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Field research on control of vegetable insects in eastern New York—1974

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Insect populations in the Orange and Ulster County region of eastern New York were adequate, in most instances, for good evaluations of insecticide activity. In the Orange County muck area, populations of the onion maggot, *Hylemya antiqua* (Meigen), and aphids, primarily the green peach aphid *Myzus persicae* (Sulzer) and the potato aphid *Macrosiphum euphorbiae* (Thomas), were quite high. Cabbage looper, *Trichoplusia ni* (Hubner), pressure was light until later August at which time populations increased to moderate numbers.

In Ulster County, the corn flea beetle, *Chaetocnema pulicaria* Melsheimer, was present in high numbers, and the incidence of bacterial wilt was severe on sweet corn in untreated areas. Populations of the European corn borer, *Ostrinia nubilalis* (Hubner), corn earworm, *Heliothis zea* (Boddie), and fall armyworm, *Spodoptera frugiperda* (J. E. Smith), were normal.

Weather conditions in the two-county area were normal during most of the growing season. An early killing frost occurred the week of September 22-28 and prevented the completion of two late season sweet corn tests.

CONTROL OF THE APHID COMPLEX ON CELERY

New York State recommendations for the control of aphids on celery have not been re-evaluated in the past few years. Materials recommended in 1973 included Systox, Diazinon, and parathion. It was felt that these materials and others should be re-evaluated to determine their present effectiveness.

Procedure

Variety: Minetto
Planting date: May 23 (transplants)
Location: Pine Island, Orange County, N. Y.
Plot size: 50′ x 380′; 4-row beds; 17″ row spacing
Design: Randomized complete block
Replications: 5
Soil type: Organic muck
Application date(s): August 14, 21, 28
Application method: All compounds were applied with a CO_2 pressurized hand-held sprayer equipped with a 4-row boom. The sprayer was operated at 37 psi and delivered 50 gal./acre through 1 nozzle/row directed at the top of each plant row.
Evaluation date(s): August 20, 28, September 4
Evaluation method: Data were taken from the 2 center rows of each 4-row plot. Apterous aphid counts were made 1 week after each application. Samples for each treatment consisted of 100 trifoliate leaves from random plants.

Results and Discussion

In order to evaluate the effectiveness of the 12 compounds involved, it is essential that aphid population fluctuations within the untreated controls be examined. Initial aphid counts were high (Table 1), averaging 598/100 leaves, but declined to an average of 53/100 leaves at the last sampling date. Not all treatments initially suppressed aphid populations, and those that failed to do so generally were not appreciably effective with subsequent applications. Of the recommended materials, only Systox provided acceptable control. Parathion not only failed to

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Table 1.—Evaluation of foliar sprays to control the aphid complex on celery. Orange County, N. Y. 1974.

Compound/form.	Rate (lb. AI/A)[a]	Av. aphids/100 leaves/date 8/20	8/27	9/4
Parathion 6 EC	.50	561	686	276
Diazinon AG500	.50	656	458	73
Lannate 1.8 L	.45	242	87	33
Phosdrin 4 EC	.25	96	42	29
Phosvel 2.7 EC	.50	638	554	305
Galecron - Fundal 4 EC	.50	165	85	19
Orthene 75 SP	.50	4	0.8	0
Carzol 97 SP	.50	132	144	76
Monitor 4 L	.50	0.6	0	0
Thiodan 3 EC	.50	471	307	38
Guthion 50 WP	.50	544	333	179
Systox 2 SC	.25	207	31	8
Untreated check	-	573	680	52
Untreated check	-	623	516	54

[a] Pounds active ingredient per acre

provide control, but when compared to the untreated checks, actually induced a population increase. Similar results were obtained with the Phosvel and Guthion treatments. Presumably, such increases are due to the elimination of natural enemies.

Since aphid vectored disease is of major concern on celery, it appears that Orthene and Monitor were the only materials evaluated which provide adequate insurance against transmission.

CONTROL OF CABBAGE LOOPER, *Tricoplusia ni* (Hubner), ON LETTUCE

Recent results from western New York indicate that under severe insect stress, the standard recommended compounds for looper control on cabbage are declining in effectiveness. Since loopers are often serious pests of lettuce in eastern New York, this test was conducted to determine the control effectiveness of recommended and candidate materials at various rates, formulations, and combinations.

