NEW PRODUCTS AND CONTROL STRATEGIES FOR SPECKLED LEAF BLOTCH IN WHEAT

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SUMMARY

The fungicides triadimefon, RH 2161, chlorothalonil, carbendazim and benomyl all reduced the severity of disease when applied to crops as foliar sprays, and significant yield responses were obtained in field plots. Disease was shown to be present in the crop from the end of July onwards, and continued through to maturity at varying levels of severity. The early phase of the epidemic was shown to be the most damaging, with reductions to the grain number per ear and ear number per unit area as well as to the individual grain weight. Provisionally, it is recommended that the disease be controlled by one or two foliar sprays of suitable fungicides during August. The future use of alternative strategies, including seed treatment, is discussed.

INTRODUCTION

In many countries, glume blotch caused by *Leptosphaeria nodorum* Muller (imperfect state *Septoria nodorum* Berk.) is considered to be a major pathogen of wheat (Jones and Rowling 1976; Melville and Jemmett 1971). Investigations have shown that a range of fungicides may be effective in controlling the disease. In New Zealand (Sanderson 1978) and Australia (Brown *et al* 1978), speckled leaf blotch caused by *Mycosphaerella graminicola* (Fuckel) Schroeter (imperfect state *Septoria tritici* Rob. ex Desm.) causes a similar symptom but is confined to the leaf laminae. In these countries it is considered to be a more important disease than glume blotch. In autumn-sown crops in the Canterbury area, reductions in yield of up to 40% have been attributed to the disease (Sanderson 1978), though reductions of 10-20% would be more usual (Gaunt and Thomson, unpublished). Little attention has been paid to chemical control of epidemics of speckled leaf blotch and there is a dearth of published information both on the optimal timing of control treatments and on the comparative efficacy of a range of chemicals.

Sanderson and Hampton (1978) concluded that ascospores released from perithecia were probably the primary source of inoculum, and that from late-August onwards pycnidiospores produced within developing lesions became the dominant inoculum source for secondary spread. In a series of trials, we assessed the efficacy of ten fungicide treatments, and the influence of the early and late phases of the natural epidemic. The results are summarized in this paper.

METHOD

Treatment plots were made out after establishment of winter wheat, cv Kopara sown 15 May 1979 on the Research Farm, Lincoln College. Each treatment plot was surrounded by a 0.5 m access path and each of four replicate blocks was separated from other blocks by a 10 m buffer zone. All buffer zones were untreated to provide an adjacent inoculum source, designed to be a more severe test of screened chemicals than the commercial situation where inoculum pressure over a large area would be reduced by successful treatments.

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Fungicide sprays (see Table 1) were applied to the plots (12.5 x 6 m) by a hand-carried 3 m counterbalanced boom, from each side of the plot to give full coverage. When appropriate, spraying oil was added to aid wetting, and a water-sprayed plot was included as an additional control to an untreated control plot. Sprays were applied on 22 August, 7 September and 26 September at Growth Stages 23,24 and 30 respectively (Zadoks *et al* 1974).

At harvest, ten 0.1m² quadrat samples were removed from the central strip of each plot for detailed yield analysis of the number of ears per unit area, number of grain per ear and individual grain weight. A central 3 m strip was then harvested mechanically and the header yield and individual grain weight recorded.

RESULTS AND DISCUSSION

Several of the fungicide combinations successfully reduced the disease severity in treated plots, and caused yield responses at final harvest. Triadimefon and RH 2161 (Rohm and Haas Co.) both with and without mancozeb caused the largest yield increases (Table 1), and chlorothalonil, benomyl and carbendazim plus mancozeb also caused significant increases in yield. Mancozeb by itself had no significant effect on yield, and had no interactive effect when used in combination with other fungicides. Previous reports of efficacy for mancozeb (e.g. Kuiper 1978) have been based on regular spray programmes with a greater number of applications than in the present trial. In laboratory trials, mancozeb acted by inhibiting spore germination and mycelial growth (Chan and Gaunt unpublished), but our observations lead us to conclude that mancozeb, as a protectant chemical, would need regular applications to realise the potential for control of the pathogen. The economics of such frequent applications is not favourable. Captafol caused a decrease in yield both when used singly and in conjunction with triadimefon. Some phytotoxicity was observed in treated plots. Captafol has been recommended as a satisfactory chemical for control of glume blotch, but our trials indicated a lack of efficacy for speckled leaf blotch.

For those treatments which increased yield, the most consistent effect was shown to be on the number of grain per unit area (Table 1), with a small and mostly insignificant effect on individual grain weight. In some treatments, the number of ears was influenced whilst in others the number of grain per ear contributed to the increase in the number of grain. From a knowledge of the development of yield potential

TABLE 1: Effect of fungicidal control of speckled leaf blotch on yield of wheat.

Treatment		Header sample % Yield increase	Quadrat sample	
Fungicide	Rate g/ha		No. grain /m ² (x 10 ⁻³)	Grain weight (mg)
triadimefon	125	13.0**	22.2*	31.5
RH 2161	250	12.8**	22.3*	31.4
RH 2161 plus mancozeb	250 + 1600	12.8**	21.5	32.3*
triadimefon plus captafol	125 + 1500	9.2*	22.3*	30.4
chlorothalonil	166	8.2*	22.0*	30.6
benomyl	250	7.8*	20.9	32.0
carbendazim plus mancozeb	250 + 1600	5.1*	22.5*	30.4
mancozeb	1600	1.1	20.8	30.1
imazalil	75	-2.5	21.0	28.5
captafol	1500	-5.4*	20.1	28.0*
control (i) water	-	-0.6	20.9	28.5
(ii) nil	-	-	20.6	29.1

* Significantly different $P \leq 0.05$. ** $P \leq 0.01$

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(Gaunt, 1978) it is known that these components are influenced at early stages of plant growth, prior to anthesis. The epidemic of speckled leaf blotch occurred from early August and continued to maturity in those plots which did not receive fungicide treatments. Our results indicated that speckled leaf blotch should be controlled during winter and spring, and that this may best be achieved by foliar sprays of either triadimefon or benzimidazole-generating fungicides. The efficacy of chlorothalonil requires further confirmation, and RH 2161, although effective, is not available commercially at the present time.

In the future, some attention should be given to the potential of seed treatment for control of this disease. Though symptoms appear only some 8-10 weeks after sowing, growth is slow during this period. Thus little dilution of the chemical will occur, and chemicals such as triadimenol and benzimidazole-generating fungicides may provide some protection against the early stages of development of this disease. These aspects are being investigated at Lincoln College.

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