| March/April - 2017 |

vegenotes

| THE EFFECTS OF USING ANHYDROUS AMMONIA TO SUPPLY NITROGEN TO VEGETABLE CROPS - VG15062 |
| REVIEW OF CURRENT VEGETABLE IRRIGATION TECHNOLOGIES - VG14048 |

VG15062: THE EFFECTS OF USING ANHYDROUS AMMONIA TO SUPPLY NITROGEN TO VEGETABLE CROPS

FACILITATORS:

Project VG15062 has been recently completed by Adam Harber and Dr Gordon Rogers from Applied Horticultural Research.

INTRODUCTION

Anhydrous ammonia has long been used as a pre-plant and side dressing fertiliser in the cotton and grain industries in Australia.

Containing about 80 per cent of nitrogen (N), the product is a popular and effective option for growers given its commercial availability and relatively straightforward application.

When incorporated into vegetable cropping systems, anhydrous ammonia could provide a range of benefits, such as increased soil health, reduced cost, yield advantages and reduced environmental impact from nitrate leaching.

ABOUT THE PROJECT

This project (VG15062) reviewed the current information on the use of anhydrous ammonia as a source of N in agricultural crops.

Conducted by Adam Harber and Gordon Rogers from Applied Horticultural Research, the project also consulted with industry groups and produced a fact sheet for growers and agronomists.

Although large supplies of anhydrous ammonia are available in Australia, information in relation to its application in vegetable crops is limited, Dr Rogers said.

"There is anecdotal evidence suggesting anhydrous ammonia could be a viable proposition for vegetable crops, but there is a shortage of research and information available to growers on how to use this fertiliser," he said.

"Proper nitrogen management on vegetable farms is essential for not only the health of the crop, but also the soil and ecosystem, which is why it's important that growers are familiar with the benefits and risks of anhydrous ammonia as a fertiliser."

The project also reported on a small-scale observational trial comparing the use of anhydrous ammonia to calcium nitrate as a source of N on baby spinach on a commercial farm located in Cowra, New South Wales.

MAJOR FINDINGS

Anhydrous ammonia has been found to be effective in row crops such as potatoes, sugar beets and cabbage, Dr Rogers said.

"In cabbage, 200kg/ha of anhydrous ammonia produced the maximum yield of first-grade cabbage heads compared to 200kg/ha of calcium nitrate," he said.

"Meanwhile, a review of 22 experiments using anhydrous ammonia in potatoes found that in nearly all trials, yield increases were observed. Yields of sugar beets were also higher on average with anhydrous ammonia."

Another advantage of using anhydrous ammonia is that residual N in the soil can be available for the subsequent crops. In a six-year trial fertilising potatoes, sugar beets and maize with anhydrous ammonia compared to calcium nitrate, it was found that high residual N after anhydrous ammonia resulted in higher yields in following winter wheat crops.

Anhydrous ammonia has also been used to suppress Root-knot nematode and increase microbial activity in the soil, which Dr Rogers said was very important in maintaining healthy soils.

New South Wales-based vegetable grower Ed Fagan from Mulyan Farms in Cowra has been using anhydrous ammonia on popcorn and more recently on baby spinach.

Dr Rogers said trials conducted on Mr Fagan's property demonstrated a number of key benefits to using the fertiliser.

"One of the most noticeable benefits Ed found was that nitrogen remained available to his crops until after harvest – residual nitrogen moved down the soil profile slightly, but remained in the root zone," he said.

"This residual nitrogen is then available for a subsequent crop because it is not lost to deep leaching."

CONCLUSION

The review found there is potential for anhydrous ammonia to be used as a source of N for vegetable crops, but that it was more suited to row crops, rather than crops such as baby leaf which require more even distribution of N across the beds.

"Nitrogen fertilisers interact with soils and plants in different ways, so understanding this is key to achieving the most profitable use of nitrogen," Dr Rogers said.

Dr Rogers added that larger vegetable growers in regions where anhydrous ammonia is accessible were more likely to consider adopting the N-efficient technology, providing they had access to the right application equipment.

But he said further trials were required to determine the optimum usage pattern for anhydrous ammonia in vegetable crops, with the focus of any further research concentrated on row crops.

"There are gaps in the current research that could certainly be explored in future research; in particular, the beneficial effects of anhydrous ammonia on soil organisms."

ACKNOWLEDGEMENTS

This project has been funded by Horticulture Innovation Australia Limited using the research and development National Vegetable Levy and funds from the Australian Government.

THE BOTTOM LINE: VG15062

Anhydrous ammonia is a potential source of nitrogen for vegetable crops, but it is more suited to row crops rather than baby leaf crops – although application could possibly be adapted to apply anhydrous ammonia in a way that is more suitable for baby leaf crops.

Anhydrous ammonia has to be applied using specialised equipment, which could be a barrier for Australian vegetable growers.

VG14048: REVIEW OF CURRENT VEGETABLE IRRIGATION TECHNOLOGIES

FACILITATORS:

Project VG14048 has recently been completed by Horticulture Innovation Australia Limited, Irrigation Australia Limited, New South Wales Department of Primary Industries and Greater Sydney Local Land Services.