Procedure

Variety: Florida 683
Planting date: May 23 (direct seeded)
Location: Pine Island, Orange County, N. Y.
Plot size: 144′ x 130′; 4-row beds; 17″ row spacing
Design: Randomized block
Replications: 3
Soil type: Organic muck
Application date(s): August 26, September 5, 11
Application method: All compounds were applied with a CO_2 pressurized hand-held sprayer equipped with a 4-row boom. The sprayer was operated at 37 psi and delivered 50 gal./acre through 1 nozzle/row directed at the top of each plant row.
Evaluation date: September 20
Evaluation method: Data were taken from the 2 center rows of each 4-row plot. Heads were considered infested if larvae or fresh larval feeding were observed. Samples consisted of 20 heads chosen at random from each treatment. Data were taken as the number of looper-free heads. Treatment means were separated by Duncan's multiple range test after arcsin transformation of data.

Results and Discussion

Under the relatively low looper population conditions, many treatments (48%) yielded greater than 95 per cent control (Table 2). Of these, only Dipel and Lannate alternated with Dipel presently can be used on lettuce. Lannate (.45 lb.) used alone provided control not significantly better than the untreated check. Diazinon (1 lb.), Bay Hox 1901 (0.25 lb.), and Phosdrin (0.50 lb.) yielded fewer looper-free heads than the untreated check.

Table 2.—Evaluation of foliar sprays to control the cabbage looper on lettuce. Orange County, N. Y. 1974.

Compound	Formulation	Rate (lb. AI/A)	Clean heads (%)[a]
Monitor	4 L	1.0	100.0 a
Orthene	75 SP	1.0	100.0 a
Orthene	2.6 EC	0.5	98.9 a
Orthene	75 SP	0.5	98.9 a
Lannate-Dipel A/W[b]	1.8 L - 3.2 WP	0.5	98.9 a
CGA 15324	4 EC	1.0	97.8 a
CGA 15324	4 EC	0.75	97.8 a
Phosvel	2.7 EC	0.9	96.7 a
Orthene	2.6 EC	1.0	96.7 a
Galecron-Fundal + CGA 15324	4 EC 4 EC	0.5+ 0.25	96.7 a
Dipel	3.2 WP	0.5	95.6 ab
Galecron-Fundal + Dipel	4 EC 3.2 WP	0.25 0.25	94.5 ab
Phosdrin	4 EC	1.0	94.5 ab
Systox	2 SC	0.25	92.2 a-c
Bay NTN 8629	40 WP	0.75	92.2 a-c
Lannate	1.8 L	0.45	84.5 b-d
Phosvel	45 WP	1.35	83.3 b-d
Galecron-Fundal	4 EC	0.50	80.0 d-f
Nemacur	3 SC	1.50	76.7 d-f
Untreated check	-	-	76.7 d-f
Diazinon	AG500	1.0	73.4 d-f
Bay Hox 1901	40 WP	0.25	72.2 ef
Phosdrin	4 EC	0.50	70.0 f

[a] Means followed by the same letter are not significantly different at P = .05. Data subjected to arcsin transformation before analysis.
[b] A/W = alternated with.

CONTROL OF ONION MAGGOT, *Hylemya antique* (Meigen), WITH GRANULAR AND DRENCH PLANTING TIME TREATMENTS

Although chemical control of the onion maggot in eastern New York has not proven as difficult as in other areas of the state, damaging populations are present annually, and insecticide treatments are essential to high yields. Extensive insecticide evaluation trials have not been conducted in recent years. The objectives of this test were to evaluate registered and candidate materials and to compare the control performance and phytotoxicity of granular and liquid formulations.

