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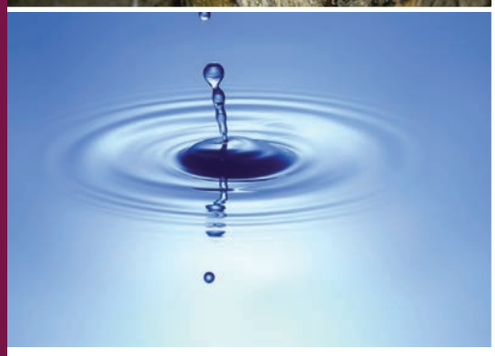
HAL R&D project number: VG09188

Project VG09188 trialled the use of nine different crop covers and their effects on baby-leaf spinach crops.

- **Overcoming onion stunting and brassica stem canker by the use of liquid fertilisers.**

HAL R&D project number: MT09045

Project MT09045 evaluated the effectiveness of commercial root growth simulating products on improving disease suppression in onion stunt and brassica stem canker.



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The production of baby-leaf lettuce under floating crop covers.

Harvesting covered product.

Facilitators:

Milestone 4 of project VG09188 has recently been completed by Primary Investigator Colin Britton of Britton Produce Pty Ltd, Queensland, with assistance from colleague and Project Administrator Rob Munton of Food ProjX.

Introduction

Floating crop covers are clear, lightweight woven and/or cast plastic sheets positioned over horticultural crops to shield them from climatic extremes and foreign body contamination. By trapping heat and preventing wind from removing warmth from soil and plants, these covers create a moist microclimate that enhances the germination and growth rate of crops. The cover further establishes a physical barrier between insects, birds and other pests and the developing crop, eliminating the opportunity for foreign body contamination and plant injury.

Lead by Primary Investigator Colin Britton, project VG09188 sought to trial the application of nine distinctive floating crop covers and their effects on the development of baby-leaf spinach crops. The initial sample of nine types was reduced to three large-scale trials using the most promising covers across a full growing season.

The three-year trial investigated the benefits of the covers versus unprotected crops across the following objectives: providing a barrier to pest infiltration, soil moisture retention, and promotion of active plant growth.

Laying the net.

About the project

Colin Britton developed the project concept several years ago when he observed the use of crop covers in Europe. Upon his return, he implemented a series of unstructured trials using locally sourced covers. The Britton research team launched a desktop study to identify leading suppliers and users of crop covers located overseas. A central component of the research was determining which products and suppliers delivered the most promising results.

Project Administrator Rob Munton said: “Our aim was to establish whether there was a key performance difference between European and Asian sourced covers. European covers are relatively more expensive to buy, but we found their performance, durability and longevity was superior.

“The covers are draped over the plants to enclose them, and the edges are secured to the ground so they appear to ‘float’ directly above the crop,” he said.

“The initial trials studied a range of crop covers in small 20 by 10 metre blocks. Once we identified which were performing best, we selected the top three and tested their performance in larger-scale beds measuring 12 by 200 metres.

Since 2010, primary trials have been conducted near Stanthorpe – a cool, high country situated on Queensland’s southern border.

“The Granite Belt is around 2,500 thousand feet in height and is typically dryer and cooler than the coastal plains, but the rich and well-draining soils provide excellent growing conditions,” Mr Munton said.

A number of trials were also undertaken in the Lockyer Valley – the farmlands that lie to the west of Brisbane.

Major project findings

According to Mr Munton, the key driver for this project was a focus on water retention and the general protection against harsh sunlight, wind, water and frost.

“We have discovered we can virtually eliminate insect contamination and damage as well as excluding foreign bodies such as wind-blown leaves and damage caused by birds, rain and light-to-moderate hail,” he said.

“We also observed quicker plant growth rates as facilitated by the microclimate under the covers. Laying and retrieving the covers is easily managed and they can be used over and over again - some of the early European covers are still in use some 12 years on. We generally opt to leave the covers on the crops for the full growing phase (four-to-five weeks) and remove them just prior to harvesting.

“Whilst the Stanthorpe winter climate is typically dry and cool, we encountered unseasonably wet conditions over the last two

years. The 2011 Queensland floods contributed to major testing delays and disrupted our early trials. Although we have been unable to satisfactorily validate the moisture retention properties of the crop covers because of the climatic conditions, we are confident this will be addressed in ongoing studies as the climate returns to more typically drier conditions."

Conclusion

Whereas this project focused on baby-leaf lettuce, application of the crop covers could extend to a range of crops. The system works well for row plants and wider bed plantations suiting the growth of leafy products such as head lettuce, baby spinach, rocket, Asian greens as well as root vegetables, where particular insect pests including cabbage root fly may cause a problem. Crop covers are available for numerous specifications and the optimum selection ultimately depends on the application and outcome required.

The Bottom Line: VG09188

- European sourced crop covers are highly effective in preventing insect contamination of baby-leaf crops.
- In the ideal environment, the covers provide facilitate soil moisture retention and active plant growth.
- While an initial capital investment is required, this cost can be apportioned over multiple growing seasons, producing a very cost-effective solution against insect contamination of baby-leaf crops.

