Section V. Cereal Crop Pests

IMIDACLOPRID AS AN APHICIDE IN SPRING CEREALS - EFFECTS ON BENEFICIALS D. E. Bragg Department of Entomology Washington State University P. O. Box 190, Pomeroy, WA 99347-0190 1(509)843-3701 braggd@coopext.cahe.wsu.edu

Identical plots of Baronesse spring barley and Centennial spring wheat were seeded by small plot drill on 14 May, 1995, at the USDA-ARS Western Regional Plant Materials Introduction Center at Central Ferry, WA. Imidacloprid (Gaucho 480) was applied as a seed treatment to one treatment at a rate of 1.0 oz. AI. Dimethoate was applied 20-days after crop emergence (DAE) to a second treatment at a rate of 0.38 lb. AI by CO2 backpack sprayer calibrated at 20 GPA and 20 PSI, with the spray buffered to pH 5.0. A third treatment consisted of an untreated check. The wheat and barley plots were 10 x 30 ft replicated 4 times in a randomized complete block design.

The experiment was designed to measure 1) the impact of Russian wheat aphid (RWA) (and other cereal aphids present) on spring wheat and spring barley at economic injury levels; 2) the value of Imidacloprid as an aphicide in spring cereals; and 3) effects of aphid controls on parasitoids of RWA and other species.

All treatments were evaluated at 6, 13, 20, 27,, 34, 41, 48, and 55-DAE by visual examination for each aphid species per plant tiller plus the number of aphids per tiller. The mean number of aphids parasitized was calculated for each treatment. Only RWA were found to be parasitized by the parasitoid *Diaeretiella rapae* (Hymenoptera: Aphidiidae), with the exception of 2 alate specimens of *Rophalosiphum padi* (L.), which produced male parasitoids (haploid).

Dimethoate was applied 20-DAE for both spring wheat and spring barley trial dimethoate treatments, at approaching economic injury levels for RWA. Dimethoate is registered for spring wheat but not for spring barley as of this time, but was used as a standard spring foliar insecticide for the purposes of these experiments. Evaluation was done on 6-DAT (27-DAE) and 13-DAT (34-DAE) as well as on all other DAE dates.

RWA were found at 6-DAE and increased rapidly in both the check and dimethoate treatments in both crops. Economic injury levels were reached in both crop trials by 20-DAE. Other cereal aphids present (Tables 1a & 1b.) did not reach economic injury levels for spring cereals, and were not parasitized except for the *R. padi* record mentioned above. By crop maturity the RWA levels in the check reached 100 percent infested tillers for barley with a mean of 88 aphids/tiller. RWA levels in the wheat trial check reached 100 per cent infested tillers with a mean of 106 aphids/tiller.

Although dimethoate reduced RWA to 0 by 6-DAT, RWA returned to better than economic injury levels by 13-DAT, and increased to near check levels in both trials by 55-DAE. RWA began to appear in the Imidacloprid treatments by 27-DAE, but never reached economic injury levels in either trial by 55-DAE. By 55-DAE the mean number of aphids parasitized was comparable between the check and Imidacloprid treatments in both trials. Parasitoid levels in the dimethoate treatments never recovered to levels equal to the check and the Imidacloprid treatments (Tables 2a. & 2b.).

Harvest date was collected for the 2 trials by meter square samples from each replicate being threshed to provide bushels per acre for wheat and pounds per acre for barley (Tables 3a & 3b.).

Significant differences between yields of the treatments in both trials demonstrate that Imidacloprid provides good RWA control compared to a dimethoate foliar treatment and a check, is not disruptive to RWA parasitoids, and is economically viable in providing yield increases over the checks and foliar treatments at a cost comparable to a foliar insecticide application. Data were analyzed by ANOVA (p = 0.05; LSD).

Treatment/Form.	Rate lb(AI)- acre	Mean Percent Aphid Infested Tiller (Mean Aphid/Tiller) - Spring Barley								
		Aphid Spp.	6-DAE	13-DAE	20-DAE*	27-DAE**	34-DAE***	41-DAE	48-DAE	55-DAE
<u>Check</u>		RWA EGA OBCA	2(1)a Oa Oa	3(1)a 0a 0a 0a	15(5)a 1(1)a 0a 0a	48(7)a Oa 1(1)a Oa	87(24)a 1(1)a 1(1)a 1(1)a	70(53)a Oa Oa Oa	100(61)a Oa Oa Oa	100(88)a 0a 0a 0a
Dimethoate	0.38	RWA EGA OBCA	2(1)a 0a 0a	3(1)a Oa Oa	15(5)a 1(1)a 0a	1(1)b Oa 1(1)a Dal	19(2)ab 1(1)a 1(1)a 1(1)a	12(6)ab Oa Oa Oa	83(5)ab 0a 0a 0a	80(63)a `0a 0a 0a
Gaucho	1.0oz	RGA RRA EGA OBCA RGA	Da Ob Oa Oa Oa	Ob Oa Oa Oa	1(1)b 0bl) 0b 0a	5(2)b Oa 1(1)a Oa	7.5(4)b Ob 1(1)a 1(1)a	1(3)b Oa Oa Oa	8(5)b- Oa Oa Oa	14(15)b Oa Oa Oa
Facks Gron Stage		and the second second	1	2	3	6-7	10	10.5	11	11+

