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FINAL REPORT
PROJECT NUMBER – VG05069

GREENHOUSE VEGETABLE STUDY TOUR HOLLAND, NOV 2005

Graeme Smith

Graeme Smith Consulting

VG05069 –*Greenhouse Vegetable Study Tour Holland, Nov 2005*

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Purpose: The purpose of the project was to assess existing, new and emerging greenhouse technologies and how they may be integrated in existing systems in Australia

Funding Source: Horticulture Australia Limited

Date of Report: June 2006

Know-how for Horticulture™

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Tour Participants

Ian Mortlock – Alma Hydroponics – Victoria
Damian Meeuwissen – Nerrigundah Berries - Victoria
Anne Wilson – Bellarine Hydroponics – Victoria
Ryan Brightwell - Nerrigundah Berries - Victoria
Rick Donnan – Growool Horticultural Supplies – New South Wales
Richard Clough – Living Shade – New South Wales
Graeme Smith – Graeme Smith Consulting – Victoria (Tour Leader)
Marcus Brandsema – J&A Brandsema P/L – Tasmania
Nicole Gallace – Sunnyridge Strawberry Farm – Victoria
Keith Atkinson – Atkinson Hydroponics – New South Wales
Max Horvath – Horvath Hydroponics – Queensland
Sohum Ghandi – AIS Greenworks – New South Wales

Summary

This study tour allowed us to view firsthand the highly efficient Dutch growing methods and glasshouse systems that have been developed over more than 30 years. The Australian protected cropping industry largely emulates the Dutch model in growing techniques and technology, therefore we assessed their approach to environmental management and plant physiology, with particular emphasis on their growing techniques and their adoption of new & emerging technologies. The industry suffers an acute shortage of opportunities for professional training and education in a range of technologies that are unique to the industry.

A key study was their total uptake of closed systems (full recycling) with very low waste water. This method is strongly recommended by our national industry and will eventually become mandatory, therefore growers needed to study the correct techniques. Professional training was received at a 5-day intensive course at Holland's main horticultural training institution, PTC+, studying a comprehensive range of greenhouse subjects that are currently not available in Australia.

Industry benefits are that skills training at all levels is necessary to underpin industry development & growth. Production and quality increases are necessary to meet the increasing demands of QA systems for both domestic and export markets. Industry skilling has the capacity to meet these needs and match the standards of the competitive imports/exports. Overseas study is mandatory if we are to match production standards with overseas competitors as well as up-skilling the industry resulting in enhanced productivity and farm viability

Tour Itinerary

Date	Location 1	Location 2	Activities
October			
Wed 26th	Australia		Travel to Holland (depart 3.30pm)
Thu 27th	Amsterdam (8.50am)	Cuijk	10ha 'Caransa/Mecano' tomatoes & Euphoria cucumber,
	Honslelerdijk	Delft	Visit 'demonstration nursery'
Fri 28th	Delft	Bergschenhoek	Visit de Ruiter Seed, inspect 'Funky' capsicum, 'Trica' tomatoes
Sat 29th	Delft	Meerle	national Belgium strawberry research centre (inc trials of tomatoes & capsicum)
Sun 30th	Delft	Ede	Tour Delft village & travel to Ede
Mon 31st	Ede		PTC+ (1st training day)
November			
Tue 1st	Ede		PTC+ (2nd training day)
Wed 2nd	Ede	Amsterdam	PTC+ (3rd training day) & Travel
Thu 3rd	Amsterdam		Hortifair (NTV)
Fri 4th	Amsterdam		Hortifair (NTV) + Priva Workshops
Sat 5th	Amsterdam		Travel on Priva Bus Tour (latest g/h tech)
Sun 6th	Amsterdam	Ede	Tour Locally
Mon 7th	Ede		PTC+ (4th training day)
Tue 8th	Ede	Amsterdam	PTC+ (5th training day) & Travel home
Wed 9th & Thu 10th		Australia	Arrive Australia (05.25am)

Grower Visits

Grower of Meccano tomatoes.
Mixture of glasshouses, old and new.
2hectares.
Density; Start 1.8m² – 2 heads on each plant – 3.3m².
Grafted plants – double blocks 2 plants per block, 4 plants per slab.

Yield: 56 – 57 kg m²
Loose truss market – 6kg collapsible crates.
No screens, no need only one or two days per year with light levels too high.
Light levels range between 50J/cm² – 3000J/cm², very rare.

Recirculate all nutrients, disinfect with UV.
Labour: Approx. 10 people plus students in summer.
Staff multi skilled do all jobs.
Pay wages not piece work.

Very practical approach to work

- start by picking up leaf and keeping everything clean but once it gets busy just leave it till the autumn.

Ten hectares Caransa.
Grafted – mostly for economic reasons, save money on seed/seedlings.
Everyone forced to graft for extra vigour to help plants cope with Pepino Mosaic Virus.

Tear leaves rather than cut, leave significant tear wounds on plant but no stubs.
Do this to save time. No leaf pruning in p.m. High pipe temp after pruning.
All leaf on floor for season.

