FUNGICIDE SEED TREATMENTS FOR THE CONTROL OF *ASCOCHYTA FABAE* F. SP. *LENTIS* ON LENTILS

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SUMMARY

Seed treatments of carbendazim, mancozeb, tridemorph and thiabendazole were evaluated in a field trial for their potential to control seed-borne *Ascochyta fabae* f. sp. *lentis* in lentils. None of the fungicides affected field establishment. All seed treatments reduced the incidence of Ascochyta blight at 90 and 115 days after planting (DAP). By 143 DAP only carbendazim and thiabendazole continued to control the disease. All seed treatments gave greater yields than the untreated control. Thiabendazole, tridemorph, and carbendazim seed treatments reduced *A. fabae lentis* infection in seed harvested from the resulting crop. Morpholine and dithiocarbamate fungicides offer alternatives to benzimidazoles for control of Ascochyta blight in lentils.

Keywords: lentils, Ascochyta blight

INTRODUCTION

Ascochyta blight of lentils (*Lens culinaris* Medik.), caused by *Ascochyta fabae* Speg. f. sp. *lentis* (Gossen *et al* 1986), was first reported in Canterbury in 1985. Widespread infection of lentil crops by *Ascochyta lentis* was reported in the wet, cool season of 1985/86. Seed from severely infected crops contained discoloured and sometimes shrivelled seeds (A. C. Russell, unpublished data). Yield losses of up to 40% caused by this disease have been reported in Canada (Gossen and Morrall 1983) with adverse effects on seed quality and marketability.

A mixture product containing fosetyl aluminium, thiram and thiabendazole (Alliete Super) is at present the only seed treatment registered for use in lentils in New Zealand, but thiabendazole alone is also widely used. Kaiser and Hannan (1987) found that thiabendazole reduced the incidence of *A. fabae lentis* in infected seed, and increased seedling emergence and crop yield. Russell *et al* (1987) found similar results in Canterbury.

Thiabendazole and carbendazim are benzimidazole fungicides. There are no reports of resistance to these chemicals occurring in *A. fabae lentis*, but the potential for this to occur exists. Two chemicals evaluated in this study, tridemorph (a morpholine) and mancozeb (a dithiocarbamate), offer potential alternatives to benzimidazoles for control of Ascochyta blight in lentils.

This paper reports the results of a field trial on the effect of four fungicide seed treatments on emergence, Ascochyta blight, yield and incidence of post-harvest seed-borne *Ascochyta lentis* in lentils.

METHODS

A field trial of randomised complete block design with six replicates was sown on 11/7/90 on the DSIR Crop Research farm at Lincoln, where the soil is a Templeton silt loam on sand. The sowing rate was 70 kg/ha and plots were 15 m² consisting of nine rows 15 cm apart. Seed was sown with a precision cone seeder. Seed of the lentil cultivar 'Titore' with a 32% infection of *A. fabae lentis* was used for all treatments. Each seed treatment was mixed with 10 mls of distilled water and applied to 2 kg of seed as a slurry in a rotating drum 2 weeks prior to sowing. The seed

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was air dried before being packaged for sowing. The fungicides evaluated in the trial and the rates used are presented in Table 1.

TABLE 1. Fungicide seed treatments evaluated for the control of *Ascochyta* blight in lentils.

Fungicide	Seed treatment Product	Rate: g ai in 10 ml water/kg of seed
Nil	Nil	Nil
Thiabendazole	Tecto	1.35
Carbendazim	Bavistin FL	1.0
"	Bavistin FL	2.0
"	Bavistin FL	3.0
Tridemorph	Calixin	0.47
Mancozeb	Mancozeb FL	1.34

The trial was rolled after sowing and sprayed on 12/7/90 with 1.75 kg/ha of cyanazine (Bladex 50 SC) herbicide. Metribuzin (Sencor DF) was applied at 105 g/ha as a post-emergence herbicide on 20/10/90 to control fathen and wireweed. Demeton-S-methyl (Metasystox) was applied at 125 g/ha on 14/11/90 to control aphids.

Plant establishment was assessed on 7/10/90, 78 days after planting (DAP). Four 0.2 m² quadrats were selected at random from within each plot and the number of plants within each quadrat counted. Assessments of *Ascochyta* blight were made at 90, 115 and 143 DAP on the entire plot using a 1 to 5 scale as follows; 1 = no disease, 2 = trace of disease, 3 = slight disease, 4 = moderate disease, and 5 = severe disease.

