INTERNATIONAL EXPERTS VISIT GIPPSLAND GROWERS

Growers from Gippsland, Victoria, welcomed visiting US scientists at a recent PotatoLink workshop. This unique opportunity, coordinated and facilitated by Dr Nigel Crump (PotatoLink and AuSPICA), merged an informal setting with globally acclaimed experts, presenting an unparalleled chance to acquire knowledge and insights into a range of topics, including diseases and their treatment and seed management.

Nothing beats the chance to hear new information direct from the source. This workshop gave Gippsland growers the chance to talk directly with international specialists, with questions asked and answered on both sides. Much of the discussion focussed on the specific concerns and challenges faced by local growers.

The following highlights some of the key issues raised in the workshop.

DISEASES

Verticillium wilt

Verticillium wilt is a major concern for growers in the region. A survey conducted some 15 years ago on potato crops across south eastern Australia (including Tasmania and SA) found that one-third were infected with the *Verticillium dahliae* pathogen. Fortunately, very few were infected with the potentially more serious *Verticillium albo-atrum* (Stagnitti, 2015).

Verticillium wilt has been identified as 'the most economically damaging disease in the mid-west (USA)' by Dr Andy Robinson, highlighting its global importance. Dr Nigel Crump characterises it as a 'sleeper disease', going relatively unnoticed in Australia.

Verticillium spp. can be synergistic with root lesion nematodes (*Pratylenchus* spp.), causing a syndrome known as 'Early dying disease'. While growers may notice dead plants in the field, early senescence is frequently attributed to other factors. However, Dr Crump warns that occurrence of verticillium wilt is increasing and growers need to be vigilant about this soil-borne pathogen.

Correct diagnosis of verticillium wilt is key to managing this disease. Symptoms include:

- Wilting of the plant leading to early dying of the crop
- Vascular browning inside stems (note other issues can also cause vascular browning, including blackdot disease (*Colletotrichum coccodes*) and desiccant herbicide)
- 'Flagging' or 'lone soldier plants,' where stems remain standing upright, but the leaves die. Typical early signs are for half the leaf to die while the other half remains green
- Vascular browning can extend to tubers when infection is severe
- Early die-offs, which may be dismissed as early crop death or other causes

Management involves targeting the

Symptoms of *Verticillium* wilt Images: Ontario CropIPM.

nematode population and/or the pathogen prior to planting. Longer crop rotations, that do not include alternative hosts of *Verticillium* spp., and use of resistant varieties, are key to control.

It is also worth considering green manures. Hort Innovation project PT09026 found that the effects of infection by *Verticillium* spp. on yield were greatly reduced when preceded by a green manure crop of millet. Green manure crops of sudangrass and corn have also provided positive results (Davis et al., 1996). Such effects are likely due in part to a general improvement in soil health, helping the potato plant to resist the onset of disease.

According to Dr Crump, biofumigation with mustard crops has also yielded good results. Key to success with such strategies is to include a high volume of green material, mulching it with immediate incorporation into the soil.

Soil fumigation with metham sodium) can reduce the amount of inoculum in the soil and may be a suitable strategy for some growers.

Late blight

Late blight (*Phytophthora infestans*) poses a significant threat, especially as the last three relatively wet years in eastern Australia are likely to have contributed to a build-up of inoculum. The disease is most prevalent in cool, moist conditions, especially if there are multiple consecutive days of damp weather.

Distinguishing between late blight and grey mould (*Botrytis cinerea*) is essential.

Late blight:

- Large, dark brown lesions on leaves and stems
- Lesions with a wet appearance
- May be masses of white spores on undersides of infected leaves

Grey mould:

- Dark brown, wedge shaped lesions with concentric rings
- Typically on leaflet tips or margins and confined by major veins

Volunteer potatoes can be sources of late blight inoculum between seasons.

Protectant fungicides act as barriers to infection and do not translocate within the plant. This means that new growth remains vulnerable to infection in between spray applications.

Dry rot

Fusarium dry rot (*Fusarium* spp.) presents a significant threat during storage. Dry rot typically requires a wound for entry, emphasising the importance of proper handling, curing and storage practices.

While fungicides are available, they are definitely not a substitute for good handling practices.

Avoiding condensation during storage is also important to prevent infection and spread. Positive ventilation to prevent condensation is particularly important during the first few weeks of storage.

Pink rot

While pink rot has similar external symptoms to pythium leak, it is characterised by the distinct pink colour that develops in lesions after 15 – 30 minutes of exposure to the air. The tuber can remain solid if no secondary soft rot bacteria are present.

Occurrence is influenced by soil pH (low pH = higher infection risk) and soil calcium levels. However, the group warned that while sap tests for calcium can be useful, results vary by test method. Also, calcium has limited mobility in plants, making tuber accumulation difficult to estimate.

Damage during harvest and condensation in the storage environment are likely to increase symptom development.

Blackleg

Various species that cause blackleg are present in different parts of Australia. This can impact the symptoms observed. In Australia, blackleg can be broadly separated into two groups: new and old.

'New' blackleg – *Dickeya dianthicola*, *Pectobacterium brasiliense, Pectobacterium parmentieri*

'Old' blackleg: P*ectobacterium atrosepticum, Pectobacterium carotovorum* (common soft rot)

Blackleg, whether the older Pectobacterium or the newer Dickeya, presents different symptoms depending on the season and conditions.

