FUNGICIDE SEED TREATMENTS IMPROVE LUCERNE ESTABLISHMENT

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SUMMARY

In a field trial, treatment of seed of lucerne (*Medicago sativa*) with the fungicides metalaxyl, ofurace or pyroxyfur, increased numbers of plants, compared with no treatment, at 3 and 13 weeks after sowing. Metalaxyl + pyroxyfur in combination (1.5 + 1.5 g/kg seed) gave the greatest increase in numbers of plants (112% and 177% more than controls at 3 and 13 weeks respectively). Routine seed treatment of lucerne to improve seedling establishment is strongly recommended, but chemicals used should not adversely affect nodulation.

INTRODUCTION

Unsatisfactory establishment of lucerne has been a problem in the volcanic plateau region of the North Island of New Zealand for many years (R. Gordon pers comm; Close *et al* 1982). Difficulties with lucerne establishment, particularly after lucerne, have also been encountered in other regions of New Zealand (G.J. Rys and N.A. Thomson pers comm).

Preliminary laboratory experiments were carried out using field soil from areas near Taupo where establishment problems had occurred. Results indicated that seed treatment with systemic fungicides active against oomycete fungi (e.g. *Pythium* spp.) would improve seedling emergence and reduce post-emergence damping-off. High soil moisture levels increased seedling mortality.

We report here results of a field trial which tested the effects on seedling establishment of seed treatments with three fungicides, applied alone or in combinations.

MATERIALS AND METHODS

The field trial was sown at the MAF Wairakei Research Station on 27 October 1981. The soil at the site was an Atiamuri sand (alluvial soil derived from pumice; pH 5.5). The area had been in lucerne (cv. 'Wairau') for about 15 years followed by a winter barley crop prior to preparation for the trial.

The fungicide treatments used are listed in Table 1. Treatments were applied to 20 g samples of lucerne seed (cv. 'Saranac') in 75 ml sealed conical flasks. Dusts were applied with 0.2 ml water except when combined with the liquid pyroxyfur formulation. Laboratory germination of untreated and treated seed was assessed using AOSA methods (Copeland 1978). Also, the lengths of 25 seedlings from each treatment plus untreated control were measured after 7 days.

The trial was of randomised complete block design with 10 treatments (including untreated controls) in six blocks. For each treatment, 100 seeds were sown by hand 2 - 3 cm deep in a 1 m row, 4 days after fungicide application to seed. Rows were 0.5 m apart. The trial area was thoroughly watered immediately after sowing and again 4 days later.

The number of plants in each row was counted 3, 6 and 13 weeks after sowing. For the third count all plants were dug up.

RESULTS

Laboratory germination of untreated seed was 81.5%. Treatment of seed with fungicides did not affect germination. Ofurace at 3.0 g/kg seed significantly

Proc. 35th N.Z. Weed and Pest Control Conf.

Fig. 1. Mean numbers of lucerne plants at 3 weeks (A) and 13 weeks (B) after sowing fungicide-treated seed (viability 81.5%) at 100 seeds/m row. Means followed by the same letter are not significantly different ($P > 0.05$).

($P < 0.01$) reduced seedling length (22% shorter than controls). None of the other treatments adversely affected seedling length. Fungicide treated seed inoculated with *Rhizobium meliloti* gave satisfactory nodulation of seedlings in laboratory tests (C.N. Hale pers comm).

In the field trial, numbers of seedlings were similar at 3 and 6 weeks after sowing. The data from the 3 week seedling count are summarised in Fig. 1A. All fungicide treatments significantly ($P < 0.05$) increased numbers of seedlings relative to untreated controls. Metalaxyl + pyroxyfur treated seed gave the greatest number of seedlings (increase of 112% relative to controls). None of the other fungicide treatments except ofurace at 1.5 g/kg seed, differed significantly from metalaxyl + pyroxyfur.

At 13 weeks after sowing (Fig. 1B), the greatest number of plants occurred in rows sown with metalaxyl + pyroxyfur treated seed. The number of plants from this treatment was 177% more than from untreated seed. However, in all treatments the number of plants decreased between 3 and 13 weeks after sowing (Fig. 1). Greatest

decrease in number of plants occurred in the controls, where there were 40% fewer plants at 13 weeks than at 3 weeks. Many of the plants dug from the soil at 13 weeks after sowing had symptoms of root knot nematode (*Meloidogyne* spp) infection.

Of the viable seed sown, 20% of untreated seed produced plants which survived for 13 weeks, whereas 54% treated with metalaxyl + pyroxyfur survived for this period.

TABLE 1: Fungicide treatments applied to seed of 'Saranac' lucerne.

Fungicides	Formulation	Rate (g/kg seed)
metalaxyl	35% seed dust	1.5 3.0
ofurace	50% wettable powder	1.5 3.0
pyroxyfur	72% emulsifiable concentrate	1.5 3.0
metalaxyl + ofurace		1.5 + 1.5
metalaxyl + pyroxyfur		1.5 + 1.5
ofurace + pyroxyfur		1.5 + 1.5

DISCUSSION

Treatment of lucerne seed with the three fungicides improved establishment of seedlings in the first 3 weeks after sowing. The effects of the seed treatments were still evident 13 weeks after sowing regardless of the decline in numbers of plants that occurred in all treatments between 6 and 13 weeks after sowing. The causes of this decline are unknown. Nematode and fungal infection of roots, or insect and other animal damage could have caused death of plants during this period. Further investigation of plant death during the later stages of establishment is warranted.

The fungicide seed treatments gave improved seedling establishment under damp conditions in an area where lucerne had been previously grown, the situation usually associated with poor establishment. Fungicide treatments can be easily applied to bare seed prior to sowing, and are inexpensive because of the small amounts of chemicals required. Close *et al* (1982) advocated the application of fungicides to pelleted seeds. The chemicals should not adversely affect nodulation. We strongly recommend that fungicides of the type used in the present trial be routinely applied to lucerne seed as an insurance against establishment failure.

ACKNOWLEDGEMENTS

The assistance of the following is gratefully acknowledged: Mr R. Gordon; Mr M. Fraser and staff of the MAF Wairakei Research Station; Mrs S. Shaw, Mr M.J. Christensen and staff of the MAF Seed Testing Station, Palmerston North for technical assistance.

REFERENCES

- Close, R.C., Harvey, I.C. and Sanderson, F.R., 1982. Lucerne diseases in New Zealand and their control. In "Lucerne for the 80's". Agronomy Society of New Zealand, Special Publication No. 1, pp.61-69.
- Copeland, L.O., 1978. Rules for Testing Seeds. Association of Official Seed Analysts. Ed. L.O. Copeland. *J. Seed Technology* 3 (3): iii + 126 pp.