1967

PESTICIDE RESEARCH REPORT

Compiled by

NATIONAL COMMITTEE ON PESTICIDE USE IN AGRICULTURE

OTTAWA, CANADA

CHAIRMAN - H. HURTIG

SECRETARY - L. ROADHOUSE

TABLE OF CONTENTS

FOREWORD

The National Committee on Pesticide Use in Agriculture was formed in 1961 by its parent body, the National Coordinating Committee on Agricultural Services. It has three main duties: to define problems in crop and animal protection and to coordinate and stimulate research on pesticides; to establish principles for drafting local recommendations for pesticide use; and to summarize and make available current information on pesticides.

The first meeting of the N.C.P.U.A., held in Ottawa, March 19-21, 1962, recommended the Committee should provide an annual compilation of summaries of research reports and pertinent data on crop and animal protection involving pesticides. In an attempt to increase the usefulness of the Report the early deadline for submission of reports was maintained this year by the cooperation of contributors and section editors.

This year 177 reports are included. We are indebted to the cooperation of research workers in this field from provincial and federal departments, as well as universities and industry, together with the section editors and members of the Pesticide Technical Information Office, for making this report possible. Suggestions for streamlining the report are always welcome.

E.Y. Spencer

E.Y. Spencer,
Coordinator.

INSECTS OF FRUIT CROPS

edited by

R.O. Paradis
G.G. Dustan

CROP: Apple

PEST: Rosy apple aphid, Anuraphis rosea (Baker)

TITLE: Evaluation of insecticides in the control of the rosy apple aphid and their effects on some aphid predators

NAME AND AGENCY: PREE, D.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario.

MATERIALS: Nicotine Sulphate, 4 lb. per Imp. gal.; Lannate 90 W.P., Sayfos 70 W.P.

METHODS: Sprays applied to 2 sides of trees June 11, with Kinkelder Super sprayer at 50 gal. water per acre. Sprayer at 140 M.P.H. air speed, 2-3 M.P.H. ground speed, 1.7 gal. per tree, temperature 85°F. Ten infested terminals from each of 2 replicates examined June 13. Data expressed as an averaged percentage of aphids killed. Effects on Coccinellidae and Syrphidae obtained using limb taps, beating trays, and examination of infested terminals. Data expressed as percentage dead of total predators examined.

RESULTS: Effect of Insecticides on Rosy Apple Aphids and Several Aphid Predators. W.O.A.S., Ridgetown, June 13, 1967.

Materials	Rate Active/Acre	% Aphids Dead	Predators Dead Coccinellidae	Predators Dead Syrphidae
Sayfos	6 oz.	92.1	36.4	0
Lannate	8 oz.	88.8	100	100
Nicotine Sulphate	60 fl. oz.	66.2	0	0
Check	-	3.5	0	0

Aphid colonies on terminals became established 2-3 weeks prior to spraying. At application time aphids had caused curling of leaves on infested terminals. Coccinellidae were found to be almost exclusively Adalia bipunctata (Linne). Most of the Syrphidae examined were larvae of the genera Syrphus, Didea and Allograpta. Populations of test insects were abundant. No phytotoxic effects were seen.

RESIDUE DATA: Nil

CONCLUSIONS: Sayfos and Lannate gave best control of aphids in this experiment. Curling and twisting of leaves caused by aphids feeding may have caused a reduction in the percentage of aphids killed. Nicotine Sulphate had no apparent effects on the predators examined. Sayfos had some effect on Coccinellidae but did not affect any of the Syrphidae examined.

CROP: Apple var. McIntosh

PEST: Apple aphid, *Aphis pomi* (de Geer)

TITLE: Control with broad spectrum insecticides

NAME AND AGENCY: COLE, R. J., May & Baker (Canada) Ltd.,
200 Bellarmin St., Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal. Imp.
Zolone (33% w/v phosalone E.C.); 20.0 fl. oz. and 30.0 fl. oz.
Zolone (30% w/w phosalone W.P.); 1.5 lb. and 2.0 lb.
Guthion 25% w/w W.P.; 1.25 lb.
Imidan 50% w/w W.P.; 1.25 lb.

METHODS: Orchard of mature McIntosh trees in Aylmer, Ontario. Sprays applied on 26.6.67 and 6.7.67 with Jeep mounted Rittenhouse sprayer at 400 lb. pressure spraying to "run-off". Treatments were applied to randomized single tree plots, replicated three times. 50 terminals examined per tree, and level of infestation determined using the following scoring system:-

0	=	No aphids on terminals
1	=	1-10 " " "
2	=	10-20 " " "
3	=	20-30 " " "
4	=	30-50 " " "
5	=	50 + " " "

RESULTS:

Material	Amt./100 gal.	Per Cent Infested Terminals on (date) 27.6	5.7	8.7
Phosalone E.C.	20 fl.oz.	2.4	8.7	2.7
Phosalone E.C.	30 fl.oz.	0.3	5.9	1.7
Phosalone W.P.	1.5 lb.	1.1	7.4	2.0
Phosalone W.P.	2.0 lb.	0.1	3.5	0.9
Guthion	1.25 lb.	14.5	37.1	32.6
Imidan	1.25 lb.	13.7	37.7	31.8
Check	-	50.0	80.3	90.6

CONCLUSIONS: Phosalone maintains good aphid supression for up to 9 days, after which re-infestation starts to occur. A further application will achieve effective knock-down. Supression was superior to that obtained with both Guthion and Imidan.

RESIDUE DATA: Results awaited.

GENERAL OBSERVATIONS: These data were obtained from an orchard under test for broad spectrum pest control, not specifically for apple aphid control. The results showed that commercial control of apple aphid can be achieved with phosalone when used in a standard spray programme. No phytotoxic effects were observed in this trial.

CROP: Apple

PEST: Apple aphid, Aphis pomi (de Geer)

TITLE: Control test

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts shown in table are for 100 gals. Imp. Banol 75% W.P.; formothion 43% E.C.; Imidan 50% W.P.

METHODS: A single row of 6 trees was sprayed with each material on June 13/67 by hand gun using Jeep-mounted Hardie 99 at 300 lbs. Two days later 25 leaves per plot were examined in laboratory for living or dead aphids and after 10 days, 5 terminals per tree were rated for infestation. 0 = zero; 1 = very light; 2 = light; 3 = medium; 4 = heavy; 5 = very heavy. All trees heavily infested when sprayed.

RESULTS:

Material	Am't form. 100 gal. Imp.	% dead 48 hrs.	Average Infestation rating/terminal Pre-Spray	after 10 days
Imidan	1.0 lb.	99.5	5.0	1.8
Banol	1.0 lb.	99.3	5.0	1.8
formothion	1.0 qt.	99.1	5.0	1.6
Check	--	16.9	5.0	4.8

CONCLUSIONS: Each material gave extremely good initial control of a heavy population, and was still effective after 10 days.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Predacious anthocorids averaged 4 per leaf in the check plot count of July 15 but none was found on any sprayed trees. Temperature when trees were sprayed 68.0°F. Rainfall over 10 day period 0.93".

CROP: Apple var. McIntosh

PEST: Apple aphid, *Aphis pomi* (de Geer)

TITLE: Evaluation of new chemicals for control

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: For amounts of formulation, see table
Dursban 25% W.P.; Lannate 90% W.D.; N-4543; Dupont 1642 90% W.D.; N-10242 50% W.P.; C-9491 25% W.P.

METHODS: Treatments replicated 3 times on randomly selected single tree plots of dwarf McIntosh. A single, run-off spray was applied on June 21 by hand gun using a Jeep-mounted Hardie 99 at 300 p.s.i. Five random terminals examined per replicate and rated according to infestation, 0= zero, 1 = very light; 2 = light; 3 = medium; 4 = heavy and 5 = very heavy. All trees very heavily infested when treatment applied.

RESULTS: Average terminal rating at times shown

Material	Am't/100 gal. Imp.	June 21 Pre-Spray	June 23 2 day	June 26 5 day	July 5 14 day
C-9491	2.0 lb.	5	0.1	0.2	2.5
N-4543	1.0 lb.	5	0.5	1.5	2.5
N-10242	1.0 lb.	5	0.0	0.1	2.8
Lannate	1.0 lb.	5	0.0	0.4	3.5
Dupont 1642	0.5 lb.	5	0.0	0.5	3.5
Dursban	1.0 lb.	5	0.6	1.3	3.5
Check	---	5	4.8	4.5	5.0

CONCLUSIONS: It is difficult for any material to eliminate a heavy population. These materials gave very good initial knockdown and maintained a relatively low population for approximately 10 days. Heavy populations throughout the rest of the orchard may contribute to the short residual of these compounds.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: One replicate of Dupont 1642 had a heavy woolly aphid population. There was no noticeable injury from any treatment. Total rainfall over test period was 1.48"; maximum temperature 86.0°F; minimum temperature 53.9°F.

CROP: Apple var. McIntosh

PEST: Apple aphid, *Aphis pomi* (de Geer)

TITLE: Evaluation of chemicals for control

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: For amounts of formulations, see table.
G. S. 13005 40% W.P.; formothion 25% E.C.; phenthoate 50% E.C.; bromophos 25% W.P.; endosulfan 50% W.P.; Lannate 90% W.P.; Dessin 50% W.P.; Tranid 50% W.P.; Galecron 50% E.C.; phosalone 30% W.P.; Kilval 40% E.C.

METHODS: Single run-off applications of each material to single tree plots replicated three times. Sprays applied on June 16 by hand gun using a Jeep-mounted Hardie 99 at 300 p.s.i. Infestation rated according to severity by examining 5 random terminals per replicate, so that 0 = zero; 1 = very light; 2 = light; 3 = medium; 4 = heavy; 5 = very heavy.

RESULTS:

			Average terminal rating at times shown			
		Amt/100	June 16	June 21	June 26	July 5
Material	Formulation	gal. Imp.	Pre-Spray	5 day	10 day	19 day
Kilval	40% E.C.	1.0 pt.	4.9	0.0	0.3	0.5
phosalone	30% W.P.	1.0 lb.	4.3	0.1	1.0	3.7
formothion	25% E.C.	0.5 pt.	5.0	0.1	1.7	3.8
G.S. 13005	40% W.P.	0.5 lb.	4.1	0.5	3.0	4.3
Tranid	50% W.P.	1.5 lb.	4.3	0.4	2.4	4.7
Lannate	90% W.P.	1.0 lb.	3.4	0.0	2.2	4.9
endosulfan	50% W.P.	1.0 lb.	4.3	0.5	2.1	4.9
phenthoate	50% E.C.	0.5 pt.	4.0	0.4	2.8	5.0
Dessin	50% W.P.	1.0 lb.	3.7	0.4	2.9	5.0
bromophos	25% W.P.	1.0 lb.	4.6	0.8	3.4	5.0
Galecron	50% E.C.	1.0 pt.	4.6	2.1	4.1	5.0
Check	---	---	4.5	4.5	4.7	5.0

CONCLUSIONS: Initial knockdown by all materials except Galecron was very good. By the 10th day only Kilval, phosalone and formothion showed sufficient control to be of value. At the end of the 19th day Kilval was still showing outstanding efficacy.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Heavy aphid population in check trees and other untreated trees in the orchard probably affected the residual life of some of these materials. Total rainfall over test period was 1.80". Maximum temperature 86.0°F; minimum 52.3°F.

CROP: Apple var. McIntosh

PEST: Apple aphid, *Aphis pomi* (de Geer)

TITLE: Evaluation of chemicals for control

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: See table for amounts of formulation

METHODS: Three replicates of single tree plots sprayed to run-off on June 19 using hand gun application with a Jeep-mounted Hardie 99 at 300 p.s.i. All trees very heavily infested when sprayed. Degree of control assessed by rating 5 random terminals per replicate so that 0 = zero; 1 = very light; 2 = light; 3 = medium; 4 = heavy; 5 = very heavy.

RESULTS:

			Average terminal rating at times shown			
Material	Formulation	Amt/100	June 19	June 21	June 26	July 5
		Gal. Imp.	Pre-Spray	2 day	7 day	16 day
Menazon	70% W.P.	1.0 lb.	5.0	0.4	0.1	0.7
dimethoate	4 E	1.0 pt.	5.0	0.0	0.3	1.0
Diazinon	50% W.P.	1.0 lb.	5.0	0.0	0.7	1.0
oxydemeton-methyl	S.C.	1.0 pt.	5.0	0.1	0.1	1.4
phosphamidon	4.8 E.C.	0.75 pt.	5.0	0.1	0.3	1.4
Imidan	50% W.P.	1.0 lb.	5.0	0.1	0.9	2.9
endosulfan	50% W.P.	1.5 lb.	5.0	0.7	1.1	3.1
carbaryl	50% W.P.	1.0 lb.	5.0	0.9	1.5	3.1
Check	---	---	5.0	3.6	4.5	5.0

CONCLUSIONS: Initial knockdown satisfactory for all materials at rates used. All held well for seven days, but after two weeks Imidan, carbaryl and endosulfan were no longer effective.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: An infestation of woolly aphid appeared to be wiped out on all treated trees, but survived on the check trees. No attempt was made to rate the infestation which was incidental to the main test. Total rainfall over test period was 1.48".

CROP: Apple var. McIntosh

PEST: Apple aphid, *Aphis pomi* (de Geer)

TITLE: Evaluation of E.P.N. as a synergist with malathion

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: For amounts of formulations, see table.
Malathion 25% W.P.; E.P.N. 25% W.P.

METHODS: Duplicated random, single tree plots sprayed to run-off with each material or in combination at two strengths. Trees were seven year old dwarf stock, sprayed by hand gun using a Jeep-mounted Hardie 99 at 300 p.s.i. Control determined by examining 5 random terminals per replicate (10/treatment) and rating the infestation present as 0 = zero; 1 = very light; 2 = light; 3 = medium; 4 = heavy; 5 = very heavy.

RESULTS:

Average infestation rating per terminal at times shown

Material	Formulation	Amt/100 Gal. Imp.	June 16 Pre-Spray	June 21 5 day	June 26 10 day
Malathion	25% W.P.	3.0 lb.	4.6	0.5	3.2
E. P. N.	25% W.P.	0.75 lb.	3.6	2.5	3.8
Mal + E.P.N.	as above	3.0 lb. + 0.75 lb.	4.5	0.3	3.4
Mal + E.P.N.	as above	1.5 lb. + 0.375 lb.	5.0	1.8	4.3
E. P. N.	as above	0.375 lb.	4.9	3.7	4.8
Check	---		3.3	3.3	5.0

CONCLUSIONS: For several years malathion has been ineffective as an aphicide; the addition of E.P.N. at the rates used did not materially increase its efficiency nor extend its residual action.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Total rainfall over period was 1.80"

CROP: Apple

PEST: European fruit scale, *Aspidiotus ostreaeformis* Curtis

TITLE: Control experiment

NAME AND AGENCY: MORGAN, C.V.G., Entomology Laboratory, Canada Agriculture Research Station, Summerland, British Columbia

MATERIALS: Lime sulphur; Shell Neutrol Emulsible Dormant Spray Oil; Parathion W-15; Diazinon 50 W. Custom-built, high pressure (425 p.s.i.); high volume, handgun sprayer; gun fitted with 8/64 in. orifice disc.

METHODS: About 1.5-acre block of mature Rome Beauty apple trees at Kelowna, British Columbia; 27 x 27 ft. hexagonal planting; heavily infested with the European fruit scale. Seven treatments; one treatment per plot; duplicate plots; 4 trees per plot. Seven nonsprayed check trees chosen throughout orchard. Strictly dormant, handgun sprays applied March 21, 1967; half-inch green sprays applied April 13 and 14; summer sprays applied June 29 (crawlers of the European fruit scale started to emerge in this orchard June 26). Average of 15 gal. spray mixture applied per tree in dormant stage, 18 in half-inch green stage, and 22 in summer sprays. Effectiveness of sprays assessed at harvest, October 27 to November 3, by examining at least 6 orchard-run boxes of apples picked, at random, from the lower half only of each tree in each plot (about 700 to 800 apples per tree). Total crop averaged about 18 boxes per tree. An apple with one or more scales was classified as a scaled fruit.

RESULTS:

Percentage of Rome Beauty apples infested with the European fruit scale at harvest

Stage	Treatment	Amount per 100 gal. Imp.	Scaled Fruit
Dormant	Lime sulphur + Dormant oil	4 gal. 2 gal.	18
Dormant	Lime sulphur	4 gal.	42
Dormant	Dormant oil	2 gal.	43
Half-inch green	Dormant oil	2 gal.	53
Half-inch green	Dormant oil	4 gal.	14
Summer	Parathion 15% W.P.	2 lb.	12
Summer	Diazinon 50% W.P.	1.5 lb.	8
	Check		70

CONCLUSIONS: The summer sprays of parathion and diazinon or the half-inch green spray of dormant oil, 4 gal. per 100 gal., were just as effective as the previously recommended standard spray mixture of lime sulphur and oil applied in the dormant stage.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No injury was evident from any treatment.

CROP: Apple variety, Northern Spy

PEST: Codling moth Carpocapsa pomonella (L.)

TITLE: Control of orchard pests with broad-spectrum insecticides

NAME AND AGENCY: COLE, R.J., May & Baker (Canada) Ltd., 200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal. Imp.
Zolone Liquid (33% w/v phosalone E.C.); 20.0 fl oz and 30.0 fl oz
Zolone W.P. (30% w/w phosalone W.P.) 1.5 lb and 2.0 lb
Guthion 25% W.P. 1.25 lb
Imidan 50% 1.25 lb

METHODS: This test was carried out in a mature but semi-neglected orchard of Northern Spy at Waterford, Ontario. Single tree plots in triplicate were sprayed to 'run-off' with a Jeep mounted Rittenhouse sprayer at 400 lb pressure. The calyx spray was applied on 11th June and cover sprays on 22nd June, 2nd, 11th, 20th and 30th July and 9th August. An additional spray was applied on 22nd August for suspected second brood codling moth attack. A full protective fungicide programme was also maintained from bud-burst onwards. Assessments are based on all dropped fruit plus all harvest fruit from each treatment.

RESULTS:

Material	Amt./100 gals	Total No. Apples Assessed	CODLING INFESTATION No. Apples attacked	Percentage
Zolone E.C.	20.0 fl oz	18,925	151	0.8
Zolone E.C.	30.0 fl oz	20,465	109	0.5
Zolone W.P.	1.5 lb	16,930	194	1.1
Zolone W.P.	2.0 lb	18,248	124	0.7
Guthion	1.25 lb	22,825	312	1.4
Imidan	1.25 lb	19,179	493	2.6
Check	-	30,161	3,235	10.7

CONCLUSIONS: 'Zolone' Liquid (E.C) gave the best control of codling. Light infestations of plum curculio, cankerworm, tarnished plant bug and red banded leaf roller were controlled equally well by all materials.

RESIDUE DATA: Results awaited.

GENERAL OBSERVATIONS: Lenticel spotting was observed at the 'run-off' point on the fruit sprayed with Zolone E.C. This was thought to have resulted from a combination of factors such as weather conditions and spray volume, linked with the use of the emulsifiable concentrate spray.

CROP: Apple

PEST: Codling Moth, Carpocapsa pomonella (Linnaeus)

TITLE: Control of codling moth with reduced dosages of Guthion

NAME AND AGENCY: MADSEN, Harold F. and K. WILLIAMS, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: Amounts given are per acre.
Guthion 25% W.P., 5 lb., Guthion 25% W.P. 2½ lb., Guthion W.P. 1¼ lb., Guthion W.P. 2½ lb. plus Superior oil, 5 gal.

METHODS: Materials applied on June 5, June 27, July 24, and August 15 with a Turbomist concentrate sprayer set to deliver 60 gallons of dilute spray per acre at 100 p.s.i. Each plot with 6 trees, replicated twice. Evaluated by examining 4 boxes of fruit per tree at harvest. Expressed as per cent infested fruit.

RESULTS:

Material	Amount per acre	Fruit Examined	Worms	Stings	% Infested
Guthion	5.0 lb.	6291	91	29	1.9
Guthion	$2\frac{1}{2}$ lb.	3553	108	47	4.3
Guthion + Superior oil	$2\frac{1}{2}$ lb. + 5 gal.	4330	162	185	8.0
Guthion	$1\frac{1}{4}$ lb.	3986	215	156	9.3
Check	-	5021	3658	273	76.5

CONCLUSIONS: Good control with Guthion at 5 lb. and $2\frac{1}{2}$ lb. in spite of a very heavy infestation in the check. Guthion $2\frac{1}{2}$ lb. when combined with oil was no better than Guthion at $1\frac{1}{4}$ lb.

RESIDUE DATA: Analysis of foliage showed deposits and persistence of Guthion to be proportional to the dosage except in the Guthion $2\frac{1}{2}$ lb. + oil 5 gal. plot. Here the initial deposit was lower than Guthion at $2\frac{1}{2}$ lb. alone, and the persistence was less than with Guthion at $1\frac{1}{4}$ lb.

GENERAL OBSERVATIONS: The Guthion-oil combination caused a severe russet on the Newtown variety of apple.

CROP: Apple

PEST: Codling Moth, *Carpocapsa pomonella* (L.)

TITLE: Control of Codling Moth

NAME AND AGENCY: PREE, D.J., and HOSTE, E.O.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario

MATERIALS: Guthion 25 W.P., Imidan 50 W.P., Formothion 40 E.C., Temik 10G.

METHODS: Temik granules applied to soil around trunk of trees at rate of 1 oz. product per inch of tree diameter at ground level. Applied in 3 ft. band beginning 2 ft. from trunk using shaker. Granules washed into soil using 20 gal. water per tree. Sprays applied June 14, July 28 to foliage in 50 gal. water per acre using Kinkelder Super sprayer. Temik applied to two trees, with all other treatments consisting of four trees in a single block. Evaluated at harvest by picking 175 apples from each tree and 25 fallen apples.

RESULTS:

Treatment	Pounds Active/Acre	% Infested Fruit
Guthion 25 W.P.	1 1/4	.13
Guthion 25 W.P.	5/8	1.17
Imidan 50 W.P.	1 1/4	.25
Imidan 50 W.P.	5/8	.33
Formothion 40 E.C.	4	0
Temik 10G	1 oz. product per inch trunk diameter	5.0
Untreated		18.9

CONCLUSIONS: All materials with the exception of Temik provided good control of Codling Moth. Reduced rates of application of Guthion and Imidan provided control equal to the full 1 1/4 lb. per acre rate.

RESIDUE DATA: Nil

OBSERVATIONS: Nil

CROP: Apple

PEST: Potato leafhopper, *Empoasa fabae* (Harris)
Apple aphid, *Aphis pomi* (DeGeer)

TITLE: Control of potato leafhopper and apple aphid.

NAME AND AGENCY: WAGNER, H. W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Carbaryl 50% W.P. 2 lb.; Imidan 50% W.P. 1 1/4 lb.; azinphos-methyl 25% W.P. 1 1/4 lb.; N 4543 50% W.P. 1 1/4 lb.; Phosalone 30% W.P. 2 lb.; DDT 50% W.P. 2 lb.

METHODS: Sprays were applied with a knapsack sprayer to four single tree plots of two year old apple trees on July 15. Counts were taken July 18 on 40 leaves per treatment for leafhopper and on 40 terminals for aphids.

RESULTS:

Materials	Leafhoppers	Aphids
Carbaryl	0	0
Imidan	0	0
azinphos-methyl	0	0
N 4543	0	0
Phosalone	0	0
DDT	0	2
Check	6	20

CONCLUSIONS: All materials showed equal control.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Spray drift from the surrounding orchard seemed to reduce the insects, even in the check plots.

CROP: Apple, variety Red Delicious, semi-dwarf, 10 to 14 ft high, 24 x 24 ft spacing.

PEST: European Red Mite, Panonychus ulmi (Koch).

TITLE: Pink and pink plus calyx sprays for control of European Red Mite (Cunningham site).

NAME AND AGENCY: Bennett, J. M., Burnard, D. G. and Walkof, K. D., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1.5, 2 and 2.5 lb, chloropropylate 25EC 32 fl oz, dicofol 18.5 WP 2 lb, Morestan 25WP 0.5 lb, dimethoate 4 lb/gal EC (Rogor 40) 20 fl oz, Genite 50WP 1.5 lb.

METHODS: Near Windham Centre, Ontario, single tree plots, in a randomized block design with four replicates, were sprayed on May 24th, when at the full pink stage. Certain treatments (see table) were repeated on June 9th, at the calyx stage (95 to 100% petal fall). Application was as dilute, high-volume sprays, with a hand-gun, at 400 psi. Volume averaged 2 to 3 gal per tree. Mites were counted on 10 leaves per tree at approximately weekly intervals. Representative counts are given in the table.

RESULTS:

Number of Mites (Active Stages) on 40 Leaves

Treatments	June 7	June 21	July 6	July 18	August 2	August 16	August 30	September 13
NC 5016 1.5 lb P	39	25	125	201	949	599	408	306
NC 5016 2 lb P	1	0	27	40	174	311	979	778
NC 5016 2.5 lb P	7	1	3	51	181	289	1175	758
NC 5016 1.5 lb P + C	31	0	2	6	21	70	457	496
NC 5016 2 lb P + C	0	0	1	3	6	60	637	572
NC 5016 2.5 lb P + C	1	0	0	1	0	12	308	162
Chloropropylate P	1	1	26	30	71	290	1030	1050
Chloropropylate P + C	0	1	0	1	17	73	723	490
Dicofol P	3	1	17	35	83	156	998	762
Dicofol P + C	5	0	1	0	5	2	40	128
Morestan P *	11	4	148	3	10	20	245	140
Dimethoate P *	10	51	402	25	42	46	172	74
Dimethoate P + C *	13	18	166	1	102	8	38	78
Genite P *	39	70	316	7	248	64	353	544
Check **	228	314	81	64	24	27	659	238

P = Pink
P + C = Pink + Calyx
* Retreated July 7th with dicofol 2 lb
** Sprayed June 28th and again July 18th with NC 5016 1 lb

CONCLUSIONS: Dicofol, applied at the pink and again at the calyx, was the outstanding treatment and provided season-long mite control. Pink plus calyx applications of NC 5016 and of chloropropylate controlled mites well until late August. Control with pink sprays of dicofol, NC 5016 2 and 2.5 lb, and chloropropylate was of somewhat shorter duration. Control with NC 5016 1.5 lb and Morestan was of short duration. The poor results with dimethoate and Genite suggest a resistant population.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for analysis.

GENERAL OBSERVATIONS: No treatment-related injury was observed on fruit or foliage. Temperatures in late August and early September were higher than normal and probably contributed to the late season build-up of mites.

CROP: Apple, variety Red Delicious, semi-dwarf, 10 to 14 ft high, 24 x 24 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch).

TITLE: Early summer sprays for control of European Red Mite (Cunningham site).

NAME AND AGENCY: Bennett, J. M., Burnard, D. G. and Walkof, K. D., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, chloropropylate 25EC 32 fl oz, tetradifon 25WP 1 lb, dicofol 18.5 WP 2 lb, dimethoate 4 lb/gal EC (Rogor 40) 20 fl oz, binapacryl 50WP 0.5 lb, ethion 25WP 1 lb.

METHODS: Near Windham Centre, Ontario, single tree plots, in a randomized block with three replicates, were sprayed on June 23rd and again on July 5th with high-volume dilute sprays applied with a hand-gun. Spraying was done at 250 psi, and all bark and foliage were thoroughly covered, using 4 to 5 gal of spray per tree. Mites were counted on 10 leaves per tree at approximately weekly intervals. Representative counts are given in the table.

RESULTS:

Number of Mites (Active Stages) on 30 Leaves

	June		July			August		September	
	20*	29	5	10	24	8	21	5	19
NC 5016 1 lb	368	38	50	0	0	2	18	27	28
NC 5016 2 lb	192	21	8	0	0	4	24	52	108
NC 5016 3 lb	474	24	1	0	0	2	12	14	48
Chloropropylate	368	29	70	0	0	0	16	28	82
Tetradifon **	209	89	282	703	28	0	5	19	26
Dicofol	357	16	1	0	0	2	0	4	4
Dimethoate	204	15	55	2	0	14	85	99	192
Binapacryl	330	37	181	0	1	7	87	178	210
Ethion	525	92	88	2	6	9	36	120	96

* Pre-spray count
** Retreated July 17th with dicofol 2 lb

CONCLUSIONS: With two sprays, applied 12 days apart, all materials except tetradifon provided excellent control of mites for the remainder of the season.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for residue analysis.

GENERAL OBSERVATIONS: The chloropropylate treatment caused injury on 35 of 100 apples examined during August. Injury consisted of a darkening of the lenticels in an irregular loop or ring-shaped pattern. Injury was still visible at harvest but was not severe enough to lower the grade. No other treatment-related injury was observed.

CROP: Apple, variety Red Delicious, standard rootstocks, 10 to 15 ft high, 15 x 15 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch).

TITLE: Half-inch green and pink sprays for control of European Red Mite (Berryman site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J., and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, Morestan 25WP 0.5 lb, dormant oil 200 - 220 vis. 2 gal.

METHODS: Near Penticton, British Columbia, single tree plots, randomized and replicated five times, were treated with dilute, high-volume sprays applied with a hand-gun. The half-inch green spray was applied April 10th at 100 psi. Volume averaged 2.5 gal per tree. The pink spray was applied on May 7th at 125 psi. Volume averaged 3.5 gal per tree. At approximately weekly intervals, starting 15 days after the pink spray, 20 leaves from each tree (100 per treatment) were brushed with a Henderson-McBurnie brushing machine and the mites counted. Counts were discontinued after the June 19th count and the entire experiment over-sprayed.

RESULTS:

Number of Mites (Active Stages) on 100 Leaves

Treatments	May 22	May 29	June 6	June 14	June 19
NC 5016 1 lb P	920	272	24	1300	820
NC 5016 2 lb P	720	322	32	540	490
NC 5016 3 lb P	624	234	40	400	2260
Morestan P	578	178	80	490	2170
Dormant oil 1/2 in	212	46	16	498	1460
Check	1208	500	414	3300	4840

P = Pink spray
1/2 in = half-inch green spray

CONCLUSIONS: Dormant oil, at the 1/2 inch green, was the most effective treatment and provided control of mites until mid-June. NC 5016, all rates, and Morestan, applied at the pink stage, were slower to gain control but held populations down well until mid-June.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for analysis.

GENERAL OBSERVATIONS: This orchard had a very high population of over-wintering European Red Mite eggs and provided a severe test for the treatments applied. A small population of McDaniel Spider Mite developed in the dormant oil treatment and on the check plots. NC 5016 and Morestan suppressed the population during the period in which observations were made. No phytotoxicity was observed.

CROP: Apple, varieties Red Delicious and McIntosh, standard rootstocks, 10 to 15 ft high, 36 x 36 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch).

TITLE: Pink and pink plus calyx sprays for control of European Red Mite (Cooper-Moore site).

NAME AND AGENCY: Bennett, J. M., Burnard, D. G. and Walkof, K. D., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1 lb, 2 lb and 3 lb, chloropropylate 25EC 32 fl oz, dicofol 18.5 WP 2 lb, Morestan 25WP 0.5 lb, dimethoate 4 lb/gal EC (Rogor 40) 20 fl oz, tetradifon 1 lb/gal EC 20 fl oz.

METHODS: Near Simcoe, Ontario, single tree plots were sprayed on May 23rd, when at the full pink stage. Certain treatments (see table) were repeated on June 8th, at the calyx stage (petal fall 98 to 100% complete). Treatments were randomized, with 4 replications on Red Delicious and 1 replication on McIntosh. Application was as dilute, high-volume sprays, with a hand-gun, at 400 psi. Volume averaged 2 to 3 gal per tree. Thorough coverage was achieved. Mites were counted on 10 leaves per tree at approximately weekly intervals. Representative counts are given in the table.

RESULTS:

Number of Mites (Active Stages) on 50 Leaves

	June		July			August		September
	6	20	4	19	1	15	31	12
NC 5016 1 lb P (1)	3	50	340	513	614	434	2050	688
NC 5016 2 lb P (2)	9	10	126	243	880	814	840	1224
NC 5016 3 lb P (2)	1	14	14	160	458	277	825	772
NC 5016 1 lb P + C	22	2	5	127	338	1038	2820	1582
NC 5016 2 lb P + C	22	1	5	68	361	726	2320	1218
NC 5016 3 lb P + C	3	0	0	21	37	116	1705	1096
Chloropropylate P	3	2	28	85	169	420	2870	1434
Chloropropylate P + C	3	0	0	43	35	154	1075	1070
Dicofol P (3)	10	42	148	256	6	8	200	18
Dicofol P + C	3	0	1	4	6	96	886	902
Morestan P (4)	12	60	112	525	125	66	925	418
Dimethoate P (5)	25	165	1459	1407	486	464	2630	1002
Check (6)	61	454	423	341	0	4	108	172

P = Pink
P + C = Pink + Calyx
(1) Retreated July 19th with NC 5016 1 lb
(2) Retreated August 11th with tetradifon 20 fl oz
(3) Retreated July 19th with dicofol 2 lb
(4) Retreated July 19th with chloropropylate 32 fl oz
(5) Retreated July 19th with dimethoate 20 fl oz
(6) Sprayed June 27th with NC 5016 1 lb and again July 19th with NC 5016 2 lb

CONCLUSIONS: NC 5016 3 lb, chloropropylate and dicofol as pink + calyx treatments were the best treatments and provided excellent control of mites until after mid-August. Control with NC 5016 at 1 and 2 lb, at pink + calyx stages, broke down about August 1st. Of the treatments applied at the pink stage only, chloropropylate was the most effective, followed by NC 5016 3 lb, NC 5016 2 lb, dicofol, Morestan, NC 5016 at 1 lb and dimethoate.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for analysis.

GENERAL OBSERVATIONS: No treatment-related injury was observed on fruit or foliage. Mite population was high in this orchard, with an infestation of about 10 per leaf by the end of June. Higher than normal temperatures in late August and early September contributed to a late season build-up of mites.

CROP: Apple, variety Red Delicious, standard rootstocks, 10 to 12 ft high, 40 x 40 ft spacing.

PEST: European Red Mite, Panonychus ulmi (Koch).

TITLE: Early summer sprays for control of European Red Mite (Kellar site).

NAME AND AGENCY: Bennett, J. M., Burnard, D. G. and Walkof, K. D., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1 lb, 2 lb and 3 lb, chloropropylate 25EC 32 fl oz, tetradifon 1 lb/gal EC 20 fl oz, dicofol 18.5 WP 2 lb, dimethoate 4 lb/gal EC (Rogor 40) 20 fl oz, binapacryl 50WP 0.5 lb, ethion 25WP 1 lb.

METHODS: Near Simcoe, Ontario, single tree plots, randomized in three replicates, were sprayed on July 20th with high-volume dilute sprays applied with a hand-gun. Spraying was done at 300 psi, and all bark and foliage were thoroughly covered using 4 to 5 gal of spray per tree. Mites were counted on 10 leaves per tree at approximately weekly intervals. Representative counts are given in the table.

RESULTS:

Number of Mites (Active Stages) on 30 Leaves

Material	July 20*	July 24	July 31	August 14	August 21	August 28	September 5	September 11	September 19	September 26
NC 5016 1 lb	239	46	22	0	86	148	78	38	40	104
NC 5016 2 lb	501	56	4	2	2	10	0	2	32	2
NC 5016 3 lb	93	0	0	0	7	2	7	0	6	2
Chloropropylate	568	15	106	30	479	1048	640	414	780	520
Tetradifon	104	6	7	1	12	30	12	30	56	96
Dicofol	572	74	23	3	76	134	66	4	134	50
Dimethoate	171	56	99	50	228	608	376	456	272	214
Binapacryl	192	14	126	122	699	1030	760	344	462	428
Ethion	130	4	11	5	241	506	512	254	270	306

* Pre-spray count

CONCLUSIONS: NC 5016 at 2 lb and 3 lb were the outstanding treatments in this trial. NC 5016 at 1 lb, tetradifon and dicofol were also very satisfactory. The other materials provided some measure of control but populations built up toward the end of August.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for residue analysis.

GENERAL OBSERVATIONS: The chloropropylate treatment caused injury on 15 of 100 apples examined during August. Injury consisted of a darkening of the lenticels in an irregular loop or ring-shaped pattern. Injury was still visible at harvest but was not severe enough to lower the grade. No other treatment-related injury was observed.

CROP: Apple variety, Northern Spy.

PEST: Spring feeding caterpillars and early hatching European red mite, *Panonychus ulmi* (Koch)

TITLE: Control of pre-blossom pests

NAME AND AGENCY: COLE, R.J., May & Baker (Canada) Ltd.,
200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal. Imp.
Zolone (30% w/w phosalone W.P.); 2.0 lb.
DDT W.P. 50%; 2.0 lb.
Kelthane (18.5% w/w dicofol A.P.) 2.0 lb.

METHODS: Orchard of mature Northern Spy at Waterford Ontario. Single tree plots replicated three times were sprayed to 'run-off' on 29th May (pink bud stage) using a Jeep mounted Rittenhouse sprayer at 400 lb. pressure. Caterpillar assessments were made on 11th June for tip damage and presence of larvae. Mite counts were made on 31st May and 11th June counting the number of mites on 30 leaves per tree (90 per treatment).

RESULTS:

Material	Amt./100 g.	CATERPILLAR % tip damage	CATERPILLAR Live larvae/ 100 terminals	EUROPEAN RED MITES per 90 leaves 31.5	EUROPEAN RED MITES per 90 leaves 11.6
Zolone W.P.	2.0 lb.	3	0	132	1
DDT + Kelthane	2.0 lb + 2.0 lb	19	2*	133	12
Check	-	61	20* + 3‡	255	106

* Spring cankerworm (*Paleacrita vernata*)
‡ Green fruitworm (*Lithophane spp.*)

CONCLUSIONS: Zolone gave excellent control of spring feeding caterpillar compared with DDT. Red mite populations were very low at pink bud, but were nevertheless controlled equally well by Zolone and Kelthane at this time.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No spray damage observed.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch.)

PREDATOR: *Neoseiulus caudiglans* (Schuster)

TITLE: Pink bud sprays for European red mite control

NAME AND AGENCY: DOWNING, R.S. and T.K. MOILLIET, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: See table below

METHODS: The orchard consisted of six-year old Golden Delicious apple trees on Malling VII rootstalk. Trees were spaced 7½ ft. in the row by 15 ft. between rows. Ten treatments, 5 replicate plots per treatment, 3 trees per plot. Estimates of mite infestations were made on May 16 by taking 4 fruiting spurs from the centre tree of each plot. Samples of 20 leaves taken from the centre tree of each plot on other dates. Pink bud sprays were applied on April 28, 1967, using a high-volume handgun sprayer (pressure 425 p.s.i., volume 600 gal. per acre). NC 5016 and Galecron plots resprayed on June 15, 1967.

RESULTS:

Numbers of European red mite after pink bud sprays

	per 20 spurs	per leaf	
Miticide per 100 gal.	May 16	June 13	June 28
Plictran 50% W.P. 4 oz.	65	3	4
Plictran 50% W.P. 8 oz.	27	1	5
NC 5016 20% W.P. 1 lb.	127	14*	0
Micasin 50% W.P. 1 lb.	3	0	0
Milbex 50% W.P. 1 lb.	0	0	0
Morestan 25% W.P. ½ lb.	3	1	2
Galecron 50% E.C. ½ pt.	120	8**	0
Shell Neutrol oil 1 gal.	10	0	1
Pennsalt Superior oil 1 gal.	2	0	0
Check - no treatment	266	13	14

*NC 5016 20% W.P. 2½ lb. per 100 gal. applied June 15, 1967.

**Galecron 50% E.C. ¾ pt. per 100 gal. applied June 15, 1967

Numbers of N. caudiglans after pink bud sprays

	per 20 spurs	per 100 leaves	
Miticide per 100 gal.	May 16	June 13	June 28
Plictran 50% W.P. 4 oz.	163	90	32
Plictran 50% W.P. 8 oz.	167	72	28
NC 5016 20% W.P. 1 lb.	9	6*	0
Micasin 50% W.P. 1 lb.	93	22	2
Milbex 50% W.P. 1 lb.	106	68	14
Morestan 25% W.P. ½ lb.	31	6	12
Galecron 50% E.C. ½ pt.	9	4**	0
Shell Neutrol oil 1 gal.	59	36	6
Pennsalt Superior oil 1 gal.	57	12	14
Check - no treatment	137	36	22

*NC 5016 20% W.P. 2½ lb. per 100 gal. applied June 15, 1967.

**Galecron 50% E.C. 3/4 pt. per 100 gal. applied June 15, 1967.

CONCLUSIONS: NC 5016 20% W.P. 1 lb. was not sufficiently effective against European red mite but was highly toxic to the predaceous mite N. caudiglans. When the amount per 100 gal. was raised to 2½ lb. NC 5016 was extremely effective against European red mite and also obliterated the predaceous mite.

Galecron 50% E.C. ½ pt. was not satisfactory against European red mite but as with NC 5016, this low rate was very toxic to the predator. When Galecron was applied at 3/4 pt. per 100 gal. the control of European red mite was very good.

Micasin 50% W.P. 1 lb., Milbex 50% W.P. 1 lb., Morestan 25% W.P. ½ lb., and the two oils at 1 gal. were all very effective against the European red mite but were not very toxic to the predaceous mite N. caudiglans.

Plictran 50% W.P. at 4 oz. or 8 oz. per 100 gal. was the least toxic miticide to the predaceous mite and also gave good control of the European red mite.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

PREDATORS: Neoseiulus caudiglans (Schuster)
Mediolata sp.
Deraeocoris brevis piceatus Kngt.

TITLE: Effect of pesticides on the European red mite and some predators.

NAME AND AGENCY: DOWNING, R.S. and T.K. MOILLIET, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: See table below

METHODS: Red and Golden Delicious apple trees on Malling IX rootstalk sprayed on August 14, 1967 using a high volume, high-pressure handgun sprayer. Trees were sprayed till dripping. There were 3 trees per plot and 4 replicated plots per treatment. Estimates of mite infestation made by sampling 25 leaves from the centre tree of each plot. The leaves were then processed by the method of Henderson and McBurnie. The predaceous mirids, D. brevis, were sampled by beating one large branch from the centre tree of each plot onto an 18-inch square tray.

RESULTS:

Numbers of mites per 100 leaves

Treatment per 100 gal.	Before spraying August 13	After spraying August 17	After spraying August 30
	European red mite		
Elgetol 1½ pt.	1664	230	99
Imidan 50% W.P. 1 lb.	3190	554	186
Guthion 25% W.P. 1 lb.	1224	364	204
Ethion 25% W.P. 1½ lb.	2510	18	4
Morestan 25% W.P. ½ lb.	3242	70	0
Morocide 50% W.P. ½ lb.	1896	182	90
Pennsalt Superior oil 1 gal.	1794	4	6
Check - no treatment	3390	1054	52
	Mediolata sp.		
Elgetol	92	8	0
Imidan	106	118	122
Guthion	116	112	108
Ethion	231	10	4
Morestan	170	54	0
Morocide	182	12	0
Pennsalt Superior oil	166	48	18
Check - no treatment	122	122	108
	N. caudiglans		
Elgetol	244	58	36
Imidan	136	0	0
Guthion	194	6	2
Ethion	112	2	0
Morestan	92	2	0
Morocide	172	4	0
Pennsalt Superior oil	99	22	2
Check - no treatment	154	116	54

Numbers of D. brevis after spraying insecticides

	August 21
Elgetol	10
Imidan	1
Guthion	1
Ethion	0
Morestan	3
Morocide	5
Pennsalt Superior oil	7
Check - no treatment	22

CONCLUSIONS: All three organic phosphates Imidan, Guthion, and Ethion were highly toxic to N. caudiglans and D. brevis but Ethion was the only one that was toxic to the European red mite and Mediolata sp. Of the rest of the pesticides, Elgetol was least toxic to N. caudiglans but it was toxic to Mediolata sp. However, all the pesticides except Imidan and Guthion were toxic to Mediolata and all showed some toxicity to D. brevis. Ethion, Morestan, and Pennsalt Superior oil were the most effective against European red mite.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Half-inch green bud sprays of Shell Neutrol oil for control of European red mite

NAME AND AGENCY: DOWNING, R.S. and T.K. MOILLIET, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: Shell Neutrol oil

METHODS: Orchard 1. Mature Delicious apple orchard with 30 ft. spacing; 8-12 trees per plot, 3 plots per treatment. Half-inch green bud sprays applied on April 11, 1967 with a 1955 Turbomist concentrate sprayer applying 65 gal. of spray mixture per acre. Guthion 25% W.P. 5 lb. per acre was applied in early June and again on August 31, 1967 to whole orchard to control codling moth. Thiodan 50% W.P. 3 lb. per acre applied to whole orchard on June 26 to control leafhoppers. Check plots sprayed with Superior oil (Orchex 796) 6 gal. per acre on June 26. Estimates of mite infestation made by sampling 20 leaves from each of 5 trees per plot. The leaves were then processed by the method of Henderson and McBurnie.

Orchard 2. Twenty-year old Delicious apple orchard, 2 trees per plot, 4 plots per treatment. Oil sprays applied on April 10, 1967 when buds in half-inch green stage. All sprays applied with a high-pressure, high volume, hand-gun sprayer using about 6 gal. of spray mixture per tree. Estimates of mite infestation made from samples of 25 leaves from each of 2 trees per plot. Leaves were processed in the same manner as in Orchard 1.

RESULTS:

Orchard 1.

Average number of mites per 100 leaves*

Shell Neutrol (oil per acre)	May 30	June 22	July 18	August 2	September 14
		European red mite			
4 gal.	0	14	52	260	108
6	1	15	63	219	121
8	3	22	57	209	116
0 - check	21	185**	14	72	155
		Apple rust mite			
4 gal.	2097	17440	18187	18667	4733
6	1572	14780	17560	12987	9680
8	2588	20440	29653	24800	6600
0 - check	2587	30947**	5407	11400	3500
		Phytoseiid mites			
4 gal.	43	10	6	58	95
6	75	25	21	127	85
8	60	7	9	98	46
0 - check	61	8**	4	43	41

*Whole orchard sprayed with
1. Guthion 25% W.P. 5 lb. per acre in first cover spray in early June.
2. Thiodan 50% W.P. 3 lb. per acre June 26 to control leafhoppers.
3. Guthion 25% W.P. 5 lb. per acre on August 31 to control codling moth.

**June 26 - check plots spray with Superior oil (Orchex 796) 6 gal. per acre.

Orchard 2.

Average number cf mites per 100 leaves

Shell Neutrol (oil per 100 gal.)	May 30	June 15	July 6	August 31
		European red mite		
1 gal.	32	451	1936	107
2	33	127	999	148
0 - check	204	1754	2371	299
		Phytoseiid mites		
1 gal.	58	42	38	60
2	36	55	66	90
0 - check	32	46	37	57

CONCLUSIONS: Shell Neutrol oil at 4, 6, or 8 gal. per acre gave good control of the European red mite, no control cf the apple rust, and did not harm the predaceous phytoseiid mites, mainly Metaseiulus occidentalis (Nesbitt), Orchard 1. Where the oil was applied by high volume handgun sprayer (Orchard 2) the control of European red mite was not so good as in Orchard 1 especially where the oil was applied at 1 gal. per 100 gal. The phytoseiids in Orchard 2, mainly Neoseiulus caudiglans (Schuster) were not harmed by the oil applications. M. occidentalis (Orchard 1) are becoming quite resistant to the organic phosphate, Guthion, as the application of this material on August 31 did not reduce the numbers of predators greatly.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: There was a slight reduction in the numbers of Tydeid mites where oil was applied in Orchard 2.

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch.)

TITLE: Summer control of European red mite

NAME AND AGENCY: DOWNING, R.S. and T.K. MOILLIET, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: See table below

METHODS: Twelve-year old apple orchard on Malling II rootstalk. Trees spaced 30' x 30' with fillers. Five treatments, two plots per treatment and 6-10 trees per plot. Estimates of mite infestation made from samples of 25 leaves from each of 2 trees per plot. Experimental sprays applied June 13 using a high-pressure (425 p.s.i.) high-volume handgun sprayer. The trees were sprayed until dripping. Check (untreated) plots were sprayed on July 4 and other plots were retreated on July 17 and July 28.

RESULTS:

Material per 100 gal.	Before spraying June 12	After spraying June 20	June 27	July 4	July 13	July 26	Aug. 4
	Average number European red mite per leaf						
Plictran 50% W.P. 4 oz.	6.6	2.6	1.3	5.1	9.2[2]	18.4[2]	0.5
NC 5016 20% W.P. 3 lb.	13.6	0.8	0	0	1.0[3]	2.0[3]	0.7
Galecron 50% E.C. ¾ pt.	10.4	1.7	2.8	11.5	11.5[3]	16.6[3]	0
Micasin 50% W.P. 1 lb.	13.1	3.3	2.5	7.5[1]	20.6[4]	13.8[4]	0.1
Check - no treatment	16.9	21.5	18.9	105.2[1]	0	0.2	0

[1]July 4. Sprayed with NC 5016 20% W.P. 2½ lb. per 100 gal.

[2]Retreated one plot with Plictran 4 oz. per 100 gal. on July 17. Both plots sprayed on July 28 with Plictran at 6 oz. per 100 gal.

