SEED TREATMENTS AND FOLIAR SPRAYS FOR CONTROL OF SCALD OF BARLEY

J. EDMUND SHERIDAN, MARY H. SHERIDAN and
JEFFREY D. EDEN

Botany Department, Victoria University of Wellington, Wellington

SUMMARY

Four seed treatment fungicides were evaluated for control of scald (*Rhynchosporium secalis*) on twelve barley cultivars in autumn 1984. Treatments containing triadimenol gave best control, holding the disease in check up to head emergence. In a foliar spray trial in spring 1984, two applications of propiconazole and DPX H 6573 gave 100% control of scald on the cultivars Triumph and Goldmarker.

INTRODUCTION

Scald always has been a common fungal disease of barley throughout New Zealand. While net blotch (*Pyrenophora teres*) has been very effectively controlled with imazalil containing seed treatments, scald remains prevalent and particularly troublesome in winter sown and early spring sown crops. In a nationwide survey in 1983-84 scald was found in 70% of winter sown and 62% of spring sown barley crops in the South Island (Sheridan and Grbavac 1984; Sheridan *et al* 1984). Incidence reached 100% in many crops by Feekes Growth Stage 8 (Zadoks 37); and in some crops the mean diseased area of the top three leaves reached 40% by Feekes G.S. 11.1 (Zadoks 77). Control is normally achieved by the application of a foliar fungicide although there is increasing interest in the use of systemic seed treatments. *Rhynchosporium secalis* has been shown to be very sensitive to triadimenol in laboratory assays (Hollomon 1984). Two seed treatments are currently available containing triadimenol and one of these is being used for net blotch control. This paper reports on trials in autumn and spring of 1984 to investigate the effectiveness of seed treatment fungicides and foliar fungicides respectively in control of scald.

MATERIALS AND METHODS

Treatments with the rates of application and cultivars used are in the accompanying tables. Application of the seed treatment products was as described for net blotch control (Sheridan and Grbavac 1983, 1984). Field trials were on land previously cropped in barley and carrying a high inoculum of *R. secalis* (Carterton) or on land cropped with fodder radish (Gladstone). The autumn trial was sown on 7 May 1984 and consisted of 5 m rows with treatments and cultivars completely randomised in blocks. The spring trial was sown on 27 October 1984 and consisted of 10 m × 2 m plots with treatments completely randomised for each of two cultivars. The seed used in the foliar spray trial was untreated.

Foliar sprays were applied with a knapsack sprayer fitted with a 3-nozzle boom (Allman "o" nozzles) and a Norgren RO6 pressure regulator and 0-400 kPa gauge operating at 200 kPa. The fan jets delivered, on average, a total of 300 litres/ha. Sprays were applied on 5 December at Feekes G.S. 6 (Zadoks 31) and 19 December 1984 at G.S. 9(39) in the early morning under more or less calm conditions.

Disease assessment began at G.S. 1(10) to determine primary infection and continued at intervals to G.S. 11.1(77). Disease severity was assessed visually on a 0-4 scale (29 August and 1 September for seed treatment trial) and on 10 tillers taken at random in each row or along a diagonal in each plot (all others) using a disease assessment key (James 1973). Plots were harvested on 13 February 1985 with a Massey-Ferguson combine with 1.6 m swath.

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TABLE 1: The effect of seed treatments on severity of scald assessed visually† at Feekes G.S. 6-7 (31-36).

Cultivar	Scald severity									
	triadimenol + fuberidazole 15 g + 2 g Baytan F17		triadimenol + imazalil 15 g + 5 g Baytan IM		imazalil 5g Fungazil		carboxin + thiram 50 g + 50 g Vitaflo 200		untreated	
	1*	2	1	2	1	2	1	2	1	2
Aclaim	2	2	2	3	4	4	4	4	4	4
Georgie	2	3	2	2	4	4	4	4	4	4
Goldmarker	2	2	3	3	4	4	4	4	4	4
Grit	2	1	1	2	4	4	3	4	3	3
Hassan	1	2	1	2	3	4	3	4	4	4
Kaniere	2	1	0	1	3	4	2	4	3	3
Lada	1	1	1	1	4	4	4	4	3**	4
Mata	1	1	1	1	2	4	3	3	2**	3
Maxima	0	1	1	1	1	2	1	1	1**	2
Porter	0	1	1	2	4	4	2	4	3	3
Triumph	2	1	1	2	3	4	3	4	4	4
Zephyr	2	2	2	1	3	4	3	3	1**	3
Mean	1.4	1.5	1.3	1.8	3.3	3.8	3.0	3.6	3.0	3.4

† 1 = present 2 = light infection 3 = moderate infection 4 = heavy infection.

* Site 1: Carterton, following barley. Rep. 1 only assessed on 29 August.

Site 2: Gladstone, following oil seed rape. Rep. 1, 2 and 3 assessed on 1st September.

** Net blotch infection was heavy.

TABLE 2: The effect of seed treatment on severity of scald assessed on ten tillers per row† at Feekes G.S. 10-10.5 (45-59).

