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Control of Rhizoctonia infection in Pinus radiata seedlings in the Manjimup pine nursery

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Abstract: Control of Rhizoctonia on pine seedlings at the Manjimup pine nursery was attempted using "Rizolex" fungicide drench. It was not successful. Assessment of the effect of "Rizolex" on the proportion of mycorrhizal roots of seedlings at Gnangara nursery was not completed because the Manjimup experiment was unsuccessful.

Introduction

Damping-off and hypocoyl infection associated with binucleate and multinucleate Rhizoctonia spp. has emerged as a problem in the new Manjimup pine nursery. Preliminary sampling showed that about 10 percent of seedlings were affected. Many fungicides which control Rhizoctonia have a wide spectrum of activity which may inhibit the formation of mycorrhizas in seedling roots. As the new nursery site has to be infested with suitable mycorrhizal fungi, drenching with a broad spectrum fungicide to control Rhizoctonia might reduce the effectiveness of Rizopogon inoculum. Shell Chemical (Australia) Pty. Ltd. market a fungicide "Rizolex" which is fairly specific for Rhizoctonia. This experiment was designed to assess the efficacy of "Rizolex" against Rhizoctonia when applied as a soil drench, and to determine whether "Rizolex" affected the proportion of mycorrhizal roots on seedling pines.

Methods

A. Assessment of the effect of "Rizolex" against Rhizoctonia infection at Manjimup nursery.

This was a randomized block design of three treatments (0, 0.27kg ha^{-1}a.i., 0.63kg ha^{-1}a.i) Rizolex replicated three times. Fungicide application was on 20.11.89 and was followed by 17 mm of irrigation. Plants were sampled before (6.11.89) and 21 days after (11.12.89) fungicide application.

The seedlings were randomly selected from experimental areas. The following day the hypocotyl region (2 cm from above the first lateral to just above ground level) was excised. In the first harvest the hypocotyls were washed in running tap water, surface sterilized in 70% ethanol for 10 seconds, washed in two changes of sterile, distilled water and plated into 0.2% malt agar. The plates were incubated at 20°C and assessed after 3 days.

The seedling hypocotyl at the second harvest were treated differently. They were washed in sterile distilled water, blotted dry, then plated onto water agar. The plates were incubated at 20°C and assessed after 1 and 2 days.

B. Assessment of the effect of "Rizolex" on mycorrhizal infection at Gnangara nursery

This was a randomized block design of three treatments (0, 0.85kg ha^{-1}a.i. and 3.42kg ha^{-1} a.i.) "Rizolex". Fungicide was applied on 16.11.89. Plants were sampled before (3.11.89) Rizolex application. They were not sampled afterwards because the Manjimup trial was not successful.

The seedlings were randomly selected from the experimental areas. The root systems from each sample of plants were washed thoroughly and then the fine lateral roots were stripped from the plant and weighed. The proportion of mycorrhizal and non-mycorrhizal roots in four 0.2g samples of fine laterals per bulk sample was assessed by a modification of the Newman method (Newman 1966).

Results

Application of "Rizolex" as a soil drench to pine seedlings at the Manjimup Nursery did not reduce the proportion of seedlings infected with Rhizoctonia assessed 21 days after fungicide application (Table 1).

The proportion of mycorrhizal roots on plants at the Gnangara nursery before application of "Rizolex" is shown in Table 2. An assessment after "Rizolex" treatment was not done because the fungicide did not reduce Rhizoctonia infection at the Manjimup pine nursery.

Conclusions

Further trials need to be initiated to attempt to control Rhizoctonia at the Manjimup nursery.

Table 1

Proportion of pine seedling hypocotys infected with Rhizoctonia at Manjimup Nursery following "Rizolex" application

Treatment	Harvest 1 (2 weeks before application)		Harvest 2 (3 weeks after application)	
	n	%	n	%
Control				
1	36	22.2	31	9.7
2	36	30.6	31	22.6
3	36	11.1	31	16.1
"Rizolex" 0.27kg ha^{-1} a.i.				
1	36	22.2	31	16.1
2	36	11.1	31	19.3
3	36	2.8	31	22.6
"Rizolex" 0.68kg ha^{-1} a.i.				
1	36	16.7	31	22.6
2	36	16.7	30	16.1
3	36	30.6	31	33.3

Analysis of variance for proportion (using arcsine $\sqrt{}$ transformed data)

	DF	SS	MS	F	P
treatments	2	0.0289	0.01445	1.04	0.382
replicates	2	0.00085	0.00043	0.03	0.970
time	1	0.00405	0.00405	0.29	0.599
error	12	0.16619	0.01385		
total	17	0.19999			

References

Newman, E.I. (1966), A method of estimating the total length of root in a sample. Journal of Applied Ecology 3, 139-145.

Table 2

Proportion of mycorrhizal roots on pine seedlings from Gnangara nursery sampled before "Rizolex" application

Proposed Treatment		Proportion of mycorrhizal roots (%)
Control	1	37.1
	2	35.5
	3	34.4
Low "Rizolex"	1	46.8
	2	47.0
	3	51.7
High "Rizolex"	1	53.9
	2	62.2
	3	60.6