Wind plants.
20cm wide slabs – 2 plants either end. Then doubled after 3rd truss.
Picking straight into trays on trolleys then train to take it out to packhouse., connected trolleys, not mechanized.
Loose truss pack. 5kg Cardboard trays.

Grower Visits (cont….)

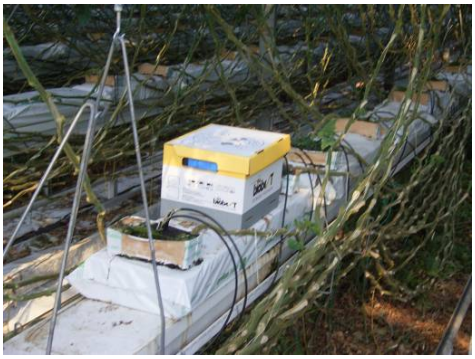
Cucumber - long English.

High temperatures – 17-18 degrees pre night, 19 – 20 night
24-26 afternoon.
Labour – 1hr per m2 per year
€16per m2 labour
190 cucumber per m2 – Average weight 400gm
€7 energy per m2

Co energy generation puts energy back into the grid, huge buffer/storage tanks for storage of waste heat.

Recirculating – bringing back in at 1 EC and fresh water.
Individual nutrient tanks injecting in individual elements as required.
But next year will be changing back to A & B tanks other system too complicated.
UV disinfection..

Uses white plastic stem guides to avoid kinking (pictured)
Individual knives per row to avoid disease (pictured)



Tomato Grower, Variety – Tricia on maxifort root stock
Greenhouse – 5m high
Yield – 67 kg/m²
Grafted plants – making two plants from each seedling.
Winding not clipping, but fewer winds on plant, roughly only 1 wind between trusses.
Only 3 to 4 trusses left on plant, fruit still good size.
Plants healthy.
Leaf on floor for season, also some rotting fruit – looked messy but no disease evident.
Grow pipe.
CO2
Contracting labour for plant training.

Grower Visits (cont….)

Grower – Vreugdenhil
Red Capsicum (Bell Pepper) 'Funky'
Area – 4.15 ha
Greenhouse – 5.5m
Plant early Dec. take through till middle of Nov. 2 weeks to cleanup and change crops.
Seedlings 6 weeks when planted in greenhouse.
Take 3 stems from one plant.
Yield – 30.5 kg/m² - red. (2.5 green, Total 30.5kg/m²)

Fantastic logistics system

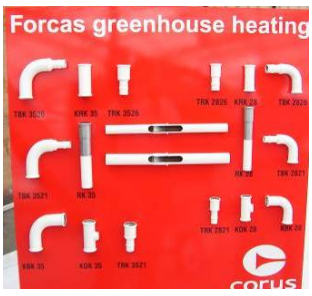
- Conveyor belts under gutters
- Trolleys with chutes into which picked capsicums are dropped, these go onto conveyor belts which are continuously moving towards the walkway.
- Here they drop onto wider conveyor belt travelling along beside the walkway.
- Then delivered directly to the packshed.
- Unique trolley system which spans two rows under the gutters, dual purpose – picking and plant work.
- 14 trolleys – 14 workers in greenhouse do all tasks.
- System designed by two young growers who also work in crop.

Metazet Demo Nursery – (limited photos allowed)
5,000m² (flowers, vegetables, pot-plants)
Various systems (harvesting, internal transport, cultivation, plant lighting, etc)
Wire mesh benches, chain path system, suspended chain rails, hanging plants, wire monorail systems, tube rail supports, harvesting carts, walking plant system, hanging gutters, pumps, paints, climate control, harvesting & processing, etc, etc

Form Flex - Supported and Hanging gutter systems

Train track system

- chain in steel track set into concrete path
- Front of trolleys has 'bar' that goes into slot & is picked up by the chain which is constantly moving.
- Safety stop bar on the front.



Metazet Trolley – high work trolley (www.metazet.com)

- Slotted steel with cross support bars
- Bars support platform but also form ladder for accessing platform..

- Tubular steel structure of platform sits over slotted steel
- Very simple – height variable to approx 20cm variations and can go quite low
- English brochure.

Crop Support Systems – ladder tape with metal clips attached with a 'gun'

Systems for lifting pipe rails when changing floors etc. Hooks under pipes to lift then wire and pulley system.

Pallet wrapping – easy wrappers, portable systems

National Strawberry Research Centre – Belgium

Total recirculation of all nutrients is required by law. Uses slow sand filter and UV.
Any drain water not used goes through reed bed and lava bed to reduce nitrates before it can be released into the sewer. Gov't checks and traces back to growers, penalties for growers who breach regulations.

Many types of growing systems including soil, glasshouse, haygrove tunnel, hanging gutter, etc

The research centre is also used by the major European seed breeding companies to trial new varieties of both tomato and sweet pepper (capsicum) before final commercialisation.