Cultivar	Mean diseased leaf area (%)					
	triadimenol + fuberidazole 15 g + 2 g*	triadimenol + imazalil 15 g + 5 g	imazalil 5 g	carboxin + thiram 50 + 50 g	untreated	cultivar mean
Aclaim	3.8	4.6	22.8	10.6	22.5	12.9
Georgie	20.5	20.5	65.8	56.8	47.5	42.2
Goldmarker	31.5	26.8	27.1	32.3	35.3	30.6
Grit	18.3	3.9	22.5	16.6	17.6	15.8
Hassan	2.9	20.8	40.0	37.1	56.0	31.4
Kaniere	6.4	0.3	2.5	4.8	7.8	4.4
Lada	4.8	0.3	6.6	14.3	9.7	7.1
Mata	8.9	0.4	12.1	15.8	15.0	10.4
Maxima	0.1	0.3	0.0	0.8	0.3	0.3
Porter	0.8	8.3	31.5	9.8	6.0	11.3
Triumph	5.8	10.3	17.0	10.7	26.6	14.1
Zephyr	1.8	8.5	12.9	12.3	9.3	9.0
Treatment mean	8.8	8.8	21.7	18.5	21.1	15.8

† Mean diseased area of top 2 leaves averaged over 2 replicates: Carterton site, 6 October 1984.

* rate ai/100 kg seed

RESULTS

Seed Treatments: Autumn 1984.

Scald was first observed during mid-July at Gladstone and mid-August at Carterton. It developed rapidly on all cultivars, except Maxima, at both sites. A visual assessment at Feekes G.S. 6-7 (32-36) showed considerably less disease where triadimenol containing seed treatments were used. Scald severity was 50% less for all cultivars following triadimenol treatment than for the untreated (Table 1). There was no difference between the carboxin + thiram or the imazalil treatment and the untreated check. Results of a later assessment at Carterton at G.S. 10-10.5 (45-59) essentially supported these findings and indicated 58% control of scald by the triadimenol seed treatments at this late growth stage (Table 2). There were considerable differences in disease severity between cultivars, with Hassan, Georgie and Goldmarker showing the highest severity.

Foliar Sprays: Spring 1984.

All fungicides gave significant control of scald on both cv Triumph and Goldmarker when two applications were made (Table 3). Propiconazole and DPX H 6573 gave complete control on both cultivars, with 23% and 30% yield increases respectively with cv Triumph. However, none of the yield increases were statistically significant. An early spray application was generally better than a late application. This was particularly marked in the case of fenpropimorph and the mixture of tridemorph + carbendazim + maneb, neither of which gave significant control following a single late application.

TABLE 3: The effect of foliar fungicides on control of scald in the cultivars Triumph and Goldmarker at Feekes G.S. 11.1 (75-77).

Treatment and rate ai/ha		Control as % of untreated					
		Triumph			Goldmarker		
		Early	Late	Early + Late	Early	Late	Early + Late
propiconazole	125 g	84 a*	86 a	100 a	91 a	89 a	100 a
DPX H 6573	200 g	94 a	91 a	100 a	97 a	94 a	100 a
prochloraz	450 g	77 a	86 a	99 a	—	—	—
triadimenol	125 g	—	—	—	79 a	92 a	99 a
fenpropimorph	750 g	83 a	38 b	96 a	—	—	—
tridemorph, cabendazim + maneb-mixture	2128 g	—	—	—	93 a	19 b	92 a
untreated disease severity**		23.4 b	39.7 b	31.0 b	28.1 b	40.6 b	39.3 b

* Analyses on disease severity. A common letter denotes no significant difference at the 5% level. Read down the columns.

** The mean diseased area of the top 3 leaves.

DISCUSSION AND CONCLUSIONS

These studies have shown that triadimenol applied as a seed treatment gives considerable control of scald on all barley cultivars tested. This supports laboratory assays (Hollomon 1984) in which *R. secalis* was sensitive to triadimenol. The fuberidazole component did not appear to add to control by triadimenol (see also Wainwright *et al* 1979). Despite the good control given by seed treatment scald developed rapidly at late growth stages on all cultivars, except the resistant cv Maxima. There is a need therefore to use foliar fungicides as well as seed treatments. On the susceptible cvs Goldmarker and Triumph, two applications of propiconazole and of the experimental fungicide DPX H 6573 gave complete control despite high inoculum pressure. Triadimenol, tested only on cv Goldmarker, gave control which was not significantly different from that of propiconazole. A single early spray (at Feekes G.S.

6) of all fungicides tested generally gave good control but a single late spray (at Feekes G.S. 9) failed to give significant control when fenpropimorph or the mixture of tridemorph + carbendazim + maneb was used. In the commercial situation an application with a herbicide would be more desirable than a later application.

While these trials showed triadimenol very effective in scald control both as a seed treatment and foliar spray, this fungicide should not be used if net blotch is likely to be present. Triadimenol does not control the prevalent strain of net blotch at the present time (Sheridan and Grbavac 1985). Propiconazole and prochloraz give good control of net blotch (Sheridan *et al* 1983). No reports of the effectiveness of DPX H 6573 on net blotch in New Zealand are available.

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