Procedure

Variety: Elite
Planting date: April 24
Location: Pine Island, Orange County, N. Y.
Plot size: 36′ x 200′; 15″ row spacing
Design: Randomized complete block; compounds with both granular (G) and drench (D) applications were planted in paired rows to allow for split-plot analysis.
Replications: 5
Soil type: Organic muck
Application date: April 24
Application method: All treatments were applied with a single-cone seeder equipped with a liquid in-furrow attachment. Pre-weighed amounts of granular formulations were applied with seed into furrows made by a single shoe. Liquid formulations were directed gravity flow into the furrow with seed at dosages comparable to 50 gal./15″ row acre. Seeds were planted to a final stand of 11 plants/foot.
Evaluation date(s): June 7, 14, 21, 27, July 7
Evaluation method: Initial stand counts were taken from the center 20′ of each 40′ row on May 30, 36 days from planting. Maggot evaluations consisted of inspecting plants from each 20′ row section for maggot infestation and infested plants were eliminated. This procedure was followed for each treatment at 44, 51, 58, 64, and 74 days from planting. Manzate 200 at 3 lb./acre (smut control) was utilized as the untreated check. Maggot damage data are presented as per cent infested plants and means were separated by Duncan's multiple range test after arcsin transformation.

Results and Discussion

Data for infested plants are presented in Table 3. Except where noted, rates are expressed as pounds active ingredient (a.i.)/15″ row acre. All treatments provided adequate or near acceptable maggot control, with the exception of Ethion G at 1.0 pound and Bay 92114 D at 1.0 pound which were not significantly better than the untreated check.

Testing at pounds a.i./15″ row acre evaluated treatments on an equal basis, but such testing may be at rates lower than would be necessary for commercial control or lower than labeled rates. Granular formulations of three recommended materials (Dasanit, Dyfonate, Diazinon) were evaluated on the ounce of formulation/1000 feet of row basis in order to compare commercial control performance. Diazinon 14G is not labeled as an in-furrow application so it was evaluated at a rate comparable to the labeled formulated dosages of Dyfonate 10G and Dasanit 15G. Although the differences in degree of control were not significant at the 5 per cent level, these data indicate that Dyfonate provides the highest degree of control, followed by Diazinon and Dasanit, respectively.

Compounds for which both granular and liquid formulations were available; i.e., Diazinon, CGA 12223,

Table 3.—Evaluation of planting-time treatments to control the onion maggot. Orange County, N. Y. 1974.

Compound	Formulation	Rate[a]	Plants infested (%)[b]
Dyfonate	10G	6.0 oz./1000′	0.6 a
Dyfonate-Thiram	5-10 G	1.0#	2.7 a-e
Dyfonate	10 G	1.0#	4.7 a-f
Dyfonate	4 E	1.0#	9.3 d-g
Lorsban	4 L	1.0#	1.5 a-c
Lorsban	10 G	1.0#	3.3 a-f
Bay 92114	10 G	2.0#	0.7 a
Dasanit	15 G	3.7 oz./1000′	1.8 a-d
Bay 92114	10 G	1.0#	2.8 a-e
Dasanit-Thiram	5-7.5 G	1.0#	6.7 b-g
Dasanit	6 SC	1.0#	7.9 c-g
Dasanit	15 G	1.0#	11.2 e-g
Bay 92114	4 EC	1.0#	27.6 hi
Counter	15 G	1.0#	4.2 a-f
CGA 12223	5 G	0.5#	0.9 ab
Diazinon	14 G	4.1 oz./1000′	1.1 ab
CGA 12223	5 G	1.0#	1.5 a-c
CGA 12223	4 L	1.0#	1.6 a-d
Diazinon	AG500	1.0#	2.0 a-d
CGA 12223	4 L	0.5#	3.1 a-e
Diazinon	14 G	1.0#	5.2 a-f
Ethion	4 L	1.0#	12.8 f-h
Ethion	5 G	1.0#	16.7 g-i
Manzate 200 (check)	80 WP	2.4#	51.4 i

[a]Pounds a.i./15″ row acre; or oz. of formulation/1000′ of row.

[b]Treatments followed by the same letter not significantly different at P = .05. Means subjected to arcsin transformation before analysis.

Table 4.—Onion maggot control and initial stand count (phytotoxicity) comparisons of granular and drench treatments. Orange County, N. Y. 1974.