Banker plants (ie wheat) are used at the end of growing rows to introduce beneficial insects (wheat quickly dies, insects move out to crop in search of food)

Assimilation & supplementary lighting is being trialled in tomato crops to increase photosynthesis (growth), with light ballasts separated from globes to introduce heat at fruit level and avoid natural light shading.

Practical Training Centre +

This centre in Ede (Holland) specialises in horticultural training (being close to Wageningen, the centre of horticultural research in the Netherlands).

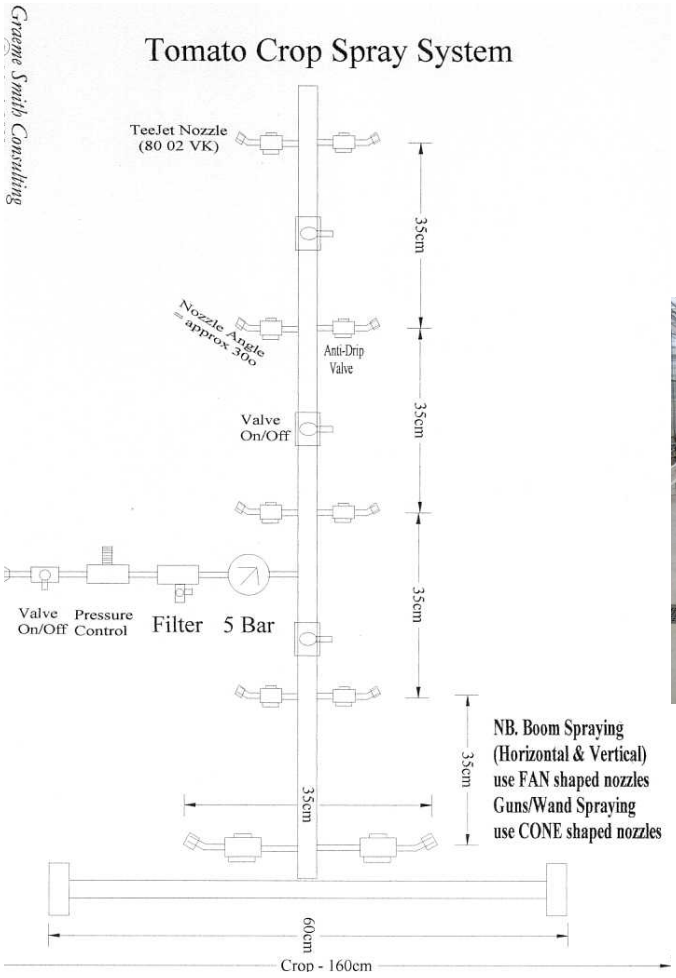
PTC+ has purpose built greenhouses to demonstrate technology & put into action their slogan “Learn by Doing”.

They annually train 40,000 graduates (in 5 campuses), have 450 employees and annual turnover of US$28million

The group completed the ‘Advanced Horticultural Course on Greenhouse Management’ (computerised environmental control, substrates, water & fertiliser management, greenhouse structures & cladding, crop protection)

As part of the course, the group developed and tested an effective crop spray trolley suitable for tall greenhouse crops (tomatoes, capsicums, cucumbers, egg plants, etc)

The resultant design is pictured below



Media-Based Nutrient Recirculation System.

Water is the life-blood of all horticulture and access to quality water should be the goal of all greenhouse managers, however the inherent low buffering of hydroponic systems demands a higher level of water management than soil based systems. Even media based systems allow root-zone conditions to change rapidly if not well managed. This aspect can be both our strength & weakness. 'Strength' in un-equalled control of plant performance if achieved, 'weakness' is lower yield & quality if not well managed.

Hydroponic systems can deliver substantial reductions in water usage compared to traditional farming activities (as much as 75%), and also increase yields per m2. The challenge for growers is to continue to reduce water consumption and to responsibly discharge wastewater to minimise environmental impacts.

Growers in the Netherlands are all obligated by legislation to recycle their drain water due to a high water table, as a large proportion of the country is flat and 4 – 6m below sea level. As a result they have been successfully recirculating their nutrient for some time after many years study on the recalculation of the nutrient load to maintain a healthy crop balance. They also capture high quality rainwater off the glasshouse roof into lined dams (called basins).

One of the prime reasons for our study tour was to study recirculation systems, the physical requirements (valves, tanks, pumps, piping, etc), and the technical methods of balancing the nutrient solution to a level suitable for the crop.