[3]Retreated one plot with Galecron 3/4 pt. per 100 gal. on July 17. Both plots sprayed on July 28 with Galecron 50% E.C. 1 pt. per 100 gal.

[4]Both plots retreated with Micasin 50% W.P. 1 lb. per 100 gal. on July 17 and July 28.

CONCLUSIONS: NC 5016 20% W.P. at 3 lb. or 2½ lb. per 100 gal. were the most effective of all the treatments giving good initial and excellent residual control of the European red mite. Unfortunately, NC 5016 caused fruit and foliage injury to Rome Beauty apple.

Plictran 50% W.P. 4 oz., Galecron 50% E.C. 3/4 pt. and Micasin 50% W.P. 1 lb. were approximately equal in effectiveness giving good control for one month after the initial application.

RESIDUE DATA: Samples of apples treated with NC 5016 and Galecron were shipped for residue analysis but this work has not been completed.

GENERAL OBSERVATIONS: NC 5016 20% W.P. 3 lb. or 2½ lb. per 100 gal. caused necrotic spots on Rome Beauty apple fruit and foliage. It did not damage Winesap, Newtown, McIntosh, Jonathan, or Spartan apple although a small amount of fruit of Spartan was bleached underneath heavy deposits of the chemical but this bleaching disappeared later.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Comparison of materials for control of European red mite winter eggs.

NAME AND AGENCY: HERNE, D. C., and T. LUND, Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: (For materials and amounts per 100 gal. (Imp.) see table below).

METHODS: Twigs were collected at random from apple trees infested with European red mite winter eggs. Clusters of eggs that appeared viable under microscope examination were marked off with masking tape and counted. The twigs were treated by dipping them in a material for 10 seconds. Two replicate twigs were used for each material, and for the untreated check.

After treatment twigs were placed in clay pots filled with a moist mixture of 75% sand and 25% peat and held in the greenhouse at 75°F. The twigs were examined, at intervals, under a binocular microscope until all viable eggs had hatched.

RESULTS:

Material	Amount formulation/ 100 gals.	Total eggs examined	Percentage Mortality
Animert 18% W.P.	2 lb.	162	68.5
Tedion 25% W.P.	1 lb.	239	18.4
Tedion 1 E.C.	1 qt.	163	66.8
Morestan 25% W.P.	0.5 lb.	187	38.4
Check	---	280	10.0

CONCLUSIONS: Animert and Tedion E.C. gave better control than the other materials. It is significant that Tedion E.C. gave much better control than Tedion W.P. at comparable rates.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Natural mortality of winter eggs is often higher than in these experiments.

CROP: Apple, McIntosh

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Early season control of European red mite

NAME AND AGENCY: HERNE, D. C. and C. T. LUND, Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Plictran (Dowco 213) 50% W.P. 8 oz.; Plictran (Dowco 213) 50% W.P. 6 oz.; Galecron (C8514) 1 pt.; Azodrin 3.2 lb. active/gal. 15 oz.; NC 5016 20% Q.P. 1 lb.; 1991 50% W.P. 0.5 lb.; EPN 25% W.P. 1 lb; malathion 25% W.P. 3 lb.; mixture of EPN 25% W.P. 1 lb. + malathion 25% W.P. 3 lb.; parathion 15% W.P. 2 lb.

METHODS: Mature McIntosh apple orchard; single tree plots replicated three times. Sprays applied to run off on June 12, with a Spraymiser hand gun (#4 disc) in a jeep-mounted Hardie 99 sprayer at 300 lb. pressure. Ten leaves from each of 3 replicates per treatment examined prespray (June 9), and 7, 14, 22 and 46 days after treatment; total mites (excluding eggs) were recorded. DDT and dodine, at the recommended rates were added to the acaricide sprays on June 12 and June 29.

RESULTS:

Material	Amt./100	Mites per 30 Leaves				
			After Spraying			
		Pre-spray June 9	June 19 7 days	June 26 14 days	July 4 22 days	July 28 46 days
Plictran	8 oz.	1	0	0	0	63
Plictran	6 oz.	1	0	0	0	84
Galecron	1 pt.	1	0	1	12	61
Azodrin	15 oz.	1	0	0	8	63
NC 5016	1 lb.	3	28	15	57	468
1991 (Dupont)	0.5 lb.	2	8	11	87	291
EPN	1 lb.	1	29	33	75	795
Malathion	3 lb.	1	9	7	63	234
Malathion	3 lb.					
+ EPN	1 lb.	1	26	18	105	531
parathion	2 lb.	0	12	12	15	360
Check		0	20	39	108	570

CONCLUSIONS: One early season application of Plictran (Dowco 213) at both rates, Galecron (C8514), and Azodrin, held initially low populations of the European red mite at very low levels for over a month. NC 5016 was ineffective at the 1 lb. rate. EPN did not synergize malathion; and the mites in this orchard are resistant to these two OP compounds as well as to parathion.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: None of the materials appeared to be phytotoxic to McIntosh apple foliage. Rainfall: June 16, 0.24"; June 17, 0.2"; June 21-22, 0.51"; June 28-29, 0.87". First new adult mites observed on June 5.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Late season evaluation of acaricides.

NAME AND AGENCY: HERNE, D. C., AND T. LUND, Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
NC 5016 20% W.P. 3 lb.; Plictran (Dowco 213) 47.5% W.P. 6 oz.; Galecron (C8514) 50% E.C. 1.0 pt.; Azodrin 3.2 lb. active/gal. 15 fl. oz.; 1991 50% W.P. 1 lb.; parathion 15% W.P. 1.5 lb.; EPN 25% W.P. 1 lb.; Malathion 25% W.P. 3 lb.; Malathion 25% W.P. 3 lb. plus EPN 25% W.P. lb.

METHODS: Mature McIntosh apple orchard; two single tree plots per treatment. Sprays applied to run off on August 17 with a Spraymiser hand gun (disc # 4), on a jeep-mounted Hardie 99 sprayer at 300 lb. pressure. Ten leaves from each of the two replicates per treatment examined prespray (August 15), and 7 and 14 days after treatment; the total number of mites (excluding eggs) was recorded.

RESULTS:

		Mites per 20 leaves		
		Prespray	After Spraying	
Material	Amt/100	Aug. 15	7 Days	14 Days
NC 5016	3 lb.	371	11	4
Plictran (Dowco 213)	6 oz.	304	6	13
Galecron (C8514)	1 pt.	205	5	3
Azodrin	15 fl. oz.	222	17	11
1991 (Dupont)	1 lb.	336	48	71
parathion	1.5 lb.	223	129	82
EPN	1 lb.	192	142	85
Malathion	3 lb.	189	164	289
Malathion	3 lb.			
+ EPN	1 lb.	175	248	428
Check		225	214	187

CONCLUSIONS: At the above rates NC 5016, Dowco 213, Galecron (C8514), and Azodrin gave very good control of European red mite generally resistant to parathion, malathion and EPN. Malathion was not synergized by the addition of EPN.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Rainfall Aug. 18, 0.48", a minimum of 26 hr. after treatment; Aug. 19-20, 0.21". By August 15, mites had begun a normal seasonal decline in numbers. Population peaked during 2nd week of August. No foliage injury was evident from any treatment.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Summer control of orchard mites

NAME AND AGENCY: MAILLOUX, M., Orchard Protection Laboratory, Research Branch, Quebec Department of Agriculture, Farnham, Qué.

MATERIALS: Amounts per 100 gal. Imp.

June 28: Neosolfan 25%, 1 pt; N-4543 50-W, 1 lb; Milbex 50-W, 1 lb; Kelthane 18.5-W, 2 lb; Morestan 25-W, ½ lb; Cygon 4-E, 1 pt; Omite 5-E, 8 oz.; Omite 30-W, 1 lb; Chloropropylate 25-W, 1½ lb.

July 12: Neosolfan 25%, 3 pt; N-4543 50-W, 1½ lb; Omite 30-W, 1½ lb.

METHODS: Nine different treatments replicated three times were respectively applied on plots of 9 trees each. Mature McIntosh trees planted 25' x 30'. Sprays applied on all plots on June 28, 1967, and on plots 1, 2 and 8 on July 12, at the rate of 8 gallons per tree with two single-orifice spray guns at a pressure of 400 p.s.i. Estimates of mite infestation were made from sample of 25 leaves taken at random from one tree per plot (75 leaves per treatment). Leaves processed by the method of Henderson and McBurnie. Counts of mites and eggs were transformed to log (x + 1) for the analysis of variance.

RESULTS: Average number of active mites and eggs per leaf

Materials	June 28	July 5	July* 12	July 19	July 26	Aug. 1	Aug. 7
1 Neosolfan	43	54b**	60c	45c	46d	33bc	46c
2 N-4543	24	23a	23bc	6ab	6abc	10a	13b
3 Milbex	35	10a	9ab	3ab	4ab	7a	15b
4 Kelthane	42	12a	6ab	5ab	9abcd	17abc	39bc
5 Morestan	22	6a	2a	4ab	18abcd	21abc	42bc
6 Cygon	19	7a	4ab	3ab	16bcd	17ab	27bc
7 Omite E	48	16a	6ab	7ab	28cd	44c	60c
8 Omite WP	24	19a	15bc	2a	3a	10a	3a
9 Chloropropylate	31	10a	11bc	8b	23cd	34bc	52c

*Sprays repeated after this sampling date on plots 1, 2 and 8.

**Figures followed by the same letter are not significantly different (Duncan's multiple range test)

CONCLUSIONS: Milbex, Kelthane, Cygon, Morestan, Omite E and Omite WP (at 1½ lb) were good against the European red mite. Milbex and Kelthane gave a good immediate kill and showed a longer residual action than the other materials. The residual effect of Morestan when used at ½ lb, as in this test, seems to be greatly reduced. Neosolfan and N-4543 were much less effective.

RESIDUE DATA: Not yet available.

GENERAL OBSERVATIONS: No phytotoxicity observed.

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Summer control.

NAME AND AGENCY: PARENT, B. and D. PITRE, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 2X/100 gal. Imp. Dessin 50% W.P. 4 lb.; Morestan 25% W.P. 2 lb.; Chloropropylate 50% W.P. 4 lb.

METHODS: Sprays applied on August 16, 1967, in St-Hilaire district, with a Hardie Mist Sprayer having an air velocity of 110 m.p.h., delivering 10 gal. p.m. with a pressure of 450 lb. p.s.i. Triplicated plots were covering an area of ¾ acre. Mite counts, made on the McIntosh variety, were transformed to log (X+2) for the analysis of variance.

RESULTS:

Material	Average No. eggs and mites/25 leaves		
	August 15*	August 23	Sept. 7
Dessin	440	235	168 b
Morestan	500	185	13 a
Chloropropylate	1481	331	61 ab

*Counts of August 15 represent the population density before the treatments. Figures followed by the same letters are not significantly different (Duncan's Multiple Range Test).

CONCLUSIONS: Morestan gave an excellent control of the European red mite in the latter part of the summer. Chloropropylate was also excellent and almost as effective as Morestan.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: At the time of the treatments, the population density of the mites was so high that the foliage had changed in color, specially in Chloropropylate plots. No injury was noted from any treatment.

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Summer control.

NAME AND AGENCY: PARENT, B. and D. PITRE, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 2X/100 gal. Imp. Morestan 25% W.P. 1 lb.; Kelthane 35% W.P. 2 lb.; Phenoflurazole 20% W.P. 1 lb.; Galecron 50% e.c. 1 pt.; Tranid 50% W.P. 2 lb.; Tedion 1-E (MeG249) 2 qt.

METHODS: Sprays applied on July 20, 1967, as a 2X/100 gal. semi-concentrate spray at St-Hilaire, Que., with a Hardie Mist sprayer having an air velocity of 110 m.p.h., delivering 10 gal. p.m. with a pressure of 450 lb. p.s.i. Plots were triplicated in randomized blocks. A check plot was retained and the initial population was recorded before the spray. Counts of eggs and mites were transformed to log (X+2) for the analysis of variance. Kelthane and Phenoflurazole were applied a second time on August 7. On August 20, Morestan was applied in the whole orchard.

RESULTS:

	Average No. eggs and mites/25 leaves			
Material	July 19[1]	August 2	August 17	Sept. 13
Morestan	541	165 ab*	129 b	19
Kelthane	1227	251 b	57 a	7
Phenoflurazole	1152	420 b	117 b	15
Galecron	685	129 ab	115 b	35
Tranid	891	8 a	23 a	11
Tedion	658	460 b	75 a	20
Check	923	708 b	775 c	53

[1] The count of July 19 represents the population density before the treatments.

*Figures followed by the same letters are not significantly different (Duncan's Multiple Range Test).

CONCLUSIONS: Tranid was found excellent to control a summer infestation of red mites. Morestan and Galecron were also good but less than Tranid. Tedion was also very good but was slower to kill.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Few apple rust mites were recorded in the experimental plots except in Galecron, Tranid and Tedion plots. No injury was noted from any treatment.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Early season control.

NAME AND AGENCY: PARENT, B. and D. PITRE, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 2X/100 gal. Imp. and per acre. Ethion 2%-Sup. Oil 70 sec. 2 gal. and 2.7 gal.; Ethion 2%-Sup. Oil 70 sec. 4 gal. and 5.8 gal.; Thiodan 5%-Sup. Oil 70 sec. 4 gal. and 6.0 gal.; Morestan 25% W.P. 1 lb. and 2.0 lb.; Tedion 1 E.C. (MeG249) 2 qt. and 1 gal.

METHODS: Ethion-oil at 2 gal. was applied twice, at the green tip (May 18) and at the pre-pink (May 22). Ethion-oil and Thiodan-oil at 4 gal. were applied once at the green-tip. Morestan and Tedion were applied at the pink on May 29. Triplicated plots were covering an area of $\frac{3}{4}$ acre. Sprays were made with a Hardie Mist Sprayer developing an air velocity of 110 m.p.h., delivering 10 gal. p.m. at 450 lb. p.s.i. Counts of eggs and mites, made on McIntosh, were transformed to log (X+2) for the analysis of variance.

RESULTS:

Material	Average No. eggs+mites/25 leaves			
	June 28	July 11	August 4	August 15
European red mite				
Ethion-Oil 70(1)	0	0	47	193 ab*
" " "	0	1	200	440 bc
Thiodan-Oil 70	0	1	20	85 ab
Morestan	3	7	212	500 bc
Tedion	0	1	24	49 a
Check	36	184	1388	1481 c
Apple rust mite				
Ethion-Oil 70	0	11	16	172
" " "	4	40	15	165
Thiodan-Oil 70	0	93	63	363
Morestan	1	63	43	341
Tedion	7	41	43	430
Check	27	491	51	451

*Figures followed by the same letter are not significantly different (Duncan's Multiple Range Test).

(1)This treatment was applied twice at half the dosage of a regular spray.

CONCLUSIONS: Tedion gave the best control of the European red mite until the middle of August. Two applications of ethion-oil at 2 gal./100 were more effective than one at 4 gal./100. Thiodan-oil was as effective as ethion-oil. The apple rust mite was controlled to a certain degree by every treatments until the month of August. Nevertheless, it appeared that ethion-oil was more effective than other chemicals on that mite.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Thiodan alone is not a good miticide, but in combination with oil it was as effective as ethion-oil against the European red mite. The two-spotted mite, *Tetranychus urticae* Koch, was almost absent in 1967 from commercial orchards. The new formulation of Tedion (in chlorobenzene solvent) was found very effective in red mite control. No injury was evident from any treatment.

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Summer control.

NAME AND AGENCY: PARENT, B. and D. PITRE, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 2X/100 gal. Imp. Azodrin (3.2 lb/gal. w.s.) 1 qt.; Omite 30% W.P. 2 lb.; Zolone 30% W.P. 2 lb.; Plictran 50% W.P. 1 lb.; N-4543 50% W.P. 2 lb.

METHODS: Sprays applied on August 24, 1967, at Rougemont, Que., with a Hardie Mist Concentrate Sprayer having an air velocity of 110 m.p.h., delivering 10 gal. p.m. with a pressure of 450 lb. p.s.i. Each plot consisted of a row of 30 Lawfam apple trees and 4 trees were sampled in each row for mite counts. These counts were transformed to log (X+2) for the analysis of variance.

RESULTS:

Materials	Average No. eggs+mites/25 leaves Sept. 1	Sept. 8	Sept. 20
Azodrin	85 a*	35 a	14 a
Omite	449 bc	216 b	36 ab
Zolone	426 b	195 b	93 bc
Plictran	576 bc	305 b	47 ab
N-4543	915 c	418 b	233 c

*Figures followed by the same letters are not significantly different. (Duncan's Multiple Range Test).

CONCLUSIONS: Azodrin was found very effective in controlling red mites during the summer. It gave a quick knockdown and its effect was as long as one month. Omite and Plictran were very promising but less effective than Azodrin. N-4543 was not very effective against that mite.

RESIDUE DATA: Residue analysis of Azodrin will be made by the Pesticide Analysis Laboratory of the Shell Chemical Company at Princeton, New-Jersey.

GENERAL OBSERVATIONS: Before treatments, the population density of the European red mite was so high that the foliage was yellowish. There was an average of 200-250 eggs and mites per leaf. No injury was evident from any treatment.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Greenhouse acaricide tests.

NAME AND AGENCY: PARENT, B. and D. PITRE, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 1 gal. Imp. Plictran 50% W.P. 2 gr.; N-4543, 2E (2 lb. act./gal.), 2 ml.; R-3422-S, 4E, 2 ml.; Bromophos 25% E.C. 5 ml.; Kelthane (1.785 lb./gal.) 2 ml.; Micasin 50% W.P. 3 gr.; Milbex 50% W.P. 3 gr.

METHODS: Sprays were applied on March 7, 1967, with a small hand sprayer on two year old apple trees grown in the greenhouse and previously infested with red mite winter eggs. The chemicals R-3422 and Bromophos were applied a second time on March 20, and Kelthane on April 10. Each treated plot consisted of three trees and a sample of 5 leaves per tree was found sufficient for a biometrical precision of 10% error in the sampling.

RESULTS:

	Average No. eggs and mites/5 leaves					
	March				April	
Material	6*	13	20	28	7	24
Plictran	1012 bc	192a	24a	4a	56a	180a
N-4543	1424 bc	532ab	36a	104 b	220ab	672 b
R-3422	620 b	792 bc	1076 bcd	1988 d	2512 c	1812 cd
Bromophos	756 b	1008 bc	1812 d	3156 d	3680 c	2840 d
Kelthane	556 b	716 bc	332 b	1104 cd	2216 c	796 bc
Micasin	3060 c	1448 c	680 bcd	308 bc	284 b	1520 bcd
Milbex	1366 bc	452ab	376 bc	342 c	200ab	776 bc
Check	184a	804 bc	1324 cd	1240 d	1960 c	3424 d

*Counts of March 6 represent the initial population density before any treatment.
Figures followed by the same letters are not significantly different (Duncan's Multiple Range Test).

CONCLUSIONS: Plictran and N-4543 were more effective than other materials tested. Milbex was not too bad but did some damage to apple leaves.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Nil.

CROP: Apple var. Mantet

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Control of a dicofol resistant strain.

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: See table for materials and amount.

METHODS: Each material applied to a single row of 10 dwarf espaliered trees after the crop had been harvested. Sprays applied on Aug. 29 with hand gun and Jeep-mounted Hardie 99 sprayer at 300 p.s.i. Ten random leaves per treatment examined in laboratory for living or dead active stages. Mite population averaged 33 active forms per leaf before spraying.

RESULTS:

% kill of active stages

Material	Formulation	Amt/100 gal. Imp.	Aug. 30 1 day	Sept. 7 9 day	Sept. 15 17 day
Karathane	4 lb/gal. E.C.	0.5 pt.	98.7	100.0	100.0
Karathane	"	1.0 pt.	99.7	98.6	100.0
dicofol	18.5% A.P.	1.0 lb.	82.5	67.8	12.7
Check *	----	----	41.2	25.7	----

* These trees had received 4 dicofol sprays during the season.

CONCLUSIONS: A single application of liquid Karathane at either rate gave very good control of this dicofol resistant strain of mite.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Previous to this test, this block of trees had received four applications of dicofol at 2 lb/100 gal. Pre-bloom (May 17), Calyx (June 12,) one cover (Aug. 8) repeated Aug. 12. Temperature at time of spraying 80°F.; rainfall over period was 0.42".

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Control of European red mite by one prebloom spray.

NAME AND AGENCY: WAGNER, H.W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Animert V-101 20% W.P. 1 lb.; Phosalone 30% W.P. 2 lb.; Azodrin 25% W.P. 1½ lb.; dicofol 18.5% W.P. 2 lb.; Milbex 50% W.P. 10 oz.; Chloropropylate 25% E.C. 16 fl. oz.; Dessin 50% W.P. 2 lb.; NC 5016 20% W.P. 2 lb.; Morestan 25% W.P. ½ lb.; Tranid 50% W.P. 1½ lb.; C 8514 50% E.C. 1 pt. and N 4543 50% W.P. 1¼ lb.

METHODS: Two single tree plots (one MacIntosh and one Red Delicious) at Simcoe were sprayed on May 26 when 75% of the eggs were hatched. Counts were taken on 20 leaves per treatment on August 3.

RESULTS: The counts on August 3 showed 104 mites on 20 leaves in the check, 16 for N 4543, 2 for Morestan, one each for C 8514 and Tranid and 0 for all other materials in the test.

CONCLUSIONS: All materials except N 4543 gave a high degree of control against the low population of mites.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Apple

PEST: European red mite, Panonychus ulmi (Koch)

TITLE: Early spring control of European red mite.

NAME AND AGENCY: WAGNER, H.W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Dormant oil (200 Visc.) 2 gal.; Superior oil (100 Visc) 2 gal.; Superior oil (70 Visc) 2 gal.; Animert V-101 20% W.P. 1 lb.; Morestan 25% W.P. ½ lb.; E.P.N. 25% W.P. ¾ lb.

METHODS: Single tree plots of one McIntosh and one Red Delicious were sprayed by dilute method at Simcoe on dates given in table of results. Counts were taken on 10 leaves per tree on August 3.

RESULTS:

Material	Date of application	No. of European red mites per 20 leaves
Dormant oil 200 Visc.	April 21	0
Superior oil 100 Visc.	May 3	0
Superior oil 70 Visc.	May 3	0
Animert V-101	May 24	0
Morestan	May 24	0
E.P.N.	May 24	5
Check	------	26

CONCLUSIONS: All materials gave almost complete control of this light infestation. E.P.N. was the least effective of the materials tested.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The mite population remained low through the season. No injury showed up in the 200 Visc. oil nor in the other oils as in previous years on Red Delicious.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Summer control of European red mite

NAME AND AGENCY: WAGNER, H. W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Dessin 50% W.P. 2 lb.; C 8514 50% E.C. 1 pt.; NC 5016 20% W.P. 2 lb.; Morestan 25% W.P. 1/2 lb.; Omite 30% W.P. 1 1/4 lb.; Milbex 50% W.P. 10 oz.; Tranid 50% W.P. 1 1/2 lb.; Animert V-101 20% W.P. 1 lb; Phosalone 30% W.P. 2 lb; Azodrin 25% W.P. 1 1/2 lb.; Chloropropylate 25% E.C. 16 oz. and N 4543 50% W.P. 1 1/2 lb.

METHODS: Single tree plots, in the Simcoe area, of one McIntosh and one Red Delicious were sprayed by, high pressure, dilute application on July 25. Counts were taken on 20 leaves per treatment.

RESULTS: No. European Red Mites on 20 Leaves

Materials	August 4	August 17
Dessin	0	0
C 8514	0	0
NC 5016	0	0
Morestan + Cyprex	0	0
Morestan + Captan	0	1
Omite	0	1
Milbex	0	2
Tranid	3	2
Animert	3	4
Phosalone	4	4
Azodrin	11	2
Chloropropylate	11	12
N 4543	19	33
No treatment	201	138

CONCLUSIONS: All materials gave good control except Azodrin, Chloropropylate and N 4543 which were slightly less effective.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The spray mixture Omite showed considerable foaming, but no harmful effect was evident in the small tank used.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Control of winter eggs of European red mite

NAME AND AGENCY: WAGNER, H.W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Animert V-101 20% W.P. 1 lb.; Morestan 25% W.P. ½ lb.; and Chloropropylate 25% W.P. 1 lb.

METHODS: On May 16, when European red mite eggs were almost ready to hatch, high pressure sprays were applied to three single tree plots of Red Delicious per treatment. Counts of hatched and unhatched eggs were made on June 9 when 90% had hatched in the untreated plots.

RESULTS: Percentages hatched in the plots were: Animert V-101 82, Morestan 89, Chloropropylate 89 and check 90.

CONCLUSIONS: None of the materials gave any appreciable degree of control of the eggs, though as noted below, all exerted residual effect on the hatched nymphs.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Egg hatch was completed by May 29. Live mites were found only in the check plots on June 20.

CROP: Apple

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Mite control with wide spectrum pesticides

NAME AND AGENCY: WAGNER, H. W., Research Station, Canada Agriculture, Vineland Station, Ontario

MATERIALS: Amounts given are for 100 gal. Imp.
Phosalone 30% W.P. 2 lb.; Azodrin 25% W.P. 1 lb.; N 4543 50% W.P. 1 1/4 lb.; a mixture of Imidan 50% W.P. and carbophenothion 12.5% W.P. 1 1/4 lb.; 1642 90% W.P. 7 oz.; Lannate 90% W.P. 7 oz.; GS 13005 40% W.P. 3/4 lb.; azinphos-methyl 25% W.P. 1 1/4 lb. and Imidan 50% W.P. 1 1/4 lb.

METHODS: In a codling moth program of six treatments, June 9, 16, 26, July 7, 19 and August 2 mite counts were taken on four trees per plot (one MacIntosh and three Red Delicious) 10 leaves per tree (40 leaves per plot). Morestan 25% W.P. 1/2 lb. was used on some plots as indicated to reduce the high population of mites. No early season miticides were applied and dodine was used all season.

RESULTS: No. of European Red Mite on 40 Leaves

Materials	June 20	July 6	August 1
Phosalone	1	1	0
Azodrin	1	1	0
N 4543	5	1	1
Imidan+carbophenothion	0	0	3
1642 (Dupont)	9	3	3
Lannate	2	0	4
GS 13005*	25	75	4
azinphos-methyl*	71	157	10
Imidan*	35	161	12
Check no insecticide*	275	379	23

* A special spray of Morestan applied on July 7.

CONCLUSIONS: The materials gave seasonal control of European red mite except GS 13005, azinphos-methyl and Imidan which required a miticide on July 7 to reduce the infestation.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: N 4543 showed better control than in a single summer treatment in another test.

CROP: Apple, variety Spartan, on Malling VII rootstocks, 10 - 12 ft high, 15 x 15 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch) and McDaniel Spider Mite, *Tetranychus mcdanieli* McG.

TITLE: Half-inch green and pink sprays for control of European Red Mite and McDaniel Spider Mite (Fitz-Gerald site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J., and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, Morestan 25WP 0.5 lb, fenson 50WP 0.5 lb, chloropropylate 25EC 32 fl oz, dormant oil 200 - 220 vis. 2 gal, ethion 25WP 1.5 lb, dicofol 18.5 WP 2 lb.

METHODS: Near Kelowna, British Columbia, single tree plots, in a randomized block design with 10 replicates, were treated with dilute, high-volume sprays applied with a hand-gun. The half-inch green spray was applied April 11th at 110 psi. Volume averaged 1.8 gal per tree. The pink spray was applied on May 6th (NC 5016 only) or on May 8th, at 120 psi. Volume averaged 2 gal per tree. At approximately weekly intervals, starting 18 days after the pink spray, 20 leaves from each tree (200 per treatment) were brushed with a Henderson-McBurnie brushing machine and the mites counted.

RESULTS:

Number of Mites (Active Stages) on 200 Leaves

No.	Treatment	May 24	June 2	9	16	27	July 6	13	21	28
(a)	European Red Mite:									
1.	NC 5016 1 lb P (1)	220	102	40	1200	452	0	0	36	56
2.	NC 5016 2 lb P	154	30	48	54	444	112	380	464	1240
3.	NC 5016 3 lb P	88	34	12	54	44	72	188	350	1000
4.	Morestan P	30	14	16	124	28	68	400	340	1040
5.	Fenson P (2)	416	84	52	1284	308	204	480	310	1100
6.	Chloropropylate P (3)	278	68	96	1264	94	248	840	548	1700
7.	Dormant oil 1/2 in	84	28	26	200	40	272	700	400	760
8.	Check (4)	220	64	140	608	161	1000	1960	340	2000
(b)	McDaniel Spider Mite:									
1.	NC 5016 1 lb P (1)	20	2	12	40	104	0	0	32	52
2.	NC 5016 2 lb P	44	2	6	62	328	1280	120	780	1240
3.	NC 5016 3 lb P	12	2	2	8	100	44	64	760	1830
4.	Morestan P	14	10	16	92	36	212	128	600	870
5.	Fenson P (2)	28	6	66	84	48	244	244	690	1520
6.	Chloropropylate P (3)	30	34	38	40	48	76	56	256	1200
7.	Dormant oil 1/2 in	54	58	80	64	24	188	240	410	720
8.	Check (4)	18	18	18	62	50	48	8	330	580

P = pink spray
1/2 in = half-inch green spray
(1) Retreated June 29th with NC 5016 2.5 lb
(2) Retreated June 29th with ethion 1.5 lb
(3) Retreated June 29th with chloropropylate 32 fl oz
(4) Sprayed June 29th with dicofol 2 lb

CONCLUSIONS: (a) European Red Mite - NC 5016 3 lb and Morestan as pink sprays were the best treatments and provided excellent control of mites until late July. NC 5016 2 lb as a pink spray and dormant oil at half-inch green were only slightly inferior. Fenson, chloropropylate and NC 5016 1 lb were relatively ineffective.

(b) McDaniel Spider Mite - Morestan and NC 5016 3 lb, applied at the pink stage, delayed the build-up of McDaniel Spider Mites. Other treatments had little effect. The retreatment of NC 5016 1 lb with NC 5016 2.5 lb brought the population to a low level.

RESIDUE DATA: Harvest samples from NC 5016 at 1, 2 and 3 lb have been submitted for residue analysis.

GENERAL OBSERVATIONS: No injury was observed.

CROP: Apple, variety Spartan, on Malling VII rootstocks, 10 - 12 ft high, 15 x 15 ft spacing.

PEST: European Red Mite, Panonychus ulmi (Koch) and McDaniel Spider Mite, Tetranychus mcdanieli McG.

TITLE: Summer sprays for control of European Red Mite and McDaniel Spider Mite (Fitz-Gerald site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J., and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1.5, 2 and 2.5 lb, binapacryl 50WP 0.5 lb, chloropropylate 25EC 32 fl oz, dicofol 18.5 WP 2 lb + tetradifon 25WP 1 lb.

METHODS: By early August mite populations had built up in the half-inch green and pink spray experiment at the Fitz-Gerald site, described above. A new experiment was laid down to evaluate summer sprays for control of McDaniel Spider Mite and, to a lesser extent, European Red Mite. Single tree plots in a randomized block design with 10 replicates were sprayed with a hand-gun at 120 psi. Spray volume averaged 3.5 gal per tree. Spraying was done on August 3rd except as noted below. Mites were counted as in the earlier experiment. The July 28th mite count on the earlier experiment at the Fitz-Gerald site can be taken as pre-spray counts for this experiment.

RESULTS:

		Number of Mites (Active Stages) on 200 Leaves							
	Previous	August				September			
Treatment	Treatment*	7	14	21	28	4	11	18	23
(a) European Red Mite:									
NC 5016 2.5 lb June 29 (1)	1	0	24	0	0	304	452	346	300
NC 5016 1.5 lb (1)	2	4	4	0	8	0	72	8	28
NC 5016 2 lb (1)	3	0	18	0	16	0	42	12	58
NC 5016 2.5 lb	4	0	40	0	0	0	54	30	34
Binapacryl (2)	5	0	0	0	168	36	424	44	364
Chloropropylate (1)	6	0	0	0	160	92	108	32	108
Dicofol + tetradifon (1)	7	0	18	0	160	44	276	22	260
Check (3)	8	108	8	0	380	100	214	64	324
(b) McDaniel Spider Mite:									
NC 5016 2.5 lb June 29 (1)	1	140	192	104	816	2190	1240	436	540
NC 5016 1.5 lb (1)	2	36	28	120	152	1580	292	92	140
NC 5016 2 lb (1)	3	52	30	128	480	1220	312	66	370
NC 5016 2.5 lb	4	20	0	32	248	424	126	220	208
Binapacryl (2)	5	40	32	380	848	3172	1436	420	440
Chloropropylate (1)	6	84	104	64	1640	908	1960	572	1172
Dicofol + tetradifon (1)	7	136	360	180	1376	4932	1520	644	1540
Check (3)	8	738	292	2260	5080	7030	3280	1030	2000

* See half-inch green and pink spray experiment (Fitz-Gerald site).
(1) Sprayed June 29th and not retreated until September 7th, when the same treatment was used.
(2) Retreated September 7th with dicofol 2 lb + tetradifon 1 lb.
(3) Sprayed August 22nd and again September 7th with dicofol 2 lb + tetradifon 1 lb.

CONCLUSIONS: (a) European Red Mite - NC 5016, all rates, and retreated as indicated, gave outstanding control of European Red Mite. All other treatments also held populations to an acceptable level.

(b) McDaniel Spider Mite - NC 5016 2.5 lb was the best treatment and provided acceptable control for the remainder of the season. Other treatments generally provided good control to the end of August but then required retreatment.

RESIDUE DATA: Harvest samples from all NC 5016 treatments have been submitted for residue analysis.

GENERAL OBSERVATIONS: No injury was observed.

CROP: Apple, variety Red Delicious, standard rootstock, 15 to 18 ft high, 30 x 30 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch) and McDaniel Spider Mite, *Tetranychus mcdanieli* McG.

TITLE: Half-inch green and pink sprays for control of European Red Mite and McDaniel Spider Mite (Keloka Orchards site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J. and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, Morestan 25WP 0.5 lb, fenson 50WP 0.5 lb, chloropropylate 25EC 32 fl oz, dormant oil 200 - 220 vis. 2 gal, dinocap 25WP 0.75 lb, ethion 25WP 1.5 lb.

METHODS: Near Kelowna, British Columbia, single tree plots, in a randomized block design with 5 replicates, were treated with dilute, high-volume sprays, applied with a hand-gun. The half-inch green spray was applied on April 11th at 110 psi, using 4 gal per tree. The pink spray was applied on May 5th at 125 psi, using about 4.5 gal per tree. At approximately weekly intervals, starting 18 days after the pink spray, 20 leaves from each tree (100 per treatment) were brushed with a Henderson-McBurnie brushing machine and the mites counted.

RESULTS:

Number of Mites (Active Stages) on 100 Leaves

No.	Treatment	May 23	May 31	June 7	June 14	June 21	June 26	July 5	July 12	July 19	July 26
(a)	European Red Mite:										
1.	NC 5016 1 lb P (1)	302	130	102	418	630	50	350	62	56	4
2.	NC 5016 2 lb P	332	114	98	212	40	80	520	62	44	32
3.	NC 5016 3 lb P	56	16	36	44	14	12	288	44	36	0
4.	Morestan P	63	30	280	100	80	50	392	80	16	4
5.	Fenson P (2)	564	370	522	1828	570	4	252	48	52	176
6.	Chloropropylate P (3)	52	16	284	224	80	2800	610	88	48	204
7.	Dormant oil 1/2 in	80	80	108	200	100	40	3130	140	16	36
8.	Check (4)	644	248	308	1292	4500	8	480	68	36	3
(b)	McDaniel Spider Mite:										
1.	NC 5016 1 lb P (1)	0	20	4	6	10	0	5	12	32	516
2.	NC 5016 2 lb P	8	38	8	3	0	0	48	0	180	864
3.	NC 5016 3 lb P	2	0	0	0	0	0	4	0	16	288
4.	Morestan P	0	0	4	0	4	6	20	8	128	208
5.	Fenson P (2)	12	4	12	6	30	0	36	4	0	564
6.	Chloropropylate P (3)	2	6	10	2	0	12	28	36	160	1772
7.	Dormant oil 1/2 in	64	26	4	12	5	0	38	24	24	68
8.	Check (4)	6	8	8	4	0	0	14	8	8	8

P = pink spray
1/2 in = half-inch green spray
(1) Retreated June 22nd with dinocap 0.75 lb
(2) Retreated June 22nd with ethion 1.5 lb
(3) Retreated June 22nd with chloropropylate 32 fl oz
(4) Sprayed June 22nd with ethion 1.5 lb

CONCLUSIONS: NC 5016 3 lb at the pink stage was the best treatment for control of European Red Mite and provided excellent control until the end of July. Morestan was only slightly less effective. NC 5016 2 lb also gave commercial control. NC 5016 1 lb and chloropropylate held the populations down until mid-June. Dormant oil provided excellent control, except for a high count in early July. Fenson was of little value in this trial.

Populations of McDaniel Spider Mite did not build up until the end of July. NC 5016 3 lb, Morestan and dormant oil appeared to retard the build-up of this species.

RESIDUE DATA: Harvest samples from NC 5016 at 1, 2 and 3 lb have been submitted for residue analysis.

GENERAL OBSERVATIONS: No phytotoxicity was observed from any treatment.

CROP: Apple, variety Red Delicious, standard rootstocks, 15 to 18 ft high, 30 x 30 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch) and McDaniel Spider Mite, *Tetranychus mcdanieli* McG.

TITLE: Summer sprays for control of European Red Mite and McDaniel Spider Mite (Keloka Orchards site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J. and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, binapacryl 50WP 0.5 lb, dicofol 18.5 WP 2 lb + tetradifon 25WP 1 lb, chloropropylate 25EC 32 fl oz.

METHODS: By late July the population of McDaniel Spider Mites had built up to a fairly high level in the half-inch green and pink spray experiment at the Keloka Orchards site, described above. A new series of treatments was applied to evaluate summer sprays for control of this species. Experimental design was as in the earlier experiment, except that the binapacryl treatment was applied on a total of 10 replicates. High-volume dilute sprays were applied with a hand-gun at 120 psi on July 28th. Volume per tree averaged 5 gal. Mite counts were made as in earlier experiments. The July 26th counts in the half-inch green and pink spray experiment at this site can be considered a pre-spray count for this experiment.

RESULTS:

Treatment	Previous Treatment	Number of Mites (Active Stages) per 100 Leaves							
		August					September		
		2	9	16	23	30	6	13	20
(a) European Red Mite:									
NC 5016 1 lb	1	0	0	8	0	4	24	2	12
NC 5016 2 lb	2	0	0	0	0	0	0	2	14
NC 5016 3 lb	3	0	0	0	0	0	2	0	4
Binapacryl *	4 and 7	16	0	4	0	0	68	16	81
Dicofol + tetradifon	5	0	0	0	0	4	26	32	20
Chloropropylate (1)	6	140	0	0	0	0	2	18	60
Check	8	0	0	0	0	12	54	124	112
(b) McDaniel Spider Mite:									
NC 5016 1 lb	1	12	16	12	16	4	40	34	6
NC 5016 2 lb	2	64	15	24	4	12	22	88	8
NC 5016 3 lb	3	0	0	0	0	0	0	0	6
Binapacryl *	4 and 7	36	26	40	20	20	28	10	27
Dicofol + tetradifon	5	0	0	0	8	0	4	70	38
Chloropropylate (1)	6	32	2100	372	910	1080	764	20	1340
Check	8	12	88	24	40	42	0	76	4

* Count made on 200 leaves but reported here on basis of 100 leaves
(1) Retreated August 12th and again September 7th with chloropropylate 32 fl oz

CONCLUSIONS: With the exception of the chloropropylate treatment, populations of both European Red Mite and McDaniel Spider Mite were brought to, and maintained at, a low level.

RESIDUE DATA: Harvest samples of NC 5016 at 1, 2 and 3 lb have been submitted for residue analysis.

GENERAL OBSERVATIONS: Fruit injury, in the form of darkening of lenticels and slight russet in a horseshoe-shaped pattern (2 - 4 cm in diameter), was observed in the chloropropylate treatment on 30% of the fruit examined; grade reduction would occur on approximately 15% of the fruit so affected. No fruit or foliar damage was observed in any other treatment.

CROP: Apple, variety Spartan, on Malling VII rootstocks, 12 to 15 ft high, 15 x 17 ft spacing.

PEST: European Red Mite, *Panonychus ulmi* (Koch) and McDaniel Spider Mite, *Tetranychus mcdanieli* McG.

TITLE: Summer sprays for control of McDaniel Spider Mite and European Red Mite (Kidston site).

NAME AND AGENCY: Bennett, J. M., McMullen, P. W., Marshall, G. J. and Burnard, D. G., Fisons (Canada) Limited, Don Mills, Ontario.

MATERIALS: Amounts are formulated product per 100 gal of water. NC 5016 20WP 1, 2 and 3 lb, binapacryl 50WP 1/2 lb, dicofol 18.5 WP 2 lb + tetradifon 25WP 1 lb, chloropropylate 25EC 32 fl oz.

METHODS: Near Vernon, British Columbia single tree plots, in a randomized block design with 5 replicates, were treated with dilute, high-volume sprays applied with a hand-gun. Spraying was done on August 1st at 120 psi, using an average of 4 gal per tree. The orchard had been sprayed on July 14th with dicofol 10 lb per acre + tetradifon 4 lb per acre, applied with an air-blast sprayer. At approximately weekly intervals, beginning 3 days after treatment, 20 leaves from each tree (100 per treatment) were brushed with a Henderson-McBurnie brushing machine and the mites counted.

RESULTS:

Number of Mites (Active Stages) per 100 Leaves

Treatment	July* 29	August 4	11	18	25	September 1	8	15	22
(a) European Red Mite:									
NC 5016 1 lb	58	0	0	0	0	4	2	0	2
NC 5016 2 lb	70	0	0	0	0	6	0	2	0
NC 5016 3 lb	160	0	0	0	0	0	8	0	8
Binapacryl	60	0	2	4	4	20	46	82	60
Dicofol + tetradifon	10	0	2	0	0	4	20	10	2
Chloropropylate	80	0	0	0	0	0	0	0	4
Check	100	0	2	2	6	12	20	22	12
(b) McDaniel Spider Mite:									
NC 5016 1 lb	228	16	12	2	5	4	10	38	90
NC 5016 2 lb	330	20	2	0	4	0	10	12	4
NC 5016 3 lb	360	16	0	0	0	0	5	6	42
Binapacryl	250	4	2	0	4	2	2	16	32
Dicofol + tetradifon	90	24	6	4	8	0	200	12	2
Chloropropylate	230	28	4	2	6	16	52	146	136
Check	230	56	50	42	50	50	56	150	48

* Pre-spray count

CONCLUSIONS: Populations of McDaniel Spider Mite remained low, even in the untreated check, probably as a result of the July 14th application of dicofol plus tetradifon. Conclusions are, therefore, difficult to make but it would appear that NC 5016 and binapacryl were the most effective treatments. European Red Mite counts were also low. There was a trend toward a build-up of this species in the binapacryl plots.

RESIDUE DATA: Harvest samples from NC 5016 at 1, 2 and 3 lb have been submitted for residue analysis.

GENERAL OBSERVATIONS: No phytotoxicity was observed from any treatment.

CROP: Apple variety, Northern Spy

PEST: European red mite, *Panonychus ulmi* (Koch)
Two-spotted spider mite *Tetranychus telarius* (L.)

TITLE: Post blossom control of spider mites with broad spectrum insecticides

NAME AND AGENCY: COLE, R. J. May & Baker (Canada) Ltd., 200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal Imp.
Zolone (33% w/v phosalone E.C.); 20.0 fl oz and 30.0 fl oz
Zolone (30% w/w phosalone W.P.); 1.5 lb and 2.0 lb
Guthion 25% W.P. 1.25 lb
Imidan 50% W.P. 1.25 lb
Kelthane (18.5% w/w dicofol); 2.0 lb

METHODS: Thirty leaves picked per tree (2 each from 5 spurs per branch, 3 branches per tree) and the mites brushed from the leaves using the standard mite brushing machine. Mite counts were made regularly throughout the season. The orchard, situated at Waterford, Ontario, was of mature Northern Spy trees which had been somewhat neglected. This site was being used for a test of broad spectrum insecticides. Single tree plots in triplicate were sprayed to 'run-off' with a Jeep mounted Rittenhouse sprayer at 400 lb pressure. A calyx application was made on 11th June with further cover sprays on 22nd June, 2nd, 11th, 20th and 30th July; 9th and 22nd August. A full protective fungicide programme was also maintained.

RESULTS:

Table 1. Control of European red mite

Materials	Amt./ 100g.	No. active red mite/90 leaves on (date)										
		21/6	23/6	1/7	10/7	14/7	19/7	26/7	29/7	8/8	16/8	18/8
Zolone E.C.	20.0 fl oz	160	224	32	48	64	16	16	0	32	24	16
Zolone E.C.	30.0 fl oz	200	152	80	16	80	0	0	0	16	0	0
Zolone W.P.	1.5lb	144	224	56	192	48	0	16	16	192	144	646
Zolone W.P.	2.0lb	120	152	48	48	80	0	0	48	112	112	608
Guthion + Kelthane*	1.25+ 2.0lb	1620	2584	1280	4144	4680	1536	880	272	192	128	112
Imidan + Kelthane*	1.25+ 2.0lb	1756	1048	912	3120	1984	528	432	160	176	112	272
Check	-	1104	2296	1936	2656	5136	864	1184	1140	2016	2064	976

*Kelthane (18.5% w/w dicofol) added 20.7.67

Table 2. Control of two-spotted spider mite

Materials	Amt/100 g.	1/7	4/7	19/7	26/7	29/7	8/8	16/8	28/8
		No. active two spotted/90 leaves on (date)							
Zolone E.C.	20.0 fl oz	0	0	0	0	0	0	0	0
Zolone E.C.	30.0 fl oz	8	32	0	0	0	0	0	0
Zolone W.P.	1.5 lb	0	16	16	16	32	96	96	432
Zolone W.P.	2.0 lb	0	0	16	0	96	32	32	608
Guthion + Kelthane*	1.25+2.0 lb	96	288	3024	480	272	32	128	48
Imidan + Kelthane*	1.25+2.0 lb	72	352	400	192	218	32	32	128
Check	-	192	736	2304	1504	6288	2064	2736	512

*Kelthane (18.5% w/w dicofol) added 20.7.67

CONCLUSIONS: Excellent mite control was achieved with Zolone E.C., and Zolone W.P. kept the populations down to a very low level. Guthion and Imidan failed to give control and had to be supplemented with 'Kelthane' in the fourth cover spray.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Lenticel spotting was observed at the 'run-off' point on the fruit sprayed with Zolone E.C. This was thought to have resulted from a combination of factors such as weather conditions and spray volume, linked with the use of the emulsifiable concentrate spray.

CROP: Apple, var. Red Delicious

PEST: European red mite, *Panonychus ulmi* (Koch)

Two-spotted spider mite, *Tetranychus telarius* (L.)

TITLE: Post blossom control of spider mites with broad-spectrum insecticides.

NAME AND AGENCY: Cole, R.J., May & Baker (Canada) Ltd., 200 Bellarmin St., Montreal 11, P.Q.

MATERIALS: Amounts given for 100 gals. Imp.
Zolone (33% w/v phosalone E.C.) 20.0 fl. oz. and 30.0 fl. oz.
Zolone (30% w/w phosalone W.P.) 1.5 lb. and 2.0 lb.
Guthion 25% W.P. 1.25 lb.
Imidan 50% W.P. 1.25 lb.
Kelthane (dicofol 18.5% w/w W.P.) 2.0 lb.

METHODS: 30 leaves picked per tree (2 each from 5 spurs per branch, 3 branches per tree), and the mites brushed off the leaves using the standard mite brushing machine. Mite counts were made regularly throughout the season. The orchard at Walsh, Ontario, was of mature, dense trees on a sandy soil which was being used for a test of broad spectrum insecticides. Single tree plots in triplicate were sprayed to 'run-off' with a Jeep-mounted Rittenhouse sprayer at 400 lbs. pressure. The calyx application was made on 8th June, and cover sprays on 19th and 30th June, 9th, 18th and 28th July and 8th August. A full protective fungicide programme was also maintained.

RESULTS: Table 1. Control of European Red Mite

Materials	Amt./100 gal.	No. active red mite/90 leaves on (date): 10/7	18/7	27/7	31/7	7/8	14/8	25/8	6/9
Zolone E.C.	20.0 fl.oz	32	64	64	32	224	144	384	128
Zolone E.C.	30.0 fl.oz	48	0	0	0	48	64	176	208
Zolone W.P.	1.5 lb.	144	32	224	320	668	464	992	1,056
Zolone W.P.	2.0 lb.	88	64	576	160	416	336	288	480
(Guthion + Kelthane*	1.25 lb.+ + 2.0 lb.	2,048	2,400	1,408	592	992	48	16	0
(Imidan + Kelthane*	1.25 lb.+ 2.0 lb.	784	1,232	976	304	192	48	0	64
Check (+ Kelthane⊕) -	(+ 2.0 lb)	1,272	720	1,488	1,008	5,136	512	40	16

* Added on 28.7.67 and 8.8.67.

⊕ " " 8.8.67.

Table 2. Control of Two spotted spider mite.

