

Potato Update



Issue 8

Evaluation of seed tuber and in-furrow fungicides on the control of soil-borne diseases in potatoes

Introduction and methods

Soil-borne diseases are prevalent in potato crops and are often likely to reduce crop yields. However, due to the wide range of soil-borne diseases occurring in potato crops, it is often hard to identify how much of a role fungicide plays in suppressing and controlling them. In order to investigate this, a replicated trial was set up in a commercial potato crop at Levels, South Canterbury with the cultivar Innovator (planted 12 October 2015). The trial site was last in potatoes four years previously, so disease pressure was likely to be high.

The aim of the trial was to evaluate different fungicides and application methods in order to evaluate their efficacy for control of soil borne diseases (Table 1). The chemical treatments were applied either directly to the seed tubers or as in-furrow sprays at planting, prior to closing the furrows. Standard crop management was undertaken by the grower for the remainder of the season. Disease assessments were carried out at two crop growth stages, full canopy, 14 weeks after planting, and late canopy, 18 weeks after planting. A final yield assessment based on marketable tubers (t/ha of tubers >65 mm) was carried out at crop maturity.

Table 1. Treatments, their active ingredients, target disease and application methods (either applied to the potato seed or in-furrow at planting) assessed in South Canterbury in the 2015/16 season.

Treatment	Active ingredient	Application method	Target diseases*
Nil (control)	-	-	-
Monceren®	pencycuron	seed tuber	*stem canker, black scurf
Monceren® + Amistar®	pencycuron + azoxystrobin	seed tuber + in-furrow	*stem canker, black scurf, silver scurf
Amistar®	azoxystrobin	in-furrow	*black scurf, silver scurf
Amistar® × 2 rate	azoxystrobin	in-furrow	*black scurf, silver scurf
F15/02	penflufen	in-furrow	(Experimental black scurf
F15/02 + F15/03	penflufen + <i>Bacillus subtilis</i>	in-furrow	(Experimental) black scurf, soilborne diseases
Nebijin®	flusulfamide	in-furrow	*powdery scab

* Indicates registered use.

Nebijin® is a product registered for control of powdery scab.

Key points

- A replicated trial was set up in a commercial crop at Levels, South Canterbury with potato cultivar Innovator, planted on 12 October 2015. The trial site was four years out of potatoes.
- A number of diseases were found in the sampled plants and tubers including *Spongospora* root gall and tuber powdery scab; *Rhizoctonia* stem canker and tuber black scurf; *Sclerotinia* white mould on stems, black leg on stems, and common scab on tubers.
- *Rhizoctonia* stem canker and *Spongospora* diseases predominated, while the other diseases were at very low incidence levels.
- Nebijin® reduced the severity of powdery scab on tubers at both assessment timings and this reduction was statistically significant when compared to the nil treatment. None of the other treatments affected any of the diseases observed in the trial.
- There were no statistically significant differences between the treatments for unmarketable or marketable yields. Overall mean yield of marketable tubers was equivalent to 82.8 t/ha.



Results

The diseases found in the sampled plants and tubers included *Spongospora* root galling and tuber powdery scab; *Rhizoctonia* stem canker and tuber black scurf; *Sclerotinia* white mould on stems, black leg on stems, and common scab on tubers. *Rhizoctonia* stem canker and *Spongospora* diseases predominated, while the other diseases were at very low incidence levels.

Less *Rhizoctonia* stem canker was recorded for the first (full canopy) assessment than for the late canopy assessment as disease severity increased during the trial. However, this disease was very common and severe on the assessed plants, and severity of stem canker was similar for all of the different treatments, including the nil experimental control. Severity of powdery scab was strongly affected by assessment date, with an overall mean severity score for the first (full canopy) assessment of 1.2 (equivalent to 6% of tuber surface affected), and 1.8 (9% tuber surface affected) for the second (late canopy) assessment. Nebijin® reduced the severity of powdery scab at both assessment timings and this reduction was significant when compared to the nil treatment (Table 2).

