Grasshopper Control Trials in Small Grains

1985 to 1989

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Grasshoppers (Orthoptera:Acrididae) constitute one of the most destructive insects affecting crop production in North Dakota. In recent years, infestation levels have increased dramatically in many areas of the state due to drought, low overwintering and spring mortality and optimal conditions for late summer and fall oviposition.

While certain grasshopper species will attack any of the various crops grown in North Dakota, early to mid season infestations will often be most severe in small grains due to the early planting and development of these crops. Late season infestations will frequently develop in late planted row crops such as corn, beans, flax and sunflower.

This report presents the results of grasshopper control trials conducted in wheat (both hard red spring and durum) and barley during the period from 1985 through 1989. Three insecticides registered for grasshopper control in small grains were evaluated as well as six insecticides that are not currently registered for small grains but are either registered for grasshopper control in other commodities or show promise based on results from other states.

The small grain varieties evaluated at the various trial sites included: hard red spring wheat (variety Len), Montpelier, 1985; 6-row spring malting barley (variety Robust) Davenport, 1986; durum (variety Ward) Beach, 1987; hard red spring wheat (variety Marshal) Georgetown, Minn. 1988; and durum (variety Vic) Mapleton, 1989.

All of the grasshopper control trials were conducted during June at a time, determined by random insect net sweeps, when grasshopper populations were primarily in the first to third instar, with a limited number in the fourth to fifth instar or adult stage. Grasshoppers collected in the pre-treatment and post-treatment counts were analyzed for species and instar composition. Tables I and II, based on the 1989 grasshopper control trial, provide examples of typical species and instar composition from initiation to completion of a grasshopper control trial.

Table I. Pre-treatment grasshopper species and instar composition in check area, June 14, 1989.

Instar	M. bivittatus	M. sanquinipes	All
1st	28	2	30 (10%)
2nd	25	8	33 (11%)
3rd	136	35	171 (56%)
4th	18	49	67 (22%)
5th	0	2	2 (1%)
Total	207 (68%)	96 (32%)	303

Table II. Post-treatment grasshopper species and instar composition in check area, June 30, 1989.

Instar	M. bivittatus	M. sanquinipes	M. femur rubrum	All
1st	1	0	0	1 (0.6%)
2nd	4	0	0	4 (2.55%)
3rd	20	1	2	23 (14.65%)
4th	38	7	1	46 (29.30%)
5th	48	12	4	64 (40.76%)
Adult	7	12	0	19 (12.10%)
Total	118 (75%)	32 (20%)	7 (5%)	157

METHODS and MATERIALS

Insecticides were aerially applied using 3 gallons of water per acre. Each treatment was applied in a 50 foot swath.

Grasshopper counts were taken using a standard 15 inch sweep net. Four sets of eight sweeps each were taken within each treatment swath at 10 pace intervals. Counts were taken one day prior to treatment (pre-treatment counts), one day post-treatment, one week post-treatment and two weeks post-treatment.

The pre-treatment counts for each treatment in each swath were used as the basis for calculating mean percent reductions for the subsequent one-day, one-week and two-week post-treatment counts.

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RESULTS and DISCUSSION

Table III presents the results of the grasshopper trials conducted over the five-year period. The insecticides Furadan 4F, Penncap-M and Sevin XLR PLUS are registered products for grasshopper control in small grains (Sevin for wheat only) and were used as standards for comparison against the insecticides not registered in small grains which included Asana XL, Capture 2E, Lorsban 4E, Orthene 75S, Pydrin 2E and Scout.

Table III. Grasshopper control in North Dakota small grains.

Treatment	Rate	No. of Trials[1]	Mean % Reduction[2] 1 Day	7 Day	14 Day
	(lb. al/A)				
Asana XL	0.0125	1	42	64	0
	0.015	1	73	74	46
	0.02	3	95	92	87
	0.03	1	99	25	—
	0.0375	1	100	100	100
Capture 2E	0.015	1	97	99	94
	0.02	2	89	85	76
	0.04	2	99	60	90[3]
Furadan 4F	0.25	3	95	75	—
Lorsban 4E	0.50	5	95	87	69[4]
Orthene 75S	0.25	2	80	97	—
Penncap-M	0.38	2	69	44	65
	0.50	2	95	97	77
	0.75	1	98	98	77
Pydrin 2EC	0.075	3	97	71	—
Scout	0.016	1	67	80	29
	0.018	1	85	72	59
	0.02	1	45	50	22
Sevin XLR PLUS	0.50	1	37	72	54
	0.75	5	80	62	35
	1.0	1	61	81	66
	1.25	1	74	76	60

[1] Trials conducted over a 5 year period (1985-1989).

[2] Mean % reduction from 1, 7 & 14-day post application insect counts.

[3] 14-day mean % reduction from 1 trial only.

[4] 14-day mean % reduction from 2 trials only.

Of the registered materials, Furadan 4F and Penncap-M provided the best control although, based on this study, Penncap-M at the 0.38 lb. rate gave only fair control. Sevin XLR PLUS performed best at the higher rates 0.75 lb., 1.00 lb. and 1.25 lb. but even at these rates control was inconsistent.

Asana XL, Capture 2E and Scout are synthetic pyrethroid insecticides. Asana XL gave excellent results at rates of 0.02 lb. to 0.0375 lb. At rates of 0.0125 lb. and 0.015 lb. the control was poor to fair. Capture 2E provided very good control at all rates tested. Scout was only tested one year, and based on these results, its performance was erratic.

Lorsban 4E gave very good results during all five years of testing at the 0.50 lb. rate. The mean percent grasshopper reduction was consistently high at one day, seven days and 14 days after application indicating relatively good residual activity.

Orthene 75S and Pydrin 2E gave similar results based on two and three years of testing, respectively, and based on post-treatment counts at one day and seven days only.

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1988 Grasshopper Trial

Paul Finstad — Farmer, Georgetown, Minn. (land)

Lynn Thompson — Thompson Flying Service, Georgetown, Minn. (aerial application)

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1989 Grasshopper Trial

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