

# Grasshopper Control Trial in Durum Wheat - 1987

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This trial marked the third consecutive year of evaluating selected insecticides for control of grasshoppers (Orthoptera: Acrididae) in North Dakota small grains. Previous trial sites involved hard red spring wheat (variety Len) near Montpelier in 1985, and 6-row spring malting barley (variety Robust) near Davenport in 1986.

The 1987 grasshopper control trial was conducted on durum (variety Ward) seven miles southeast of Beach, North Dakota on the Lawrence Zook farm. This field was planted the third week in April, 1987 at a seeding rate of 1.25 bushels per acre, fertilized with 2 gallons of 9-18-9 starter fertilizer per acre and 70 lbs. of urea per acre. A post-emergence application of 2,4-D amine was applied for weed control at 1 pint per acre.

Pre-treatment grasshopper counts were taken on June 16, 1987. The counts consisted of four sweeps with a 12 inch diameter Ward sweep net per sampling site at 10 pace intervals, beginning at the south margin of the field. Counts were made at four consecutive sampling sites within the center of where each treatment swath was applied immediately after grasshopper counting was completed. The pre-treatment grasshopper counts are given in Table 2.

A total of 262 grasshopper specimens were collected from the trial site and later analyzed for species and instar composition. The results of the analysis are presented in Table 1.

The durum was in the four to five leaf stage (Feekes scale 4.0-5.0) at the time the pre-treatment grasshopper counts were taken and significant leaf feeding had already occurred.

The insecticides were applied on the morning of June 16, 1987 and the air temperature at the time the applications were made was 78°F. Winds were blowing from the south, southeast at 10-14 mph.

## Methods and Materials:

The seven candidate insecticides were applied by airplane using 3 gallons of water per acre. The aircraft was equipped with 34 flood jet nozzles on the spray boom, consisting of 17 #10 orifice, 15 #4 orifice and two #2 orifice. Spraying pressure was 30 lbs. psi and the flying speed was 115 mph.

Each of the seven insecticides was applied in a 70-foot swath extending from the south margin to the north margin of the field.

Table 1. Pre-treatment Species and Instar Composition.

Species	Instar					Adult	Total	Percentage
	1	2	3	4	5			
<i>Melanoplus bivittatus</i> two striped grasshopper	0	5	30	88	40	0	163	62%
<i>Melanoplus sanguinipes</i> migratory grasshopper	0	0	8	46	30	0	84	32%
<i>Melanoplus packardii</i> Packard grasshopper	0	0	0	6	0	0	6	2%
Unidentified <i>Melanoplus</i> sp.	9	0	0	0	0	0	9	3%
Total	9	5	38	140	70	0	262	
Percentage	3%	2%	15%	53%	27%	0%		

The treatments were applied side by side in the design indicated below:

Check	Sevin XLR plus 0.75 lb. A/A (Buffer Strip)*	Sevin XLR plus 0.75 lb. A/A	Pennncap-M 0.38 lb. A/A	Furadan 4F 0.25 lb. A/A	Pydrin 2.4EC 0.075 lb. A/A	Lorsban 4EC 0.50 lb. A/A	Capture 2EC 0.04 lb. A/A	Asana 1.9EC 0.03 lb. A/A
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\*Sevin XLR plus was applied as a buffer treatment between the check and the Sevin XLR plus treated swath in which counts were taken to prevent an anticipated grasshopper migration from the check into the Sevin XLR plus treatment or other adjacent treatments, which could create unrealistically higher populations when the post-treatment counts were taken.

Post-treatment counts were taken on June 17 (one day after application) and June 23 (one week after application). A two week post-treatment count was planned for July 1 but was abandoned when severe reinfestation of grasshoppers occurred from adjacent non-treated fields.

## Summary and Conclusions:

Pre-treatment counts taken on June 16 indicate numbers of grasshoppers collected per four insect net sweeps at each sampling site:

Table 2. Pre-treatment Counts - June 16, 1987.