The trial was harvested on 5/1/91 using a Wintersteiger plot combine thrashing the entire plot and seed from each plot was weighed. Five weeks after harvest a 100 seed sample was taken from each treatment. Samples were sterilised in a solution of 0.4% available chlorine for 2 minutes and were then plated on 20% V8 agar (10 seeds/plate). Plates were held at room temperature under near ultraviolet light (12 h photoperiod). After 10 days the number of seeds giving rise to colonies of *A. fabae lentis* was determined.

RESULTS

Weather statistics at Lincoln throughout the season were similar to the long term means apart from a wetter than average August. During that month 138.5 mm of rain fell, compared to the long term mean of 63 mm. Symptoms of water-logging were observed in replicates five and six as a consequence of this high rainfall. Both replicates had fewer plants, less disease and lower yields than other replicates.

None of the seed treatments affected plant establishment (Table 2.)

Disease symptoms were first observed on the lower leaves and stems of plants approximately 90 DAP as small, circular, purple to tan lesions with light margins. Disease symptoms intensified throughout the season. By 143 DAP, lesions in the untreated control were easily observed on leaves and stems. At assessments 90 and 115 DAP, all chemical seed treatments gave lower levels ($P < 0.05$) of disease than the untreated control. Mancozeb, at the rate evaluated, was less effective ($P < 0.05$) than either tridemorph or the benzimidazole fungicides (Table 2.). By 143 DAP only carbendazim and thiabendazole were still providing control of the disease. There were no differences ($P > 0.05$) between the efficacy of carbendazim or thiabendazole over the three assessments. No rate responses were detected within the carbendazim treatments.

There were no differences in yield ($P > 0.05$) between the seed treatments which all gave higher yields than the untreated control.

In laboratory seed tests, mancozeb and carbendazim at 1.0 and 2.0 g did not differ ($P > 0.05$) from the untreated control in the number of seeds giving rise to colonies of *A. fabae lentis* (Table 2). The seed treatments tridemorph, thiabendazole and carbendazim (3.0 g) produced fewer colonies of *A. fabae lentis* than the untreated

control. Tridemorph seed treatment gave the lowest incidence of *A. fabae lentis* infection in the seed harvested from the resulting crop.

TABLE 2. Field emergence, Ascochyta blight, yield and degree of post-harvest infection from a field trial sown with either untreated seed or seed treated with different fungicides. Means followed by the same letter are not significantly different.

Treatment	Plants/ m ²	Ascochyta blight score			Yield t/ha	Ascochyta % (Post harvest laboratory test)
		90 DAP	115 DAP	143 DAP		
Untreated	121	3.8 a	4.3 a	3.8 a	2.34 b	72 ab
Thiabendazole	132	1.1 c	1.0 c	1.7 b	3.00 a	28 d
Tridemorph	131	1.1 c	1.3 c	2.8 a	2.91 a	16 e
Mancozeb	126	2.1 b	3.0 b	3.2 a	2.78 a	81 a
Carbendazim (1.0g)	135	1.0 c	1.0 c	1.8 b	2.77 a	62 b
“ (2.0g)	148	1.1 c	1.3 c	1.7 b	3.16 a	80 a
“ (3.0g)	141	1.1 c	1.0 c	1.5 b	2.96 a	41 c
LSD	NS	0.81	0.61	0.90	0.40	11.3
CV%		31.8	27.8	32.8	12.1	23.15

DISCUSSION

None of the fungicide seed treatments affected field emergence of lentils, but all controlled Ascochyta blight for up to 115 DAP. Carbendazim and thiabendazole were still providing control 143 DAP. Harvested seed from several treatments had lower levels of seed-borne *A. fabae lentis* infection than the untreated control.

Results suggest that seed treatments to control Ascochyta blight can increase lentil yields by up to 0.82 t/ha and provide seed with a lower level of seed-borne infection. The current standard benzimidazole seed treatments used for lentils are from the “at risk to resistance” group of fungicides (Prince *et al* 1989). Tridemorph, a morpholine, and mancozeb, a dithiocarbamate, offer suitable alternative fungicides and these could be used in mixtures with products containing benzimidazoles. Some growers use benzimidazoles as foliar sprays on lentil crops during the growing season, increasing the likelihood of resistance developing in *A. fabae lentis*. By using alternative fungicides either in seed or foliar treatments the effective life of the benzimidazole group for use on lentils may be prolonged.

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