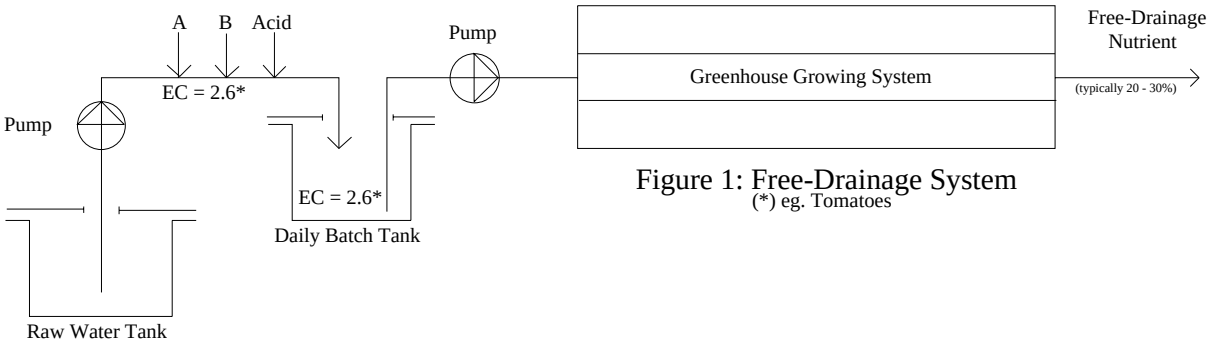


Figure 1: Free-Drainage System
(*) eg. Tomatoes

Figure 1: shows a typical media based 'Free-Drainage' system used in Australia today. This simple schematic shows a pump drawing raw water from a supply tank to fill a batching tank. On the way a fertiliser injection system adds the nutrient to an EC & pH set-point. The greenhouse irrigation controller calls for a feed and a second pump draws from the batch tank to feed the crop. Any waste water (typically 20 - 30%) is then collected and disposed of or used on a secondary crop (eg. pasture improvement). Some systems utilise a direct injection system to the crop and do not have a batch tank, however the principle and outcomes are the same.

Growers strive to maintain around 20 – 30% free drainage to balance out root-zone conditions in the media and environmental impacts, however this relatively low figure makes our media management that much tighter, hence a higher degree of control is necessary.

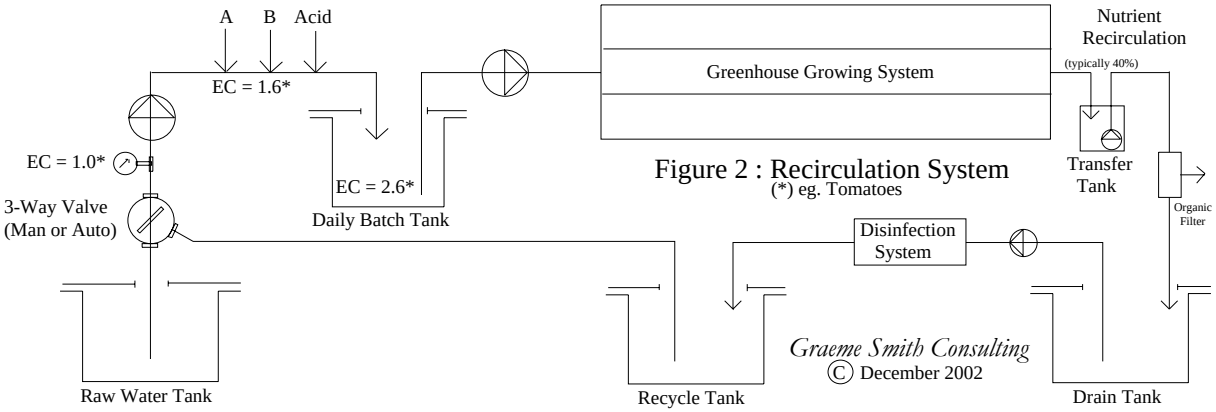


Figure 2 : Recirculation System
(*) eg. Tomatoes

Figure 2: shows the Dutch recirculation system, which is collected in a small transfer tank, pumped via a filter (to capture organic wastes), to a drain tank.

This nutrient is then pumped to a second 'recycle' tank via a disinfection system. This recycled, disinfected water is then introduced into the raw water pump via a proportional 3-way valve that is adjusted to supply an output EC target (eg. 1.0). This 3-way valve can be manually or automatically adjusted to maintain the required set-point to the pump.
This tomato example then shows that our fertiliser injection system only needs to supply an EC of 1.6 to deliver our required 2.6 to the batch tank. (1.0 recycle water + 1.6 injected = 2.6EC).
We have now seen the basic mechanics of a recirculation system.

Growers in this system typically aim for a 40% drain solution as it delivers them a more stable media condition and they are not losing any precious resources (water or nutrient) to the environment. This 40% drain matches the recycle EC (2.6 / 1.0); therefore our zero waste system is in balance!

Grower's outcomes are 40% saving in fertiliser, 40% water saving, and are environmentally sound and responsible!

Nutrient analysis of the recycle tank is initially required every 2 weeks to convert the nutrient load to a standard reference, which in turn is used to modify the injection recipe. This recipe modification takes account of the individual nutrient ions already present and adjusts these ions if necessary to maintain a reasonable balance at all times.
We can also allow for different recipes at different crop stages (eg. tomatoes - filling bags, starter mix, 3rd, 5th, 10th & 12th + truss stage), to meet changing crop demands for maximum yield & quality.
Analysis frequency can be dropped to approx 3 - 4 weeks once the system is stable.