Insecticide	Replicate				Total	Mean <sup>a</sup>
	I	II	III	IV		
Asana 1.9EC	51	41	50	42	184	46.00
Capture 2EC	56	61	26	43	186	46.50
Lorsban 4EC	88	49	42	54	233	58.25
Pydrin 2.4EC	55	71	46	75	247	61.75
Furadan 4F	58	29	36	65	188	47.00
Pennncap-M	52	50	33	49	184	46.00
Sevin XLR plus	54	38	31	34	157	39.25
Check	102	46	48	32	228	57.00

<sup>a</sup>No significant differences exist among mean counts. Analysis of variance: F = 1.20, P = 0.344, SEM = 7.09.

Post-treatment counts on June 17 (one day after treatment) and June 23 (one week after treatment) indicate numbers of grasshoppers collected per four insect net sweeps at each sampling site.

Analysis of variance and, where appropriate, Duncan's New Multiple Range Test were used to make comparisons among mean counts on the pre-treatment date and two post-treatment sampling dates. In addition, the pre-treatment counts for each treatment in each swath were used as a basis for calculating percent reductions in count for the two subsequent sampling dates. This data was analyzed, using the same procedures as above and results are presented in Tables 3 and 4 as mean % reduction.

Grasshopper infestation pressure increased dramatically between June 17 and June 23. This increased population pressure, and the fact that a 1/2-3/4 inch rainfall occurred on the evening of June 16 reducing the residual effectiveness of the insecticides, produced high grasshopper counts within all treatment swaths and the untreated checks. Thus the one week post-treatment counts may not be reflective of the control capabilities of the insecticides had they been tested under normal rainfall conditions and grasshopper infestation levels for the area.

Table 3. First Post-treatment Counts - June 17, 1987.

Insecticide	Rate (lb. A/A)	Replicate				Mean Count <sup>a</sup>	Mean % Reduction <sup>b</sup>
		I	II	III	IV		
Asana 1.9EC	0.03	2	0	0	0	0.50 a	99.0 a
Capture 2EC	0.04	0	0	0	0	0.00 a	100.0 a
Lorsban 4EC	0.50	0	0	0	1	0.25 a	99.5 a
Pydrin 2.4EC	0.075	0	0	0	0	0.00 a	100.0 a
Furadan 4F	0.25	8	3	0	1	3.00 a	93.6 a
Pennncap-M	0.38	25	14	11	5	13.75 b	70.1 b
Sevin XLR plus	0.75	26	11	11	4	13.00 b	68.9 b
Check		49	45	38	13	36.25 c	33.6 c

<sup>a</sup>Means in columns not followed by a common letter are significantly different, Duncan's New Multiple Range Test, P = .05. ANOVA: F = 16.45, P < .001, S.E.M. = 3.13.

<sup>b</sup>Mean % reduction figures are from each pre-treatment count. ANOVA: F = 16.65, P < .001, S.E.M. = 5.88.

**Table 4. Second Post-Treatment Counts - June 23, 1987.**

Insecticide	Rate (lb. AI/A)	Replicate				Mean Count <sup>a</sup>	Mean % Reduction <sup>a</sup>
		I	II	III	IV		
Asana 1.9EC	0.03	32	33	30	40	33.75	25.4
Capture 2EC	0.04	40	47	33	19	34.75	20.1
Lorsban 4EC	0.50	61	27	15	27	32.50	47.5
Pydrin 2.4EC	0.075	54	17	32	19	30.50	45.7
Furadan 4F	0.25	53	24	27	22	31.50	29.2
Penncap-M	0.38	68	23	18	37	36.50	23.3
Sevin XLR plus	0.75	56	50	37	19	40.50	(-2.3)
Check		46	41	36	19	35.50	32.8

<sup>a</sup>No significant differences occurred among mean counts or mean % reductions. ANOVA: Counts - F = 0.32, P = 0.937, S.E.M. = 5.62; % Reduction - F = 1.32, P = 0.289, S.E.M. = 13.75.

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