	$\bar{x}$ no. infested plants		$\bar{x}$ stand count/20′ row	
Compound/rate[a]	Gran.	Drench	Gran.	Drench
Diazinon 1#	4.6	8.6	196.2	180.0
CGA 12223 1#	7.6	8.2	170.8	206.0
CGA 12223 0.5#	6.6	10.2	182.4	165.4
Lorsban 1#	11.2	8.0	197.0	206.2
Dyfonate 1#	10.4	19.2	174.6	190.4
Dasanit 1#	25.8	19.0	186.6	177.6
Ethion 1#	35.2	26.2	181.0	197.6
Manzate 200 (check)	112.4		208.8	
TOTAL:	101.4	99.4	1288.6	1323.2

[a]Lbs. a.i./15″ row acre.

Lorsban, Dyfonate, Dasanit, and Ethion were subjected to split plot analysis of variance to compare the overall performance and phytotoxicity (stand count) readings of these formulations. There were no significant differences among treatments for maggot control or phytotoxicity, although differences within specific compounds were evident (Table 4).

CONTROL OF FIRST BROOD CORN BORER, *Ostrinia nubilalis* (Hubner), WITH GRANULAR WHORL AND/OR SILK SPRAY TREATMENTS

Granular whorl treatments have not been commonly utilized in fresh market sweet corn production. Communications from the New England States indicate that satisfactory 1st brood corn borer control can be achieved with a single carbofuran granular whorl application. In an effort to determine if such a practice is feasible in the Hudson Valley, single granular whorl treatments were compared to two silk sprays, and to one granular whorl treatment plus one silk spray.

Procedure

Variety: Seneca Explorer
Planting date: May 8
Location: New Paltz, Ulster County, N. Y.
Plot size: 2.5 acres; 36" rows
Design: Split-plot with insecticide compounds as mainplots and subplots consisting of 1 granular whorl application at midwhorl stage; 1 granular whorl application plus 1 silk spray at 50 per cent mid-silk; 2 silk sprays; and an untreated check.
Replications: 4
Soil type: Tioga silt loam
Application date(s): Granular = July 1; spray = July 16, 20
Application method: Granular formulations were applied through a Gandy applicator mounted on a high-clearance sprayer. Silk sprays were applied with a high-clearance sprayer operated at 40 psi and delivered 30 gal./acre through 5 nozzles/row. All treatments were applied at 1 lb. a.i./A.
Evaluation method: Samples at harvest maturity consisted of 100 ears from the 2 center rows of each 4-row plot. Ears were considered infested if larvae had fed upon the cob and/or kernels, or had bored into the shank.

Results and Discussion

Only the first seven treatments provided control that was significantly superior to the untreated check (Table 5). Although single granular applications of Orthene and Furadan yielded 93.5 per cent worm-free ears, this degree of control would not be sufficient for fresh market corn which generally requires greater than 95 per cent worm-free ears. However, for some operations, such as roadside markets, a single granular whorl application could provide acceptable control.

The addition of one silk spray to the Orthene and Furadan granular treatments provided adequate control, and this program appears to be feasible under low corn borer pressure.

Table 5.—Effectiveness of granular whorl and silk spray treatment combinations for 1st brood European corn borer control. New Paltz, N. Y. 1974.

Compound[a]	Treatment	Worm-free ears (%)[b]
Furadan	1 gran. + 1 spray	97.4 a
Orthene	1 gran. + 1 spray	96.4 a
Orthene	1 gran.	93.5 ab
Diazinon	1 gran. + 1 spray	93.5 ab
Furadan	1 gran.	93.5 ab
EPN	2 sprays	92.0 a-c
Dyfonate	1 gran.	91.5 a-d
Furadan	2 sprays	90.0 a-e
EPN	1 gran. + 1 spray	89.4 a-e
Diazinon	2 sprays	87.5 a-e
Dyfonate	1 gran. + 1 spray	85.7 a-e
EPN	1 gran.	83.1 b-e
Orthene	2 sprays	79.9 b-e
Diazinon	1 gran.	76.1 c-e
Dyfonate	2 sprays	74.7 d-e
Untreated check	----	71.4 e

[a]Furadan—10G, 4F; Diazinon—14G, AG500; Dyfonate—10G, 4E; Orthene—10G, 2.6 EC; EPN—2 G, 25 WP. All applied at 1 lb. a.i./A.