There were no statistically significant differences between the treatments for unmarketable or marketable yields (Table 3). Yields of harvested marketable tubers were high, with an overall mean equivalent to 82.8 t/ha.

Discussion

Potatoes had been grown in the field four years previously, and a commercial “Predicta Pt” test on soil from the area used for this trial indicated that the trial site had “medium to high” risk of soil borne diseases. Of the different fungicide treatments applied in the trial, only the Nebijin® in-furrow treatment affected incidence and severity of disease. Effects of Nebijin® were detected at both the full canopy and late canopy disease assessments. Nebijin® did not reduce severity of *Spongospora* root galling, but did reduce incidence and severity of powdery scab on the harvested tubers. None of the other treatments affected any of the diseases observed in the trial, including *Rhizoctonia* stem canker which was of high incidence. Although *Rhizoctonia* stem canker and *Spongospora* root galling were common, the yield assessments indicated that these diseases were not at levels sufficient to reduce tuber yields. Furthermore, although powdery scab was reduced by one of the treatments, this reduction was not manifested in a yield response.

These results are very similar to the results from two trials carried out in the 2014/15 season where a range of fungicide seed and soil treatments did not reduce disease incidence or increase yields. The results from the 2015/16 season indicate that in some situations pre-planting fungicide treatments have limited efficacy for management of soil-borne diseases, and did not increase tuber yields. Further work is needed to identify when and which fungicide seed and soil treatments will reduce disease and increase yields.

Table 2. Mean powdery scab severity scores for potato tubers, grown from different fungicide treatments applied at planting, assessed at full and late canopy at Levels, South Canterbury in the 2015/16 season.

Treatment	Mean powdery scab severity score*	
	Full canopy	Late canopy
Nil (control)	1.1	1.9
Monceren®	1.2	1.9
Monceren® + Amistar®	1.1	1.8
Amistar®	1.3	1.7
Amistar® × 2 rate	1.2	1.8
F15/02	1.1	1.6
F15/02 + F15/03	1.2	1.9
Nebijin®	1.0	1.4
LSR ($\alpha = 0.05$), df = 75	0.25	

* Mean score: 1.0 = 2% tuber surface affected, 1.9 = 5% tuber surface affected.

Table 3. Treatment effect on potato tuber total yield and marketable yield (t/ha) at Levels, South Canterbury in the 2015/16 season.

Treatment	Unmarketable yield (t/ha)	Marketable yield (t/ha)
Nil (control)	2.2	84.0
Monceren®	2.9	80.7
Monceren® + Amistar®	2.6	81.5
Amistar®	2.2	82.5
Amistar® × 2 rate	2.3	83.9
F15/02	2.7	85.1
F15/02 + F15/03	2.6	82.4
Nebijin®	1.9	82.4
Mean	2.4	82.8
LSD (P < 0.05), df = 35	1.1	7.1

Acknowledgments

Plant & Food Research for expertise with disease assessments and Morgan Bowles for providing the trial site and assistance with planting the trial.

© This publication is copyright to Potatoes New Zealand Incorporated and may not be reproduced or copied in any form whatsoever without written permission.

Disclaimer: This publication is intended to provide accurate and adequate information relating to the subject matters contained in it. It has been prepared and made available to all persons and entities strictly on the basis that Potatoes New Zealand Incorporated, the Foundation for Arable Research, their researchers, authors and contractors are fully excluded from any liability for damages arising out of any reliance in part or in full upon any of the information for any purpose. No endorsement of named products is intended nor is any criticism of other alternative, but unnamed product.

Potatoes New Zealand has taken reasonable steps and exercised skill, care and diligence in producing this fact sheet to meet the requirements of growers. However there is no implicit or expressed warranty that the information contained is free from error or omission. Potatoes New Zealand Incorporated does not expressly or otherwise endorse the products promoted in this fact sheet. Neither Potatoes New Zealand Incorporated, the Foundation for Arable Research, nor any of their employees or contractors shall be liable for any cost (including legal costs), claim, liability, loss, damage, injury or the like, which may be suffered or incurred as a direct or indirect result of the reliance by any person on any information contained in this fact sheet.