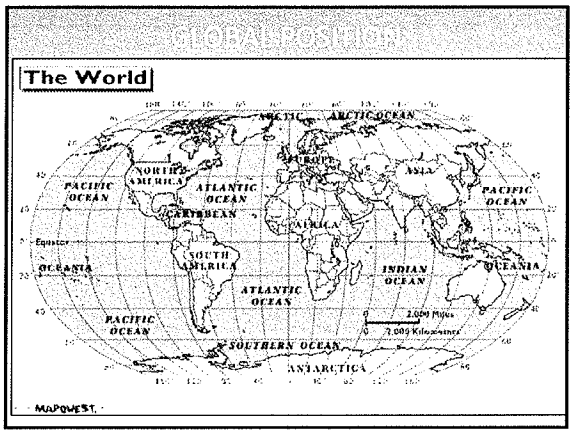
Comments

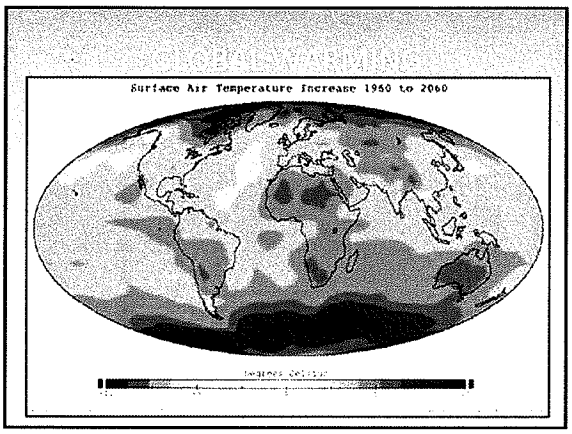
Very in depth and enjoyable
Excellent range of information
Well presented, very well structured, easy to interact
Very informative day
Excellent, enjoyable, professional
Good value for participants
Very interesting
A long day, but it was good
I valued all the information provided and found the day very interesting
Excellent day to be further promoted
One of the best organised programs, well put together and much to observe and learn
Great day, good to spend time with other growers

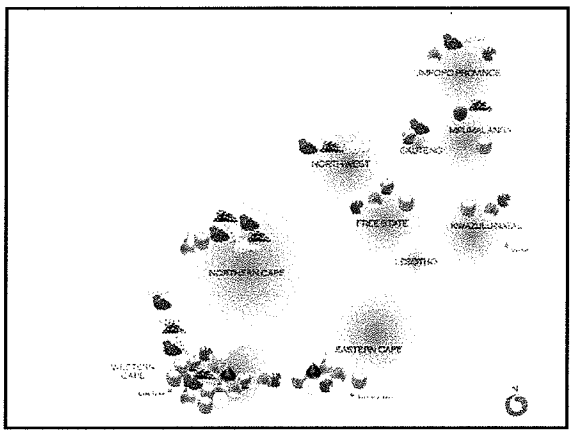
Topfruit

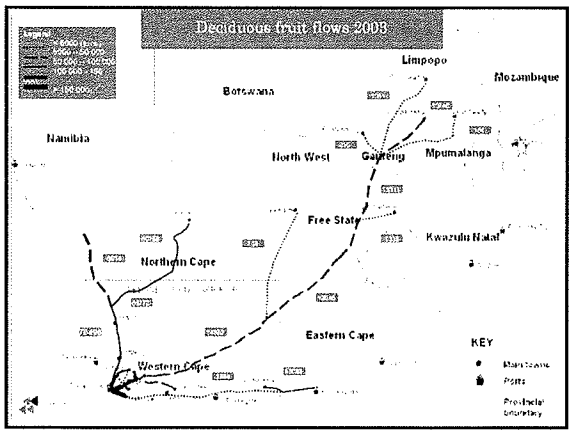
Rosenhof

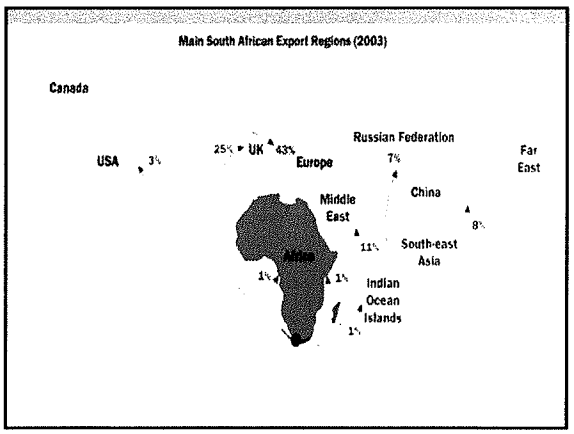
AIGN

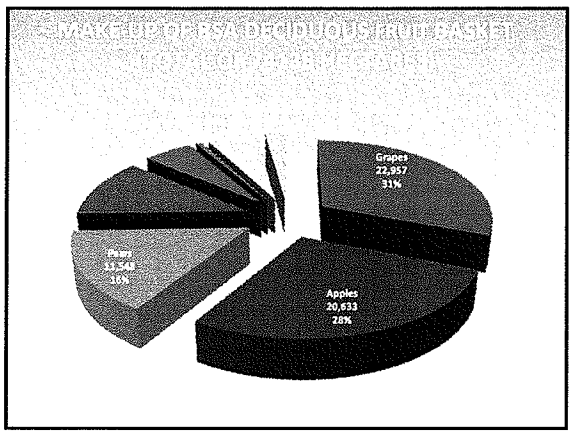


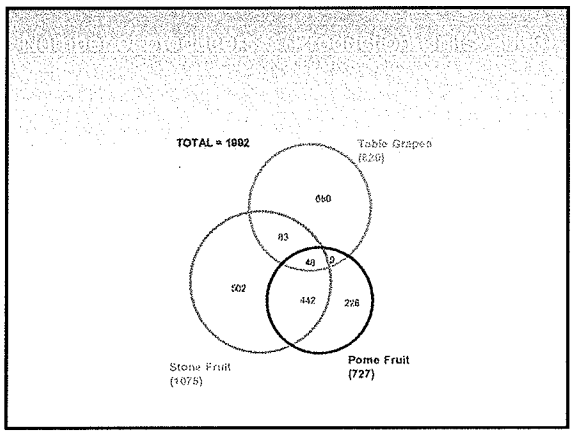












On-farm employment

Fruit	Labourers*	Dependents
Apples	25,878	103,514
Grapes	36,949	147,796
Pears	14,588	58,352
Peaches	10,516	42,064
Plums	6,014	24,055
Apricots	4,522	18,087
Nectarines	2,024	8,096
TOTAL	**100,491**	**401,964**

*** Permanent equivalent. Casual labour converted to permanent equivalent**

MAIN CHANGES IN INDUSTRY IN PAST 10 YRS

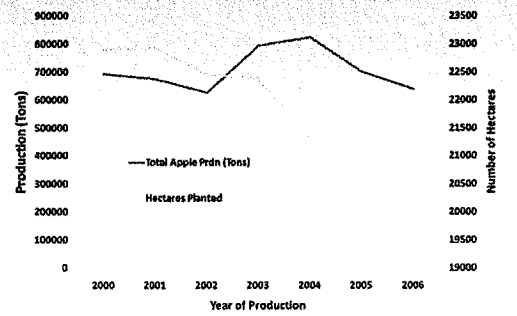
- **PRE 1998** SINGLE CHANNEL EXPORTS (VERY LIMITED DOMESTIC MARKET)
- **1998** SUDDEN DEREGULATION
  - FROM 1 TO >100 EXPORTERS
- DFPT FORMED TO MAINTAIN INDUSTRY DISCIPLINES & FUNDING FOR
  - CURRENTLY DFPT HAS 3 TRUSTEES PER FRUIT TYPE AND A BUDGET OF R 35 MILLION SPENT AS FOLLOWS:
  - FUNDING TECHNICAL & RESEARCH 5.3%
  - PLANT IMPROVEMENT & CERTIFICATION 6.4%
  - BASIC INFORMATION GATHERING & STATISTICS 4.5%
  - DEVELOPMENT OF REAL TIME INFORMATION SYSTEMS 13.8%
  - MARKET ACCESS 5.3%
  - TRANSFORMATION 9.0%
  - ADMINISTRATION 8.0%
  - EACH FRUIT TYPE DECIDES UPON THE SPLIT MADE OF ITS LEVIES BETWEEN SOME OF THE ABOVE CATEGORIES (NO CROSS-SUBSIDIZATION BETWEEN FRUIT TYPES IE EACH FRUIT TYPE CONTROLS IT'S OWN SPEND)
- **1998 - 2000**
  - CHAOS ON EXPORTS MORE COMPETITION BETWEEN SOUTH AFRICAN EXPORTERS RATHER THAN WITH OTHER COUNTRIES
  - NUMEROUS PRODUCERS AS WELL AS EXPORTERS BANKRUPTED ..THESE YEARS CO-INCIDED WITH LOW PRICES OVERSEAS
  - POME FRUIT VOLUNTARY LEVIES DROPPED FROM 70% TO < 20% GRAPES AND STONEFRUIT KEPT STATUTORY LEVIES
  - START OF LAND REFORM
- **2000 - PRESENT**
  - FRESH PRODUCE EXPORTERS FORUM ESTABLISHED IN 2000 TO PROMOTE HONEST & ETHICAL EXPORTERS
  - STATUTORY LEVIES RE-INTRODUCED SUBJECT TO CONDITIONS SET BY GOVERNMENT & REVIEWABLE EVERY 4 YEARS
  - CONTINUAL RESTRUCTURING TO ADDRESS CHANGING CIRCUMSTANCES WITHIN DIFFERENT INDUSTRY SECTORS
- FORMATION OF **"FRUIT SOUTH AFRICA"** TO CO-ORDINATE DECIDUOUS, CITRUS & SUB-TROPICAL FRUITS

RELATIVE PROFITABILITY OF VARIOUS FRUIT TYPES

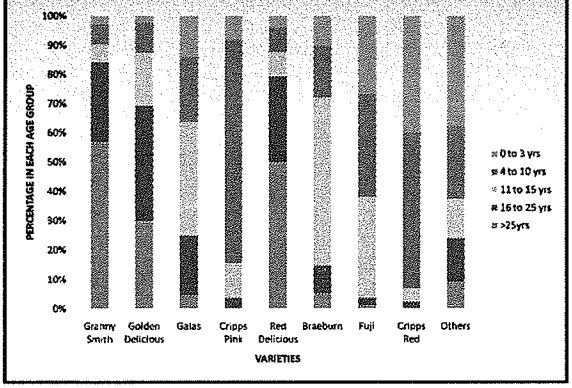
	APPLES	PEARS	PLUMS	PEACH & Nectarine	APRICOTS	GRAPES
Net Farm Income/ Ton	108	110	172	523	448	86

APPLES

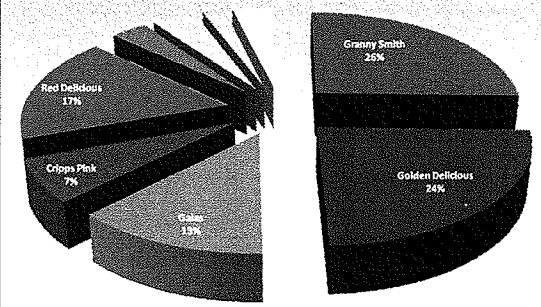
TRENDS IN APPLE PRODUCTION & PLANTING



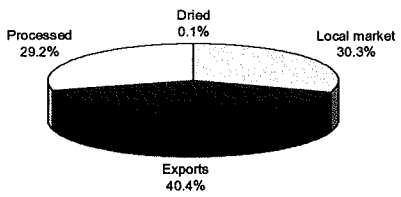
APPLE VARIETY / TREE AGE TRENDS



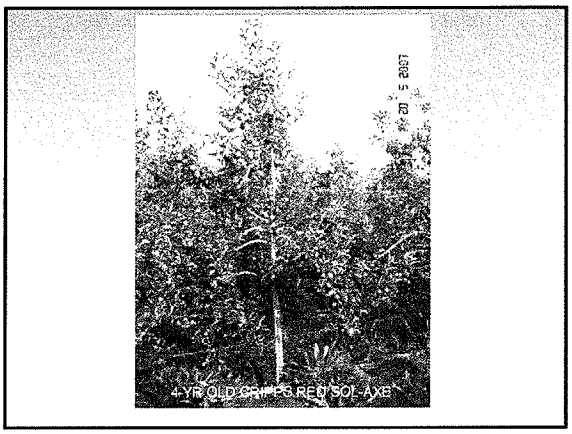
MAIN APPLE VARIETIES 2006



UTILIZATION OF THE APPLE CROP (2006)



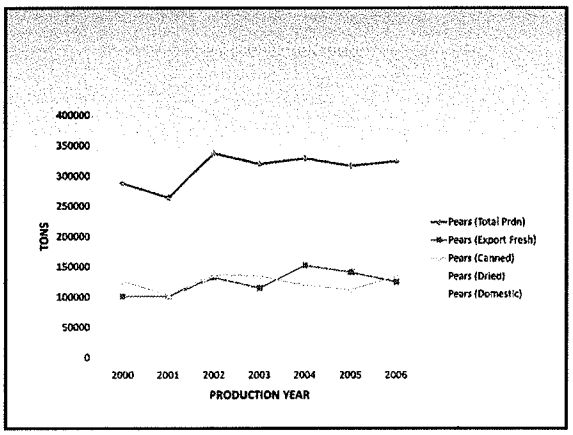

20 5 2007
MODERN ORCHARD END OF FIRST LEAF


20 5 2007
4-YR OLD CRIMPED RED SOL-AXE

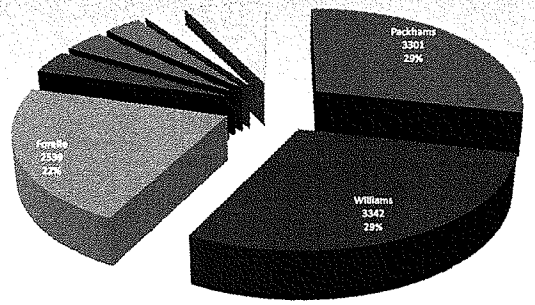

20 5 2007
MATURE GOLDEN TREE CONVERTED
FROM CENTRAL LEADER TO SOL-AXE


1ST LEAF SOL-TREES SOL-AXE
20 5 2007

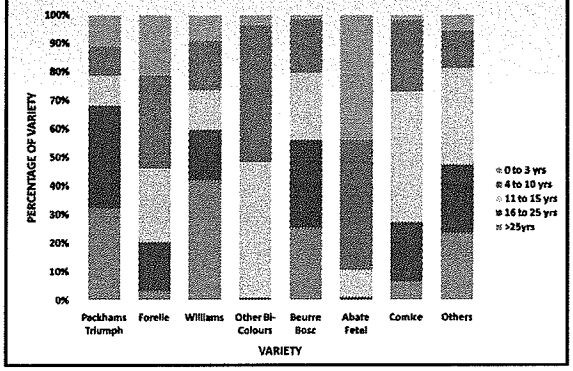
PEARS


400000
350000
300000
250000
200000
150000
100000
50000
0
TONS
2000
2001
2002
2003
2004
2005
2006
PRODUCTION YEAR
Pears (Total Prdn)
Pears (Export Fresh)
Pears (Canned)
Pears (Dried)
Pears (Domestic)

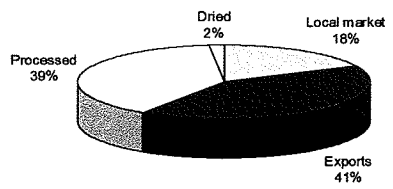
MAIN PEAR VARIETIES (HECTARES) IN 2009

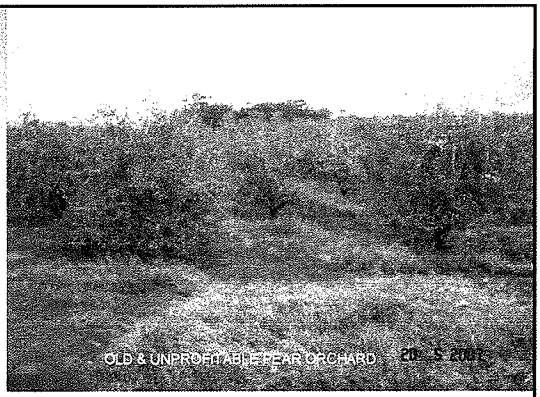


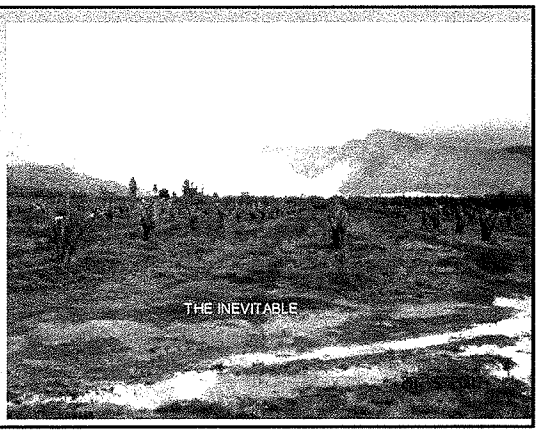
PEAR VARIETY / TREE AGE TRENDS



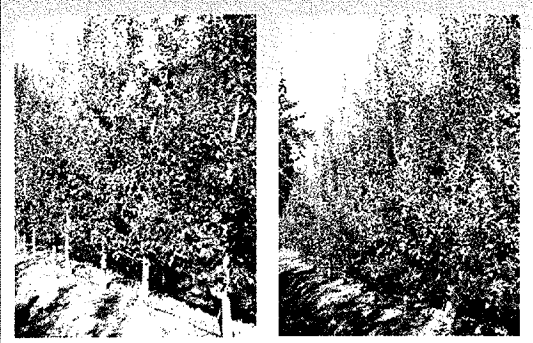
UTILIZATION OF THE PEAR CROP (2009)



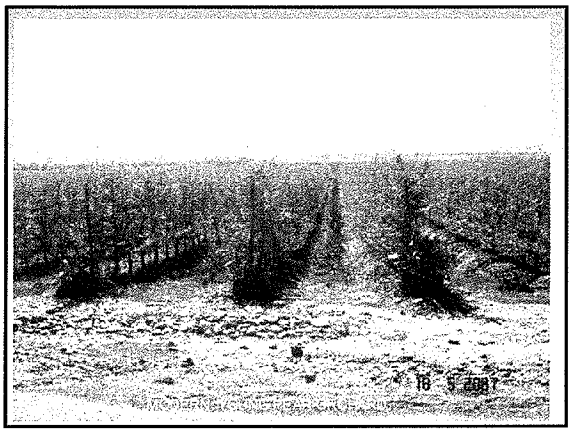


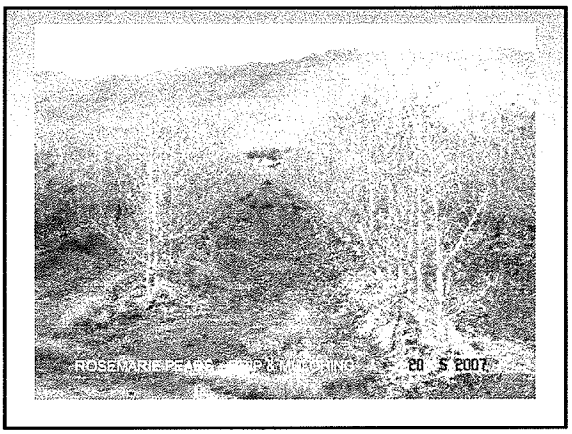


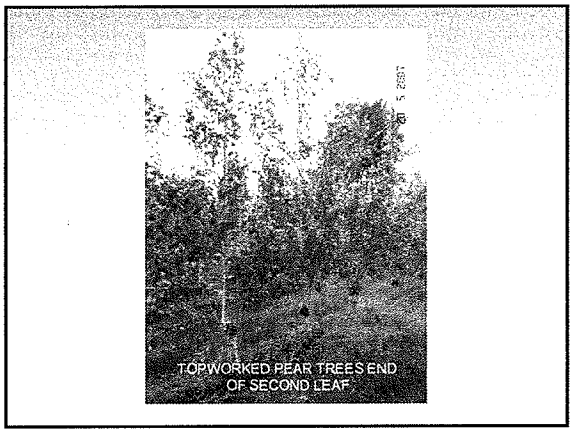
FORELLE ON BA 29 VS BP1 ROOTSTOCK



Forelle on BA 29 | Forelle on BP 1





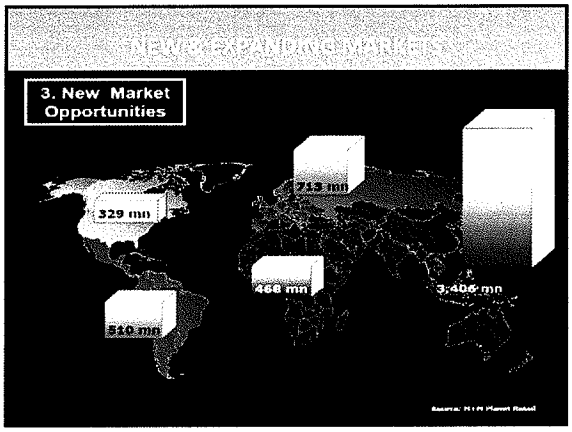


COMMERCIAL OPPORTUNITIES
&
THREATS

WHAT HAS HAPPENED TO SA'S DECIDUOUS EXPORTS?

Export Volumes ('000 Tons)							
Fruit Kind	2004/05	2005/06	2006/07	2007/08	2009/10	2010/11	Prediction
Apples	224.5	222.3	220	217.8	215.7	213.5	1% Reduction per annum
Pears	153.7	155.3	156.8	158.4	160	161.6	1% Growth per annum
Table Grapes	210.6	214.8	219.1	223.5	227.9	232.5	No growth / Fluctuations
Plums	39.5	40.24	41.05	41.87	42.71	43.56	2% Growth per annum with Large Fluctuations
Nectarines	5	5.18	5.39	5.6	5.83	6.06	4% Growth per annum with Large Fluctuations
Peaches	2.5	2.56	2.61	2.66	2.71	2.77	2% Growth per annum with Large Fluctuations
Apricots	3.5	3.62	3.69	3.77	3.84	3.92	2% Growth per annum with Large Fluctuations

NEW & EXPANDING MARKETS



MANAGING THE COMPETITION

- AVOIDING HEAD-TO-HEAD COMPETITION WITH OTHER EXPORTING COUNTRIES EG. LATE PLUMS INTO UK & EUROPE
- FINDING THE GAPS EG. EARLY STONE FRUIT TO UK & EUROPE
- REAL TIME DATA COLLECTION ON CROP & MARKET CONDITIONS (DECAFRUIT)
- EXCHANGE OF INFORMATION ON CROP SIZE AND MARKETING STRATEGY (IPLA)
- KEEPING AHEAD WITH TECHNOLOGY
- KEEPING UP WITH COMSUMER DEMAND & NEW VARIETIES
- SECURING SUPERMARKET PROGRAMMES

MANAGED PRODUCTS

- TWO MAIN MOTIVATIONS
  - LEVERAGING VALUE FOR GROWERS FROM RETAILERS
  - IMPROVED REWARDS TO BREEDER & LICENSEE CHAIN
  - SECURING POSITION IN VALUE CHAIN (Exporters less important with managed varieties)
- RESULTS TO DATE
  - SOME SUCCESSES eg. PINK LADY®, JAZZ®
    - SUCCESSFUL PRODUCTS ALL TRULY UNIQUE & CAN BE DIFFERENTIATED
    - HAVE BIG $ FOR DEVELOPMENT & PROMOTION
  - BACKLASH FROM RETAILERS
  - BALANCE BETWEEN "CONTROL" AND SUFFICIENT "COMMERCIAL FREEDOM" IS DIFFICULT TO ACHIEVE
- THE FUTURE OF MANAGED VARIETIES
  - FACE MUCH COMPETITION BETWEEN EACH OTHER & WITH RETAILER BRANDS
  - MORE DIFFICULT TO SECURE A NICHE, PRODUCT MUST BE UNIQUE AND NOT A SUBSTITUTE
  - EVEN LARGER BUDGETS WILL BE REQUIRED TO LAUNCH & SUSTAIN
  - GREATEST POTENTIAL IS WITH RANGES OF PRODUCT RATHER THAN INDIVIDUAL ITEMS
- IN SOUTH AFRICA
  - PINK LADY® & SUNDOWNER® (IPLA)
  - BRADFORD PEACH & NECTARINE GROWERS COMPANY
  - TABLE GRAPE GROWERS COMPANY
  - SUNWORLD PRODUCTS

SOME RECENT DEVELOPMENTS

- POPULATION OF 46 MILLION WITH RISING LEVEL OF DISPOSABLE INCOME
- PREFERENCE FOR DECIDUOUS FRUITS
- EXPANSION OF INFORMAL TRADING OUTLETS
- PARALLEL SEA AND AIR FREIGHT STONE FRUIT PROGRAMS
- ELIMINATION OF EXPORTERS FROM THE COST CHAIN?
- INVOLVEMENT OF EXPORTERS IN VARIETY PROCUREMENT & DEVELOPMENT
  - COLORS... MEILLARD
  - CATOPE' .... BEN D'OR
  - CAPESPAN and TRUCAPE
- INVOLVEMENT OF IMPORTERS IN VARIETY DEVELOPMENT AND FINANCING
  - MACK MULTIPLES AND ZAIGER INTERSPECIFIC HYBRIDS

IMPROVED VARIETIES

APPLES
- Pink Lady(R)
- Sundowner(R)
- Pajam2 & Nic 29 Rootstocks
- CG Rootstocks?