[b]Means followed by the same letter are not significantly different at P = .05. Means subjected to arcsin transformation before analysis.

CONTROL OF FIRST BROOD CORN BORER, *Ostrinia nubilalls* (Hubner), MAIZE BILLBUG, *Sphenophorus maidis* Chittenden, AND THE REDUCTION OF BACTERIAL WILT INCIDENCE THROUGH CONTROL OF THE CORN FLEA BEETLE, *Chaetochema pulicaria* Melsheimer

Two granular planting time treatments were evaluated for the control of European corn borer in sweet corn ears. Since such treatments to date have shown little effectiveness in the reduction of ear damage, tests utilizing this application method are usually performed at the request of the insecticide industry.

Little recent data pertaining to maize billbug and corn flea beetle control are available, primarily because billbugs are a problem in only a few isolated areas and because significant flea beetle populations are very dependent upon overwintering temperatures.

Billbug and flea beetle numbers were high at the test location, and corn borer populations at the time of silk development were moderate. Evaluations were for flea beetle vectored bacterial wilt rather than for insect feeding.

Procedure

Variety: Seneca Explorer
Planting date: May 15
Location: New Paltz, Ulster County, N. Y.
Plot size: 0.5 acre; 36" rows
Design: Randomized complete block
Replications: 3
Soil type: Tioga silt loam
Application date: Planting time
Application method: All compounds applied with a Gandy 2-row granular applicator mounted on a 3-point hitch corn planter. Granules were placed in a 4" band, level with the seed, just before disc covers.
Evaluation date(s): Billbug—June 14; bacterial wilt—July 17; corn borer—July 29.
Evaluation method(s): Small corn plants (ca. 10" high) were examined for billbug feeding holes; damage occurred as extensive feeding resulting in lack of vigor, stunting, or death. Bacterial wilt infection was determined by observation of wilting, stunting, and/or by internal plant examination. For wilt and billbug, 200 consecutive plants/treatment were examined. Corn borer evaluations consisted of examining 100 ears/treatment for kernel and/or shank infestation.

Results and Discussion

No treatments provided significantly more worm-free ears than the untreated check (Table 6). It is concluded that neither planting time treatment offered any protection against ear infestation.

When compared to the untreated check, the Furadan treatment significantly reduced billbug damage, but the degree of reduction would not be acceptable in commercial production.

Although no insecticide treatment significantly reduced the incidence of bacterial wilt, Furadan did provide some protection. The evaluation of Furadan at higher rates for both billbug control and bacterial wilt reduction would appear to be warranted.

Table 6.—Evaluation of granular planting-time treatments for control of 3 sweet corn pests. New Paltz, N. Y. 1974.

	Per cent (%)[b]		
Compound/form.[a]	Corn borer worm-free ears	Maize billbug[c] damage	Bacterial wilt[d,e] infection
Furadan 10G	60.01 a	43.3 b	7.4 a
Bay 92114 10G	61.58 a	50.2 ab	17.5 a
Untreated check	60.45 a	59.8 a	16.7 a

[a]All applied at 1# a.i./A

[b]Means followed by same letter are not significantly different at P = .05. Where applicable, data subjected to arcsin transformation before analysis.

[c]Evaluated 30 days after planting.

[d]Evaluated 63 days after planting.

[e]Vectored by corn flea beetle.

EFFECTIVENESS OF GRANULAR PLANTING-TIME AND WHORL TREATMENTS FOR THE CONTROL OF LATE-SEASON SWEET CORN INSECTS

Various rates of three insecticide compounds were evaluated as planting-time and/or whorl applications for the control of European corn borer, corn earworm, and fall armyworm.

Procedure

Variety: Seneca Scout
Planting date: July 19
Location: Highland, Ulster County, N. Y.
Plot size: 0.5 acre; 36" rows
Design: Randomized block
Replications: 3
Soil type: Cossayuna gravely loam
Application date(s): July 19 (planting time); whorl applications on August 28 and September 5

Table 7.—Effectiveness[a] of granular formulations in controlling three insect species in ears or stalks of late season sweet corn. Highland, N. Y. 1974.