INTRODUCTION

In 2013-14, the Australian vegetable industry used just over 383,000 megalitres (ML) of irrigation water to produce a gross value of irrigated agriculture of $2.52 billion, resulting in the second-highest water productivity of all irrigated industries.

With the impacts of climate change and increasing competition for water from a range of other industry and urban/peri-urban communities, the need for greater water use efficiency has never been more crucial.

Australian vegetable growers today face very specific challenges in producing a highly perishable crop and, as a result, are generally less likely or slower to adopt and/or update irrigation technology compared to other agricultural industries.

ABOUT THE PROJECT

This project was developed to give Australian vegetable growers an understanding of available and emerging irrigation practices, and technologies that could improve profitability and encourage the uptake of more efficient water practice.

The key outputs of this project, led by Irrigation Australia Limited, included the document *Review of current vegetable irrigation technologies – Desktop Review and Project Extension*.

This document contains the results of the desktop review undertaken by the New South Wales Department of Primary Industries – which involved surveys with growers, researchers, allied industry and manufacturers – and workshop evaluations, along with other supporting documents.

Three YouTube videos were also produced to support the extension activities on vegetable farms in Tasmania, Queensland and New South Wales.

The YouTube videos are available on the Irrigation Australia website (irrigationaustralia.com.au).

MAJOR FINDINGS

A variety of irrigation systems are currently being used for field vegetable production in Australia. These range from fixed/solid set, surface and drip/trickle systems to centre pivot/lateral moves and soft/hard travelling irrigators.

Growers are using sprinkler irrigation for crop establishment combined with drip irrigation following establishment.

Geoff Harvey, National Training and Marketing Manager at Irrigation Australia, said the project also found a moderate uptake of drip irrigation in short cycle crops, with drip irrigation trials on lettuce crops in Victoria's Gippsland region out-yielding travelling irrigator blocks.

"If carefully integrated into the crop and farm context, drip irrigation can offer major production, disease prevention and labour-saving benefits for vegetable growers," he said.

"System automation also has a high application, particularly in field vegetables and when farms are located a long way apart. For example, one grower saved one full time equivalent in labour by adopting an automation system."

Also proving effective is variable rate irrigation (VRI), which Mr Harvey said had the potential to improve crop water productivity, save energy and reduce runoff.

"Using variable rate irrigation for centre pivot irrigators can precisely vary the amount of water applied to a field, however, consideration must be given to the increased management and backup support needed," he said.

Mr Harvey said non-drain sprinklers, solar pumping, automating surface irrigation systems, tracking nutrient movement to save money, the importance of an irrigation design and minimum tillage were also seen as viable options to improve water productivity in some areas.

However, there are barriers to the adoption of some irrigation technologies, particularly in short season crops (four to six weeks) and where farms were leased.

"Greater uptake of irrigation technologies has generally

occurred in longer season crops (eight to 15 weeks) and larger scale vegetable production areas such as Tasmania," Mr Harvey explained.

"When changing their irrigation systems, it is important that growers consider a holistic management approach – this will influence soil management, weed control, bed design and disease management."

Precision irrigation technologies such as drones and robots had potential application but needed further investigation.

"The need for ongoing technical and agronomic support is critical when investing in new technologies or management practices, especially if growers are looking to maximise its potential benefits," Mr Harvey said.

NEXT STEPS

A comprehensive social research program is recommended to identify the specific barriers to adoption of irrigation technologies and management practices in the Australian vegetable industry.

Future work would focus on impediments to adoption of irrigation technologies, targeting specific technologies for adoption in certain crop groups and the use of minimum tillage and permanent beds on drip-irrigation.

A full version of the report is available on the Irrigation Australia website irrigationaustralia.com.au under the 'Publications' tab.

ACKNOWLEDGEMENTS

This project has been funded by Horticulture Innovation Australia Limited using the research and development National Vegetable Levy and funds from the Australian Government.

THE BOTTOM LINE: VG14048

Simple visual tools for irrigation are preferred by growers and must be easy to install, set up and interpret. Some growers have dis-adopted certain technologies due to lack of perceived value of moving to more efficient tools.

Rising energy costs are a concern for all growers, highlighting the importance of investing in energy-efficient irrigation equipment.

Technical support is critical for growers when investing in new irrigation technologies or management practices.

ISSN: 1449 - 1397

PO Box 138, Camberwell, Vic, 3124 T: 03 9882 0277 | F: 03 9882 6722

This project has been funded by Horticulture Innovation Australia Limited using the research and development National Vegetable Levy and funds from the Australian Government.

Please contact Michelle De'Lisle at AUSVEG on 03 9882 0277 or email michelle.delisle@ausveg.com.au to submit topics for potential inclusion in future editions of *Vegenotes*.

Image credits:
VG15062 – Applied Horticulture Research and Incitec Pivot
VG14048 – Irrigation Australia Limited

Do you have any feedback on the redesigned *Vegenotes* or *Vegetables Australia*? We would be happy to hear from you! Contact the editorial team on 03 9882 0277 or email info@ausveg.com.au.