PEARS
- Abate Fetel
- BA 29 Rootstock

NEW TECHNOLOGY

- MATCHING ROOTSTOCK & SCION
  - Vigorous on dwarf & Vice Versa
  - Replant Performance
- TREE ARCHITECTURE
  - Soil Axe for Apples
  - Regalis®
  - Light Management
  - Reduced Pruning
- PRE-HARVEST
  - New Chemical Thinning agents
  - Fruitlet analysis
  - Maturity Indexing/ Monitoring
  - Retain®
- SOIL HEALTH
  - Organic Material
  - Pre-Plant Preparation
  - Cover Crops
  - Mulching
- TRELLISING
  - NB with Dwarfing stocks
  - Limited Compatibility
- POST-HARVEST
  - SmartFresh®

POLITICAL INFLUENCE

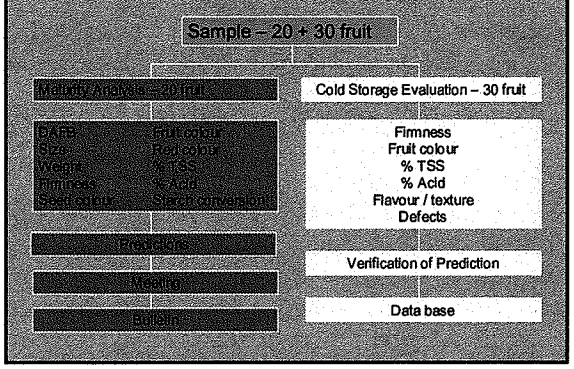
- SOUTH AFRICA TOTAL LAND AREA IS 122MILLION HECTARES
- TOTAL FARM LAND IS 100 MILLION HECTARES
- TOTAL OWNED BY WHITE FARMERS 82 MILLION HECTARES
- >50 % OF FARMS HAVE LAND CLAIMS PENDING (WESTERN CAPE HAS VERY FEW)
- 5128 LAND CLAIMS PENDING.... MUST BE RESOLVED BY END 2008
- IT TOOK THE PAST 12 YEARS FOR 4 Mil HECTARES TO BE TRANSFERRED TO BLACK OWNERS
- GOVT. DECREES THAT 30% OF 82 Mil Ha (20,6Mil) MUST BE IN BLACK HANDS BY 2014
- THE TARGET IS A MINIMUM OF 3,1MIL HA PER YEAR FOR THE NEXT 3 YEARS
- 90% OF CURRENT FARMING UNITS HAVE AN ANNUAL TURNOVER OF < R 5 MILLION (<10% RETURN ON CAPITAL INVESTED) AND THE COUNTRY HAS AN INFLATION RATE OF AT LEAST 6% PER YEAR
- < 5% of RSA GDP COMES FROM AGRICULTURE (vs >80% IN CASE OF ZIMBABWE) ... SO...
  - GOVT SEES NO PRIORITY IN TRADE AGREEMENTS, BIOSECURITY, MARKET ACCESS
  - GOVT INVESTMENT ONLY IN BLACK FARMER BUSINESSES AND NO PVT. CORPORATE INVESTMENT.... "LRAD" HELPFUL BUT MAINLY TO LARGE FARMING ENTERPRISES

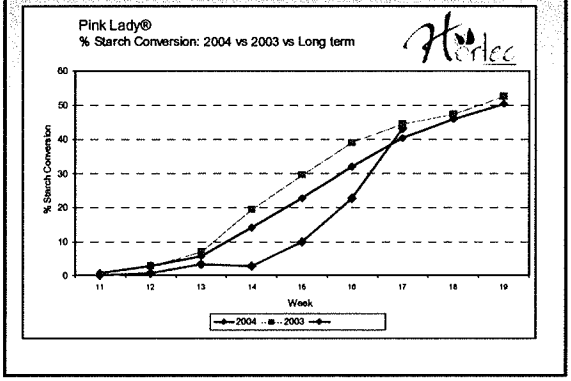
- LAND RESTITUTION MASSIVELLY EMOTIONAL (NOT COMMERCIAL) & IS USED BY UNDERPRIVILEGED AS THE MAIN INDICATOR OF FAILURE TO DELIVER ON ELECTION PROMISES
- LABOUR LEGISLATION THROTTLING ENTERPRISES
- ALL WATER RIGHTS RESCINDED .. APPLY, REGISTER, AND PAY WATER & LAND TAXES (NO SERVICES)
- GOVT. ENCOURAGING SMALL FARMING UNITS... (AGAINST ECONONOMIC REALITY)
- MAJORITY OF NEW BLACK VENTURES HAVE FAILED..(LACK OF CAPITAL & BUSINESS EXPERTISE)
- MENTORING & JOINT VENTURES ... MORE SUCCESSFUL
- FOR FUTURE STABILITY WHITE FARMERS HAVE TO FIND A SOLUTION!!!!!!
- VIRTUALLY NO BLACKS STUDYING AGRIC
- SECURITY OF TENURE ACT

MATURITY INDEXING

- STARTED PRE-DEREGULATION TO ACHIEVE UNIFORMITY IN EXPORT PRODUCT QUALITY
- FUNDED BY STATUTORY LEVY AND COMPLIANCE ENFORCED THROUGH LEGISLATION (In consultation with industry and through PPECB who issue the required phyto and export certificates)
- POST-DEREGULATION –STILL REQUIRED BY MOST LARGE PACKERS & EXPORTERS – NOW ON USER-PAY BASIS
- HORTEC (INDUSTRY-FUNDED) STILL CONTINUING TO MONITOR MAINLY NEW OR PROBLEMATIC VARIETIES AND SHOW UP SPECIFIC SEASONAL DIFFERENCES
- IMPORTANT TOOL IN SCHEDULING HARVEST TO OPTIMISE QUALITY
- CAN PERMIT EXTENSION OF PICKING WINDOW
- ACCUMULATE GOOD DATA FOR FUTURE MANAGEMENT DECISIONS

MATURITY INDEXING PROCESS





Certificate of Analysis

Sample report

Copyright Hortec (Pty) Ltd

Area: Wyebcom Farm: 004-Boslamenarug Cultivar: Granny Smith Orchard: Kakamas 1

Area	Sample date	Week	Fruit size	Firmness	Fruit colour	Seed colour	% TSS	% Acid	Starch	Release date
68 002	16/03/04	12	67.2	6.6	1.7	2.9	10.3	0.66	4.5	
68 087	23/03/04	13	69.6	7.6	1.8	3.7	10.4	0.63	11.5	30/03/04
68 050	29/03/04	14	67.6	6.4	1.3	4.1	12.0	0.70	7.0	02/04/04
67 950	05/04/04	15	72.8	7.4	1.7	4.4	11.8	0.73	22.0	02/04/04
68 577	13/04/04	16	74.2	7.6	1.8	6.0	12.0	0.67	38.7	
68 084	19/04/04	17	70.7	7.3	1.6	6.0	12.9	0.69	45.7	
68 556	26/04/04	18	74.3	7.1	1.7	6.0	12.7	0.68	47.7	
69 828	03/05/04	19	73.6	6.9	2.0	6.0	11.5	0.61	48.3	
Release criteria				7.0	1.5	4.2	11.4	0.70	20.0	

Maximum and minimum standards for Granny Smith

Maximum firmness: Minimum firmness: 5.9 kg Tolerance: 20%

Min. starch conversion(%): 20.0 Minimum % TSS: 11.0%

Seed colour: 2/3 brown Tolerance: 20%

Sample ID: 69 828

Granny Smith

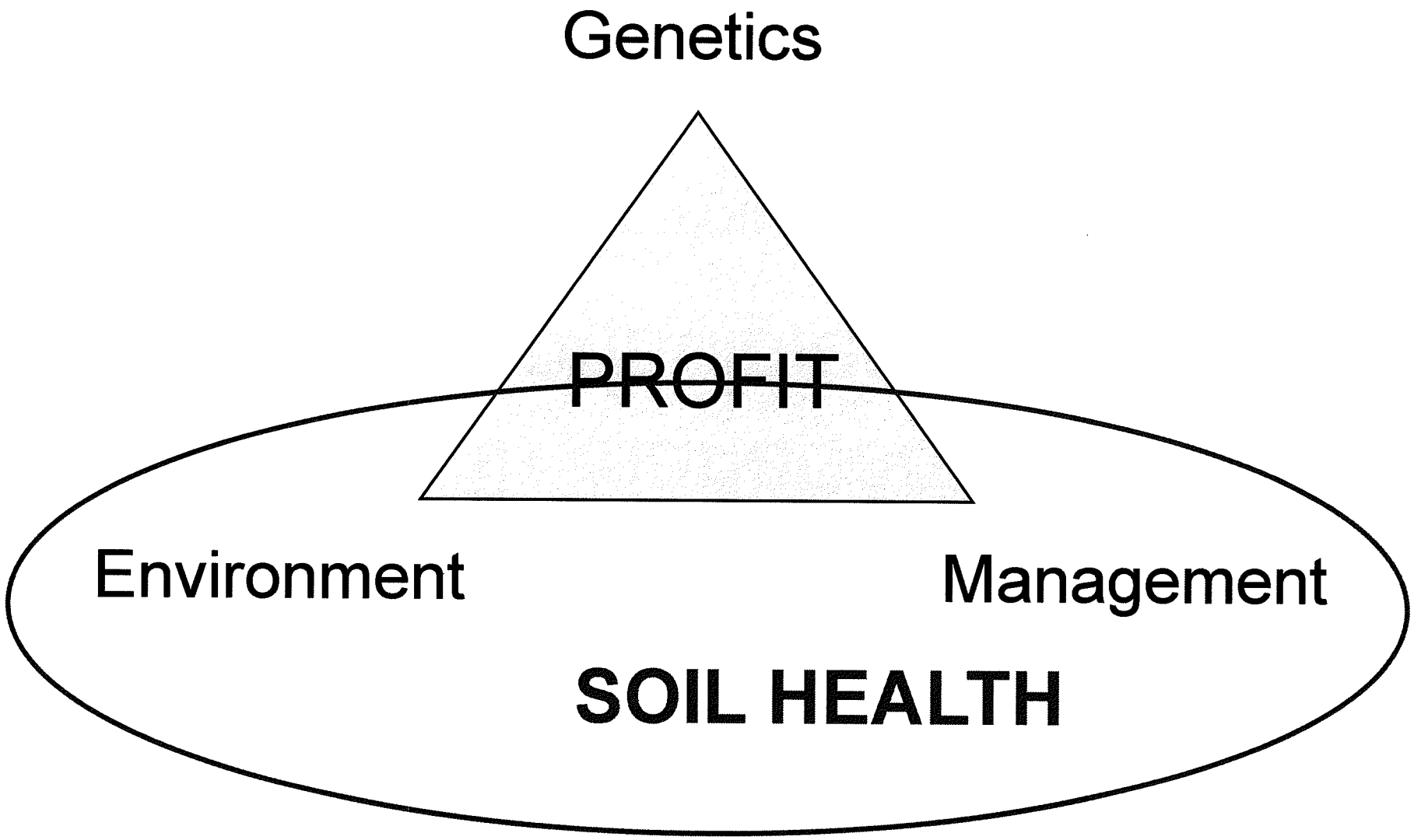
		Optimum picking window		
Name	**Release date**	**Start**	**End**	**Final harvest date**
Block 3	27 Mar 04	01 Apr 04	16 Apr 04	22 Apr 04
Block 51	29 Mar 04	03 Apr 04	18 Apr 04	24 Apr 04
Block 34	29 Mar 04	03 Apr 04	18 Apr 04	24 Apr 04
Block 22	01 Apr 04	06 Apr 04	21 Apr 04	27 Apr 04
Block 1	03 Apr 04	08 Apr 04	23 Apr 04	29 Apr 04
Block 7	03 Apr 04	08 Apr 04	23 Apr 04	29 Apr 04
Block 32	05 Apr 04	10 Apr 04	25 Apr 04	01 May 04

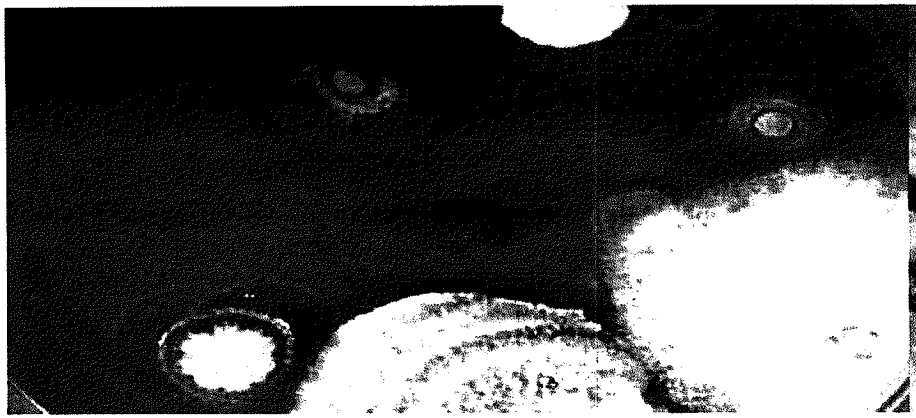
In Conclusion

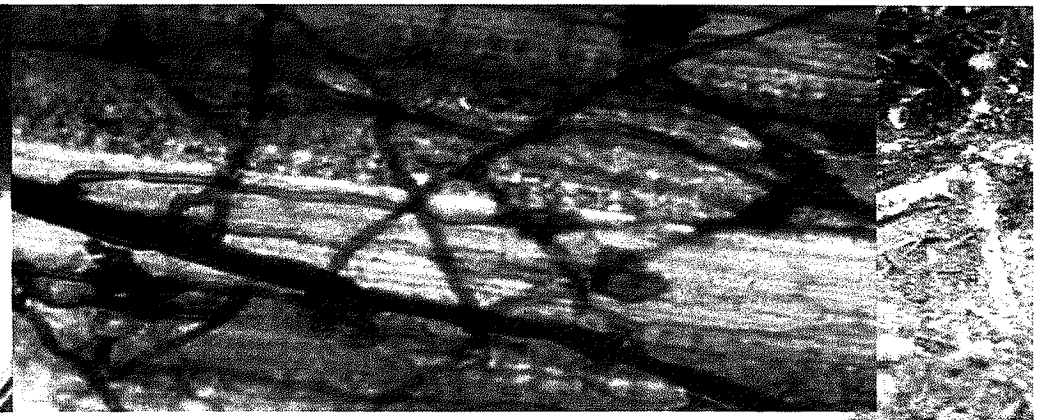
- Fruit maturity .... part science .... part art
- A mature fruit is not necessarily ripe
- All parameters are biologically independent
- No single parameter can identify maturity
- Focus on frequency distribution of readings
- Focus on consumer and eating quality
- Local market apple maturity/quality inspection

Thank you

There are 3 things to consider







Soil health management - the principles

AFFCO STONEFRUIT WORKSHOP 2007

Doris Blaesing

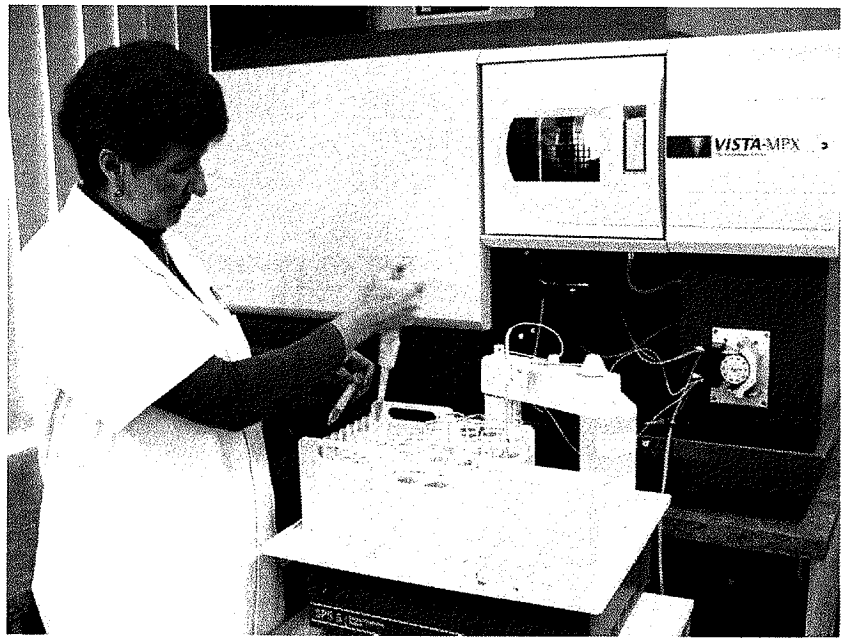
Serve-Ag Pty Ltd

1 Chemical soil health indicators

1. Organic Carbon — *My favourite*
2. Soil pH
3. Salinity indicators *(Electrical Conductivity, chloride)*
4. Nutrient levels
5. Cation exchange capacity

On every soil test report!

Can be manipulated!



There are 3 soil health areas

Chemical

PROFIT

Physical

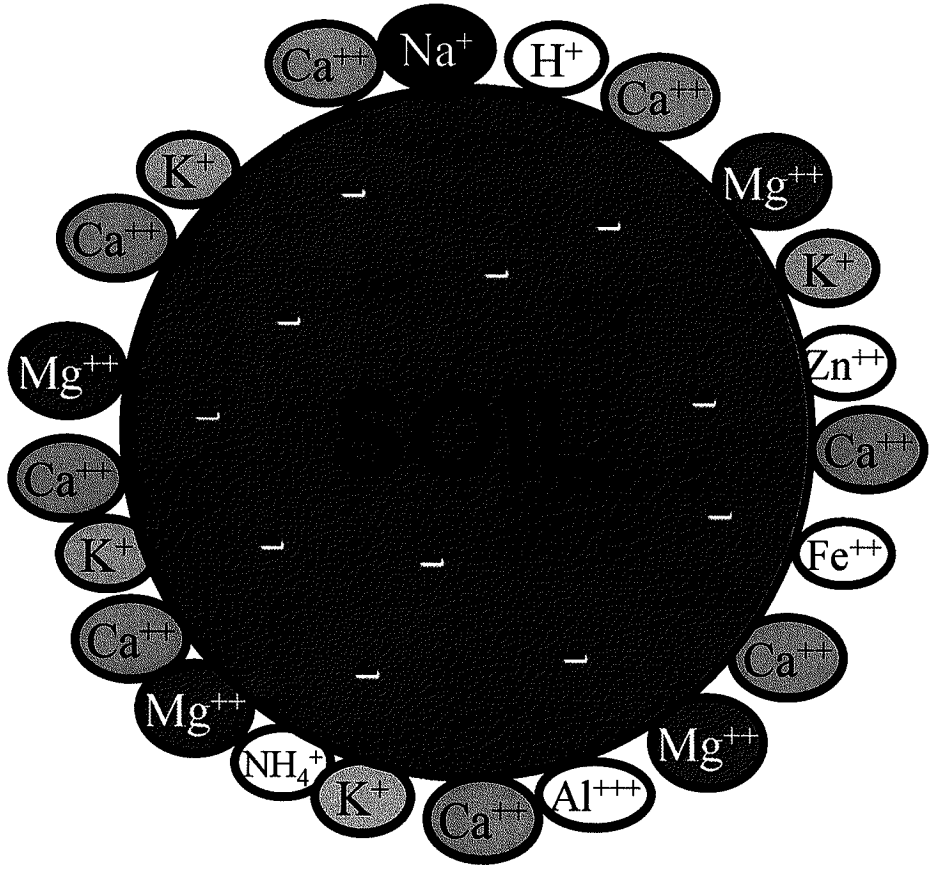
Biological

????

Cation Exchange Capacity

- Nutrients are positively or negatively charged (cations, anions)
- Clay and Organic Matter have negatively & positively charged sites

The cation exchange capacity (CEC) indicates how many positively charged nutrients a soil can hold.



ORGANIC MATTER - ORGANIC CARBON

Why?

Microbe & plant food

'Glue' for soil particles

Holds onto nutrients

Improves water infiltration and holding capacity

Improves soil air volume

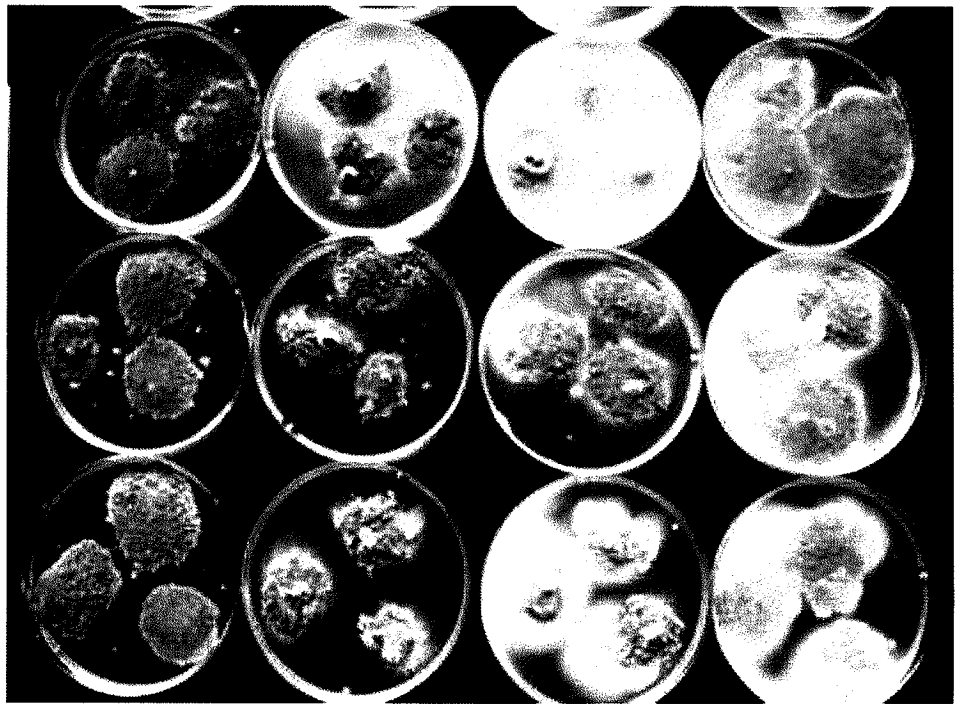
Better root growth

BLACK MAGIC

2 Physical soil health indicators

1. Penetration resistance
2. Aggregate size distribution
3. Aggregate stability
4. Aggregate dispersion
5. Bulk density
6. Vane strength
7. Infiltration
8. Soil Texture

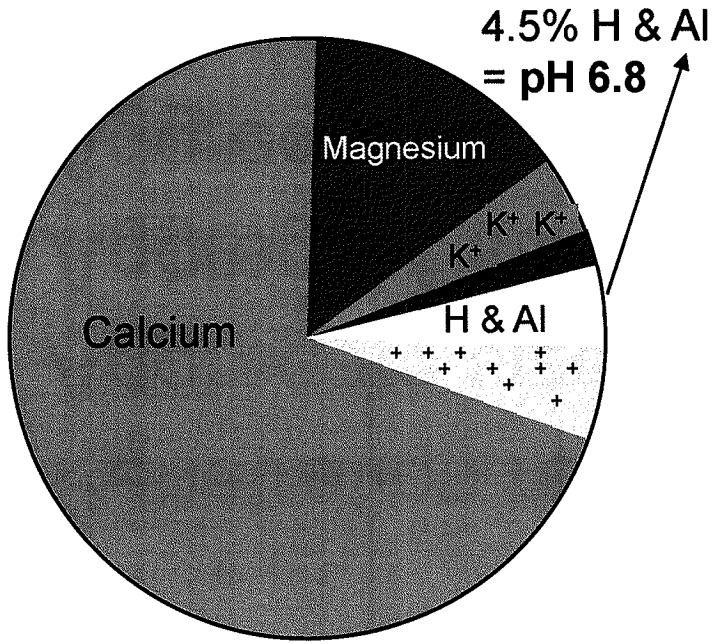
????