			Ears infested (%)[c]				
Compound	Rate (lb. AI/A)	Appn.[b] method	ECB	CEW	FAW	Clean ears (%)	Stalks infested (%)
Bay 92114	2	PT	39 b	36 c	3 b	24a	90 a
Bay 92114	4	PT	54 a	18 d	15 ab	27 a	75bc
Furadan	2	PT	60 a	36 c	12 ab	18 ab	93 a
Furadan	4	PT	51 ab	51 ab	9 ab	6 b	81 ab
Furadan	1	1W	15 c	54 a	15 ab	21 a	66 c
Furadan	1	2W	8 c	56 a	20 a	26 a	10 e
Thuricide HP	1	1W	39 b	45 abc	12 ab	24 a	81 ab
Thuricide HP	1	2W	39 b	39 bc	12 ab	15 ab	30 d
Untreated			42 b	36 c	14 ab	20 ab	90 a

[a]Means followed by the same letter are not significantly different at P = .05. Where applicable, data were subjected to arcsin transformation before analysis.

[b]PT = planting time; W = whorl.

[c]ECB = European corn borer; CEW = corn earworm; FAW = fall armyworm.

Application method: Planting time treatments applied by same method as described for previous test. Whorl treatments applied with Gandy in 8" band over row at mid-whorl; 2nd application 8 days later.

Evaluation date: Harvest maturity (October 10)

Evaluation method: If at least 1 borer hole was observed, a plant was considered infested; no attempt was made to determine the number of tunnels or the location of such tunnels. Ears were considered infested if there was kernel feeding, shank damage, or if a larva was present. No attempt was made to access corn borer or fall ar-myworm foliage feeding damage.

Results and Discussion

No treatment provided overall insect control that would approach acceptable levels for fresh market sweet corn (Table 7). Furadan (two whorl applications) at 1 lb. a.i./acre yielded few corn borer infested ears (8%) but control of the other two insect species was inadequate. This treatment also yielded 10 per cent stalk infestation which was significantly less than all other treatments.

1974 WEATHER DATA

	Rainfall (inches)		Mean Air Temp. (°F)	
	Middletown	Highland	Middletown	Highland
April	3.01	2.91	52.4	51.2
May	3.75	4.19	58.6	56.6
June	4.24	5.83	67.1	65.3
July	4.09	4.41	73.0	71.3
August	4.46	3.99	71.8	68.9
September	5.64	5.00	62.6	59.6
TOTAL:	25.19	26.33		

MATERIALS USED

Compound	Company	Table
Bay 92114	Chemagro, Div. of Baychem	3,6,7
Bay Hox 1901	Chemagro, Div. of Baychem	2
Bay NTN 8629	Chemagro, Div. of Baychem	2
Carbofuran	FMC, Niagara Chem. Div.; Chemagro	5-7
Carzol	NOR-AM Agric. Prod., Inc.	1
CGA 12223	Ciba-Geigy	3,4
CGA 15324	Ciba-Geigy	2
Counter	American Cyanamid, Agric. Div.	3
Dasanit	Chemagro, Div. of Baychem	3,4
Dasanit-Thiram	Chemagro, Div. of Baychem	3
Diazinon	Ciba-Geigy	1-5
Dipel	Abbott Laboratories	2
Dyfonate	Stauffer Chem. Co.	3-5
Dyfonate-Thiram	Stauffer Chem. Co.	3
EPN	FMC, Niagara Chem. Div.	5
Ethion	FMC, Niagara Chem. Div.	3,4
Fundal-Galecron	NOR-AM, Ciba-Geigy	1,2
Guthion	Chemagro, Div. of Baychem	1
Lannate	DuPont, Biochem. Dept.	1,2
Lorsban	Dow Chem. Co.	3,4
Monitor	Chemagro, Div. of Baychem	1,2
Nemacur	Chemagro, Div. of Baychem	2
Orthene	Chevron Chem. Co., Ortho Div.	1,2,5
Parathion	FMC, Niagara Chem. Div.	1
Phosdrin	Shell Chem. Co.	1,2
Phosvel	Velsicol Chem. Corp.	1,2
Systox	Chemagro, Div. of Baychem	1,2
Thiodan	FMC, Niagara Chem. Div.	1
Thuricide	Sandoz-Wander, Inc.	7