Materials	Amt./100 gal.	No. active two spotted mite/90 leaves on (date): 18/7	27/7	31/7	7/8	14/8	25/8	6/9
Zolone E.C.	20.0 fl.oz	16	240	144	320	0	624	272
Zolone E.C.	30.0 fl.oz	0	16	0	32	16	256	384
Zolone W.P.	1.5 lb.	48	400	896	624	320	1,584	1,024
Zolone W.P.	2.0 lb.	48	1,248	272	208	272	496	496
(Guthion + Kelthane*	1.25 lb.+ 2.0 lb.	2,064	2,672	1,728	416	48	0	32
(Imidan + Kelthane*	1.25 lb.* 2.0 lb.	1,936	1,808	896	48	64	0	64
Check (+ Kelthane⊕)	2.0 lb.	816	2,496	1,872	6,144	352	24	16

* Added on 28/7/67 and 8/8/67.

⊕ " " 8/8/67.

CONCLUSIONS: Good control of both red and two-spot mite was achieved with regular applications of Zolone E.C., particularly at the higher rate. Zolone W.P. gave inferior control compared with the E.C., but was superior to both Guthion and Imidan (Kelthane had to be added to these treatments for mite control). Four weeks after the final cover spray, populations had started to build up of both species.

RESIDUE DATA: Results awaited.

GENERAL OBSERVATIONS: The Zolone E.C. caused some russet ring spots on the fruit, particularly at the higher dose rate. Both Zolone E.C. and W.P. caused some leaf blotching. These blotches were mauve in colour and occurred on the fresh foliage after each spray application. This damage did not appear to result in any premature defoliation; and did not affect the fruit in any way.

CROP: Apple

PEST: Apple maggot, *Rhagoletis pomonella* (Walsh)

TITLE: Chemical control tests in southwestern Quebec.

NAME AND AGENCY: RIVARD, I. and A. CLEMENT, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 100 gal. Imp. Bromophos 40% E.C. 1 pt.; Formothion 40% E.C. 1 pt.; Gardona 75% W.P. 1 lb.; GS-13005 40% W.P. 1.25 lb.; Imidan 50% W.P. 1.25 lb.; N-4543 50% W.P. 1.25 lb.; Rogor 40% E.C. 1 pt.; Sevin 50% W.P. 2 lb.; Zolone 30% W.P. 2 lb.

METHODS: Tests conducted in two separate orchards. Materials sprayed as dilute on tri-replicated mature tree blocks with a hydraulic sprayer delivering 12 gallons per minute at about 500 p.s.i. pressure using a handgun from the ground. All materials, except Rogor, applied in five cover sprays on July 6, 17 and 27, August 2 and 14. Only two applications of Rogor, on July 6 and 17. Estimates of % clean fruit from examination of 150 apples picked in mid-September for each treatment and the checks.

RESULTS:

Orchard No. 1

Materials	% clean fruit
Imidan	100.0
Sevin	100.0
Gardona	100.0
Bromophos	99.3
N-4543	99.3
GS-13005	98.7
Check	91.7

Orchard No. 2

Materials	% clean fruit
Imidan	99.3
Sevin	98.0
Zolone	98.0
Rogor	96.0
Formothion	96.0
Check	74.0

CONCLUSIONS: All materials gave excellent control of the apple maggot, even in orchard No. 2 where the natural infestation was about threefold that in orchard No. 1. However, percentage of infested fruit might have been higher if count could have been made on dropped apples earlier in the season.

RESIDUE DATA: Samples of apples treated with Gardona have been forwarded to the Shell Chemical Company for residue analysis. No reports to date.

GENERAL OBSERVATIONS: No injury was evident from any treatment.

CROP: Apple

PEST: Buffalo treehopper, *Stictocephala bubalus* (F.)

TITLE: Chemical control of adults.

NAME AND AGENCY: PARADIS, R.O., and L.-G. SIMARD, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 100 gal. Imp., and, in brackets, per acre. DDT 50% W.P. 2 lb. (4 lb.); carbaryl 50% W.P. 2 lb. (4 lb.); diazinon 50% W.P. 2 lb. (4 lb.).

METHODS: Tests were carried out in three-replicated plots of 6-year old apple trees of McIntosh and Cortland varieties. Materials were applied once, on August 11, with a spray gun operated at 600 p.s.i. and at the rate of 200 gallons per acre mostly directed to the cover crops. The control was based on the number of alive adults collected five days after the spray date from 175 net sweepings in each treatment and the checks.

RESULTS:

Materials	Adults from 175 sweepings	% reduction over the checks*
DDT	4	94.1 a
Carbaryl	0	100.0 a
Diazinon	0	100.0 a
Check	68	0.0 b

*Figures followed by the same letter are not significantly different (Duncan's multiple range test).

CONCLUSIONS: All treatments gave significant control over the checks but did not differ significantly from each other. Those data corroborated, in a large extent, the results obtained in 1966 with similar treatments.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Nil.

CROP: Apple

PEST: Buffalo treehopper, *Stictocephala bubalus* (F.)

TITLE: Effects of oil and ethion-oil on the eggs of the buffalo treehopper.

NAME AND AGENCY: PARADIS, R.O., and L.-G. SIMARD, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 100 gal. Imp. Superior oil 70 sec. 2 gal.; ethion-superior oil 70 sec. 2 gal.

METHODS: The materials were used in a single spray on May 18, when fruit buds of McIntosh were at the advanced green tip, and were applied in three-replicated plots with a conventional hand gun sprayer operated at 600 p.s.i. In early June, i.e., just before the hatching period of the buffalo treehopper, twigs were collected from treated and untreated plots, placed in jars provided with water, and kept in insectary for daily examinations.

RESULTS:

Materials	Total number of eggs	Percent of eggs hatched	dead	para-sitized
Superior oil 70 sec.	721	53.4	32.5	15.1
Ethion-sup. oil 70 sec.	487	48.2	38.0	13.8
Checks	641	63.0 (1)	18.9 (1)	18.1 (1)

(1) Data not significantly different at the 5% level.

CONCLUSIONS: For the second consecutive year, the treatments with a superior oil or ethion-superior oil, when timed and applied to control the European red mite, did not significantly affect the egg survival of the buffalo treehopper. The egg parasitism ranged 14 to 18 per cent and was caused by the chalcid, *Polynema striaticorne* Gir.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Nil.

CROP: Apple

PEST: Apple seed chalcid, *Torymus varians* (Wlk.)

TITLE: Chemical control tests in southwestern Quebec.

NAME AND AGENCY: RIVARD, I., and A. CLEMENT, Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: Amounts given are for 100 gal. Imp. DDT 50% W.P. 2 lb.; Imidan 50% W.P. 1.5 lb.

METHODS: Materials applied as dilute until run off with a spray gun of a conventional sprayer at about 500 p.s.i. pressure on June 16. Both treatments and the check replicated four times. Percentage of infestation determined from 25 apples sampled in each replicate on August 16 and again on August 18, and control expressed as percentage of reduction over the check.

RESULTS:

Materials	Percentage of infested apples	% reduction over the check
DDT	10.5	61.8
Imidan	14.5	47.3
Check	27.5	-

CONCLUSIONS: DDT was more effective than Imidan, but either insecticide did not give satisfactory reduction of infestation for commercial control. Though spraying was done as soon as adult chalcids were observed in the field, the insects probably had already started to lay eggs when the materials were applied.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: The distribution of infestation by the apple seed chalcid was not uniform throughout the plot, being more severe on trees located in the western portion of the orchard. Heavy rains following soon after that single application could have washed away part of the insecticides, so a second spraying might have been advisable in order to kill late appearing adults.

CROP: Apple variety McIntosh

PEST: Apple rust mite, Vasates schlechtendali (Nal.)

TITLE: Control with broad spectrum insecticides

NAME AND AGENCY: COLE, R.J., May & Baker (Canada) Ltd., 200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal Imp.
Zolone (33% w/v phosalone E.C.) 20.0 fl oz and 30.0 fl oz
Zolone (30% w/w phosalone W.P.) 1.5 lb and 2.0 lb
Guthion 25% W.P. 1.25 lb
Imidan 50% W.P. 1.25 lb

METHODS: In a mature (but neglected) orchard of McIntosh being sprayed with broad spectrum insecticides for general pest control, a routine leaf examination for mites gave the results shown in the accompanying table. Treatments were applied to randomized single tree plots, replicated three times, with a Jeep mounted Rittenhouse sprayer at 400 lb. pressure, spraying to 'run-off'. Treatments were applied on 5th, 16th, and 26th June and on 6th, 16th and 26th July and leaf samples were taken on 3rd August. 30 leaves per tree (3 replicates) were brushed through a standard brushing machine and the mites counted with the aid of a binocular microscope.

RESULTS:

Material	Amt./100 gal.	Active mites/90 leaves
Zolone E.C.	20.0 fl oz	16
Zolone E.C.	30.0 fl oz	32
Zolone W.P.	1.5 lb	48
Zolone W.P.	2.0 lb	16
Guthion	1.25 lb	1008
Imidan	1.25 lb	288
Check	-	3088

CONCLUSIONS: Zolone treatments gave the best control of this pest. Imidan gave moderate control and Guthion slight control.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No phytotoxic symptoms were observed at this site.

CROP: Apple

PEST: Apple rust mite, *Vasetes schlechtendali* (Nal.)

TITLE: Summer control of apple rust mite.

NAME AND AGENCY: WAGNER, H. W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Morestan 25% W.P. 1/2 lb.; binapacryl 50% W.P. 1/2 lb.; dicofol 18.5% A.P. 2 lb.; carbaryl 50% W.P. 2 lb.; and N4543 50% W.P. 1 1/4 lb.

METHODS: Four single tree plots of McIntosh, three years old, were used per treatment at Simcoe. A knapsack sprayer was used to apply the materials on July 20. Counts were made on 40 leaves per treatment July 27.

RESULTS: A total of 12 rust mites on 40 check leaves were found on July 27 and none on the treated trees.

CONCLUSIONS: All materials gave good control of this infestation of apple rust mite.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The rust mite population in the check dropped considerably between the time of spray application and recording of the results. European red mites and clover mites which were also present helped to reduce the food supply in the leaves.

CROP: Apple, mixed varieties

PEST: All apple pests

TITLE: Evaluation of new materials in a full season spray schedule

NAME AND AGENCY: SIMPSON, C.M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts shown are for 100 gal. Imp.
Imidan 50% W.P. 1.25 lb; azinphos-methyl 25% W.P. 1.25 lb.; phosalone 30% W.P. 2.0 lb.; phenthoate 50% E.C. 1.0 pt.; bromophos 25% W.P. 2.0 lb.

METHODS: Duplicate trees selected at random for each insecticidal treatment. Sprays applied to drench by hand gun with Jeep-mounted Hardie 99 at 300 p.s.i. Schedule started at calyx period (June 13) and was followed by seven cover sprays at 10 day intervals from June 22 until Aug. 24. Counts made of 200 fruits per tree on July 25, and sample of total crop on Oct. 2. Ten leaves per tree examined periodically in laboratory for red-mite buildup. Captan added to all sprays for scab control.

RESULTS:

	% fruit free of insect injury		E. R. M. eggs and active stages per leaf at times shown				
Material	July 25	Oct. 2	June 12	July 13	Aug. 8	Aug. 21	Sept 7
azinphos-methyl	100.0	96.0	0.0	0.0	1.8	4.8	6.9
phosalone	98.9	98.5	6.7	1.7	10.8	20.2	9.0
phenthoate	99.7	96.0	1.1	1.6	95.1	119.4	83.0
bromophos	99.5	98.5	0.2	1.3	71.9	82.5	45.4
Imidan	100.0	100.0	1.9	6.0	67.5	36.4	3.8
Check	---	---	0.9	1.4	11.7	11.3	1.0

CONCLUSIONS: All materials gave very good control of many apple pests except the European red-mite and warrant further testing on a larger scale. None of the materials as used can be considered as an effective miticide even on a seasonal schedule.

RESIDUE DATA: Samples of fruit sprayed with phenthoate and bromophos have been collected for residue analysis by Green Cross.

GENERAL OBSERVATIONS: Population of Typhlodromids and Zetzellia mali (Ewing) were to be found on the check trees throughout the summer and on one occasion (Sept. 7) Zetzellia was found on an azinphos-methyl treated tree. Among the insects present in the orchard were codling moth, red-banded leaf roller, curculio, plant bugs and San José scale. Bud moth infestation was heavy when the test started but appeared to be wiped out before the season ended. San José scale was only found on the trees treated with azinphos-methyl or phosalone and on the check trees. None of the materials injured the foliage or fruit.

CROP: Apple variety McIntosh

PEST: Common apple insects

TITLE: Control of orchard pests with broad-spectrum insecticides

NAME AND AGENCY: COLE, R. J., May & Baker (Canada) Ltd., 200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gals Imp.
Zolone Liquid (33% w/v phosalone E.C.); 20.0 fl oz and 30.0 fl oz
Zolone W.P. (30% w/w phosalone W.P.); 1.5 lb and 2.0 lb.
Guthion 25% W.P. 1.25 lb.
Imidan 50% W.P. 1.25 lb.

METHODS: This test was carried out in a mature but neglected orchard of McIntosh at Aylmer, Ontario. Single tree plots in triplicate were sprayed to 'run-off' with a Jeep mounted Rittenhouse sprayer at 400 lb. pressure. Calyx application was made on 5th June and cover sprays on 16th and 26th June; 6th, 16th and 26th July and 6th August. An additional spray was applied on 17th August for suspected second brood codling. A full protective fungicide programme was also maintained from bud-burst onwards. Results given are based on all dropped fruit PLUS all harvest fruit from each treatment.

RESULTS:

Material	Amt./100g.	Total No fruit observed	Percentage infestation Codling	Curculio	Spring Caterpillar	Plant Bug	RBLR
Zolone E.C.	20.0 fl oz	9,401	0.3	4.0	1.1	1.9	0.1
Zolone E.C.	30.0 fl oz	13,546	0.2	2.6	0.9	1.7	0.1
Zolone W.P.	1.5 lb.	15,607	0.5	7.3	2.0	1.8	0.1
Zolone W.P.	2.0 lb.	15,718	0.01	1.6	0.7	1.0	0.0
Guthion	1.25 lb.	10,419	0.8	3.8	2.3	1.4	0.3
Imidan	1.25 lb.	15,393	0.3	3.7	2.2	1.5	0.2
Check	-	10,172	24.0	37.0	9.1	10.3	2.2

CONCLUSIONS: All treatments gave excellent control of codling moth. The higher rates of Zolone were the most effective treatments for curculio and spring caterpillar (cankerworm and fruitworm) control. All treatments gave equally good control of plant bug and Red banded leaf roller (RBLR), although with the latter pest, infestation was light.

RESIDUE DATA: Results awaited.

GENERAL OBSERVATIONS: No phytotoxic symptoms observed at this trial site.

CROP: Apple variety, Red Spy

PEST: Common Apple Insects

TITLE: Control of orchard pests with broad spectrum insecticides

NAME AND AGENCY: COLE, R. J., May & Baker (Canada) Ltd.,
200 Bellarmin Street, Montreal 11, P.Q.

MATERIALS: Amounts given are for 100 gal. Imp.
Zolone Liquid (33% w/v phosalone E.C.); 20.0 fl oz and 30.0 fl oz
Zolone W.P. (30% w/w phosalone W.P.); 1.5 lb. and 2.0 lb.
Guthion 25% W.P. 1.25 lb.
Imidan 50% W.P. 1.25 lb.

METHODS: Mature but neglected orchard of Red Spy at Aylmer, Ontario. Single tree plots in triplicate sprayed to 'run-off' with Jeep mounted Rittenhouse sprayer at 400 lb. pressure. Calyx application made on 9th June and cover sprays on 20th June; 1st, 10th, 19th and 29th July and on 9th August, with an additional spray on 21st August for suspected second brood codling. A full protective fungicide programme was also maintained from bud-burst. Assessments were based on all dropped fruit plus all harvest fruit from each treatment.

RESULTS:

Material	Amt./100g.	Total No Apples	Percentage Infestation Codling	Curculio	Plant Bug	RBLR
Zolone E.C.	20.0 fl oz	15,742	1.5	4.6	3.9	1.3
Zolone E.C.	30.0 fl oz	16,147	0.3	5.9	3.8	0.2
Zolone W.P.	1.5 lb.	17,071	0.3	2.7	4.5	0.3
Zolone W.P.	2.0 lb.	13,952	0.3	3.2	4.6	0.3
Guthion	1.25 lb.	17,328	0.8	4.1	3.8	0.5
Imidan	1.25 lb.	15,510	0.5	2.6	4.7	0.5
Check	-	21,926	11.2	9.3	6.0	3.8

RBLR - Red banded leaf roller

CONCLUSIONS: All treatments gave excellent control of codling. Imidan was the most effective material for controlling plum curculio in this test. Zolone E.C. gave better control of plant bug than other treatments, including Zolone W.P., although the level of infestation was not high. All treatments controlled RBLR.

RESIDUE DATA: Results awaited.

GENERAL OBSERVATIONS: Lenticel spotting was observed at the 'run-off' point on the fruit sprayed with Zolone E.C. prior to the fifth cover spray. This was thought to be caused by factors such as weather conditions and spray volume, linked with the use of emulsions.

CROP: Apple

PEST: Common apple insects

TITLE: Control of insects with wide spectrum insects

NAME AND AGENCY: WAGNER, H. W., Research Station, Canada Agriculture, Vineland Station, Ontario

MATERIALS: Amounts given are for 100 gal. Imp.
N 4543 50% W.P. 1 1/4 lb.; Imidan 50% W.P. 1 1/4 lb.; azinphos-methyl 25% W.P. 1 1/4 lb.; Azodrin 25% W.P. 1 lb.; Phosalone 30% W.P. 2 lb.; GS 13005 40% W.P. 3/4 lb.; Lannate 90% W.P. 7 oz.; mixture of Imidan 50% W.P. and carbophenothion 12.5% W.P. 1 1/4 lb. and 1642 90% W.P. 7 oz.

METHODS: Six post bloom sprays were applied (June 9, 16, 26, July 7, 19 and August 2) to single tree plots replicated 4 times (one replicate was MacIntosh and three were Red Delicious).The orchard was a semi-neglected one near Simcoe. An additional spray for second brood codling moth in August was purposely omitted to give a better comparison of materials. Dodine was used throughout the season in all plots.

RESULTS: Percentage Fruit Injury at Harvest

Materials	Codling moth Deep	Codling moth Sting	Scab	Red-banded leaf roller	Plum curculio	Other biting insects	Clean fruit
N 4543	2.2	.5	.4			.1	96.8
Imidan	5.0	.5	.6			.8	93.1
azinphos-methyl	7.1	1.0	.3			.1	91.5
Azodrin	3.5	5.3			.1	.3	90.8
Phosalone	4.4	5.1	.5				90.0
GS 13005	9.8	1.1	.1		.3	.1	88.6
Lannate	7.1	3.9	.2	.1		.5	88.2
Imidan + carbophenothion	10.3	1.5	.2		.3	.3	87.4
1642 (Dupont)	31.9	3.9	.3	.1	.2	.6	63.0
Check no insecticide	30.5	2.9	.5	.2	.3	.4	65.2

CONCLUSIONS: Under the conditions of this experiment (early termination of second brood Codling moth sprays) N 4543 gave the best results followed by Imidan and azinphos-methyl. N 4543 was also the best material tested in 1966. 1642 was ineffective.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Azodrin caused severe foliage and fruit injury even to leaf drop and small fruit on Red Delicious but not on MacIntosh. Pests other than codling moth seemed to be in small numbers.

CROP: Grape var. Duchess

PEST: Erinose mite, Eriophyes vitis (Pgst)

TITLE: Control experiment

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Elgetol 2 gal. and 1 gal. per 100 Imp. gal.

METHODS: A twenty four row block of grape vines divided into sections of 4 rows each to give two replicates of each treatment and two check treatments. Counts were made by examining the first 25 vines in the two center rows of each block and recording total number infested. Dormant sprays applied on April 30 by grower using a conventional double-row, hooded-boom sprayer to apply 100 gal. per acre.

RESULTS:

Average Per Cent Infested Vines

Treatment	June 8	June 26	July 7	Sept. 6
Check	77	61	63	24
Elgetol 1 gal.	46	30	15	3
Elgetol 2 gal.	33	21	17	7

CONCLUSIONS: Both treatments were somewhat better than the checks, but not significantly different from each other.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Pre-bloom (June 15) and post-bloom (July 1) sprays of captan 2 lb/100 plus carbaryl 1 lb./100 were applied to this grapery without any apparent reduction of the erinose population.

CROP: Grape var. S10878

PEST: Erinose mite *Eriophyes vitis* (Pgst)

TITLE: Control experiment

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
C 8514 (Galecron) 50% E.C. 1.0 pt.; N-10242 50% W.P. 1.0 lb.; FAC (L 600) 20% E.C. 1.0 pt.

METHODS: Twelve vines were sprayed to drip (approx. 200 gal/A) with each material, using a hand gun and Jeep-mounted Hardie 99 at 300 lbs. Sprays applied to heavily infested vines on July 25 and efficacy rated on Sept. 8 by counting back from the tip to the first infested leaf on 5 random terminals of 5 random vines.

RESULTS: It is not known how many leaves were produced between the time of spray application and assessment of results, however, on the average of the 25 terminals examined per treatment, erinea were found on the 4th leaf of the check plot.; - 8th leaf on Galecron; and 10th leaf on FAC and N-10242.

CONCLUSIONS: It is believed that each of the test materials effectively prevented spread of this mite on the vines and warrant further investigation on a larger scale.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No apparent injury with any material as used. Total rainfall over period 2.1". Average temperature 67.6°F.

CROP: Grape

PEST: Grape phylloxera, *Phylloxera vitifoliae* (Fitch)

TITLE: Control of the leaf form.

NAME AND AGENCY: STEVENSON, A. B., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Endosulfan, 50% W.P., 1 lb./100 gal. Imp.

METHODS: Experiment 1: At St. Catharines, Ont. Cultivar Foch. Plots 6 rows wide by 18 vines long. Sprayed post-bloom July 5; applied about 250 gal. per acre. Control evaluated Aug. 29.
Experiment 2: At Vineland Station, Ont. Cultivar Foch. Plots 5 rows wide by 12 vines long. Sprayed post-bloom July 7. Applied about 225 gal. per acre. Control evaluated Aug. 31.

Experiment 3: Vineland Station, Ont. Cultivars Seibel 7053 and Seibel 5279. Plots one row of each cultivar x 16 vines. S-7053 sprayed July 11 and August 1. S-5279 sprayed July 11 only. Control evaluated August 31. All experiments: Sprays applied with Jeep-mounted Hardie 99 sprayer at 300 p.s.i. with a Bean Spraymiser gun, except spray of July 11 which was applied by an air-blast sprayer. Control evaluated by examining 5 terminal leaves from each of 30 sheets (20 in Experiment 3) per plot and classify leaves according to the estimated number of galls as 1-5, 6-15, 16-35, 35-75 and 75-155 and up.

Results:

Treatment	% Shoots infested	% Leaves infested	No. of leaves with 1-5 galls	No. of leaves with 6-35 galls	No. of leaves with More than 35 galls
Experiment 1					
Sprayed	53.3	19	91	13	0
Unsprayed	91.7	69	133	213	69
Experiment 2					
Sprayed	15	4	20	4	0
Unsprayed	85	67	106	217	79
Experiment 3					
S-7053, Sprayed	15	5.6	18	8	2
S-7053, Unsprayed	96	75.8	99	220	60
S-5279, Sprayed	37	12.8	51	13	0
S-5279, Unsprayed	89	73.6	84	204	80

Experiment 1. Roots sampled Sept. 6-12. Galls per gram of root dry weight calculated; sprayed, 19.0; unsprayed 33.7.

CONCLUSIONS: A post-bloom spray of endosulfan effected a substantial decrease in the amount of leaf galls in all experiments. A second spray 3 weeks later probably helped to reduce injury even further.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Samples of petioles for nutrient analysis and fruit for sugar content and wine making were taken from all experiments; no results available at time of writing.

CROP: Grape var. Fredonia

PEST: Grape mealy bug, *Pseudococcus maritimus* (Ehr.)

TITLE: Control experiment

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: See table for amounts of formulation.
phenthoate 50% E.C.; formothion 43% E.C.; C-9491 50% W.P.; Lannate 90% W.D.; phosalone 30% W.P.; Galecron 50% E.C.; oxydemeton-methyl 2 lb/gal S.C.; Diazinon 50% W.P.; azinphos-methyl 25% W.P.

METHODS: Unreplicated, random plots of 7-9 vines each were sprayed on June 27 by hand gun with Jeep-mounted Hardie 99 at 300 p.s.i. to deliver 0.5 gal. per vine (approx. 225 gal. per acre). Check plot was replicated 3 times. Infestation on each vine rated visually (by two observers) as 0 = clean; 1 = scarce; 2 = easily found; 3 = heavy. Total for plot added together and divided by number of vines to give a numerical expression of incidence per vine.

RESULTS:

Average vine rating

Material	Amt/100 Gal. Imp.	3 days June 30	28 days July 25
formothion	1.0 qt.	0	0
Galecron	1.0 pt.	0	0
oxydemeton-methyl	1.0 pt.	1	0
C-9491	2.0 lb.	1	0
Diazinon	1.0 lb.	0	1
Lannate	1.0 lb.	0	1
azinphos-methyl	1.25 lb.	1	1
phosalone	1.0 lb.	1	1
phenthoate	1.0 qt.	1	1
Check	--	2.5	1.5

CONCLUSIONS: All materials as used gave very good control, with formothion and Galecron very slightly better than the others. Any mealy bugs exposed at the time of treatment were killed by all materials.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Mealy bug emerges from behind the bark over a very long period and two sprays would be more effective than one. By July 25, a new brood of crawlers was present but by Aug. 18th mealy bug was still scarce in all plots except checks and C-9491. Rainfall over period was 1.59", half of which fell within two days of spraying. Maximum temperature was 86.0°F.

CROP: Peach

PEST: European red mite, *Panonychus ulmi* (Koch)

TITLE: Late season control of European red mite.

NAME AND AGENCY: HERNE, D. C. and C. T. LUND, Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: For amounts of formulations per 100 Imp. gal. see table below. Plictran (Dowco 213) 47.5% W.P.; Galecron (C8514) 50 E.C.; Azodrin 3.2 lb. active/gal.; NC 5016 20% W.P.; dicofol 18.5% W.P.; binapacryl 50% W.P.; demeton 26% E.C.; Chloropropylate 25% E.C.; ovex 50% W.P.; parathion 15% W.P. ethion 25% W.P.; mevinphos 100% active.

METHODS: On August 11, 2 trees per material were sprayed to run-off using a jeep-mounted Hardie sprayer with a Spraymiser gun (#4 disc) operating at 300 p.s.i. Ten leaves per tree were examined for mites 2 days prior to treatment and at 7, 14, and 21 days after treatment. Mevinphos-treated leaves were also sampled 2 days after treatment.

RESULTS:

Material	Form./100 gal.	Motile Mites on 20 Leaves: Pre-spray Aug. 9	After Spraying: 2 Day Aug. 13	7 Day Aug. 18	14 Day Aug. 25	21 Day Sept. 1
Plictran (Dowco 213)	6 oz.	230		2	0	0
Galecron (C8514)	1 pt.	152		10	0	0
Azodrin	15 fl. oz.	436		20	0	0
NC 5016	3 lb.	174		40	0	0
dicofol	2 lb.	152		80	2	0
binapacryl	0.5 lb.	6		1	12	6
demeton	0.75 pt.	20		6	1	1
Chloropropylate	1 qt.	10		20	2	2
ovex	1.5 lb.	46		100	80	108
parathion	1.5 lb.	106		150	140	206
ethion	1 lb.	110		360	242	498
mevinphos	5 fl. oz.	332	272	826	774	1068
Check		348		578	718	1314

CONCLUSIONS: Dicofol, binacapryl, and demeton, effectively controlled low to moderate infestations of the mite apparently resistant to ovex and the organophosphorus compounds parathion, ethion, and mevinphos. The following experimental compounds also gave good control: Plictran, Galecron, NC 5016, Chloropropylate, and Azodrin.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Azodrin caused extensive leaf injury of peach foliage.

CROP: Peach

PEST: Lesser peach tree borer, *Synanthedon pictipes*

TITLE: Control Experiment

<u>NAME AND AGENCY</u>: BOYCE, H. R., Research Station, Canada Agriculture, Harrow, Ontario

<u>MATERIALS</u>: Amounts given are for 100 gal. Imp. Lannate 90% W.D. 0.3 lb; Dylox 50% S.P. 2.0 lb.

<u>METHODS</u>: Sprays applied June 20, July 11 and August 1 or only on the two latter dates. A knapsack sprayer was used and the sprays were applied to infested areas only to runoff. The numbers of living larvae per square foot of infested area were determined by digging them from the bark with a knife during the first week of October. Each treatment was applied to three randomized single-tree plots. B1956 was added with Lannate as a surface active agent.

<u>RESULTS</u>:

Material	Amt./100	No. applications	Live larvae per sq. ft. infested area(a)	Percent reduction
Lannate	0.3 lb.	2	5.4	70.0
		3	11.3	37.2
Dylox	2.0 lb.	2	6.6	63.3
		3	2.4	87.0
Check	-	-	18.0	-

(a) Average of 3 replicates

<u>CONCLUSIONS</u>: Lannate exhibited toxicity to the lesser peach tree borer larvae but the results were ambiguous. Three, but not two, applications of Dylox gave a promising level of control.

<u>RESIDUE DATA</u>: nil

<u>GENERAL OBSERVATIONS</u>: nil

<u>CROP</u>: Peach

<u>PEST</u>: Lesser peach tree borer, <u>*Synanthedon pictipes*</u> (G. & R.)

<u>TITLE</u>: Control Experiment

<u>NAME AND AGENCY</u>: BOYCE, H. R., Research Station, Canada Agriculture, Harrow, Ontario

<u>MATERIALS</u>: Amounts given are for 100 gal. Imp. Thiodan 50% W.P. 1.5 lb.; malathion 25% W.P. 2.0 lb.; malathion 50% E.C. 1.0 pint; Sevin 50% W.P. 2.0 lb.

METHODS: Sprays applied June 20, July 11 and August 1 with Rittenhouse sprayer at 250 lb. pressure using a Bean Spraymaster gun and sprayed to run off. Lower 18 inches of limbs and trunk to ground treated. Numbers of living larvae determined in first week of October by digging out from bark in infested areas. Ten randomized blocks used.

RESULTS:

Material	Amt./100	Average numbers live larvae per tree(a)	Per cent reduction
Thiodan	1.5 lb.	0.1	97.4
Malathion E.C. +	1.0 pint		
Sevin	2.0 lb.	0.5	87.2
Malathion W.P. +	2.0 lb.		
Sevin	2.0 lb.	0.6	84.6
Check	-	3.9	-

(a) Ten single tree replicates per treatment

CONCLUSIONS: Formulations of malathion combined with Sevin had no effect on control obtained. Malathion plus Sevin was not as good as Thiodan but the combination may be useful on certain early and mid-season peach varieties when use of Thiodan could result in unacceptable residues on the fruit at harvest, that is when the use of Thiodan in relation to time of harvest would be less than 15 days.

RESIDUE DATA: nil

GENERAL OBSERVATIONS: No injury to foliage occurred.

CROP: Pear var. Bartlett

PEST: Pear rust mite *Epitrimerus pyri* (Nal.)

TITLE: Evaluation of new materials for control

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts are of formulation per 100 gal. Imp.
N-10242 50% W.P. 1.0 lb.; Galecron (C8514) 50% E.C. 1.0 pt.; Morestan 25% W.P. 1.0 lb.; dicofol 18.5% A.P. 1.0 lb.; Ethion 25% W.P. 2.0 lb.; Dowco 213 50% W.P. 6.0 oz.; phosalone 30% W.P. 1.0 lb.; N-4543 50% W.P. 1.0 lb.; Diazinon 50% W.P. 1.0 lb.; azinphos-methyl 25% W.P. 1.25 lb.

METHODS: Materials applied to randomly selected blocks of 4 trees at prebloom period (May 5) with a second application on two trees in each plot at calyx period (May 31). Also, Morestan, dicofol, ethion and Diazinon were applied to two trees each at calyx period only. Sprays applied to drip by hand gun with Jeep-mounted Hardie 99 at 300 p.s.i. The crop was too light to get enough fruit for injury ratings, so results were obtained only on the foliage by rating the trees as clean, or with trace, light or heavy injury.

RESULTS: Rating of Foliage Injury by Pear Rust Mite

Materials and Sprays *		Clean	Trace	Light	Heavy
dicofol	P			X	
	C	X			
	P & C		X		
Diazinon	P			X	
	C	X			
	P & C	X			
Ethion	P			X	
	C		X		
	P & C	X			
Morestan	P				X
	C		X		
	P & C		X		
Galecron	P				X
	P & C			X	
N-10242	P			X	
	P & C			X	
Dowco 213	P			X	
	P & C			X	
phosalone	P	X			
	P & C	X			
N-4543	P				X
	P & C				X
Guth.	P			X	
	P & C			X	

* P = prebloom spray; C = calyx spray

CONCLUSIONS: Best apparent control was obtained with a single pre-bloom spray of phosalone, or a single calyx spray of Diazinon or dicofol. Equally effective was the two sprays of Diazinon, ethion and phosalone. N-4543 as used, was ineffective in this orchard as were single applications of Morestan or Galecron. There was no apparent difference between one or two sprays of either Dowco 213 or N-10242. Injury in check trees varied from light to heavy.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: At the rate used (0.25 lb. a.i.) Morestan caused severe leaf spotting. Traces of injury were found with the pre-bloom sprays of azinphos-methyl and Galecron, and with the two sprays of Dowco 213. Temperature on May 5, 50°F and on May 31, 60°F. By May 15, many mites were active and hundreds of eggs were present in the unsprayed trees.

CROP: Pear

PEST: Pear psylla, *Psylla pyricola* Foerster

TITLE: Control of the pear psylla with petroleum oils

NAME AND AGENCY: MADSEN, Harold F. and K. WILLIAMS, Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: Amounts given are per acre.
Orchex 696, 5 gal., Orchex 796 (0.46% emulsifier) 5 gal., Orchex 796 (1.0% emulsifier) 5 gal., Volck Supreme 5 gal., PGSO-1 5 gal., PGSO-2 5 gal.

METHODS: Sprays applied on March 21, June 26, and July 25 with a Turbomist concentrate sprayer set to deliver 60 gallons of dilute spray per acre at 100 p.s.i. Plots 9 trees each with two replications. Evaluation at approximately biweekly intervals. Adults sampled with a beating tray, 2 beats per tree on 6 trees in each replicate. Nymphs sampled by taking 50 leaves per replicate, 25 from spur leaves and 25 from terminal shoots.

RESULTS:

		Psylla adults per 12 beats								
	Amount	March		April	May	June		July	August	
Materials	per acre	21	29	24	12	15	29	13	3	16
Orchex 696	5 gal.	133	39	38	24	15	82	69	45	58
Orchex 796 (0.46% E.)	5 gal.	141	28	44	26	53	61	69	35	48
Orchex 796 (1.0% E.)	5 gal.	131	34	18	10	32	21	15	10	7
Volck Supreme	5 gal.	137	30	9	8	32	21	25	12	11
PGSO-1	5 gal.	128	17	23	13	36	35	28	25	27
PGSO-2	5 gal.	111	43	20	14	53	42	36	25	24
Check	-	143	166	176	104	153	-	-	-	-

CONCLUSIONS: Orchex 796 oil with 1.0% emulsifier and Volck Supreme oil gave the best control. The higher percent emulsifier apparently wets the adults and gives a better initial kill. All of the oils kept the pear psylla below an economic level, although there were differences between oils in the control of adult psyllids. All of the oils gave good control of the nymphal stages.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: All of the oils caused an enlargement and corkiness of the bark lenticels on 1 and 2-year old wood. This was especially noticeable on the trees treated with the PGSO oils. The oils also provided control of the European red mite, Panonychus ulmi (Koch).

CROP: Bartlett and d'Anjou pear

PEST: Pear psylla, Psylla pyricola Förster

TITLE: Control experiment

NAME AND AGENCY: McMULLEN, R.D., Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: Amounts are for 100 gal. Imp. Perthane 40% W.P. 2½ lb., Nissol 35% W.P. 1½ lb., NC 5016 20% W.P. 3 lb., C8353 50% W.P. 1½ lb., C8514 50% E.C. 1½ pt.

METHODS: Single plots of 7-year old Bartlett and d'Anjou pear trees, three of each variety, were used for each treatment. Sprays were applied to the point of runoff with a handgun sprayer operated at 500 p.s.i. on June 26. Relative efficiencies of the treatments were obtained by making pre and post spray counts of living nymphs on leaves growing 6 to 8 inches from the tips of new twig growth. Twenty-five such leaves were taken at random from each plot.

RESULTS:

	Number of live nymphs on 25 leaves	
Material	June 26 (pre spray)	July 6 (post spray)
Perthane	338	49
Nissol	119	26
NC 5016	271	27
C8353	174	2
C8514	180	5
Check	126	121

CONCLUSIONS: Single treatments of C8353 and C8514 caused outstanding mortality of pear psylla nymphs.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Treatment effects on adults were not assessed because of the vagility of adults and the small size of the plots. Evidence that C8514 has ovicidal properties against pear psylla eggs was observed. None of the treatments produced phytotoxic symptoms on fruits or foliage of either variety included in the tests.

CROP: d'Anjou pear

PEST: Pear psylla, *Psylla pyricola* Förster

TITLE: Control experiment

NAME AND AGENCY: McMULLEN, R.D., Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia

MATERIALS: Dithane M-45 80% W.P. 12 lb. per acre and Imidan 50% W.P. 4 lb. per acre.

METHODS: Single quarter acre plots of 7-year old d'Anjou pear trees were used for each treatment. Sprays were applied on June 26 with a Turbo-mist concentrate sprayer at the rate of 60 gal. of spray per acre. Treatment efficiencies were assessed by counting eggs and living nymphs on leaves growing 6 to 8 inches from the tips of new twig growth. Twenty-five such leaves were taken at random from each plot.

RESULTS:

Number of live eggs (E) and nymphs (N) on 25 leaves

Material	June 26 (pre spray)		July 6		July 17		August 11	
	E	N	E	N	E	N	E	N
Dithane M-45	355	387	105	27	41	7	111	0
Imidan	358	338	148	38	129	9	166	17
Check	365	341	344	242	212	162	171	12

CONCLUSIONS: Both treatments gave excellent control of pear psylla.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: When the treatments were applied, the pear psylla population in the orchard was very high and at the point of causing severe injury to the foliage. Post treatment, moderate to severe defoliation occurred in the check plot but not in the treated plots. Reduced tree vigor, defoliation and extremely hot weather caused a general decline in the pear psylla infestation in the check plot. The extremely hot weather probably assisted in maintaining the low levels of infestation achieved in the treated plots.

CROP: Pear var. Bartlett

PESTS: Pear psylla, *Psylla pyricola* (Foerst); European red mite, *Panonychus ulmi* (Koch); pear rust mite, *Epitrimerus pyri* (Nal.)

TITLE: Control Experiment

NAME AND AGENCY: SIMPSON, C. M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: All amounts are for 100 gal. Imp.
Kilval 40% E.C. 1.0 pt.; Gardona 75% W.P. 1.25 lb.; Galecron 50% E.C. 1.0 pt.; formothion 40% E.C. 1.0 pt.; bromophos 25% W.P. 2.0 lb.; Lannate 90% W.P. 1.0 lb.; Dupont 1642 90% W.P. 0.5 lb.; Banol 75% W.P. 1.0 lb.; N-4543 50% W.P. 1.0 lb.; dimethoate (Rogor) 40% E.C. 1.0 pt.; N-10242 50% W.P. 1.0 lb.; endosulfan 50% W.P. 1.5 lb.; phenthoate 50% E.C. 1.0 pt.; Imidan 50% W.P. 1.0 lb.; azinphos-methyl 25% W.P. 1.0 lb.;

METHODS: All test materials except Imidan and azinphos-methyl were applied to randomized single tree plots, replicated three times. Sprays applied three times in regular pear schedule as follows: Calyx (June 1), first cover (July 12), second cover (Aug. 10). Trees sprayed to run-off by hand gun with Jeep-mounted Hardie 99 sprayer at 300 p.s.i. Imidan and azinphos-methyl applied on same dates and in same manner on single plots of 45 trees each. These two plots also were sprayed on July 12 with 18.5% dicofol A.P. 2.0 lb/100 gal. to prevent further increase of rust mite. Periodic counts were made of psylla eggs and young and of European red mite by selecting 10 random leaves per tree and examining them under binocular microscope at the laboratory. One hundred fruits per tree scored at harvest for rust mite injury.

RESULTS:

Table 1. Numbers of Pear Psylla Nymphs per 30 Leaves (Sprays: June 1, July 12, August 10)

Material	June 5*	June 20	July 10	July 17	July 27	Aug. 15
Kilval	0	4	14	5	3	9
Gardona	0	1	4	0	0	0
Galecron	0	28	14	11	59	3
formothion	0	2	27	10	3	5
bromophos	0	7	65	0	10	3
Lannate	0	6	33	10	30	2
1642	0	4	48	14	79	49
Banol	0	6	54	10	98	6
N-4543	3	1	65	3	0	4
dimethoate	0	3	4	1	11	0
N-10242	1	0	125	22	143	67
endosulfan	0	0	50	0	23	6
phenthoate	0	5	28	5	19	3
Check	7	5	9	31	62	83
azinphos-methyl	0	0	0	0	0	0
Imidan	1	0	0	0	0	0

* A prespray count on 100 leaves taken at random in the test block had the following population of pear psylla: 17 1st instar; 11, 2nd instar; 5, 3rd instar; 2, 4th instar, and a few eggs.

Table 2. Number of European Red Mite Eggs and Active stages per 30 Leaves

Material*	June 5	June 20	July 10	July 17	July 27	Aug. 15
Kilval	66	24	0	86	144	507
Gardona	1	2	0	0	0	10
Galecron	0	0	0	0	2	35
formothion	33	28	267	441	670	362
bromophos	0	3	3	3	0	15
Lannate	0	2	113	24	10	77
1642	0	0	1	4	7	38
Banol	58	128	308	215	590	861
N-4543	29	260	535	847	330	30
dimethoate	0	0	0	7	1	0
N-10242	0	0	7	5	41	293
endosulfan	3	79	26	73	321	1027
phenthoate	185	75	179	133	346	301
Check	220	74	91	271	383	126
azinphos-methyl**	0	5	268	0	13	0
Imidan**	0	23	28	0	0	0

* Sprays applied June 1, July 12 and August 10

** Also sprayed on July 12 with dicofol (See treatments). This also reduced the European red mite.

Table 3. Control of Pear Rust Mite

Material	Average % fruit free of rust mite injury
N-4543	99.3
Kilval	98.3
N-10242	97.6
Banol	95.0
Galecron	94.3
Gardona	93.3
dimethoate	92.0
endosulfan	90.0
1642*	85.6
phenthoate*	85.0
formothion*	83.3
bromophos*	83.0
Lannate*	81.0
Imidan**	43.0
azinphos-methyl**	0.0
Check***	73.6

* One replicate of each of these treatments varied widely from the other two.

** Also sprayed with dicofol July 12 (See treatments). Imidan in past used at 1¼ lb. has given good control of rust mite. Imidan had 1% heavy russetting; 6% light; 50% trace whereas azinphos-methyl had 35% heavy; 22% light and 43% trace.

*** Check foliage was not conducive to rust mite due to heavy psylla and red mite populations.

CONCLUSIONS: Best control of all three pests was obtained with Galecron, Gardona, and dimethoate. When observed in the orchard, psylla control appeared about equal in all plots, however, leaf counts indicate best control by Imidan, azinphos-methyl, Gardona, dimethoate, formothion, N-4543 and Kilval.

Table 2 indicates best European red mite control with Galecron, Gardona, dimethoate and bromophos. The dicofol spray on July 12 prevented further mite build-up in the Imidan and azinphos-methyl plots.

In table 3, the first three materials are outstanding, and the next five satisfactory for control of pear rust mite. The others were ineffective as used. The dicofol spray (July 12) stopped further rust mite injury in the Imidan and azinphos-methyl plots, but the damage was severe by that time.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: A heavy blister mite Eriophyes pyri (Pgst) population was present in all trees throughout the test period, and none of the materials appeared to control it. Total rainfall over period was approx. 4.85"; highest temperature 88°F.

CROP: Prune

PEST: European red mite, Panonychus ulmi (Koch.)

TITLE: Soil application of Temik and Nia 10242 to control European red mite on prune trees.

NAME AND AGENCY: DOWNING, R.S., Entomology Laboratory, Canada Agriculture Research Station, Summerland, British Columbia

MATERIALS: Temik 10 G. and Nia 10242 10 G.

METHODS: Italian prune trees, 15 years old were treated with Temik 10 G. or Nia 10242 by spreading one ounce of the formulated product per inch of diameter of tree trunk around the area under the tree canopy. Sprinklers were immediately placed under the trees to water the insecticides into the soil. The treatments were applied on May 25, 1967, to two trees per treatment. Fifty leaves from each of the two trees per treatment were sampled on June 23 and August 3 and then processed by the method of Henderson and McBurnie.

RESULTS:

Numbers of European red mite per 100 leaves

	June 23		August 3	
	Mites	Eggs	Mites	Eggs
Temik 10 G.	6	60	72	502
Nia 10242 10 G	414	4564	3890	5110
Check - no treatment	642	7060	2580	4540

CONCLUSIONS: Temik 10 G. applied to the soil underneath prune trees at the rate of 1 ounce per inch of diameter of the tree trunk was outstandingly effective against European red mite. The Temik treated trees were very green at the end of the growing season in comparison to the other trees which were heavily mite injured.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Mealy plum aphid that was present on the prune trees at treatment time were dead within one week on trees treated with Temik. Partial mortality of these aphids occurred on Nia 10242 treated trees three weeks after treatment. Both treatments had little or no effect on fruit tree leaf roller larvae that were over half-grown at treatment time.

INSECTS OF VEGETABLES AND SPECIAL CROPS

edited by

D. G. Finlayson

CROP: Lima bean

PEST: Potato leafhopper, *Empoasca fabae* (Harris)

TITLE: Control of potato leafhopper

NAME AND AGENCY: HIKICHI, A., O.D.A.F. Simcoe, WAGNER, H.W., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Amounts given are for 100 gal. Imp.
Carbaryl 50% W.P. 2 lb.; DDT 50% W.P. 2 lb.; and Malathion 25% W.P. 3 and 4 lb.

METHODS: A Solo Port mistblower was used to spray plots 50 foot rows by 4 rows in triplicate on July 14 in Simcoe area. Live adults were counted on a 10 foot section of each plot on July 17.

RESULTS:

Materials	No. of adults
carbaryl 2 lb.	0
DDT 2 lb.	0
Malathion 4 lb.	0
Malathion 3 lb.	1
Untreated (adjoining area)	100 (approximately)

CONCLUSIONS: All materials gave effective control.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Numerous adults were present at spraying time and at time of counting in the area surrounding the treated area.

CROP: Bean var. Scarlet Runner

PEST: Two-spotted spider mite, Tetranychus urticae (Koch)

TITLE: Greenhouse test of newer acaracides.

NAME AND AGENCY: SIMPSON, C.M., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: See tables of results for materials and amounts.

METHODS: All plants were heavily infested with a parathion-resistant strain of the mite. Three plants per treatment were sprayed in the greenhouse on July 7 using a DeVilbiss spray gun at 20 p.s.i. and living and dead active stages counted on sections of the leaves 4, 7 and 14 days after treatment. The test was repeated on July 28 using lower doses of some of the materials and mortality counts made 7, 10 and 14 days later. For each individual record approximately 150-200 mites were counted.

RESULTS: The following two tables show the results.

Table 1. Mortality of Active Stages of Mites after July 7 spray. Averages for 3 replicates

Material	Formulation	Am'ts/100 gal.	4 days	7 days	14 days
dicofol	18.5 % A.P.	2.0 lb.	100	100	100
binapacryl	50% W.P.	0.75 lb.	100	100	100
Azodrin	3.2 lb/gal. E.C.	1.0 qt.	100	100	100
Tranid	50% W.P.	1.0 lb.	100	100	100
Acaralate	25 E.C.	1.0 qt.	100	100	100
Milbex	50% W.P.	1.0 lb.	100	100	100
fenoflurazole	20% W.P.	2.0 lb.	100	100	100
Galecron	50% E.C.	1.0 pt.	100	100	100
Morestan	25% E.C.	0.5 lb.	99.7	100	100
Animert V-101	20% W.P.	2.0 lb.	99.7	98.1	100
ethion	25% W.P.	2.0 lb.	98.4	96.4	100
Lannate	90 W.D.	1.0 lb.	100	91.5	84.4
N-10242	50% W.P.	1.0 lb.	73.6	31.6	17.7
Check	—	—	1.0	2.1	1.0

Table 2. Mortality of Active Stages of Mites after July 28 Spray
Averages for 3 replicates

Material	Formulation	Amts/100 gal.	7 day	10 day	14 day
dicofol	18.5% W.P.	1.0 lb.	100	100	100
Milbex	50% W.P.	0.75 lb.	100	100	100
acaralate	25 E.C.	32 fl. oz.	100	100	100
Tranid	50% W.P.	0.75 lb.	100	100	100
Morestan	25% W.P.	0.5 lb.	100	100	100
fenoflurazole	20% W.P.	1.0 lb.	100	100	100
Azodrin	3.2 lb/gal. E.C.	32 fl. g.	100	100	100
binapacryl	50% W.P.	0.75 lb.	100	100	100
Galecron	50% E.C.	16 fl. oz.	99.6	100	99.5
ethion	25% W.P.	2.0 lb.	99.4	99.3	98.8
Lannate	90 W.D.	1.0 lb.	100	97.5	93.6
Animert V-101	20% W.P.	1.0 lb.	70.1	73.6	50.4
N-10242	50% W.P.	1.0 lb.	20.6	9.9	24.1
Check	—	—	3.5	1.8	5.4

CONCLUSIONS: With the exception of N-10242 and the lower rate of Animert V-101, all materials were highly effective in the greenhouse against this parathion-resistant strain of mites. N-10242 had little or no residual effect against eggs or newly hatched nymphs.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Fenoflurazole caused severe burn of the bean leaves by the seventh day after the July 7 spray, and Azodrin caused slight burning after the July 28 spray. Daytime greenhouse temperature during first test was between 88° - 90°F and in the low 80's for the second test.