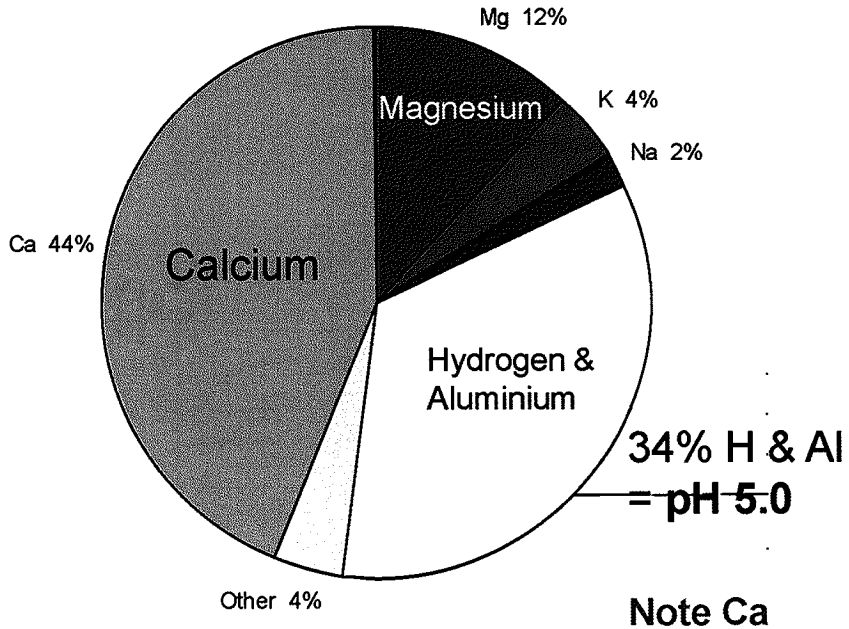


pH and CEC

- **pH** is a measure of **Hydrogen** concentration

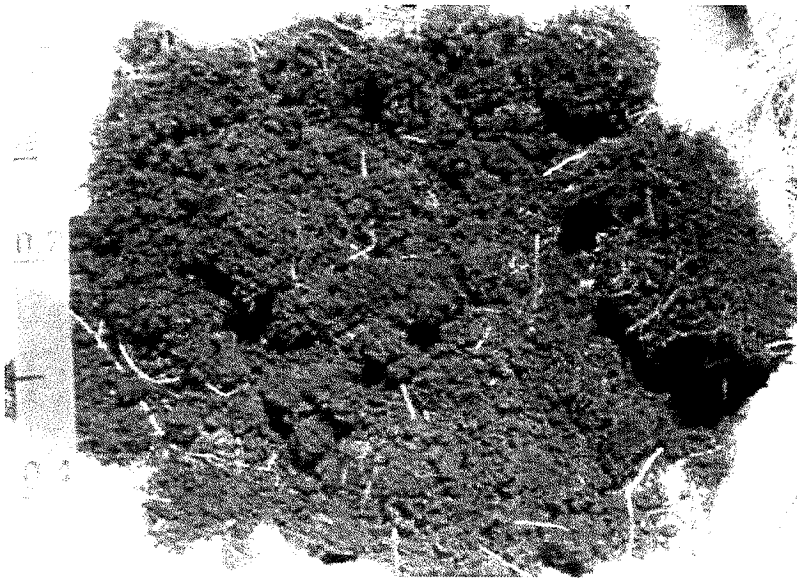
- The more Hydrogen, the more acidic the soil reaction
- An acidic soil usually leads to nutrient deficiency or **Al toxicity**





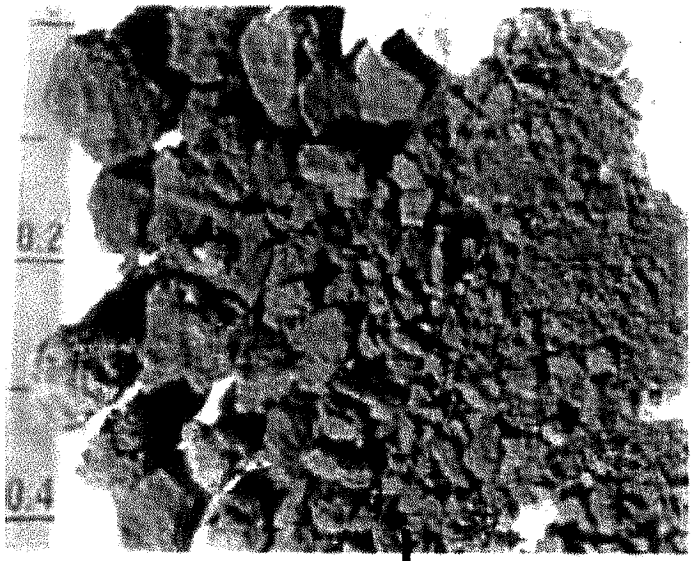
Note Ca deficiency and low Mg & K

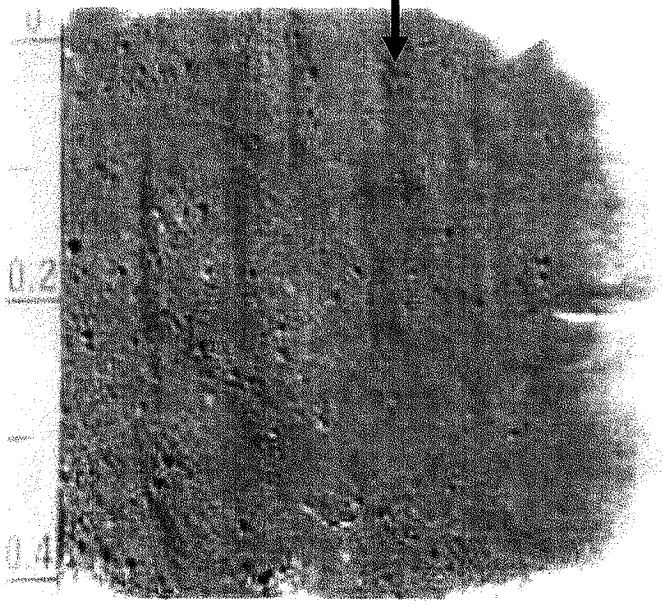
GOOD



STRUCTURE

POOR

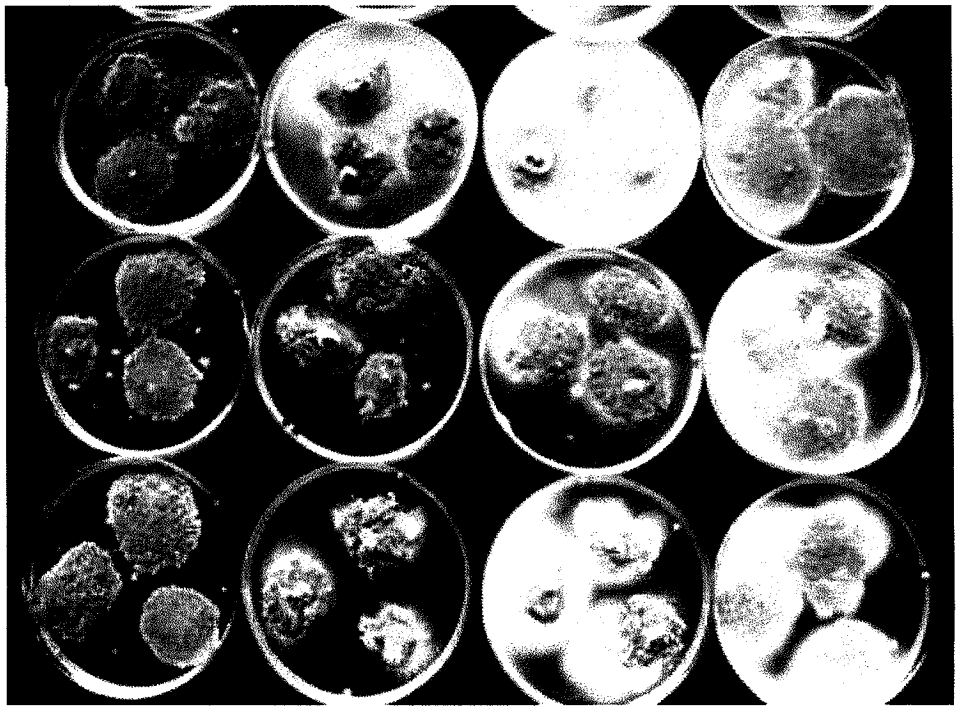




Physical indicators tell about

1. Resistance to root growth
2. Water & air holding
3. Resilience under pressure
4. Salinity,sodicity?
5. Weight (e.g. g/L)
6. Compaction
7. Water intake
8. Water holding

ahh

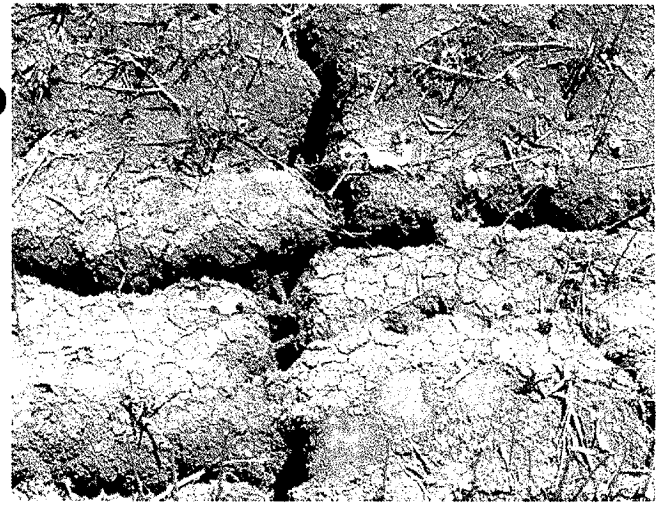


Maintain/improve structure

Add organic matter

Still my favourite

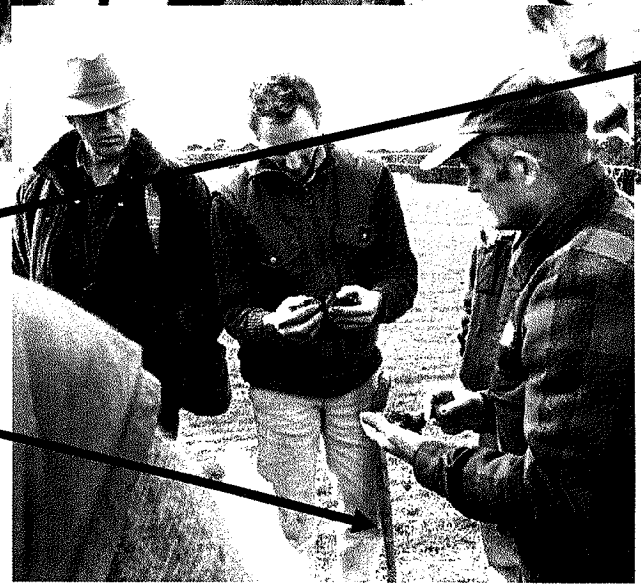
40 tonnes of dry matter needed to increase organic carbon by 1%



Add lime, dolomite or gypsum or other calcium sources (CEC)

The soil structure investigators

. . . in action

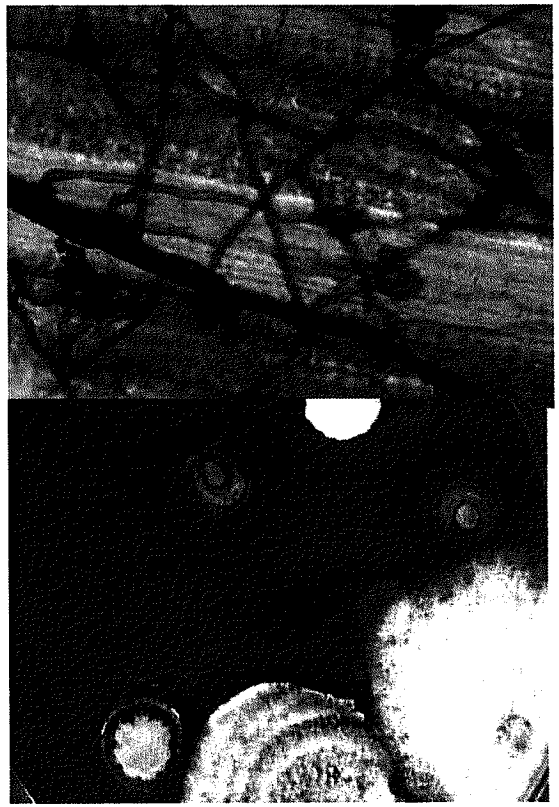


Watch the spade

The best bet is to manage soil structure, organic carbon and pH/CEC.

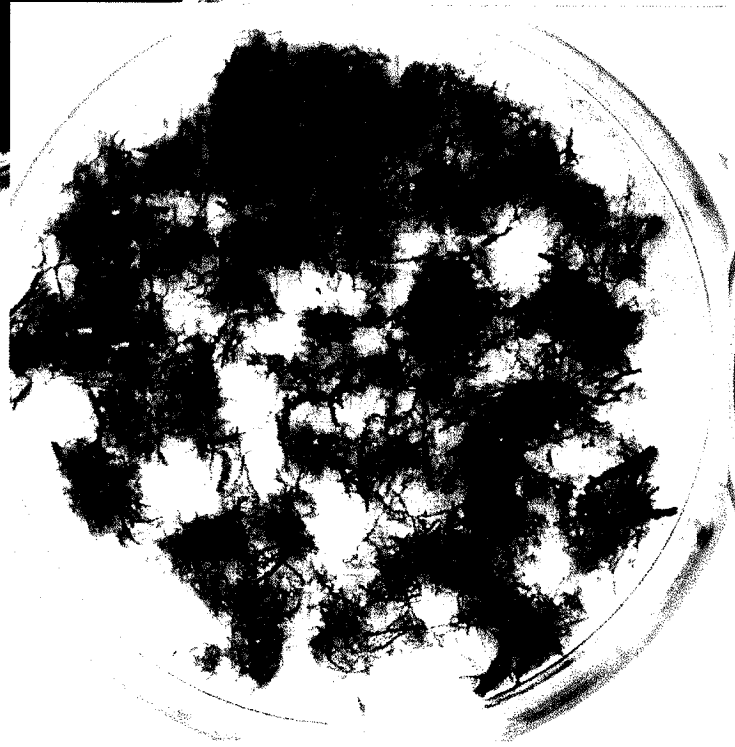
3 Biological soil health indicators

1. Bacteria (inc. Azotobacter)
2. Fungi (inc. Yeasts)
3. Actinomycetes
4. Protozoa
5. Nematodes
6. Soil borne pathogens
7. Ratios of micro-organisms……



ROOT GROWTH
is affected by soil conditions

'virgin' soil



orchard soil

'agricultural' soil

What does all that have to do with growing fruit??

????

It's all about ROOTS

<u>The</u> factor determining nutrient uptake is

<u>Root elongation</u>

Major issues

- Loss of organic carbon
- Soil structure decline
- Salinity/ Sodicity
- Acidification

POOR ROOT SYSTEMS, INADEQUATE NUTRTION

THE STORY BEHIND THE ROOTS

SOIL HEALTH = Roots

Soil structure ok (drainage, accessible root zone)

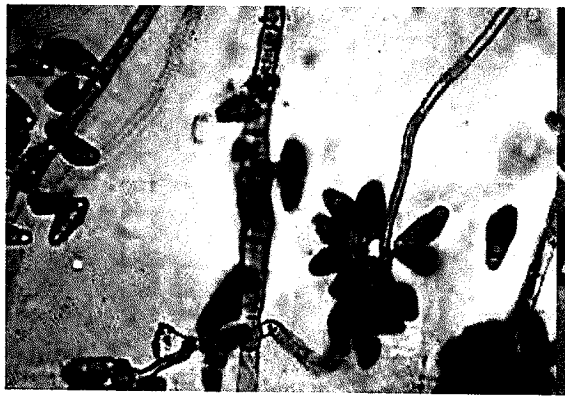
Organic Carbon high (nutrients, water, structure)

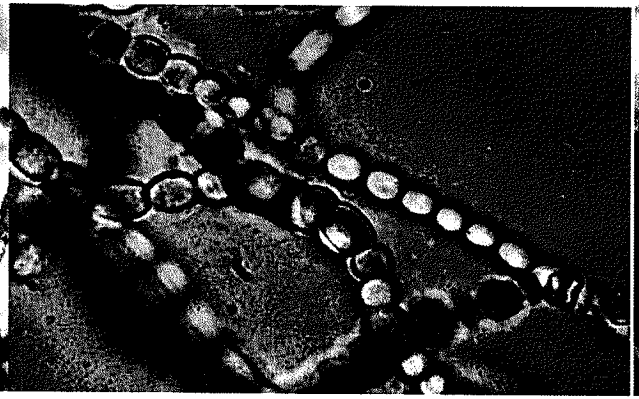
pH & CEC ok (nutrients, water, structure)

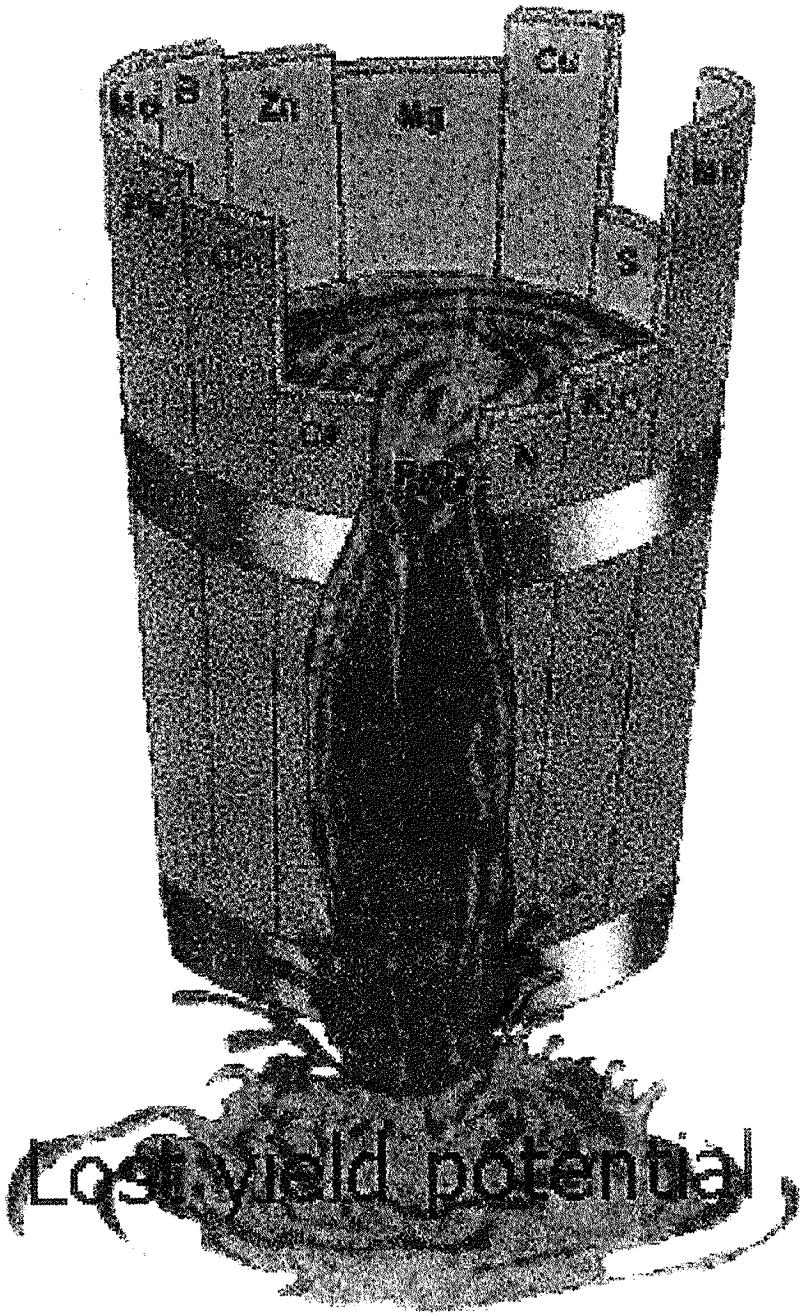
= Happy critters & microbes

= HEALTHIER TREES

= Good water & fertiliser use






Cu
Mo
B
Zn
Mg
Mn
Fe
S
Ca
N
Lost yield potential

Soil Structure Why and How !

MARTIN HOCKEY

Australian Soil Planners PTY LTD

Soil is a habitat not just “DIRT”

a Ants

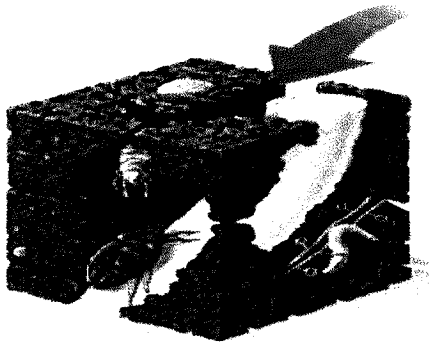
b Earthworms

c Rhicobium bacteria

d Fungi

e Actinomycetes

f Bacteria



The Supply and Availability of Plant Nutrients in Mineral Soils

Factors Controlling the Growth of Higher Plants

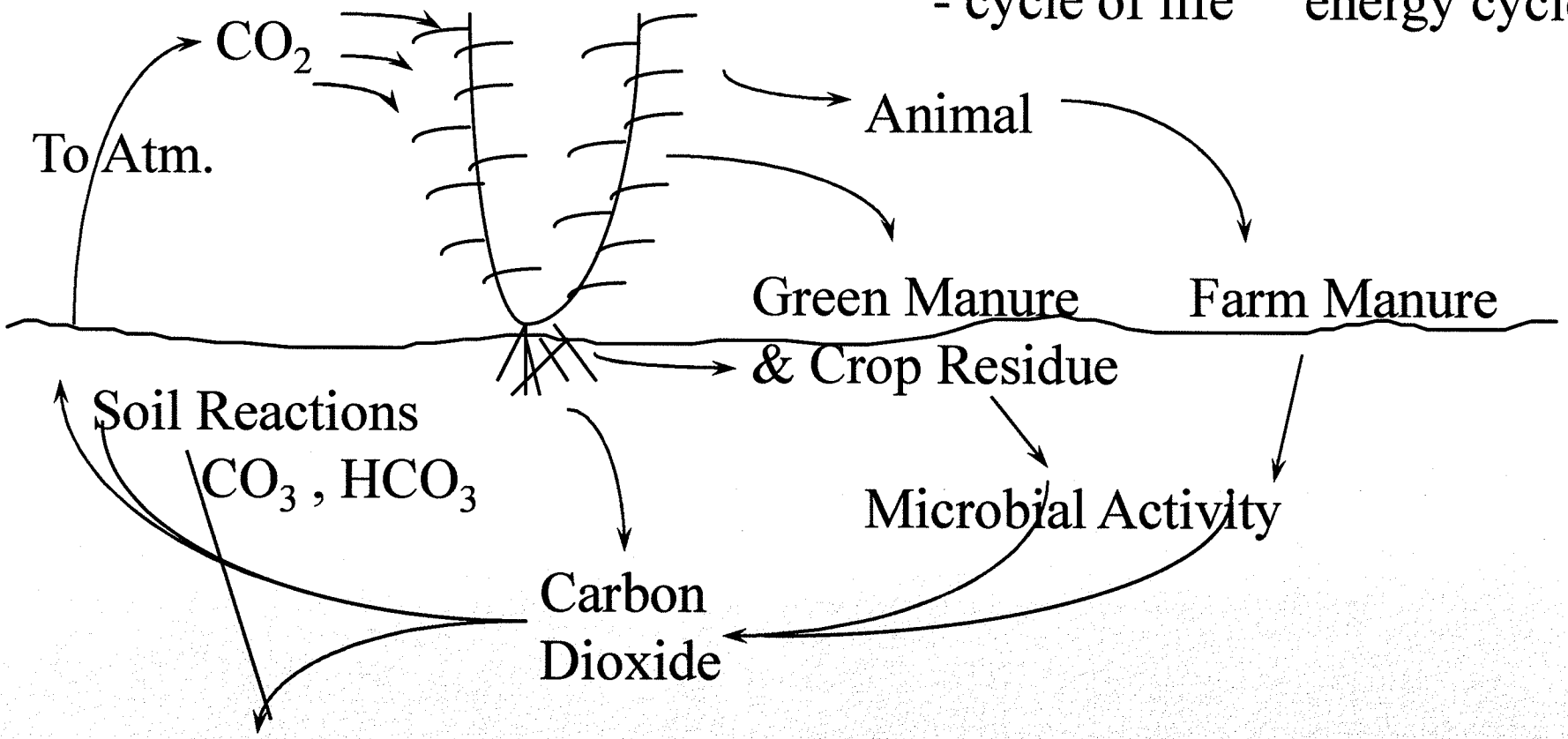
1. Light
2. Mechanical Support (Soil)
3. Heat
4. Air
5. Water
6. Nutrients

Objectives of the presentation

- Carbon the no.1 nutrient deficiency
- Soil structure – what is it!
- Provide the farmer with an understanding of the importance of soluble calcium as a major soil nutrient necessary for maintaining soil flocculation (soil structure)
- The effect of different forms of nutrients and there effect on soil structure(= soil “health”)
- Chlorides and it’s ability to compromise soil and plant function.
- Root Mass- the soil conditions and practices that increase it and decrease it !
- Factors effecting phosphate availability

The Carbon Cycle

- cycle of life energy cycle



Drainage losses CO2 & Carbonates &
Bicarbonates of Ca, Mg, K, Etc.

