

Evaluating *Trichoderma* for the Integrated Control of White Rot on Bunching Onions

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Introduction

- Onion white rot, caused by *Sclerotium cepivorum*, is prevalent in spring onion production regions of southeastern Australia, causing crop losses ranging from 5 to 50% if crops are not protected with fungicides.
- Alternative treatments to fungicides are needed to ensure the efficacy of the limited number of fungicides available to control this disease is not lost through overuse and for integrated management of white rot.
- In onion trials in New Zealand, good early season control of white rot has been reported using the biological control agent *Trichoderma atroviride* isolate C52. Consequently, this biocontrol agent could be a suitable treatment for white rot control on short-season onion crops such as spring onions and shallots.



Onion white rot on spring onions

Aim

To evaluate the capacity of *T. atroviride* C52, applied alone or in combination with fungicide applications, to protect the roots of spring onion plants against white rot infection.

Materials and Methods

- Field trials were conducted within commercial crops in sandy soils, Cranbourne and Heatherton, Victoria.
- Fungicide treatments were applied after sowing and repeated four weeks later. The sprays were applied in a band across plant-rows using a knapsack with 1000L water/ha.
- Prills with spores of *T. atroviride* C52 (Trichopel Ali 52™) were placed below the seed at sowing with a StanHay seeder using 30, 50 and 70 kg of prills/ha (1.5×10^6 *Trichoderma* cfu per g of prills).
- Supplementary biocontrol treatments were applied four weeks after sowing using a powder formulation of *Trichoderma* C52 (1.2×10^8 *Trichoderma* cfu/g) delivered as stem-base sprays with 400L water/ha.
- Trichoderma* levels (cfu/g soil) in soil of the root zone were measured using a dilution plating technique and selective medium. In all trials, *Trichoderma* levels ranged from 1×10^4 to 6×10^4 and 1×10^2 to 1×10^3 at 3 and 6 weeks after sowing, respectively.
- Plants with white rot were counted at fortnightly intervals and yields measured 10-12-weeks after sowing.



Seeder applying prills (yellow) below seed (black) with *Trichoderma* spores

Autumn 2003 trial

Table 1. Effect of biocontrol treatments alone and combined with fungicide on disease incidence and marketable bunches (square m) of spring onions

Treatment	% plants with white rot	Number bunches
untreated control	28.8a	10.8a
biocontrol (sowing)	22.0a	11.4a
biocontrol (sowing+4-weeks later)	21.5b	13.6ab
biocontrol (sowing+boscalid)	11.7c	14.6b
boscalid (sowing+4-weeks later)	2.7d	19.8c

- The fungicide treatment was highly effective in controlling white rot and yield was significantly higher than in other treatments (Table 1).
- The biocontrol applied at sowing (50kg prills/ha) and supplemented with one spray of boscalid gave a reduction in disease in the order of 59% of that of the untreated control.

Autumn 2005 trial

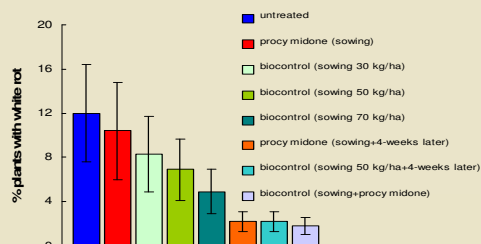
Table 2. Effect of biocontrol treatments alone and combined with fungicide on disease incidence and marketable bunches (square m) of spring onions

Treatment	% plants with white rot	Number bunches
untreated control	29.0a	15.3a
biocontrol (sowing)	14.4b	18.0b
biocontrol (sowing+boscalid)	7.2c	18.7b
boscalid (4-weeks after sowing)	8.1c	17.8b
boscalid (sowing)	1.4d	19.3c
boscalid (sowing+4-weeks later)	0.1d	21.3c

- The fungicide treatments (excluding the late application) were very effective in controlling white rot and increased yields (Table 2).
- The biocontrol applied at sowing (50kg/ha) gave a reduction in disease in the order of 50% of that of the untreated control.

Autumn 2004 trial

Fig. 1. Effect of biocontrol treatments alone and combined with fungicide on disease incidence (per square m) of spring onions



- The biocontrol combined with one fungicide spray was as effective as two fungicide sprays or two biocontrol applications in controlling white rot (Fig. 1).
- There were no significant differences in disease control between different rates of biocontrol, with 70kg/ha giving slightly better control.

Conclusions

- The fungicide boscalid provided effective long-season disease control and yields increases at the two high disease sites.
 - Trichoderma* C52 levels in sandy soils were probably less than optimal for more effective early-season biocontrol.
 - Dispute that, in a low disease site *Trichoderma* C52 (2 applications) was capable of providing a level of protection equal to that of procymidone.
 - In a high disease site, the biocontrol applied at sowing gave a reduction in disease of 50%, indicating that *Trichoderma* C52 was also able to protect the roots of plants against early season infection when its levels were highest in the root zone.
 - At the two high disease sites, fungicide sprays added to biocontrol plots prevented further spread of disease.
- Trichoderma* C52 showed potential for the control of white rot on bunching onions, therefore it warrants further development.