PIRIMICARB SPRAY TIMING FOR ROSE-GRAIN APHID CONTROL IN BARLEY

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SUMMARY

Optimum timing of pirimicarb application for the control of rose-grain aphid (*Metopolophium dirhodum*) on barley was studied in two trials in the 1985-86 season. Aphid numbers were reduced by an application during the stem extension stage of plant growth but numbers recovered during the flowering to milky-ripe stages. This recovery was less in barley sprayed at the flag leaf sheath extension stage, and the overall aphid burden was reduced to 19-46% of that found with pirimicarb applied at an earlier growth stage.

INTRODUCTION

Trials by Stufkens and Farrell (1984, 1985) on rose-grain aphid (RGA) (*Metopolophium dirhodum*) control in oats and barley at Lincoln have shown that aphid numbers rise above 10/tiller late in the stem extension stages, peak at heading and decline below 10/tiller at the watery-ripe stage. Peak numbers/tiller of 115 in barley and 240 in oats have been recorded. When pirimicarb was applied at the flag leaf sheath extension stage in four trials, aphid numbers did not subsequently recover above 11/tiller, and grain yields were increased by more than 10% over untreated controls. There was no yield response to application of pirimicarb at heading or flowering stages and total aphid burdens over the season were 4-10 times greater than under the earlier spray regime (Stufkens and Farrell 1984, 1985).

This paper reports trials in which we compare the effect of pirimicarb application at stem extension, and at flag leaf sheath extension stages, on RGA populations on barley in mid-Canterbury.

METHODS

Plant growth stage at insecticide treatment was varied in two ways: by varying spray date with a constant sowing date (Trial 1) and by varying sowing date with a constant spray date (Trial 2).

Triumph barley was drilled in 15 cm rows at *c.* 120 kg seed/ha, and treated with pirimicarb (Pirimor 50) at 125 g ai/ha with a controlled droplet spray applicator (Trial 1) or a high-volume cone-jet sprayer (Trial 2). The decimal code was used to define plant growth stages (GS) (Zadoks *et al* 1974).

Trial 1, at Lincoln, was sown on 22 May 1985, and received three treatments: sprayed at GS 31 (12 September); sprayed at GS 39 (17 October); and a control treatment without insecticide. Five 40 m^2 replicates were used in a randomized block design.

Trial 2 was part of an agronomy trial at Templeton directed by Dr R.J. Martin (MAF). Barley was sown on four dates (7 May, 10 June, 2 July and 6 August 1985) with three replicates of 100 m^2 plots in a randomized block design. Insecticide was applied on 17 October to all sowing date treatments at GS 41, 37, 34 and 32 respectively.

Numbers of RGA were recorded on tiller samples taken on 10 occasions between 25 September and 4 December in Trial 1 and on six occasions between 30 October and 12 December in Trial 2. Samples comprised 10-100 tillers/plot. Tiller number/sample was reduced as aphid population density increased. Number of aphids/tiller x days infested was used to estimate the aphid burden in aphid days (AD).

RESULTS

Numbers of RGA in unsprayed barley (Trial 1) rose above 1/tiller in late September and fell to this level again in early December. Two peaks in aphid numbers occurred in sprayed plots — before spraying, and after the period of effective insecticide cover on the foliage. Immediately after spraying numbers fell below 1/tiller. Tables 1 and 2 show data on plant growth stage and aphid population density at each peak, together with aphid burdens (AD) sustained before and after spraying. These data illustrate the following points.

1. Before spraying, aphid numbers (< 1-20/tiller) and AD values (1-200) varied with plant growth stage.
2. Peak aphid numbers occurred at GS 53 in unsprayed plots but were delayed to GS 65-77 in sprayed plots.
3. Aphid peaks (49-78/tiller) following sprays at GS 31-37 were significantly greater than those following sprays at GS 39-41 (4-16/tiller, $P < 0.01$).
4. Total aphid burdens for the period of infestation were substantially greater in plots sprayed at GS 31-37 (1111-1480 AD) than in those sprayed at GS 39-41 (250-510 AD). Plots sprayed at later growth stages supported aphid burdens which were 19% (Trial 2) — 46% (Trial 1) of those sprayed at an earlier growth stage.

TABLE 1: Plant growth stages (GS) and RGA numbers in Trial 1.

		Date of pirimicarb application	
	Untreated	12 September	17 October
GS at spray date	—	31	39
Aphid n/tiller at spray	—	<1	20
Aphid burden (AD) pre-spray	—	1+	200
GS at aphid peak	53	71	71
Aphid n/tiller at peak	74	49	16**
Aphid burden (AD) post-spray	1825	1110	310
Total aphid burden (AD)	1825	1111	510

**P < 0.01 +estimated

TABLE 2: Plant growth stages (GS) and RGA numbers in Trial 2, sprayed 17 October.

	Sowing date			
	7 May	10 June	2 July	6 August
GS at spray date	41	37	34	32
Aphid n/tiller at spray +	20	10	2	1
Aphid burden (AD) pre-spray	200	100	20	10
GS at aphid peak	77	73	71	65
Aphid n/tiller at peak	4**	74	75	78
Aphid burden (AD) post-spray	50	1380	1270	1180
Total aphid burden (AD)	250	1480	1290	1190

**P < 0.01 +estimated

DISCUSSION

The period of RGA control following pirimicarb treatment of barley in the present work, and in other trials at Lincoln, was about three weeks (Stufkens and Farrell, unpublished). This means that optimum spray timing is necessary to get maximum benefit from one application. Results in Tables 1 and 2 show that application of pirimicarb during barley stem extension (GS 31-37) may allow recovery of aphid

numbers to a peak at the flowering-milky ripe stages (GS 65-73), resulting in an aphid burden similar to that on unsprayed barley. Delay in application until flag leaf sheath appearance (GS 39-41) was followed by only a slight aphid resurgence and substantially lower aphid burdens. As late spraying (GS 55) has been shown to be ineffective for aphid control in barley (Stufkens and Farrell 1985), we conclude that the optimum timing for pirimicarb sprays against *M. dirhodum* on barley is at GS 39-41.

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