Essential Elements from Air and Water

C from CO_2

H from H_2O

O from O_2

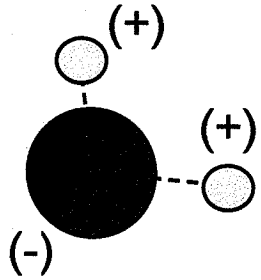
$$CO_2 + H_2O \longrightarrow C_6H_{12}O_6$$

94 - 95% of fresh plant tissue

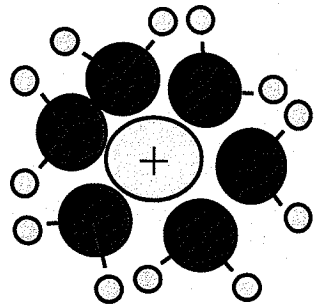
Flocculating Power of Cations

Cations in water attract water molecules because of their charge, and become hydrated.

Water molecule is polar: (+) on one end, (-) on the other end



Hydrated cation



Cations with a single charge and large hydrated radii are the poorest flocculators.

Cation	Charges per molecule	Hydrated radius (nm)	Relative flocculating power
Sodium	1	0.79	1.0
Potassium	1	0.53	1.7
Magnesium	2	1.08	27.0
Calcium	2	0.96	43.0

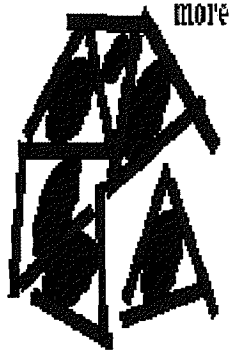
Soil Structure:

- Soil clay particles can be unattached to one another (***dispersed***) or clumped together (*flocculated*) in aggregates. Soil aggregates are cemented clusters of sand, silt, and clay particles.

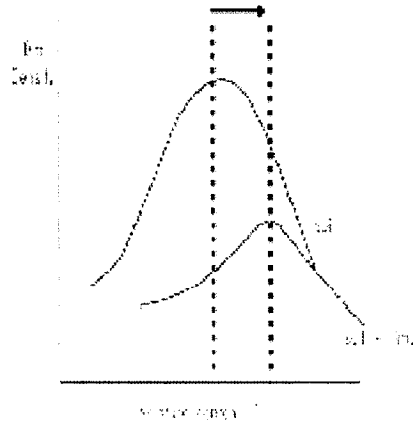
•Clay

Randomly orientated platelets - large surface area - water adsorbed onto surfaces - unstable

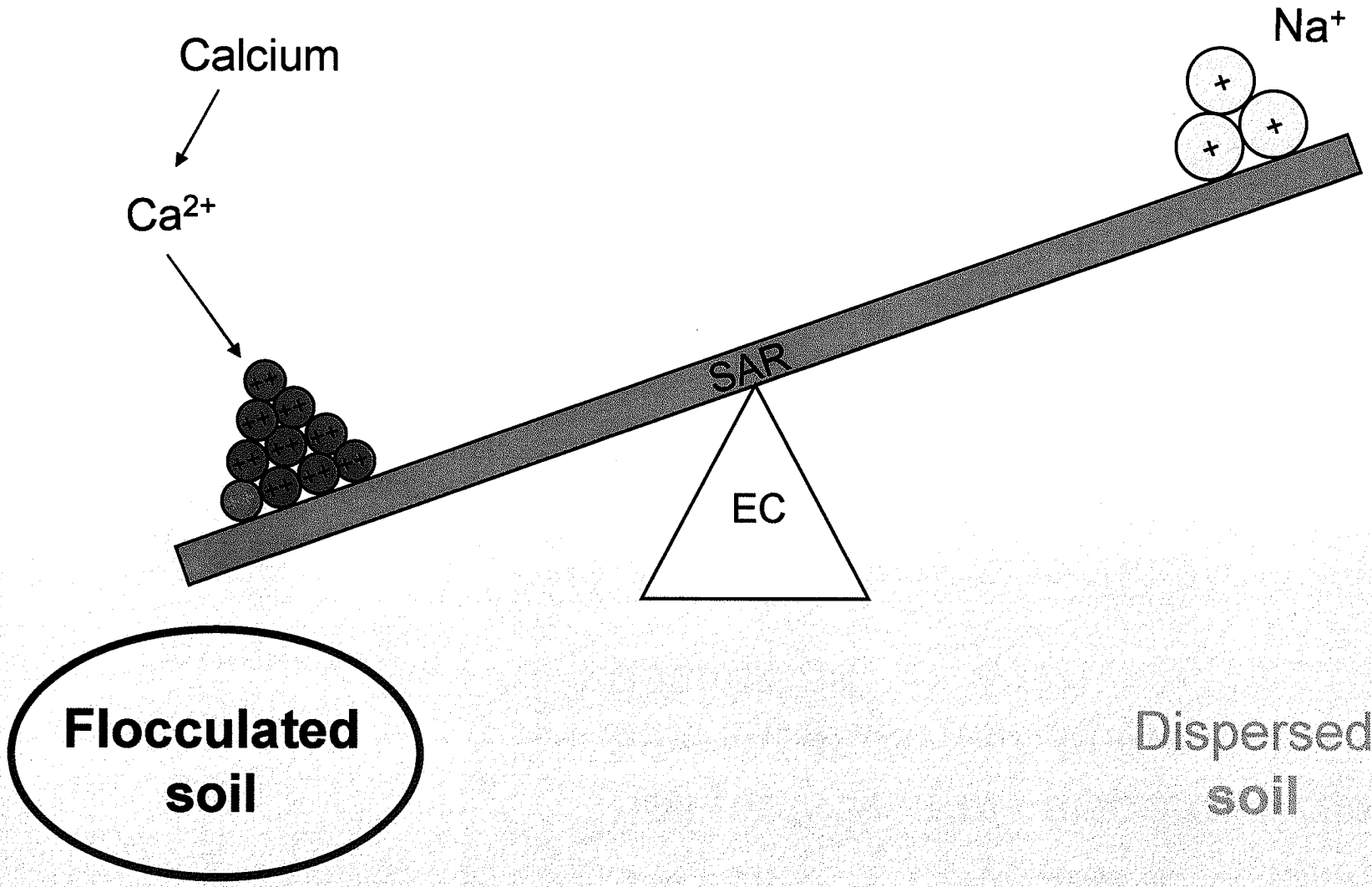
•Clay –lime



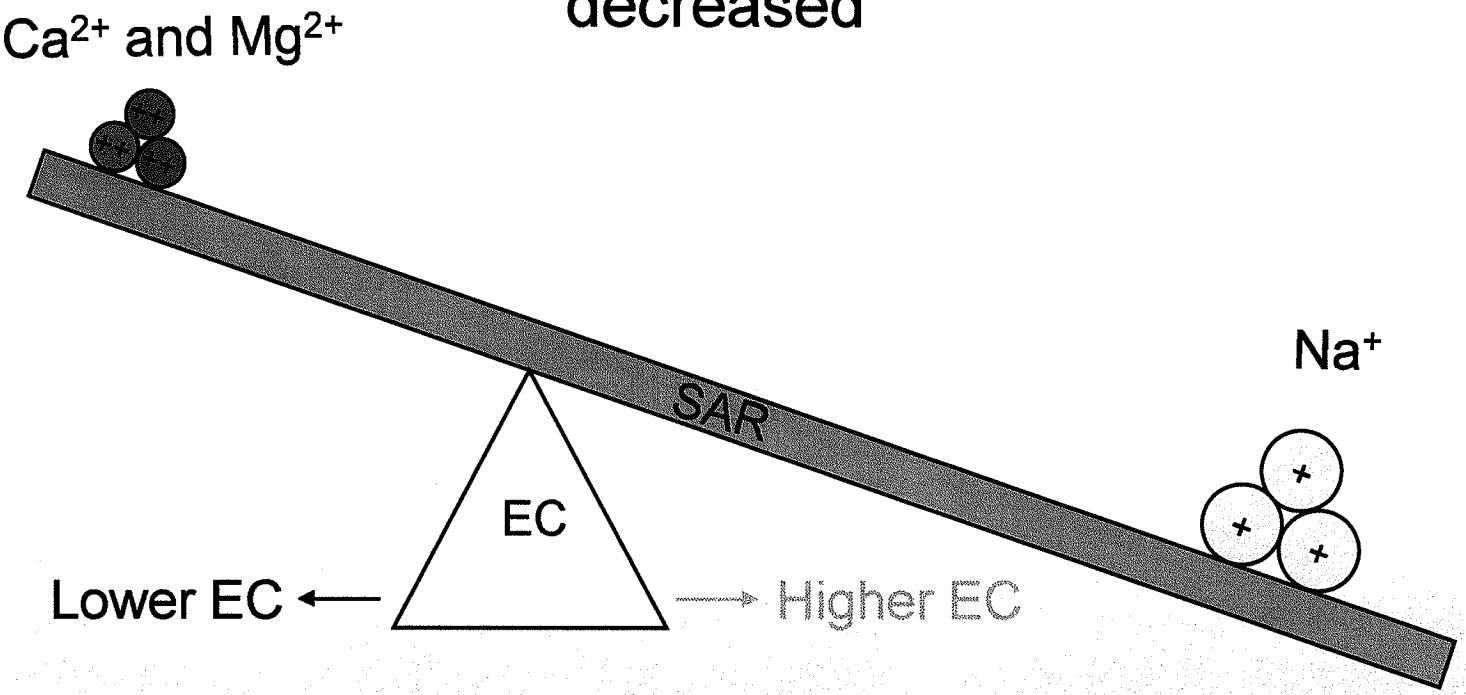
Water trapped between platelets- not available for lubrication ∴ m.c for opt. density increases - more stable structure



Increasing *soluble* calcium improves aggregate stability in soils with poor structure.



Soil particles may disperse if the amount of calcium in the soil is decreased

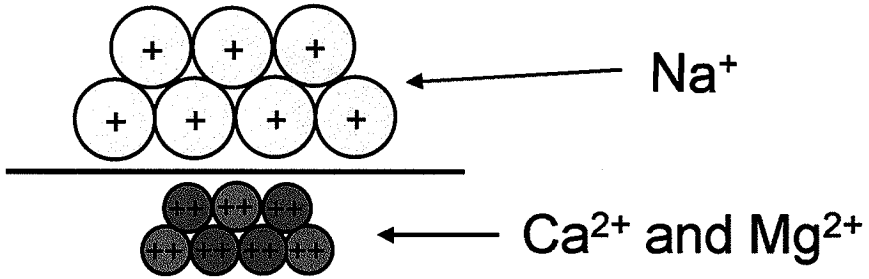


Flocculated soil

Dispersed soil

Sodium Adsorption Ratio

The ratio of 'bad' to 'good' flocculators gives an indication of the relative status of these cations:

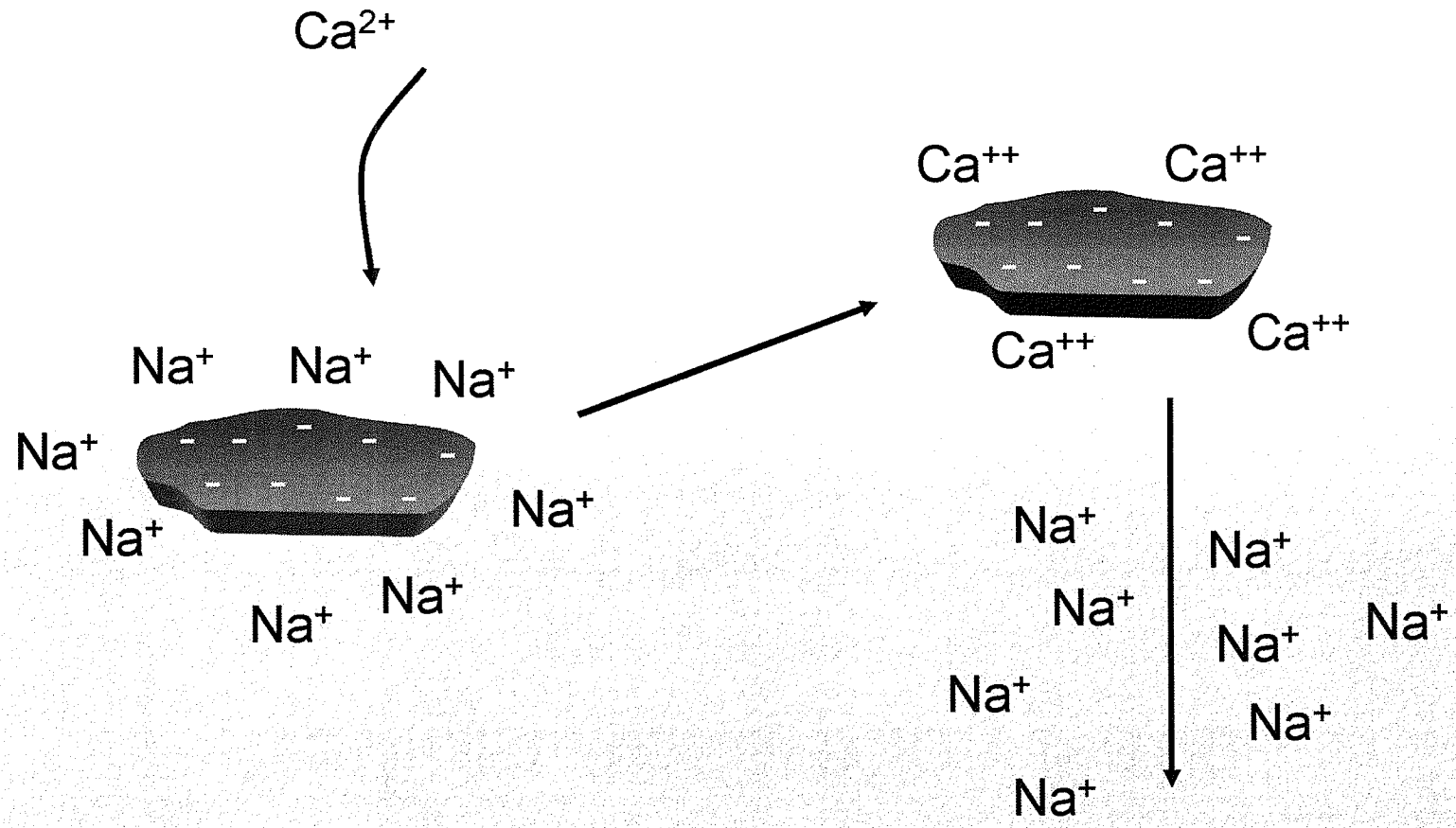


Mathematically, this is expressed as the 'sodium adsorption ratio' or SAR:

$$SAR = \frac{[Na^+]}{\sqrt{[Ca^{2+}] + [Mg^{2+}]}}$$

where concentrations are expressed in mmoles/L

Apply soluble calcium *before* leaching salts out of soils susceptible to dispersion Replacing sodium with calcium before leaching will stabilize soil structure.



Same site, same soil, completely different structure- Calcium??

Observe your soil - sodic soils often crack when dry

Soil Structure

- Good soil structure allows for favorable movement of air and water and root development
- Can be destroyed through the nutrients we apply
- Can be improved by the nutrients we apply
- Can be improved by adding more carbon.
- Low or inactive microbial populations exist in poorly structured soils

Manage soil structure

- Be aware of the quality of irrigation water. Water with high levels of sodium (high SAR) will tend to destabilize soil.
  - Have irrigation water analyzed for SAR and EC or ask your water provider for analyses.
  - If you have high sodium irrigation water, the water and/or the soil may need amendments such as highly soluble Calcium.
- Observe your soil.
  - If water infiltrates very slowly, or if rain water infiltrates more slowly than irrigation water, the soil may have a sodium problem.
  - Sodium impacted soils may noticeably crack when dry.
- Analyze your soil.
  - Laboratory analysis can tell you the soil EC and SAR or ESP.

Soils that are usually Dispersed

- High Magnesium
- Low Calcium
- High Sodium (Potassium)
- Low Organic Carbon
- Low Microbial activity

Compaction Indicators on Farm

- Hard soil √
- Standing water √
- Excessive water runoff √
- Poor plant growth √
- Increased bulk densities √
- Surface crust √

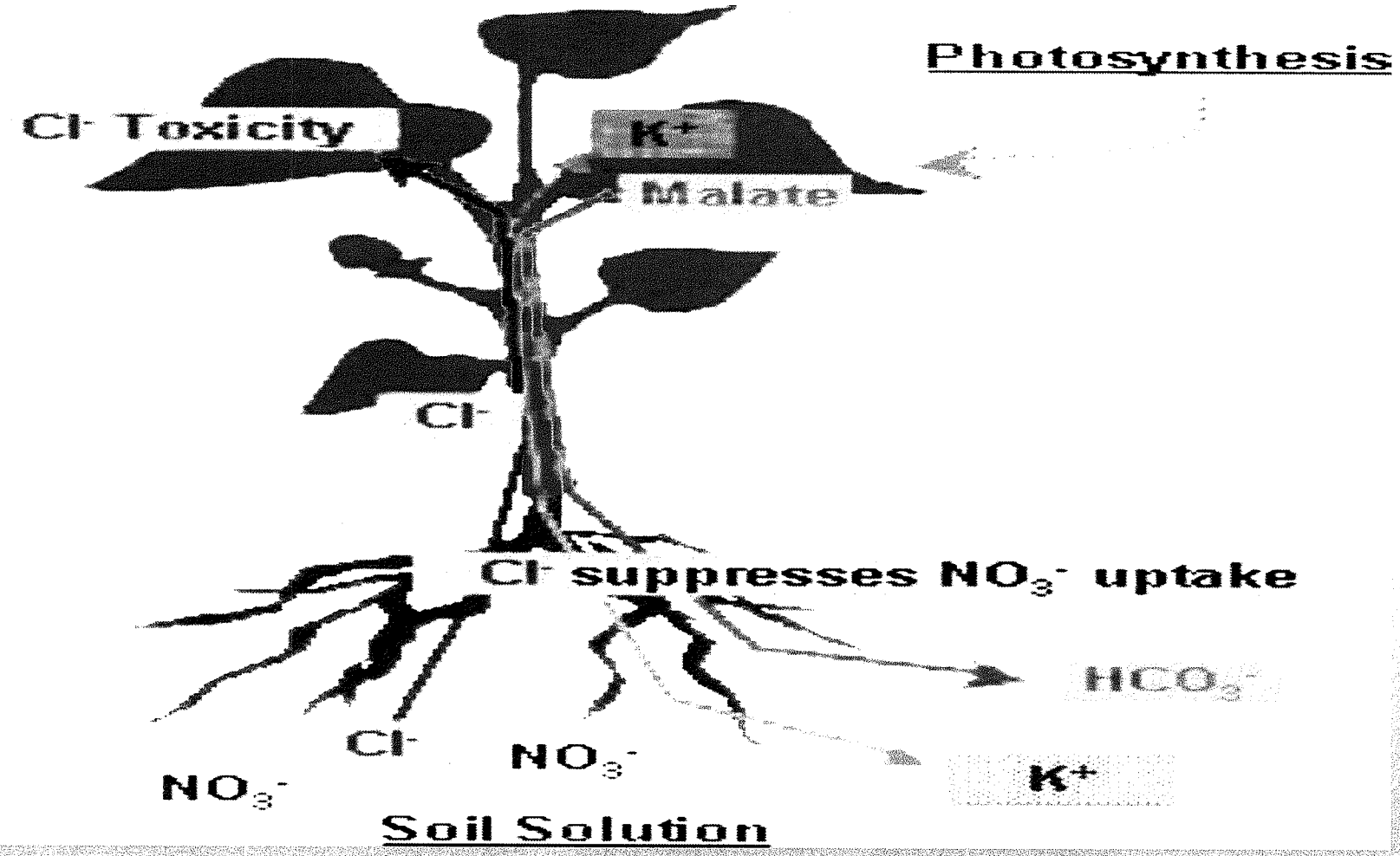
Malate : Chloride and Sodium Toxicity

- Malate is the plant manufactured salt of malic acid.Malate occupies a central role in plant metabolism. Its importance in plant mineral nutrition is reflected by the role it plays in symbiotic nitrogen fixation, phosphorus acquisition, and aluminum tolerance. In nitrogen-fixing root nodules, malate is the primary substrate for bacterial respiration, thus fueling nitrogenase. Malate also provides the carbon skeletons for assimilation of fixed nitrogen into amino acids. During phosphorus deficiency, malate is frequently secreted from roots to release unavailable forms of phosphorus. Malate is also involved with plant adaptation to aluminum toxicity.

Nutrients that contribute to the loss of structure.