The Australian Hydroponic & Greenhouse Association is keen to encourage all greenhouse growers to adopt the above 'closed' system principles as a basic tenet of a code of conduct (yet to be developed). This code is intended (in part) to further minimise any impacts on the natural environment.

The knowledge gained has been part of the industry presentations (see technology transfer on page 21) to encourage grower adoption nationwide.

Priva Bus Tour

Penning Freesias

3.7ha (growing, breeding, research, cooling)
Developed 30 new varieties over 30 years
Currently aim for 2-3 new varieties annually
Leading supplier of corms & cormlets (local & export)
New 1.2ha for propagation, commercial testing & showing new varieties

polystyrene beads introduced into the growing media to both cool and warm in summer/winter

Innovative 'ground loop' system to both heat & cool crops using 2 adjoining bores via a heat exchanger

SION Orchids

Total 5ha (2 sites) of Phalaenopsis orchids

Sion supplies groups of 1 – 3 spikes/pot

Breeding program to increase spikes & buds/spike

26 weeks @ 28ºC, auto sorted, 26 weeks @ 28ºC, 20 weeks @ 19ºC (total 72 weeks)

25,000 in & out each week (1.8million)

Sell €7 - €70 each (minimum €12.6 million)

Site fully automated

Ground-Loop system (heat & cool)

Only 4 manual tasks throughout production

Robots & cameras do most work

Cladding – 8mm twin-walled Plexiglas acrylic (high light transmission & 30% thermal efficiency)

2 levels over 6,500m² (lights in finishing area underneath can be dimmed)

Hortifair

Also included was 2 days at Hortifair (NTV) at the RAI. This Expo is the worlds largest in the protected cropping industry and showcases the latest (existing, new & emerging) technologies.

The area is so large that 1 day is required to have an overview of what is available, and the second day is to target the products of most interest.

The 900 booths showcases many items, that if not yet in common use in Australian greenhouse systems, we can expect adoption in the near future as they have assisted Dutch growers earn a strong reputation for being the most productive and efficient.

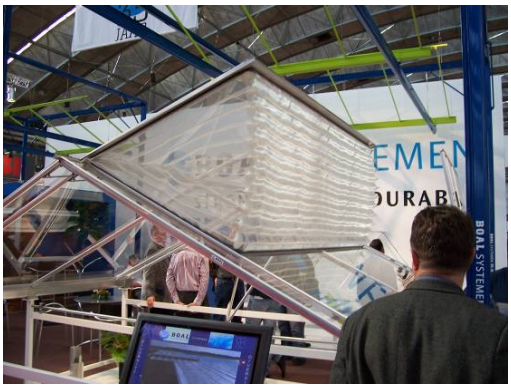
Some full sized units on show included CHP systems (combined heat & power) that allow growers to produce greenhouse heat and sell any surplus energy to the power companies.

With the continuing adoption in glasshouse (over poly greenhouses), special cleaning technologies were on display including glass cleaning machines and crop spray systems that travel on heating pipes.

A piece of boiler maintenance equipment was of special interest to Australian growers who used waste-oil fired boilers that often required cleaning of the boiler tubes due to relatively poor combustion.

The equipment consisted of a long shaft with a metal head brush that was driven by a heavy-duty drill that allowed easy cleaning of the tubes. In addition the unit had a commercial vacuum cleaner to trap dust particles (these particles can contain heavy metals injurious to human health)

Specialist insect screening for glasshouse ventilators was demonstrated. These screens were available in grades to suit different insects and air-exchange rates



Under-bench heating coils to supply direct root-zone heating for various systems (inc pot culture)

These systems are in common use in seedling nurseries, etc.

Tour Outcomes

The tour group was fortunate to experience a wide variety of experiences in a relatively short time frame, with none more so than the time spent at PTC+.

The trips main focus was a 5-day intensive training course at PTC+ (Practical Training Centre – Ede – Holland), on greenhouse management, plant physiology, computerised environmental control, substrates, water and fertiliser management, greenhouse structures and claddings and crop protection.

On the completion of the course, each participant was presented with a completion certificate entitled "Advanced Horticultural Course on Greenhouse Management"

PTC+ has well developed training facilities that include classrooms connected to a glasshouse (divided into 8 different compartments for 8 different crops), that allows us to immediately put into practice the theory learnt.
The course entry level is aimed at greenhouse managers & consultants, however ample time was allocated to ensure all participants' needs were met.
The course modules covered are subject to feedback from participants and can be tailored to best meet any group's needs.
Our main instructor was Ben van Onna who comes with great credentials and was well received during his all-states visits & workshops for the 2003 AHGA national conference.

