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- **Summer root rot in parsley scoping study.**

HAL R&D project number: VG12102

Project VG12102 reviewed relevant literature on root rots of parsley and met with growers affected by the recent outbreaks in order to determine an approach to further investigate the issue.

- **Understanding and managing impacts of climate change and variability on vegetable industry productivity and profits.**

HAL R&D project number: VG12041

Project VG12041 assessed the likely impacts of climate change and increased climatic variability on the productivity and profitability of the Australian vegetable industry. It aimed to identify measures that could be undertaken to minimise adverse impacts and take advantage of opportunities.

www.ausveg.com.au

Summary root rot in parsley scoping study.

Parsley crop in Victoria.

Facilitators:

Project VG12102 has recently been completed by Project Leader Stuart Grigg and Ben Winter, both from Stuart Grigg Ag-Hort Consulting Pty Ltd.

Introduction

During the last decade, root rot disease complexes of parsley crops have been investigated through a series of projects in Australia, with particular attention to Victorian and Queensland production systems, where the disease has recently caused crop losses of up to 90%.

A national study of parsley crops conducted by the Victorian Department of Primary Industries in 2005 identified a variety of fungi associated with parsley roots of species. However, findings have revealed that *Pythium* species and *Phytophthora* species appear closely interrelated with winter sown parsley crops, while *Fusarium* is likely to be associated with summer parsley crops.

Furthermore, whereas the most significant root rots of parsley in Victoria were encountered during winter, summer root rots were considered to potentially not warrant management.

About the project

“The aim of this project was to better understand the immediate issues associated with recent outbreaks of summer root rot in parsley crops and to further recommend activities to address this issue,” Project Leader, Stuart Grigg said.

Parsley crop in Victoria.

“At the time, Australian vegetable growers were facing considerable constraints in managing parsley root rot disease in their crops,” he said.

“We were concerned that there was something else - a more complex set of pathogens - present in summer crops that aren’t necessarily present in winter crops.”

“Evidently, there was a need for more investigation into the cause of summer root rots of parsley as well as how previous research could be revisited in order to develop some sustainable practices to manage the disease.”

Literature related to parsley root rot in Australia, with a specific focus on what aspects of disease management have been considered and addressed and what knowledge gaps still exist, were reviewed and summarised.

The project consulted with growers, a seed company representative and a local agronomist to understand the key issues faced by local growers who have been impacted by parsley root rots, and a collection of plant and soil samples were carried out to confirm the pathogen(s) involved in the disease.

Major findings

“We established that a variety of factors appear to affect the extent to which root rot disease in parsley occurs. These include environmental conditions, production systems, cultural practices, plant variety and management options,” Mr Grigg said.

Throughout the consultation phase, the research team identified that a range of grower observations and practices were currently employed to manage parsley root rots. *Fusarium* was found to be a common pathogen in infected samples across geographically diverse Victorian growing regions.

“I collected three plant and soil samples on three different properties in two different growing regions which contained evidence of root rots to assess, from a pathology point-of-view, what the actual pathogens were and whether they were linked to the winter disease complex.”

“All three tests confirmed that *Fusarium* was the only common root rot pathogen present.”

“Summer root rots appear to occur either during, or shortly following, periods of extreme temperature spikes where irrigation practices result in higher than normal irrigation applications or during, or shortly following, significant summer rain.”

“We also discovered that soil borne pathogens are in fact, more likely to exist in soil that is heavily cropped, as opposed to fresher ground.”

“While this is a good indicator of the disease, in reality, control methods such as extensive crop rotation are very costly for growers to implement on a regular basis.”

Recommendations

The investigation of *Fusarium* introduction to parsley crops and the control of this pathogen is typically very difficult to manage, especially as *Fusarium* has not been investigated as extensively in past projects.

Recommendations for the future management of parsley root rots highlight additional research into irrigation scheduling and moisture monitoring techniques and the roles these play in disease prevention.

Other recommendations include a consideration of chemical alternatives, bio-control agents, nutrient management, variety selection, integrity of irrigation sources and the impact of herbicide applications on plant health.

An awareness and understanding of previous cropping cycles and field history is also valuable for investment in the management of parsley root rots by the Australian vegetable industry.

THE BOTTOM LINE: VG12102

- Previous investigations into root rots in parsley crops have largely focused on winter root rots caused by *Pythium* and *Phytophthora*, and not summer root rots.
- Incidences of summer root rots are extremely variable, growers do not know when they will lose a crop to summer root rot.
- Crop losses of up to 90% or greater can occur when a crop succumbs to summer root rot.
- Summer roots generally occur after a period of increased irrigation applications or a significant rainfall event.
- *Fusarium* was identified as the only common root rot pathogen identified in all three plant and soil samples, which underwent plant pathology assessment.