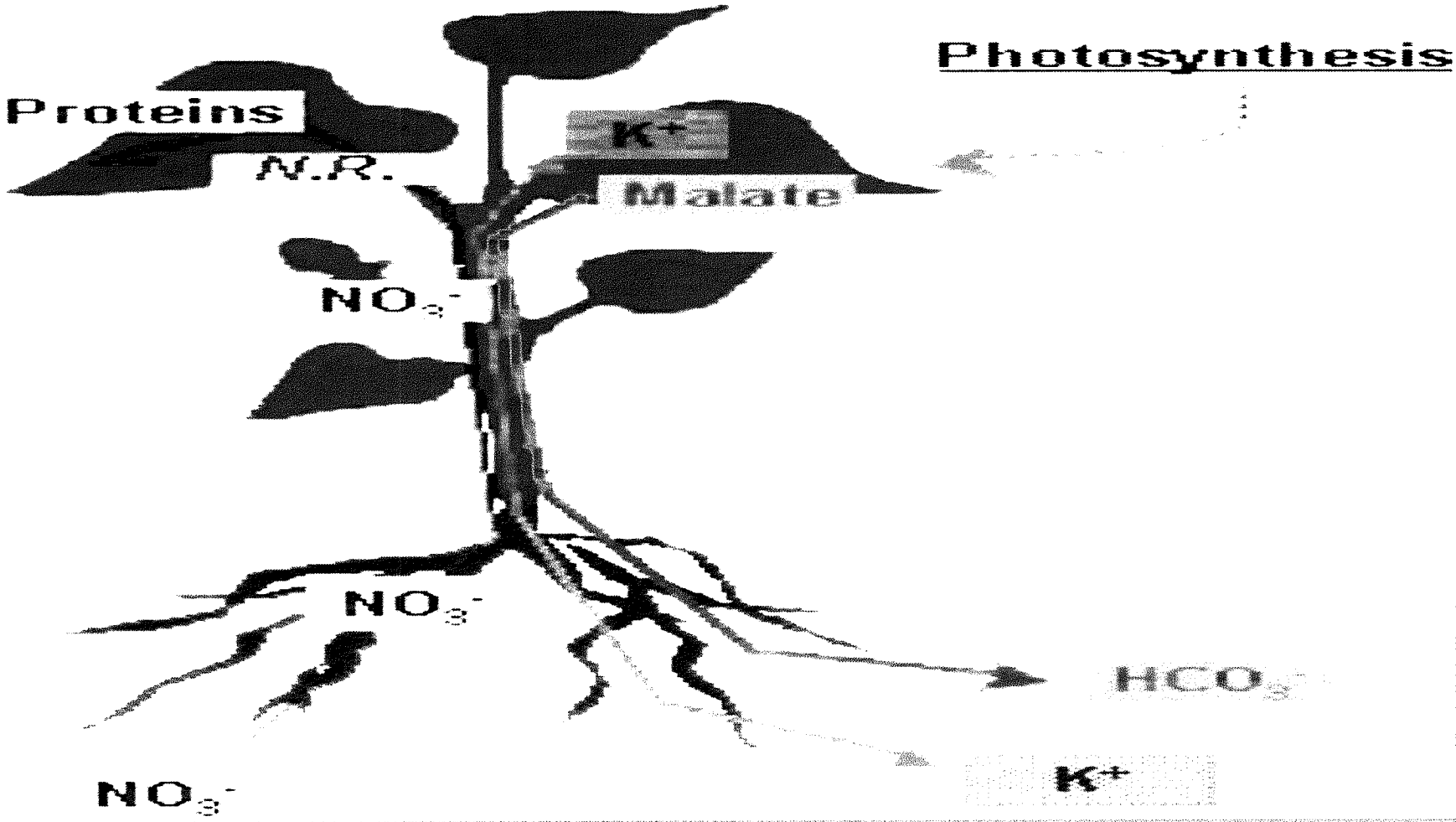
- Nitrogen (precipitating calcium/ reducing carbon and ph)
- Over use of Gypsum (acid sulphate leaching of calcium)
- Potassium Chloride (Muriate of Potash) soil sterilization (reduction of microbial activity)
- Over use of acid forms of Phosphate (reduction of Glomalin producing Fungi/ increase in Aluminium in solution thus reducing root penetration and reducing ph).

A Simplified Model of Chloride Accumulation in Leaf-tips at Excessive Cl in Soil The K+ moves Cl- upwards, and malate downwards. Proteins production is halted. Ben-Asher and Pacardo, 1997



A Simplified Model of Normal Metabolism at Non-Saline Conditions in Soil

The K+ moves NO3- upwards,
and malate downwards. Proteins are
Produced, Roots are well nourished . Ben-Asher and Pacardo, 1997

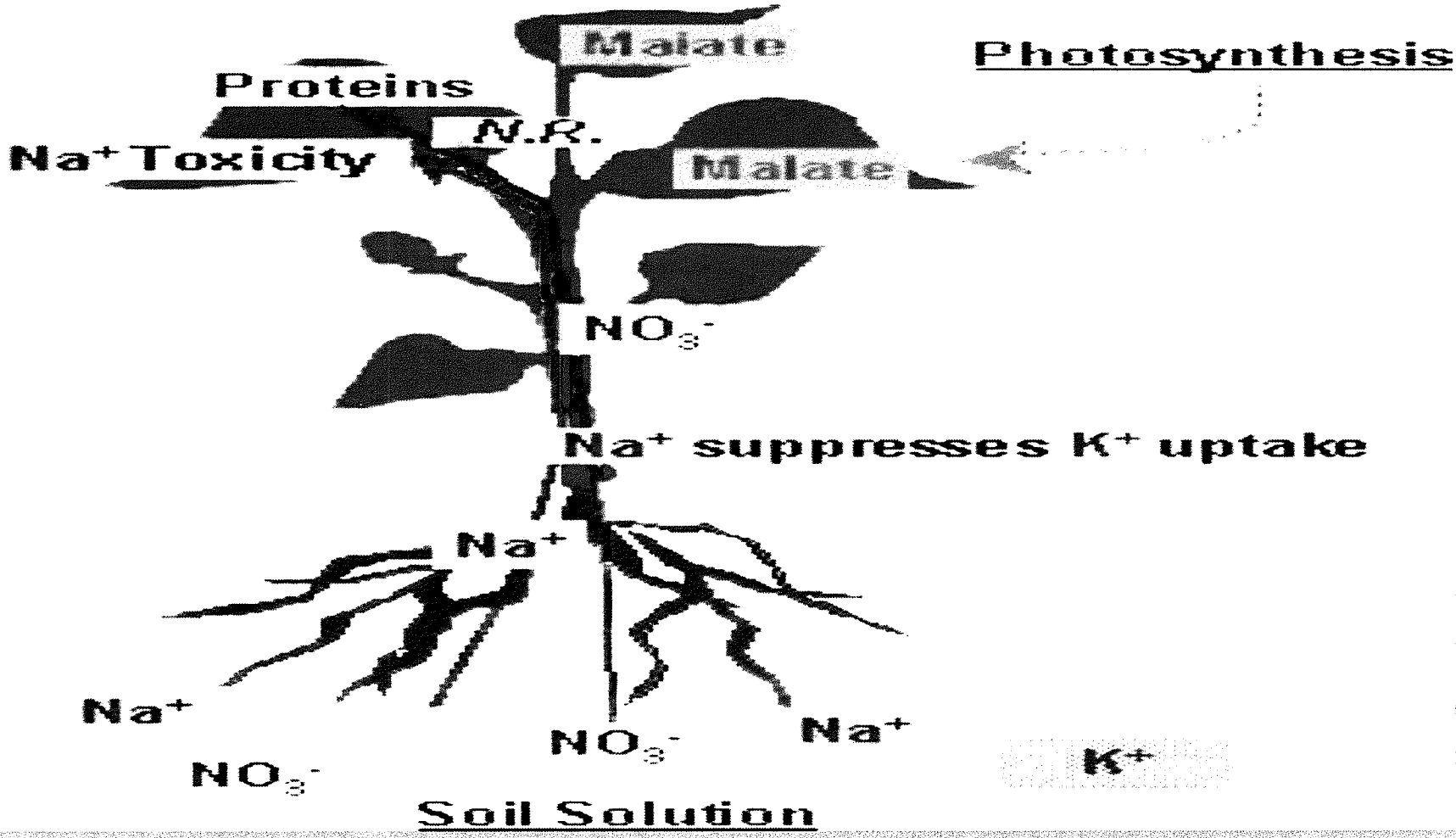


Nutrient sources that contribute to soil structure.

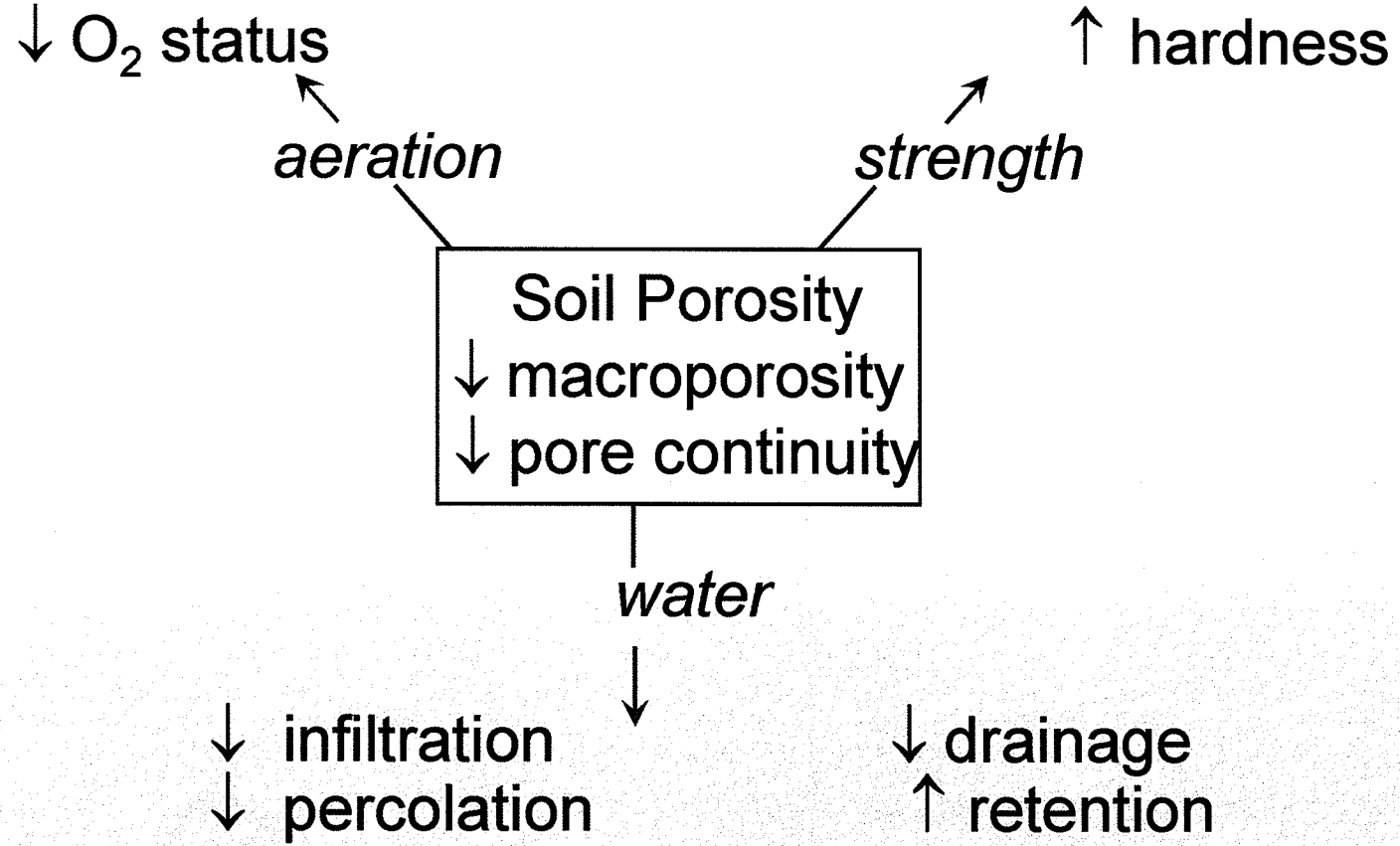
- Soluble Calcium sources.
- Magnesium (Dolomite) if magnesium is low only !!
- Molasses (if used correctly !!)
- Gypsum –In certain circumstances
- Organic material sources eg. Manures, composts and the like

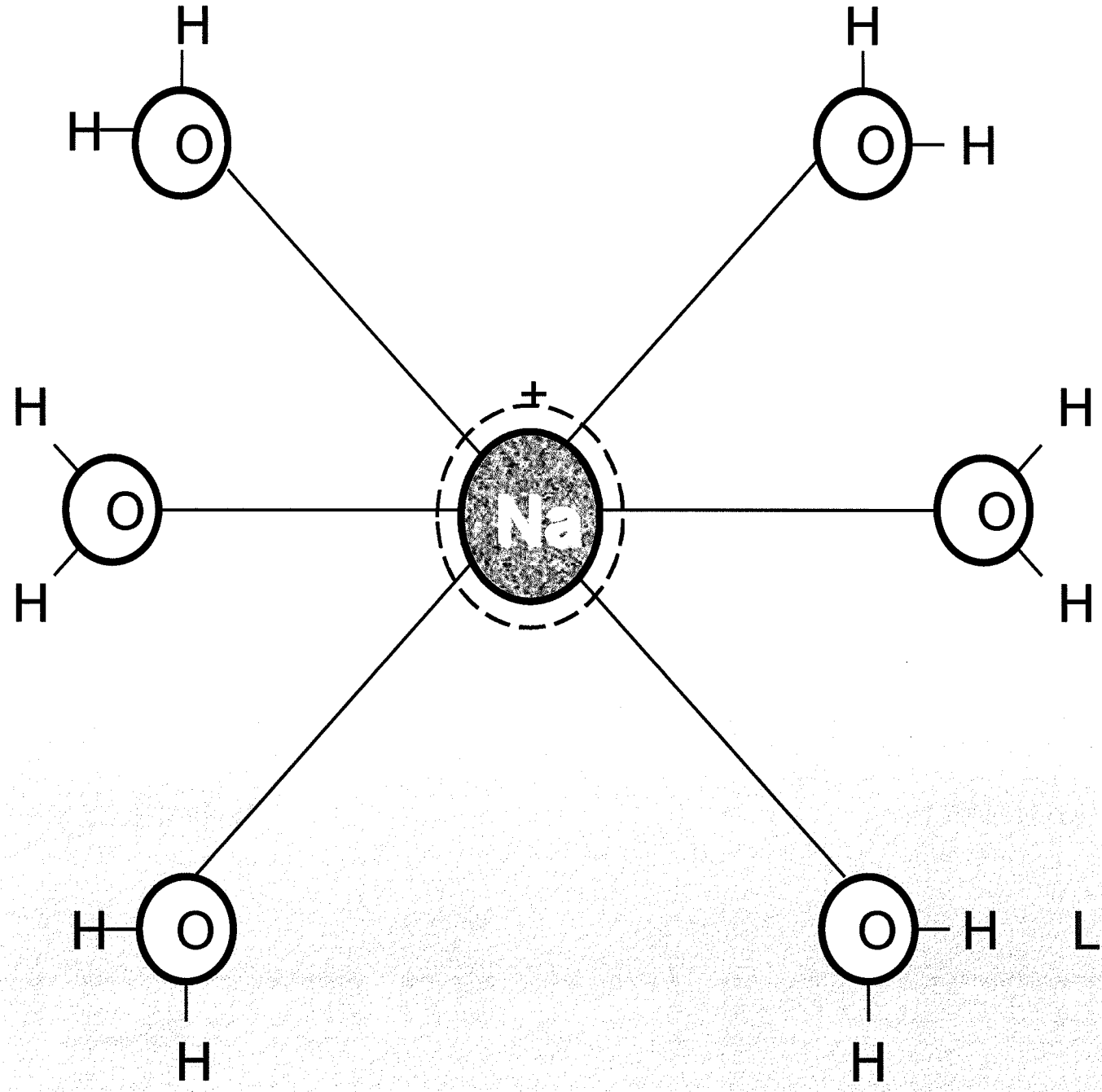
A Simplified Model of Sodium Accumulation in Leaves at Excessive Na in Soil

The K+ is paralyzed due to shortage in K+. malate is not moved downwards. Roots are undernourished. Ben-Asher and Pacardo, 1997



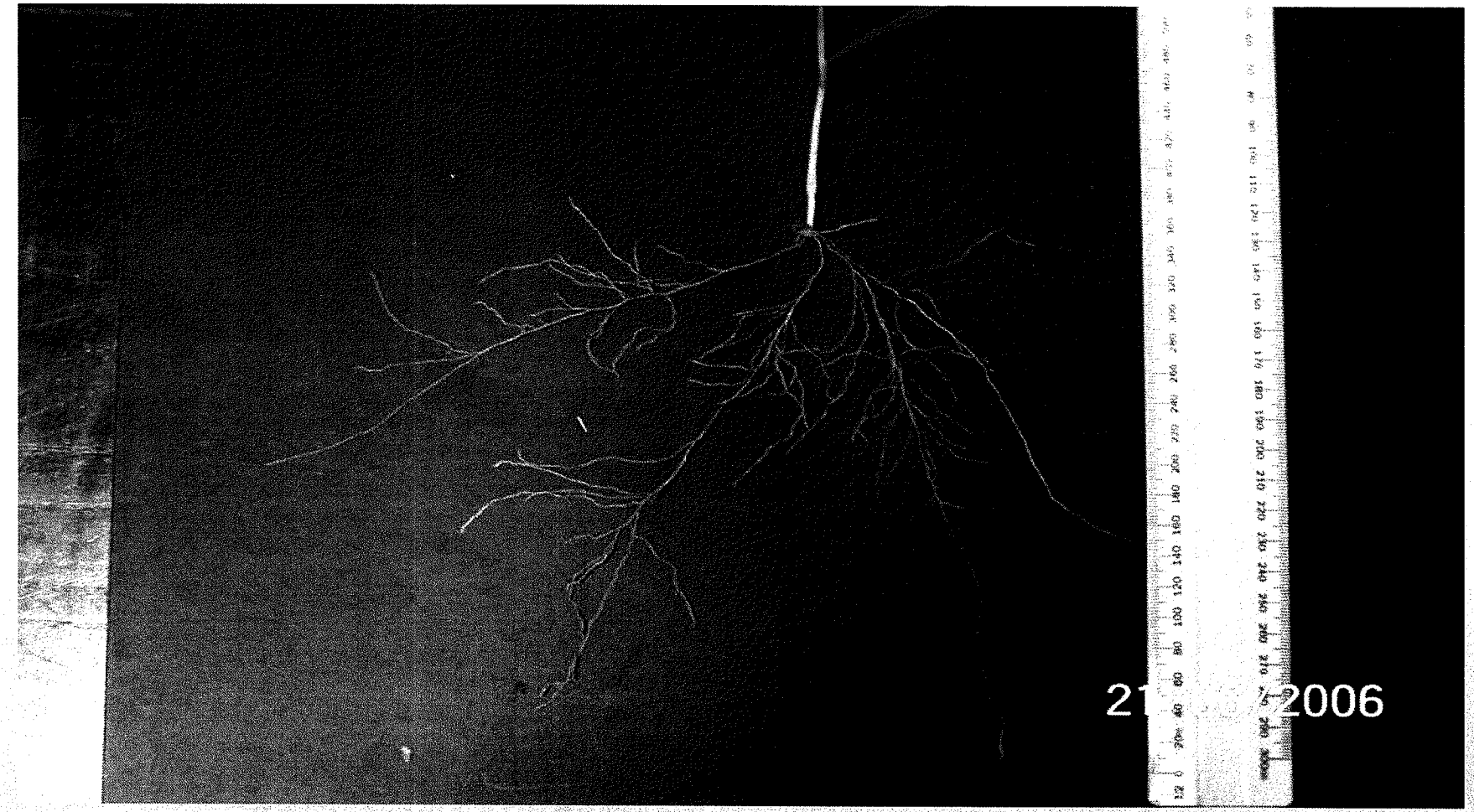
Na Effects on Soil Permeability





Like Shit to a
Bears Fur

Wheat Germination Trial - 2006

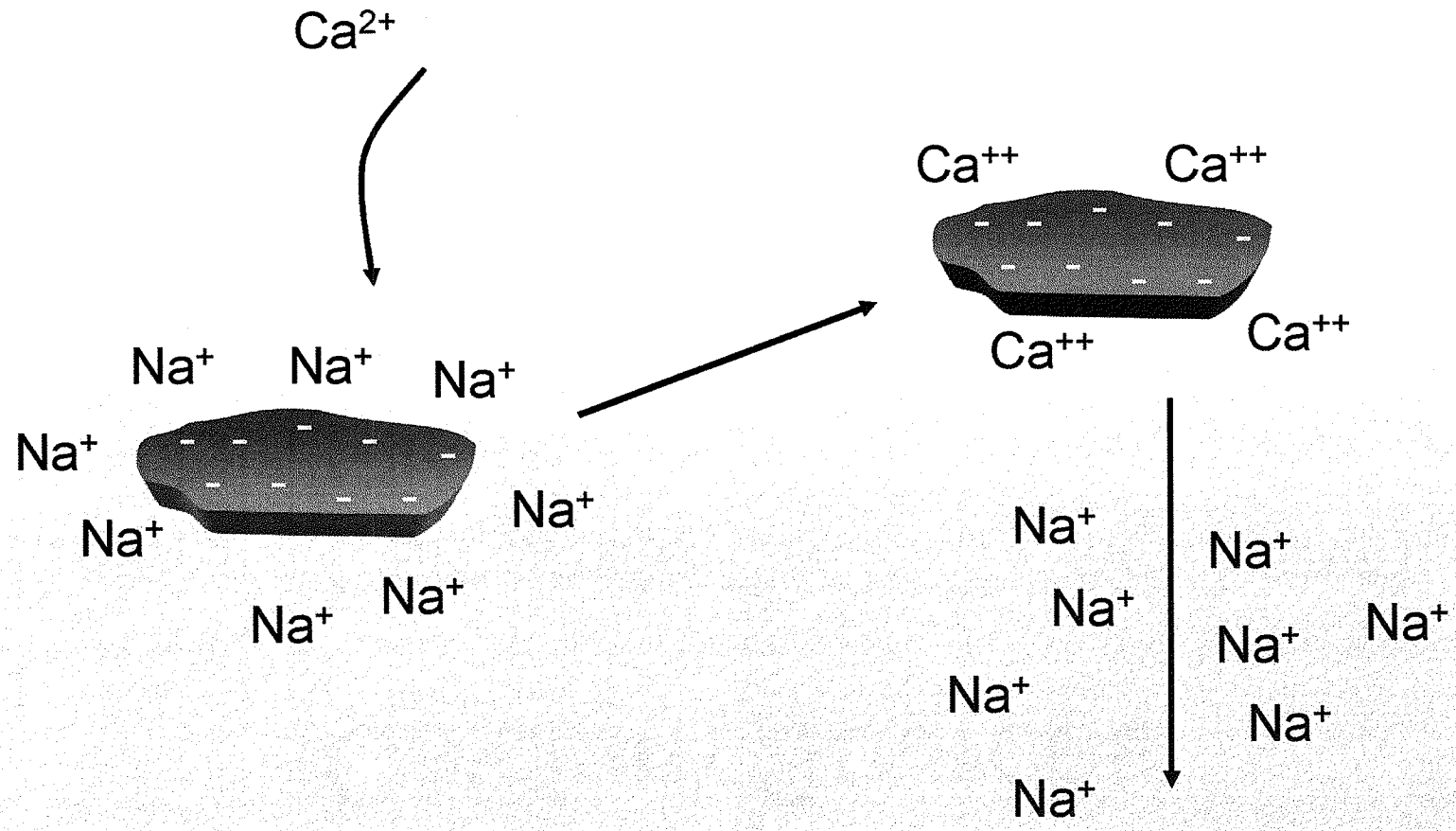


Green Manure on Salt

Calcium Sources

- Calcium Carbonate CaCO3 (Ag- Lime)
- Calcium Nitrate
- Micronised Carbonates
- Newer Generation soluble non nitrate non chloride forms
- CaSO4 (Gypsum)
- Dolomite.
- Calcium Chloride

Apply soluble calcium *before* leaching salts out of soils susceptible to dispersion Replacing sodium with calcium before leaching will stabilize soil structure.



Solubility of Lime Sources

- The measured water soluble calcium fractions supplied from solid lime sources
- Soluble fractions are able to move through the soil profile for both structural remediation and plant available calcium
- It is not the total amount of product that is applied, but the amount of water soluble calcium that is relevant

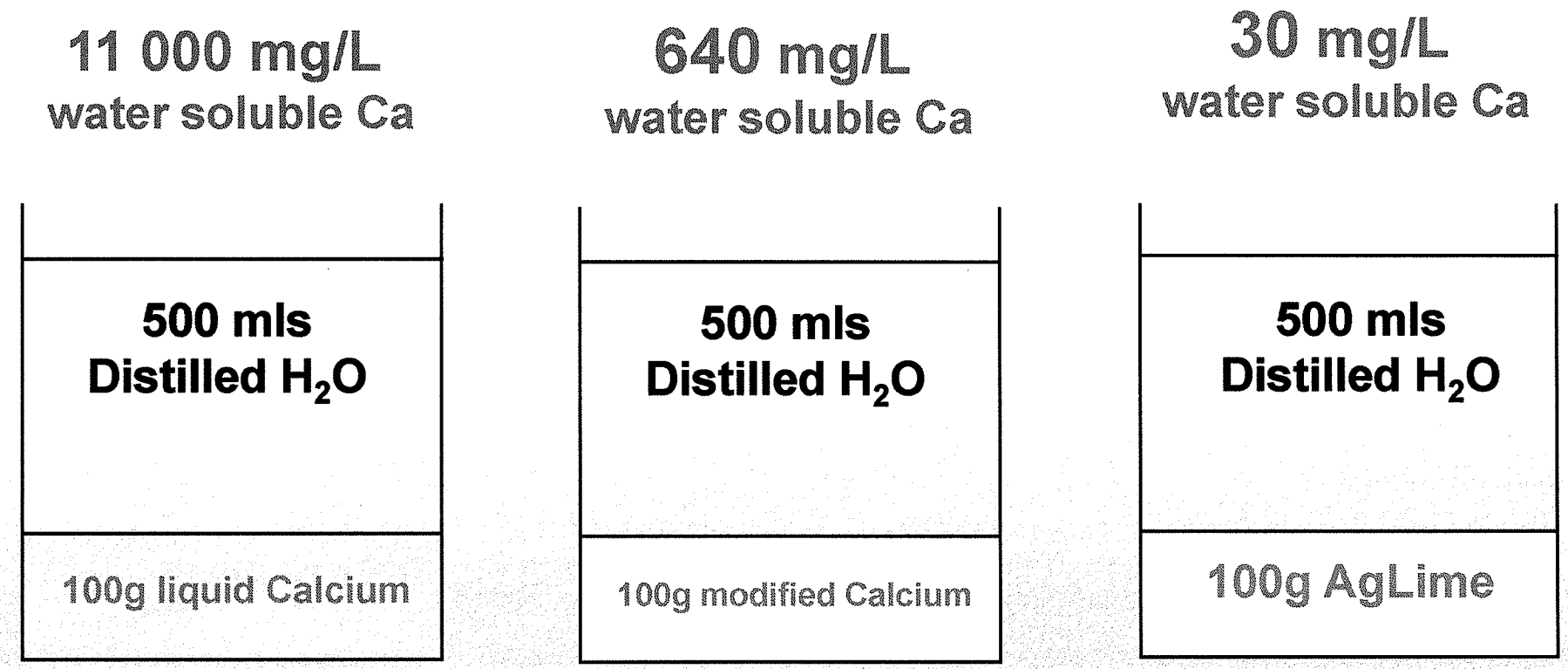
So if its as simple as the previous slide says why in the real world doesn't happen as easily and all the Boffins say it should!~

BECAUSE !!!!!!