Acknowledgements

This project has been funded by HAL using the voluntary contributions from industry and matched funds from the Australian Government.

Overcoming onion stunting and brassica stem canker by the use of liquid fertilisers.

Brassica trial in glasshouse.

Facilitators:

Project MT09045 was completed by Project Leader Barbara Hall, Senior Research Scientist at the South Australian Research and Development Institute (SARDI), in Adelaide.

Introduction

Soil-borne diseases such as those caused by *Rhizoctonia* are major constraints of crops grown in soil. Failure to control these diseases results in significant crop loss. One of the diseases investigated in South Australia, brassica stem canker, was caused by complexes of soil-borne organisms – *Leptosphaeria maculans* and three anastomosis sub-groups of *Rhizoctonia solani:* AG 2.1, 2.2 and 4. While *Leptosphaeria* infects mainly brassicas, including weeds, *Rhizoctonia* has a much wider host range, infecting most vegetables.

Recent studies established crops in the Northern Adelaide Plains of South Australia as most susceptible to the disease. In 2000, losses of up to 80 per cent from the complete stalk collapse of cauliflowers were observed in the region. While the outbreak usually affects crop seedlings after four-to-six weeks from planting, new research has revealed brassica seedlings are often infected by pathogens linked to brassica stem canker within the first two-to-three weeks of planting.

About the project

Senior Research Scientist Barbara Hall evaluated the effectiveness of fungicides and plant root stimulating products to suppress brassica stem canker and improve growth in greenhouse cauliflower cultivated in soil inoculated with different levels of *Rhizoctonia* and *Leptosphaeria*. Phase 2 involved an in-field investigation into the effect of plant growth products on the canker in cauliflower planted in commercial properties previously infected with the two pathogens.

More than 15 different fungicides were trialled as root drenches prior to, or post, transplanting the seedlings, in addition to alternatives to traditional fungicides. The products were applied as a seedling root drench to six-week-old cauliflower cultivar, together with the fungicide *Azoxystrobin* (Amistar®). Mean severity ratings of staining and cankers were recorded every 14 days until harvest on 10 replicate plants in artificially inoculated soil.

Ms Hall explained: "The brassica disease is difficult to counter as canker symptoms often don't appear until six-to-eight weeks after planting, by which time control is not possible. The pathogens can survive in the absence of the crop host which makes it difficult to track."

According to Ms Hall, symptoms typically range from superficial scurfing/russeting and discrete legions on the stem to complete stem rot and plant collapse.

"Because brassica stem canker is a soil borne disease you are dealing with the whole complex of biological factors associated with soil growth. The pathogens are also know to thrive in diverse conditions - in dryer seasons, *Rhizoctonia* is more prevalent, whereas *Leptosphaeria* is more active in the wet."

Major project findings

Findings confirmed that fungicides registered for controlling blackleg in canola assisted in reducing brassica stem canker, when applied as a pre-transplant drench in combination with the fungicide Amistar®. Such products were found to assist plants to resist disease sufficiently to allow a harvestable age and quality to be achieved.

"We found that both *Rhizoctonia* and *Leptosphaeria* appeared to infect seedlings in the initial two weeks of planting. While infection from *Rhizoctonia* was soil borne, *Leptosphaeria* had the potential to infect plants through the soil, from seed and also through airborne spores that infect foliage. Wounded plants were also more susceptible to *L maculans*, so it was important to limit leaf damage and avoid trimming tops," she said.

While there was potential for improved plant growth, there was no consistent improvement noted in disease suppression. "Fungicides were generally more effective at disease suppression and were not always enhanced when the stimulation products were introduced. In some trials, growth advantage in plant size, head size and weight was achieved by using fungicides combined with root stimulation products."

Brassica Stem Canker Root Stimulation field.

Conclusion

Project MT09045 revealed that root stimulation products provided no significant benefit in suppressing the stem canker present in soils with low disease pressure.

Ms Hall said: "Management of brassica disease relies on a managed approach that works for the individual. If growers are concerned, I would suggest they undertake a formal plant material and soil analysis to confirm the genesis of infection is stem canker – a rotting stem does not always indicate this disease."

She recommended that growers plough in plant residue after harvest to help reduce the level of pathogens in the soil, treat seedlings before they are sown and adequately maintain the overall health and organic matter of the soil.

Severely rotted cauliflower stem as a result of stem canker.

The Bottom Line: MT09045

- Brassica stem canker was discovered in Australia 12 years ago and is one of a new batch of diseases attacking vegetable crops.
- Greenhouse trials on cauliflower and Brussels sprouts demonstrated that some plant health products, in combination with the fungicide Amistar®, helped reduce the staining and canker symptoms of brassica stem canker and improved plant growth.
- Australian growers needed industry support to continue to look for and research brassica varieties that were less susceptible to brassica canker.

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

Photo credits:

VG09188 photos credit: Colin Britton, Rob Munton
MT09045 photos credit: Barbara Hall

Please contact Hugh Gurney at AUSVEG on 03 9822 0388 or email hugh.gurney@ausveg.com.au to submit topics for potential inclusion in future editions of **vege**notes.

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