

CABBAGE: *Brassica oleracea* L. 'Gideon'
**EVALUATION OF SURFACTANTS AND INSECTICIDES FOR CONTROL OF
LEPIDOPTERAN PESTS IN MINNESOTA NON-IRRIGATED CABBAGE, 2001**

E.C. Burkness,

R.L. Koch,

S.J. Wold &

W.D. Hutchison

Department of Entomology

University of Minnesota

219 Hodson Hall

St. Paul, MN 55108

Phone: (612) 624-3670

Fax: (612) 625-5299

E-mail: burkn001@tc.umn.edu

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. Replicates were separated by a 5 ft (1.52 m) alley. Treatment applications were made with a CO₂ 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). SpinTor 2SC was added to all treatments, at the 0.094 lbs AI/acre rate. Treatments were applied on 18, 25 Jul, 3, 13, 17 Aug. Treatments were evaluated for CL, ICW and DBM larval infestation 20 Jul (2 days after 1st application), 27 Jul (2 days after 2nd application) and 21 Aug (4 days after 5th application). 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 indicated 8.75 small CL per 10 heads were present within the trial area. The 1st sample on 20 Jul was taken after 2 days after the 1st application, the 2nd sample was taken on 27 Jul 2 days after the 2nd application, and the 3rd sample was taken 4 days after the 5th application. The density of CL was extremely high throughout this study. For the 1st sample date, treatments did not significantly reduce total densities ICW and DBM (due to low infestation levels) or CL compared with the untreated check. However, most treatments did significantly reduce densities of medium and large CL compared with the untreated check. For the 2nd sample date, no significant differences were found in the densities of total ICW and DBM or small CL compared with the untreated check. All treatments provided significant control of medium, large, and total CL compared with the untreated check. For the 3rd sample date, all

treatments provided significant control of total ICW, DBM, and CL as well as all larval sizes of CL compared with the untreated check except for small CL where no significant differences were found. Silwet L-77 was the only treatment that significantly improved marketability of heads. All treatments had significantly fewer larval contaminants than the untreated check. No phytotoxicity was observed.

		20 Jul					
		Larval-pupal density (avg./10 heads)					
Treatment/formulation ¹	Rate	Total ICW ²	Small CL	Medium CL	Large CL	Total CL ²	Total DBM ²
LI-700	8 oz/100gal	0.00	4.00	3.50 ab	0.00 b	7.50	0.25
Activator 90	16 oz/100gal	0.00	2.75	0.75 b	0.25 b	3.75	0.00
Bond	16 oz/100gal	0.50	4.75	1.25 b	0.00 b	6.25	0.75
Silwet L-77	8 oz/100gal	0.00	5.00	2.50 ab	0.00 b	7.50	0.25
Kinetic	8 oz/100gal	0.00	5.50	1.00 b	0.00 b	6.50	0.25
SpinTor 2SC	0.094 lbs AI/acre	0.25	5.50	2.00 ab	0.00 b	7.50	0.00
Untreated check	--	0.00	3.75	5.25 a	2.25 a	11.25	0.75
		NS	NS			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.

¹ All treatments included SpinTor 2SC at the 0.094 lbs AI/acre rate.

² Total includes all larval instars and pupae.

		27 Jul					
		Larval-pupal density (avg./10 heads)					
Treatment/formulation ¹	Rate	Total ICW ²	Small CL	Medium CL	Large CL	Total CL ²	Total DBM ²
LI-700	8 oz/100gal	0.00	1.25	0.25 b	0.25 b	1.75 b	0.00
Activator 90	16 oz/100gal	0.00	1.75	0.25 b	0.00 b	2.00 b	0.00
Bond	16 oz/100gal	0.25	2.75	1.00 b	0.00 b	4.00 b	0.25
Silwet L-77	8 oz/100gal	0.00	1.00	0.50 b	0.00 b	1.50 b	0.25
Kinetic	8 oz/100gal	0.25	2.00	0.75 b	0.00 b	2.75 b	0.00
SpinTor 2SC	0.094 lbs AI/acre	0.00	3.25	0.75 b	0.50 b	4.75 b	0.00
Untreated check	--	0.00	3.50	4.50 a	3.50 a	15.25 a	0.25
		NS	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.

¹ All treatments included SpinTor 2SC at the 0.094 lbs AI/acre rate.

² Total includes all larval instars and pupae.

Treatment/formulation ¹	Rate	21 Aug						23 Aug (Harvest)	
		Larval-pupal density (avg./10 heads)						Avg. larval contaminant / 10 heads ³	Market- ability rating ⁴
		Total ICW ²	Small CL	Medium CL	Large CL	Total CL ²	Total DBM ²		
LI-700	8 oz/100gal	0.00 b	22.33	16.00 b	2.00 b	40.33 b	0.00 b	0.25 b	1.63 ab
Activator 90	16 oz/100gal	0.00 b	15.33	13.00 b	1.67 b	30.00 b	0.00 b	1.25 b	1.58 ab
Bond	16 oz/100gal	0.00 b	25.67	20.00 b	1.00 b	46.67 b	0.00 b	0.50 b	1.63 ab
Silwet L-77	8 oz/100gal	0.00 b	13.33	10.00 b	1.00 b	24.33 b	0.00 b	0.00 b	1.40 b
Kinetic	8 oz/100gal	0.00 b	25.67	23.67 b	1.00 b	50.33 b	0.00 b	1.00 b	1.60 ab
SpinTor 2SC	0.094 lbs AI/acre	0.00 b	18.33	10.00 b	0.33 b	28.67 b	0.00 b	0.00 b	1.63 ab
Untreated check	--	2.00 a	35.00	40.33 a	12.33 a	89.00 a	1.33 a	38.00 a	4.68 a
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.

¹ All treatments included SpinTor 2SC at the 0.094 lbs AI/acre rate.

² Total includes all larval instars and pupae.

³ Larval contaminants include all larval instars and pupae of all three species (ICW, CL, and DBM) found within the head or 4 wrapper leaves.

⁴ 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

EVALUATION OF SURFACTANTS AND INSECTICIDES FOR CONTROL OF LEPIDOPTERAN PESTS IN MINNESOTA NON-IRRIGATED CABBAGE, 2001

SpinTor 2SC, (2((6-Deoxy-2,3,4-tri-O-methyl- α -L-mannopyranosyl)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

Activator 90, alkyl polyoxyethylene ether and free fatty acids, Loveland Industries Inc.
Bond, a mixture of 45% synthetic latex and 10% primary aliphatic oxyalkylated alcohol, Loveland Industries Inc.

Kinetic, Polyalkyleneoxide modified polydimethylsiloxane and non-ionic surfactants, Helena
LI-700, phosphatidylcholine, methylacetic acid and alkyl polyoxyethylene ether, Loveland Industries Inc.

Silwet L-77, silicone-polyether copolymer, Loveland Industries Inc.