

Wastewater Recycling for Greenhouse & Hydroponic Vegetables: Watch and Learn

The National Greenhouse Waste-Water Recycling project aims to address growers' lack of technical expertise - in converting from 'open' to 'closed' systems for full wastewater recycling - by delivering a series of free, hands-on workshops in the main greenhouse growing areas of Australia.

The Australian protected cropping industry is composed of approx 1,665 vegetable growers producing in 1,341ha of greenhouses. Currently, they contribute over \$1.3billion farmgate value through the production of major vegetable crops, including cucumbers, capsicums, egg plants, tomatoes, lettuce, herbs, Asian greens and strawberries (of these numbers, 90% are growing in an artificial substrate or growing media to provide a nutrient and water buffer to each plant).

Industry estimates that around 90% of media-based growers are in 'open' systems that free-drain their nutrient-rich waste-water to the environment, and it has been identified that wastewater products from hydroponic systems are potentially harmful to the environment and should be managed on farm.

Greenhouse growers can substantially reduce their cost of production through savings of around 40% water and 60% fertiliser and further reduce their impact on the natural environment by easily converting a waste-stream into a revenue-stream.

A recent HAL project (VG05095 – Pathways to Production, a skilling initiative of the protected cropping industry), conducted a needs and gap analysis of the Australian protected cropping industry by facilitating 20 grower workshops in all states to ascertain their training and development needs.

An outcome of these workshops was an identified desire for greenhouse growers to lower their water and fertiliser use as well as their impact on the natural environment by converting to 'closed' systems whereby all wastewater drained from their greenhouses was fully recycled back through the crop following suitable treatment.

This was in part driven by their concern for the environment (especially the parlous state of the national water balance), and by the manifold increases in water and fertiliser costs.

Additionally, today an increasing number of municipalities are refusing permits to new industry entrants (or expansion of existing enterprises) due to their concern for wastewater impacts on the local environment. This trend has significant implications for growth and development of our industry and is most apparent in the Sydney Basin and Brisbane regions.

This project has the capacity to overcome these restrictions by educating growers on how to reduce their wastewater effluent to negligible levels.

Greenhouse growers today lack the technical expertise to convert from open to closed systems for full wastewater recycling and this project aims to deliver these skills via a series of hands-on workshops in the main greenhouse growing areas of Australia.

The Protected Cropping Working Group (instigated by AusVeg and HAL), is a representative group of greenhouse growers vested with the responsibility of providing expert opinion on industry R&D funding applications and setting industry priorities.

This representative group has identified this project as having the highest industry priority for '09 – '10 due to the manifold benefits it will deliver.

The project would deliver to all media-based hydroponic growers the skills and knowledge to save on average around 40% of all water and 60% of all fertiliser supplied to their crops and develop their systems to become even more environmentally sound and responsible.

It should be noted that greenhouse growers today are already using 80% less water than traditional farming activities, however, the wastewater impact on the natural environment can still be considerable. Growers recognise that irrespective of how little water they use or lose as wastewater (compared to traditional farming activities), they can always strive to be even better and save significant monies in the process.

The industry recognises that not only will there be environmental advantages, but also economic and production gains to be made through better understanding of nutrient management and wastewater use.

Of the above total industry 1,665 growers in 1,341ha of protected cropping, approx 664ha of protected cropping will be targeted for delivery via skills-based workshops.

Typical water savings per ha = 7.5ML @ \$1,000/ML = \$7,500

Typical fertiliser savings per ha (@ \$3.00/m²) = \$30,000

Total average savings per ha = \$37,500

\$37,500 x 664ha = \$25 million potential savings annually for the protected cropping industry.

Additionally, around 5 giga-litres of nutrient-rich water is diverted from the natural environment.

Soil-based greenhouse growers

Whilst there are a minimal number of greenhouse growers in soil-based systems, the principles involved in converting an 'open' to 'closed' recycling system are based on hydroponic technologies and systems, therefore soil-based growers normally would not be considered for this project, however, pathology issues and outcomes are still relevant to soil growers as well as the suite of sterilising treatment options, therefore there would also be flow-on benefits for soil greenhouse growers.

Anecdotal industry evidence suggests that current greenhouse soil-based growers are increasingly adopting standard hydroponic irrigation, fertigation and environment management techniques and take up of soilless substrates is considered the next logical step.

Pathology trials

The project includes pathology trials to assess pre-and post-efficacy of various sterilisation systems against common greenhouse pathogens. It is proposed to test a total of 40 pre-and post-water samples to advise industry of suitable treatment options and their effectiveness.

Growers Workshops

The free grower workshops would consist of the following elements:

1. Hydroponic nutrient feed recipes for all identified vegetable crops
2. Recipes to cover the changing physiological stages for each crop
3. Root-zone nutrition targets for each vegetable crop
4. Adaption recipes to balance and control root-zone nutrition
5. Interpretation of laboratory drain analysis results
6. How to convert from open to closed systems by capture of drain water and reuse
7. Plant nutrition and nutrient management
8. Drain & Fresh water sterilisation options and assessment (investment and annual running costs)
9. Demonstration of recycling equipment (blend valves and controllers)
10. Workbook and CD ROM containing automatic greenhouse nutrition software program.

Through the workshops, Australian greenhouse growers will gain all necessary skills to safely recirculate nutrient-rich wastewater, sterilise and neutralise disease pathogens and rebalance nutrient inputs and outputs.

Service providers and facilitators for the project include Graeme Smith (Team Leader) from Graeme Smith Consulting, who has provided project management, system design and crop agronomy services to industry for over 15 years.

Graeme was the team leader for the 'Pathways to Production' project and also the team leader for the European greenhouse study tours that attends a specialist training institute in Holland (PTC+), which is a primary source of technical resources for this project.

Graeme will develop and deliver the technical components for the workshops along with the following project collaborators: Rick Donnan (Growool Horticultural Systems P/L), Len Tesoriero (NSW DPI Greenhouse Pathology), and Leigh Taig, Horticulture Centre for Goulburn Ovens TAFE.

Growers can register for the free workshops by completing the course registration form that can be downloaded from www.graemesmithconsulting.com or by contacting Ross Wade of GOTafe on (03) 5833 2816, or email Ross on rwade@gotafe.vic.edu.au

Workshop Program (each day 9.30am – 4.30pm)

State	City Location	Venue	Date/s
VIC	Shepparton Werribee Cranbourne	GOTAFE Campus Fryers St: 152 Fryers St Werribee RSL: 2 Synnot Street Amstel Golf Club 1000 Frankston -Cranbourne Rd	Wed 17 th March Tue 23 rd March Wed 24 th March
TAS	Campbell Town	Campbell Town Hotel: 118 High Street	Wed 14 th April
NSW	Coffs Harbour Luddenham Oakville Tahmoor	Catholic Club, 61a West High Street Golf & Country Club, Twin Creeks Drive Joseph Azzi Farm, Smith Road Said Azzi Farm, Bargo River Road	Wed 12 th May Tue 22 nd June Wed 23 rd June Thu 24 th June
WA	Baldivis	Old Barnyard Function Centre: 441 Old Mandurah Rd	Tue 8 th June
QLD	Brisbane Bundaberg	Virginia Golf Club, 10 Elliot Road, Banyo Alloway Country Club: Goodwood Road	Tue 20 th July Wed 21 st July
SA	Murray Bridge Virginia Virginia	Murray Bridge Racing Club: Maurice Road Virginia Horticultural Centre Virginia Horticultural Centre	Tue 10 th August Wed 11 th August Thu 12 th August

(N.B. lunch, morning & afternoon teas included in free workshop)