Some Maths !!!

- The total amount of water soluble Calcium in
- 1 tonne of Ag lime ($CaCO_3$) is 150-350grams per tonne
- 20 ltrs per ha of liquid calcium will supply the same levels of soluble calcium as 7.4 tonnes of Ag lime

Soluble Calcium Sources



Location Hamilton.

Samples

Sampled	14-Feb	A(Calsap 40ltrs)	C No Calsap
Nitrate Nitrogen		22	19
Phosphorus	Olsen	16	10
Phosphorus	Colwell	70	39
Phosphorus Butter Index	PBI	260	200
Avaliable Potassium		215	115
Avaliable Sulphur		18	18
Dry Dispersion	2hrs	1	1
Dry Dispersion	20hrs	1	1
Remoudled Dispersion	2hrs	1	1
Remoudled Dispersion	20hrs	2	2
Zinc	mg/kg	0.8	0.61
Copper	mg/kg	0.28	0.23
Iron	mg/kg	400	480
Manganese	mg/kg	5.7	3.7
Boron	mg/kg	4	2.4
Chloride	mg/kg	84	70
Electrical Conductivity	EC ds/m	0.18	0.22
EC of Saturated Extract	Eca ds/m	1.08	0.9
Organic Carbon	%	5.4	3.9

Some practical examples

- On exchangeable soil nutrients
- On Sodium levels
- On increasing Potassium levels
- On reduced Aluminum
- On Plant sap

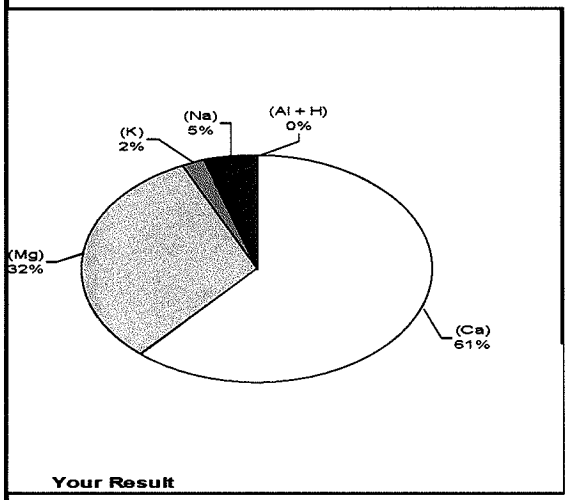
Why is Phosphorus Unavailable?

- **Highly weathered soils in warm, humid and subhumid regions**
  - Acidic → reactive Al and Fe
  - Little capacity to supply P for plant growth
    - Extensive losses during intense weathering
    - Adsorbed P and P in Al- and Fe-phosphates is not readily available
- **Soils in arid and semi-arid regions**
  - Alkaline → high Ca levels
  - Little capacity to supply P for plant growth
    - P in Ca-phosphates is not readily available

Cation Ratio data prior and post application of 40 litres of Calsap August 2006.
Hamilton Victoria

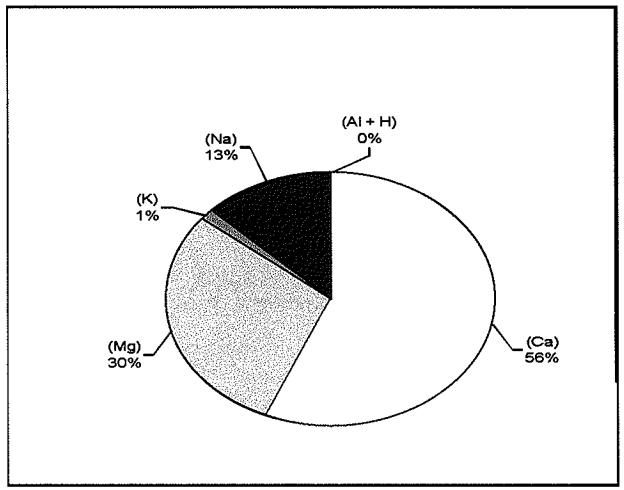
Calsap Treatment 40 litres/ Ha

Calcium	**(Ca)**	9.6	meq/100g	61.4 %
Magnesium	**(Mg)**	5.0	meq/100g	31.7 %
Potassium	**(K)**	0.3	meq/100g	2.1 %
Sodium	**(Na)**	0.8	meq/100g	4.8 %
Ca/Mg Ratio		1.9		
K/Mg Ratio		0.1		
Zinc	**(Zn)**	0.65	mg/kg	or ppm
Iron	**(Fe)**	172.56	mg/kg	or ppm
Manganese	**(Mn)**	3.82	mg/kg	or ppm
Copper	**(Cu)**	0.75	mg/kg	or ppm
Boron	**(B)**	5.23	mg/kg	or ppm



No Calsap Treatment

Calcium	**(Ca)**	13.5	meq/100g	56.3 %
Magnesium	**(Mg)**	7.1	meq/100g	29.6 %
Potassium	**(K)**	0.3	meq/100g	1.3 %
Sodium	**(Na)**	3.1	meq/100g	12.8 %
Ca/Mg Ratio		1.9		
K/Mg Ratio		0.0		
Zinc	**(Zn)**	0.71	mg/kg	or ppm
Iron	**(Fe)**	240.81	mg/kg	or ppm
Manganese	**(Mn)**	9.42	mg/kg	or ppm
Copper	**(Cu)**	0.88	mg/kg	or ppm
Boron	**(B)**	4.99	mg/kg	or ppm



© Australian Soil planners 2007 no reproduction without the express permission of the Author.

Soil Acidity

Natural Sources of Acidity:

- Precipitation and cation leaching
- Carbonic acid and organic acids
- Organic matter

Human Induced Acidity:

- Acid rain
- Urea
- Ammonium fertilizers
- Mono and diammonium phosphate
- Elemental S

Factors effecting P availability

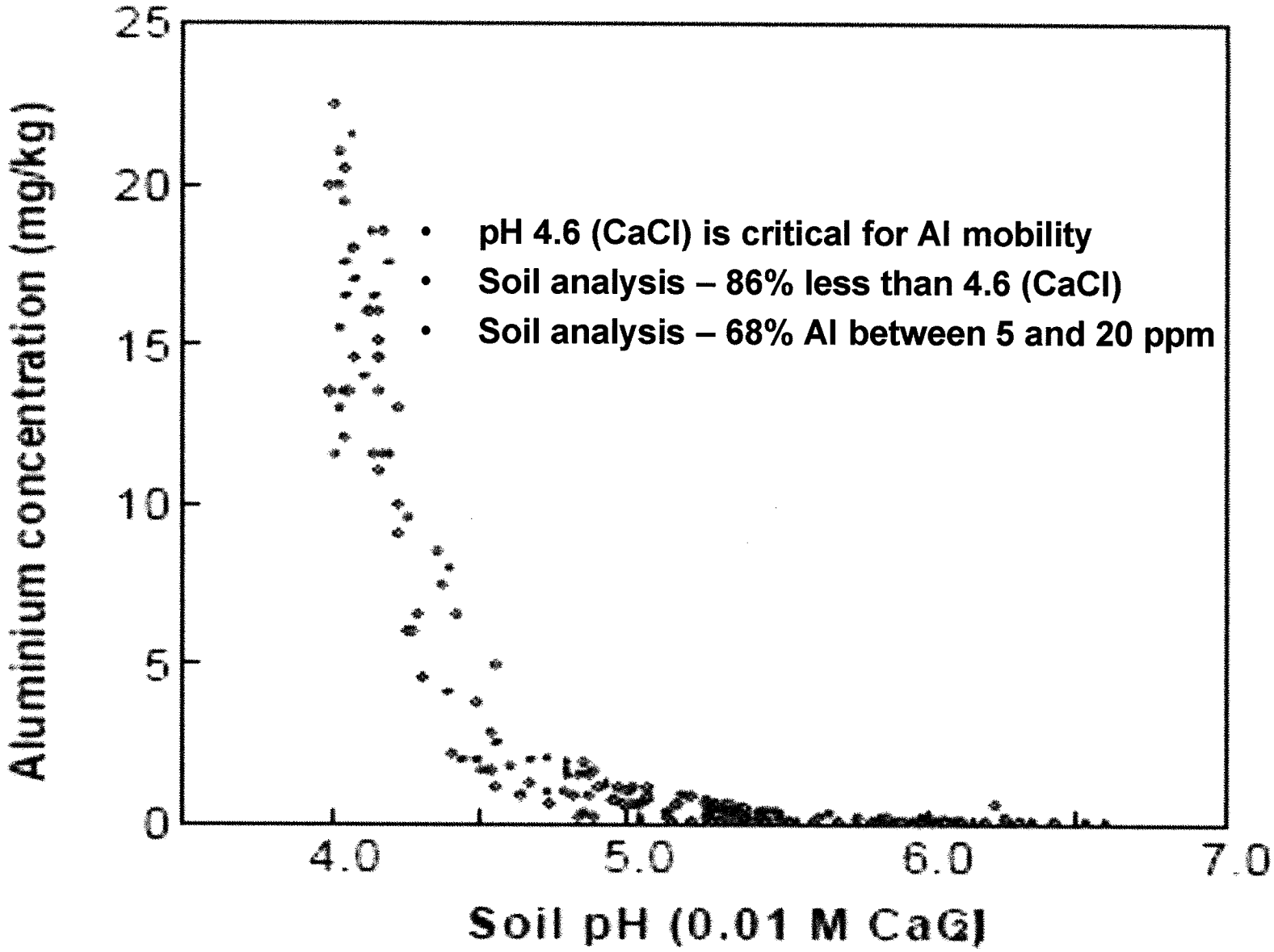
- Ph
- Aluminium and Iron
- Organic matter levels
- Forms of P applied
- There are practical ways to reduce P applications by increasing efficiency.

pH after 1 day and after 90 days

pH – 5.5	pH – 5.7	pH – 5.4
pH – 5.8	MAP @ 80 kg/ha pH – 4.1	pH – 5.6
pH – 4.9	pH – 4.7	pH – 5.0

You need to know this !!!

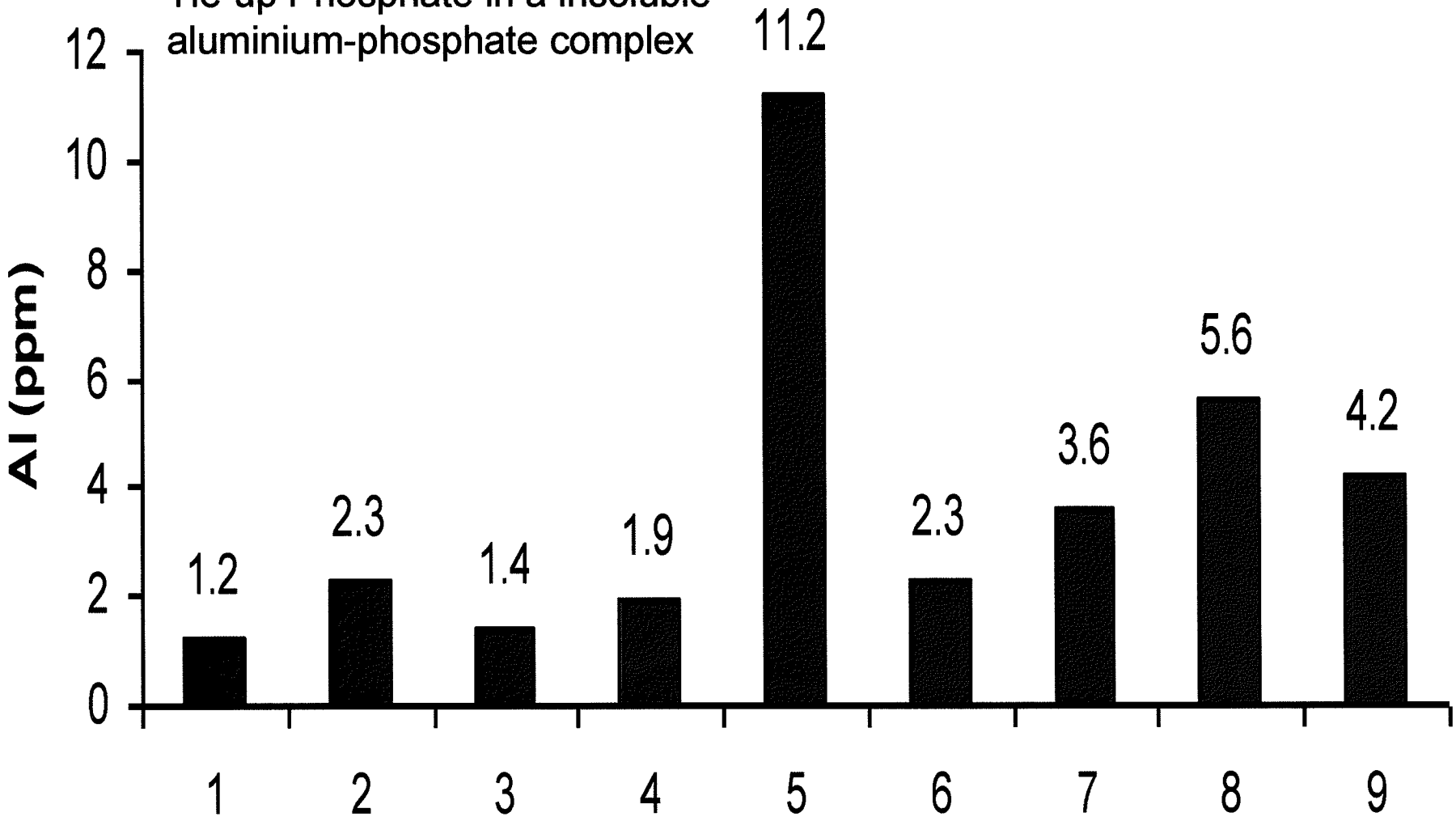
- There only needs to be 0.1%P in soil solution at any one given time for adequate plant growth.
- This equates to 250grams per hectare
- P applied has no bearing on plant available P
- Single super predicted to be $600.00 per tonne in 5 years (World Bank)



Relationship between toxic aluminium concentration in soil and soil pH

Aluminium in Solution

- Reduce root development
- Tie-up Phosphate in a insoluble aluminium-phosphate complex



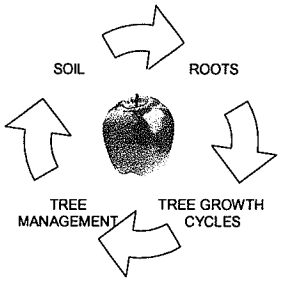
Take Home Message !!!

- **You cannot and will not have soil structure without soluble calcium**
- To have a functional microbial populations there needs to be nutritional balance.
- You cannot remediate risk within your production system without Calcium.
- Do not listen to a fertilizer salesman
- Gross margin is more important than yield
- The ten year average is the key to profitability
- The soil is a habitat not just dirt.
- Commonsense is far more valuable than all the science in the world.
- Do not collect data if you do not utilize it.
- Learn that units of P in the soil has very little correlation to plant available P

ORCHARDING ASPECTS THAT AFFECT THE POST-HARVEST QUALITY OF APPLES.

By Colin R. Little

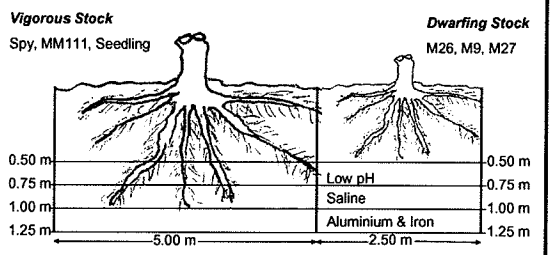
Soil and tree effects



Soil

- Mineral Profile
- Structural Profile
- pH Profile
- Drainage Profile
- Salinity Profile
- Toxic levels of IRON, ALUMINIUM, MAGANESE

Roots



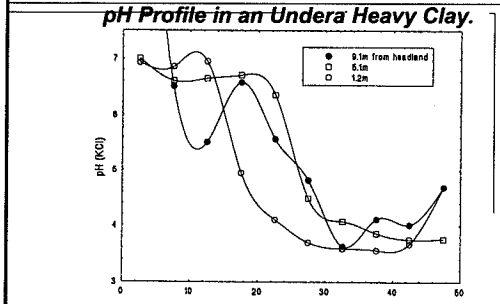
Tree Growth Cycle

- Break of dormancy
- 50 days after full bloom (D.A.F.B)
- 50 days out from harvest (D.O.F.H)
- Harvest Maturity
- Harvest
- Dormancy

Tree Management

- New Planting
- Early Training
- Early Cropping
- Freedom from Pests and Diseases

Effect of lime slurry on pH levels.

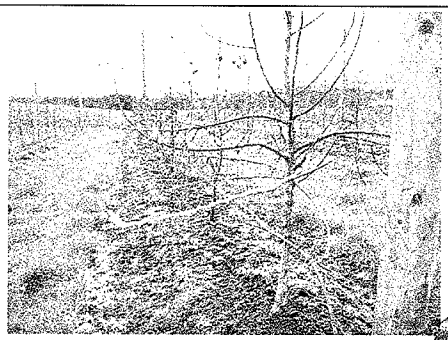


Source: D. Bolitho, 1993

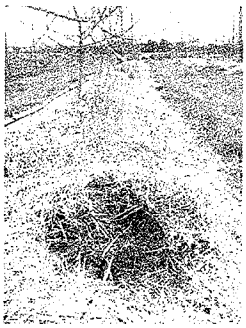
Basic Principles of tree planting

- New Plantings
- Early Training
- Early Cropping

Bare Soil with Moss

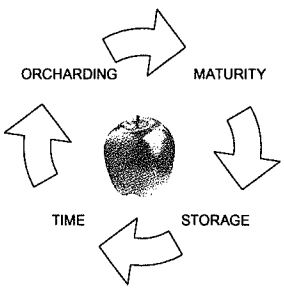


Thick mulch for dwarfing stocks



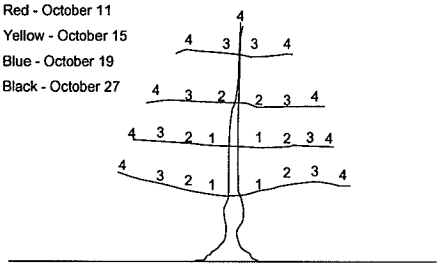
Hail netting improves quality attributes

Orcharding, maturity, storage,and time aspects that secure sustainability



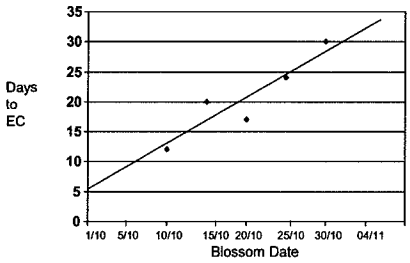
Blossom Sequence in Jonathan on Northern Spy, Red Hill, October 1998

1 - Red - October 11
2 - Yellow - October 15
3 - Blue - October 19
4 - Black - October 27



Colin Little, Scientific Horticultural Consultants, May 2007.

Relationship between Blossom Time and Ethylene Climacteric Post Harvest



Colin Little, Scientific Horticultural Consultants, May 2007.

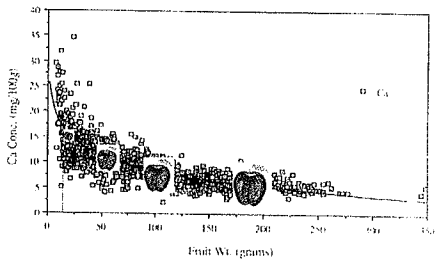
Pink Tip

Colin Little, Scientific Horticultural Consultants, May 2007.

Full Bloom

Colin Little, Scientific Horticultural Consultants, May 2007.

A typical depiction showing the dilution profile for calcium from fruitlet stage to harvest.



Colin Little, Scientific Horticultural Consultants, May 2007.

FIELD OBSERVATIONS

APPLES AND PEARS FROM SMALL TREES HAVE A LOWER WITHIN TREE VARIABILITY IN RELATION TO MATURITY AND COLOUR PRESENTATION THAN FRUIT FROM LARGE TREES.

VARIABLES THAT AFFECT FLOWERING TIME ARE;-

- **BETWEEN YEAR WEATHER CONDITIONS THROUGH OCTOBER/NOVEMBER.**
- **LOCATIONS PROGRESSIVELY FURTHE INTO SOUTHERN LATITUDES.**
- **LOCATIONS OF INCREASING ALTITUDE.**

Colin Little, Scientific Horticultural Consultants, May 2007.

Locations of Increasing Altitude

Colin Little, Scientific Horticultural Consultants, May 2007.

Measuring Maturity

FOR APPLES.

(1). STARCH STAIN (PLATE 1. BLACK IMMATURE ON TO PLATE 6. WITE FULLY TREE RIPE).

(2).FRUIT FIRMNESS. (A RANGE FOR EACH VARIETY GIVING VALUES FOR FIRST PICKS – 'LONG TERM CA' ON TO LAST PICKS –'SHORT TERM CA'.

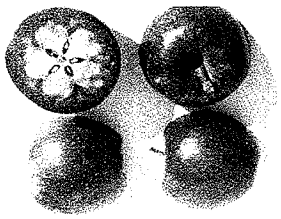
(3). SUGAR. (RANGE AS FOR FIRMNESS).

(4). BACKGROUND COLOUR. ONSET OF YELLOWING.

(5). RED COLOUR. AREA AND INTENSITY.

Colin Little, Scientific Horticultural Consultants, May 2007.

STARCH TEST FOR CAMEO APPLE



Colin Little, Scientific Horticultural Consultants, May 2007.

Measuring Maturity

FOR PEARS.

•OPTIMUM MATURITY IS BASED MAINLY ON CATEGORIES (2) FIRMNESS AND (3) SUGAR.

•PEARS ARE NON-CLIMACTERICAND DEVELOP NO (EC).

•PEARS ARE SLOWER TO SHOW SIGNIFICANT CHANGE IN FIRMNESS AND SUGAR. HOWEVER, THE RATE OF CHANGE DOES INCREASE SUDDENLY PRIOR TO TREE RIPENING.

•PEARS NEED A PERIOD OF CHILLING (5°C TO 0°C) TO STIMULATE RIPENING AT AMBIENT TEMPERATURES.

Colin Little, Scientific Horticultural Consultants, May 2007.

Storage Management

OPTIONS THAT CAN BE APPLIED IMMEDIATELY POST-HARVEST AND PRE-STORAGE.

(1). PROMPT TRANSFER TO 'SMARTFRESH' THEN PROMPT 'CA'.

(2). DPA + FUNGICIDE THEN PROMPT 'CA'.

(3). SANITISE WASH THEN DPA + FUNGICIDE THEN PROMPT 'CA'.

Colin Little, Scientific Horticultural Consultants, May 2007.