TABLE 1A:

* Dimethoate applied

** 6-DAT Dimethoate application

*** 13-DAT Dimethoate application

Means followed by same letter are not significantly different (p = 0.05; LSD)

TABLE 1B:

	Rate	Mean Percent Aphid Infested Tillers (Mean aphid/Tiller) - Spring W							heat	and and
Treatment/Form.	acre	Aphid Spp.+	6-DAE	13-DAE	20-DAE*	27-DAE**	34-DAE***	41-DAE	48-DAE	55-DAE
Check		RWA	1(1)a	3(1)a	10(2)a	29(13)a	64(21)a	87(71)a	95(250)a	1007106)a
		EGA	0a	0ā	0'a	0a	13(3)a	10(1)a	0a	0a
		OBCA	0a	0a	0a	10(1)a:	12(2)a	11(1)a	0a	110(1)a
		RGA	0a	0a	Oa	0a	19(5)a	Oa	0a .	0a
Dimethoate 0.3	0.38	RWA	ОЪ	3(1)a	10(2.5)a	ОЪ	31(5)ab	42(9)ab	59(19)ab	72(84)ab
		EGA	0'a	0a	Oa	0a	7(1)ab	2(1)b	0a	0a
		OBCA	0a	0a	0a	ОЪ	3(1)ab	2(1)ab	Oa	10(1)a
		RGA	0a	Oa	0a .	0a	8(3)ab	0a	0a	0a
Gaucho	1.0oz ·	RWA	ОЪ	0Ъ	Oa	5(2) ab	4(3)b	2(1)b	6(3)b.	9(14)b
		EGA	0a	0a	0a	Oa	1(1)b	1(1)b	0a	0a
		OBCA	0a	0a	0a	0Ъ	0Ъ	1(1)b	0a :	10(1)a
		RGA	0a	0a	0a	0a	1(1)b	Oa	0a	0a
Feeks Crop Stage	Neg T		1	2	3	6-7	10	10.5	11	11+

* Dimethoate applied

** 6-DAT Dimethoate application

*** 13-DAT Dimethoate application

Means followed by same letter are not significantly different (p = 0.05; LSD)

TABLE 2A:

Rate Mean Percent KWA Parasitized/Treatment - Spring Barley

Treatment/Form.	1b(AI)- acre	6-DAE	13-DAE	20-DAE*	27-DAE**	34-DAE***	41-DAE	48-DAE	55-DAE
Check		Oa	1a	la	4a	6a	8.5a	67.5a	82.5a
Dimethoate 400	0.38	0a	ОЪ	ОЪ	ОЪ	0Ъ	ОЪ	1.25b	13.75b
Gaucho	1.0oz	Oa	ОЪ	ОЪ	0Ъ	0Ъ	ОЪ	2.05	48.75a
Feeks Crop Stage		1	2	3	6=7	10	10.5	11	11+

* Dimethoate applied ** 6-DAT Dimethoate application *** 13-DAT Dimethoate application Means followed by same letter are not significantly different (p = 0.05; LSD)

TABLE 28:

	Rate Mean Percent EMA Parasitized/Treatment - Spring Wheat									
Freatment/Form.	1b(AI)- acre	6-DAE	13-DAE	20-DAE*	27-DAE**	34-DAE***	41-DAE	48-DAE	55-DAE	
Theek		0a	0a	0a	la	5.5a	11.25a	77.5a	72.5a	
	0.38	0a	0a	Oa	ОЪ	ОЪ	1b	1.5b	15.0b	
Gaucho	1.0oz	0a	Oa	0a -	ОЪ	0Ъ	2.25Ъ	10.05	63.75a	
Feeks Crop Stage		1	2	:37	6-7	10 .	10.5	11	11+	

* Dimethoate applied ** 6-DAT Dimethoate application

*** 13-DAT Dimethoate application

Means followed by the same letter are not significantly different (p = 0.05; LSD)

TABLE 3A:

Treatment/Form.	Rate	Spring barley yie			
	acre	Tield/Lb/Acre	Lb. Increase*	Value of Increase**	
Check	- Gertina	1599.12			
Dimethoate	0.38	1918.95	319.83	\$18.39	
Gaucho	1.0oz-	4797.36	3198.245	\$183.90	

* Increase in pounds per acre over check

** Based on average barley price of \$115 per ton for spring barley in 1995

Data are significantly different (p =).05; LSD)

TABLE 3B:	Rate Spring wheat yield compared to check								
Treatment/Form.	acre	Yield/Bu/Acre	Bu. Increase*	Value of Increase**					
Check		20.35		ter a service a service se					
Dimethoate	0.38	31.40	11.05	\$52.50					
Gaucho	1.0oz	50.00	29.65	\$140.80					

* Increase in bushels per acre over the check

** Based on average wheat price of \$4.75 per bushel for soft white spring wheat in 1995 Data are significantly different (p = 0.05; LSD)