

Integrated Control of *Allium* White Rot

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Introduction

Allium white rot (AWR) caused by the soil-borne fungus, *Sclerotium cepivorum*, is a major problem for the onion-growing industry in the UK and large areas of onion-growing soils have been lost due to AWR infestation (Figure 1). Chemical control is limited to off-label use of tebuconazole and there is an increasing need for alternative and sustainable methods of controlling AWR.

HRI is investigating the integration of applications of biological control agents (BCAs) and composted onion waste.



Fig 1: Onion bulbs infected with AWR

Biological Control Agents

- Two effective fungal BCAs of *S. cepivorum* (*Trichoderma viride* L4 and S17A) destroyed 80-90% of sclerotia in soil after 8 weeks at 20°C in laboratory tests
- In the glasshouse AWR was reduced by at least 50% for three commercial onion varieties (Figure 2) in a silty clay soil
- Efficacy of the BCAs was also confirmed in sand and peat soil but there was no effect in a silt soil
- In the field, *T. viride* isolates also reduced AWR disease compared to untreated plots
- Application of the BCAs encapsulated in alginate pellets is also being examined (Figure 3)

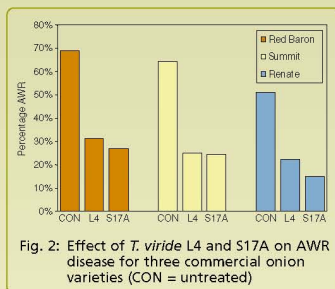


Fig. 2: Effect of *T. viride* L4 and S17A on AWR disease for three commercial onion varieties (CON = untreated)

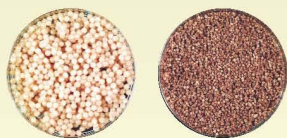


Fig. 5: Effect of 50% w/w incorporation of onion compost on AWR disease in different soils

Composted Onion Waste

- Over 30,000 tonnes of onion waste are produced in the UK annually and disposal in landfill is increasing in cost
- Techniques have been developed at HRI which allow onion waste to be composted without nuisance odours or pollution from run-off (Figure 4)
- The use of composted onion waste has been shown to destroy sclerotia and reduce AWR
- Degradation of *S. cepivorum* sclerotia was dependent on rate of waste incorporation, duration of exposure and soil type
- A 50% w/w waste incorporation rate destroyed 60-90% of sclerotia in peat, silt and sand soils
- In the glasshouse, onion compost reduced AWR on onion seedlings although disease control varied with soil type (Figure 5).



Fig 4: Onion waste being loaded into bulk composting tunnel

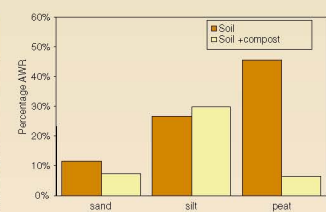


Fig. 3: Alginate pellets of *T. viride* before and after drying

The future: Integrated Control of AWR

- The use of both BCAs and composted onion waste therefore have potential as alternative methods for reducing
- A preliminary experiment in the glasshouse where BCAs were added to onion compost that had been mixed with soil infested with sclerotia 12 weeks previously, suggested that control of AWR was enhanced compared with treatments of compost or BCA only (Figure 6)
- Experiments in both the glasshouse and field are currently underway to confirm this and also to further test the BCAs and onion waste compost alone. Integration with further AWR control methods such as the use of tebuconazole seed treatments are also being investigated

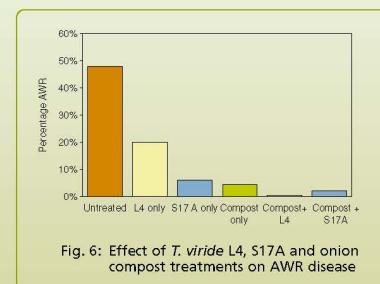


Fig. 6: Effect of *T. viride* L4, S17A and onion compost treatments on AWR disease