Recommended Best CA Storage

(1) 'CA' ROOM FILL IN 7 DAYS FROM FIRST FRUIT INTAKE.

(2) REDUCTION OF CORE TEMPERATURE TO <5°C BEFORE OXYGEN PULLDOWN.

(3) OXYGEN IN THE 'CA' ROOM SHOULD BE REDUCED FROM 21% TO 2% IN THE 3-DAY PERIOD FROM THE START OF 'CA' GENERATION.

(4) CORE TEMPERATURE SHOULD BE REDUCED TO 0°C FOR ALL PEARS, AND FOR GALA, GOLDEN DELICIOUS FIRMGOLD AND FUJI APPLES.

Colin Little, Scientific Horticultural Consultants, May 2007.

Recommended Best CA Storage

(5) FOR THE STORAGE OF JONATHAN, GRANNY SMITH, PINK LADY, AND SUNDOWNER USE STEPWISE-COOLING (4°C FIRST 10 TO 14 DAYS, THEN TO 2°C FOR NEXT 10 DAYS THEN 1°C THEREAFTER IF WELL MANAGED 'CA' STORAGE IS POSSIBLE TO MAINTAIN.

(6) MAINTAIN OXYGEN BETWEEN 1.8% AND 2.2%.

(7) MAKE SURE CARBON DIOXIDE DOES NOT EXCEED 1% FOR SENSITIVE VARIETIES SUCH AS 'WILLIAMS PEAR', AND FOR JONATHAN, GRANNY SMITH, PINK LADY AND SUNDOWNER APPLES.

Colin Little, Scientific Horticultural Consultants, May 2007.

Time in Storage

• ALL FRUIT THAT GO INTO STORAGE HAVE A FINITE LIFE SPAN. THEY AGE, LOOSE EATING QUALITY AND EVENTUALLY DIE. DEAD FRUIT AT 0°C SHOW NO VISUAL SIGNS OF DEATH.

• HOWEVER ONCE THESE FRUIT ARE TRANSFERRED TO AMBIENT TEMPERATURE THEY FAIL TO RESPIRE ANAEROBICALLY, FAIL TO EMIT FRESH FRUIT AROMAS, FAIL TO YIELD CLEAN JUICE WHEN CRUSHED AND ARE RAPIDLY INVADED BY PATHOGENS.

• THE STORAGE LIFE OF POME FRUIT IS GOVERNED BY THE RATE OF LIVING (RESPIRATION RATE) OF EACH VARIETY, THE SUSCEPTIBILITY OF THE VARIETY TO LOW TEMPERATURE AND THE METHOD USED TO REDUCE RESPIRATION.

Colin Little, Scientific Horticultural Consultants, May 2007.

Time in Storage

• FRUIT THAT ARE HARVESTED IN THE *EARLIEST STAGE OF TREE* ***RIPENING*** HAVE MAXIMUM TERM STORAGE POTENTIAL.

• FRUIT THAT ARE HARVESTED IN THE ***MID-STAGE OF TREE RIPENING*** HAVE A MEDIUM-TERM STORAGE POTENTIAL.

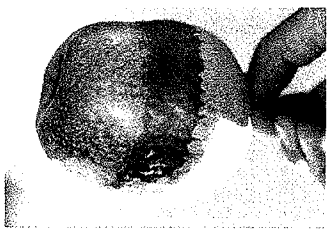
• FRUIT THAT ARE HARVESTED IN THE ***FINAL STAGE OF TREE RIPENING*** HAVE A VERY SHORT–TERM STORAGE POTENTIAL.

Colin Little, Scientific Horticultural Consultants, May 2007.

THINGS THAT HAVE JEOPARDISED THE LONG TERM VIABILITY OF THE POME FRUIT INDUSTRY THROUGH THE 2006/07 SEASON.

Colin Little, Scientific Horticultural Consultants, May 2007.

FROST



Colin Little, Scientific Horticultural Consultants, May 2007.

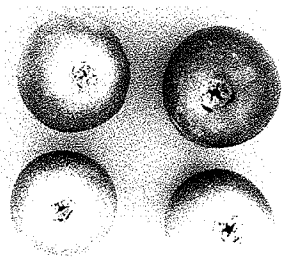
DROUGHT

Colin Little, Scientific Horticultural Consultants, May 2007.

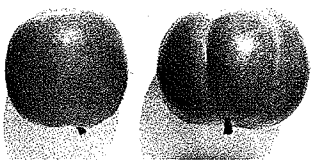
SMOKE

HAIL

CALYX CAVITY CRACKING



CULTIVAR REVERSION



BIRD DAMAGE

BUREAUCRACY

J-Tech Systems Pty Ltd

AFFCO Conference – Melbourne

GS1 DataBar

May 26 2007

Stuart Abbott

J-TECH SYSTEMS Pty Ltd

- **Established 1998.**
- **Licensed Manufacturer of Sinclair Labels.**
- **Agent for:**

Sinclair™

FRUIT PACKAGING & SYSTEMS

Sunkist

J-Tech Operations:

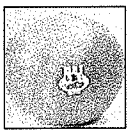
- Head Office and Manufacturing located Albury, NSW.
- Regional Service Centres located in;
  - Mildura
  - Shepparton.
  - Adelaide
- Additional service representation in
  - W.A.,
  - Tasmania,
  - South Australia – (Adelaide Hills and Renmark)
  - Queensland – (Stanthorpe, Gayndah and Bowen)

GS1 DataBar™

- What is GS1 Databar? > family of barcodes formerly known as RSS (Reduced Space Symbology)

- DataBar stacked Omnidirectional
- Can be applied individually to small items eg. *pharmaceuticals, fruit.*
- Carries more information than EAN / UPC barcode
- Readable PLU # remains on label

GS1 DataBar
Stacked Omnidirectional



GTIN
00 614141 19999 6

Leading zero's | Company Prefix (6-9 digits) | Item Reference | Check Digit

GS1 DataBar cont...

- *Why are retailers driving the change?* = limited ability to trace products from shipment to point of sale - ongoing difficulties with specific product line recalls.
  ....variety names > PLU code > RSS 14 > GS1 Databar

  > Improved accuracy at checkout (eg.Tesco)

  > Increased speed at checkout (quicker than entering PLU #)

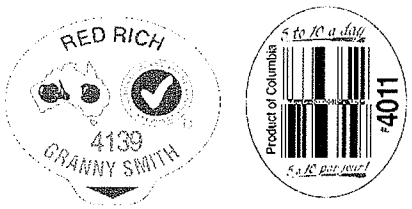
  > Reduced shrinkage

  > Identification of vendor

  > Facilitates product recall and enables traceability

  > Improves category management / inventory control

PLU # v's Databar



Sinclair

Where to from here....?

- Full implementation > 1st Jan 2010 – (or sooner via retailers).
- Wal-Mart, Loblaws & Tesco trials 2007
- Graphics may be effected
- Barcode may comprise 60% label area
- Next step.....GS1.....Sinclair/J-Tech

Sinclair

The SmartFresh℠ Quality System

From Pilot Programme to Commercial Success 2005-2007

AFFCO/IHD Workshop

Nick Sanders
Account Manager, Australia

26 May 2007

The SmartFresh℠ Quality System

Agenda

- Introduction
- What is happening globally with SmartFresh technology
- Our experience locally with SmartFresh
- Technical update
- What else are we doing with the SmartFresh system?
- What next?

The SmartFresh℠ Quality System

Introduction to SmartFresh

- A "freshness protection system"
- Works with the natural ripening process by minimising loss in quality and over-ripening in fruit
- Provides fresh-picked quality, taste, appearance
- Gives consumers the crunch they crave
- Most influential innovation in post-harvest horticulture in 30 years

The SmartFresh℠ Quality System

Global Developments

- Innovation awards – industry recognition in EU
- Registrations – 27 countries, expansion continues
- Market development – other crop segments

The SmartFresh℠ Quality System

Australian Experience with SmartFresh

2005 'Pilot commercial' launch

- Introductory season for customers, marketers and retailers
- Tracked 'SmartFresh' and 'Non SmartFresh' quality apples through to market for evaluation
- Highlighted disciplines required to ensure future development
- SmartFresh surpassed everyone's expectations

The SmartFresh℠ Quality System

2006 Commercial Experience

- Value of SmartFresh measured beyond storage
- Confidence in quality of inventory to sell now recognised
- Improved packouts
- Greater storage and packing flexibility
- Proven sales and marketing tool

The SmartFresh℠ Quality System

2007 Commercial Expansion

- Exponential growth across key varieties now being stored with the SmartFresh Quality System
  - Fine tuned use recommendations
  - Harvest maturity programme
  - Scald management customer demonstrations
- Customers are choosing SmartFresh for maximising the value of their apple crop.

The SmartFresh℠ Quality System

Technical Update

- SmartFresh is not a short cut to quality
- Complements existing industry recognised harvest and storage guidelines
- At harvest, apples are subject to many different challenges:
  - Picking
  - Transport
  - Cooling
  - Applying CA conditions

SmartFresh helps the fruit get through challenges with storage

The SmartFresh℠ Quality System

The European Experience - cooling

Sensitivity:

- Golden Delicious
- Granny Smith, Pink Lady
- Fuji
- Gala
- Red Delicious

More sensitive

Less sensitive

The final storage temperature is not the key parameter.

- Need to provide step-wise cooling for SmartFresh apples to adjust to the storage environment.

The SmartFresh℠ Quality System

The European Experience – CA Conditions

- As a general rule, SmartFresh apples don't need extreme Controlled Atmosphere conditions
- In some cases the SmartFresh system increases the sensitivity of apples to severe CA conditions
- CO_2 is the most important parameter, but often the ratio CO_2:O_2 is important as well
- Different apple varieties have different sensitivity to CA conditions.

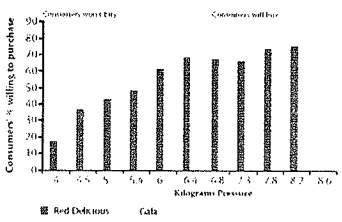
The SmartFresh℠ Quality System

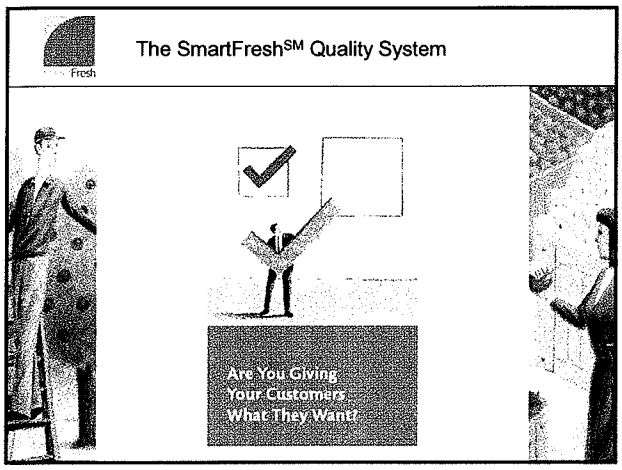
What else are we doing in Australia?

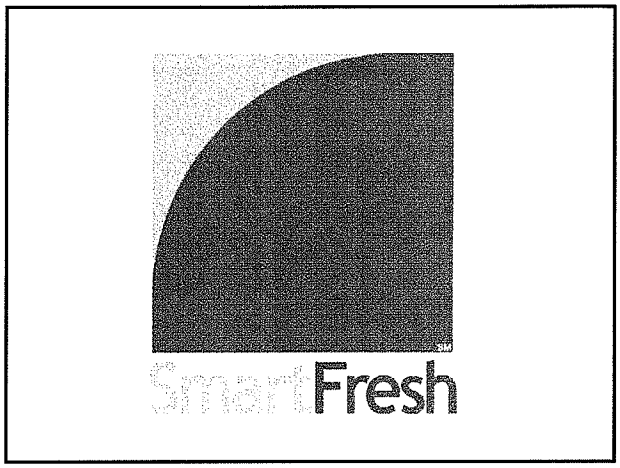
- Plums – pre commercial evaluations
- Persimmons – commercial
- Kiwifruit – pre commercial evaluation
- Avocado – market evaluation
- Mango – market evaluation
- Bananas – market evaluation

The SmartFresh℠ Quality System

What next?




The SmartFresh℠ Quality System
Are You Giving
Your Customers
What They Want?


SmartFresh

LANDGUARD

Landguard™ to assist with Post Harvest Management

Kate Dawson
Business Development Manager – Landguard
0434 072 555

Contributors:
Orica, CSIRO,
Cotton CRC, Sugar CRC, Rice CRC
Cotton R & D Corporation,
Rural Industries R&D Corporation,
Horticulture Australia Limited, Australian Wool,
Australian Centre for International Agricultural Research
Australian Golf Course Superintendents Association (AGCSA)

Agenda

- The technology
  - What it is, how it works
  - Awards
- Commercial applications
  - Results
  - Potential use in post-harvest applications
- Where to from here
- Questions

LANDGUARD

Technology – what is Landguard™

✓ Landguard™ enzymes rapidly break down toxic and persistent pesticides.

✓ In minutes, pesticide residue can be reduced to levels that can takes years to occur naturally.

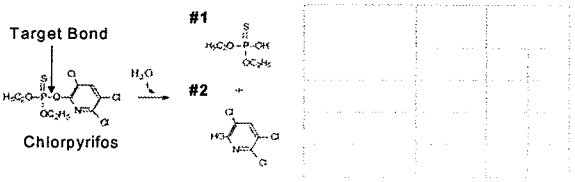
✓ By-products are formed which are both significantly less toxic and more bio-degradable.

✓ Relatively small amounts of Landguard™ enzyme can treat large quantities of contaminated water.

LANDGUARD

Technology – How Landguard™ works

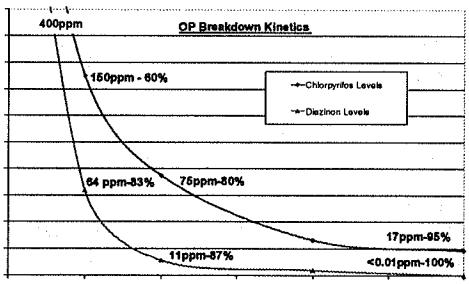
Enzyme accelerate naturally occurring hydrolysis reaction



By-products are always significantly less toxic than original active

LANDGUARD

Results



LANDGUARD

Commercial Applications

Point Source Treatment

– preventing off-target movement.

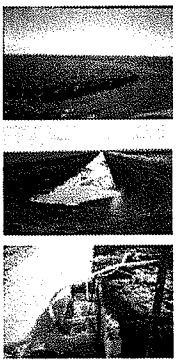
Irrigation	Operations	Livestock /produce
		
• Field run-off •US, Australia	• Equipment de-con • Spills / LOC's • Equipment wash-water • Pits / Sumps / Trade-waste	• Waste dip disposal •UK, Australia

LANDGUARD

Run-Off Treatment – m-parathion

Cotton farm, Narrabri NSW

- 17 hectares of cotton was sprayed with m-parathion.
- Field flood irrigated 20 hrs later



Treatment:

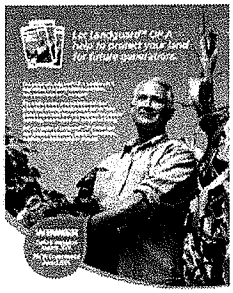
- Irrigation return channel treated with Landguard™OP-A .
- Treatment of 84,000 L (1hr run-off) required 620 g of Landguard™OP-A.

Treated run-off residue levels:

- were reduced **from 15ppb to 0.3 ppb** prior to return to the water source in 40 minutes.

Rinsate Treatment – key OPs

LANDGUARD OP-A



- ✓ Easy to use
- ✓ Single-use sachet
- ✓ >95% degradation of key OPs*
- ✓ Overnight
- ✓ RRP $40 +GST

* Chlorpyrifos (**Lorsban**), parathion methyl (**Folidol**), diazinon (**Diazol**), fenitrothion, maldison (**Hy-Mal**), phosmet (**Imidan**)

Current and Future Target Pesticide Groups

Insecticides
- •Organophosphates
- •Synthetic Pyrethroids (i.e. Bifenthrin)
- •Neonictinoids (i.e. Imidacloprid)

Herbicides
- •Triazines (i.e. Atrazine)
- •Phenyl Ureas (i.e Diuron)

Fungicides
- •Fungicidal Carbamates (i.e. Carbendazim)
- •Strobilurins (i.e Azoxystrobin)

LANDGUARD

Use in Post Harvest Situation

Dip Remediation using Landguard™ZIM-A

- ✓ Active on carbendazim, and benomyl metabolites
- ✓ Carbendazim has a half life of 61 days in water (issue for any used dip being dumped)
- ✓ Friends of the Earth "Filthy Four" for its hormone disrupting properties
- ✓ >90% degradation over 3 hours – more work being undertaken to perfect dosing

Use in Post Harvest Situation

Using Landguard™ZIM-A prior to Export?

- ✓ Registration for general purposes not required
- ✓ Could Landguard™ZIM-A be used prior to export (post dipping) as a fruit wash?
- ✓ – would registration be required?
- ✓ Work would be required to determine efficacy / disease control / timeline
- ✓ Potential in the Australian market?

Where to from here?

- ✓ Commercialisation of Carbendazim degrading product, Landguard™ZIM-A **'Imminent'**
- ✓ Potential for Landguard™OP-A as a fruit wash – any interest?
- ✓ Questions?

Lean Supply Chains

John McBride

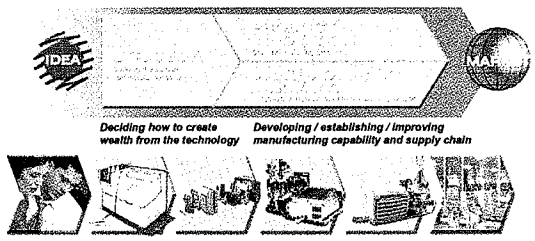
May 26th 2007

www.invetech.com.au

Invetech

What is Invetech?

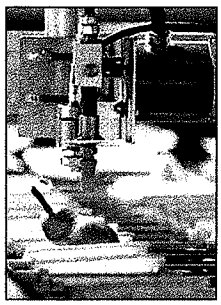
Developing the market-ready physical product

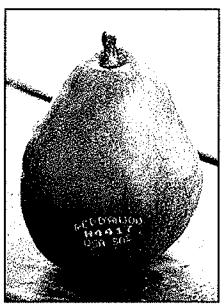


How do we do it?

- 200+ professionals
- a wide range of skills
- adaptability
- quality products, made to order
- world's best practice services

...and delivering an estimated $1 Billion in economic value to our clients.

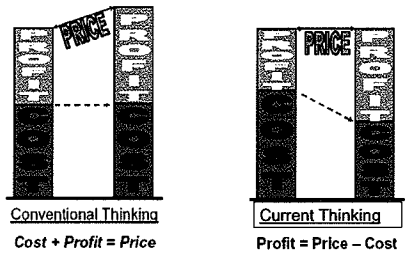




Automaker	*Total revenue*
General Motors	$193.0
Daimler Chrysler	$194.1
Toyota	$179.4
Ford Motor	$175.5

Car maker	Total % of Sales	capital	revenue	Profit/loss
Gen Motors	$12.7	$193.0	-$3.9	-2.0
D/Chrysler	$52.3	$194.1	$3.1	1.6
Toyota	$166.4	$179.4	$10.7	5.9
Ford Motor	$15.2	$175.5	$2.0	1.1
Mitsubishi	$9.9	$18.9	-$3.4	-17.9

Car maker	Profit each car
Gen Motors	-$1300
Toyota	+$2,000
Ford Motor	-$284



Conventional Thinking
Cost + Profit = Price

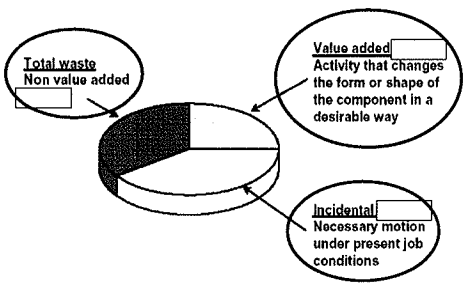
Current Thinking
Profit = Price – Cost

The Essential Equation

Selling price = Costs + Profit ✗

Profit = Selling price - Costs ✓

Value Adding Activities



Waste Elimination

- Activity definition
  - **"Value adding"**
    - Activities that add value through the eyes of the customer. I.e. What the Customer would pay for.
      - **AIM TO ENHANCE**
  - **Necessary "non-value adding"**
    - These are activities that must be performed despite the fact that they add no value
      - **AIM TO ELIMINATE AND OR REDUCE**
  - **Unnecessary "non-value adding"**
    - These are activities that add no value. I.e. What the customer would not pay for
      - **AIM TO ELIMINATE**

What do we mean by Waste?
– Anything that the customer doesn't pay for?

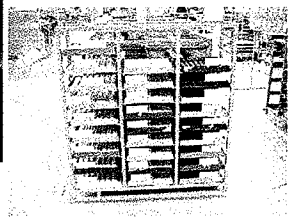
- **Over production** – More than is immediately required
- **Delays** – queues, waiting and stoppages
- **Over Processing** – unnecessary process steps, double handling etc.
- **Unnecessary Transportation** – moving product around
- **Inventory** – stock sitting in stores and work-in-progress not being worked upon

What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Excessive Motion** – people walking, bending, reaching, stretching etc.
- **Defective products** – scrap, rework etc.
- **Waste Resources** –I.e. Gas, Electrical, water etc not used to add value to our products
- **Untapped resources** – not using the potential *brainpower* of an organisation

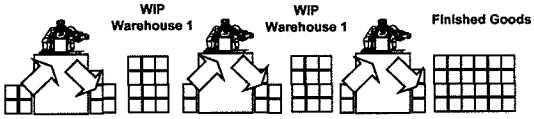
What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Over production** – More than is immediately required



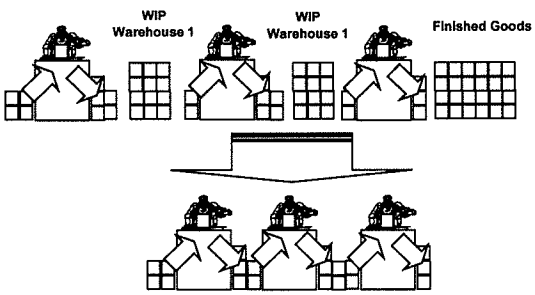
What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Unnecessary Transportation** – moving product around



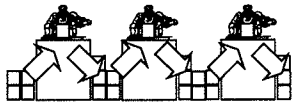
What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Unnecessary Transportation** – moving product around



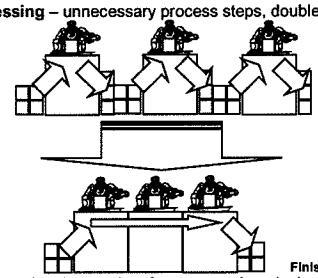
What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Over Processing** – unnecessary process steps, double handling etc.



What do we mean by Waste?
– Anything that the customer doesn't pay for?

- **Over Processing** – unnecessary process steps, double handling etc.

