

**CABBAGE:** *Brassica oleracea* L. 'Gideon'  
**INSECTICIDAL CONTROL OF LEPIDOPTERAN PESTS IN MINNESOTA,  
IRRIGATED CABBAGE, 2001**

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Imported cabbageworm (ICW): *Pieris rapae* (L.)

Cabbage looper (CL): *Trichoplusia ni* (Hübner)

Diamondback moth (DBM): *Plutella xylostella* (L.)

'Gideon' was seeded 19 May at the University of Minnesota Agricultural Experiment Station at Rosemount, MN. Treatments were arranged in a RCB design with 4 replications. Plots consisted of 3 rows, 25 ft (7.6 m) long with 40 inch (1.02 m) row spacing. Each replicate was separated by a 5 ft (1.52 m) alley. Using an overhead lateral irrigation system, the irrigation schedule was as follows: 17 Jul: 1 in (2.54 cm); 21 Jul: 1 in (2.54 cm); 10 Aug: 0.75 in (1.91 cm); 13 Aug: 1 in (2.54 cm). Treatment applications were made with a CO<sub>2</sub> pressurized backpack sprayer using a 10 ft boom with 6 nozzles (XR-Teejet 8002 flat fan, with no screen). The sprayer was calibrated to deliver 20 gpa (187.04 l/ha) at 35 psi (242 kPa). Kinetic surfactant was added to all treatments, at a rate of 8 fl oz/100 gal (0.625 ml/liter). Treatments were applied on 18, 25 Jul, 3, 13, 17 Aug. Treatments were evaluated for CL, ICW and DBM larval infestation 27 Jul and 16 Aug. All larval counts were taken from the middle row of each plot. Plots were harvested 23 Aug. In each treatment, 10 consecutive heads, with 4 wrapper leaves on each head, were harvested from the middle row and evaluated for feeding damage using Greene's rating scale (J. Econ. Entomol. 1969 62: 798-800), where: 1= no feeding damage; 2= minor feeding damage on the wrapper leaves (0-1% eaten) with no head damage; 3= moderate feeding damage on the wrapper leaves (2-5% eaten) with no head damage; 4= moderate feeding damage on the wrapper leaves (6-10% eaten) and minor feeding scars on the head; 5= moderate to heavy feeding on the wrapper leaves (11-30% eaten) and moderate feeding scars on the head; 6= greater than 30% of the wrapper leaves eaten and numerous feeding scars on the head. The number of larval contaminants within the 4 wrapper leaves and head were also noted.

Preliminary larval counts were taken 13 Jul. Preliminary counts revealed 6.0 small CL and 1.0 total DBM per 10 heads. The first sample on 27 Jul was taken after 2 applications and the second sample was taken on 16 Aug after 4 applications. CL densities were exceptionally high throughout this study. For the first sample date, Warrior T significantly reduced densities of small CL compared with the untreated check. SpinTor and Avaunt significantly reduced medium CL densities compared with the untreated check. Large CL and total CL densities were significantly reduced by all treatments compared with the untreated check. On the second sample date, Warrior T significantly reduced densities of small CL compared with the untreated check. Avaunt, Warrior T and SpinTor significantly reduced densities of medium, large and total CL compared with the untreated check. ICW

and DBM pressure continued to be light through the first and second sampling dates, resulting in no significant differences in the control of these pests compared with the untreated check. All treatments significantly reduced the number of larval contaminants and increased the marketability of the heads compared with the untreated check, except for Proclaim, which had a marketability rating similar to the untreated check. No phytotoxicity was observed.