Key points:

- *P. atrosepticum* (old blackleg) causes stems to rot from the outside-in
- *D. dianthicola* and *P. parmentieri* (new blackleg) cause internal blackening, with the stems rotting from the inside-out
- Symptoms of new blackleg tend to develop at warmer temperatures, with the infection potentially remaining asymptomatic in cool conditions
- Mandatory testing for *D. dianthicola* in Australia has helped to reduce occurrence

Fusarium dry rot (left) and backleg (right). Images: PotatoLink

TREATMENTS

Fungicide resistance

Fungicide resistance is a major international issue. There is evidence of resistance developing in several key potato pathogens including late blight, target spot (*Alternaria* spp.) and pink rot.

The status of fungicide resistance in Australia is relatively unknown.

A combination of different modes of action can prove beneficial in minimising the risk of resistance development, particularly when switching between chemical groups. However it is crucial to ensure that these combinations do not have antagonistic effects on plant growth.

Key points:

- Always read and adhere to label instructions when using agricultural chemicals
- Use the specified application rate, timing, purpose and method
- Avoid using the same chemical group for in-furrow and foliar applications
- Healthy, well nourished plants are generally more resilient against diseases
  - » For example, plants with poor nutrition are more vulnerable to target spot infection

SEED MANAGEMENT

Key points:

- Ensure knives are sharp when cutting seed, as healing is slower when blunt blades are used.
- Seed tubers that are pre-cut 2-3 weeks before planting should be warmed and exposed to good airflow; this will facilitate effective wound healing before planting
- Dust treatments can be effective but it is essential they are applied in ways that protect worker safety
- Application of seed coating chemicals in-furrow at planting has proven ineffective.

Determining the physiological age of seed presents challenges. However, bringing some seed out of storage and allowing it to sprout can provide some information. A warm environment will make this happen more quickly.

- Fewer sprouts = fewer stems but more large tubers
- More sprouts = more stems with more smaller tubers
- Optimum seed age depends on the intended use of the crop, whether fresh consumption or processing

Hort Innovation POTATO – FRESH FUND

This project has been funded by Hort Innovation using the potato – fresh research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Hort Innovation POTATO – PROCESSING FUND

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EXPLORE THE TOPIC FURTHER BYCLICKING THE TITLE BELOW

FACTSHEET: Pink rot

FACTSHEET: Late blight

WEBINAR: Late blight

FACTSHEET: Blackleg

Q: *If individual products within Group 7s start to fail or gain resistance, will all Group 7s lose effectiveness?*

A: *No, not necessarily. Different modes of action within Group 7 fungicides mean that if one product fails or encounters resistance, others may still remain effective.*

Q: *Can old chemistry become effective again against resistant strains?*

A: *Sometimes, although it's not always the case. While there may be instances where older chemistries regain effectiveness against resistant strains, this outcome is not guaranteed. It depends on various factors, including the specific resistance mechanisms involved.*

Q: *Is resistance localised in certain areas or spread across states?*

A: Initially, resistance may be localised in specific areas. However, over time, it tends to spread beyond these regions and become more widespread across states.

Q. *Are there rapid tests to test for resistance?*

A. *No*

Q: *Does application of lime have an influence on incidence of scab?*

A: *No, liming does not cause or control scab*

EVENT COORDINATOR

Dr Nigel Crump is a potato crop specialist with extensive experience working in the Australian potato industry. Nigel is the General Manager for the Australian Seed Potato Industry Certification Authority (AuSPICA), an industry-based organisation that operates the seed potato certification Scheme in South Australia, Victoria and northern New South Wales. Nigel also oversees the day-to-day operation of the Toolangi Elite business which produces G0 potato minitubers and tissue culture plantlets. Nigel holds adjunct roles including Deputy Chair of the UN Economic Commission specialised section on seed potatoes. Recently, Nigel was appointed as a director of the World Potato Congress Inc.. His research interests include international projects in Vanuatu, Ethiopia, Indonesia and New Zealand. Nigel is a PotatoLink regional representative for eastern Victoria and key contact for the seed potato sector.

SPEAKERS

Dr Andy Robinson is an Associate Professor and Extension Potato Agronomist at North Daktoa State University / University of Minnesota. He works with potato growers on the agronomics of potato production, cultural management of potato, herbicide use and misuse in potatoes, and variety development.

Dr Mike Thornton is a professor of plant science working on potatoes and onions for the University of Idaho. His research program focuses on agronomic management practices with an emphasis on evaluation of new varieties, management of in-season pest problems, and reduction of bruising together with other factors that reduce quality and storability.

Dr Jeff Miller is the principal field investigator and owner at Miller Research. He has previously worked as the potato pathologist at the University of Minnesota and the University of Idaho. He conducts research on pest management in potatoes focusing on fungal diseases including Rhizoctonia canker and scurf, early blight and brown spot, late blight, powdery scab, white mould, Fusarium dry rot, pink rot, black dot, Verticillium wilt, and silver scurf.

Dr Brad Geary is a professor of plant health at Brigham Young University (BYU), Utah, a position he has held for over 20 years. Prior to BYU, he worked as an assistant professor of potato production at the University of Idaho. Dr Geary's current research interests include potato diseases associated with the soil, soil health, and biological control. Specific areas of research include silver scurf, black dot, the soil microbiome, and use of *Streptomyces* as a biological control.