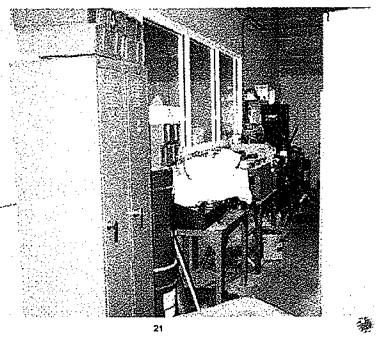


- Once a component has been taken from a container, it should not be returned to a container until all of the processing has been completed

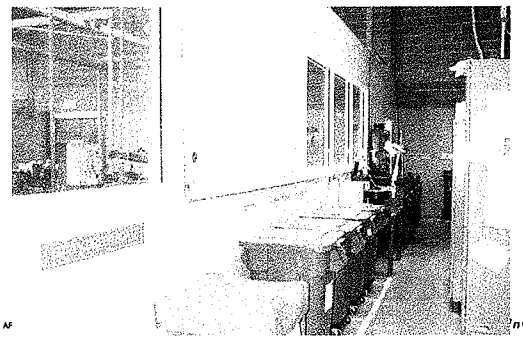
BEFORE

AFTER

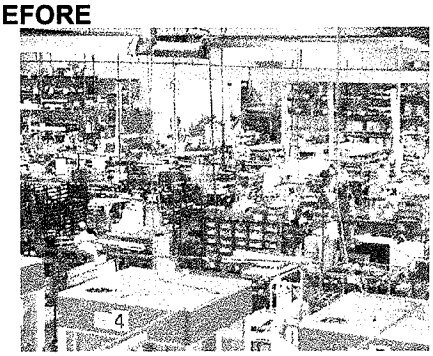
BEFORE



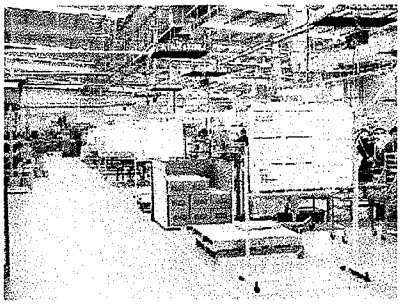
AFTER



BEFORE



AFTER

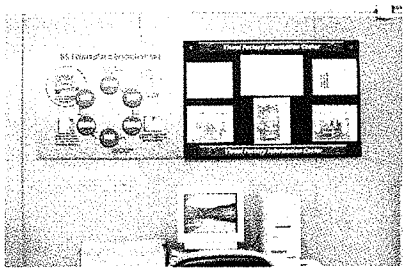


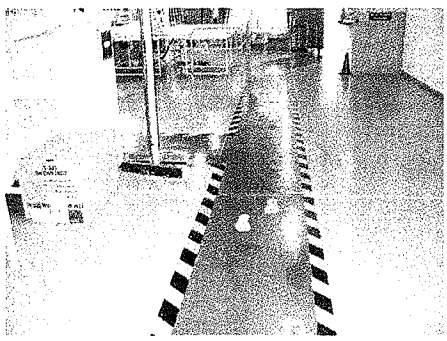
Toyota developed a number of tools now referred to as "Lean Manufacturing"

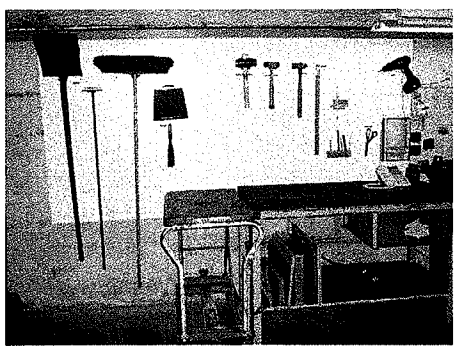
- Lean tools include
  - Value chain mapping
  - 5S
  - Single minute exchange of die (SMED)
  - Kanban
  - Group technology or Cellular manufacturing
  - Takt time and level scheduling
  - Total productive maintenance

Individually, these tools all provide positive benefits

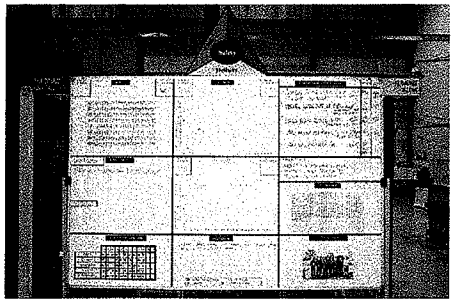
6S Control and Maintenance

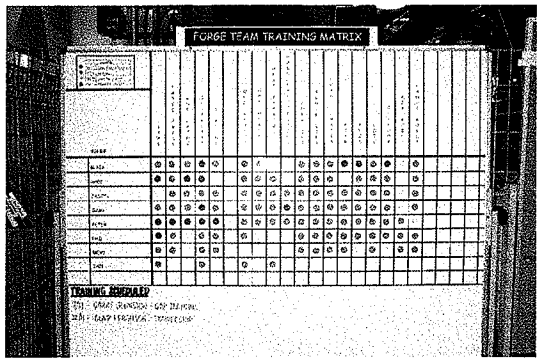






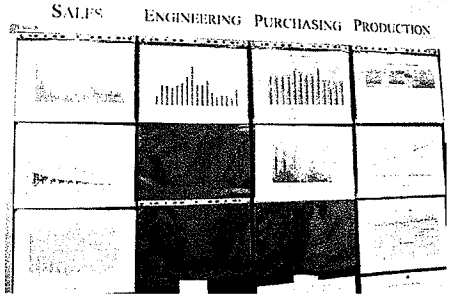
Visual Workplace

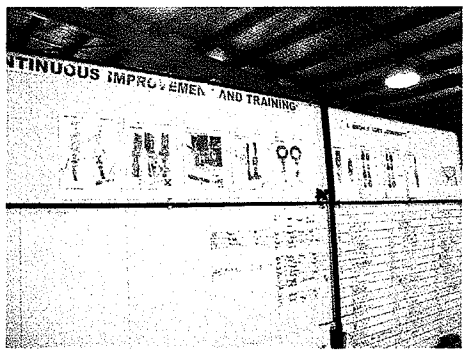


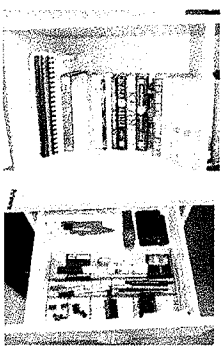


KPI
SCORE BOARD

SALES ENGINEERING PURCHASING PRODUCTION

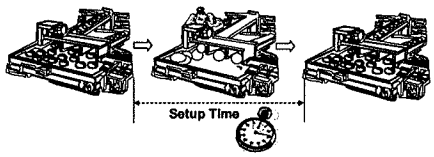






Quick Changeover or SMED

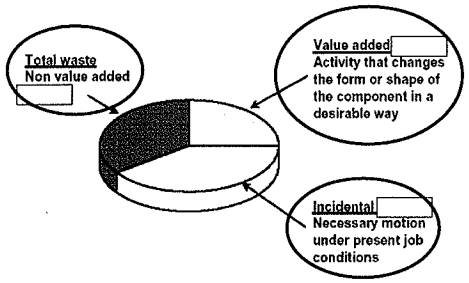
- Setup time is the elapsed time from making the last good part of type A to the first good part of type B



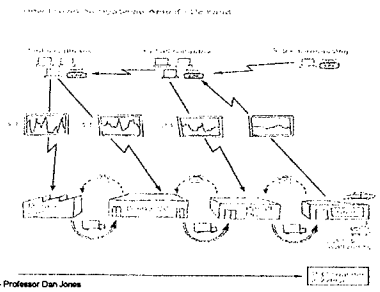
- Setup time represents a loss of productivity and therefore should be minimised

What has Toyota got to do with fruit processing?

Value Adding Activities

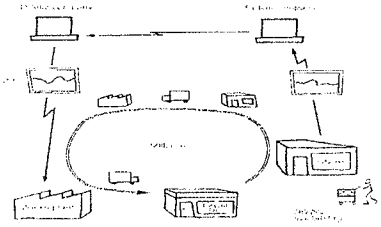


Tesco Before



Source:- Professor Dan Jones

Tesco Model Now



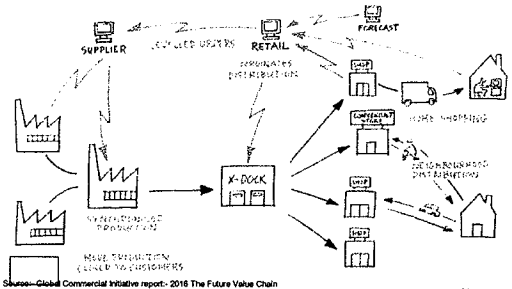
Source:- Professor Dan Jones

AFFC 26th May 2007 42 Invetech

AFFC 26th May 2007 43 Invetech

What next :- Supply Chain Future Model

Evolving Value Chain of 2016



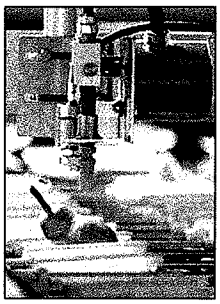
Source:- Global Commercial Initiative report:- 2016 The Future Value Chain

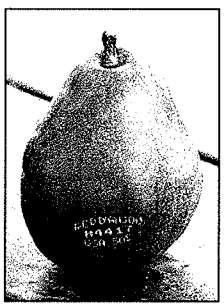
AFFC 26th May 2007 44 Invetech

Global Commercial Initiative report:- 2016 The Future Value Chain

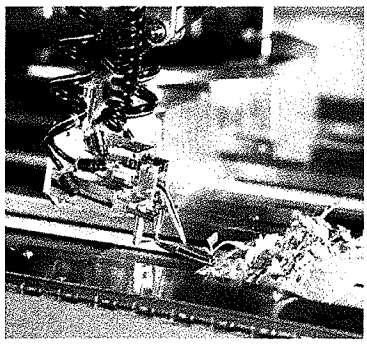
Nigel Bagley, **Unilever**
Mogens Bak, **DHL**
Douglas Brown, **Dairy Farm**
Friso Coppes, **Royal Ahold**
Jim Crawford, **Intel**
Priscilla Donegan, **Capgemini**
Jim Flannery, **Procter & Gamble**
Ruediger Hagedorn, **GCI**
Marshall Haine, **Procter & Gamble**
Bernard Helders, **Capgemini Ard**
Ronnie Herzfeld, **Pick 'n Pay**
Kees Jacobs, **Capgemini**
Prof. Dan Jones, **Lean Enterprise Academy**
Duane Judd, **Nestlé**
Mette Kole, **Intel**
Kathleen Riordan, **Kraft Foods**
Sabine Ritter, **GCI**
Randy Salley, **Wal*Mart**
Marco Urlos, **Carrefour group**
Hans van Grieken, **Capgemini**
Fred van Ommen, **Philips**
Jan Vethman, **Capgemini**
Robert Wilkinson, **Coca-Cola Company**
Dr. Gerd Wolfram, **Metro Group**

AFFC 26th May 2007 45 Invetech

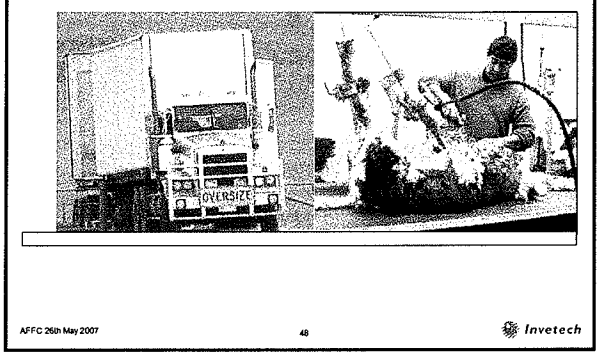




AFFC 26th May 2007 46 Invetech



AFFC 26th May 2007 47 Invetech



AFFC 26th May 2007 48 Invetech

Thank You

Invetech

SIGMA

A Measurement

σ	PPM
2	308,537
3	66,807
4	6,210
5	233
6	3.4

Process Capability

Defects per Million Opp.

Six Sigma is about reducing Defects and eliminating opportunities for Defects

AFFC 26th May 2007 50 Invetech

SIGMA

A Measurement

σ	PPM
2	308,537
3	66,807
4	6,210
5	233
6	3.4

Process Capability

Defects per Million Opp.

Six Sigma is about reducing Defects and eliminating opportunities for Defects

AFFC 26th May 2007 51 Invetech

SIGMA

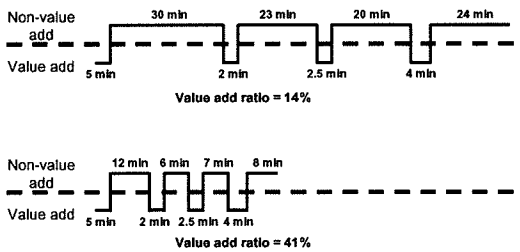
Practical Meaning

99% Good 3.5σ	99.99966% Good 6σ
U.S. Postal System	U.S. Postal System
20,000 Lost Articles Of Mail/Hr	7 Lost Articles of Mail/Hr
Airline System	Airline System
Two Short/Long Landings/Day	One Short/Long Landing/5 Years
Medical Profession	Medical Profession
200,000 Wrong Drug Prescriptions/Yr	68 Wrong Drug Prescriptions/Yr

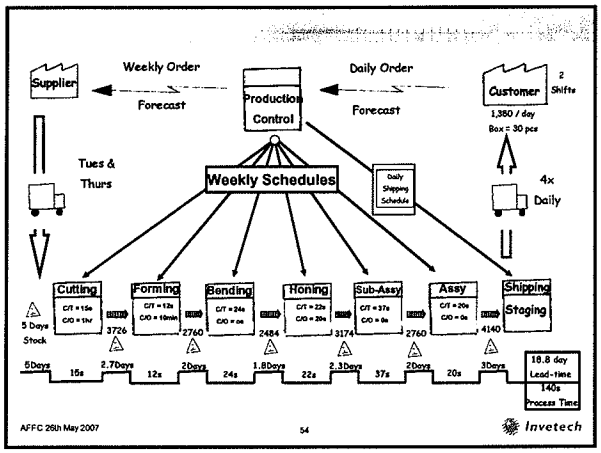
Six Sigma is about reducing Defects and eliminating opportunities for Defects

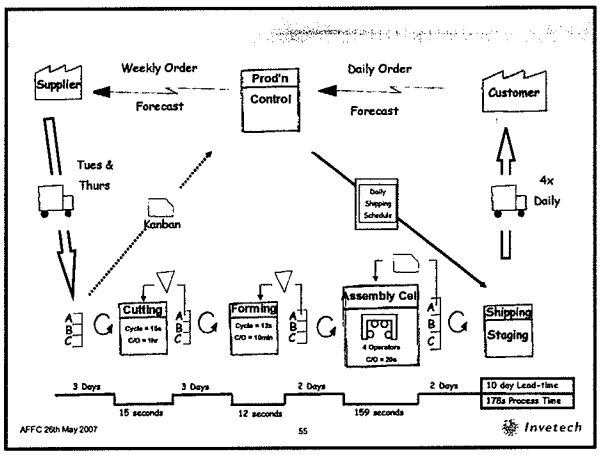
AFFC 26th May 2007 52 Invetech

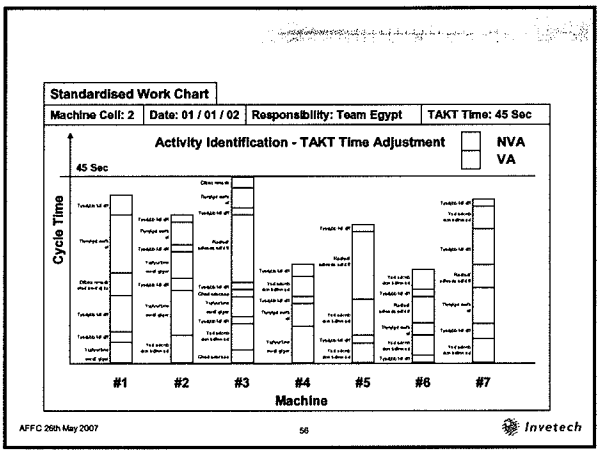
Waste Elimination

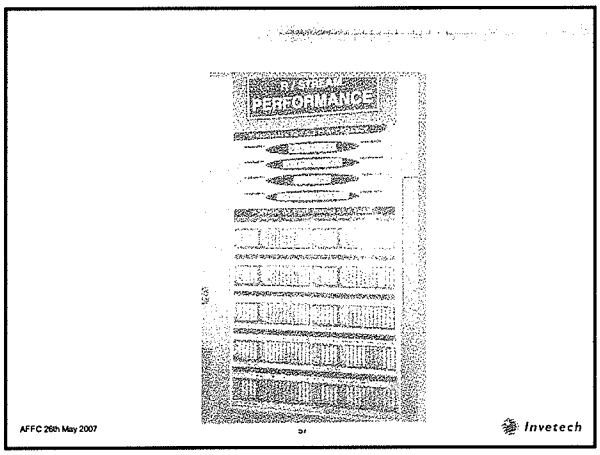


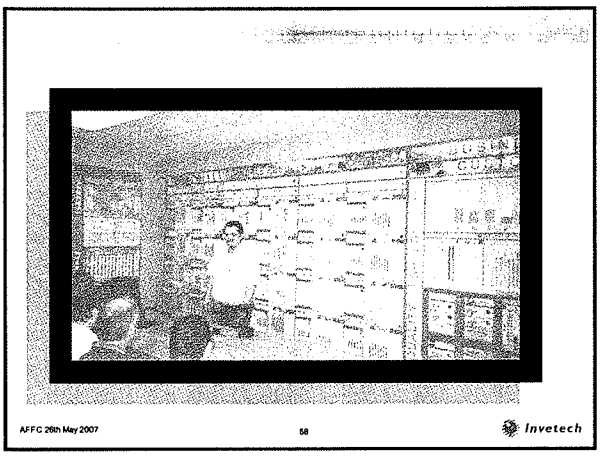
AFFC 26th May 2007 53 Invetech

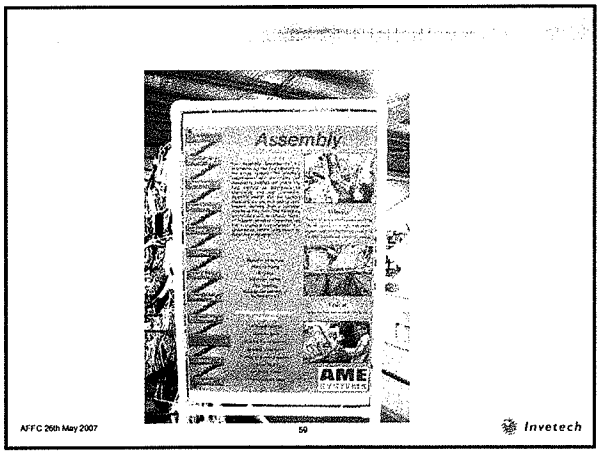

Supplier
Weekly Order
Forecast
Production Control
Daily Order
Forecast
Customer
2 Shifts
1,380 / day
Box = 30 pcs
Tues & Thurs
Weekly Schedules
Daily Shipping Schedule
4x Daily
Cutting
Forming
Bending
Honing
Sub-Assy
Assy
Shipping Staging
5 Days Stock
3726
2760
2484
3174
2760
4140
5Days
15s
2.7Days
12s
2Days
24s
1.8Days
22s
2.3Days
37s
2Days
20s
3Days
18.8 day Lead-time
140s Process Time
AFFC 26th May 2007
54
Invetech

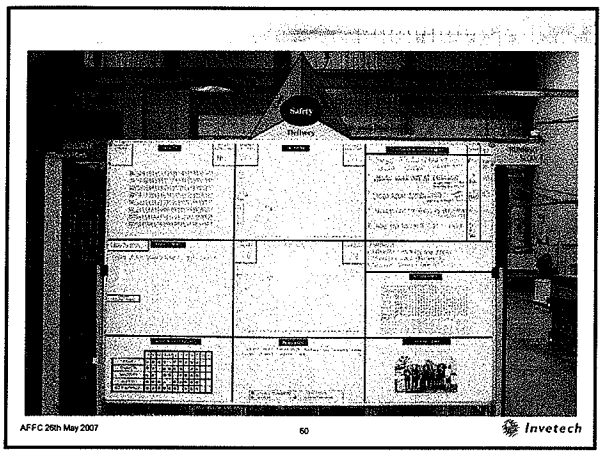

Supplier
Weekly Order
Forecast
Prod'n Control
Daily Order
Forecast
Customer
Tues & Thurs
Kanban
Daily Shipping Schedule
4x Daily
Cutting
Forming
Assembly Cell
4 Operators
Shipping Staging
3 Days
3 Days
2 Days
2 Days
15 seconds
12 seconds
159 seconds
10 day Lead-time
178s Process Time
AFFC 26th May 2007
55
Invetech


Standardised Work Chart
Machine Cell: 2
Date: 01 / 01 / 02
Responsibility: Team Egypt
TAKT Time: 45 Sec
Activity Identification - TAKT Time Adjustment
NVA
VA
45 Sec
Cycle Time
#1
#2
#3
#4
#5
#6
#7
Machine
AFFC 26th May 2007
56
Invetech


PERFORMANCE
AFFC 26th May 2007
Invetech

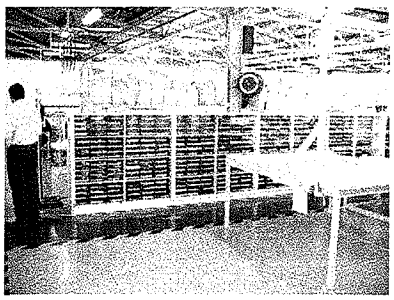

AFFC 26th May 2007
58
Invetech


Assembly
AME
AFFC 26th May 2007
59
Invetech



AFFC 26th May 2007 60 Invetech

Kanban

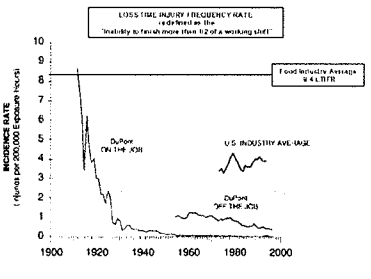


AFFC 26th May 2007 61 Invetech

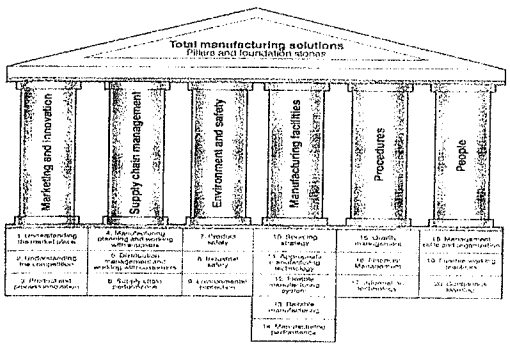
AFFC 26th May 2007 62 Invetech

AFFC 26th May 2007 63 Invetech

DuPont Safety Performance Versus Food Industry



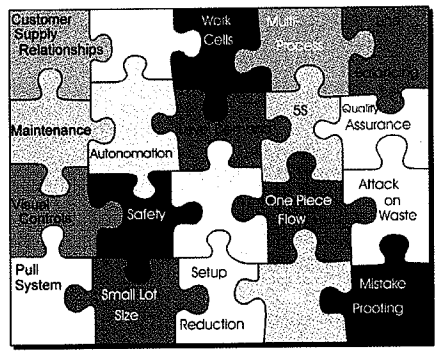
AFFC 26th May 2007 64 Invetech



AFFC 26th May 2007 Source: The Manufacturing Game 65 Invetech

Department of Trade & Industry UK

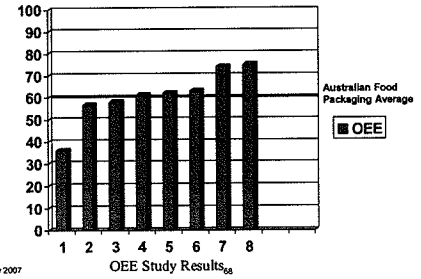
Item	Av Perf.	Top 25%	Top 10%	Own Performance
Delivery reliability	94%	98.8%	99.5%	
Ex stock availability	97%	99.5%	100%	
New product (last 5 yrs)	4.0%	14.0%	63.0%	
Scrap rate	3.0%	1.0%	0.8%	
V A employee (£0,000)	150	200	350	
Total stock turns	13	18	30	
Capacity used Cl vers	10.5%	2.6%	0.8%	
Av component setup(mins)	100	15	6	
Av assembly setup (mins)	82	10	4	
Training on job (days)				
Existing employees	7	8	20	
New employees	23	24	48	
Off job (existing)	2	3	5	
Absenteeism	4.0%	2.4%	1.9%	



Overall Equipment Effectiveness Survey

OEE Line Surveys Conducted on Australian Food Packaging Lines

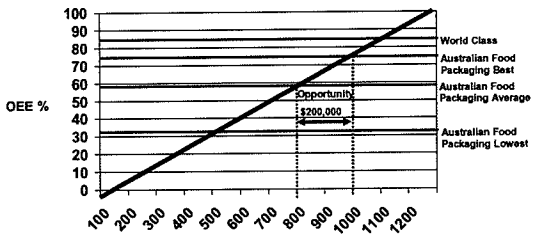
BCB Beverages	Can Line (medium speed)
Colonial Farm	Finger Food line
Coca Cola	Pet Filling line 1.5 litre & Can Line (high speed)
Carlton & United Breweries	Can Line (high speed)
Darrell Lea	Soft centre line & Enrobing line
Murray Goulburn	Cheese Wrapping Line
Nestle	Noodle line
Wrigley Australia	Pan coating section



OEE Study Results[68]

Improvement Opportunity

Two shifts per annum 100 packs per minute form fill and seal



Overheads Recovered per Annum x $1,000

Thank You

Invetech