		27 Jul					
		Larval-pupal density (avg./10 heads)					
Treatment/formulation	Rate (lb AI / ac)	Total ICW <sup>1</sup>	Small CL	Medium CL	Large CL	Total CL <sup>1</sup>	Total DBM <sup>1</sup>
Avaunt 30WG	0.065	0.00	6.50 b	0.50 a	0.00 a	7.00 a	0.25
Warrior T	0.025	0.25	0.50 a	3.25 ab	1.25 a	6.00 a	0.00
SpinTor 2SC	0.094	0.00	3.50 ab	1.25 a	0.25 a	5.25 a	0.00
Proclaim 5SG	0.01	0.00	3.50 ab	4.50 ab	2.00 a	13.25 a	0.00
Untreated check	--	0.25	7.00 b	6.75 b	6.75 b	27.50 b	1.00
		NS					NS

Means within columns followed by the same letter are not significantly different ( $P=0.05$ ); Ryan-Einot-Gabriel-Welsch multiple range test (REGWQ). NS = not significant ANOVA.

<sup>1</sup>Total includes all larval instars and pupae.

		16 Aug						23 Aug (Harvest)	
		Larval-pupal density (avg./10 heads)							
Treatment/formulation	Rate (lb AI / ac)	Total ICW <sup>1</sup>	Small CL	Medium CL	Large CL	Total CL <sup>1</sup>	Total DBM <sup>1</sup>	Avg. larval contaminant / 10 heads <sup>2</sup>	Market-ability rating <sup>3</sup>
Avaunt 30WG	0.065	0.00	75.33 ab	9.33 a	0.00 a	84.67 a	0.00	0.00 a	1.20 a
Warrior T	0.025	0.00	46.33 a	29.33 a	0.67 ab	77.67 a	4.00	1.00 a	1.83 b
SpinTor 2SC	0.094	0.00	85.67 ab	39.67 a	1.00 ab	126.33 a	0.67	1.75 a	2.05 b
Proclaim 5SG	0.01	0.00	97.33 ab	96.00 b	6.67 bc	201.33 b	1.00	11.00 b	4.13 c
Untreated check	--	0.33	111.67 b	106.33 b	10.33 c	231.67 b	3.33	29.50 c	4.86 c
		NS					NS		

Means within columns followed by the same letter are not significantly different ( $P=0.05$ ); Ryan-Einot-Gabriel-Welsch multiple range test (REGWQ). NS = not significant ANOVA.

<sup>1</sup>Total includes all larval instars and pupae.

<sup>2</sup>Larval contaminants include all larval instars and pupae of all three species (ICW, CL, and DBM) found within the head or 4 wrapper leaves.

<sup>3</sup>Greene's rating system; refer to text. Mean separation test run on rank transformed data; untransformed means are presented.

## Part II. Materials Tested for Arthropod Management

### INSECTICIDAL CONTROL OF LEPIDOPTERAN PESTS IN MINNESOTA, IRRIGATED CABBAGE, 2001

Avaunt 30WG, (Ideno(1.2-e)(1,3,4)oxadiazine-4a (3H)-carboxylic acid, 7-chloro-2,5-carbonyl)-methyl ester), indoxacarb, DuPont

Warrior T, (3-(2-Chloro-3,3,3-trifluoro-1-propenyl)-2,2dimethylcyclopropanecar-boxylate (S),(S)-cis-Z isomers, lambdacyhalothrin, Syngenta

SpinTor 2SC, (2((6-Deoxy-2,3,4-tri-O-methyl-a-L-mannopyronaosyl)oxy)-13-((5-(dimethylamino)tetrahydro-6-methyl-2H-pyran-2-yl)oxy)-9-ethyl

2,3,2a,5a,5b,6,9,10,11,12,13,14,16a,16b-tetradecahydro-14-methyl-1H-as-indaceno(3,2,-d)oxacyclododecin-7,15-dione), spinosad, Dow AgroSciences

Proclaim 5SG, (Epi-methylamino-4"-deoxy-avermectin B,hydrochloride and a maximum 20% 4"-epi-methylamino 4"-deoxyavermectin B benzoate), emamectin benzoate, Syngenta

Kinetic, Polyalkyleneoxide modified polydimethylsiloxane and non-ionic surfactants, Helena