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## Managing onion white rot in Tasmania

### Key Points

- Disease symptoms were highest when OWR inoculum was in the top 100 mm of soil.
- In commercial fields most onion roots (over 80%) occur in the top 100 mm of the soil profile.
- Fungicide applications should target the top 100 mm of the soil profile.
- Disease symptoms were highest in trials planted from May to August and least in those planted in September.
- Fields considered to be at risk of having OWR would be best planted later in the season. Fungicide management is still recommended.

Onion white rot (OWR), caused by *Sclerotium cepivorum*, is a widespread and destructive fungal disease of commercial onion crops. Fungicides are a key component of disease management. In this study we looked at how the onion and fungus interact in space and time over a range of different environmental conditions.

Disease expression is influenced by a combination of factors. The depth of the inoculum and onion roots in the soil, interact with environmental factors such as temperature and rainfall. These factors, when combined with the time of planting, can influence disease development. Improving our knowledge in these areas enables development of better integrated control options, and in the case of fungicides, optimised timing and target depths for improved disease management.

This two-year study included multiple commercial onion crop trials from Hagley to Rocky Cape in north-west Tasmania and planter bag studies in both outdoor and controlled environments. We studied the effect of planting date, environmental conditions, inoculum depth and root growth patterns to provide further insight into OWR disease development and management.

## Onion white rot (OWR) is a persistent soil borne disease of *Allium* species

Onion is a key host of OWR. The fungus also affects related *Allium* species including garlic, leek, chives and spring onion. The fungus infects plant roots and progresses up the roots to the base of the onion bulb. Infection can spread from the roots of one plant to another, resulting in patches of infected plants.

The fungus can **survive in the soil for as long as 20 years** in the form of sclerotia (hard, small poppy seed like structures). Once a field has had OWR, there is always a risk that the disease will infect subsequent crops. This limits the options growers have to avoid the disease with crop rotation.

## Timing of onion trials

Onions are grown over a relatively long period in Tasmania (from May until late February). To reflect this we collected data for three planting periods early, intermediate and late crops (May, July and September).



## Root growth and OWR

Trials in commercial onion fields showed that the majority of onion roots (over 80%) are in the top 100 mm of the soil profile. The high root biomass in this section of the soil under field conditions, provides opportunity for infection to spread from root-to-root and from one plant to another.

Outdoor trials in planter bags found that the greatest number of infected onions occurred when sclerotia were in the top 100 mm of soil.

## Planting date influences infection

The incidence of infected bulbs in the bag trials was highest when onions were planted from May until early August and lowest when onions were planted in September. This relates to soil temperature during the life of the crop and how this influences survival and growth of the fungus.

***The finding that ‘most root and fungal pathogen activity occurs in the top 100 mm of the soil’ indicates that ‘fungicide application needs to target this area.’***

## Soil Temperature and OWR infection

Soil temperature appears to be an important factor in disease development.

In controlled environment studies, soil temperatures between 15 to 20 °C were optimum for fungal activity and onion infection. The number of infections was reduced with sustained temperatures above 20 °C. Soil temperatures recorded at commercial field sites during the project showed that temperatures in the top 100 mm of soil can be above 20 °C periodically from October, and more so from November to February.

Root growth was fastest for the onions planted in September and yet they had the lowest incidence of infected bulbs. The higher temperatures experienced in the top 100 mm of soil from November to February are likely to have reduced the ability of the fungus to reach the base of the onions planted in September.

**Fields with a history of OWR and considered to be at risk of infection would be best planted late in the season.** However, the fungus appears able to survive in lower cooler soil depths and progress up towards bulbs if soil temperatures decrease towards the end of the season and before harvest. Fungicide management is still recommended, with adjustments to timing, possible inclusion of a late application and compliance with chemical registration guidelines.

## Targeted control solutions

### Strategic fungicide application

- Target the top 100mm of the soil profile. This is the key zone where the fungus and onion interact. This could be achieved applying before a rain event or by irrigating the fungicide into the soil after application.

### Later planting

- If feasible, planting later in the season is recommended for fields known to have a history of OWR and potential soil inoculum. Fungicide management is still recommended to reduce the risk of infection reaching the bulbs.

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