CROP: Broccoli, Morses 9392; Cabbage, Earlihead; Cauliflower, Snowball-Y and Rutabaga, Laurentian.

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché)

TITLE: Compatibility of herbicides and insecticides applied to crucifers

NAME AND AGENCY: FINLAYSON, D.G., Research Station, Canada Agriculture, Vancouver, and FREEMAN, J.A., Research Station, Canada Agriculture, Agassiz, British Columbia.

MATERIALS: Dasanit, 10G and 7E; Zinophos, 10G and 4E.

METHODS: In silt loam at Agassiz, B.C., the insecticides, Dasanit and Zinophos were applied to plots singly and to those treated with herbicides as preplant, pre-emergent, post-emergent and stale seed-bed applications. The crucifers were sown in 25-foot rows, 16 inches apart, replicated 4 times in a randomized block design. Dasanit and Zinophos were applied as split applications to the stem crucifers, 2 oz. toxicant per 1000 row-feet in a 4-inch band over the seeded row and as a drench, at the same rate, 28 days after seeding. The rutabaga were treated after seeding as above and with drench applications of 2 oz toxicant per 1000 row-feet 28, 49, and 70 days after seeding. Damage was assessed by grading the roots at harvest and alloting an index as follows: no damage, 0.0; very light, 0.2; light, 0.4; severe, 0.6; and very severe, 0.8. Percentage damage was expressed in terms of the maximum index (number of plants examined x 0.8).

RESULTS: (1) Preplant herbicide treatments with CDEC, DCPA, EPTC, SD-11831 and trifluralin with or without the insecticides caused no appreciable effect on crop yield. Of the crucifers broccoli had the least maggot damage, cauliflower and cabbage about equal damage and rutabaga had the most. Dasanit allowed slightly less maggot damage than Zinophos but both were very effective.

(2) Pre-emergence herbicide treatments with C-7019, OCS-21693, VCS-365 in conjunction with Dasanit and Zinophos showed some incompatibilities. C-7019 alone killed cauliflower and rutabaga but broccoli and cabbage were tolerant; in combination with Dasanit and Zinophos yields were depressed. Only broccoli survived treatment with VCS-365. The susceptibility of the crucifers to maggots was in the same order as above and the herbicides did not affect the efficacy of the insecticides.

(3) Pre- and post-emergence herbicide treatments with various rates of Dicamba, Nitrofen, and R-11913 caused various degrees of phytotoxicity. R-11913 was phytotoxic to the stem brassicas but less so to rutabaga. Nitrofen caused considerable leaf curling especially to cabbage. Dasanit and to some extent, Zinophos tended to increase this injury. Dicamba caused slight curling of the leaves. None of the herbicides reduced the protection from maggot damage afforded by the insecticides.

(4) Stale seed-bed weed control with treatment of diquat and paraquat at two rates in conjunction with applications of Dasanit and Zinophos caused very little, if any, phytotoxicity. The herbicides did not adversely affect the action of the insecticides against cabbage maggots.

CONCLUSIONS: None of the herbicides had any insecticidal value, nor any deleterious effect on the regular insecticides.

RESIDUES: Nil

GENERAL OBSERVATIONS: Nil

CROP: Cabbage, Golden Acre

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché)

TITLE: Control of cyclodiene-resistant strain of cabbage maggot

NAME AND AGENCY: GOBLE, H.W., Ontario Agricultural College, University of Guelph, Guelph, Ontario, and WARNER, Charles, Ontario Department of Agriculture and Food, Milton, Ontario.

MATERIALS: Bay 37289, 4E; Dasanit, 6E; Guthion, 25% WP; Zinophos, 4E; diazinon, 50% WP; Nia 10242, 50% WP; Birlane (GC 4072) 25% WP.

METHODS: The plots, 30 feet long, on sandy loam at Hornby, Ont., planted May 2, consisting of 20 plants, 18 inches apart and 30 inches between rows, were harvested July 6. Insecticides were applied in the transplant water and as a drench at 6 fl. oz. per plant, and as a spray in a 6-inch band at 7 gal./1000 row-feet (see Table 1 for rates, dates, and methods of application). At harvest plants were graded in two categories: (1) those marketable and those with small heads which would be marketable at a later date and (2) those which were marketable at harvest. These were expressed in terms of percentage of the number of plants remaining at harvest.

RESULTS: See Table 1.

CONCLUSIONS: The cabbage maggot infestation was moderate as shown by 47% of the untreated check being marketable. Zinophos in transplant water was phytotoxic. It caused yellow plants through May and into June and the injury was reflected in the yield. Dasanit sprays caused slightly yellow plants in May. Visible symptoms disappeared later and the yield was satisfactory. Nia 10242 in transplant water caused the leaves to curl, or "cup", and the edges to turn white. There was no visible phytotoxic effect with other treatments.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

TABLE 1 - CABBAGE MAGGOT 1967

Material	Formulation	Rate	Method of Application	Total Plants[1]	Per Cent of Total Plants: Destroyed by Maggots	Marketable Heads[2]	Marketable at Harvest[3]
Bay. 37289	EC (4 lb/gal)	2 fl.oz/40gal	Transplant water	70	0	99	86
Dasanit	EC (6 lb/gal)	2 pints/100gal	Sprays-May 2&16	56	3	95	86
Guthion	25% WP	1 lb/40 gal	Transplant water and Drench May 23	57	0	100	86
Guthion	25% WP	1 lb/40gal	Transplant water	64	0	92	81
Zinophos	EC (4 lb/gal)	3 pints/100gal	Sprays-May 2&16	63	3	90	79
Diazinon	50% WP	4 oz/40gal	Drench - May 23	64	1	91	78
Diazinon	50% WP	4 oz/40gal	Transplant water & Drench May 23	69	1	91	77
Nia.10242	50% WP	4 oz/ 40gal	Transplant water	61	0	93	77
Diazinon	50% WP	4 oz/40gal	Transplant water	70	1	91	73
Zinophos	EC (4 lb/gal	½ pint/50 gal	Drench - May 2	59	2	93	68
GC 4072	25% WP	8 oz/40gal	Transplant water	64	0	86	67
Check	-	-	-	66	15	70	47
Zinophos	EC (4lb/gal)	½ pint/50 gal	Transplant water	69	0	81	42

1. Total plants less those removed by root rot, as seeders, or by cultivation.
2. Includes small heads on July 6 that would be marketable at a later date.
3. Heads of marketable size on July 6.

CROP: Cabbage, Bergkabis

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché).

TITLE: Control Experiment.

NAME AND AGENCY: MORRIS, Ray F., Research Station, Canada Agriculture, St. John's West, Newfoundland.

MATERIALS: Bayer 37289 10% G. and 4 lb. E.C.; Basudin 14 G.; C8874 30 E.C.; Dasanit 10 G. and 6 lb. E.C.; Diazinon 5 G. and 50 E.C.; GC 4072 10 G. and 20 E.; NIA 10242 10G. and 50 W.P.; phorate 10 G.; Zinophos 10 G. and 4 lb. E.

METHODS: Fifteen treatments and a check, replicated four times in random block design, establsihed at St. John's on June 14. Each plot 30' row contained 20 cabbages, var. Bergkabis. Insecticide treatments (see leader table) applied around plant stems ten days after transplanting. Mortality counts taken June 21, June 28, July 4, July 13 and at harvest August 9 - 11. Overwintering puparia sifted from soil around 5 roots/plot (20/treatment). Yields obtained by harvesting all living plants/plot during period July 28 - August 3.

RESULTS: The percent control, average per cent mortality, average plot yield and average number of larvae and pupae per plant for each insecticide treatment were as follows:

Material	Dosage Rates oz. in water or oz. per row[1]	Mortality %	Control %	Plot Yield lb.[2]	Larvae & Pupae per root
Zinophos 4 lb. E.	0.39 ozs./30' row	2.5	97.0	43.0	0.8
Dasanit 6 lb. E.C.	0.26 ozs./3 qts. water	5.0	94.0	39.5	0.2
B37289 4 lb. E.C.	0.39 ozs./3 qts. water	5.0	94.0	52.0	1.2
Diazinon 50 E.C.	1.0 oz./2 gal. water	5.0	94.0	43.0	0
NIA 10242 50 W.P.	0.5 oz./2 gal. water	5.0	94.0	44.0	0
C8874 30 E.C.	0.6 oz./30' row	5.0	94.0	47.0	1.0
GC 4072 20 E.	0.78 oz./3 qts. water	15.0	83.0	29.0	0.4
Zinophos 10 G.	0.9 oz./30' row	27.5	69.0	31.0	0.6
Dasanit 10 G.	0.9 oz./30' row	32.5	64.0	29.0	0.4
Phorate 10 G.	0.9 oz./30' row	42.5	52.0	15.0	1.2
Basudin 14 G.	0.8 oz./30' row	45.0	50.0	16.0	2.8
B37289 10 G.	0.9 oz./30'row	50.0	44.0	6.0	0
Diazinon 5 G.	1.8 oz./30' row	50.0	44.0	15.0	0.4
GC 4072 10 G.	0.8 oz./30' row	52.5	42.0	12.0	0.2
NIA 10242 10 G.	0.9 oz./30' row	55.0	39.0	14.0	0.2
Check (No treatment)		90.0		1.0	3.2

[1] All drenches at 6 oz. per plant

[2] Marketable - 30' row

Zinophos 10 G. and 4 lb. E., dasanit 6 lb. E.C., B37289 4 lb. E.C., Diazinon 50 E.C., NIA 10242 50 W.P., C 8874 30 E.C., and G.C. 4072 20 E. all gave satisfactory control of root maggots on early cabbage in a heavy infestation which caused 90 % mortality in untreated control plots. The remaining treatments gave inadequate control. Average plot yield ranged from 6.0 to 52.0 lb. as compared with 1.0 for the control. The average number of larvae and pupae/root varied from 0. to 2.8 for the chemically treated plots while the untreated plots averaged 3.2/root.

CONCLUSIONS: Cyclodiene resistant strains of root maggots on early cabbage can be adequately controlled with single applications of B 37289, C 8874 30 E.C., Dasanit 6 lb. E.C., diazinon 50 E.C., GC 4072 20 E., NIA 10242 50 W.P., and Zinophos 4 lb. E., and 10 G.

RESIDUE DATA: No samples were submitted for residue analysis.

GENERAL OBSERVATIONS: Of the materials tested in the experiment, Dasanit, diazinon, GC 4072 (Birlane) and Zinophos are currently registered for use on cabbage.

CROP: Carrots, Early Nantes Half-long

PEST: Carrot rust fly, Psila rosae (Fab.)

TITLE: Chemical control of resistant strain of carrot rust fly

NAME AND AGENCY: FULTON, H.G., Entomology Sub-station, Chilliwack, and FINLAYSON, D.G., Research Station, Canada Agriculture, Vancouver, British Columbia.

MATERIALS: Dasanit, 10 G and 7 E; diazinon, 5 G and 50 E.C.; and Zinophos, 10 G and 4 E.

METHODS: In muck soil at Cloverdale, in-furrow granular applications of 0, 1, and 2 lb. of Dasanit and Zinophos and 2 lb. of diazinon per acre, were supplemented with drenches as follows:

for Dasanit or Zinophos

0 lb.	4 @ 1 lb. Dasanit or Zinophos
1 lb.	3 @ 0.5 lb. Dasanit or 4 @ 1 lb. Dasanit or Zinophos
2 lb.	3 @ 1 lb. Dasanit or 4 @ 1 lb. Dasanit or Zinophos

for diazinon

2 lb.	14 @ 10, 20, or 30 oz. toxicant per acre (i.e. 1x, 2x or 3x the recommended dosage).

Plots, sown May 1, consisted of 4 20-foot rows (2 rows for the 3 drench applications of Dasanit), 16 inches apart, replicated 3 times. Dasanit and Zinophos drenches were applied 28, 49, 70, and 91 days after seeding, the diazinon was applied weekly, starting 28 days after seeding and terminating Aug. 28 (120 days). Sampling began 90 days after sowing and continued periodically thereafter.

RESULTS: Phytotoxicity of granules in the furrow resulted in slight reduction of the numbers of seedlings. Flies were present in May and the maggots feeding on the carrot seedlings probably resulted in about 50% of the untreated plants having multiple tap roots. Examination at 90 days revealed no damage in treated carrots and only slight damage in those left untreated. At harvest, 147 days after sowing, only 4% of the untreated carrots had maggot tunnels. In the treated plots, a 2% infestation was recorded in carrots which did not receive the furrow application of Dasanit and Zinophos, and in carrots treated at the recommended rate of diazinon. Examination of roots on Nov. 2, 185 days after seeding and 66 days after the final application, showed a slight increase of damage in the untreated carrots.

CONCLUSIONS: Nil

RESIDUE DATA: Samples were taken at regular intervals after treatments and are held in frozen storage pending analyses.

GENERAL OBSERVATIONS: No reason can be advanced for the lack of infestation by second generation maggots. The season was hot and dry. Under conditions similar to this it has been reported that aestivation may occur and result in delayed emergence of flies. (R. Glendenning. 1946. The carrot rust fly, a new pest of British Columbia. Proc. Publ. #52, Div. Ent. Sci. Service, Ottawa).

CROP: Cauliflower - Early Snowball

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché) and clubroot, *Plasmodiophora brassicae* Wor.

TITLE: Compatibility of fungicides and insecticides applied to cauliflower in transplant water.

NAME AND AGENCY: FINLAYSON, D.G., Research Station, Canada Agriculture, Vancouver, British Columbia

MATERIALS: Birlane (GC 4072), 2E; Dasanit, 7E; dibasic ammonium phosphate; diazinon, 50% E; Furadan (Nia 10242), 50 W; mercuric chloride; phosphoric acid; Terraclor, 75W; and Zinophos, 4E.

METHODS: In peat and sandy loam soils, insecticides with and without combinations of fungicides and acidic or basic starter solutions, were applied in the transplant water for maggot and clubroot control. The materials were used in 50 gal. water as follows: the insecticides, Birlane, Dasanit, diazinon, Furadan, and Zinophos all at 3 oz. toxicant; the fungicides, mercuric chloride at 8 oz. and Terraclor at 3 lb. 75 W; and the starter solutions, dibasic ammonium phosphate at 3 lb. and phosphoric acid at 80 fl. oz. The dose per plant was 8 oz. of the transplant water. Every insecticide was tested alone and in combination with each fungicide with and without the starter solutions and applied at the same rate of liquid per plant. Untreated plants received 8 oz. of water. Treatments were replicated 5 times at both sites and each plot contained 10 plants. Effects were assessed by periodic counts to determine phytotoxicity, by uprooting wilted plants to determine maggot damage or wirestem, by counting the marketable and unmarketable heads, and by uprooting the plants at harvest and grading the maggot damage and incidence of clubroot. The roots were graded as follows: no damage or clubroot, 0.0; very light damage, 0.2; light, 0.4; severe, 0.6; very severe, 0.8; and complete, 1.0. Percentage damage and incidence of clubroot was calculated from the index based on 10 X 1.0 as 100 per cent.

RESULTS: Maggot damage was severe in plots where no insecticide was present. Mercuric chloride gave some protection from maggot damage, but tended to retard early growth and appeared to be incompatible with the organophosphorus (OP) insecticides, allowing more maggot damage in the roots than when OP materials were applied without the fungicide. Clubroot was more severe in the sandy loam than in the peat soil. Mercuric chloride appeared to offer better protection than Terraclor. Many plants that had clubroot and were under attack by maggots produced marketable heads if they survived the six-week period immediately after transplanting. Diazinon was the least effective insecticide and Furadan had the additional feature that its systemic properties delayed a cabbage aphid infestation in the peat soil planting until harvest.

CONCLUSIONS: Single applications of Birlane, Dasanit, Furadan or Zinophos in the transplant water protect cauliflower sufficiently from maggot attack to allow production of marketable heads. Addition of mercuric chloride for prevention of clubroot nullify the efficacy of OP compounds and retard growth immediately after planting.

RESIDUE DATA: Samples treated with insecticides and mercuric chloride are being held in frozen storage for analyses.

GENERAL OBSERVATIONS: Populations of aphids and damage by cabbage worm were negligible till harvest on plants treated with Furadan.

CULTURE: Chou, var. Golden Acre

ENNEMI: Larves des racines, *Hylemya* spp.

TITRE: Essais de répression des larves des racines (*Hylemya* spp.) du chou

NOM ET INSTITUTION: Richard, M.-A., Station de Défense des Cultures, Ste-Foy, Qué., Ministère de l'Agriculture et de la Colonisation du Québec.

INSECTICIDES: Dasanit SC, Cygon 4-E, Guthion 25 W; 2 lbs M.A. à l'acre.

METHODE: Chaque parcelle, d'une longueur de 40 pieds, contenait 41 choux; méthode des blocs avec 4 répétitions. Tous les traitements ont été faits avec un pulvérisateur de 2 gallons. Le jet a été orienté sur le centre du rang de façon à mouiller surtout le collet des plants de choux. Taux de bouillie à l'acre: 365 gallons imp.. Le premier traitement a été effectué immédiatement après la transplantation, et le second, deux semaines plus tard.

	Racines saines %	Racines légèrement attaquées %	Racines gravement attaquées %	Rendement par parcelle (lbs)
Dasanit SC	100 a	0.0	0.0	249.0
Diazinon 50 W	80 ab	13.3	6.7	231.0
Guthion 25 W	80 ab	11.6	8.4	176.0
Cygon 4-E	71.7 cd	16.6	11.7	169.5
Témoin	51.6 d	23.4	25.0	199.5

CONCLUSION: Comme nous l'indique le tableau ci-haut, le Dasanit SC permet la récolte du plus grand nombre de racines exemptes de dommages causés par la mouche des racines. Les autres insecticides ont donné également des résultats très satisfaisants dans la répression de cet insecte. Il n'existe aucune différence significative entre les rendements de chaque parcelle, lors de la récolte.

CULTURE: Choux, variété Golden Acre.

ENNEMI: Larves des racines, *Hylemya* spp.

TITRE: Essais de traitements sur les choux contre les larves des racines, *Hylemya* spp.

NOM ET INSTITUTION: RITCHOT, C., Institut de Technologie Agricole, St-Hyacinthe, Qué.

MATERIAUX: Les quantités indiquées représentent les livres de matière active à l'acre.
Aldrine 40% E.C. 2 lb.; Bayer 37289 4 S.C. 1 lb. et 2 lb.; Birlane 10% G. 1 lb., 25% W.P. 3/4 lb. et 1 lb., 2 E.C. 1 lb. et 2 lb.; Dasanit 10% G. 2 lb., 6.5 S.C. 1 lb. et 2 lb.; Diazinon 5% G. 2 lb., 50% W.P. 1 lb. et 2 lb.; Dyfonate 10% G. 1 lb., 4 E.C. 1 lb. et 2 lb.; Guthion 25% W.P. 1 lb. et 2 lb.; NIA-10242 10% G. 2 lb., 50% W.P. 1 lb. et 2 lb.; Zinophos 10% G. 2 lb., 4 E.C. 1 lb. et 2 lb.

METHODES: Cette expérience a été réalisée à la Station Provinciale de Recherches de l'Assomption, Qué. Les parcelles, constituées chacune d'un rang de 41 choux, ont été distribuées d'après la méthode des blocs (randomized blocks), avec 4 répétitions. Des applicateurs spéciaux, fournis par les Compagnies Shell et Fisons, servirent à épandre les insecticides granulés autour du collet des plants, au moment de la transplantation, le 8 juin. Les traitements dans l'eau du plantoir ont été effectués à la même date. Les traitements de surface ont été appliqués le 19 juin, et consistaient à pulvériser 32 on. de bouillie insecticide par parcelle sur une bande de 4 po. de largeur. Du 6 au 11 juillet, 15 choux ont été prélevés par parcelle et subdivisés en 3 catégories: sains, faiblement attaqués et très attaqués.

RESULTATS:

Insecticides	Mode de traitement	Dose (lb M.A./acre)	Plantes saines	Plantes faiblement attaquées	Plantes très attaquées
Guthion 25% W.P.	Plantoir	1	54	6	0 a
NIA-10242 10% G.	Collet	2	55	5	0 a
NIA-10242 50% W.P.	Plantoir	2	50	10	0 a
Dyfonate 4 E.C.	Plantoir	2	54	6	0 a
Birlane 25% W.P.	Plantoir	1	51	9	0 a
Birlane 25% W.P.	Plantoir	3/4	54	6	0 a
Birlane 10% G.	Collet	1	56	4	0 a
Bayer 37289 4 S.C.	Plantoir	1	53	7	0 a
Bayer 37289 4 S.C.	Plantoir	2	53	7	0 a
Diazinon 50% W.P.	Plantoir	1	56	4	0 a
Diazinon 50% W.P.	Plantoir	2	54	6	0 a
Dasanit 6.5 S.C.	Plantoir	1	51	9	0 a
Dasanit 6.5 S.C.	Plantoir	2	41	19	0 a
Dasanit 10% G.	Collet	2	51	9	0 a
Diazinon 5% G.	Collet	2	40	19	1 a
Dyfonate 10% G.	Collet	1	46	13	1 a
NIA-10242 50% W.P.	Plantoir	1	47	11	2 a
NIA-10242 50% W.P.	Surface	2	53	5	2 a
Guthion 25% W.P.	Plantoir	2	43	14	3 a
Bayer 37289 4 S.C.	Surface	1	44	13	3 a
Zinophos 10% G.	Collet	2	49	7	4 ab
Dasanit 6.5 S.C.	Surface	2	38	17	5 abc
NIA-10242 50% W.P.	Surface	1	34	21	5 abc
Dyfonate 4 E.C.	Plantoir	1	42	12	6 abc
Bayer 37289 10% G.	Collet	2	37	17	6 abc
Zinophos 4 E.C.	Surface	2	40	14	6 abc
Dasanit 6.5 S.C.	Surface	1	30	22	8 abcd
Birlane 2 E.C.	Surface	1	27	21	12 abcde
Aldrine 40% E.C.	Plantoir	2	33	14	13 abcde
Birlane 2 E.C.	Surface	2	28	19	13 abcde
Zinophos 4 E.C.	Surface	1	21	23	16 bcdef
Diazinon 50% W.P.	Surface	1	16	27	17 cdef
Bayer 37289 4 S.C.	Surface	2	21	20	19 def
Diazinon 50% W.P.	Surface	2	27	13	20 def
Dyfonate 4 E.C.	Surface	2	24	14	22 ef
Témoin	—	-	20	17	23 ef
Dyfonate 4 E.C.	Surface	1	19	14	27 f

<u>CONCLUSIONS</u>: Cette année, la faible intensité de l'attaque des larves des racines dans les parcelles de choux réduisit les possibilités de comparaisons entre les insecticides ou les traitements. Toutefois, d'après les résultats obtenus, il semble que les traitements dans l'eau du plantoir et l'application de granulés autour du collet des plants ont une tendance à l'emporter sur les traitements de surface (drenchings). Quant aux insecticides essayés, ils semblent tous d'une égale efficacité contre les larves des racines des choux. Même l'Aldrine eut un effet significatif contre ces insectes.

<u>DONNEES SUR LES RESIDUS</u>: nil

<u>OBSERVATIONS GENERALES</u>: nil

<u>CULTURE</u>: Choux-fleurs, variété Early Snowball.

<u>ENNEMI</u>: Larves des racines, <u>Hylemya</u> spp.

<u>TITRE</u>: Essais de traitements sur les choux-fleurs contre les larves des racines, <u>Hylemya</u> spp.

<u>NOM ET INSTITUTION</u>: RITCHOT, C., Institut de Technologie Agricole, St-Hyacinthe, Qué.

<u>MATERIAUX</u>: Aldrine 40% E.C.; Bayer 37289 4 S.C.; Birlane 2 E.C.; Dasanit 6.5 S.C.; Diazinon 50% W.P.; Guthion 25% W.P.

<u>METHODES</u>: Cette expérience a été réalisée à la Station Provinciale de Recherches de l'Assomption, Qué. Les parcelles, constituées chacune d'un rang de 41 plants, ont été établies d'après la méthode des blocs (randomized blocks), avec 4 répétitions. Seuls des traitements dans l'eau du plantoir ont été effectués au moment de la transplantation, le 12 juin, à raison de 2 lb. de matière active à l'acre. Le 13 juillet, 15 choux-fleurs ont été prélevés par parcelle et subdivisés en 3 catégories, selon le degré des dommages causés à leurs racines: sains, faiblement attaqués et très attaqués.

<u>RESULTATS</u>:

Insecticides	Plantes saines	Plantes faiblement attaquées	Plantes très attaquées
Birlane 2 E.C.	55	4	1 a
Bayer 37289 4 S.C.	39	12	9 ab
Diazinon 50% W.P.	29	20	11 ab
Dasanit 6.5 S.C.	29	18	13 ab
Guthion 25% W.P.	25	16	19 b
Aldrine 40% E.C.	2	20	38 c
Témoin	7	14	39 c

CONCLUSIONS: Tous les insecticides essayés sauf l'Aldrine ont réduit significativement les dommages aux racines des choux-fleurs. De plus, le Birlane tend ici à surclasser les autres produits.

DONNEES SUR LES RESIDUS: nil

OBSERVATIONS GENERALES: nil

CROP: Field corn Pioneer 383

PEST: Wireworm, *Agriotes obscurus* L.

TITLE: Chemical control of wireworms in British Columbia.

NAME AND AGENCY: WILKINSON, A.T.S., Research Station, Canada Agriculture, Vancouver 8, B.C.

MATERIALS: Dyfonate 4E., Bay 37289 10% G., Furadan (Nia 10242) 10% G., N2790 10% G., Parathion 10G.

METHODS: Two methods of treatment were used; broadcast and furrow: Broadcast: The insecticide was broadcast evenly over the surface at 4 lb toxicant per acre and worked into the top 3-4 inches of soil immediately with a rotovator and disks. Corn was planted May 1 and the plants were harvested and weighed Sept. 6. Plant counts were made June 9 and Sept. 6. The counts and weights were made from two 5-meter (16.4 ft) rows in each plot. Each treatment was replicated 5 times. The corn was planted by a commercial operator May 1. Furrow: The insecticide was applied at 1 oz toxicant per 1000 ft of row in the furrow with the seed in single row plots on May 9 using a rod-row seeder. Each treatment was replicated 4 times. Plant counts were made in 5-meter rows on June 9 and Sept. 7. Weights were taken Sept. 7. The soil will be sifted in spring 1968 to determine wireworm kill.

RESULTS:

Broadcast

Av no and wt per 5 m row

Treatment	Seedlings June 9	Plants Sept.6	Wt Sept.6
Parathion	20.9	18.9	51.8
Bay 37289	20.8	7.4	20.2
Furadan	20.0	13.5	44.1
N2790	22.3	18.7	49.4
Dyfonate	21.5	17.4	49.0
Check	19.1	1.2	2.3

Furrow

Av no and wt per 5 m row

Treatment	Seedlings June 9	Plants Sept.7	Wt Sept.7
Parathion	36.7	31.5	48.3
Bay 37289	33.0	30.5	52.4
Furadan	32.7	34.8	63.3
N2790	34.7	33.3	58.3
Check	31.0	6.6	11.8

CONCLUSIONS: All treatments in the furrow and all but the broadcast treatment of Bayer 37289 gave good protection to the corn. There was no apparent phytotoxicity.

RESIDUE: Nil.

GENERAL OBSERVATIONS: Based on 20 cores 5 inches in diameter, 6 inches deep, taken at random over the ¼ acre plot field, the population of *A. obscurus* was calculated to be 26.6 per sq ft.

PROJECT NO: HB/67-FC-1E

CROP: Field corn, Warwick 401

PEST: Northern corn rootworm, *Diabrotica longicornis* (Say)

TITLE: Control of Northern Corn Rootworm

NAME AND AGENCY: PREE, D.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario

MATERIALS: Phorate 10G, Baygon 5G, Bayer 25141 10G, Niagara 10242 10G, Buxten 10G, diazinon 14G, 4072 10G, chlordane 25G, N-2790 10G, disulfoton 10G, carbaryl 20G, aldrin 5G.

METHODS: Two sites, 18 treatments, randomized block, 4 replications. Plots 3 rows 20 ft. long. Site No. 1, R.R. #3, Kerwood - row width 38 inches, Site No. 2, R.R. #4, Aylmer - row width 36 inches. Planted May 16, May 24 respectively. Insecticides applied at planting in 6 inch band over seed furrow, incorporated, using Ford Unit Planter. Thinned to 25 plants per 20 ft. row June 20, 1967. Rows reduced to 18 ft. September 14. Examined for goosenecking, lodging September 15. Harvest centre row October 5, 6, 1967.

RESULTS: Site No. 1, Farm of Kenneth Patterson, R.R. #3, Kerwood

Materials	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[2]
Aldrin 5G	1	0a	91.8
Disulfoton 10G	1/2	7.6a	72.3
Disulfoton 10G	1	1.1a	82.3
Baygon 5G	1	0a	81.4
Buxten 10G	1	0a	81.4
4072 10G	3/4	9.8a	81.4
4072 10G	1	5.4a	82.3
Chlordane 25G	2	0	82.3
Diazinon 14G	1	10.9a	79.6
Niagara 10242 10G	1	2.3a	76.8
Phorate 10G	1/2	4.4a	75.0
Phorate 10G	1	0a	76.8
Bayer 25141 10G	1	3.8a	71.4
N-2790 10G	1/2	10.9a	70.4
N-2790 10G	1	6.5a	70.4
Carbaryl 20G	1 1/2	34.8b	64.0
Carbaryl 20G	2	26.1b	71.4
Untreated	-	28.3b	68.6

1. Figures followed by the same letter not significantly different at 5% level (Duncan's Multiple Range Test).

2. No significant difference between figures at 5% level.

Site No. 2, Farm of Murray Laidlaw, R.R. #4, Aylmer.

Materials	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[2]
Aldrin 5G	1	.3	114.3a
Niagara 10242 10G	1	.8	110.7ab
N-2790 10G	1/2	1.0	103.4abc
N-2790 10G	1	0	101.5abc
Disulfoton 10G	1/2	1.3	102.5abc
Disulfoton 10G	1	0.3	87.8cd
4072 10G	3/4	0.3	96.0bc
4072 10G	1	0.5	103.4abc
Baygon 10G	1	1.5	101.5abc
Buxten 10G	1	0.5	100.6abc
Phorate 10G	1/2	0.3	85.0cd
Phorate 10G	1	1.0	95.1bc
Diazinon 14G	1	0.3	94.2bc
Chlordane 25G	2	1.0	94.2bc
Bayer 25141 10G	1	0.5	79.7d
Carbaryl 20G	1 1/2	2.5	70.4d
Carbaryl 20G	2	2.5	73.2d
Untreated		2.5	82.3cd

1. No significant difference between figures (ANOV 5% level).

2. Figures followed by same letter not significantly different at 5% level (Duncan's Multiple Range Test).

OBSERVATIONS: Site No. 1 - Populations of Northern Corn Rootworms had been allowed to increase without treatment for 5 years. In 1967 (based on samples of 100 ears) populations averaged 26.6 beetles per ear in mid-August. Pollination was almost completed at this time and little adult-feeding damage was apparent.

Site No. 2 - No treatment over 4 years of continuous corn. Samples of 100 ears in mid-August showed an average of 10.0 beetles per ear.

RESIDUE DATA: Samples of N-2790 have been collected from Site No. 1 and have been forwarded to the company for analysis. No reports to date.

CONCLUSIONS: Data from Site No. 1 shows that all compounds except carbaryl significantly reduced the numbers of plants goosenecked or lodged. Goosenecking and lodging was slight at Site No. 2 but data show that yields can be significantly reduced without visibly affecting stalks. Yield data from both sites indicate that aldrin gave best control of Northern Corn Rootworm. All other compounds, with the exception of carbaryl and Bayer 25141 (in Site No. 2) gave some yield increases when compared to the check.

PROJECT NO: HB/67-FC-2E

CROP: Field corn, Warwick 401

PEST: Northern corn rootworm, *Diabrotica longicornis* (Say)

TITLE: Control of northern corn rootworm using liquid insecticides

NAME AND AGENCY: PREE, D.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario

MATERIALS: Disulfoton 6 lb. per U.S. gal., Baygon 50 W.P., diazinon 5 lb. per Imp. gal., diazinon 50 W.P., 4072 2 lb. per Imp. gal. N-2790 4 lb. per U.S. gal., phorate 6 lb. per U.S. gal.

METHODS: Eleven treatments, randomized block, 4 replications. Plots 3 rows, 20 ft. long. Farm of Kenneth Patterson, R.R. #3, Kerwood - row width 38 inches. Planted May 16 using Ford Unit Planter. Materials applied May 17 in 6 inch band over seed furrow in 30 gal.

water per acre using Oxford Precision sprayer at 40 lb. pressure. Raked in. Thinned to 25 plants per 20 ft. row June 20, 1967. Rows reduced to 18 ft. September 14. Examined for goosenecking, lodging September 15. Harvest centre row October 5, 1967.

RESULTS:

Materials	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[1]
N-2790 4 lb./U.S. gal.	1/2	10.9	128.3
N-2790 4 lb./U.S. gal.	1	2.2	136.3
Bayer 25141 6 lb./U.S. gal.	1	9.8	119.8
Disulfoton 6 lb./U.S. gal.	1	2.2	115.3
Baygon 50WP	1	3.3	110.7
4072 2 lb./Imp. gal.	3/4	8.7	109.8
4072 2 lb./Imp. gal.	1	8.7	108.9
Diazinon 5 lb./Imp. gal.	1	8.7	104.3
Diazinon 50 WP	1	8.7	97.9
Phorate 6 lb./U.S. gal.	1	6.5	99.7
Untreated		20.7	128.1

[1]No significant difference between figures (ANOV 5% level).

OBSERVATIONS: Populations of Northern Corn Rootworm (based on sample of 100 ears) averaged 12.6 beetles per ear in mid-August.

RESIDUE DATA: Nil

CONCLUSIONS: Nil

PROJECT NO: FC/67-3E

CROP: Field corn, Pioneer 388

PEST: Northern corn rootworm, *Diabrotica longicornis* (Say)

TITLE: Control of Northern Corn Rootworm Using Liquid Insecticides

NAME AND AGENCY: PREE, D.J., and HOSTE, E.O.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario

MATERIALS: Bayer 25141 6 lb. per U.S. gal., diazinon 5 lb. per Imp. gal., diazinon 50 W.P., Baygon 50 W.P., N-2790 4 lb. per U.S. gal., 4072 2 lb. per Imp. gal., disulfoton 6 lb. per U.S. gal., aldrin

METHODS: Eleven treatments, 4 replications, randomized block. Plots 3 rows 20 ft. long. Farm of Mr. Patrick Waite, R.R. #1, Wallacetown - row width 38 inches. Corn planted by cooperator May 22. Insecticides applied in 6 inch band in 30 gal. water per acre over seed furrow May 26, using Oxford Precision sprayer at 40 lb. pressure. Thinned to 25 plants per 20 ft. row June 19, 1967. Rows reduced to 18 ft. September 16. Examined for goosenecking, lodging, September 16. Harvest centre row October 6, 1967.

RESULTS:

Materials	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[1]
Aldrin 4 lb./Imp. gal.	1	0	112.5
Baygon 50WP	1	3.3	107.9
Bayer 25141 6 lb./U.S. gal.	1	3.3	103.4
4072 2 lb./Imp. gal.	3/4	1.1	96.0
4072 2 lb./Imp. gal.	1	1.1	103.4
Diazinon 50 WP	1	5.4	103.4
Diazinon 5 lb./Imp. gal.	1	5.4	99.7
N-2790 4 lb./U.S. gal.	1/2	5.4	97.9
N-2790 4 lb./U.S. gal.	1	6.5	101.5
Disulfoton 6 lb./U.S. gal.	1	2.2	90.6
Untreated		12.0	97.0

[1]No significant difference between figures (ANOV 5% level).

OBSERVATIONS: Populations of Northern Corn Rootworm adults averaged (based on samples of 100 ears) 4.3 beetles per ear in mid-August.

RESIDUE DATA: Nil

CONCLUSIONS: All materials treated gave some reduction in the percentage of plants showing goosenecking and lodging. Plots treated with aldrin gave best yields. These differences were not statistically significant.

PROJECT NO: HB/67-FC-3E

CROP: Field corn, Warwick 401

PEST: Northern corn rootworm, *Diabrotica longicornis* (Say)

TITLE: Control of Northern Corn Rootworm

NAME AND AGENCY: PREE, D.J., and HOSTE, E.O.J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario

MATERIALS: Phorate 10G, Baygon 5G, Bayer 25141 10G, Niagara 10242 10G, Buxten 10G, diazinon 14G, 4072 10G, chlordane 25G, N-2790 10G, disulfoton 10G, carbaryl 20G, aldrin 5G.

METHODS: Two sites, 18 treatments, randomized block, 4 replications. Plots 3 rows 20 ft. long. Site No. 1 - W.O.A.S., Ridgetown - row width 38 inches. Site No. 2 - R.R. #6, Dresden - row width 36 inches. Planted May 19 and May 23 respectively. Insecticides applied at planting in 6 inch band over seed furrow, incorporated, using Ford Unit Planter. Thinned to 25 plants per 20 ft. row June 20, 1967. Rows reduced to 18 ft. September 12. Examined for goosenecking, lodging September 15. Harvest centre row October 3, 4, 1967.

RESULTS: Site No. 1, W.O.A.S., Ridgetown, Ontario.

Treatment	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[1]
Bayer 25141 10G	1	3.3	182.0
Phorate 10G	1/2	3.3	164.7
Phorate 10G	1	1.1	179.3
Diazinon 14G	1	1.1	175.6
Aldrin 5G	1	1.1	174.7
Niagara 10242 10G	1	2.2	174.7
4072	3/4	0	173.8
4072	1	2.2	163.7
Carbaryl 20G	1	1.1	172.0
Carbaryl 20G	1 1/2	7.6	172.8
Baygon 5G	1	5.4	167.4
Chlordane 25G	2	5.4	166.5
Disulfoton 10G	1/2	0	162.8
Disulfoton 10G	1	1.1	166.5
N-2790 10G	1/2	0	162.8
N-2790 10G	1	3.3	154.6
Buxten 10G	1	2.2	155.5
Untreated		3.3	167.4

[1]No significant difference between figures at 5% level (ANOV).

Site No. 2, Farm of Gordon Brooksbank, R.R. #6, Dresden.

Treatment	Pounds Active/Acre	% Goosenecking and Lodging[1]	Yield Bu/Acre 15.5% Moisture[1]
Niagara 10242 10G	1	0	137.2
4072 10G	3/4	0	128.1
4072 10G	1	1.1	136.3
Carbaryl 20G	1	0	129.0
Carbaryl 20G	1 1/2	3.3	133.6
Disulfoton 10G	1/2	3.3	130.8
Disulfoton 10G	1	1.1	127.1
N-2790 10G	1/2	3.3	127.1
N-2790 10G	1	3.3	129.0
Buxten 10G	1	3.3	128.1
Aldrin 5G	1	4.3	127.1
Chlordane 25G	2	2.2	121.7
Baygon 5G	1	0	118.0
Bayer 25141 10G	1	3.3	118.0
Phorate 10G	1/2	2.2	112.5
Phorate 10G	1	0	118.0
Diazinon 14G	1	1.1	115.3
Untreated		4.3	118.9

[1]No significant difference between figures at 5% level (ANOV).

OBSERVATIONS: Site No. 1. Corn had been grown continuously on this site without treatment for three years previous to 1967. Populations of adult Northern Corn Rootworms (based on samples of 100 ears) averaged 0.5 beetles per ear in mid-August.

Site No. 2. Corn had been grown continuously on this site without treatment for four years previous to this experiment. Based on samples of 100 ears, adult Northern Corn Rootworm beetles averaged 1.0 beetles per ear in mid-August.

None of the chemicals tested appeared phytotoxic to corn plants.

RESIDUE DATA: Nil

CONCLUSIONS: Light infestations of Northern Corn Rootworm do not significantly reduce corn yields. Populations of Northern Corn Rootworms do not necessarily reach levels at which significant yield reductions occur after four or five years of continuous corn.

PROJECT NO: HB/67-PBI-E

CROP: Field corn, Warwick 401

PEST: *Glisrochilus quadrisignatus* (Say)

TITLE: Screening Bait Materials in the Control of *Glisrochilus quadrisignatus*.

NAME AND AGENCY: PREE, D.J. and HOSTE, E.O.J., Western Ontario Agricultural School, Ridgetown, Ontario.

MATERIALS: Endosulfan 50 W.P., Bait materials (see results below).

METHODS: All materials mixed in Waring Blendor with endosulfan 50 W.P. at the rate of 1% by weight. Thirty c.c. of tap water added per 100 grams of silage and bread mixtures. One hundred grams of each mixture placed in 6 inch aluminium pie plates, covered by a second plate having perforations at the edges to facilitate entrance by beetles. Plates placed 50 ft. apart at the edge of corn field August 1, 1967. Results August 8 by count of dead or moribund beetles in and around plate.

RESULTS:

Material		No. Beetles Killed
Immature sweet corn + 1% Thiodan		5,312
(including cob)	"	
Banana	"	2,972
Sour cherries	"	2,104
(overripe)		
Raspberries	"	1,488
(overripe)		
Bread	"	610
Peaches	"	412
Cherry pits	"	97
Tomatoes (ripe)	"	45
Apple	"	40
Corn stalk leaf	"	7
Silage	"	0

OBSERVATIONS: Most baits were still moist and attracting beetles at the end of one week. The bait containing tomatoes had apparently soured and this odour appeared unattractive to beetles. Baits containing corn stalks and silage had dried up and had no noticeable odour. Other more attractive baits appeared to be fermenting or rotting and were quite odourous.

CONCLUSIONS: Large numbers of *Glisrochilus quadrisignatus* (Say) beetles are attracted to baits. Unripened sweet corn and ripe bananas appear to be the most attractive of the materials tested and show most promise if baits are to be used to control these insects.

CROP: Sweet corn, var. Seneca 60, Seneca Chief

PEST: European corn borer *Ostrinia nubilalis* (Hübner)

TITLE OF PROJECT: Timing insecticide applications to control European corn borer on sweet corn in southwestern Quebec.

NAME OF CONTRIBUTOR AND HIS AGENCY: HUDON, M., Research Station, Canada Agriculture, St. Jean, Que.

MATERIALS: DDT 25% E.C. 1.5 lb./a.

METHODS: Plots received two applications at weekly intervals except for the criterion '15 days after the beginning of egg laying' on which only one application was made. Treatments applied with Hardie tractor-drawn sprayer with two Tee Jet nozzles (No. D3-23)/row, one over the row, the other between, at 45 gal./a. and 125 p.s.i.; three replications of each treatment used. Plots, planted May 23, .023 a., eight rows 3' apart and 45' long. Sampled 25 random plants/plot dissected at harvest; number of plants and ears infested and borers/ plant and /ear recorded.

RESULTS: See Table 1

CONCLUSIONS: Based on the percent marketable ears, all treatments were significantly better than the check at the 1% level in the late variety and were highly effective in giving over 93% marketable ears. For the early variety, all treatments were significantly better than the check at the 5% level, except the criteria 5, 10 and 15 days after the beginning of egg laying; from the practical viewpoint, only 3 criteria in the early variety gave good commercial control: 15 days after the accumulation of 525 borer degree-days, 5 days after the accumulation of 700 borer degree-days and the fixed date July 15.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Corn borer infestation in study plots in 1967 was very severe for both varieties and all treatments did reduce substantially the borer populations in the plants.

Table 1

Treatments	Percent infested plants	Percent infested ears*	Borers per 100 plants*	Percent borer reduction**
Early Seneca 60				
5 days after 700 borer degree-days	8.0	4.0a	8.0a	93.6
15 days after 525 borer degree-days	9.3	5.3a	8.0a	93.6
On July 15	12.0	5.3a	14.7a	88.3
On July 10	9.3	8.0ab	21.3a	83.
At 800 borer degree-days	12.0	10.4ab	13.3a	89.4
15 days after 1st moths	13.3	12.0ab	13.3a	89.4
5 days after 1st eggs	16.0	13.0abc	22.7a	81.9
35 days after 1st pupae	25.3	13.0ab	32.0a	74.5
15 days after 1st eggs	30.7	19.0abc	49.3a	60.6
10 days after 1st eggs	33.3	26.6 bc	56.0a	55.3
Check	56.0	35.1 c	125.3 b	-
Late Seneca Chief				
10 days after 1st eggs	18.6	1.7a	20.0a	89.6
15 days after 525 borer degree-days	17.3	1.9a	16.0a	91.7
On July 15	9.3	2.4a	17.3a	91.
15 days after 1st moths	18.7	2.5a	20.0a	89.6
5 days after 1st eggs	20.0	2.6a	18.7a	90.3
On July 10	29.3	4.9a	32.0a	83.4
At 800 borer degree-days	20.0	5.2a	25.3a	86.9
35 days after 1st pupae	20.0	5.5a	22.7a	88.3
5 days after 700 borer degree-days	16.0	6.5a	25.3a	86.9
15 days after 1st eggs	24.0	6.7a	26.7a	86.2
Check	81.3	34.9 b	193.3 b	-

*Means flanked by the same letter are not significantly different at the 5% level (Duncan's multiple range test).
**Calculated by the method of Abbott.

CROP: Sweet corn, var. Seneca 60 and Seneca Chief.

PEST: European corn borer *Ostrinia nubilalis* (Hübner)

TITLE OF PROJECT: Number of insecticide applications to control European corn borer on sweet corn in southwestern Quebec.

NAME OF CONTRIBUTOR AND HIS AGENCY: HUDON, M., Research Station, C.D.A., St. Jean, Que.

MATERIALS: Amounts/a. - DDT 25% E.C. 1½ lb.; carbaryl 85% W.P. 1½ lb.

METHODS: Plots planted May 23 received one, two and three applications respectively (July 14, 21, 28); first application 5 days after beginning of egg laying except for single application, made 15 days (July 24) after first eggs found. Treatments applied with Hardie tractor-drawn sprayer with two Tee Jet nozzles (No. D3-23)/row, one over the row, the other between for wetting the lower leaves; treatment 45 gal./a. at 125 p.s.i.; three replications of each treatment. Plots .023 a., eight rows 3' apart and 45' long. Sampled 25 random plants/plot dissected at harvest; number of plants and ears infested and borers/plant and/ ear recorded.

RESULTS:

Treatments and number applications	Percent infested plants	Percent infested ears*	Borers per 100 plants*	Percent borer reduction**
Early Seneca 60 -				
2 DDT	16.0	7.6a	24.0a	87.2
3 DDT	18.6	10.8ab	29.3a	84.4
3 carbaryl	22.6	11.1ab	45.3ab	75.9
2 carbaryl	34.6	20.5 bc	61.3ab	67.4
1 carbaryl	56.0	24.4 bc	94.7 b	49.6
1 DDT	81.3	25.0 c	73.3ab	61.0
Check	64.0	39.2 d	188.0 c	-
Late Seneca Chief -				
2 DDT	14.7	4.7	17.3a	91.5
1 DDT	22.6	5.0	28.0a	86.3
3 carbaryl	18.6	6.7	36.0a	82.3
3 DDT	24.0	7.8	24.0a	88.2
1 carbaryl	48.0	11.5	89.3a	56.2
2 carbaryl	42.7	12.7	69.3a	66.0
Check	81.3	34.0 n.s.	204.0 b	-

*Means flanked by the same letter are not significantly different at the 5% level (Duncan's multiple range test).
**Calculated by the method of Abbott.

CONCLUSIONS: Based on the percent marketable ears, all treatments were significantly better than the check at the 1% level in the early variety, although economic control was obtained only with the treatment 2 DDT. For the late variety and based on the percent marketable ears, none of the treatments were statistically significant from the check, but all treatments, except 1 or 2 carbaryl applications, did give economic control. For both varieties and based on the number of borers per 100 plants, all treatments were significantly better than the check at the 1% level. Little relation was revealed, however, in both varieties, between the number of insecticidal applications and the percentage of marketable ears.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: For both varieties, corn borer infestation in study plots in 1967 was very severe, DDT was slightly superior to carbaryl and all treatments did reduce substantially the borer population in the plants.