PTC+ is not just a training institute but also offers a number of other roles that have been identified by the Australian protected cropping industry as constraints to industry development. These roles include:

- Centralised Training Facilities
  a location that delivers industry specific training in both theory and practical
- Demonstration Facilities
  to showcase both existing, new and emerging technology and how to integrate into growers systems
- Dedicated R&D Facilities
  to ensure our technology driven industry adapts to Australian conditions and crops
- Field Grower Incentives
  demonstrate alternative production techniques to traditional Australian farmers
- Model Business Plans
  developed using centre's growing technology for each crop
- Minor-Use Program
  a location to assist with efficacy trials on new greenhouse products
- Bio-control Facilities
  potential area to develop or trial new greenhouse bio-controls
- Energy & Water Efficiencies
  centre for industry research into resource utilisation and efficiencies
-

A National Greenhouse Training Institute

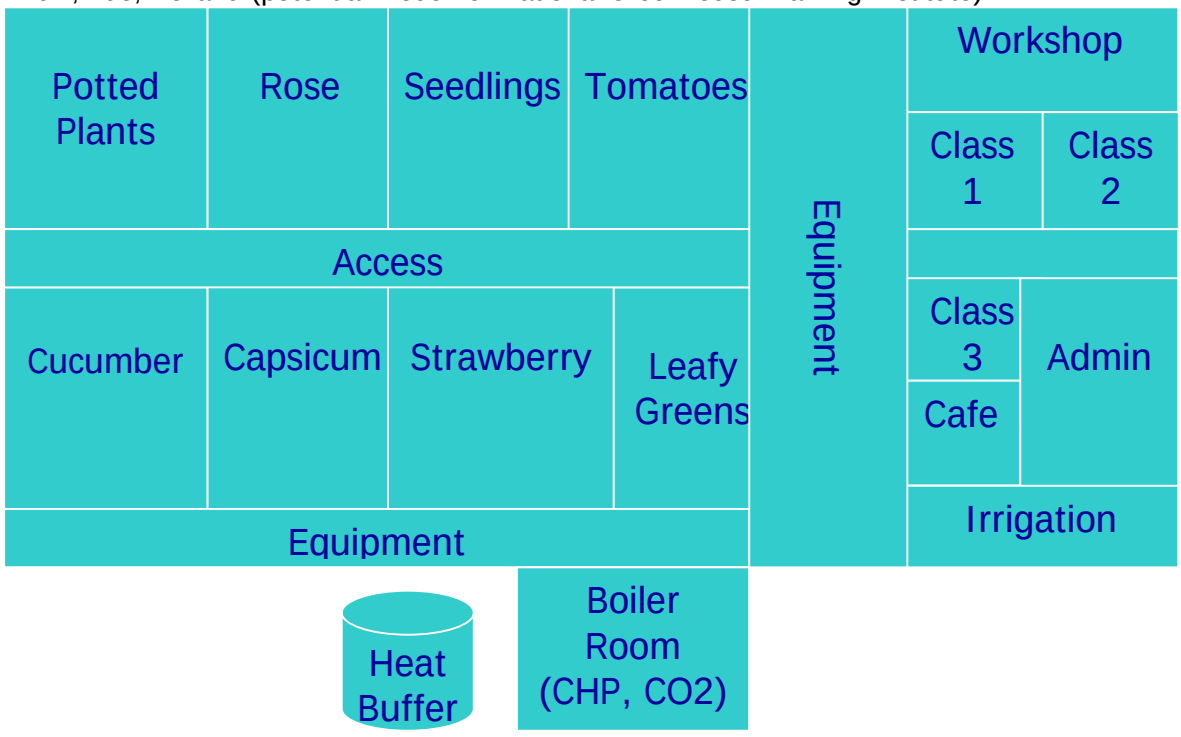
- Has capacity to lift entire industry through targeted education and research
- Assist in overcoming grower reluctance to invest in unfamiliar (yet proven) technology
- Sets industry standards and targets (both quality & production)
- Demonstrates best-practice growing techniques for Australian greenhouse crops

- Centre for Asia/Pacific education and training in greenhouse crops and technologies (targeting Malaysian, Indonesian, Chinese, New Zealand and other regional growers.)
- Partnership with PTC+ to develop & deliver specialist industry training.
- Based on PTC+ model (theory & practical)
- Include classrooms, growing systems, structures, common technology, café, catering, admin, student accommodation?, etc
- Crops targeted – tomatoes, capsicum, strawberry, cucumber, lettuce & herbs, rose, gerbera ++
- Located for best industry return (TBA?)
- Funding sources: industry and commercial partnerships, government, course fees from participants, produce sales, breeders trials, etc
- Capital infrastructure costs (yet to be determined?)

A National Greenhouse Training Institute can meet a significant number of identified industry failures and industry is urged to investigate this proposal.

We emulate Dutch growers in terms of technology and varieties, however if we aim to match their quality, efficiency & productivity, then industry up-skilling is mandatory. An institute can offer this and more.

