

vegenotes

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EFFECTIVE MANAGEMENT OF PARSLEY SUMMER ROOT ROT – VG13101

TOOLS AND INTERVENTIONS FOR INCREASING CHILDREN'S VEGETABLE KNOWLEDGE: VEGKIT – VG16064

VG13101 – Effective management of parsley summer root rot

Facilitators

Project VG13101 was undertaken by Dr Len Tesoriero from the New South Wales Department of Primary Industries.

Introduction

Parsley summer root rot (SRR) affects all parsley-growing regions of Australia and can cause crop losses of 100 per cent. The soil-borne disease complex causes severe rot and stunting of root systems, coupled with collar rot, leaf chlorosis and plant collapse.

“In the field you see the plants collapse, dig them up and basically the roots are completely rotted,” Project Lead Dr Len Tesoriero said.

A three-year study examined the causal pathogens of SRR to develop a greater understanding of the disease epidemiology, encompassing environmental conditions and practices, to provide greater protection for growers in the \$34 million industry.

About the project

Project VG13101 aimed to identify the causes of SRR, with previous studies highlighting fungal pathogens such as *Fusarium oxysporum*, bacteria and various species of the oomycete *Pythium* as suspected prime candidates.

Seeking to provide some resolution to the disease etiology, an extensive

literature review was conducted to identify the potential causes of SRR and possible management options. The result of this, coupled with pot trials, determined all curly leaf parsley varieties were most susceptible to SRR.

Crops from 19 farms across Western Australia, New South Wales, Queensland and Victoria were collected, growers were interviewed, and farm biosecurity and crop hygiene was assessed.

Greenhouse trials using potential chemical controls, microbial biocontrols and nutrient supplements were conducted using candidate pathogens or macerated roots from diseased plants at affected farms.

Chemical products were chosen with efficacy to potential fungal and oomycete pathogens associated with SRR. Only drenching plants with metalaxyl-M tested in greenhouse experiments gave significant control of *Pythium sulcatum* or combinations of pathogens that included this species.

Major findings

Research confirmed the causal oomycete *Pythium sulcatum* is the most important (but not sole) cause of parsley SRR, which was reported by growers as being more prevalent during and after wet weather. Consequently, irrigation methods can play their part in avoiding excessive soil moisture.

The influence of *Pythium mastophorum* and *Rhizoctonia solani* was also significant.

Farm audits highlighted a lack of grower understanding for sound biosecurity practices. Hygiene standards were low in soil-based production enterprises to reduce the risk of new pathogens being introduced to sites. This included no designated wash-down facilities (foot baths or for vehicles), unrestricted vehicular access to growing areas, and a lack of disinfection practices for tools and farm machinery.

In contrast, the hydroponic enterprises at Stanthorpe, in Queensland, used raised, run-to-waste systems with sawdust strata beds, which reduce the risk of pathogens spreading via recirculating nutrients. Weed-free lawns around hydroponic tables appeared to be effective cultural controls.

A biosecurity manual entitled *Managing Farm Biosecurity in the Parsley Industry*, and a related factsheet featuring a farm hygiene checklist and SSR background information, were developed and distributed to growers.

Longer crop rotations – for at least a two-year interval – are needed in soil-based parsley production systems, particularly on farms where other apiaceous crops (celery, carrot and coriander) are grown.

The environmental factors of herbicides, a range of nitrogen-based fertilisers, soil moisture content and temperature were examined in greenhouse and field-based experiments. SRR was successfully induced in all growing environments but no significant effects were found on disease expression from pre-emergent herbicides, organic or inorganic fertilisers, or compost soil amendments. Similarly, microbial biocontrols and a range of agrichemicals were of no significant value.



Brown rot of lateral roots.
Images courtesy of Dr Len Tesoriero.



Internal rot of parsley tap root.

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This project is a strategic levy investment under the Hort Innovation Vegetable Fund. VG13101 has been funded by Hort Innovation, using the vegetable research and development levy, co-investment from the New South Wales Department of Primary Industries, and contributions from the Australian Government.

VG16064 – Tools and interventions for increasing children’s vegetable knowledge: VegKIT

Facilitators

Project VG16064 is funded by Hort Innovation and being undertaken by CSIRO, Flinders University and Nutrition Australia.

Introduction

Consecutive Australian Health Survey results have revealed that children around the country are not consuming enough vegetables – and the numbers suggest that they are a long way off from meeting their recommended daily intake.

It has been estimated that just five per cent of two-to-six-year-old children consume adequate amounts of vegetables, which has led to a \$4 million, five-year national project to help address this significant underconsumption of vegetables by Australian children.

This project is bringing together science and industry, with CSIRO, Flinders University and Nutrition Australia working together to deliver an integrated approach to improve these consumption figures through the education of children, training for educators and engagement with industry.

About the project

Project VG16064 is in its infancy; however, the early stages point towards a community-minded, educational approach. Research conducted over the first year of the project was implemented at an early-childhood, primary school and even peri-natal level.