CROP: Onion Sets

PEST: Onion Maggot, *Hylemya antiqua* (Meigen)

TITLE: Tests on seed-dressings for onion maggot control.

NAME AND AGENCIES: ALLEN, W. R., Research Station, Canada Agriculture, Winnipeg, Manitoba and M. A. ASHRAFF, Green Cross Products, Winnipeg, Manitoba.

MATERIALS: Seed dressings were as follows:
Bromophos 15%, plus Captan 30%, applied at 5 oz. per lb. of seed; Diazinon 25% plus Captan 5%, applied at 4 oz. per lb. of seed. Dasanit 10% G. 20 lb., applied to seed furrow.

METHODS: Plots were seeded with field equipment, supplied with Planet Jr. seed boxes and granules were applied directly to the furrow from a Gandy applicator. Treated plots consisted of 2 rows - 560 feet long. Row spacing was 14 in.; treatments were duplicated. The untreated plot consisted of 150 feet of row. Seedling stands were evaluated by staking out 6 to 8, 100 in. lengths of row. The number of inches that contained seedlings were recorded June 29th and July 4th.

RESULTS:

	Rate Applied		Seedling Stand	
Insecticide	oz./lb. of seed	lb./A	June 29	July 4
Dasanit		2.0 (40)[1]	94.2	94.4
Bromophos	5.0	1.1 (25)	93.4	94.4
Diazinon	4.0	1.4 (22)	87.6	86.0
Untreated		- (40)	44.4	12.5

[1] Pound of seed applied per acre.

CONCLUSIONS: Seed treatments used in this test were not suitable for controlling the onion maggot when onions are grown for set production. The formulations prevented flow of the seed, caused bridging in the seeder and reduced the seeding rate by 40%. This resulted in thin stands which produced oversized sets. The untreated plot was virtually destroyed by the onion maggot. Dasanit granules gave effective control.

RESIDUE DATA: Onions treated with Bromophos were collected in the green onion stage and at harvest and submitted for residue analysis.

GENERAL OBSERVATIONS: The seed treatment formulations may be suitable for treating small batches of seed for home and garden use.

CROP: Onion, var. Autumn Spice.

PEST: Onion maggot, *Hylemya antiqua* (Meigen).

TITLE: Control of the onion maggot in organic soils of Quebec.

NAME AND AGENCY: PERRON, J.P. and TOUPIN, P., Research Station, Canada Agriculture, St. Jean, Quebec.

MATERIALS: A.- Seed treatment - diazinon 50% W.P.; dieldrin 50% W.P.; NIA 10242 Seed Treater; Chipman I-F Seed Treater; and Drillbox onion maggot powder (Green Cross Product), last two products containing diazinon and captan.

B.- Furrow granular treatment - diazinon 5% G.; Bay 25141 10% G. (Dasanit); BAY 37289 10% G.; NIA 10242 10% G.; Zinophos 10% G.; N-2790 (Dyfonate) 5% G.; and aldrin 5% G.

METHODS: Tests conducted in two separate fields, one for seed treatment including 20 treatments and the other for granular furrow treatments including 17 treatments. Plots in each field consisted of two 15' rows, 17" apart, replicated four times. As seed treatment, diazinon, dieldrin, NIA 10242 and the commercial preparations were used at one ounce toxicant per pound of seed with and without adhesive carrier, and seed was treated at 2 various dates. As granular furrow treatment, BAY 37289, BAY 25141 (Dasanit), N-2790 (Dyfonate), Zinophos, NIA 10242 and aldrin were applied at the rate of 2 lb. of toxicant per acre with the seed in the furrow with and without a fungicide.

RESULTS: (See Tables 1 and 2).

CONCLUSIONS: It appears evident that seed treatment including a fungicide (Thiram or Captan), and an adhesive carrier permitting a dry mixing of the seed with the insecticide-fungicide mixture, and also when the treatment is done some three weeks before seeding, would be the most effective and economical method of control of *H. antiqua* for Quebec type of muck soils.

Table 1.- Effects of various seed treatments with Diazinon, Dieldrin including commercial preparations on the control of *H. antiqua* (Meig.) Ste-Clotilde, Quebec, 1967.

Insecticide	Fungicide T[1]	Fungicide C[2]	Fungicide S[3]	Adhesive Carrier	Water	Time Seed treated 3 W.B.S.[4]	Time Seed treated D.S.[5]	% plants killed by maggot	% injured bulbs	Weight in pounds per 120' row
Diazinon 50W	X			X		X		0.07	3.3	194.0
Diazinon 50W	X				X		X	0.28	3.5	191.0
Diazinon 50W		X			X	X		0.40	3.3	195.5
Diazinon 50W		X			X		X	0.42	4.5	183.5
Diazinon 50W			X		X		X	0.64	4.3	173.5
Diazinon 50W	X			X			X	1.00	3.8	195.0
S.T. 10242	X				X	X		1.04	7.5	182.5
Diazinon 50W		X		X		X		1.05	3.6	194.5
Diazinon 50W		X		X			X	1.12	4.0	195.5
Diazinon 50W	X				X	X		1.55	4.7	192.5
S.T. 10242	X				X		X	1.61	5.8	194.5
1-F Chipman		X			X	X		1.91	5.2	193.0
D.S.T. Green Cross		X		X		X		2.30	6.1	186.5
D.S.T. Green Cross		X		X			X	2.36	4.8	193.0
1-F Chipman		X			X		X	4.09	7.4	164.5
Check	X			X			X	34.67	20.5	105.5
Check								35.64	18.4	126.0
Check				X			X	39.90	21.1	114.0
Check	X				X		X	51.30	24.7	91.5
Dieldrin 50W	X			X			X	70.81	41.1	84.0

L.S.D. 5% = 23.28
L.S.D. 1% = 27.05

[1]T = Thiram
[2]C = Captan
[3]S = Systemic D-735 75W
[4]W.B.S. = 3 weeks before seeding
[5]D.S. = Date of seeding
Note: All treatments applied at 1 oz. tox./pound of seed.

Table 2.- Effects of various granular organophosphate and carbamate compounds applied at two pounds toxicant per acre with and without fungicide. Ste-Clotilde, Quebec, 1967.

Insecticide	Fungicide	No fungicide	% plants killed	% injured bulbs	Weight in pounds per 120' row (marketable bulbs)
Dyfonate 5% G	X		1.49	4.6	185.0
Bayer 37289 10% G	X		2.39	4.8	193.5
Bayer 37289 10% G		X	2.44	8.5	187.0
Zinophos 10% G		X	2.62	8.8	174.5
Dasanit 10% G		X	2.66	6.5	172.0
Dyfonate 5% G		X	2.96	3.9	195.0
Diazinon 5% G	X		3.09	7.0	182.5
Diazinon 5% G	Syst(D-735)		3.15	7.7	188.5
NIA 10242 10% G		X	4.31	12.5	186.0
Dasanit 10% G	X		4.60	6.8	190.5
Diazinon 5% G		X	5.12	10.2	180.5
NIA 10242 10% G	X		6.42	10.6	174.0
Zinophos 10% G	X		10.35	16.5	177.0
Check	X		47.89	37.4	87.5
Check		X	49.24	26.0	90.0
Aldrin 5% G		X	63.76	54.5	52.5
Aldrin 5% G	X		76.90	57.9	24.0

L.S.D. 5% = 10.14
L.S.D. 1% = 11.72

These requirements are particularly needed especially when soil moisture conditions are low during the germination period, low temperature being second in importance. As indicated in Table 1, all seed treatments were found effective but the one containing the systemic fungicide D-735 75W was phytotoxic to seed germination and gave a lower yield than most of the other treatments.

The furrow granular treatment proved again to be less effective against the pest (Table 2) giving also a lower yield than the seed treatment. Treating the seed with a fungicide when using a granular do not seem to give positive results on the initial plant stand or on the yield at harvest. BAY 25141 (Dasanit) and Zinophos 10% G. which gave good control of the maggot for the past few years were included in the 1968 recommendations. Other unregistered materials which have been found excellent for the past years were the organophosphate compounds N-2790 (Dyfonate) and BAY 37289 and also the carbamate NIA 10242 which gave very promising results. There was no significant differences in plants killed by maggot between the treatments and all granulars gave fair control of the pest. Again this year, aldrin or dieldrin used as granulars or as wettable powders were found totally ineffective showing heavier damage than in the check plots. The percent injured bulbs at harvest is always heavier in the furrow granular treated plots than in the seed treated plots on account of the fact that this damage is directly related to effectiveness of the material against the pest.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Onion - Autumn Spice

PEST: Onion maggot, *Hylemya antiqua* (Meigen)

TITLE: Control of onion maggot with furrow granular treatments

NAME AND AGENCY: SWAILES, G. E. Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: Amounts used were 2 lb. toxicant/acre based on 17-in.-row spacing, and a 4-in. band of insecticide. Bay 37289 10% G. Dasanit 10% G. Diazinon 5% G. N 2790 5% G. Thimet 10% G. Zinophos 10% G.

METHODS: Randomized block, rows 20-ft. long, 6 replicates at the Horticulture Station, Brooks, Alberta. Insecticide was applied from a V-belt seeder modified with a fan to spread the material in a 4- to 6-inch band. This was raked lightly. Onion seed was drilled through the centre of the band with a Planet Jr. seeder. Application and seeding on June 5.

Effects of the treatments were determined at harvest on Sept. 19 by counting damaged and clean plants.

RESULTS:

Average number of clean and damaged plants at maturity per 20-ft. row in 6 replicates

Material	Clean[1]	Damaged by second-generation maggots
Bay. 37289, 10G	187 a	1
N 2790, 5G	173 a	3
Diazinon, 5G	154 a	5
Thimet, 10G	146 a	9
Dasanit, 10G	144 a	1
Zinophos, 10G	46 b	12
Check	8 b	2

[1] Numbers followed by the same letter are not significantly different at the 1% level. (Duncan's multiple range test)

CROP: Pepper

PEST: Green peach aphid, *Myzus persicae* (Sulzer)

TITLE: Control Experiment

NAME AND AGENCY: FOOTT, W. H., Research Station, Canada Agriculture, Harrow, Ontario.

MATERIALS: Disulfoton 10% granular

METHODS: Two 142' x 18' plots, each consisting of 6 varieties of peppers, were treated at a rate of 2 lb. actual toxicant per acre on June 12. The insecticide was applied in furrows approximately 3 inches deep each side of the row 2 to 3 inches from the plants. Samples of 54 leaves from each treated plot and from each of 5 check plots were examined weekly.

RESULTS: The first evidence of a large reduction in numbers of aphids in treated plots was noted on July 6. Disulfoton provided effective control until August 24. After this date populations declined rapidly in all plots. The total per cent reduction in treated over check plots during an 8-week period was 97.5.

CONCLUSIONS: One application of disulfoton provided effective control during the period that aphids were most abundant on peppers.

RESIDUE DATA: See submission by Dr. F. G. von Stryk.

GENERAL OBSERVATIONS: Disulfoton was registered for use on peppers in 1967, but cannot be applied within 90 days of harvest. A reduction in this interval is necessary to be of practical use to growers.

CULTURE: Pommes de terre, variété Katahdin.

ENNEMI: Les insectes de la pomme de terre: doryphores, altises, cicadelles, punaises ternes, pucerons.

TITRE: Essais de répression des insectes de la pomme de terre sur terre minérale à l'Assomption.

NOM ET INSTITUTION: RIOUX, Gérard, Station provinciale de Recherches, L'Assomption, Qué.

MATERIAUX: A- En pulvérisation sur feuillage: DDT 25E; Sevin 50% W.P.; Thiodan 2 E.C.; Phosphamidon E.C. 4.8 lb/gal.; Dibrom E.C. 9.6 gal.; Guthion 25W 2 lb.; Guthion 25W 1½ lb.; Guthion 50W; Guthion E; Systox S.C. 2 E.C.; Meta-Systox-R 2 E.C. 2 lbs U.S./gal.; Cygon (Dimethoate) 4 E.C.; Diazinon 50% E.C.; NIA-10242 50% W.P.; Bidrine 8.5E; Methoxychlore 50 W.P. (Marlate); Imidan 3E; Imidan 50W; GS-13005 40 W.P.; B-37289 4E; SD-8447 2E; Malathion 57%; Thuricide 90 TS; B-25141 6E.

B- Sous forme de granulés dans le sillon: Phorate 10% G.; Zinophos 10% G.; GC-4072 10% G.; NIA-10242 10% G.; Témik 10% G.; B-25141 10% G.; B-37289 10% G.; N-2790 5% G.; Di-Syston 10% G.

METHODES: A- Arrosage: Les essais ont été réalisés d'après la méthode des blocs (randomized blocks), et chacun des insecticides répétés quatre fois. Chaque parcelle comprenait 4 rangs de 35 pieds de longueur espacés de 40 pouces. Quatre arrosages ont été effectués aux dates suivantes: le 4 juillet, le 21 juillet, le 11 août et le 25 août. Un pulvérisateur de marque "Bean", avec rampe d'arrosage pouvant couvrir quatre rangs, a été utilisé pour nos traitements sur le feuillage. Cet appareil avait un débit de 60 gallons à l'acre à une pression constante de 125 lbs p.s.i. La population d'insectes sur le feuillage était déterminée deux jours avant les arrosages, à l'aide d'un filet à collection d'une ouverture de 15 pouces de diamètre. Dix coups de filet étaient donnés sur les deux rangs du milieu de chaque parcelle, et les relevés étaient enregistrés pour chacune des espèces présentes. Pour déterminer l'efficacité des insecticides un second relevé au filet était pratiqué 3 ou 4 jours après l'arrosage. Les rendements à la récolte ont été calculés d'après le poids des tubercules recueillis dans les deux rangs du centre de chaque parcelle.

B- Traitement de sol: Ces essais ont été pratiqués suivant la méthode des blocs tout comme dans le cas des arrosages. Les produits granulés ont été épandus à la main dans les sillons, et la plantation des tubercules de pommes de terre ainsi que la fermeture du rang a suivi immédiatement. Pour le relevé des insectes, nous avons procédé suivant des méthodes identiques à celles décrites pour le traitement du feuillage et ces opérations ont été effectuées aux mêmes dates.

RESULTATS:

Tableau I Pourcentage de répression des Doryphores. Résultats basés sur la moyenne de trois traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
Guthion 25W	1½ lbs	100.0
Guthion 25W	2 lbs	100.0
Guthion 50W	½ lb.	100.0
Imidan 3E	1 pte	100.0
GS-13005 40 W.P.	½ lb. a.i.	100.0
B-25141 6E	0.5 lb. a.i.	100.0
Bidrine 8.5E	0.5 lb.	99.4
NIA-10242 50W	1 lb.	99.2
Dibrom 9.6E	1 chop.	99.2
Guthion E	1 pte	99.1
B-37289 4E	1 pte	98.7
Cygon 4E	1½ chop.	98.6
SD-8447 2E	0.5 lb.	98.4
Imidan 50W	1 lb.	98.2
Sevin 50 W.P.	2 lbs	96.8
Meta-Systox-R 2 E.C.	1½ chop.	96.2
DDT 25E	1½ ptes	95.3
Diazinon 50E	1 chop.	94.6
Phosphamidon 4.8E	1 chop.	93.4
Méthoxychlore 50 W.P.	2 lbs	91.3
Systox SC 2 E.C.	1½ chop.	82.4
Malathion 57%	1 pte	81.3
Thiodan 2E	1 pte	69.0
Thuricide *	3 ptes	37.6
Témoin *	eau	31.9

* Moyenne des 2 premiers traitements.- Après les deux premiers arrosages, les plants de pommes de terre étant presque complètement défoliés, nous avons dû traiter avec le Guthion E pour préserver ce qui restait du feuillage.

Tableau II Pourcentage de répression des Altises. Résultats basés sur la moyenne de trois traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
B-25141 6E	0.5 lb. a.i.	99.2
Sevin 50 W.P.	2 lbs	98.5
Imidan 3E	1 pte	98.3
Guthion 50W	½ lb.	98.3
Méthoxychlore 50 W.P.	2 lbs	98.2
Diazinon 50E	1 chop.	97.7
Dibrom 9.6E	1 chop.	97.1
Guthion 25W	1½ lbs	97.1
Imidan 50W	1 lb.	96.6
GS-13005 40 W.P.	½ lb. a.i.	96.1
Bidrine 8.5E	0.5 lb.	96.0
Phosphamidon 4.8E	1 chop.	95.9
DDT 25E	1½ ptes	94.9
Systox SC 2 E.C.	1½ chop.	94.7
Guthion 25W	2 lbs	94.4
SD-8447 2E	0.5 lb.	93.6
NIA-10242 50W	1 lb.	93.4
Meta-Systox-R 2 E.C.	1½ chop.	92.9
Guthion E	1 pte	92.1
Cygon 4E	1½ chop.	91.7
Thiodan 2E	1 pte	86.4
Malathion 57%	1 pte	78.0
B-37289 4E	1 pte	73.1
Thuricide *	3 ptes	48.9
Témoin *	eau	39.1

* Voir remarques au bas du tableau I.

Tableau III Pourcentage de répression des Cicadelles. Résultats basés sur la moyenne de quatre traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
Imidan 3E	1 pte	93.8
NIA-10242 50W	1 lb.	93.4
Guthion 25W	1½ lbs	92.2
GS-13005 40 W.P.	½ lb. a.i.	90.5
Sevin 50 W.P.	2 lbs	89.8
Guthion E	1 pte	89.6
Meta-Systox-R 2 E.C.	1½ chop.	88.9
Phosphamidon 4.8E	1 chop.	86.8
B-25141 6E	0.5 lb. a.i.	86.6
DDT 25E	1½ ptes	85.9
Méthoxychlore 50 W.P.	2 lbs	84.7
Malathion 57%	1 pte	82.7
Guthion 25W	2 lbs	82.4
Imidan 50W	1 lb.	82.2

Tableau III (suite)

Insecticides	Dose à l'acre	Pourcentage de répression
Guthion 50W	½ lb.	82.2
Diazinon 50E	1 chop.	80.0
SD-8447 2E	0.5 lb.	77.5
Bidrine 8.5E	0.5 lb.	75.2
Dibrom 9.6E	1 chop.	71.9
B-37289 4E	1 pte	66.7
Cygon 4E	1½ chop.	63.6
Thiodan 2E	1 pte	59.6
Systox SC 2 E.C.	1½ chop.	57.8
Thuricide *	3 ptes	29.6
Témoin *	eau	23.1

* Voir remarques au bas du tableau I.

Tableau IV Pourcentage de répression des Punaises Ternes. Résultats basés sur la moyenne de quatre traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
Meta-Systox-R 2 E.C.	1½ chop.	87.5
NIA-10242 50W	1 lb.	80.0
SD-8447 2E	0.5 lb.	78.0
Bidrine 8.5E	0.5 lb.	74.8
Dibrom 9.6E	1 chop.	72.1
B-37289 4E	1 pte	71.2
GS-13005 40 W.P.	½ lb. a.i.	69.1
Sevin 50 W.P.	2 lbs	67.3
Guthion E	1 pte	66.7
Thiodan 2E	1 pte	65.5
DDT 25E	1½ ptes	65.4
B-25141 6E	0.5 lb. a.i.	64.0
Malathion 57%	1 pte	60.0
Diazinon 50E	1 chop.	59.5
Guthion 25W	2 lbs	59.0
Guthion 50W	½ lb.	58.5
Systox SC 2 E.C.	1½ chop.	55.1
Imidan 50W	1 lb.	54.4
Imidan 3E	1 pte	53.7
Cygon 4E	1½ chop.	53.2
Thuricide *	3 ptes	50.3
Phosphamidon 4.8E	1 chop.	48.1
Guthion 25W	1½ lbs	44.9
Méthoxychlore 50 W.P.	2 lbs	34.7
Témoin *	eau	41.2

* Voir remarques au bas du tableau I.

Tableau V   Pourcentage de répression des Pucerons. Résultats basés sur le dernier traitement.**

Insecticides	Dose à l'acre	Pourcentage de répression
NIA-10242 50W	1 lb.	80.0
B-37289 4E	1 pte	66.7
Systox SC 2 E.C.	1½ chop.	57.1
Diazinon 50E	1 chop.	48.4
Meta-Systox-R 2 E.C.	1½ chop.	46.7
Imidan 50W	1 lb.	41.4
Dibrom 9.6E	1 chop.	39.5
Cygon 4E	1½ chop.	25.0

** La population de pucerons n'ayant été vraiment représentative qu'à l'occasion du dernier traitement, nous sommes donc obligés de nous en tenir aux seuls résultats figurant dans ce tableau. La liste de traitements a été volontairement limitée aux produits qui ont fourni des données positives.

CONCLUSIONS: Dans l'ensemble, nos tableaux démontrent que nous disposons d'un nombre assez important de produits capables de réprimer avec efficacité la grande majorité des insectes les plus nuisibles à la pomme de terre. D'après les données du tableau I, il semble bien que nous ayons l'embarras du choix pour la répression du Doryphore. Les Altises n'offrent aucune résistance bien marquée à la quasi totalité des traitements (tab. II). Une bonne douzaine d'insecticides offrent un potentiel de répression intéressant contre les Cicadelles, et certains produits nouveaux sont assez prometteurs (tab. III). Les données du tableau IV indiquent que les punaises ternes opposent une résistance assez prononcée à plusieurs traitements, et de plus laissent supposer qu'il y aurait place pour d'autres bons insecticides même parmi ceux qui se classent en tête de la liste actuellement. Les pucerons n'ayant fait leur apparition en nombre respectable que dans la dernière quinzaine d'août, nous n'avons donc retenu que les résultats du dernier traitement. Il nous faut reconnaître que les bons pesticides susceptibles de tenir ces insectes en échec sont assez clairsemés et plus ou moins efficaces. Certains cependant semblent prometteurs et méritent qu'on leur accorde de nouvelles chances de se faire valoir. D'après l'analyse objective de toutes ces données et observations, il semble bien que les Guthion 25W, 50W et Guthion E soient les plus recommandables, que le Dibrom 9.6E et le Cygon 4E assurent aussi une excellente protection et qu'enfin la liste pourrait s'augmenter de plusieurs unités, si leur enrégistrement était approuvé.
Des neuf Granulés mis à l'essai, seul le Temik 10% G. est à retenir. Il s'est révélé comme un excellent produit pour la répression de tous les insectes s'attaquant à la pomme de terre. De plus, le rendement obtenu dans les parcelles traitées avec ce granulé se compare avantageusement avec ceux des meilleurs de nos traitements de surface. Pour tous les autres insecticides granulés, il est bien évident que leur durée d'efficacité est définitivement trop restreinte et trop limitée sous nos conditions dans le Québec.

DONNEES SUR LES RESIDUS: Nil

OBSERVATIONS GENERALES: En 1967, la population de la majorité des insectes nuisibles à la pomme de terre a été assez abondante et a favorisé nos travaux de recherche. Pour les Doryphores, en particulier, ce fut une année exceptionnelle et tous les produits ont eu une chance unique de se mettre en évidence. Aucun des insecticides utilisés n'a montré d'effets phytotoxiques. Une diminution assez sensible du rendement dans les parcelles traitées au DDT, a été constatée, sans toutefois pouvoir y trouver une explication bien plausible pour l'instant. Eliminé de nos essais depuis deux ans, parce que peu significatif, le Sevin semble avoir récupéré une nouvelle vigueur, toute à son avantage. Le NIA-10242 continue à se signaler de plus en plus, et les insecticides Imidan et Bidrine, par leurs résultats bien significatifs, sont des plus prometteurs.

CULTURE: Pommes de terre, variété Katahdin.

ENNEMI: Les insectes de la pomme de terre: doryphores, altises, cicadelles, punaises ternes, pucerons.

TITRE: Essais de répression des insectes de la pomme de terre sur sol organique à Ste-Clotilde.

NOM ET INSTITUTION: RIOUX, Gérard, Station provinciale de Recherches, L'Assomption, Qué.

MATERIAUX: A- En pulvérisation sur feuillage: NIA-10242 50W; Guthion 50W; Diazinon 50E; Meta-Systox-R 2 E.C.; Endrine 2E; Dibrom 9.6E; GS-13005 40 W.P.; B-25141 6E; Bidrine 8.5E; Thiodan 2E; Phosphamidon 4.8E; Systox SC 2 E.C.; Malathion 25 W.P.; DDT 25E; Sevin 50 W.P.

B- Sous forme de granulés dans le sillon: Temik 10% G.; Phorate 10% G.; Di-Syston 10% G.; B-25141 10% G.; N-2790 5% G.; GC-4072 10% G.

METHODES: A- Arrosage: Méthode des blocs (randomized blocks) avec 4 répétitions. Parcelle de 4 rangs de 50' de longueur avec espacement de 36 pouces. Quatre arrosages pratiqués avec un pulvérisateur de marque "Friends" aux dates suivantes: le 7 juillet, le 21 juillet, le 7 août et le 21 août. Evaluation de la population d'insectes, selon le procédé suivi à l'Assomption. (Voir Rapport Essais de répression... sur terre minérale).

B- Traitement de sol: Méthode des blocs avec 4 répétitions.- Procédé manuel d'épandage des granulés et de distribution de la semence dans le sillon.- Relevé des insectes, suivant la formule préconisée dans nos essais de l'Assomption.

RESULTATS:

Tableau I Pourcentage de répression des Doryphores. Résultats basés sur la moyenne de quatre traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
Bidrine 8.5E	0.5 lb.	100.0
Phosphamidon 4.8E	1 chop.	99.2
B-25141 6E	0.5 lb. a.i.	96.9
Sevin 50 W.P.	2 lbs	95.5
GS-13005 40 W.P.	½ lb. a.i.	95.5
NIA-10242 50W	1 lb.	93.5
Diazinon 50E	1 chop.	92.2
Dibrom 9.6E	1 chop.	91.5
Guthion 50W	½ lb.	90.7
Thiodan 2E	1 pte	87.0
DDT 25E	1½ ptes	83.3
Endrine 2E	1 chop.	80.3
Systox-SC 2 E.C.	1½ chop.	79.8
Meta-Systox-R 2 E.C.	1½ chop.	79.4
Malathion 25 W.P.	4 lbs	41.2
Témoin	eau	24.0

Tableau II Pourcentage de répression des Altises. Résultats basés sur la moyenne de quatre traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
GS-13005 40 W.P.	½ lb. a.i.	98.6
Phosphamidon 4.8E	1 chop.	98.4
B-25141 6E	0.5 lb. a.i.	97.9
Bidrine 8.5E	0.5 lb.	97.8
NIA-10242 50W	1 lb.	97.6
Systox SC 2 E.C.	1½ chop.	96.7
Diazinon 50E	1 chop.	96.7
DDT 25E	1½ ptes	96.4
Thiodan 2E	1 pte	96.3
Sevin 50 W.P.	2 lbs	96.2
Dibrom 9.6E	1 chop.	96.1
Endrine 2E	1 chop.	95.7
Meta-Systox-R 2 E.C.	1½ chop.	95.6
Guthion 50W	½ lb.	95.1
Malathion 25 W.P.	4 lbs	87.4
Témoin	eau	68.4

Tableau III Pourcentage de répression des Cicadelles. Résultats basés sur la moyenne de trois traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
DDT 25E	1½ ptes	88.2
GS-13005 40 W.P.	½ lb. a.i.	84.6
Meta-Systox-R 2 E.C.	1½ chop.	80.0
Dibrom 9.6E	1 chop.	78.7
Malathion 25 W.P.	4 lbs	78.3
Guthion 50W	½ lb.	77.0
Phosphamidon 4.8E	1 chop.	75.7
Sevin 50 W.P.	2 lbs	75.5
Thiodan 2E	1 pte	73.8
Bidrine 8.5E	0.5 lb.	73.7
Endrine 2E	1 chop.	72.5
Systox SC 2 E.C.	1½ chop.	72.2
B-25141 6E	0.5 lb. a.i.	67.6
NIA-10242 50W	1 lb.	61.6
Diazinon 50E	1 chop.	53.5
Témoin	eau	70.4

Tableau IV Pourcentage de répression des Punaises Ternes. Résultats basés sur la moyenne de quatre traitements.

Insecticides	Dose à l'acre	Pourcentage de répression
NIA-10242 50W	1 lb.	90.9
Meta-Systox-R 2 E.C.	1½ chop.	84.2
Phosphamidon 4.8E	1 chop.	81.1
B-25141 6E	0.5 lb. a.i.	80.0
GS-13005 40 W.P.	½ lb. a.i.	79.8
Systox SC 2 E.C.	1½ chop.	78.5
Dibrom 9.6E	1 chop.	76.2
Bidrine 8.5E	0.5 lb.	76.0
Endrine 2E	1 chop.	73.2
Diazinon 50E	1 chop.	72.7
Guthion 50W	½ lb.	66.7
Sevin 50 W.P.	2 lbs	63.9
DDT 25E	1½ ptes	63.1
Malathion 25 W.P.	4 lbs	55.7
Thiodan 2E	1 pte	49.4
Témoin	eau	34.0

Tableau V Pourcentage de répression des Pucerons. Résultats basés sur le dernier traitement.*

Insecticides	Dose à l'acre	Pourcentage de répression
NIA-10242 50W	1 lb.	95.9
Guthion 50W	½ lb.	73.8
Bidrine 8.5E	0.5 lb.	72.4
Diazinon 50E	1 chop.	63.0
Thiodan 2E	1 pte	62.3
Meta-Systox-R 2 E.C.	1½ chop.	50.0
Phosphamidon 4.8E	1 chop.	23.1
Endrine 2E	1 chop.	17.6
Systox SC 2 E.C.	1½ chop.	-
Dibrom 9.6E	1 chop.	-
Malathion 25 W.P.	4 lbs	-
GS-13005 40 W.P.	½ lb. a.i.	-
DDT 25E	1½ ptes	-
B-25141 6E	0.5 lb. a.i.	-
Sevin 50 W.P.	2 lbs	-
Témoin	eau	-

* La population des pucerons ne s'est montrée vraiment représentative qu'à la date du dernier traitement, soit le 21 août.

CONCLUSIONS: Comme l'indiquent les résultats du tableau I, plusieurs produits assez récents s'avèrent très bons pour la répression des Doryphores, alors que les plus anciens accusent un léger recul.- A Ste-Clotilde, tout comme à l'Assomption, il ne semble pas y avoir de problème de résistance de la part des Altises comme on peut le constater par les données du tableau II.- La répression des Cicadelles n'est certes pas aussi parfaite qu'elle l'était pour les Altises, mais on relève tout de même des pourcentages assez élevés et intéressants dans le cas de certains produits tels que le DDT, le GS-13005, le Meta-Systox-R, le Dibrom, le Malathion et le Guthion (tab. III).- Dans le cas des Punaises ternes plusieurs insecticides montrent des pourcentages d'efficacité assez intéressants et significatifs comme en font foi les données du tableau IV. Les résultats, dans l'ensemble, sont légèrement supérieurs à ceux de l'Assomption, et cela pour un nombre plus grand d'individus. Le NIA-10242 et le Meta-Systox sont les plus stables.- Pour les pucerons, malheureusement, les données sont peu nombreuses et peu probantes puisque basées sur un seul traitement. Il nous faut cependant attirer l'attention sur les qualités évidentes du NIA-10242 de beaucoup supérieur à tous les autres; nous devons aussi accorder une mention spéciale au Guthion et au Bidrin. Pour les mêmes traitements pratiqués à des endroits et sur des sols différents (l'Assomption et Ste-Clotilde), les résultats ne concordent peut-être pas toujours, ce qui est assez naturel et inévitable, mais ils nous laissent voir aussi beaucoup de points communs, beaucoup de ressemblances permettant des comparaisons et des vérifications intéressantes.
Des six Granulés mis à l'essai, seul le Temik 10% G. est à retenir. Il s'est révélé comme un excellent produit pour la répression de tous les insectes s'attaquant à la pomme de terre. Pour plus de renseignements nous vous référons au "Rapport sur les essais de répression... à l'Assomption."

DONNEES SUR LES RESIDUS: Nil

OBSERVATIONS GENERALES: Par comparaison avec les années précédentes, soit 1964-65-66, les populations des cinq principaux insectes nuisibles ont augmenté d'une façon assez considérable et ont par conséquent favorisé nos travaux de recherches.- Aucun des insecticides utilisés n'a semblé affecter les plants de pomme de terre. Parmi les insecticides qui se sont mis particulièrement en évidence signalons: le NIA-10242, le Bidrin, le GS-13005, le Phosphamidon et le Meta-Systox.

CROP: Potatoes, var. Sebago

PEST: Wireworms, *Dalopius pallidus* (Brown) and *Agriotes mancus* (Say)

TITLE: Chemical control of wireworms in organic soils of Quebec.

NAME AND AGENCY: LAFRANCE, J., Research Station, Canada Agriculture, St. Jean, Quebec.

MATERIALS: Dieldrin 20% E.C., 50% W.P.; aldrin 20% E.C., 50% W.P.; GC 4072 20% E.C., 25% W.P.; diazinon 25% E.C.; bromophos 40% E.C., 25% W.P., 5% G.; GS 12968 40% W.P.; SD 9098 5% G.; NIA 10242 50% W.P., 10% G.; Dasanit 60% E.C., 10% G.; Dyfonate 5% G.

METHODS: Tests conducted in two separate fields, one measuring 314' x 98' and the other 116' x 98'; each field divided in four blocks, one with seventeen randomized plots and the other with seven randomized plots; block and plots surrounded by uncultivated strip 6' wide. For the first test emulsion, wettable powder and granular treatments applied in the fall 1966 at the rate of 5 lb. toxicant/a.; and for the second test emulsion treatments applied in late May 1964 at the rate of 7 lb. toxicant/a., a year before planting potato tubers. The wettable powder and emulsion insecticides applied to soil surface with garden sprayer and incorporated into soil at 4-6" by rotary tiller; granular materials applied by hand and similarly incorporated. During the first week of June, seed pieces of Sebago potato were planted in each plot by hand in four rows 20" and 40" apart. Potatoes harvested during the first week of October; samples of 100 tubers per plot, taken at random, examined for feeding punctures.

RESULTS:

Test 1 - Treatments Fall 1966; Counts of Feeding Punctures December 1967

Insecticide Treatment Active Ingredient		lb./A.	Percent Marketable Tubers* 0 Puncture	1 Puncture	Total	
aldrin	20% E.C.	5	97.5	0.5	98.0	a**
dieldrin	20% E.C.	5	95.3	1.0	96.3	ab
Dyfonate	5% G.	5	91.2	3.0	94.2	abc
dieldrin	50% W.P.	5	90.5	1.0	91.5	abcd
bromophos	40% E.C.	5	86.0	2.5	88.5	abcde
bromophos	25% W.P.	5	83.5	3.5	87.0	bcdef
aldrin	50% W.P.	5	85.2	1.3	86.5	bcdef
NIA 10242	10% G.	5	82.5	3.3	85.8	bcdef
SD 9098	5% G.	5	82.7	1.3	84.0	bcdef
bromophos	5% G.	5	80.5	3.0	83.5	cdef
GC 4072	20% E.C.	5	80.8	2.0	82.8	def
NIA 10242	50% W.P.	5	79.5	1.5	81.0	defg
GC 4072	25% W.P.	5	79.3	0.5	79.8	efg
Dasanit	60% E.C.	5	74.5	1.8	76.3	fg
Dasanit	10% G.	5	75.3	1.0	76.3	fg
GS 12968	40% W.P.	5	67.7	4.0	71.7	gh
Check			63.2	2.0	65.2	h

* Tuber having 0 to 1 wireworm feeding puncture.

** Figures followed by the same letters are not significantly different at the 1% (Duncan's Multiple Range Test).

Test 2 - Treatments May 1964; Counts of Feeding Punctures December 1967

Insecticide Treatment Active Ingredient		lb./A.	Percent Marketable Tubers* 0 Puncture	1 Puncture	Total	
dieldrin	20% E.C.	7	100.0	0.0	100.0	a**
aldrin	20% E.C.	7	100.0	0.0	100.0	a
Dasanit	60% E.C.	7	95.5	0.8	96.3	ab
GC 4072	20% E.C.	7	92.0	2.5	94.5	ab
BAY 37289	40% E.C.	7	91.0	3.0	94.0	ab
diazinon	25% E.C.	7	84.5	3.0	87.5	bc
Check			75.0	7.0	82.0	c

* Tuber having 0 to 1 wireworm feeding puncture.

** Figures followed by the same letters are not significantly different at the 1% level (Duncan's Multiple Range Test).

Soil samples were taken in the spring 1964 to determine larval population; an average of 11 wireworms sq./ft. was found for the whole field before treatment; two weeks after treatment the average infestation was reduced to 3.

CONCLUSIONS: In the first test, aldrin, dieldrin, bromophos emulsion and dieldrin wettable powder and Dyfonate granular were more effective than any other treatments. Fall treatments at a reduced dosage continued to give adequate control and consequently spring treatments were discontinued. The soil moisture and temperature conditions appear more favourable in the fall than in the spring for the upward larval migration. In the second test, all treatments were applied only once in May 1964; afterward clover and timothy were seeded in the plots. In June 1967, seed pieces potatoes were planted for the first time in this plot section. After four-year residual effects, the actual percent marketable tubers were here higher except with diazinon than in plots treated with the same products applied in the fall preceding the spring seeding. Such results are explained by the absence of re-infestation and the cumulative decrease of populations of larvae reaching the adult stage.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Injuries on potatoes were mostly done by larvae of *Dalopius pallidus* (Brown), and *Agriotes mancus* (Say).

CROP: Potatoes, variety Netted Gem

PEST: Wireworms

TITLE: Preliminary control experiment

NAME AND AGENCY: POND, D. D., Research Station, Canada Agriculture, Fredericton, New Brunswick.

MATERIALS: Phorate 10% G 3 lb. active/acre.

METHODS: Four alternate rows 90 feet long treated with phorate. Control results based on an examination of all the Grade A tubers from each row.

RESULTS: Percent Wireworm Injury to Grade A Tubers after Treatment with Phorate at 3 lb. Active per Acre at Fredericton, N. B., 1967

	Phorate		Check	
Row	No. of Tubers	% Injured	No. of Tubers	% Injured
1	136	17.6	98	35
2	73	24.7	52	67.5
3	174	17.2	119	50.3
4	110	10.9	134	59.7
Mean		17.1		52.0

CONCLUSIONS: Phorate reduced the damage.

GENERAL OBSERVATIONS: These plots were in an extremely wet portion of the field and had had a previous record of wireworm damage. Netted Gem was chosen as it seems to be more susceptible to wireworm attack judging from previous experience in our variety Foundation plots.

CROP: Potato (Netted Gem)

PEST: Tuber flea beetle, Epitrix tuberis Gent.

TITLE: Systemic action of Temik against the tuber flea beetle

NAME AND AGENCY: BANHAM, F.L., Entomology Laboratory, Canada Agriculture, Research Station, Summerland, British Columbia.

MATERIALS: Temik 10 G.

METHODS: Laboratory experiment. Five replications. Temik 10 G. at the rate of 4 lb. of toxicant per acre was broadcast over the soil of potted potato plants and incorporated to a depth of 1 inch. The plants were then irrigated. Commencing 48 hours after treatment application, 10 field-collected adult tuber flea beetles were caged on one leaflet of each plant at weekly intervals. Knockdown and mortality were observed at 24-hour intervals following exposure.

RESULTS: Adult tuber flea beetles caged on leaflets 48 hours after treatment showed typical toxicity symptoms within 3 hours of exposure, and 100% mortality at 12 hours. At 37 days, mortality averaged 83% after 76 hours exposure.

CONCLUSIONS: Broadcast soil applications of Temik 10 G. applied at the rate of 4 lb. of toxicant per acre showed effective systemic action against a leaf-feeding Chrysomelid, the adult tuber flea beetle. Toxic doses of Temik or metabolites were translocated throughout the foliage of potato plants within 48 hours.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No detectable phytotoxicity. Good control of the potato aphid, Macrosiphum solanifolii (Ashm.), the green peach aphid, Myzus persicae (Sulz.) and the greenhouse whitefly Trialeurodes vaporariorum (Westwood).

CROP: Potato, Netted Gem

PEST: Tuber flea bettle, Epitrix tuberis Gent.; potato aphid, Macrosiphum solanifolii (Ashm.); and green peach aphid, Myzus persicae (Sulz.)

TITLE: Control experiments using soil-incorporated insecticides

NAME AND AGENCY: BANHAM, F.L., Entomology Laboratory, Research Station, Canada Agriculture, Summerland, British Columbia.

MATERIALS: Diazinon, 5G; Dyfonate, 10G; Furadan (Nia 10242), 10G; and Temik, 10G.

METHODS: Nine treatments and an untreated check at two locations replicated four times in a randomized block design. Furadan, as a broadcast treatment, at 8 lb. toxicant per acre applied following planting. Diazinon, Dyfonate, Furadan and Temik, as 16-inch band treatments, at 4 lb. toxicant per acre applied once following planting or applied following planting and again 51 days later. Post-planting treatments were incorporated into the top 3 to 4 inches of soil by harrowing or rotary tilling. The mid-season treatment was incorporated to the same depth by cultivating and hilling. Two samples of tubers were taken from each plot to assess larval damage. The first, at 44 days after planting, consisted of 25 tubers selected at random from each plot. The second, at 125 days or harvest, consisted of a sub-sample of 10 lb. of marketable tubers from a sample of 20 hills. The number of larval tunnels was determined by peeling the tubers.

RESULTS: A post-planting broadcast application of Furadan or a post-planting band treatment of Dyfonate followed by a second at mid-season produced 32 to 50% marketable tubers. Two band treatments of diazinon, Furadan, or Temik were significantly less effective, even though the mid-season application increased effectiveness by 0.2 to 4.5 times over that of a single post-planting application. At both locations, the post-planting broadcast or band treatment effectively prevented larval feeding by first generation E. tuberis. Based on adult emergence, the first generation larval population peaked about 30 days after the post-planting treatment. Second and third-generation larvae were not controlled effectively. Larval occurrence for those generations peaked approximately 25 and 60 days after the mid-season band treatment.

The potato aphid and the green peach aphid were effectively controlled for about 35 days following band application with Temik. Visible symptoms of leaf roll virus were reduced.

CONCLUSIONS: None of the treatments gave economic protection against three generations of flea bettle larvae feeding on potato tubers. Mid-season applications reduced damage. Temik effectively controlled aphids for about 5 weeks.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: None of the treatments caused detectable phytotoxicity or off-flavor in the tubers.

CROP: Potato, Sebago

PEST: Colorado Potato Beetle, *Leptinotarsa decemlineata* (**Say**)

TITLE: Control of Colorado potato beetle with Thiodan and Thiodan mixtures.

NAME AND AGENCY: MOORE, R.E. and DEVER, D.A., Technical Department, Niagara Brand Chemicals, Burlington, Ontario.

MATERIALS: Amounts given are for 60 gal. Imp. per acre. Thiodan 4E 1 and 2 pints; Thiodan-DDTEC(containing 2.6 lb. Thiodan Technical and 2.5 lbs. DDT Technical) 1, 1.5 and 2.0 pints; Parathion 1 Thiodan 2 EC (containing 1.0 lb. of technical parathion and 2.0 lbs. of actual Thiodan per gallon) 1.0, 1.5 and 2.0 quarts; Thiodan oil 2 EC (containing 2 lbs. Thiodan Technical in a vegetable oil) 1.0, 1.5 and 2.0 quarts; Ethion 1 Thiodan 2 EC (containing 1 lb. technical Ethion and 2 lbs. Technical Thiodan per gallon) 1.0, 1.5 and 2.0 quarts.

METHODS: Plots were marked out 4 rows x 1000 feet. On July 10, 1967, pre-treatment counts were made on 25 feet of row in four locations in the centre two rows of each plot. A total of 100 row feet per treatment. Treatments were applied July 11, 1967 in 60 gal. water per acre with a boom type, drop nozzle, power take-off row crop sprayer. Heavy rain (1.9") occurred the night of July 11. Adults, larvae and egg masses were counted in the staked areas on July 13, 14 and 20. These counts were made on the same plants each time.

RESULTS: See Table

CONCLUSIONS: All materials initially reduced populations. Thiodan mixtures were essentially better than Thiodan alone. Parathion 1 Thiodan 2 appeared to give the best control under the conditions of this test.

RESIDUE DATA: Samples of Parathion 1 Thiodan 2 treated potatoes were harvested for residue analysis.

GENERAL OBSERVATIONS: Based on these results and those in the U.S.A., Thiodan mixtures currently being used in the United States appear to give longer lasting control than Thiodan alone.

TABLE

L - Larvae
A - Adults
EM - Egg Masses
NH - Newly Hatched

MATERIALS	AMT/ACRE (60 GALS WATER)	Totals: 4x25' plots = 100' row — July 10-11 Pre-treat. Counts			July 13			July 14			July 20		
		L	A	EM	L	A	EM	L	A	EM	L	A	EM
Thiodan 4 E	1 pint	573	8	0	461	0	3	195	0	11	792	1	1
Thiodan 4 E	2 pints	204	10	6	56	3	6	74 (52NH)	7	2	423	4	2
Thiodan-DDT EC	1 pint	512	4	12	150	4	1	136 (55NH)	3	1	217	0	0
Thiodan-DDT	1.5 pints	380	13	12	94	1	7	98 (9NH)	1	0	493 (353NH)	2	0
Thiodan-DDT	2 pints	215	11	11	25	4	2	26 (18NH)	2	4	23	1	0
Parathion 1 Thiodan 2	1 qt.	127	6	2	2	0	2	4	0	7	4	0	0
Parathion 1 Thiodan 2	1.5 qts	399	3	9	0	0	1	0	0	3	0	0	0
Parathion 1 Thiodan 2	2.0 qts.	326	3	6	0	0	1	0	0	1	0	0	0
Thiodan-oil 2EC	1.0 qt.	354	2	5	103	1	6	52 (10NH)	3	4	76	0	2
Thiodan-oil 2EC	1.5 qts.	59	9	16	8	2	4	3	1	11	64	0	3
Thiodan-oil 2EC	2.0 qts	159	2	8	16	3	1	4	1	2	49 (48NH)	0	0
Ethion 1 Thiodan 2	1 qt.	140	4	2	61	3	4	21 (8NH)	0	3	94	0	4
Ethion 1 Thiodan 2	1.5 qts.	98	2	0	12	4	2	10	2	0	24	0	2
Ethion 1 Thiodan 2	2.0 qts.	113	5	6	26	1	1	7	1	4	29	0	1
Check		447	2	8	671	1	2	744	1	7	(8NH)		

CROP: Potato, var. Irish Cobbler.

PEST: Colorado potato beetle, Leptinotarsa decemlineata (Say). Potato flea beetle, Epitrix cucumeris (Harris).

TITLE: Potato insect control, 1967.

NAME AND AGENCY: PASS, H.A.; WATT, B.J.; NURSE, M.; Research and Technical Development Department, Green Cross Products, 2875 Centre St., Montreal, Quebec.

MATERIALS: Temik 10 G at 1 and 2 lb. active per acre.

METHODS: Temik granules were applied in the planting furrow on June 16. Counts were made July 26. Three sprays of Sevin applied to check rows, July 26, August 4 and 11.

RESULTS:

	Colorado beetle Adults and larvae/10 plants	Potato fleabeetle No.: "Shotholes"/25 leaves
Temik 2 lb. a.i.	0	153
Temik 1 lb. a.i.	0	174
Untreated	51	760

CONCLUSIONS: Excellent control of Colorado potato beetle was evident at both rates of Temik. Control of potato fleabeetle was fair, as "Shotholes" were mainly of a scarring nature, and not complete punctures as was the case with the untreated plants.

RESIDUE DATA: Tubers were submitted for analysis of Temik residues.

GENERAL OBSERVATIONS: No trace of beetles was seen on the treated plants throughout the season.

CROP: Potatoes

PEST: Potato insects, mainly the potato aphid, Macrosiphum euphorbiae (Thomas), the potato flea beetle, Epitrix cucumeris (Harris) and the Colorado potato beetle, Leptinotarsa decemlineata (Say.)

TITLE: Potato insect control

NAME AND AGENCY: CANNON, F. M., Research Station, Canada Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Dasanit EC (6 lb./U.S. gal.); C-8353 50% WP; Endrin 2 EC; C-9491 50% WP; Endosulfan 2 EC; NIA 10242 50% WP; Cidial 50 L; Supracide 40% WP (GS 13005); Imidan 50% WP; C-8874 30 EC; Diazinon 50 EC; Anthio 40; Dimethoate (Rogor 40); Bromophos (Nexion EC 40); Phosphamidon 4.8 lb./gal.; Temik 10% G; Phorate 10% G; disulfoton 10% G; Zinophos 10% G; Dyfonate 5% G and Menazon 4% G.

METHODS: Spray treatments - Randomized block experiments, fifteen treatments and one control with four replicates; plots four 60' rows; five sprays during the growing season, applied at 10-day intervals beginning July 17 with tractor mounted sprayer four nozzles per row delivering about 120 gal./a. at 375 p.s.i. Effectiveness of treatments was assessed by counting the various species of insects collected in the two centre rows in 20 sweeps per plot 48 hours after each treatment using a 15" net. Soil treatments - Design of experiment similar to spray treatments with ten treatments and one control; granular materials applied by hand in the row just previous to planting. Insect counts were made on the same days and by the same methods as described for spray treatments.

RESULTS: See table.