Acknowledgements

This project was funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.

Understanding and managing impacts of climate change and variability on vegetable industry productivity and profits.

Gas sampling trials in Victoria.

Facilitators:

Project VG12041 has been recently completed by Project Leader Gordon Rogers of Applied Horticultural Research (AHR).

Introduction

The Australian vegetable industry has recognised that issues around climate variability and change may affect growers and the broader industry. Australian Government policies and regulations in relation to climate change, while intended to have a positive effect on the nation’s environmental performance, may at the same time represent a threat to the Australian vegetable industry.

About the project

Project VG12041 was commissioned by the industry in 2013 to provide a comprehensive assessment of the potential threats and opportunities posed by climate change concerning the Australian vegetable industry and current regulatory frameworks.

“The scope of our research was broad,” Project Leader, Gordon Rogers said. “Our main focus was on identifying the threats and opportunities of climate change in the vegetable industry and the expected impacts to profitability and viability.”

“Once established, the next step was to develop strategies growers could use to manage these risks.”

This project reviewed and evaluated four key areas: climate impacts on productivity, on-farm energy efficiency, emissions reduction and adapting to change.

Major findings

Project VG12041 found the Australian vegetable industry to be in a strong position to deal effectively with climate change, and that vegetable growers have a greater capacity to adapt to change than most other rural industries.

“The horticulture and vegetable sectors have a very low rate of greenhouse gas emissions per dollar of value produced. The industry’s credentials in relation to climate change are generally pretty good if you look at emissions on the basis of yield or gross income,” Dr Rogers said.

“However, the vegetable industry is also characterised by a high level of water and fertiliser inputs and this results in high greenhouse gas emissions on a per hectare basis.”

“Virtually all of our emissions derive from two main sources - 66% comes from electricity usage and 19% from nitrous oxide emissions from soils.”

“While there’s a lot more work to be done with regard to the potential impact of climate change on farming operations, the main climate-related threats in the short and medium-term will be increased weather variability and frequency of extreme weather events in our vegetable growing areas, which is already occurring."

"In the longer-term, we can expect moderate increases in average temperature but much larger increases in temperature variability. There will also be a longer frost window resulting in a higher risk of frost damage. There may be new challenges arising from a sustained increase in winter minimums."

More positively, Dr Rogers said the fact that vegetables had a low carbon (and water) footprint compared to most other food items was likely to be a significant marketing advantage for the industry in the future.

Future strategies

In the immediate-term, Australian vegetable growers can minimise the impacts of climate policies and increased climatic variability and prepare for the future by:

- Improving electricity use efficiency.
- Introducing adaptions to climate change and increased variability.
- Reducing on-farm emissions (mitigation).
- Applying for funding available for assistance with implementing energy efficiencies and undertaking activities related to the Carbon Farming Initiative (CFI).

"Reducing electricity consumption and the release of nitrous oxide from soils are two key ways for vegetable growers to begin reducing emissions," Dr Rogers said.

"Electricity for running cool rooms and pumps is in itself, a major cost for the Australian vegetable industry. Savings in both cost and emissions can be achieved by more efficient use of electricity for cooling or irrigation, and the use of on-farm power generation technologies.

"Nitrous oxide emissions from soils can be reduced through better management of nitrogen, or potentially through the use of nitrification inhibitors."

For the longer-term, Dr Rogers recommends some key areas of focus for increasing Australia's capacity for a viable vegetable industry. These include:

- Improved on-farm power generation and more efficient cooling.
- Innovative energy-efficient protected cropping for vegetables.
- Improved medium-range (three-month) weather forecasting.
- Better forecasting of extreme events.
- Understanding pest and disease interactions in a changing climate.
- Varieties that can produce good quality and high yields in a more variable climate.
- Region-specific information on how crops will perform in vegetable growing areas.

Gas sampling NSW vegetable crop.

Project outputs and material relevant to the vegetable industry is available at www.vegetableclimate.com

THE BOTTOM LINE: VG12041

- While there is some debate in the rural community about the cause(s) of Australia's changing climate, there is no disputing that changes are already occurring.
- The Australian vegetable industry is in a strong position to deal effectively with climate change and vegetable growers have the capacity to adapt to such change.
- There are a range of immediate and long-term actions that Australian vegetable growers can take to reduce their carbon footprint and minimise expenditure on electricity and cropping inputs.

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Photo credits:
VG12102 photos credit: Stuart Grigg, Ben Winter
VG12041 photos credit: Gordon Rogers

Please contact Hugh Gurney at AUSVEG on 03 9882 0277 or email hugh.gurney@ausveg.com.au to submit topics for potential inclusion in future editions of ***vege*****notes***.*

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