“The adage of telling children that eating vegetables is good for them is counterproductive,” CSIRO Project Lead Dr David Cox said.

Dr Cox and his colleagues are in the process of developing VegKIT, which is a collaborative initiative that spearheads children’s increased vegetable intake, even in utero. VegKIT aims to introduce tools and interventions to increase vegetable intake in Australian children by adopting best practice guidelines for educators, health practitioners and researchers.

VegKIT will aim to provide a national framework for promoting vegetable consumption and bring together a number of research and educational resources, with the ultimate aim of increasing a child’s vegetable intake by more than half a serving per day.

With that goal in mind, there is potential to increase demand for fresh produce by 19,000 tonnes per year if every child (aged two-to-six years) increases consumption by greater than half a serving – demonstrating a great return on research investment.

The first year of research and development culminated in a VegKIT workshop held in Melbourne in June 2019. The workshop featured keynote speakers from the CSIRO, Flinders University and Nutrition Australia and provided best-practice behaviour change techniques for a range of vegetable consumption settings as well as introducing the VegKIT National Registry of Initiatives.

Dr Cox said that the basis for the registry focuses on learning, supporting, providing tools and enhancing interventions at a community level.

One presentation of note included outlining how stakeholders can involve early childhood, school communities, as well as growers, to raise awareness of best practice guidelines and increase vegetable intake and production.

Major findings

The project has found that developing a taste for vegetables begins in utero and continues to the weaning process in adapting infant palates to regular vegetable intake.

Updating dietary advice for maternal, infant and early years is a key activity, as using evidence-based knowledge of flavour exposure and food preference development can facilitate vegetable acceptance.

Research also highlighted that primary school canteens in New South Wales offer a poor selection of vegetable-based options for students. Steps are being taken to bridge the gap between current offerings, such as introducing a vegetable juice range. It is planned that Thomas

Farms Kitchen will also develop vegetable lunchboxes and other vegetable-based products at school canteens.

Another crucial result of this project so far has been the formation of the Vegetable Intake Strategic Alliance, which unites a wide range of stakeholders to increase children’s vegetable consumption. The alliance includes growers, health departments, early learning and childcare workers and retailers.

Conclusion

The key to the project’s success will be two-fold:

- applying interventions, such as community- and supply chain-initiatives at a maternal, early childhood and primary school level; and
- influencing health and food policies by increasing knowledge of the drivers of food preferences that will promote vegetable consumption for children and coordinating industry and government efforts to increase children’s vegetable consumption.

This objective will be supported in two ways: through a national registry of initiatives for the community to increase children’s vegetable intake; and in the development and co-ordination of the alliance, which comprises cross-sector stakeholders.

Dr Cox hopes that, within 10 years, every Australian child will be consuming the recommended amount of vegetables and believes that the five-year project will go a long way towards achieving that aim.



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VG16064 has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.



A wilting plant in the field.

The bottom line: Effective management of parsley summer root rot (VG13101)

Project VG13101 found *Pythium sulcatum* was determined to be the primary pathogen responsible for SRR. It is also the primary cause of cavity spot and root forking diseases in Australian carrot production and is an aggressive pathogen of apiaceous plants and survives for more than two years in soils. SRR can also contaminate water reservoirs.

Successful control of parsley SRR has largely been achieved in hydroponic production at Stanthorpe through sound crop hygiene and sanitation.

The project publication *Managing Farm Biosecurity in the Parsley Industry* and a related factsheet have useful checklists and protocols for growers to improve their farm and crop hygiene. Further education should be encouraged so risk-mitigation protocols are integrated to improve farm biosecurity.

An integrated approach to SRR is necessary to manage disease. Improved farm biosecurity and crop hygiene minimises risks, while greater attention to irrigation, extended crop rotations and improved production technologies can avoid excess soil moisture.

Further information

For more information, please contact Dr Len Tesoriero on 0447 623 487 or len.tesoriero@dpi.nsw.gov.au.

The final report for this project is available on InfoVeg. Readers can search 'VG13101' on the InfoVeg database: ausveg.com.au/infoveg/infoveg-database.



The bottom line: Tools and interventions for increasing children's vegetable knowledge: VEGKIT (VG16064)

With less than five per cent of two-to-six-year-old children consuming adequate amounts of vegetables, researchers are looking for ways to boost these numbers through a five-year, \$4 million project involving government, health practitioners and vegetable producers.

Project VG16064 has revealed that increasing vegetable consumption requires a community-minded approach and should also be instilled at infancy, daycare and early childhood level.

Even though the project is in its infancy, the potential for future growth is proving encouraging. VegKIT is a tool that is being developed which aims to provide a national framework for promoting awareness levels and health outcomes.

There has also been the formation of the Vegetable Intake Strategic Alliance which is bringing together a cross-sector of the industry to collaborate on ways to increase vegetable consumption among children.

Initiatives in both daycare and primary school settings are underway, including identifying new vegetable-based products to be made available at school canteens.

Further information

For more information about the project or to receive an update, please contact CSIRO Project Lead Dr David Cox at David.Cox@csiro.au.