CONCLUSIONS: The soil treatments of systemic insecticides were much more effective this season than for the two previous years. The probable reason was that 1967 was relatively wet while 1965 and 1966 were very dry

RESIDUE DATA: Samples of potato tubers from the Temik treated plots have been forwarded to the Union Carbide Co. for residue analysis. No report has been received to date.

GENERAL OBSERVATIONS: Potato insect infestations, particularly aphids, were lighter than usual in many areas. Populations of Colorado potato beetles have been increasing for the past two years.

TABLE:

Mean numbers of flea beetles, aphids and Colorado potato beetles per replicate for each treatment.

Material	Rate (lb. toxicant/a)	Fleabeetles	Aphids	Colorado potato beetles
		Foliage Sprays		
Dasanit	0.75	5.00	0.25	1.25
C-8353	1.0	6.50	1.50	1.75
Endrin	0.25	6.50	0.25	2.25
C-9491	0.5	6.75	0	2.25
Endosulfan	0.5	7.00	0.25	2.25
NIA 10242	0.5	7.50	0.25	4.00
Cidial	0.5	9.25	5.50	1.50
Supracide	0.5	9.25	0.50	2.00
Imidan	1.00	9.50	4.00	1.50
C-8874	0.5	10.75	0.25	1.50
Diazinon	0.5	11.00	0.25	1.00
Anthio 40	0.5	15.25	0.50	4.25
Dimethoate	0.25	15.50	1.00	24.50
Bromophos	0.5	16.00	1.75	1.00
Phosphamidon	0.25	21.00	0.75	1.00
Check	-	175.75	158.0	277.25
L. S. D. 0.01		N.S.D.	50.6	102.8
L. S. D. 0.05		76.5	40.2	77.0
		Granular Soil Applications		
NIA 10242	3.0	29.20	37.25	1.00
Dasanit	2.0	47.00	29.00	11.00
Temik	2.0	73.70	4.00	1.25
Phorate	1.0	77.50	26.50	14.50
disulfoton	2.0	78.70	7.75	7.75
disulfoton	1.0	156.50	9.00	22.75
Zinophos	2.0	105.70	46.00	12.50
Dyfonate	3.0	199.20	70.50	207.75
Dimethoate	2.0	203.70	42.25	90.75
Menazon	1.0	361.70	58.00	171.75
Check	-	410.00	132.75	191.50
L. S. D. 0.01		178.4	33.93	109.83
L. S. D. 0.05		132.5	25.20	81.56

CROP: Potatoes, variety Katahdin

PEST: Green peach aphid, *Myzus persicae* (Sulzer); Potato aphid, *Macrosiphum euphorbiae* (Thomas); Buckthorn aphid, *Aphis nasturtii* (Kaltenbach) and Wireworms

TITLE: Control experiment

NAME AND AGENCY: POND, D.D., Research Station, Canada Agriculture, Fredericton, New Brunswick

MATERIALS: Disulfoton 10% G. 1 lb. active/acre; phorate 10% G. 1 lb. active/acre; Temik 10% G. 1 lb. active/acre; phorate 10% G. 2 lb. active/acre; dimethoate 4E 6.5 oz. active/acre; Anthio 43% E 0.82 oz. active/acre; oxydemetonmethyl S.C. 2.4 lbs/gal. 0.48 oz. active/acre.

METHOD: A randomized block design was used. Each treatment was replicated 4 times. Each plot was 4 rows wide and 30 feet long. Rates and times of insecticide application are shown in the table. Control results are based on the number of aphids counted from a top, a middle and a bottom leaf from each of ten plants selected at random from each of ten plants from the two center rows of each plot. Wireworm injury is based on number of Grade A tubers showing injury.

RESULTS: Reduction in Numbers of Aphids (all species) on Potatoes and Yield of Grade A tubers After Various Insecticides were Applied at Fredericton, N.B. 1967

Insecticide	Amount/ac. a.i.	Mean Number of Aphids/plot July 13	July 27	Aug. 16	Aug. 30	Yield/ac. cwt.[c]
Disulfoton 10% G[a]	1 lb.	0	0.2	4	119	286
Phorate 10% G[a]	1 lb.	0	3.9	163	777	273
Temik 10% G[a]	1 lb.	2	3.7	30	365	260
Phorate 10% G[a]	2 lb.	0	2.9	75	198	223
Dimethoate 4E[b]	6.5 oz.	0	0.6	39	292	242
Anthio 43% E[b]	0.8 oz.	0	0.4	103	482	251
Oxydemetonmethyl 2.4 lb./gal[b]	0.48 oz.	14	3.6	229	824	271
Check	Nil	66	266.0	3141	7527	169
LSD 0.05			2.3	673	1810	54
0.01			3.1	916	2524	73

[a]Treatments applied May 25
[b]Treatments applied July 4, 14, 27, August 17
[c]Grade A tubers 3-12 oz.

Reduction in Numbers of Aphids by Species and to Wireworm Injury on Potatoes After Various Insecticides were Applied at Fredericton, New Brunswick 1967

Insecticide	Myzus persicae July 27	Myzus persicae Aug. 16	Myzus persicae Aug. 30	Mac. euphorbiae July 27	Mac. euphorbiae Aug. 16	Mac. euphorbiae Aug. 30	Aphis nasturtii July 27	Aphis nasturtii Aug. 16	Aphis nasturtii Aug. 30	Percent Wireworm Injury
Disulfoton	0.0	1.4	118	0.7	0.0	0.8	0.2	0.2	0.0	14
Phorate @ 1 lb.	1.8	103.6	707	0.9	2.2	3.0	0.2	0.2	67.0	19
Temik	0.7	8.6	232	2.1	2.9	32.7	0.0	0.2	75.0	35
Phorate @ 2 lb.	0.9	5.1	197	1.1	1.2	0.0	2.7	61.0	0.2	11
Dimethoate	0.9	19.8	284	0.8	10.7	0.3	0.0	2.0	9.5	28
Anthio	0.7	58.7	473	0.8	12.4	1.8	0.2	3.5	7.0	36
Oxydemetonmethyl	0.7	112.6	588	2.0	27.8	3.3	0.0	6.2	232.0	29
Check	3.0	313.1	241	12.9	98.4	52.0	92.0	2660.5	7237.0	46
LSD 0.05	0.9			2.2	2.9					19
0.01	1.3			3.0	3.9					26

CONCLUSIONS: Disulfoton gave the best performance of all the insecticides tested. Phorate at the 2 lb. active rate was also good but not at the 1 lb. rate. Dimethoate was the best of the sprays applied. The heavy foliage plus its early flattening down between the rows made spray coverage almost an impossibility.

A breakdown by species shows that M. persicae was the aphid that accounted for most of the increase in the insecticide plots. In the check plots M. persicae was actually reduced due to the tremendous upsurge in A. nasturtii.

RESIDUE DATA: Tubers and soil samples from the check and Temik plots have been forwarded to Union Carbide for residue analysis but no report has been received to date.

GENERAL OBSERVATIONS: Heavy rainfall in May plus fog and high humidity in June gave a lush growth of tops. These fell over the latter part of the season thus making an ideal environment for production of A. nasturtii which had become well established in the check plots.

CULTURE: Radis, variété Cavalier.

ENNEMI: Larves des racines des crucifères, Hylemya spp.

TITRE: Essais sur les radis de traitements de semence contre les larves des racines de crucifères, Hylemya spp.

NOM ET INSTITUTION: RITCHOT, C., Institut de Technologie Agricole, St-Hyacinthe, Qué.

MATERIAUX: Sont indiquées les quantités de produit par livre de semence. Aldrine 50% W.P. 1 on.; Birlane 25% W.P. 1 et 2 on.; Diazinon 50% W.P. 1 et 2 on.; NIA-10242 75% W.P. 0.7 et 1.3 on.

METHODES: Cette expérience a été réalisée à l'Institut de Technologie Agricole de St-Hyacinthe. Les parcelles, qui étaient constituées d'un rang de 20 pieds de longueur, ont été distribuées d'après la méthode des blocs (randomized blocks) avec 4 répétitions. La semence a été traitée le 17 mai et mise en terre le 18 mai. A la récolte, le 29 juin, 25 radis furent prélevés par parcelle et subdivisés en 2 catégories, sains et attaqués. Le test de Duncan servit à l'interprétation des différences entre les traitements.

RESULTATS:

Insecticides	On./lb. de semence	Radis sains	Radis attaqués
Birlane 25% W.P.	2	99	1 a
Birlane 25% W.P.	1	94	6 ab
NIA-10242 75% W.P.	1.3	93	7 b
NIA-10242 75% W.P.	0.7	91	9 b
Diazinon 50% W.P.	2	82	18 c
Diazinon 50% W.P.	1	76	24 d
Aldrine 50% W.P.	1	38	62 e
Témoin	-	20	80 f

CONCLUSIONS: Les traitements de semence de radis avec le Birlane et le NIA-10242 se sont avérés excellents contre les larves des racines des crucifères, et significativement mieux que les traitements avec le Diazinon.

DONNEES SUR LES RESIDUS: nil

OBSERVATIONS GENERALES: nil

CULTURE: Rutabaga, var. Laurentien

ENNEMI: Larves des racines, Hylemya spp.

TITRE: Essais de traitement sur les rutabagas, contre les larves des racines, Hylemya spp., effectués à Ste-Foy, Qué.

NOM ET INSTITUTION: Richard, M.-A., Station de Défense des Cultures de Ste-Foy, Qué., Ministère de l'Agriculture et de la Colonisation du Québec.

INSECTICIDES: Dasanit 10-G, Dasanit SC, Diazinon 50-E, Cygon 4-E, et Zinophos 4-E. Quantités: 2 onces M.A. pour 1000 pieds linéaires de rang.

METHODES: A- L'insecticide granulé a été appliqué dans le sillon, mais non en contact avec la graine, au moment du semis;

B- Les traitements de surface ont été faits sur une bande de 4 pouces de largeur, et suivant la cédule suivante:

Dasanit SC - immédiatement après le semis

Diazinon 50 W - ler, immédiatement après le semis; 2ième, 2 semaines plus tard; les 4 suivants à 2 semaines d'intervalle.

Cygon 4-E - ler, 1 semaine après la levée; 2ième, 3 semaines plus tard; 3et4ièmes, 3 semaines d'intervalle.

Zinophos 4-E - traitements à 15, 28, 51 et 72 jours après la date du semis.

DIMENSION DES PARCELLES: 1 rang de 20 pieds avec 4 répétitions

TRAITEMENTS: La quantité d'eau utilisée dans les traitements de surface (drenchings) a été de 7 gallons imp. par 1000 pieds de rangs. Les applications effectuées avec pulvérisateur de 2 gallons.

RESULTATS

	Nombre de traitements	Racines saines %	Racines légèrement attaquées %	Racines gravement attaquées %
Dasanit 10 G	1	93.3 a	6.7	0.0 a
Dasanit SC	1	85.0 ab	13.3	1.7 ab
Diazinon 50 W	6	75.0 b	13.3	11.7 c
Zinophos 4-E	4	71.6 bc	15.0	13.4 cd
Cygon 4-E	4	60.0 cd	23.3	16.7 cde
Témoin	-	00.0 e	00.0	100.0 f

CONCLUSION: Le Dasanit 10 G a donné un meilleur pourcentage de navets sains, légèrement supérieur au Dasanit SC. Avec 2 traitements, ce dernier aurait donné de meilleurs résultats. Les autres insecticides sont assez efficaces, mais le nombre de traitements les rendent moins pratiques d'emploi dans cette culture.

<u>CULTURE</u>: Rutabaga, variété Laurentian.

<u>ENNEMI</u>: Larves des racines, <u>Hylemya</u> spp.

<u>TITRE</u>: Essais de traitements sur les rutabagas contre les larves des racines, <u>Hylemya</u> spp.

<u>NOM ET INSTITUTION</u>: RITCHOT, C., Institut de Technologie Agricole, St-Hyacinthe, Qué.

<u>MATERIAUX</u>: Les quantités correspondent à la matière active par 1000 pieds linéaires.
Aldrine 5% G. 3 on., 40% E.C. 2 on.; Bayer 37289 10% G. 3 on. et 2 on., 4 S.C. 2 on. et 1 on.; Birlane 10% G. 2 on., 2 E.C. 2 on. et 1 on.; Dasanit 10% G. 3 on. et 2 on., 6.5 S.C. 2 on. et 1 on.; Diazinon 5% G. 2 on., 50% E.C. 2 on.; Dyfonate 5% G. 2 on. et 1 on., 4 E.C. 2 on. et 1 on.; NIA-10242 10% G. 2 on., 50% W.P. 2 on. et 1 on.

<u>METHODES</u>: Les expériences ont été réalisées en deux localités différentes, à l'Institut de Technologie Agricole de St-Hyacinthe et à la Ferme Expérimentale Fédérale de Lennoxville. La disposition des parcelles se fit d'après la méthode des blocs (randomized blocks) avec 4 répétitions. Chaque parcelle était constituée d'un seul rang, qui était de 20 pieds de longueur à St-Hyacinthe et de 8 mètres à Lennoxville. Les traitements dans le sillon avec les insecticides granulés ont été réalisés le 5 mai à St-Hyacinthe et le 30 mai à Lennoxville; on se servit à cette fin d'un semoir avec une courroie en V. Les parcelles, où aucun insecticide granulé n'avait été appliqué au moment du semis, reçurent un traitement de surface le 16 juin à St-Hyacinthe et le 21 juin à Lennoxville. Les autres traitements de surface ont été effectués les 17 juillet et 2 août à St-Hyacinthe et les 12 juillet et 3 août à Lennoxville. Les traitements de surface consistèrent en l'application de 16 onces de bouillie par parcelle, sur une bande de 4 à 6 pouces de largeur. Au moment de la récolte, on préleva 15 plantes par parcelle qu'on subdivisa en 3 catégories: saines, faiblement attaquées et très attaquées. Le test de Duncan servit pour l'interprétation des différences entre les traitements.

<u>RESULTATS</u>: Voir Tableaux I et II.

<u>CONCLUSIONS</u>: Plusieurs insecticides se sont avérés très efficaces: le Birlane, le Dyfonate, le Dasanit et le Bayer 37289. A St-Hyacinthe, les meilleurs résultats provinrent des parcelles n'ayant reçu que des traitements de surface avec ces insecticides (Tableau I). En effet, elles avaient un plus grand pourcentage de rutabagas parfaitement sains.
A Lennoxville, cependant, tous les traitements, sauf celui au Diazinon 5% G., ont donné de très bons résultats (Tableau II). La différence d'efficacité entre les traitements dans le sillon de St-Hyacinthe et de Lennoxville dépend probablement de leur date d'application. En effet, à St-Hyacinthe les insecticides granulés sont demeurés dans le sol 3 semaines de plus qu'à Lennoxville, et plus d'un mois avant l'apparition des premières larves des racines.
L'auteur tient à mentionner l'aide de M. Paul Cloutier, chef de parcelles à la Ferme Expérimentale de Lennoxville, qui a rendu possible la réalisation des essais sur les rutabagas dans cette région.

RESULTATS:

Tableau I. Résultats des essais sur les rutabagas, effectués à la Station de Recherches de l'Institut de Technologie Agricole de St-Hyacinthe.

Insecticides	Mode de traitement	On. M.A./ 1000 pi. lin.	Nombre de traitements de surface	Plantes saines	Plantes faiblement attaquées	Plantes très attaquées
Birlane 2 E.C.	Surface	2	2	64.3*	25.6	0.0 a
Birlane 2 E.C.	Surface	1	2	63.8	24.0	5.3 ab
Dyfonate 4 E.C.	Surface	2	2	71.8	13.3	7.5 abc
Dasanit 6.5 S.C.	Surface	2	2	70.4	17.6	7.5 abc
Bayer 37289 4 E.C.	Surface	3	2	65.4	20.6	9.1 abc
Bayer 37289 10% G.	Sillon	2		51.0	35.7	11.2 abcd
+ Bayer 37289 4 E.C.	+ surface	2	1			
Bayer 37289 4 E.C.	Surface	2	2	56.9	24.6	11.5 abcd
Dasanit 10% G.	Sillon	2		57.7	26.8	12.2 abcd
+ Dasanit 6.5 S.C.	+ surface	2	1			
Birlane 10% G.	Sillon	2		56.5	26.1	13.5 abcd
+ Birlane 2 E.C.	+ surface	2	1			
Dasanit 6.5 S.C.	Surface	1	2	40.1	45.9	15.0 abcde
Dasanit 10% G.	Sillon	3		50.5	31.4	15.8 abcde
Dyfonate 4 E.C.	Surface	1	2	41.5	40.1	18.1 abcdef
Diazinon 50% E.C.	Surface	2	3	49.2	31.3	18.5 abcdef
NIA-10242 10% G.	Sillon	2		44.4	35.2	20.7 abcdefg
+ NIA-10242 50% W.P.	+ surface	2	1			
Dyfonate 5% G.	Sillon	2		52.9	24.4	22.1 abcdefg
+ Dyfonate 4 E.C.	+ surface	2	1			
Bayer 37289 10% G.	Sillon	3		49.1	25.5	28.3 bcdefgh
Bayer 37289 10% G.	Sillon	2		45.0	29.5	29.1 cdefgh
Diazinon 50% E.C.	Surface	2	2	41.2	29.1	33.7 defghi
Birlane 10% G.	Sillon	2		34.3	32.3	37.0 efghi
Dasanit 10% G.	Sillon	2		33.5	30.9	39.9 fghij
Dyfonate 5% G.	Sillon	2		30.8	32.1	41.5 ghij
Diazinon 5% G.	Sillon	2		26.3	28.6	46.5 hijk
+ Diazinon 50% E.C.	+ surface	2	2			
NIA-10242 10% G.	Sillon	2		19.0	34.0	49.0 hijk
Dyfonate 5% G.	Sillon	1		30.2	22.0	50.2 hijk
HHDN 5% G.	Sillon	3		7.5	34.5	53.5 ijk
+ HHDN 40% E.C.	+ surface	2	1			

Tableau I (suite)

Insecticides	Mode de traitement	On. M.A./ 1000 pi. lin.	Nombre de traitements de surface	Plantes saines	Plantes faiblement attaquées	Plantes très attaquées
NIA-10242 50% W.P.	Surface	2	2	9.2	24.9	59.8 jk
NIA-10242 50% W.P.	Surface	1	2	12.8	25.1	60.4 jk
Diazinon 5% G.	Sillon	2		13.5	22.4	61.5 jk
+ Diazinon 50% E.C.	+ surface	2	1			
Diazinon 5% G.	Sillon	2		10.9	20.2	65.4 k
Témoin	—	-	-	0.0	0.0	90.0 l

* Ces nombres représentent des angles, d'après la formule: angle = $\arcsin \sqrt{\text{pourcentage}}$

Tableau II. Résultats des essais sur les rutabagas effectués à la Ferme Expérimentale Fédérale de Lennoxville

Insecticides	Mode de traitement	On. M.A./ 1000 pi. lin.	Nombre de traitements de surface	Plantes saines	Plantes faiblement attaquées	Plantes très attaquées
Birlane 10% G.	Sillon	2		58	2	0 a
+ Birlane 2 E.C.	+ surface	2	1			
Dasanit 6.5 S.C.	Surface	2	2	58	2	0 a
Dasanit 10% G.	Sillon	2		57	3	0 a
+ Dasanit 6.5 S.C.	+ surface	2	1			
Diazinon 5% G.	Sillon	2		48	12	0 a
+ Diazinon 50% E.C.	+ surface	2	1			
Diazinon 50% E.C.	Surface	2	3	56	3	1 ab
Diazinon 50% E.C.	Surface	2	2	51	8	1 ab
Birlane 4 E.C.	Surface	2	2	55	4	1 ab
Bayer 37289 10% G.	Sillon	2		55	3	2 ab
+ Bayer 37289 4 S.C.	+ surface	2	1			
Bayer 37289 4 S.C.	Surface	2	2	48	10	2 ab
Dasanit 10% G.	Sillon	2		53	4	3 abc
Diazinon 5% G.	Sillon	2		48	9	3 abc
+ Diazinon 50% E.C.	+ surface	2	2			
Birlane 10% G.	Sillon	2		41	14	5 abc
Aldrine 5% G.	Sillon	2		46	7	7 bc
+ Aldrine 50% W.P.	+ surface	2	1			
Bayer 37289 10% G.	Sillon	2		34	17	9 c
Diazinon 5% G.	Sillon	2		23	18	19 d
Témoin	—	-	-	1	13	46 e

DONNEES SUR LES RESIDUS: nil

OBSERVATIONS GENERALES: Il est intéressant de noter qu'à Lennoxville les larves des racines des crucifères ne semblent pas avoir développé des lignées totalement résistantes à l'Aldrine.

CROP: Rutabaga, var. York Swede.

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché)

NAME AND AGENCY: MORRIS, R. F., Research Station, Canada Agriculture, St. John's West, Newfoundland.

MATERIALS: Dasanit 10% G. and 6 lb. E.C.; Bayer 37289 10% G. and 4 lb. E.C.; NIA 10242 10% G. and 50% W.P.; GC 4072 10% G. and 20% E.C.; diazinon 5% G. and 50% E.C.; Basudin 14 G.; phorate, 10% G.; Zinophos, 10 G. and 4 lb. E.C.; C 8874, 30% E.C.; and Chem 5461 46.3% E.C.

METHODS: Twenty-one insecticide treatments and a control were established at St. John's and twenty insecticide treatments and a control were established at St. Davids. Treatments were replicated four times in random block design. Each plot 30' rows with 28" spacings; each 30' row seeded with 200 seeds. Insecticides, at several rates, were applied as granules in the furrow; as granules in the furrow plus a post-thinning drench; or as granules in the furrow plus 2 supplementary drenches. Phytotoxic effects of each treatment determined by counting seedlings in 20' of each row. Infestation index determined as follows: 50 roots from each plot examined at harvest; injury to each root assessed on basis of ratings (clean - 0, slight injury - 1, moderate injury - 2, severe injury - 4). Index for each plot calculated by multiplying number of roots in each category by its numerical value and adding the products. Percentage control determined by subtracting infestation index for each treatment from that of untreated plots and expressing difference as a percentage of the latter. Marketable yields determined by weighing all marketable roots in each plot (60' of row).

RESULTS: See following tables. The most effective treatments in both localities were split applications of: Dasanit, NIA 10242, Zinophos and GC 4072. At St. David's granular Zinophos and GC 4072 were phytotoxic when placed in the furrow with the seed but were not phytotoxic when applied and mixed with the soil before seeding at St. John's. Split applications of Zinophos and GC 4072 were less phytotoxic than equivalent applications at seeding.

Insecticide treatments, rates of application, percent seedling reduction, infestation index, and percent control at St. John's were as follows:

Insecticide	Rates of Application Seeding[1]	Thinning[2]	% Seedling reduction	Infestation index	% Control	Marketable yield (lbs.)
Dasanit	6 lb. E. 1.2 ml.	6 lb. E. 1.2 ml.[3]	-	19	89	185
NIA 10242	10 G. 1.2 oz.		-	20	88	180
NIA 10242	10 G. 0.6 oz.	50 W.P. 1/16 oz.	-	18	88	163
Zinophos	10 G. 0.8 oz.	4 lb. E. 2.7 ml.	2	22	87	154
Dasanit	10 G. 1.2 oz.		-	28	84	163
Dasanit	10 G. 0.6 oz.	6 lb. E. 1.2 ml.	-	27	84	191
NIA 10242	10 G. 0.6 oz.		-	33	81	148
Zinophos	10 G. 1.7 oz.		14	38	78	178
Dasanit	10 G. 0.6 oz.		-	47	72	156
GC 4072	10 G. 0.6 oz.	20 E. 4.7 ml.	-	48	72	157
GC 4072	10 G. 0.6 oz.		-	59	65	138
Diazinon	5 G. 1.2 oz.	50 E. 1.4 ml.[4]	-	62	64	147
GC 4072	10 G. 1.2 oz.		-	63	63	141
Bay 37289	10 G. 0.6 oz.	4 lb. E. 2.7 ml.	-	76	56	153
Basudin	14 G. 1.2 oz.		-	79	54	138
Phorate	10 G. 1.2 oz.		-	86	50	146
Bay 37289	10 G. 1.2 oz.		-	87	49	147
Diazinon	5 G. 1.2 oz.	50 E. 1.4 ml.	-	97	43	136
C 8874	30 E. 2.3 ml.	30 E. 2.3 ml.	-	107	37	143
Diazinon	50 E. 1.4 ml.[5]	50 E. 1.4 ml.	-	128	25	140
Chem 5461	46.3 E. 1.8 ml.	46.3 E. 1.8 ml.	30	139	19	156
Check				171		120

1 Furrow application 30' row

2 Drench 1 qt. water 30' row

3 Both applications sprayed over row in 3" band, 1st. after seeding

4 Two appl. second Aug. 29

5 Applied after seeding

Insecticide treatments, rates of application, percent seedling reduction, infestation index, and percent control at St. David's were as follows:

Insecticide	Rates of Application: Seeding[1]	Thinning[2]	% Seedling reduction	Infestation index	% Control	Marketable yield (lbs.)
Dasanit	10 G. 0.6 oz.	6 lb. E. 1.2 ml.[3]	7	0	100	108
Dasanit	6 lb. E. 1.2 ml.	6 lb. E. 1.2 ml.[3]	-	0	100	136
NIA 10242	10 G. 0.6 oz.	50 W.P. 1/16 oz.	-	0	100	112
Zinophos	10 G. 1.7 oz.		61	1	99	38
GC 4072	10 G. 1.2 oz.		29	1	99	92
Bay 37289	10 G. 0.6 oz.	4 lb. E. 2.7 ml.	-	1	99	143
NIA 10242	10 G. 1.2 oz.		-	1	99	106
Dasanit	10 G. 1.2 oz.		7	2	97	77
NIA 10242	10 G. 0.6 oz.		-	2	97	127
Zinophos	10 G. 0.8 oz.	4 lb. E. 2.7 ml.	36	2	97	67
GC 4072	10 G. 0.6 oz.	20 E. 4.7 ml.	-	2	97	119
Dasanit	10 G. 0.6 oz.		7	4	94	99
GC 4072	10 G. 0.6 oz.		-	8	89	18
C 8874	30 E. 2.3 ml.	30 E. 2.3 ml.	-	18	75	128
Phorate	10 G. 1.2 oz.		-	23	68	97
Diazinon	5 G. 1.2 oz.[4]	50 E. 1.4 ml.	-	25	66	129
Diazinon	50 E. 1.4 ml.[4]	50 E. 1.4 ml.	-	45	66	93
Bay 37289	10 G. 1.2 oz.		-	33	55	121
Diazinon	5 G. 1.2 oz.	50 E. 1.4 ml.[5]	-	37	49	96
Basudin	14 G. 1.2 oz.		-	38	48	118
Check				73		48

[1]Furrow application 30' row

[2]Drench 1 qt. water 30' row

[3]Both applications sprayed over row in a 3" band, 1st. after seeding

[4]Applied after seeding

[5]Two appl. second Aug. 21

CONCLUSIONS: Cyclodiene resistant strains of root maggots can be adequately controlled with any of the following insecticides: Dasanit, NIA 10242, GC 4072 and Zinophos. Split applications - granules at seeding and a drench after thinning - more effectively controlled root maggots than single applications at seeding. In addition it helped reduce phytotoxicity at St. David's where the insecticides were placed in the furrow at seeding. At St. John's, phytotoxicity was reduced by incorporating the insecticide with the soil before seeding.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Both experiments were conducted in areas of moderate infestations of root maggots.

HOST: Rutabagas

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché)

TITLE: Control of root maggots and rhizoctonia in rutabagas in Prince Edward Island.

NAME AND AGENCY: READ, D. C. and C. P. DUFFY, Research Station, Canada Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Birlane (GC 4072) 10 G.; Dasanit (Bay 25141) 10 G.; Dasanit 4497, 10 G.; Bay 37289 10 G. and 4 EC; Diazinon 5 G.; 14 G. and 4 EC.; EI 47031 10 G.; heptachlor 5 G.; Murfotox 5 G.; NIA 10242 10 G.; phorate (Thimet) 10 G.; Tartan

METHODS: Two randomised block experiments in cyclodiene resistant areas; main test in a fine sandy loam soil area at Johnson's River adjoining a field that was heavily infested with root maggots in 1966; second test in a clay loam soil area at Cherry Valley in a section of a field where rutabagas grown in 1966 were heavily infested with root maggots and rhizoctonia. Insecticides and rates given in tables; granular formulations applied 1" to 1½" below surface of soil in a ridged seeding drill with a 2-row subsurface insecticide applicator which sowed the seed above the center of the band of insecticide. At thinning, ½ to 1" of soil removed from surface of ridge leaving about ½" of soil over insecticide. Efficacy of treatments measured by counting numbers of larval tunnels caused by early attacks (large scars resulting from tunnels made when plants were small) and late attacks (recently vacated larval tunnels or tunnels containing larvae at harvest) and appraising total root damage per 100 plants per treatment into categories of 0, clean; 2, moderate; and 4, severe (a damage index of 100 indicates that all plants were severely damaged).

RESULTS: See tables. The materials giving more than 90% control in previous years continued to provide excellent protection against root maggot injury in 1967. Diazinon gave good control of early injury but did not give all-season protection. Tartan was ineffective and heptachlor again resulted in more severe injury than occurred in the untreated plots. Rhizoctonia infections were not more severe in treated than in untreated plots, and the insecticide-fungicide mixture of Dasanit 4497 did not reduce disease infection.

CONCLUSIONS: Nil

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Rhizoctonia and secondary bacterial rot infections were more severe in rutabagas grown in land that had been planted in potatoes the previous year than in stubble land. Dasanit with the fungicide 4497 did not give as good maggot control as Dasanit alone and it would appear that the fungicide had in some way adversely affected the residual efficiency of the insecticide. It appears that rhizoctonia infections may be influenced by root maggots carrying the disease into the plant as in untreated plots, but infections are usually much more severe in treated plots where the insecticide does not give all-season control. The rot is not usually found in areas where larvae survive and tunnel through the root tissue but rather in spots where the larvae appear to have gained entry into but then died in the plant tissue. This observation requires further observation.

Table 1

Numbers of larval tunnels per 100 rutabagas recorded for both early and late attacks, and damage indices after treatments with various insecticides, Johnson's River, P. E. I. 1967

Insecticide	Toxicant Lb./Ac.[1]	Larval Tunnels[2] Early	Late	Total	Dammage Index
Untreated	-	204	276	480	43
NIA 10242	5	0 (100)	0 (100)	0 (100)	0
Dasanit	5	0 (100)	2 (99)	2 (99)	0.2
Birlane	5	0 (100)	2 (99)	2 (99)	0.2
NIA 10242	3	0 (100)	1 (99)	1 (99)	0.1
Zinophos	5	0 (100)	17 (94)	17 (96)	2
Bay 37289	5	14 (93)	6 (98)	20 (95)	2
EI 47031	5	1 (99)	22 (91)	23 (95)	2
Birlane	3	12 (94)	17 (94)	29 (94)	4
Dasanit	3	14 (93)	18 (93)	32 (93)	3
Zinophos	3	0 (100)	34 (88)	34 (92)	3
EI 47031	3	6 (97)	29 (89)	35 (92)	2
Dasanit 4497	5	4 (98)	39 (86)	43 (91)	4
Bay 37289	3	14 (93)	32 (88)	46 (91)	5
Thimet	8	21 (90)	45 (84)	66 (87)	6
Murfotox	4	23 (89)	51 (82)	74 (85)	7
Diazinon (14 G.)	5	24 (88)	102 (63)	126 (74)	12
Thimet	5	29 (86)	165 (40)	194 (60)	18
Diazinon (5 G.)	2.5	104 (49)	165 (40)	269 (45)	17
Tartan	5	111 (46)	220 (20)	331 (30)	30
Tartan	3	188 (8)	224 (20)	412 (15)	40
Heptachlor	5	201 (1)	345 (-25)	546 (-14)	40

[1]All 10% granular formulations except where indicated.

[2]Figures in parenthesis are percentages of control.

Table 2

Numbers of larval tunnels per 100 rutabagas recorded for both early and late attacks, and damage indices after treatments with various insecticides, Cherry Valley, P. E. I. 1967

Insecticide	Toxicant Lb./Ac.[1]	Larval Tunnels[2] Early	Late	Total	Damage Index
Untreated	-	530	750	1284	92
Dasanit	5	0 (100)	0 (100)	0 (100)	0
Dasanit 4497	5	3 (99)	18 (98)	21 (99)	2
Thimet	10	0 (100)	23 (97)	23 (98)	3
10242	5	3 (99)	20 (97)	23 (98)	2
Dasanit	2.5	34 (94)	43 (94)	77 (94)	21
Zinophos	5	6 (99)	210 (72)	216 (83)	17
Murfotox	5	98 (81)	504 (33)	602 (52)	44
Dasanit + 4497	2.5	330 (38)	499 (33)	829 (36)	51
Heptachlor	5	808 (-53)	1030 (-37)	1838 (-43)	100

[1], [2] as in Table 1

Table 3

Per cent rhizoctonia infection in rutabagas grown in soil in which grain and potatoes had been grown the previous year and where various insecticides were used for root maggot control. Cherry Valley, P. E. I. 1967

Insecticide	Rate	Stubble Land	Potato Land	Average for each insecticide
Check	-	26	37	31.5
Heptachlor	5	22.5	72.5	47.5
Zinophos	5	14	60	37
Dasanit 4497	2.5	33	28	30.5
Dasanit	2.5	7	18	12.5
Dasanit 4497	5	11	22	16.5
Thimet	10	14	27	20.5
10242	5	7	14	10.5
Murfotox	5	31.5	32	31.7
Dasanit	5	12	10.5	11.2
Average for Stubble and Potato areas		17.8	31.1	

CROP: Rutabaga, Laurentian

PEST: Cabbage maggot, *Hylemya brassicae* (Bouché)

TITLE: Control of root maggots on rutabagas

NAME AND AGENCY: SWAILES, G.E. and McDONALD, S., Research Station, Canada Agriculture, Lethbridge, Alberta.

MATERIALS: AC 47031, 35% EC; AC 47470, 36% EC; aldrin, 20% EC; Bay 37289, 4E; Dasanit, 6E and 10G; diazinon, 25% EC and 5G; Dursban, 2E; N-2790, 5G; phorate, 10G; and Zinophos, 10G.

METHODS: At Edmonton and Lethbridge, Alta., 21 treatments and an untreated check, in a randomized block design replicated 6 times, were compared for maggot damage to rutabaga. Plots consisted of one 20-foot row and two untreated guard rows. The insecticides, at 2 and 4 oz. toxicant per 1000 row-feet, were applied in a 6-inch band and raked into the top inch of soil before seeding into the centre of the band. Sprays were applied with a portable power sprayer in 1 gal. of water per 1000 row-feet; granules, with a modified V-belt seeder. Split applications were made at Lethbridge (see Table 2) at seeding, and at the beginning of emergence of second-generation adults. Plots at Edmonton were not thinned. Treatments were assessed by grading the damage as follows: no damage, 0; slight damage, 1; moderate damage, 2; and severe damage, 4. Two replicates harvested Aug. 17, at Edmonton, to determine first-generation damage, included roots of at least 0.5 inches in diameter. The final examination, at Edmonton in September and Lethbridge in October, included only roots greater than 1.5 inches in diameter. Control was evaluated by multiplying the percentage of plants in each category by the rating and dividing by four to give the damage rating. The difference between the damage rating for the untreated check and each treatment was expressed as percentage control in terms of the rating for the untreated check.

RESULTS : See tables.

CONCLUSIONS: Some reduction in plant stands resulted from the N 2790 G treatment. No treatments gave satisfactory control.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The plots at Edmonton were under extremely heavy population pressure whereas the population at Lethbridge was light. Soil type at Edmonton was a silty clay in the black soil zone, and at Lethbridge, Lethbridge silt loam.

Table I. Plant stand and control of cabbage maggot at Edmonton, Alberta

Treatment	Rate/ 1000 ft	Emergence stand plants/yd	Aug. 17, 2 reps Plant stand/ 20 ft	Aug. 17, 2 reps % control	Sept. 26, 4 reps Plant stand/ 20 ft	Sept. 26, 4 reps % control
Bay. 37289 E.C.	2 oz	14.7	88	45	86	38
N 2790 G	4 oz	10.5	72	62	54	37
Bay. 37289 E.C.	4 oz	12.5	93	84	81	33
Zinophos G	4 oz	17.8	74	80	89	24
Dasanit G	4 oz	15.7	104	63	77	24
Dursban E.C.	4 oz	12.7	90	48	73	16
Zinophos G	2 oz	19.0	94	65	97	15
Dasanit E.C.	4 oz	18.8	83	62	81	10
Dursban E.C.	2 oz	14.5	90	30	86	9
Dasanit G	2 oz	18.2	84	38	76	8
Diazinon G	4 oz	14.0	87	33	83	7
Aldrin E.C.	4 oz	17.2	81	19	77	1
Dasanit E.C.	2 oz	13.0	84	34	78	1
AC 47470 E.C.	2 oz	14.2	56	18	57	0
Phorate G	4 oz	17.7	85	18	79	0
AC 47031 E.C.	4 oz	16.3	76	20	74	0
Diazinon G	2 oz	15.3	104	27	83	0
AC 47031 E.C.	2 oz	15.2	76	26	72	0
AC 47470 E.C.	4 oz	16.5	98	22	60	0
Diazinon E.C.	2 oz	15.2	73	18	57	0
Diazinon E.C.	4 oz	14.7	95	11	65	0
Check	-	14.7	70	0	61	0

Table II. Plant stand and control of cabbage maggot at Lethbridge, Alberta

Treatment	Rate/1000 ft Preplant	Rate/1000 ft Foliage	Emergence stand plants/yd	Oct. 16, 6 reps Plant stand/ 20 ft	Oct. 16, 6 reps % control
Dasanit G	4 oz		16.8	38	72
Dasanit G and E.C.	2 oz	2 oz	22.3	40	66
Bay. 37289 E.C.	4 oz		16.0	38	66
Bay. 37289 E.C.	2 oz		21.7	38	63
N 2790 G	4 oz		7.5	18	58
Dasanit E.C. and E.C.	2 oz	2 oz	20.3	37	51
Diazinon G	4 oz		19.3	36	47
Dasanit E.C.	4 oz		20.4	40	40
Phorate G	4 oz		19.3	33	38
Aldrin E.C.	4 oz		18.0	34	38
Zinophos	2 oz		20.0	38	34
Dursban E.C. and E.C.	2 oz	2 oz	20.5	40	33
Dursban E.C.	4 oz		20.3	37	33
Diazinon G and E.C.	2 oz	2 oz	18.8	37	32
Zinophos G	4 oz		19.7	35	29
AC 47031 E.C. and E.C.	2 oz	2 oz	20.5	37	27
AC 47031 E.C.	4 oz		21.8	38	22
AC 47470 E.C.	4 oz		24.2	38	21
Diazinon E.C.	4 oz		17.7	33	20
AC 47470 E.C. and E.C.	2 oz	2 oz	17.3	37	19
Diazinon E.C. and E.C.	2 oz	2 oz	26.0	39	2
Check	-		20.3	36	0

CROP: Rutabagas, Laurentian

PEST: Turnip maggot, *Hylemya floralis* (Fallen)

TITLE: Chemical control of the turnip maggot in rutabagas in Saskatchewan

NAME AND AGENCY: STEWART, W. W. A., Research Station, Canada Agriculture, Saskatoon, Saskatchewan

MATERIALS: Bay 37289 10 G. and 4 E.C.; Bay 25141 (Dasanit®) 10 G. and 6 E.C.; NIA 10242 50% W.P.; C8874 30 E.C.

METHODS: Twenty-five treatments, including check, replicated four times in randomized complete block at Saskatoon in a previously untreated silty loam field. Each plot three rows 15 ft. long, 36 in. apart, seeded to rutabagas, Laurentian var., with Milton Precision Planter May 29, 1967. Granulars applied in bands 4 in. wide mixed with top ½ to 3/4 in. soil over rows immediately after seeding. Emulsibles and wettable powders applied in 60 gal. water/a. in bands 4 in. wide centred on the growing plants. First spray applied at beginning of oviposition July 27 and repeated at 10 day intervals, August 7, August 18. Assessment based on 10 roots/plot (40 roots/treatment) taken from the centre row September 20-21.

RESULTS: See table.

CONCLUSIONS: As in 1966 Bay 37289 granular band treatments plus one or two sprays prevented maggot damage completely (see Pesticide Research Report 1966, p. 112). Dasanit® granular band treatment plus two sprays eliminated damage as did two or three sprays of NIA 10242. Any of the above treatments are suitable for control of the turnip maggot providing residues are tolerable. Treatments at planting time without subsequent sprays were of doubtful value with Bay 37289 and Dasanit® in 1967 as was NIA 10242 in 1966. Sprays of C8874 were ineffective.

RESIDUE DATA: Samples of rutabagas from NIA 10242 treatments taken October 2 were sent fresh to Niagara Chemicals for analysis of residues. No report to date. Samples from plots treated with the Bayer products were submitted in 1966. No reports to date.

GENERAL OBSERVATIONS: Populations of aphids on the plants at harvest were negligible in plots treated with NIA 10242. All other plots were infested severely.

CONCLUSIONS: Five of the treatments gave satisfactory control to harvest. Seedling counts were not made so there was no separate estimation of first-generation maggot damage and phytotoxicity.

RESIDUE DATA: Nil

TABLE:

Toxicant lb./a./ application	Applications(1)	Roots damaged %	Damage rating per damaged root
	Bay 37289		
.89	1 (P)	10	2
1.33	1 (P)	12.5	1
1.77	1 (P)	15	2
.89	2 (P + E1)	0	0
.89	3 (P + E1-20)	0	0
1.33	1 (E1)	12.5	5
1.33	2 (E1-20)	30	3
1.33	3 (E1-10-20)	12.5	3
	Dasanit		
.67	1 (P)	30	4
1.33	1 (P)	25	3
2.0	1 (P)	30	3
.67	2 (P + E1)	12.5	2
.67	3 (P + E1-20)	0	0
.67	2 (E1-20)	12.5	2
.67	3 (E1-10-20)	7.5	2
	NIA 10242		
.335	2 (E1-20)	12.5	3
.335	3 (E1-10-20)	0	0
.67	2 (E1-20)	15	3
.67	3 (E1-10-20)	0	0
1.33	2 (E1-20)	0	0
1.33	3 (E1-10-20)	0	0
	C8874		
.335	3 (E1-10-20)	22.5	3
.67	3 (E1-10-20)	30	3
1.33	3 (E1-10-20)	22.5	3
	Check		
0	0	57.5	4

(1) P - Granular formulations applied at time of planting.
E1-10-20 - Sprays applied 1, 10 and 20 days after egg laying began.

<u>CROP</u>: Sugar beets

<u>PEST</u>: Red-backed cutworm, *Euxoa ochrogaster* (Guenée).

<u>TITLE</u>: Control of cutworms in sugar beets.

<u>NAME AND AGENCY</u>: ALLEN, W. R., Research Station, Canada Agriculture, Winnipeg, Manitoba and Menno KLASSEN, Agronomist, Manitoba Sugar Co., Winnipeg, Manitoba.

<u>MATERIALS</u>: Toxaphene 60% EC (7.2 lb./gal.), E.I. 47031 (3.6 lb./gal.)

<u>METHODS</u>: Sprays were applied in 8" bands using a sprayer provided with flat spray nozzles (6502). Thirteen gallons of spray were applied for each beet-acre, which contains 23760 lineal feet of row, 22 in. spacing. Plots were each 200 ft. long and consisted of either 6 rows (Location 1) or 4 rows (Location 2). Each treatment was duplicated. The number of cutworms were evaluated 3 or 7 days after treatment as follows: 10 samples each one square foot, 3 inches deep were selected from 2 or 3 central rows ; or 20 and 30 samples per plot. The number of living cutworms were recorded. Sprays were applied June 13 and 16; respectively.

<u>RESULTS</u>: Mean percentage control of red-backed cutworms in sugar beets

Insecticide	oz./acre	Days after treatment 3	7
Location 1			
EI 47031	3	–	76
	6		87
Toxaphene	36		96
Untreated (worms/sq. ft.)			0.75
Location 2			
EI 47031	5	75	60
	9	81	93
Untreated (worms/sq. ft.)		0.80	0.75

<u>CONCLUSIONS</u>: EI 47031 gave effective control at the higher rates of application; being as effective as Toxaphene that was applied at a much higher rate.

A cutworm density of 0.75/ft. caused a complete loss of sugar beet stand.

RESIDUE DATA: Root and foliage from sugar beets treated with EI 47031 were supplied to Cyanamid of Canada for analyses.

GENERAL OBSERVATIONS: Prior to suitable registration for new materials Toxaphene does provide effective commercial control when applied in the early seedling stage. Farm practice will not support band application for now, 60 ft. booms for overall application are in vogue.

CROP: Sugar beets

PEST: Sugar-beet maggot Tetanops myopaeformis (Röder)

TITLE: Insecticide placement; phytotoxicity and maggot control.

NAME AND AGENCY: ALLEN, W. R., Research Station, Canada Agriculture, Winnipeg, Manitoba and Menno KLASSEN, Agronomist, Manitoba Sugar Co., Winnipeg, Manitoba.

MATERIALS: As formulated insecticide lb./a. applied to furrow: heptachlor 20% G. 5; Furadan 10% G. 7.5; Dasanit 10% G. 5, 10, 15 and 20; carbophenothion 10% G. 10; Dyfonate 5% G. 20; Disulfoton 10% G. 10; phorate 10% G. 10; Bay 37289 10% G. 10, 15 and 20; Ekatox (5% parathion) G. 30. Applied to row after thinning Baygon 5% G. 20.

METHODS: An International Flexi-planter, of new design used to assure better separation of seed and the bulk of insecticide granules within the furrow. Granules were deposited as the furrow was closing; forming an inverted wedge of granules which was lightly covered with soil. Seeding density 7 to 8 seeds/ft. (3 lb./a.), depth 1½ in. Granules and fertilizer (45 lb./a. - 11, 48, 0) were deposited from rear of disc into closing furrow; soil firmed by a press wheel. Only Bagon was applied to the soil surface along the rows after thinning, and covered with soil. Before treatment on May 24th, 290 lb./a. (33, 0, 0) was broadcast on the plot areas and 6 lb./a. of TCA was also applied. Plots four-60' rows arranged in randomized blocks and replicated either 4 or 8 times, in rate and insecticide tests, respectively. Beets thinned June 16th. Stand evaluated on June 13th as beet containing inches/100" row and number of beets/100' of row were counted on July 13th. Number and yield of beets determined at harvest. Maggot counts and beet harvest as reported (Pest. Res. Rept. 1964).

RESULTS: (a) Test on effective and recommended insecticides

Insecticides	Toxicant lb./a. furrow	Stand Before thinning	Stand After thinning	Maggots[1] per beet	Harvested beets Number per 100' row	Harvested beets Tons per acre
Heptachlor	1.0	28.5	96	0.34 (86)	97	13.7
Furadan	0.75	27.0	96	0.41 (84)	93	13.1
Dasanit	1.0	14.9	71	0.84 (67)	76	12.0
Trithion	1.0	28.7	100	0.74 (71)	96	13.2
Dyfonate	1.0	16.4	76	0.17 (93)	78	12.6
Disulfoton	1.0	21.7	89	0.51 (40)	91	12.3
Phorate	1.0	20.2	83	0.40 (84)	83	12.3
Untreated		30.0	100	2.52	98	12.9

(b) Test on rates of application

Heptachlor	1.0	29.6	97	0.06 (94)	98	13.1
Dasanit	0.5	23.9	85	0.17 (83)	89	13.3
	1.0	15.2	80	0.11 (89)	82	13.7
	1.5	13.4	73	0.23 (78)	71	12.5
	2.0	12.7	61	0.25 (76)	62	11.7
Bay 37289	1.0	27.5	93	0.22 (79	89	13.5
	1.5	25.5	78	0.09 (91)	79	12.1
	2.0	26.5	77	0.17 (83)	76	11.9
Ekatox	1.5	16.0	75	0.09 (91)	79	11.8
Baygon[2]	1.0	27.2	93	2.83 (0)	89	13.8
Untreated		28.9	97	1.03	96	12.5

[1] Values in parenthesis - percentage control.
[2] Baygon applied after thinning to soil surface.

CONCLUSIONS: Dasanit showed increased phytotoxicity as application rates increased from 0.5 to 2.0 lb./a. Dyfonate, disulfoton, phorate and Ekatox showed phytotoxic effects. Seedlings treated with these insecticides showed symptoms of tip-burn June 13th. While surprisingly Furdan appeared to have stimulated growth and larger seedlings were noted. Where plant stand was reduced from 25 to 40% by phytotoxicity, stand at harvest and yield was affected. The phytotoxic effects observed are difficult to evaluate, since excessive stand reduction is most often associated with a dry seed bed during seedling emergence and excellent soil moisture prevailed at this stage of growth. Maggot infestation was the lowest yet recorded. However, control values while generally high appear to rank the insecticides, relative to heptachlor, as in previous tests. Baygon applied to the soil surface along the rows, after thinning, was non-effective.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: The systemic action of the phytotoxic insecticides was indicated by the percentage reduction in the number of plants damaged by spinach leaf miner Pegomya hyoscyami (Panzer); in brackets: heptachlor (0, 2); carbophenothion (0); Bay 37289 (16, 31, 41); Dasanit (33, 59, 65, 66); Furadan (62); Dyfonate (29); Ekatox (32); Baygon (42); disulfoton (57) and phorate (58).