PTC+, Ede, Holland (potential model for National Greenhouse Training Institute)



Suggestions for leaders of future study tours

Ours is a strongly technology driven industry and when travelling overseas we will see lots of these new and emerging technologies, however it is important to realise that basic principles still apply. (in terms of plant physiology and environmental management).
Australian growers are yet to fully comprehend the growing basics and maybe should concentrate on these before necessarily investing in expensive equipment that possibly will not improve production or quality if not used well.
The Australian protected cropping industry suffers an acute shortage of opportunities for professional training and education in a range of technologies that are unique to the industry. Overseas study is mandatory if we are to match production standards with overseas competitors as well as up-skilling the industry resulting in enhanced productivity and farm viability.

It was very clear from the start of the tour that obtaining access to the best European growers was almost impossible unless you had an appointment that only major companies (like seed and equipment suppliers) could facilitate. Normal greenhouse access was restricted due to the threat of disease spread (ie Pepino Mosaic Virus) and prior arrangements were always necessary. Do your homework before you travel.

Whilst European distances are relatively short (compared to Australia), larger traffic volumes greatly affect road travel times and reasonable allowances should be made when planning routes. Growers are happy to welcome us into their greenhouses (provided prior arrangement made), but do not appreciate late arrivals as each & every day in the greenhouse is a busy one.

International phone charges (ie. roaming) can be substantial as charges are applied both to & from Australia and even received calls are charged at a premium rate.

Vehicle parking & rates in Europe are substantial and can be as much as €35 per night per vehicle (even when parking at the hotel you are staying at). Also allow for parking a significant distance away from your hotel (ie larger centres like Amsterdam, etc). Best to ask about parking availability & costs when booking rooms.

Foreign Currency transaction fees add up to substantial figures when using credit cards, though these are considered desirable as they offer a full financial audit trail for tour costs.

Credit cards can be quickly exhausted by hoteliers or hire-car companies, as they typically hold against your card the full rate for accommodation and car hire, then charge the actual rate on top when paying the bill. The booking fees are not released for around 7 days and can be substantial if paying for 12 people or more!

Excess baggage was a common event charged by international airlines as tour participants often were overloaded due to an array of notes, books, brochures, gifts, etc that were gathered from expo's, training institutions, etc. Best to weigh suitcases at hotels and share around group if possible.

Technology Transfer

The learned outcomes of this tour have been presented at a number of industry association meetings and include the following:

Greenhouse Constructions Australia (GCA) Workshop – Brisbane Jan 2006
Tasmanian Association of Greenhouse Growers (TAGG) – Launceston Feb 2006
West Australian Greenhouse Growers Association (WAGGA) – Perth July 2006
Virginia Horticultural Centre (VHC) – Adelaide Feb 2006
Hydroponic Farmers Federation (HFF) Biennial Conference – Geelong July 2006
Misc presentations to Victorian TAFE colleges – Shepparton/Geelong/Burnley Jan – July 2006
Articles in the 'Soilless Australia', newsletter of the Australian Hydroponic & Greenhouse Association

To Come:

Bundaberg Fruit & Vegetable Group (BFVG) – planned for latter half of 2006
Greenhouse Vegetables NSW (GVNSW) - planned for latter half of 2006
Article in 'Practical Hydroponics & Greenhouse Magazine' – Casper Publications Australia

Published Article

European hydroponics – what Australia can expect of the future

BY SUSAN HUDSON (Vegetables Australia)

For those involved in greenhouse production in Australia, an escorted tour of Holland and Belgium to witness the state of the art in the industry might seem like a two-week sojourn in heaven.
And it fulfilled all expectations. Tour participants from around Australia joined this Pathways to Production tour in October 2003 to study at the acclaimed Practical Training Centre Plus at Ede, and to view 'walking plant systems', where plants are tended on conveyor belts that come to the grower instead of the other way around. They visited the only double storey automated and robotized greenhouse in the world, where 25,000 orchids are cultivated and later exported every week.

With funding from Horticulture Australia Limited, the tour was organised by president of the Australian Hydroponic & Greenhouse Association, Graeme Smith.

"We saw something of what Australia can expect in the future," Graeme told *Vegetables Australia* recently. "Although some Australian growers are already on the right track and not too far behind production methods being used in Europe."

Graeme, who now runs Graeme Smith Consulting, studied at PTC+ in 2002, gaining a post-graduate diploma in greenhouse management. So he was well aware of what the highly competitive European market had to offer our growers in terms of knowledge and expertise. "Sadly there has been a lack of formal opportunities in Australia for training in this highly specialised field of vegetable production," he said. "Although this is changing quite rapidly."

After arriving in Holland the group visited the National Greenhouse Research Centre in Naaldwijk and the Strawberry Research Centre at Meerle in Belgium, before joining a 5-day

intensive training course at the PTC+ in Ede where they were tutored in the management of energy, water, fertilizers and humidity control.

Their principal tutor, Ben van Onna, is well known to many Australian growers after attending the National Australian Hydroponic & Greenhouse Association Conference staged in Melbourne in 2003.

The institute at Ede is unique in that as well as classrooms, there are large greenhouses on campus displaying different crops and cultivation technologies. Students attend this centre of excellence from all over the world.
The group then spent two days at Amsterdam's Hortifair – the world's largest expo in the protected cropping industry, showcasing new and emerging technologies.
Tour participants were able to view a diverse range of goods and equipment, including glasshouses, and shade screens.