INSECTS OF CEREAL AND FORAGE CROPS

edited by

N.D. Holmes

CROP: Cereals and forage

PEST: Grasshopper, *Melanoplus sanguinipes* (Fabricius)

TITLE: Laboratory studies on the toxicity of insecticides to grasshoppers by topical application

NAME AND AGENCY: McKINLAY, K.S., Research Laboratory, Canada Agriculture, Saskatoon

MATERIALS: Lannate, Dursban, DuPont 1642, CIBA 9643, Dibrom, Dieldrin, Baygon, American Cyanamid 47031 and 47470, Malathion, Dimethoate, Baytex

METHODS: Materials were applied at the rate of 3.5 gallons per acre using a laboratory track sprayer. An electrically driven boom fitted with two 650067 Tee Jet nozzles at 20 inch spacing is passed at 4.3 m.p.h. over the treatment surface at a height of 21 inches. To facilitate treatment the test insects, second instar *M. sanguinipes*, seven days old, were lightly anaesthetized with carbon dioxide and exposed to the spray on filter paper in open petri dishes. After treatment the insects were held for 24 hours without food at 75°F and 50% R.H. before counting.

RESULTS: The test results together with the insecticide's acute-oral L.D.50s to male white rats obtained from the literature are shown in TABLE I.

TABLE I

Toxicities of insecticides by topical application. Counts made after holding for 24 hours at 75°F & 50% R.H. without food

Compound	Grasshopper L.D.90 oz. Active/Acre	Rat Acute Oral L.D.50 Mg./Kg.	Insecticide Formulation
DuPont Lannate	8.7	17.0	90% Water Dispersible
Dursban	0.80	163.0	41% Emulsion Concentrate
DuPont 1642	10.0	60.0	90% Water Dispersible
CIBA 9643	1.00	110.0	40% E.C.
Dibrom	1.10	430.0	Dibrom 8 Emulsive
Dieldrin	1.90	60.0	2 lb./Imp. Gal. E.C.
Baygon	0.75	95.0	1.5 lb./U.S. Gal. E.C.
AC47470	3.6	11.3	3.0 lb./U.S. Gal. E.C.
Malathion	4.0	1650.0	5 lb./Imp. Gal. E.C.
AC47031	4.4	8.9	3 lb./U.S. Gal. E.C.
Dimethoate	6.0	250.0	Cygon 267 2.67 lb./U.S. Gal. E.C.
Baytex	25.0	190.0	4 lb./U.S. Gal. E.C.

CONCLUSIONS: Dursban and Dibrom, with relatively high toxicities to grasshoppers and low toxicities to mammals, show considerable promise as contact insecticides for grasshoppers.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Grass

PEST: Marsh crane fly, *Tipula paludosa* Mg.

TITLE: Chemical control of leatherjackets

NAME AND AGENCY: WILKINSON, A.T.S., Research Station, Canada Agriculture, Vancouver, British Columbia.

MATERIALS: Baygon 14% E.C., Bay 37289 45% E., DDT 25% E.C., Diazinon 50 E.C., naled 39% E., Dyfonate 4E., Trichlorfon 50W, Malathion 500 E.C., Methoxychlor 50% W., Parathion 15 W., Carbaryl 50% W.

METHODS: Two tests were carried out on a 10-acre farm in North Surrey. Insecticides were applied to the grass at the rate of 100 gal per acre with a hand sprayer. Control was measured by counting population after spraying gasoline on the sod. This treatment brings most larvae to the surface. The area of each sample was ¼ sq ft.

RESULTS:

Test 1. Plots were sprayed Mar. 29

Material	Toxicant lb/A	Av. larvae per ¼ sq ft Apr.5	Apr.11	Apr.18	May 19	May 25
DDT	3	3.7	.1	0	0	.2
Baygon	3	2.7	.2	1.2	2.4	1.5
Bay 37289	3	3.2	2.6	1.7	1.4	1.5
Diazinon	3	3.7	3.0	1.2	3.6	4.0
Carbaryl	3	15.2	7.4	10.5	7.6	3.2
Naled	3	12.0	13.6	13.5	8.7	6.0
Malathion	3	14.7	11.9	16.2	8.7	9.7
Methoxychlor	3	19.7	16.0	16.5	6.7	6.4
Check	-	15.0	19.6	12.0	7.8	5.0

Test 2. Plots were sprayed May 13

Material	Toxicant lb/A	Av. larvae per ¼ sq ft May 19	May 25
Parathion	1	.4	.5
	½	.5	1.0
Trichlorfon	1	12.6	9.0
	½	8.6	9.4
Dyfonate	1	11.4	10.4
Check	-	9.6	7.8

CONCLUSIONS: Counts obtained May 25 were generally much lower than previous counts. Most of the larvae move down in the soil about 3 inches starting about mid-May. They remain until mid-August when they pupate and emerge as adults. The gasoline method of sampling is not so reliable after mid-May as before, which accounts for the reduced numbers found at this time even in the check.

In Test 1 DDT gave the best control, Baygon, Bayer 37289 and Diazinon gave fair control, while the remaining four gave inadequate or no control.

In Test 2 only parathion gave good control with little difference between the 1 and ½ lb. rates.

RESIDUE: Nil.

GENERAL OBSERVATIONS: In non-irrigated pastures many of the mature larvae died from desiccation greatly reducing adult emergence. The dry weather during the oviposition period probably has reduced this pest further. It is considered that populations in non-irrigated areas will be greatly reduced in 1968.

CROP: Rapeseed (Target)

PEST: Flea beetle, *Phylotreta spp*.

TITLE: Field trial using seed treatments at reduced rates for flea beetle control on seedling rapeseed.

NAME AND AGENCY: ASHRAFF, M. A., Green Cross Products, Winnipeg and SMITH, D. L., Extension Service Branch, Manitoba Department of Agriculture, Winnipeg, Manitoba.

MATERIALS: Drill Box Lindasan; containing Lindane 37.5% and Captan 5%.

METHODS: Seed was treated with Drillbox Lindasan at the rate of ½ oz. and 1 oz. per pound of seed. An untreated check strip was seeded between the treatments. A standard grain drill was used for seeding.

RESULTS: Drillbox Lindasan at the rate of ½ oz. and 1 oz. per pound of seed effectively controlled flea beetles on seedling rapeseed. The untreated check strip was completely destroyed by flea beetle damage and was reseeded at a later date.

RESIDUE DATA: Nil

CONCLUSIONS: Seed treatments at the rate of ½ oz. of Drillbox Lindasan per pound of seed gave the same degree of control as the recommended rate of 1 oz. per pound of seed.

GENERAL OBSERVATIONS: Because of the problem of grain drill plugging encountered with seed treatments, many farmers use rates much below those which are recommended. The flowability of seed treated at reduced rates was improved. No drill plugging was experienced and control was equal to the 1 oz. rate.

CROP: Chinook wheat

PEST: Wireworms, mostly *Ctenicera destructor* Brown

TITLE: Seed treatments on wheat for the control of wireworms

NAME AND AGENCY: BURRAGE, R.H., Research Station, Canada Agriculture, Saskatoon, Saskatchewan

MATERIALS: Each of the following at 1 oz. toxicant per bu. of seed: aldrin 2.5 lb./gal. liquid; diazinon 25% plus captan powder; bromophos 15% plus captan 30% powder.

METHODS: Treatments applied to sound dry seed in late May by mixing 25-lb. lots in a rotary drum with a tumbling action. Seed planted May 29 in silty loam plots 10 ft. x 40 ft. with a 10 ft. double disc drill. Each treatment replicated four times in a randomized plot complete block design. Counts of surviving and wireworm-killed emerged plants taken June 20 in ten sq.-ft. units per plot.

RESULTS: Surviving and wireworm-killed emerged plants/sq. ft.

Treatment	Surviving plants/sq. ft.	Killed plants/sq. ft.
Untreated	9.9	1.3
Aldrin	13.6	0.1
Bromophos	8.3	0.8
Diazinon	10.1	1.0

CONCLUSIONS: Neither the bromophos nor the diazinon seed treatment resulted in a better stand of plants than no treatment, while the aldrin increased the stand by about 40%.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

INSECTS OF ORNAMENTAL AND GREENHOUSE CROPS

edited by

H. Andison

CROP: Greenhouse cucumber, var. Burpee Hybrid

PEST: Two-spotted spider mite, *Tetranychus urticae* (Koch)

TITLE: Screening Tests of Systemic Insecticides as Root Drenches Against the Two-spotted Spider Mite

NAME AND AGENCY: McCLANAHAN, R. J., Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: In 1965 and 1966 twenty-two materials were tested, with results recorded in the respective Pesticide Research Reports. The program was continued in 1967 with Animert V101, Anthio, Aphidan, Bromophos, C9491, C9643, Dowco 213, Galecron, GS12968, Kilval, Milbex and PP781.

METHODS: Burpee Hybrid cucumbers were grown in quartz sand with complete nutrient solution. Plants with the second leaf just starting were treated with a 5 ml root drench of aqueous solution or suspension. The first true leaf was cut off and assayed after 24 hr. with 30-40 adult mites. Three replicates of each of four concentrations were tested. The holding temperature was 23°C and mortality counts were made at 48 hr.

RESULTS: % Mite Control in 48 hr.

Material	Concentration of Drench (%)			
	.01	.05	.20	1.0
Galecron	97	94	98	---
Anthio	85	82	100	---
Kilval	18	55	89	100
GS12968	7	17	10	---
Aphidan	23	22	---	---

---Indicates leaf damage too severe to warrant assay.

There was no appreciable systemic action with Animert V101, Bromophos, C9491, C9643, Dowco 213, Milbex or PP781.

CONCLUSIONS: Galecron and Anthio were the two materials that were reasonably toxic as systemics.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: This series of screening tests and experiments with root drenches on large cucumbers in the greenhouse (McClanahan, R. J. 1967. Proc. Entomol. Soc. Ont. 97 (1966): 99-102) have shown that some acaricides may effectively control mites when applied as a drench. However the relatively long persistence in the leaves points to the probability of a residue in the fruit. The hypothesis that drench treatments of systemics would provide ecological selectivity for mite predators proved to be invalid for a number of compounds because of a food-chain toxicity (McClanahan, R. J. 1967. Nature 215: 1001).

MEDICAL AND VETERINARY INSECTS

edited by

G. Rich

HOST: Beef cattle.

PEST: Horn fly; Haematobia irritans

TITLE: Dust bags for horn fly control on beef cattle.

NAME AND AGENCY: Kolach, A. J., Extension Service Branch, Manitoba Department of Agriculture, Winnipeg, Manitoba.

MATERIALS: Co-Ral 5% Dust.

METHODS: Co-Ral 5% Dust was applied from three double-lined burlap sacks suspended in a gate-way through which cattle had to pass to reach a water trough. There were twelve animals in the treated herd and nine in the untreated herd. The two herds were two miles apart. Fly counts were taken on mature animals only since these were the only ones able to receive dust from the bags which were placed at a fixed height. The trial commenced on August 18, 1967.

RESULTS: See table.

CONCLUSIONS: Co-Ral 5% Dust applied in a forced-use system was highly effective in controlling horn fly on beef cattle. This method of controlling horn fly was considered to be a very practical one.

GENERAL OBSERVATIONS: The amount of dust used per animal per day from this type of dispenser was calculated at 1.6 ounces. However, a certain amount of dust coming out of the burlap sacks by contact with the animal did not actually fall on the hair of the animal.

Face flies and stable flies appeared to be controlled by this treatment but no counts were made on these species.

The animals became accustomed to the dust bags very quickly and were free from horn fly irritation during the treatment period.

EFFECTIVENESS OF FORCED USE OF BURLAP BAG APPLICATIONS OF 5% CO-RAL DUST FOR HORN FLY CONTROL ON BEEF CATTLE IN MANITOBA DURING 1967

Group	Treatment	Intervals in Days During Treatment	Number of Horn Flies Per One Side of Animal		Per Cent Control
			Average	Range	
1 2	Co-Ral Control	Immediately prior to treatment	303 201	220-420 150-240	- -
1 2	Co-Ral Control	3	11 124	5- 20 50-190	96.4 -
1 2	Co-Ral Control	5	7 106	2- 13 40-270	97.7 -
1 2	Co-Ral Control	7	7 106	2- 25 40-600	97.7 -
1 2	Co-Ral Control	9	1.6 125	0- 4 15-500	99.5 -
1 2	Co-Ral Control	12	7 168	2- 12 25-750	97.7 -
1 2	Co-Ral Control	*14	- -	- -	- -
1 2	Co-Ral Control	18	3 176	1- 8 28-750	99.0 -
1 2	Co-Ral Control	20	4.5 103	2- 8 35-500	98.5 -
1 2	Co-Ral Control	23	10 88	4- 18 15-450	96.7 -
1 2	Co-Ral Control	**26	- -	- -	- -

* Dust bags were removed.

** Animals were re-located.

HOST: Beef cattle

PEST: Cattle grubs, *Hypoderma bovis* (L.) and *H. lineatum* (De Vill.)

TITLE: Cattle grub control with Tiguvon and Neguvon pour-ons and Tiguvon water additive

NAME AND AGENCY: WEINTRAUB, J., Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: 8% Neguvon, 2% and 3% Tiguvon pour-on solutions (P.O.); 10% Tiguvon water-miscible solution (W.M.).

METHODS: The three P.O.s were applied undiluted at 0.5 oz. per 100 lb. to separate groups of 25 weanling range steers upon arrival to a feed lot on October 28, 1966. The same treatments were given to similar groups 10 days after arrival, at the peak of stress period. Also on the latter date two groups of 25 calves were provided with drinking water that was kept charged for six days with Tiguvon W.M. at the rate of 15 p.p.m. Grubs were assessed monthly by squeezing out all grubs in the backs from February to May. The grubs were identified to species.

RESULTS: No significant differences were found between the two groups of each treatment, and the within treatment data were combined in the table showing effectiveness of the treatments. (See table next page.)

CONCLUSIONS: The Neguvon P.O. and Tiguvon W.M. treatments were equally effective and significantly better than the remaining treatments ($P<.01$). The 3% Tiguvon P.O. was more effective than the 2% ($P<.01$). Both species of grubs were equally affected by all treatments.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No side-effects were observed, confirming the advisability of early treatment. The cases of shipping fever and other illnesses were equally distributed among all sub-groups, treated and untreated alike. Therefore, in this experiment, treatment with systemic insecticides did not seem to constitute an additional stress factor, whether applied upon arrival or at the peak stress period. A total of five calves died, either untreated or about two to three months after the treatments.

Treatment	Calves assessed	Calves with grubs	Ave. grubs/ calf	Range	% reduc- tion	Average *H. lineatum*	% reduc- tion	Ave. *H. bovis*	% reduc- tion
8% Neguvon pour-on	50	15	1.1	0-20	96	0.66	96	0.44	96
2% Tiguvon pour-on	50	43	7.4	0-39	72	4.8	69	2.6	77
3% Tiguvon pour-on	49	31	2.5	0-22	91	1.4	91	1.0	91
Tiguvon H_2O	48	16	1.8	0-22	93	1.2	92	0.7	94
Untreated	48	44	26.8	0-97		15.3		11.5	

HOST: Cattle

PEST: Cattle grubs, *Hypoderma bovis* (L.) and *H. lineatum* (De Vill.)

TITLE: Evaluation of several systemic insecticides for cattle grub control.

NAME AND AGENCY: Rich, G. B., Canada Department of Agriculture, Research Station, Kamloops, British Columbia.

MATERIALS: Ruelene 25E and Ruelene 8R pour-ons, Neguvon (trichlorophon) 8% pour-on, Tiguvon (fenthion) 2% and 3% pour-ons, and Tiguvon water miscible as a diluent in drinking water.

METHODS: The pour-on materials were applied in each of September, October, November, and December. The Tiguvon in drinking water was applied in late December. The Ruelene pour-ons were applied at 1 fl. oz. of 8% preparation per 100 lbs body weight, the Neguvon and Tiguvon pour-ons at 1 fl. oz. per 200 lbs body weight. The Tiguvon water diluent was applied through a chemical feeder into an automatic pressurized watering system at a dosage rate of 1.6 mg per kg per day for six days. The animals were spring born calves weighing from 400 to 500 lbs from the calf herds of two ranches.

RESULTS: no adverse post-treatment reactions were observed. (See attached sheet for tabulated data).

CONCLUSIONS: Pour-on treatments with Ruelene, Neguvon and Tiguvon in water were comparatively more effective in reducing cattle grubs than Tiguvon pour-ons. Tiguvon 2% pour-on was comparatively quite ineffective at all times of application, whereas Tiguvon 3% was comparatively ineffective in the early application, but was comparable in the late applications.

GENERAL OBSERVATIONS: Neguvon and Tiguvon pour-ons are clear-coloured solutions applied at low volumes and disappear very rapidly in the hair after application. This could readily lead to doubled or missed treatment of animals, particularly if application was made in poor handling facilities. The stockowners in the water diluent test, graduates of a University Faculty of Agriculture, considered the calculations and calibrations necessary for efficient use of the chemical feeder too complex for general application of this method.

Date of Treatment	Treatment	# of calves	# of calves with grubs	Mean grubs/ calf	Range of grubs	% grub reduction
1966	Untreated*	49	45	18.4	0-75	
	Untreated**	39	31	18.2	0-87	
Sept.20*	Neguvon 8% pour-on 1 fl.oz/200 lbs	34	17	2.2	0-34	88.0
Oct. 27*		46	12	0.4	0-4	97.8
Dec. 19**		42	3	0.2	0-4	98.8
Sept.20*	Tiguvon 2% pour-on 1 fl.oz/200 lbs	34	26	6.9	0-32	62.5
Oct.27*		45	26	2.5	0-14	86.4
Dec. 19**		46	12	2.6	0-34	85.7
Sept. 20*	Tiguvon 3% pour-on 1 fl.oz/200 lbs	38	26	3.9	0-19	78.8
Oct. 27*		47	16	1.0	0-15	94.6
Dec. 19**		46	16	0.5	0-3	97.2
Dec. 21** to Dec. 27	Tiguvon in drinking water, 1.6 mg/kg/day for 6 days	46	14	1.8	0-25	90.1
Sept. 20*	Ruelene 25E, 1:3 dil. 1 fl.oz/100 lbs	37	16	2.0	0-18	89.1
Oct. 27*		41	22	2.8	0-33	84.8
Nov. 22*		33	4	0.2	0-2	98.8
Dec. 19**		43	4	0.1	0-3	99.5
Oct. 27*	Ruelene8R 1 fl.oz/100 lbs	38	9	0.6	0-11	95.6
Nov. 22*		50	2	0.1	0-2	99.5
Dec. 19**		42	4	1.6	0-29	91.2

* Guichon Ranch ** Bonaparte Ranch

HOST: Cattle

PEST: Cattle grubs, *Hypoderma bovis* (L) and *H lineatum* (De Ville)

TITLE: Evaluation of Tiguvon pour-on treatments for cattle grub control.

NAME AND AGENCY: SMITH, D. L., Extension Service Branch, Manitoba Department of Agriculture, Winnipeg, Manitoba.

MATERIALS: Tiguvon 2% and 3% pour-on solutions.

METHODS: Tiguvon 2% and 3% pour-on solutions were applied at the rate of 0.5 fluid oz. per 100 lb. body weight. Animals treated were 400 lb. calves. Treatments were applied on October 7, 1966 and grub counts were made on April 27, 1967.

RESULTS:

Treatment	No. of Calves	No. Calves with Grubs	Total No. of Grubs	Mean Grubs per Calf	Range of Grubs	% Grubs Reduction
Untreated	37	27	239	6.46	0-35	-
Tiguvon 2%	41	16	53	1.29	0- 8	80.0
Tiguvon 3%	35	18	60	1.71	0-14	73.5

CONCLUSIONS: Pour-on treatments of 2% and 3% Tiguvon applied at 0.5 fluid oz. per 100 lb. body weight did not effectively control cattle grubs.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: No toxic reactions were observed in any test animals following treatment.

HOST: Cattle

PEST: Horn fly, *Haematobia irritans* (L.)

TITLE: Efficacy of bromophos in an automatic spray race to control flies

NAME AND AGENCY: HAUFE, W. O., Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: Bromophos 1% in oil solution diluted with No. 2 diesel oil for application at 0.05% concentration.

METHOD: Six yearling Hereford heifers randomly assigned to each of two small pasture fields. Automatic spray race installed in one pasture at the entrance to watering trough. Equipment activated daily by a photo-cell circuit between 8:00 a.m. and 4:00 p.m. when animals passed through the race. Total number of flies on animals subjected to the spray race and on those serving as controls in the second pasture were determined weekly by counting the flies on individual animals in a chute in early morning.

RESULTS: Flies were reduced to low levels within two weeks after beginning of treatment (Table I). Mean reduction of flies for a 35-day period through the annual peak of the fly population was 89%. The mean volume of 0.05% bromophos solution used by the treated animals was 7.6 fluid oz./animal/day. Rate of exposure of animals to bromophos as active ingredient by body weight was 19 mg/kg.

Table I

Date	Sprayer	Mean No. of flies/animal	
		Untreated	Treated
July 5	Pre-treatment	12.5	19.8
11	On after fly-count	55.7	65.2
18	On	54.0	31.7
25	On	83.3	7.8
Aug. 1	On	152.7	4.8
10	On	179.0	7.7
15	On	106.0	11.8

CONCLUSION: Daily application of 7.6 oz./animal of 0.05% solution of bromophos in diesel oil as a light spray on the tips of the hair on back, sides and underline provided good continuous protection from horn flies.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Treated animals grazed and lounged quietly during both day and night indicating that they were also protected from mosquitoes.

PEST: Black flies; Simulium venustum Say., Cnephia mutata Mall., Prosimulium gibsoni Twinn., Cnephia dacotensis (D. & S.).

TITLE: Black fly control in streams.

NAME AND AGENCY: Kolach, A. J., Extension Service Branch, Manitoba Department of Agriculture, Winnipeg, Manitoba

MATERIALS: Abate 4 E

METHODS: Abate was tested in two streams at a rate of 0.3 p.p.m. Injection of this rate was made over a 30 minute period using water as a dilutant.

RESULTS: See table.

CONCLUSIONS: Abate at 0.3 p.p.m. did not give complete control of black fly larvae for distances of up to one mile downstream from point of application. The 0.3 p.p.m. rate was more effective than the 0.1 p.p.m. rate tested in these same streams in 1966.

GENERAL OBSERVATIONS: Larvae species, instar stage and estimated proportion in Pilot Creek during time of treatment were:

- Simulium venustum (2 - 4 instar) - 65%
- Cnephia mutata (4 - 6 instar) - 25%
- Prosimulium gibsoni - (6th instar) - 8%
- Cnephia dacotensis (3rd instar) - 2%

Larvae species, instar stage, and estimated proportion in Long River during time of treatment were:

- Simulium venustum (3 - 4 instar) - 84%
- Cnephia mutata (5 - 6 instar) - 14%
- Cnephia dacotensis (3rd instar) - 2%

About 20 dead snails were observed floating in a quiet pool about 50 yards from point of application in Pilot Creek below dam two days after treatment.

AVERAGE LARVAL COUNTS

Stream and Flow Rate	Toxicant and Dosage	Before Treatment	Two Days After	% Control	Before Treatment	Two Days After	% Control	Before Treatment	Two Days After	% Control	Before Treatment	Two Days After	% Control
		200 yards downstream			450 yards downstream			600 yards downstream					
Pilot Creek below dam 1 cu.ft. per sec.	Abate 0.3 ppm for 30 minutes	26	6	77%	159	8.4	94%	162	26	84%			
		50 yards downstream			200 yards downstream			350 yards downstream			½ mile downstream		
Pilot Creek below Beaver Dam 1 cu.ft. per sec.	Abate 0.3 ppm for 30 minutes	26.6	42.4	Nil	26.6	29	Nil	67.6	28.2	58%	46	20	56%
		200 yards downstream			1 mile downstream								
Long River 2 cu. ft. per sec.	Abate 0.3 ppm for 30 minutes	83	11.4	87%	39.8	15	62.5%						

BASIC STUDIES ON INSECTICIDES

edited by

S. McDonald

PEST: Cabbage maggot, Hylemya brassicae (Bouché)

TITLE: Degradation of the more persistent organophosphorus compounds in soils determined by bioassay.

NAME AND AGENCY: READ, D. C. and C. P. DUFFY, Research Station, Canada Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Dasanit 10 G.; phorate (Thimet) 10 G.; Zinophos 10 G.

METHODS: Insecticides at 100 ppm banded at different depths ranging from 0 to 1" in measured quantities of sandy, fine sandy loam, and clay loam soils at pH levels from 5.3 to 6.8 over plastic screen on shallow ridged drills. Plots set up in a field near the laboratory. Crocks of treated soil also set up in the greenhouse and kept at 21°C and with 12-15% moisture. Accurately measured quantities of the treated soil collected at 3-week intervals throughout the growing season, placed in plastic containers and stored at approximately -24°C. For bioassay, portions of the treated soil samples were thawed, diluted with untreated soil to predetermined levels, and placed around sized whole rutabagas in 1 gallon crocks containing 7" of untreated soil. Samples of 300 cabbage maggot eggs that had been incubated at 21°C for 60 hours were placed at a depth of 1/8" to 1/4" in the treated soil approximately 1/4" away from the sides of the rutabagas. Viability of the eggs, which hatched within 6 hours after tests were set up, was tested for each composite collection. Crocks were then placed in a compartment at 18°C and survival of larvae was measured by screening the soil 3 weeks later and counting the puparia that emerged from the rutabagas. Standards were run periodically to test tolerance of the larvae.

RESULTS: In the greenhouse approximately 10% of the original application of Dasanit remained after 1 year in a sandy soil. Similar concentrations of Zinophos persisted for 7 to 8 months and of phorate approximately 4 to 6 months. Results not yet completed for field plot tests. Toxic residues of Dasanit persist much longer than residues of Zinophos or phorate. Phorate residues below 1 ppm in about 3 months in all soils tested, whereas Dasanit persists at levels of 10 to 30 ppm for at least 4 months.

GENERAL OBSERVATIONS: Dasanit is by far the most persistent of the materials tested. Bioassay tests on rutabagas grown in soil treated with Dasanit indicate that residues are present at harvest and attempts are being made to determine concentrations.

PEST: Two-spotted spider mite, *Tetranychus urticae* Koch

TITLE: Effect of age of adult females on susceptibility to OP-compounds

NAME AND AGENCY: HERNE, D.H.C., Research Station, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: Mevinphos (100% active ingred.) and parathion (98.6% pure). Potter Spray Tower, constant temperature thermoregulator and water bath, microslides and Scotch Brand adhesive tape.

METHODS: Groups of females differing in age from newly-moulted adults to 15-day-old adults treated with mevinphos (0.0018%) in a Potter Spray Tower. For treatment in the tower mites were placed on their backs on Scotch Brand adhesive tape fastened to a microslide. Mites placed in constant temperature (24°C), R.H. 95% and examined for mortality 24 hours later. In addition adults respectively 7, 14 and 31 days old were tested simultaneously with a logarithmic series of parathion dosages ascending from 0.013 to 0.1% concentration.

RESULTS:

Experiment I

Relative toxicity of mevinphos (0.0018%) to susceptible adult female mites of different ages

Age	No. Tested	% Mortality
4 - 5 hrs.	496	71
14 - 26 hrs.	259	13
2 - 4 days	139	3.1
7 - 15 days	165	2.6
Check 7 - 15 days	50	0
Check 1 - 4 days	56	0

Experiment II

Mortalities of susceptible adult female mites treated with parathion at different ages

% Concentration of parathion	Percentage mortality of females of indicated ages after final moult		
	7 days	14 days	31 days
0.1	100	98	94
0.07	98	94	84
0.05	96	90	70
0.035	88	82	66
0.025	74	60	48
0.013	32	30	18
Solvent Control	0	0	0
LD_{50} (% concentration)	0.017	0.021	0.028

CONCLUSIONS: Adult females a few hours old were much more susceptible than older ones to mevinphos. With parathion susceptibility also decreased with age.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

PEST: Two-spotted spider mite, Tetranychus urticae (Koch)

TITLE: Toxicity of Dried Spray Deposits to Adult Two-spotted spider Mite

NAME AND AGENCY: McCLANAHAN, R. J. and J. RAGER, Research Station, Canada Agriculture, Harrow, Ontario.

MATERIALS: Animert V101, Anthio, Bromophos, Cygon, C9643, Dowco 213, Galecron, Karathane, Kelthane, Kilval, Milbex, Morestan, Phosdrin, Tedion, Thiodan. Concentrations were based on % active ingredient.

METHODS: Excised leaves from small cucumbers were placed with the upper surface down on a wet cotton pad in a plastic petri dish which had muslin covered holes in the top for ventilation. The leaves were sprayed in a Potter tower with 2 ml of four concentrations of acaricides The deposit averaged 2.01 ul per sq. cm. (S.D. 0.32 ul per sq. cm.). When the leaves were dry, 35 adult female mites were placed on each of three replicates at each dosage level. The leaves were held at 23°C and mortality counts were taken after 48 hr.

RESULTS:

	48 hr. Mite Mortality at Concentration			
Material	0.1%	0.05%	0.2%	1.0%
Animert V101	2	9	14	5
Anthio	83	88	95	100
Bromophos	5	12	49	100
Cygon	52	91	98	100
C9643	9	33	95	98
Dowco 213*	93	100	98	99
Galecron	35	78	98	100
Karathane	6	89	100	100
Kelthane	100	100	100	100
Kilval	15	67	94	100
Milbex	7	95	100	100
Morestan*	97	97	100	100
Phosdrin	28	64	100	100
Tedion	3	5	4	3
Thiodan	7	39	100	100

*Slow-acting materials, with 48 hr. counts showing badly affected mites, but not dead.

CONCLUSIONS: All materials except Animert V101 and Tedion showed acaricidal action when mites walked and fed on the treated surface. These two compounds are ovicides. The 1.0% concentration was not needed for screening tests. The strain of mites tested was not resistant to malathion.

CROP: Various

PEST: Various

TITLE: Alternatives to Insecticides.

NAME AND AGENCY: WRIGHT, R. H. British Columbia Research Council, Vancouver 8, Canada.

MATERIALS: Various

METHODS: Olfactometric, behavioral and electrophysiological studies of insect responses to attractive and repellent chemicals, and pheromones, are expected to lead to the development of economical behavior-control preparations suitable for use as non-toxic pest-control agents.

RESULTS: Some insight has been gained into the basis of scent specificity ("olfactory coding") as it applies, for example, to insect sex-attractants.

CONCLUSIONS: Progress to date strengthens the expectation that potent attractants can be developed by suitably combining a limited number of "primary stimuli".

RESIDUE DATA: Not important.

GENERAL OBSERVATIONS. Before behavior-control scents can become useful as practical pest-control agents ("metarchons"), ways must be found to produce biologically active materials quickly and cheaply. Duplicating the natural scents is unlikely to meet this requirement - hence the need for a basic approach.

DISEASES OF FRUIT CROPS

edited by

D.L. McIntosh
A.T. Bolton

CROP: Apple

PEST: Fire blight, *Erwinia amylovora* (Burrill) Winslow *et al.*

TITLE: The phytotoxicity of copper sprays applied for summer control of fire blight.

NAME AND AGENCY: WAGNER, H.W., Research Station, Canada Agriculture, Vineland Station, Ontario, and HIKICHI, A., O.D.A.F., Simcoe, Ontario.

MATERIALS: Copper sulphate, hydrated lime and C.O.C.S. 55 W.P.

METHOD: Single tree plots of heavily infested Rhode Island Greening trees and single branches of Red Delicious, McIntosh and Yellow Transparent near Port Rowan were sprayed on July 12. Examination of the previously tagged lesions and fruit were made on July 17 and 26.

RESULTS:

Material	Rate applied per 100 Imp. gal.	Injury to McIntosh, Greening and Red Delicious Foliage and Fruit
C.O.C.S.	2.5 lb.	Severe
C.O.C.S.	5.0 lb.	Severe
Bordeaux	2.5 - 7 lb.	Moderate
Bordeaux	2.5 - 5 lb.	Severe
Unsprayed	—	None

CONCLUSIONS: The copper sprays are phytotoxic to varieties grown under current practices. The use of increased quantities of hydrated lime in bordeaux mixture slightly reduced its phytotoxicity with no injury on Yellow Transparent.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: High humidity and soft new growth may have influenced conditions for injury. Treatments did not minimize further development of stem cankers, and no observations were made on the effectiveness of these sprays in preventing foliage infection.

CROP: Apple

PEST: Apple scab, *Venturia inaequalis* (Cke.) Wint.
Apple mildew, *Podosphaera leucotricha* (Ell. and Ev.) Salm.

TITLE OF PROJECT: Evaluation of fungicides for the control of scab and mildew.

NAME OF CONTRIBUTOR AND HIS AGENCY: NORTHOVER, J., and HOWARD, M. G., Research Station, Canada Department of Agriculture, Vineland Station, Ontario.

MATERIALS: Orthocide, 50 W.P., 50% captan; Phaltan W.P., 50% folpet; Cyprex W.P., 65% dodine; Dithane M-45, W.P., 80% mancozeb; Karathane W.P., 22.5% dinocap; Micro Niasul W.P., 92% sulfur; Morocide W.P., 50% binapacryl.

METHOD: Fifteen year old standard McIntosh trees, arranged in a randomized triplicate block design, were sprayed individually, as single tree plots, with a Jeep-mounted Rittenhouse sprayer at 250 p.s.i. using a Bean Spray miser gun. A 9-11 day protectant-type schedule was followed with sprays applied on May 12, 23, June 1, 12, 21, 30, July 10, 20, 31, August 10 and 18th.

The incidence of disease was evaluated September 6-11, when 20 shoots were randomly sampled from around the periphery of each tree at a height of 5-8 feet above ground level. The terminal five leaves of each shoot were rated for the presence or absence of powdery mildew and scab lesions.

RESULTS:

MATERIAL	AMOUNT PER 100 IMPERIAL GALLONS	PERCENTAGE OF LEAVES INFECTED SCAB	MILDEW
CAPTAN	2.0 lb.	15.2 a..	86.5 ..fg
PHALTAN	2.0 lb.	15.3 a..	72.4 .ef.
CYPREX	0.5 lb.	21.7 a..	90.1 ...g
DITHANE M-45	2.0 lb.	23.0 a..	89.4 ...g
KARATHANE	0.5 lb.	74.2 .b.	60.8 .e..
MICRO NIASUL	3.3 lb.	92.0 .bc	25.1 d...
MOROCIDE	1.0 lb.	98.0 ..c	32.0 d...
CHECK, UNSPRAYED	—	90.6 .bc	92.1 ...g
Least significant difference (P=0.05)		14.47 angles,	12.28 angles

Treatment means with the same letter are not significantly different at the 5% level of probability.

Captan, Phaltan, Cyprex and Dithane M-45 were equally effective in controlling scab. Of these, Phaltan alone controlled mildew, but only to a slight extent comparable with Karathane. Morocide and Micro Niasul were superior for mildew control, but failed to control scab.

CONCLUSIONS: Although the incidences of both diseases were high compared with those normally expected with a protectant spray programme, the failure of Micro Niasul (sulfur) and Karathane (dinocap) to control scab and mildew respectively, was particularly significant. This may be explained by the very high levels of inoculum present in the orchard, by favourable climatic conditions, and by the practice of restricting the spray application to a strict 9-11 day schedule. Following a heavy rain or an infection period, no fungicide was applied until the next scheduled spray date. In this way the results tend to emphasize the retention and redistribution characteristics of these particular formulations.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: No phytotoxicity was encountered.

CROP: Apple

PEST:

TITLE: Fungicides as safeners for Lead Arsenate.

NAME AND AGENCY: ROSS, R. G. and SANFORD, K. H., Research Station, Canada Department of Agriculture, Kentville, Nova Scotia.

MATERIALS: Captan 50% W.P.; Cyprex 65% W.P.; Zineb 65% W.P.; Glyodin 30% E.C.; Ryania 50% W.P.; Glyodex W.P.; Lead Arsenate W.P.

METHODS: Plots of 2 Cortland apple trees replicated 3 times. Gun sprayed at 500 p.s.i. Eight fungicide applications with lead arsenate, 3 lb. and safeners being added in the last 3 cover sprays. Foliage rated for arsenic injury on scale of 0 - 5, "0" being the foliage of trees with no arsenic injury, and "5" being the most severe.

RESULTS: Average ratings with the dosage in amounts per 100 Imp. gal. were as follows:

Early treatments	Final 3 treatments	Injury rating 1966	Injury rating 1967
	Lead arsenate 3 lb. +		
Captan 2 lb.	Captan 1½ lb.	0.6	1.0
Cyprex ½ lb.	Cyprex ½ lb.	1.8	1.8
Cyprex ½ lb.	Cyprex ½ lb. + Zineb ½ lb.	2.4	1.0
Cyprex ½ lb.	Cyprex ½ lb. + Captan ½ lb.	0.8	1.7
Cyprex ½ lb.	Cyprex ½ lb. + Ryania 6 lb.	2.3	3.5
Glyodin 1 qt.	Glyodin 1 qt.	1.8	4.3
Glyodin 1 qt.	Glyodin 1 qt. + Zineb ½ lb.	2.6	1.8
Captan 2 lb.	Zineb 2 lb.	1.7	0.3
Glyodin 1 qt.	Glyodex ½ lb.	2.4	3.3
Glyodin 1 qt.	Glyodex ½ lb. + Zineb ½ lb.	1.3	2.5

CONCLUSIONS: Effectiveness of treatments and severity of injury varies with years. Mixture of Ryania and Cyprex caused more injury than Cyprex alone.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Nil.

CROP: Peach, var. Redhaven and Dixired

Pest: Perennial canker, *Cytospora cincta* and *C. leucostoma*

TITLE: Control of Cytospora Canker of Peach

NAME AND AGENCY: DHANVANTARI, B. N., Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: Phygon 50% W.P.; Captan 50% W.P.; Kolo-100; Elgetol; Hydroxyquinoline benzoate; Dimethyl sulfoxide.

METHODS: A block of 6-year-old Redhaven peach trees was used for the experiment in which the fungicides Phygon, Captan, Kolo-100 and Elgetol were used as spray treatments in fall (October 6 and 25, 1966) and spring (April 12 and May 2, 1967). Spray application was done by means of a hand gun at the rate of 3 gal. per tree. A block of 4-year-old Dixired peach trees was used for the experiment in which hydroxyquinoline benzoate (HQB) was used as a soil-drench, 3 gallons per tree, in the fall (October 7 and 26, 1966). In one treatment 0.25% dimethyl sulfoxide (DMSO) was included with HQB at 100 p.p.m., and in another DMSO was used alone at the same concentration. Each treatment was replicated on 6 to 7 trees in a row and the treatment rows were randomized. The extent of canker incidence was assessed by counting the number of newly initiated cankers on 20 twigs of 1966 growth per tree and computing the average for the 6 or 7 replicate trees of each treatment.

RESULTS:

1. Redhaven block.

Fungicide (per/100 gal.)		No. of Applications Fall (1966)	Spring (1967)	No. of Replicate Trees	Avg. No. of Cankers
Phygon 50% W.P.	½ lb.	2	-	7	18.85
Phygon 50% W.P.	½ lb.	2	2	7	7.14
Phygon 50% W.P.	1 lb.	2	-	7	11.42
Phygon 50% W.P.	1 lb.	2	2	7	13.00
Captan 50% W.P.	2 lb.	2	-	6	8.00
Captan 50% W.P.	2 lb.	2	2	6	7.33
Kolo-100	6 lb.	2	-	6	11.66
Kolo-100	6 lb.	2	2	7	21.14
Elgetol	2 qt.	2	-	7	26.25
Elgetol	2 qt.	2	2	6	20.66
Control (no spray)				6	11.16

RESULTS: con'd.

2. Dixired block.

Fungicide (p.p.m.)*	No. of Replicate Trees	Avg. No. of Cankers
Hydrozyquinoline benzoate 50	6	10.83
100	8	8.25
250	8	8.00
500	5	18.00
1000	8	7.63
Hydroxyquinoline benzoate 100 + DMSO 0.25%	8	9.88
DMSO 0.25%	7	11.00
Control	8	11.25

*2 applications; on October 7 and 26, 1966.

CONCLUSIONS: Even though some treatments appear to be better than others, because of a lack of consistency, all were considered to be quite ineffective.

RESIDUE DATA: Nil.

CULTURE: Pomme, variété McIntosh.

ENNEMI: Tavelure, Venturia inaequalis (Cke) Wint.

TITRE: DESMARTEAU, Roger, Sous-station de protection des vergers, Ministère de l'Agriculture du Québec, Farnham (Missisquoi), Québec.

PRODUITS: Quantités par 100 gal. Imp.: Dithane M-22 Spécial, 2 lb; Dithane M-45, 2 lb et Cyprex 65-W, ½ lb.

METHODES: Chaque parcelle était composée de quatre McIntosh adultes enrourés d'arbres-tampons et sans répétition. Les traitements ont été faits à la pression de 550 lb au pouce carré avec un pulvérisateur John Bean 35 équipé de fusils "rod gun" manipulés par deux opérateurs. Le nombre des traitements pour les deux premiers fongicides s'élève à onze, le dernier ayant été fait le 19 juillet. Quant au Cyprex, les applications ont été faites après les pluies d'infection, la dernière le 3 juillet.

RESULTATS:

Produit	Tavelure (fruits)	Roussissure
Dithane M-22 Spécial	traces	traces
Dithane M-45	traces	1%
Cyprex 65-W	traces	2.5%

CONCLUSIONS: Tous les produits ont donné d'excellents résultats compte tenu des conditions climatiques très favorables au développement de la tavelure.

RESIDU: nil

OBSERVATIONS GENERALES: L'épreuve a donné des résultats significatifs, mais sur un petit nombre de pommiers. En certaines occasions, le Cyprex a joué un rôle de protectant car quelques-unes des 10 infections étaient très rapprochées.

CULTURE: Pomme, variété McIntosh.

ENNEMI: Tavelure, *Venturia inaequalis* (Cke) Wint.

TITRE: Essai de fongicides.

NOM ET ORGANISME: DESMARTEAU, Roger, Sous-station de protection des vergers, Ministère de l'Agriculture du Québec, Farnham (Missisquoi), Québec.

PRODUITS: Les doses d'emploi données sont pour une acre de verger. Glyodex, 1½ lb, 2 lb, 2½ lb; Delan 75, 3 lb, 4 lb, 5 lb; Polyram 80, 3½ lb, 5 lb, 6¼ lb et Cyprex 65-W, ¾ lb, 1 lb, 1¼ lb dans 75, 100 et 125 gallons d'eau (imp.) à l'acre à la première, deuxième et troisième période respectivement: celles des traitements pré-floraux, post-floraux et de fin de saison.

METHODES: Chaque parcelle était composée de 35 McIntosh adultes et répétée trois fois. Trois minots de pommes cueillies au hasard dans quatre arbres-échantillons par parcelle ont été examinées pour la tavelure et le fini des fruits.

RESULTATS:

Fongicides	Tavelure (%)	Rugosité (%)
Polyram 80	traces	6.2
Delan 75	traces	7.0
Cyprex 65-W	2.5	12.7
Glyodex	4	21.9

CONCLUSIONS: Les résultats ont été très significatifs compte tenu des conditions climatiques. Le Delan 75 et le Polyram 80 ont donné des résultats parfaits tandis que le Glyodex n'a pas été satisfaisant si l'on considère, en outre, la présence de la tavelure d'automne susceptible de s'aggraver au cours de l'entreposage. Le Cyprex 65-W a donné 2.5% de pommes tavelées, un pourcentage étonnant considérant les excellents résultats que nous avons obtenus au cours des dix dernières années. Le plus beau fini des pommes a été obtenu avec le Polyram 80 tandis que le Glyodex a été déclassé.

RESIDU: Deux applications de dieldrine 50-W, à raison de 2 lb par 100 gallons d'eau (imp.), ont été faites les 8 et 16 juin. L'analyse a démontré que le résidu de dieldrine dans les fruits n'atteint pas le niveau de tolérance permis par la Loi (0.25 ppm), quelque soit le fongicide employé: Cyprex, 0.047 ppm de dieldrine; Delan, 0.062, Glyodine 0.053, Polyram, 0.041 et témoin, 0. (1)

OBSERVATIONS GENERALES: Les conditions climatiques ont été très favorables au développement de la tavelure. Il y a eu dix infections primaires et des ascospores ont été capturées le 9 juillet avec la trappe Hirst.

---

(1) Analyse du Directorat des Aliments et Drogues - MM. G. Léveillé et G. Guérin.

CROP: Strawberry

PEST: Gray mold fruit rot, *Botrytis cinerea*

TITLE: Control Experiment

NAME AND AGENCY: GOURLEY, C. O., Research Station, Canada Agriculture, Kentville, Nova Scotia.

MATERIALS: Amounts given are for 100 gal. Imp. (Spray dates May 30, June 12, 20 and 28) Dichlofluanid 50% W.P., 2 lb. 1st spray, at rates of 1 lb. (low) and 1½ lb. (high) for 3 sprays. Captan 50% W.P. and thiram 65% W.P. at 4 lb. 1st spray, 3 lb. for 3 sprays. Captan + thiram at ½ rate used individually. DDT 50% W.P. at 1 lb. applied separately to all plots on June 12.

METHODS: Four varieties, Gorella, Midway, Redcoat, Sparkle, in each of 6 plots and replicated 4 times. Gun sprayed at 200 p.s.i. Sound fruit, field rot and berry size recorded by weight at each of 9 pickings. Post-harvest rot determined from one box of sound fruit from each variety in each plot at the 1st, 3rd, 5th 7th and 9th pickings after storage for 72 hours at 18.3°C.

RESULTS:

	Marketable Yield T/A					Field Rot T/A				
Material	Gorella	Midway	Redcoat	Sparkle	Mean	Gorella	Midway	Redcoat	Sparkle	Mean
Dichlofluanid (low)	8.3	7.1	9.0	4.9	7.3	0.6	0.5	0.4	0.5	0.5
Dichlofluanid (high)	7.9	8.1	7.5	4.6	7.0	0.3	0.6	0.4	0.3	0.4
Captan	8.1	7.7	8.1	4.0	7.0	1.0	0.6	0.5	0.3	0.6
Thiram	9.6	7.1	8.7	4.6	7.9	0.9	0.3	0.5	0.5	0.5
Captan + thiram	6.3	7.0	8.7	4.8	6.6	0.5	0.3	0.6	0.4	0.5
Control	6.7	7.6	6.7	4.3	6.3	1.2	0.8	1.0	0.6	0.9
L.S.D.	1.4	N.S.	1.4	N.S.	0.8	0.4	0.4	0.4	N.S.	0.2

Material	Weight (gms) 25 fruit at harvest					Per cent post-harvest fruit rot				
	Gorella	Midway	Redcoat	Sparkle	Mean	Gorella	Midway	Redcoat	Sparkle	Mean
Dichlofluanid (low)	269	212	180	200	215	48	34	47	54	46
Dichlofluanid (high)	252	231	171	197	213	35	36	42	53	41
Captan	297	225	199	204	231	43	38	33	60	43
Thiram	288	203	185	217	223	42	37	40	48	42
Captan + thiram	237	229	197	223	222	40	31	40	52	41
Control	296	251	188	202	234	64	56	63	77	65
L.S.D.	34	34	N.S.	N.S.	17	14	14	14	14	9

CONCLUSIONS: Dichlofluanid (low) and thiram increased mean marketable yields. Thiram was significantly better than dichlofluanid (high) and captan. All materials reduced mean field rot and dichlofluanid (high) was significantly better than captan. There was no correlation between the reduction in field rot and the increase in marketable yield. Both dichlofluanid treatments reduced mean fruit size and dichlofluanid (high) sprayed fruit were significantly smaller than captan sprayed fruit. All treatments were about equally effective for post-harvest fruit rot.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: The experiment was conducted under conditions ideal for the development of fruit rot. Rain fell on 14 days during the spray season, May 30 to June 28, and on 10 days during harvest, July 9 to July 28.

The difference in yields of Redcoat with the two rates of dichlofluanid is not due to field rot or fruit size. This material may be phytotoxic by interfering with set and development of fruit. Captan + thiram may have had a similar effect on Gorella.

CROP: Strawberry, var. Northwest and Stelemaster.
Raspberry, var. Willamette.

PEST: Gray mold, *Botrytis cinerea* (Pers.) Fr.
Powdery mildew, *Sphaerotheca macularis* (Wallr. ex Fr.) P. Maqn.)

TITLE: The control of gray mold and powdery mildew in strawberries and raspberries.

NAME AND AGENCY: FREEMAN, Jack A., Research Station, Canada Agriculture, Agassiz, British Columbia, and
PEPIN, H. S., Research Station, Canada Agriculture, Vancouver, British Columbia.

MATERIALS: Amounts per acre reported as active ingredient. Fungicide 1991 (1-butylcarbamoyl)-2-benzimidazole carbamic acid, methyl ester) ½ lb, calcium polysulfide ¾ lb, captan 1½ lb, DAC 2787 (tetrachlorisophthalonitrile) 1½ lb, dichlofluanid 1 lb, sulphur 3.6 lb, dinocap ¾ lb.