Representatives from a number of Dutch companies had also generously agreed to meet with our growers to talk about technology, and issues and problems affecting the European greenhouse industry generally. Growers in Holland are facing a major virus threat from the *Pepino Mosaic.*

Other topics discussed were labour methods, new technologies and new and old crops and the protected cropping of tomatoes, capsicum, cucumber, aubergine and strawberries generally.

Graeme's next conducted tour will be to Canada this year in Sep/Oct, where he will conduct another educational tour for growers wanting to attend the national greenhouse conference to be held in Toronto in October.
Contact Graeme on president@ahga.org.au if you wish to be receive a tour itinerary.
(509 words)

Budget

Macedon Ranges Travel Service		
	Air Travel & Insurance	$29,421
Practical Training Centre +		
	Specialist Course Fees	$28,131
Hotels (x 4)		
	Accommodation	$16,771
Hertz		
	2 x Ford Transit Vans	$6,025
Fuel Stations		
	Hire Car Fuel	$700
Australian Geographic		
	Thank you Gifts (European growers)	$324
Villa Brutus		
	Celebratory Dinner (end tour)	$400
British Airways		
	Excess Baggage (books, notes, etc)	$523
Hortifair		
	Expo Entry Fees	$686
Misc Fees		
	Train	$29
	Internet Access	$36
	Study Tour CD's	$46
	International Phone	$568
	Drivers (tour chauffeurs)	$500
	Bank Processing & Foreign Exchange	$574
	Total Tour Costs	$84,734

PARTICIPANTS SURVEY

1	2	3	4	5
Strongly Disagree	**Mostly Disagree**	**Agree**	**Mostly Agree**	**Strongly Agree**

(please circle most appropriate answer!)

Study tour met my expectations				
1	2	3	4	5
I received suitable information prior to the study tour				
1	2	3	4	5
Training Centre (PTC+) met my expectations				
1	2	3	4	5
Grower visits met my expectations				
1	2	3	4	5
Transport arrangements met my expectations				
1	2	3	4	5
Accommodation arrangements met my expectations				
1	2	3	4	5
Graeme Smith Consulting met my expectations (as Tour Leader)				
1	2	3	4	5
I would recommend future study tours to other growers				
1	2	3	4	5

Any general comments re this study tour

Name: (optional)

Please email or fax completed form ASAP to ***Graeme Smith Consulting***
Fax: (03) 5427 3843 or hydesign@bigpond.net.au

PARTICIPANTS SURVEY RESULTS

1	2	3	4	5
Strongly Disagree	**Mostly Disagree**	**Agree**	**Mostly Agree**	**Strongly Agree**

Study tour met my expectations
Mostly Agree x 2, Strongly Agree x 9

I received suitable information prior to the study tour
Mostly Agree x 7, Strongly Agree x 4

Training Centre (PTC+) met my expectations
Mostly Agree x 5, Strongly Agree x 6

Grower visits met my expectations
Mostly Agree x 5, Strongly Agree x 6

Transport arrangements met my expectations
Agree x 1, Mostly Agree x 4, Strongly Agree x 6

Accommodation arrangements met my expectations
Mostly Agree x 3, Strongly Agree x 8

Graeme Smith Consulting met my expectations (as tour leader)
Mostly Agree x 4, Strongly Agree x 7

I would recommend future study tours to other growers
Strongly Agree x 11

Any general comments re this study tour
information gained was very good and relevant and of a very high standard
tour represented excellent value for money, and money spent is more than recouped thru better growing practices
excellent opportunity to gain knowledge and experience not available in Australia
very good, extremely informative tour that inspired us to seek to improve our current operation
well worth it
every grower should do this
I hope the PTC+ course can be made available locally

ACKNOWLEDGEMENTS

In my role as Project Leader, I wish to thank the tour participants (refer page 4) for their co-operation and punctuality. Their interest in all things greenhouse and the general spirit of togetherness was most satisfying. I thank them for their friendship. I specially thank them for their contribution to the information included in this report.

Recognition and appreciation is also given to the following for their welcome contribution to ensuring a successful, informative and interesting tour:

Arie Baelde	Mgr, Rijk Zwaan Australia	introductions to European growers & locations
Marcus van Heyst	Powerplants Australia	
Dennis van Dijk	Area Mgr, De Ruiter Seeds	
Jan Hanemaaijer	De Ruiter Seeds Netherlands	
John Verbruggen	Rijk Zwaan Netherlands	
Peter Reinders	Rijk Zwaan Netherlands	
Philip Lieten	Belgium National research centre – Strawberries	
Ronald Tukker	Priva Hortimation BV	
Kurt Parbst	Ludvig Svensson Inc	
Ben van Onna	Senior Trainer PTC+	
Peter van Oene	Coordinator PTC+	
Marc Vijverberg	Metazet Demonstration Nursery	

Graeme Smith
Project Leader