METHODS: Three tests were conducted to evaluate the efficacy of Fungicide 1991 for gray mold and powdery mildew in strawberries and raspberries.

Test 1 - A pot test with Stelemaster strawberries was conducted at the Vancouver Research Station. The experiment was laid out in a randomized block design with 4 replicates. Fungicide 1991 at ½ lb/A and calcium polysulfide at ¾ lb/A were applied May 23, June 2, June 13, June 23, and July 4. The amount of berry infection was determined by counting the number of berries with powdery mildew, with Botrytis and other rots, and with no infection.

Test 2 - Fungicide 1991 was tested at the Small Fruits Substation, Abbotsford, British Columbia, on a first-year crop of Willamette raspberries. The experiment was laid out in a randomized block design with three replicates. Each plot consisted of a single 25-foot row. Three sprays of each of the fungicides captan, DAC 2787, dichlofluanid and Fungicide 1991 were applied. The first sprays were applied June 5 when many of the plants were in full bloom. The follow-up sprays were applied on June 14 and 22. Control of pre-harvest infection was determined by weighing all infected berries from each plot at each picking. The crop was picked 6 times between July 5 and July 29. In addition to weighing the infected fruit, the weights of marketable and of cull fruit were also recorded. The size index of sound berries from each plot was determined at each picking. The effect of treatment on postharvest fruit rot was determined from a random sample of at least two pounds of sound berries picked on July 6, 11, 18, and 25 from each plot in each replicate. The berry samples were placed in common storage. The percentage of sound berries was recorded 24 and 48 hours after harvest.

Test 3 - Fungicide 1991 was compared with dinocap and sulphur for the control of powdery mildew in a field test at the Small Fruits Substation. A 2-year-old planting of Northwest strawberries was used in this trial. The experiment was laid out in a randomized block design. Each plot consisted of a single 30-foot row. The test originally consisted of 6 replications with treatments as follows: Fungicide 1991 was applied in three different regimes, (1) spraying only once during the season on July 21; (2) spraying 3 times at approximately 14-day intervals on July 21, August 3 and 18; and (3) spraying 5 times, also at approximately 14-day intervals, on July 21, August 3 and 18, September 1 and 15. This plan allowed for the study of the residual nature of the fungicide. Dinocap and sulphur were applied 3 and 5 times only. All sprays were applied in 180 gal of water/A. A random sample of 20 leaves was collected from each plot in each replicate on September 1, 20, and October 5, to determine the percentage of mildew infection.

RESULTS:

Test 1 - The influence of Fungicide 1991 and calcium polysulfide on gray mold and powdery mildew infection of fruit of Stelemaster strawberries is presented in the following table:

Treatment lb a.i./A	Percent berry infection Gray mold*	Percent berry infection Powdery mildew	Percent sound fruit
Unsprayed	42.9	14.8	42.2
Fungicide 1991 ¼	6.6	0	93.4
Calcium polysulfide ¾	45.3	6.1	48.5

* Also includes *Rhizoctonia*, leather rot, and sun scald.

Test 2 - Fungicide 1991 proved as effective as the other fungicides for preharvest control of fruit rot in raspberries. Even though the rot incidence in the field was relatively low (about 7%), considerable postharvest rot developed (50%). Fungicide 1991 tended to be more effective than the other fungicides for postharvest rot control. Dichlofluanid reduced berry size while captan, DAC 2787 and Fungicide 1991 all tended to increase size.

Test 3 - As at September 1, the 3 sprays of Fungicide 1991 ¼ lb/A were as effective as 3 sprays of dinocap ¾ lb/A for the control of powdery mildew on strawberry foliage. The sulphur sprays were not as effective as either Fungicide 1991 or dinocap. Plants that were sprayed only on July 21 with Fungicide 1991 showed a very slight reduction of powdery mildew infection by September 1, indicating that this fungicide does not persist in or on the plant for any appreciable length of time. From the September 20 readings it was apparent that in order to control powdery mildew when the weather conditions are conducive to the development of this disease the fungicides must be applied at about 14-day intervals. This was the case, not only for Fungicide 1991, but also for dinocap and sulphur. Fungicide 1991 and sulphur showed no phytotoxicity but dinocap caused some leaf curl and burn. There was no increase in powdery mildew on the leaves after September 20. The weather, by this time, had become cool and wet, and the disease was no longer active.

CONCLUSIONS: Fungicide 1991, a systemic fungicide, showed considerable potential for the control of gray mold and powdery mildew in strawberries and raspberries.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Strawberry

PEST: *Verticillium* Wilt, *V.* dahliae Kleb.

TITLE: Control of *Verticillium* Wilt of strawberry plants.

NAME AND AGENCY: LOCKHART, C. L., Research Station, Canada Department of Agriculture, Kentville, Nova Scotia, and MACNAB, A. A., Nova Scotia Department of Agriculture, Kentville, Nova Scotia.

MATERIALS: DuPont experimental fungicide 1991, 4 lb/12000 ft/row + 4 oz Surfactant F/100 gal; Lanstan 20% granular (1-chloro-2-nitropropane), 3¾ lb/200 ft of row; Lannate, 1 lb/A.

METHODS: One cup of DuPont 1991 was added to planting hole at planting time. Lanstan was rototilled in before planting and one cup of Lannate was added to planting hole at planting time. Redcoat strawberry plants were planted 2 feet apart in rows 5 feet apart on June 13, 1967. Treatments were replicated 4 times with 100 plants per replicate. Plants were examined for symptoms of wilt on October 13; counts of runner plants and isolations of 30 plants were made on October 23.

Treatment	% with *Verticillium* Visual symptoms	% with *Verticillium* Isolated	Total number of runner plants per 100 mother plants
DuPont 1991	0	0	668
Lanstan	5.8	13.3	487
Lannate	0.4	17.5	108
Control	10.5	10.8	334

DuPont 1991 was the only treatment that controlled *Verticillium* Wilt. Lannate was phytotoxic to strawberry plants at the rate used.

CONCLUSIONS: A single soil application of DuPont 1991 at planting time gave control of *Verticillium* Wilt of strawberry plants.

DISEASES OF VEGETABLE AND SPECIAL CROPS

edited by

C.B. Kelly
L.C. Callbeck

CROP: Green bush beans, var. Topcrop

PEST: Bean Anthracnose, *Colletotrichum lindemunthianum* (Sacc. & Magn.) Briosi & Cav.

TITLE: Evaluation of 3 Fungicides to Control Bean Anthracnose

NAME AND AGENCY: SLINGSBY, K. and C. D. McKEEN, Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: Rates given are for 100 gal./Imp. of spray per acre. Dithane M-22 special 80% W.P. 3 lb.; Dithane M-45 80% W.P. 3 lb.; Dithane Z-78 80% W.P. 2 lb.

METHODS: The bean seed, pre-treated with dieldrin seed disinfectant, was sown with a Planet Junior seed drill in rows 30 inches apart on May 17. The experiment was a randomized Latin Square block design consisting of 3 treatments plus check replicated 4 times. Each sprayed row of 30 feet in length constituted a replicate. All sprayed rows were separated by 2 unsprayed buffer rows. 3 fungicide sprays were applied at 10-day intervals commencing June 30 and ending July 20. 'Zephyr' knapsack sprayers of $3\frac{1}{2}$ gal. Imp. capacity were used exclusively, and all the plants were sprayed to the point of run-off. On July 19 a water suspension containing spores of *C. lindemunthianum* was sprayed over the experimental block as a blanket treatment.

RESULTS: Due to an exceptionally dry season in 1967 a natural infection did not occur. The artificially applied inoculum also failed to produce a satisfactory level of infection, although random traces of anthracnose were observed on pods in buffer rows. A disease rating was not established and the crop was not harvested. No phytotoxicity was observed at the rates of spray used.

CONCLUSIONS: Because of a very low incidence of infection the relative effectiveness of applied fungicides could not be determined.

RESIDUE DATA: Bean samples were collected by the Rhom and Haas Company Ltd. for analysis of residues of Dithane M-45. No results to date.

GENERAL OBSERVATIONS: During June a severe wilting and in some cases death of several plants occurred. The infection was caused by *Sclerotinia sclerotiorum* (Lib.) D By.

CROP: Carrot, var. Nantes Coreless

PEST: Leaf spot, Alternaria dauci (Kühn) Groves & Skolko

TITLE: Evaluation of 8 fungicides to control Leaf Spot on carrots.

NAME AND AGENCY: SLINGSBY, K. and C.D. McKEEN, Research Station, Harrow, Ontario

MATERIALS: Rates given are for 100 Imp. gal/acre. maneb (Dithane M-22) 80% W.P. 2 lbs; mancozeb (Dithane M-45) 80% W.P. 2 lbs; Difolatan 80% W.P. 3 lbs; Daconil 2787 75% W.P. 2 lbs; Organil 66 2 lbs; Micene 2 lbs; Dyrene 50% W.P. 3 lbs; Polyram 80% W.P. 2 lbs; Triton B-1956 spreader sticker was used in all spray applications.

METHODS: The carrot seed, treated with Arasan seed disinfectant was sown with a Planet Junior seed drill in rows 16 inches apart on June 19. Insect control was maintained by three overall applications of DDT 50% W.P. 2 lbs/100 gal/acre at 10-day intervals commencing August 11 and ending September 1. The experiment was a randomized block design consisting of eight treatments and a check each replicated four times. Each 20 feet of sprayed row constituted a replicate. Two unsprayed rows separated each sprayed row in the block. Seven fungicide sprays were applied at 10-day intervals commencing July 31 and ending October 3. All sprays were applied with 'Zephyr' knapsack sprayers and plants were sprayed to point of run-off. A spore suspension of leaf spot disease inoculum was applied as an overall spray on September 10. On October 10 and 11 one 10-foot strip was hand dug from each replicate; weight of roots and tops were recorded.

RESULTS: See table - following page

CONCLUSIONS: Because of an unrelated cropping history of the plot, diseases specific to carrots were absent. Failure of the applied leaf spot spore suspension to develop the disease in epidemic proportions was attributed to the lateness of its application. Phytotoxicity was usually evident in all the Difolatan replicates as indicated by reddening of the foliage accompanied by necrosis. Micene replicates also showed necrotic spotting but to a lesser degree.

In view of the significant differences in yield between sprayed and unsprayed replicates in the absence of disease, it is assumed that all the fungicide sprays contributed to a general depression in total yield.

RESIDUE DATA: Analysis for residues of Daconil-2787 on carrots are being conducted by Diamond Alkali Company. Results are not yet available.

Marketable Yield in Pounds and Rating for Control of Leaf Spot.

Fungicide	Rate 100 gal/acre	Total Yield 4 Reps.		Average Yield	Disease Rating	Depression % in Yield
Check	---	61.6	a*	15.40	Nil	---
mancozeb	2 lbs.	54.2	a b	13.55	"	12.0
Polyram	2 lbs.	52.8	a b	13.20	"	14.3
Micene	2 lbs.	49.2	b c	12.30	"	20.1
Organil-66	2 lbs.	47.3	b c	11.82	"	23.2
Daconil-2787	2 lbs.	46.2	b c	11.55	"	25.0
maneb	2 lbs.	45.5	b c	11.37	"	26.1
Dyrene	3 lbs.	44.8	b c	11.20	"	27.2
Difolatan	3 lbs.	38.5	c	9.62	"	37.5

*Figures followed by the same letters are not significantly different at the 5% level of significance. (Duncan's Multiple Range Test)

GENERAL OBSERVATIONS: Nil.

CROP: Celery, var. Non-bolting Green

PEST: Leaf spot, Septoria apii (Briosi & Cav.) Chester

TITLE: Control of Leaf Spot on Celery

NAME AND AGENCY: SLINGSBY, K. and C. D. McKEEN, Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: Amounts given are for 100 gal. Imp.
Dithane M-22 Special 80% W.P. 1 lb. & 2 lb.; Dithane M-45 80% W.P. 1 lb. & 2 lb.; Triton B1956 spreader sticker was used in all spray applications.

METHODS: On August 2 celery seedlings were transplanted to the field. The experiment consisted of a randomized block design with 4 treatments plus check replicated 3 times. Each of the sprayed plots measured 8 feet in length with plants spaced at intervals of 6 inches. A straw mulch 3 inches deep was placed between each row and the plot was irrigated frequently to maintain a high soil moisture. Between August 20 and October 10 seven fungicide sprays were applied at 8- to 10-day intervals using low pressure knapsack sprayers. The plants were sprayed to the point of run-off. Insects were controlled by 3 applications of DDT 50% W.P. 2 lb./100 gal. Imp. and 1 application of Thiodan E.C. 1.5 qt./100 gal. Imp. On August 22 the whole experimental block was sprayed with a water suspension of celery leaf spot inoculum. Symptoms of leaf spot disease were observed on the celery leaves on September 6 and a heavy infection developed. During September and October the plots were rated 4 times for incidence of leaf spot. On October 16 to 18 the celery plots were dug and all heads were washed, trimmed, and weighed.

RESULTS:

Fungicide & Rate	Leaf Spot Mean Rating	Total Heads Harvested	Total Weight lb.	Average Weight lb. per Head
Dithane M-22 1 lb.	0.7*	45	33.0	0.73
Dithane M-22 2 lb.	0.2	45	38.5	0.85
Dithane M-45 1 lb.	0.7	43	32.8	0.76
Dithane M-45 2 lb.	0	48	38.2	0.79
Check	3.0	48	24.3	0.50

*Rating of celery leaf spot was on the scale of 0.5, 0 representing freedom from infection and 5 representing a heavy infection.

CONCLUSIONS: Considering the severity of the leaf spot infection Dithane M-22 Special and Dithane M-45 at the 2 lb. rate of application gave excellent control. Also at the 1 lb. rate of application both fungicides gave good control. Average yields proved to be slightly higher in accordance with the higher rates of application.

RESIDUE DATA: Celery samples were collected by Rohm and Haas Company Ltd. for analysis of residues of Dithane M-22 Special and Dithane M-45. No results to date.

GENERAL OBSERVATIONS: A light infestation by aphids in early September caused leaf curl on several plants.

CROP: Field cucumber, var. Burpee Hybrid

PESTS: Powdery mildew, *Erysiphe cichoracearum* D. C., and scab, *Cladosporium cucumerinum* Ell. & Arth.

TITLE: Evaluation of Fungicides for the Control of Powdery Mildew and Scab

NAME AND AGENCY: SLINGSBY, K. and C. D. McKEEN, Research Station, Harrow, Ontario

MATERIALS: Amounts given are for 100 gal. Imp.
Morestan 25% W.P. 1 lb.; Morestan 25% W.P. 0.5 lb. + Dithane Z-78 75% W.P. 1 lb.; PP781 (JF2067 40% colloidal formulation) 0.1%; Dithane M-45 80% W.P. 3 lb.; Morocide 50% W.P. 0.375 lb. + Dithane Z-78 75% W.P. 1 lb.; Morocide 50% W.P. 0.75 lb.; Organil 66 2 lb.; PP781 (JF2067 40% colloidal formulation) 0.1% + Dithane Z-78 75% W.P. 1 lb.; Karathane W.D. 2 lb.; Karathane W.D. 1 lb. + Dithane Z-78 75% W.P. 1 lb.; Daconil 2787 75% W.P. 3 lb.; Siaprit 3 lb.; Dyrene 50% W.P. 3 lb.; Micene 2 lb.; Dithane M-22 80% W.P. 3 lb.; Polyram 80% W.P. 3 lb.; Difolatan 80% W.P. 3 lb.; Triton B-1956 spreader sticker was used in all spray applications.

METHODS: The cucumber seed was sown on May 1 in 3-inch peat pots containing sterilized soil in a greenhouse and plants were transplanted to the field on May 29 and 30. The experiment consisted of a randomized block design with 17 treatments plus check replicated 5 times. Rows were 5 feet apart. Each sprayed plot measured 30 feet in length and contained 6 hills each of two plants set 5 feet apart in the row. Unsprayed buffer rows separated each sprayed row in the block. Between June 15 and August 28 eight fungicide sprays were applied at 10-day intervals using a Rittenhouse sprayer operated at 100 p.s.i. All plants were sprayed to point of run-off. Seasonal insect control was maintained by 4 applications of Thiodan 50% W.P. 1 lb./100 gal. Imp. using a John Bean field sprayer operated at 400 p.s.i. On July 20 plots were inoculated with conidia of the powdery mildew fungus. During August and September the plots were rated 5 times for incidence of mildew. July 19 to September 8 all marketable size cucumbers were harvested and the yields recorded.

RESULTS: See table.

CONCLUSIONS: The general trend indicates a good correlation between the degree of mildew control and the total yield. Although all fungicides gave some control of mildew Morestan and the Morestan + Dithane Z-78 combination proved outstanding in the control of powdery mildew.

Since scab only occurred in trace amounts, no ratings of scab control were made.

RESIDUE DATA: Cucumber samples were collected by the Diamond Alkali Company for analysis of residues of Daconil-2787. No results to date.

GENERAL OBSERVATIONS: Minor plant injury in the form of tan-coloured necrotic spots ranging up to 1 mm. in diam. was observed on three Morestan replicates and one Difolatan replicate following the fourth spray application. No clear explanation of the cause of injury was forthcoming.

TABLE: Effect of Materials on Powdery Mildew and Yield

Fungicides	Mean Mildew Rating	Total Yield (Lbs.)		Mean Yield (Lbs.)
Morestan	0.76*	524.8**	a	105.0
Morestan + Dithane Z-78	0.68	492.7	a b	98.5
PP781	2.04	478.6	a b c	95.7
Dithane M-45	2.56	469.0	a b c d	94.0
Morocide + Dithane Z-78	1.88	468.3	a b c d e	93.7
Morocide	1.44	460.5	a b c d e f	92.1
Organil 66	1.76	453.1	a b c d e f g	90.6
PP781 + Dithane Z-78	1.68	451.5	a b c d e f g	90.3
Karathane	1.80	446.6	a b c d e f g	89.3
Karathane + Dithane Z-78	1.68	433.5	a b c d e f g	86.7
Daconil 2787	1.76	428.8	a b c d e f g	85.8
Siaprit	1.56	402.8	b c d e f g	80.6
Dyrene	2.32	400.2	b c d e f g	80.0
Micene	2.56	393.4	b c d e f g	78.7
Dithane M-22	2.48	390.1	b c d e f g	78.0
Polyram	2.08	366.8	c d e f g	73.4
Difolatan	2.52	339.9	g	68.0
Check	4.04	399.3	b c d e f g	79.9

* Rating of powdery mildew was on the scale of 0-5, 0 representing freedom from mildew and 5 representing a heavy infection.

**Numbers followed by the same letter are not significantly different at the 5% level. (Duncan's multiple range test).

CROP: Muskmelon, var. Honey Rock

PESTS: Powdery mildew, *Erysiphe cichoraceanum* D.C.; anthracnose, *Colletotrichum lagenarium* (Pass) E. & H.

TITLE: Evaluation of fungicides for the control of powdery mildew and anthracnose on muskmelon.

NAME AND AGENCY: SLINGSBY, K. and C.D. McKEEN, Research Station, Harrow, Ontario.

MATERIALS: Amounts given are for 100 gal Imp.
Morestan 25% W.P. 1 lb; Morestan 25% W.P. 0.5 lb + Dithane Z-78 75% W.P. 1 lb; PP781 (JF2067 40% colloidal formulation) 0.1%;

Dithane M-45 80% W.P. 3 lb; Morocide 50% W.P. 0.5 lb + Dithane Z-78 75% W.P. lb; Morocide 50% W.P. 1 lb; Organil 66 2 lb; PP781 (JF2067 40% colloidal formulation) o.1% + Dithane Z-78 75% W.P. 1 lb; Karathane W.D. 2 lb; Karathane W.D. 1 lb. + Dithane Z-78 75% W.P. 1 lb; Daconil-2787 75% W.P. 3 lb; Siaprit 3 lb; Dyrene 50% W.P. 3 lb; Micene 2 lb; Dithane M-22 80% W.P. 3 lb; Polyram 80% W.P. 3 lb; Difolatan 80% W.P. 3 lb; Triton B-1956 spreader sticker was used in all spray applications.

METHODS: The muskmelon seed was sown on May 2 in 3-inch peat pots containing sterilized soil. The seedlings were maintained in a greenhouse for 4 weeks prior to transplanting to the field on May 31. The experiments consisted of a randomized block design with 17 treatments and a check replicated 5 times. Rows were 5 feet apart with unsprayed buffer rows separating each sprayed row. Each sprayed plot was 30 feet long and contained 6 hills (each of 2 plants) set 5 feet apart in the row. Eight fungicide sprays were applied at 10-day intervals between June 15 and August 28 using a Rittenhouse sprayer operated at 100 p.s.i. All plants were sprayed to point of run-off. Four overall spray applications of Thiodan 50% W.P. 1 lb/100 gal provided insect control during the season. On July 20 all plots were inoculated with conidia of the powdery mildew fungus. This was followed by a blanket spray containing a water suspension of anthracnose spores. During August and September the plots were rated 5 times for incidence of mildew and anthracnose. Between August 11 and September 6 all ripe muskmelons of marketable size were harvested. The fruits were examined, graded, and yields recorded.

RESULTS: Effect of Fungicides on Powdery Mildew and Yield

Fungicides	Mean Rating Powdery Mildew	No. Fruit Harvested	Total Yield (lb)
Organil 66	1.8*	207	245.6**
Dyrene	2.3	175	238.7
Micene	2.5	199	233.3
Karathane	1.3	179	233.1
Dithane M-45	1.9	188	232.6
Morocide + Dithane Z-78	1.6	190	230.8
PP781 + Dithane Z-78	1.2	179	214.9
Morocide	1.2	179	213.4
Morestan + Dithane Z-78	0.7	163	211.9
Siaprit	1.4	180	208.9
Dithane M-22	1.6	172	206.3
Daconil 2787	1.2	160	203.1
Karathane + Dithane Z-78	1.1	167	202.1
Morestan	0.6	158	198.6
PP781	1.3	165	195.4
Difolatan	2.2	164	190.2
Polyram	1.4	149	187.7
Check	3.6	188	225.1

*Rating of powdery mildew was on the scale of 0.5, 0 representing no infection and 5 representing a heavy infection.

**No significant differences between treatments was obtained at the 5% level by application of Duncan's multiple range test.

CONCLUSIONS: The absence of any significant differences in yield between treatments suggests that little correlation exists between the severity of powdery mildew infection and yield. However, due to the late appearance of powdery mildew in the field most of the fruit set had already occurred, and therefore minimized the normal yield depression expected. All the fungicides used in the experiment gave some degree of powdery mildew control. Morestan and Morestan + Dithane Z-78 combination proved the most effective.

RESIDUE DATA: Muskmelon samples were collected by the Diamond Alkali Company for analysis of residues of Daconil-2787. No results to date.

GENERAL OBSERVATIONS: Due to an exceptionally dry season, anthracnose occurred only in trace amounts. No ratings of anthracnose control were made.

CROP: Seed onions, var. Aristocrat

PEST: Purple blotch, *Alternaria porri* (Ell.) Cif.

TITLE: Evaluation of Fungicides to control Purple Blotch

NAME AND AGENCY: SLINGSBY, K. and C. D. McKEEN, Research Station, Harrow, Ontario

MATERIALS: Amounts given are for 80 Imp. gal. of spray per acre. maneb (Dithane M-22) special 80% W.P. 2 lb.; mancozeb (Dithane M-45) 80% W.P. 2 lb.; Difolatan 80% W.P. 3 lb.; Daconil-2787, 75% W.P. 3 lb.; Organil-66, 2 lb.; Micene 2 lb.; Dyrene 50% W.P. 3 lb.; Polyram 80% W.P. 2 lb.
Triton B-1956 spreader sticker was used in all spray applications.

METHODS: The onion seed, treated with Arasan seed disinfectant, was sown with a Planet Junior seed drill in rows 16 inches apart on April 19. On May 4 a pre-emergence herbicide, Dacthal 75% W.P., was applied at the rate of 12 lb. in 100 gal./acre. One month after emergence, plants were hand thinned to 10 plants per foot of row.

Insect control was maintained by one overall application of Malathion 50% E.C. 1 qt. acre followed by two applications of DDT 50% W.P. 2 lb/ 100 gal./acre at 10-day intervals commencing June 2.

The experiment consisted of a randomized block design with eight treatments and a check each replicated six times. Each 20 feet of sprayed row constituted a replicate. Two unsprayed rows separated each replicate in the block. Six fungicide sprays were applied at 10-day intervals commencing June 20 and ending August 10. Sprays were applied with Zephyr knapsack sprayers and plants were sprayed to point of runoff. Following complete break-over of tops all replicates were hand dug, tops removed, bulbs inspected and weighed.

RESULTS: Marketable Yield in Pounds and Rating for Control of A. porri

Fungicide	Total Yield 6 Reps.	Average Yield	Disease Rating
maneb	64.5*	10.75	Nil
mancozeb	71.8	11.96	"
Difolatan	61.7	10.28	"
Daconil-2787	67.4	11.23	"
Organil	74.9	12.48	"
Micene	71.5	11.90	"
Dyrene	70.4	11.73	"
Polyram	64.8	10.80	"
Check	67.2	11.20	"

*No significant differences were obtained at the 5% level (Duncan's multiple range test).

CONCLUSIONS: Due to an unusually dry season and the unrelated cropping history of the location no diseases specific to onions were evident.

RESIDUE DATA: Analysis for residues of Daconil-2787 on onions are being conducted by Diamond Alkali Company. Results are not yet available.

GENERAL OBSERVATIONS: No phytotoxicity was observed from any of the treatments. Since considerable activity and build-up of thrips occurred late in the season in all plots, one or two additional sprays containing DDT should have been applied.

CROP: Potato, var. Green Mountain

PEST: Bacterial ring rot, *Corynebacterium sepedonicum* (Spiek and Kott.) Spat. and Burk.

TITLE: Disinfection of potato knife

NAME AND AGENCY: GENEREUX, H., Research Station, Canada Agriculture, La Pocatiere, Que.

MATERIALS: SCL 210:2, 10, 20, 40, 80, 100 and 200 p.p.m.; Kem-Germ (3%): 5 ounces per gallon.

METHODS: Potato sets cut with contaminated knife, then dipped for various lengths of time into disinfectant solution. This procedure was repeated until 25 sets had been cut. Cutting knife contaminated on diseased tubers, then dipped into disinfectant solution. (Instant and one-minute dips). Potato sets planted in field. Tubers examined at digging time. Results based on symptom expression of bacterial ring rot on tubers and on microscopic examination of smears from apparently healthy tubers.

RESULTS: Apparently healthy tubers were harvested following treatment of cutting knife (instant and one-minute dips) with SCL 210, 200 p.p.m. and with Kem-Germ (3%). Tubers were free of bacteria after treatment with Kem-Germ. Both chemicals were ineffective for disinfection of potato sets.

CONCLUSION: Kem-Germ appears quite effective for quick disinfection of cutting knife.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Potato

PEST: Black leg, *Erwinia atroseptica* (van Hall) Jennison

TITLE: DMSO as a seed treatment additive for control of potato black leg.

NAME AND AGENCY: ORMROD, D.J., B.C. Department of Agriculture, c/o Research Station, Canada Agriculture, Vancouver, British Columbia.

MATERIALS: Agristrep - 26.7% streptomycin sulfate; Iodine - 99.9%; DMSO - 99.9% dimethyl sulfoxide.

METHODS: Plots were located on a grower's farm in Pemberton, B.C. The treatments were 30 minute dips as follows: streptomycin sulfate - 200 ppm; iodine - 200 ppm; streptomycin sulfate - 200 ppm plus 2% DMSO; iodine - 200 ppm plus 2% DMSO; 5% DMSO. The experimental units were 100 lb. sacks of seed potatoes (var. Netted Gem) planted in single rows approximately 350 yards long. There were 5 replications arranged in randomized complete blocks. The seed was treated in 25 gal. drums on May 16, 1967. Cutting and planting was done on May 17, using a single row, hand fed, tuber-unit planter. The treatments were evaluated by recording the number of plants rogued for symptoms of black leg on two dates, July 4 and July 16. Only a trace of black leg infected plants showed up after the second roguing date. Yields were determined by digging 100 ft. of each plot on September 20.

RESULTS:

Treatment	No.Rogued out of Ca. 1056 plants (mean of 5 reps)	Yield of Tubers in Tons/Acre Marketable	Total
Streptomycin - 200 ppm	1.4 a*	20.3	21.2
Iodine - 200 ppm	7.0 bc	19.6	20.8
Streptomycin - 200 ppm + 2% DMSO	1.8 a	19.8	20.8
Iodine - 200 ppm + 2% DMSO	2.8 ab	20.3	21.5
DMSO - 5%	11.6 c	19.2	20.7
Check	20.2 d	19.4	20.7

*Numbers within columns followed by the same or no letter are not significantly different at the 5% level (Duncan's New Multiple Range Test)

CONCLUSIONS: Streptomycin at 200 ppm gave good control of black leg when used as a pre-cutting seed treatment. This is of significance for seed growers who wish to plant in tuber-units and cannot cut the seed before treatment. DMSO did not increase the effectiveness of streptomycin but it did appear to have some bactericidal activity when used alone. None of the treatments affected yield significantly and no rotted tubers were seen at harvest.

GENERAL OBSERVATIONS: The treated tubers were not completely dry at planting time and the resulting wet condition of the planter may have caused more than normal spread of black leg bacteria in the checks.

CROP: Potatoes, var. Irish Cobbler

PEST: Seed piece decay, *Erwinia atroseptica* and *Fusarium* spp.

TITLE: Evaluation of 4 Seed Treatments to Control Seed Decay of Potatoes

NAME AND AGENCY: SLINGSBY, K. and C. D. McKEEN, Research Station, Harrow, Ontario

MATERIALS: Semesan Bel. 1 lb. in 7.5 gal. water (wet dip); Captan 7.5% + Diazinon 0.1%, 1 lb. per 100 lb. seed (dust); Captan 30% + Diazinon 15%, 4 oz. in 7.5 gal. water (slurry); Polyram 7.000% + Diazinon 0.125%, 1 lb. per 100 lb. seed (Dust).

METHODS: Whole potato seed was machine cut and the seed pieces selected on the basis of soundness with each containing two or more eyes.

All treatments were applied in a rotating drum to ensure uniform coverage of seed pieces. A 24-hr. drying period in a well-ventilated room at a temperature of 50 to 60°F. followed.

The seed pieces were hand planted in plots on April 12 in a double latin square block design. Treatments including check were randomized and replicated ten times. Each plot consisted of a row 42 feet in length. Rows were spaced 40 inches apart.

Ten-inch planting distances and 50 seed pieces per plot were used throughout the experiment.

Overhead sprinkler irrigation supplemented natural rainfall to provide 1 inch of water per week to the crop during the active growing season.

Insects and early blight were controlled by regular sprays containing Thiodan 50% W.P. 1 lb. + Dithane M-22 1½ lb. in 150 gal. acre. Four spray applications were made at 10-day intervals commencing on June 9, using a John Bean field sprayer at 400 p.s.i.

On June 7 all plots were checked to record plant emergence. This was followed by two later observations to record the incidence of Blackleg, *Erwinia atroseptica*.

Four replicate plots from each treatment and check were hand dug on August 14 and 18 and the total ungraded yields were examined and weighed.

RESULTS:

Treatment	% Emergence (10 reps.)	% Infection (10 reps.) Blackleg	Yield Weight in lb. (4 reps.) Total	Yield Weight in lb. (4 reps.) Mean
Check	94.2	0.63	398	99.5
Semesan Bel	98.6	0.42	380	95.0
Polyram 7.000% + Diazinon 0.125% S.P.	98.4	0.63	377	94.25
Captan 7.5% + Diazinon 0.1%	99.6	0.42	363	90.75
Captan 30% + Diazinon 15%	98.8	1.26	331	82.70

CONCLUSIONS: Treatments failed to show any significant differences from non-treatments both in plant emergence and total yield. However, emergence data show a trend in favour of treated seed pieces. In contrast there was the suggestion that seed treatment depressed final yields slightly.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Nil.

CROP: Potato, var. Hunter

PEST: Fusarium coeruleum (Lib.) Sacc., a fungus causing seed-piece decay

TITLE: Seed treatment

NAME AND AGENCY: AYERS, G. W., Research Station, Canada Department of Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Polyram 7 Dust

METHODS: Sixteen randomized plots, each planted with 50 seed-pieces. The cut seed for 8 plots was dipped in spore suspension of F. coeruleum and half of this stock was then treated with Polyram 7 dust at the rate of 1.5 lb. per 100 lb. of seed pieces. Uninoculated seed-pieces for 4 other plots were given a similar dust treatment and another 4 plots were planted as untreated controls.

RESULTS:

Seed	Treatment	Plant Stand	Yield (lb.)
Spore inoculated	-	165	264.0
Spore inoculated	Polyram 7 Dust	185	353.5
Uninoculated	Polyram 7 Dust	186	352.0
Uninoculated	-	188	353.5

CONCLUSIONS: The fungal pathogen, Fusarium coeruleum, destroyed a significant number of seed pieces and caused an apparent reduction in vigor in plants from contaminated seed. Polyram 7 dust was shown to be an efficient protectant against this disease.

RESIDUAL DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Potato

PEST: Rhizoctonia, Pellicularia filamentosa (Pat.) Rogers

TITLE: Chemical control of Rhizoctonia

NAME AND AGENCY: WRIGHT, N.S., Research Station, Canada Agriculture, Vancouver, B.C.

MATERIALS: Rates are lb. actual quintozene per acre.
Terraclor E.C. 24%, Broadcast (potato var. Warba) 15, 30 and 60; (potato var. Netted Gem) 12.5, 25; In-row (potato var. Netted Gem) 5, 10 and 20. Terraclor Gran. 10%, Broadcast (potato var. Netted Gem) 12.5 and 25; In-row (potato var. Netted Gem) 20. Terraclor Super-X E.C. (23% quintozene and 6.1% Terrazole), Broadcast (potato var. Warba) 11, 22 and 44; (potato var. Netted Gem)

12.5, 25 and 45; In-row (potato var. Warba) 2.5, 5, 10 and 20; (potato var. Netted Gem) 2.5, 5 and 10. Terraclor Super-X Gran. (10% quintozene and 2.5% Terrazole), Broadcast (potato var. Netted Gem) 12.5, 25 and 45.

METHODS: Plots were located on clay loam in Richmond, B.C. A randomized block design with four replications was used. Broadcast treatments of E.C. formulations were made to ploughed and cultivated soil of Warba plots with a boom sprayer and to Netted Gem plots with a knapsack sprayer. Granular formulations were applied by hand. The soil was double disked or rototilled within 4 hours after the applications. Liquid in-row applications were made to the bottom and sides of drills with a knapsack sprayer; the granular formulation was applied by hand. The Warba and Netted Gem plots were planted on April 24 and May 19, respectively. All rows were 34 inches apart. Warba plots for broadcast treatments each contained two 35-foot rows and those for the in-row treatments contained two 25-foot rows. Netted Gem plots for broadcast treatments contained six 25-foot rows and those for in-row treatments contained two 25-foot rows. Stem infection was rated in Warba plots by examining all stems in 10 feet (in-row treatments) or 20 feet (broadcast treatments) of row in each plot on June 5. In Netted Gem broadcast treated plots all stems in 50 feet of row were examined on June 26 and in another 10 feet of row on August 4. Stems in 10 feet of row in each in-row treated plot were examined on June 26. Stems were rated as follows: 0 = no cankers, 1 = few superficial cankers, 2 = many superficial and 2 deep cankers, 3 = 3 or more deep cankers, 4 = stem completely girdled. A canker index was calculated for each treatment. Plots were harvested and graded on August 30 (Warba) and September 18 (Netted Gem). A sample of approximately 50 tubers was taken at random from each plot, stored for 2 weeks, washed and examined for sclerotia. Ratings used to calculate each sclerotial index were based on total surface covered by sclerotia as follows: 0 = no sclerotia, 1 = 0.5% or less, 2 = 1%, 3 = 3%, 4 = 5%, 5 = 7% or more.

RESULTS:

Potato variety Warba

Material	Quintozene lb/ac	Canker Index	Yield (tons/acre) Marketable	Total	Sclerotial Index
		In-row treatments			
Terraclor Super-X E.C.	2.5	0.8	5.9	7.1	2.2
Terraclor Super-X E.C.	5	1.0	5.6	7.0	1.4
Terraclor Super-X E.C.	10	0.6	6.4	7.5	1.9
Terraclor Super-X E.C.	20	0.8	6.2	7.4	2.0
Control		0.8	5.3	6.6	2.1
		Broadcast treatments			
Terraclor E.C.	15	0.9 ab	5.3 a	6.7 a	1.3
Terraclor E.C.	30	0.8 b	6.8 ab	8.4 bc	1.7
Terraclor E.C.	60	0.5 b	7.7 b	9.2 b	1.2
Control		1.4 a	5.6 a	7.6 a c	1.5
Terraclor Super-X E.C.	11	1.2 ab	6.2	7.7	1.9
Terraclor Super-X E.C.	22	0.9 b	6.2	7.5	1.1
Terraclor Super-X E.C.	44	0.4 c	6.5	8.6	1.2
Control		1.4 a	5.7	8.1	1.7

Means in each group followed by the same letter or no letter are not significantly different at the 5% level (Duncan's Multiple Range Test).

Potato variety Netted Gem

Material	Quintozene lb/ac	Canker Index June 26	Canker Index Aug.4	Yield (tons/acre) Mktbl.	Yield (tons/acre) Total	Sclerotial Index
In-row treatments						
Terraclor Super-X E.C.	2.5	0.9 a		19.6	22.3	0.4
Terraclor Super-X E.C.	5	1.0 a		18.9	21.5	1.1
Terraclor Super-X E.C.	10	0.9 a		18.1	20.9	0.9
Terraclor E.C.	5	1.4 ab		19.2	22.2	0.4
Terraclor E.C.	10	1.3 ab		19.3	22.4	0.5
Terraclor E.C.	20	1.2 ab		19.6	22.1	0.5
Terraclor Gran.	20	0.9 a		19.4	22.1	0.6
Control		1.8 b		19.4	22.8	0.5
Broadcast treatments						
Terraclor Super-X E.C.	12.5	1.2 ab	2.4 ab	21.2	24.8	1.3
Terraclor Super-X E.C.	25	0.9 bc	2.0 b	21.0	23.9	0.9
Terraclor Super-X E.C.	45	0.7 c	1.6 b	21.6	24.8	0.9
Control		1.3 a	3.3 a	20.7	25.4	1.7
Terraclor Super-X Gran.	12.5	1.8 a	2.5 abcd	19.3	21.0	1.5 ab
Terraclor Super-X Gran.	25	0.9 b	1.9 bcd	21.7	26.0	.7 b
Terraclor Super-X Gran.	45	1.0 b	1.6 d	20.7	24.3	.6 b
Terraclor E.C.	12.5	1.1 bc	3.0 ab	23.5	27.8	2.2 c
Terraclor E.C.	25	1.1 bc	2.9 abc	20.9	25.4	2.2 c
Terraclor Gran.	12.5	1.4 abc	2.3 bcd	22.7	25.9	1.1 ab
Terraclor Gran.	25	1.4 abc	2.8 abc	20.5	26.0	1.6 c
Control		1.6 a	3.6 a	20.0	22.7	2.3 c

Means in each group followed by the same letter or no letter are not significantly different at the 5% level (Duncan's Multiple Range Test).

CONCLUSIONS: In-row applications of quintozene at rates up to 20 lb. per acre on clay loam soil gave inconsistent control of Rhizoctonia stem cankers on Warba and Netted Gem potato. They also failed to improve yield or to reduce the incidence of tuber borne sclerotia. Thoroughly incorporated broadcast applications at rates of 30, 44 and 45 lb. per acre reduced stem infection but did not increase yield. A 60 lb. rate which was used only in Warba plots controlled stem infection and increased marketable and total yield. A granular formulation of Terraclor Super-X applied as a broadcast treatment to Netted Gem plots at rates of 25 and 45 lb. quintozene per acre reduced stem cankers and tuber borne sclerotia.

RESIDUE DATA: 1967 - nil; 1966 - Potato tubers grown in plots on clay loam soil were harvested on September 21, 1966 and analysed at the B.C. Department of Agriculture Pesticide Laboratory on January 3, 1967. Extractions were made from peels and peeled tubers. Analysis of duplicate samples showed residues as follows:

Material	Rate/acre lb. actual quintozene	p.p.m. quintozene[a)] Peel	Peeled potato
Terraclor Super-X E.C.	15	0.004	Nil
Terraclor Super-X E.C.	15	0.004	Nil
Terraclor Super-X E.C.	30	0.006	Nil
Terraclor Super-X E.C.	30	0.008	Nil
Terraclor	30	0.006	Nil
Terraclor	30	0.010	Nil
Terraclor	60	0.010	Nil
Terraclor	60	0.020	Nil
Control	0	Trace	Nil
Control	0	Trace	Nil

a) pentachloronitrobenzene

GENERAL OBSERVATIONS: Growing conditions in the 1967 Netted Gem plot area were favourable. Conductivity readings on a Bouyoucos bridge indicated adequate soil moisture throughout the season at the 6, 12, and 18-inch levels. Better than average yields and grades were obtained.

CROP: Potato, var. Green Mountain

PEST: Late blight, *Phytophthora infestans* (Mont.) de Bary.

TITLE: Screening of fungicides

NAME AND AGENCY: CALLBECK, L. C., Research Station, Canada Department of Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Amounts given are for 120 Imp. gals. per acre
Brestan 60, 7.0 oz.; Cela A-36 (Decafentin), 7.0 oz.; Cufram Z, 1.5 lb.; Daconil 2787, 1.0 lb.; Difolatan, flowable, 1.2 qt.; Difolatan 80W, 1.5 lb.; Dithane M-45, 1.5 lb.; Du-Ter, 1.0 lb.; Fennite, 1.5 lb.; Organil 66, 1.5 lb.; Polyram 80W, 1.5 lb., RH-90, 2.4 lb.; Siaprit, 3.7 lb.

METHODS: Randomized block design; plots 4 rows by 50 feet and buffered by unsprayed rows; 4 replicates; 13 treatments and unsprayed control. Treatments were applied with a power sprayer at 120 gallons per acre, 8 applications being made between July 18 and September 12, with a mean interval of 8 days. Insects were controlled by spraying all rows with endosulfan at appropriate times. The buffer rows were inoculated on July 29 by sprinkling the foliage with a water suspension of spores produced on cultures of race 1, 2, 3, 4, 5, 6, 7 and race 1, 3, 4, 6, 7, 8. The disease established itself at a moderate pace through August and accelerated rapidly in September, rain prevailing through the first six days of that month. The defoliation of the unsprayed controls reached 80 percent on September 5 and differences in the fungistatic abilities of the test products were becoming apparent. The test was terminated by spraying the plants with sodium arsenite on September 18 and the tubers were lifted in the first week of October.

RESULTS:

DEFOLIATION, YIELD, AND TUBER ROT

Fungicide	Defoliation %	Total bu./ac.	Smalls bu./ac.	Rot bu./ac.	No. 1 bu./ac.	Rot %
Brestan 60	40	296.1	43.1	4.8	248.2	1.7
Cela A-36	80	269.5	46.0	4.2	219.3	1.6
Cufram Z	68	242.2	37.6	15.4	189.2	6.3
Daconil 2787	43	259.4	31.4	6.4	222.6	2.5
Difolatan, flowable	22	296.1	30.6	2.2	263.3	0.7
Difolatan 80 W	34	259.6	35.2	2.0	222.4	0.8
Dithane M-45	18	314.8	35.2	13.2	266.4	4.2
Du-Ter	54	272.6	51.3	9.0	212.3	3.3
Fennite	54	251.9	35.4	8.6	207.9	3.4
Organil 66	23	306.2	34.5	11.0	260.7	3.6
Polyram 80 W	41	255.4	33.9	13.6	207.9	5.3
RH-90	20	317.7	35.4	9.5	272.8	3.0
Siaprit	40	263.5	34.5	9.7	219.3	3.7
Check	100	184.4	44.5	5.7	134.2	3.1
L.S.D. 5%	38.1				30.0	2.5
L.S.D. 1%	51.0				40.1	3.4

CONCLUSIONS: Under the severe disease condition in 1967, Dithane M-45, RH-90, Difolatan (flowable), and Organil 66 gave the best control of foliage blight. Plots treated with Difolatans had the smallest percentages of loss from tuber rot.

RESIDUAL DATA: Nil

GENERAL OBSERVATIONS: None of the fungicides showed visible phytotoxic effects.

CROP: Potato, var. Irish Cobbler

PEST: Late blight, *Phytophthora infestans* (Mont) de Bary.

TITLE: Screening potato fungicides, 1967.

NAME AND AGENCY: PASS, H.A.; WATT, B.J.; NURSE, M., Research and Technical Development Department, Green Cross Products, 2875 Centre St., Montreal, Quebec.

MATERIALS: Amounts given are for 80 Imp. gals.
Difolatan, 1 lb.; Micene, 1 lb.; Organil, 1 lb.; du-Ter, 1 lb.; Maneb (M-22), 1 lb.; Daconil, 0.75 - 1 lb.; Daconil, 1 - 1.5 lb.; Zineb 85, 1.7 lb.; Siaprit, 3 lb.; D-342-59, 2 lb. + Zinc Sulfate, 1 lb.; D-342-59, 1 lb. + Zinc Sulfate, 0.5 lb.

METHODS: Randomized block design; plots 3 rows by 10 feet; 3 replicates; 11 treatments and unsprayed check. Treatments applied by compressed air sprayer, 7 applications being made between July 26 and September 7. Daconil rates increased August 16, with 4 applications at higher rate. Three sprays of Sevin 50W applied for insect control. Periodic blight ratings made starting August 23 until frost terminated the trial in late September.

RESULTS:

Chemical	Per cent Defoliation Aug. 23	Sept. 4	Sept. 16	Sept. 23
Siaprit	6.0	25.3	51.6	84.6
Daconil (1-1.5 lb.)	3.0	14.3	50.0	86.3
du-Ter	15.0	37.6	65.0	88.3
Difolatan	15.0	26.6	66.6	92.0
Daconil (0.75-1 lb.)	6.0	28.3	63.3	93.0
Zineb	7.0	41.0	76.3	95.6
Maneb	7.0	8.6	55.0	96.0
D-342-59 (1 lb.)	10.0	31.6	98.0	98.0
D-342-59 (2 lb.)	5.0	25.3	86.6	99.0
Micene	12.0	26.6	90.0	99.3
Organil	12.0	45.0	83.3	100.0
Untreated check	15.0	60.0	100.0	100.0

Chemical	Yield (lb./3 reps.)	Percent tuber rot
du-Ter	92.00	3
Daconil (1-1.5)	93.00	3
Siaprit	104.80	4
Difolatan	101.80	4
Zineb	109.70	5
Maneb	107.05	5
Daconil (0.75 - 1)	77.80	6
D-342-59 (2)	80.50	6
Micene	116.25	7
Organil	92.55	8
D-342-59 (1)	77.30	10
Untreated check	76.80	21

CONCLUSIONS: Though blight was severe and defoliation high, tuber rot was well controlled by most of the treatments.

RESIDUE DATA: Analyses of du-Ter treated tubers has been undertaken.

GENERAL OBSERVATIONS: Low night temperatures accompanied by heavy dews resulted in ideal blight conditions in September.

CROP: Potato, var. Katahdin

PEST: ---

TITLE: To determine the potential of linuron as a potato top killer

NAME AND AGENCY: BRANDIS, W. B. A., Technical Department, Niagara Brand Chemicals, Burlington, Ontario

MATERIALS: Amounts per 25 Imp. gal. water per acre: linuron 50 WP, 1.0 lb. and 2.0 lb., each with 3 gal. Agroil; sodium arsenite, 6.5 pints.

METHODS: Plots were approximately 0.5 ac. Applications were made on Sept. 7 with a Myers airblast sprayer. Potato foliage was healthy. Weeds were mainly lamb's-quarters, redroot pigweed, and barnyard grass but the populations were small, linuron having been applied on June 1 at 3.0-3.5 lb./ac. The kills of potato tops and weeds were rated on September 8, 12, 15, readings being made on 10 feet of row in 4 locations in each plot.

RESULTS: Potato Top and Weed Killing Ratings*

Treatments	Potato Foliage			Potato Stems			Broadleaves			Ann. Grasses		
per/ac.	9/8	9/12	9/15	9/8	9/12	9/15	9/8	9/12	9/15	9/8	9/12	9/15
Linuron 50 WP 1 lb. + 3 gal. Agroil	2	8	10	0	7	9	0	7	8	1	7	8
Linuron 50 WP 2 lb. + 3 gal. Agroil	3	10	10	0	9	9.5	2	9	9	2	8	8
Sodium arsenite 6.5 pints	5	10	10	2	9	9.5	3	8	9	4	8	8

* Complete kill = 10; No effect = 0.

CONCLUSIONS: Linuron caused slower kill than sodium arsenite. Linuron at the lower dosage was slightly less effective than sodium arsenite; at the higher dosage it was equally effective as the arsenite. Top kill obtained with linuron 50 WP at 1.0 lb. plus oil was acceptable for commercial potato production.

RESIDUAL DATA: Samples from the linuron treatments were taken for residual analyses.

GENERAL OBSERVATIONS: Additional tests, using other varieties of potatoes, are needed.

CROP: Potato, var. Green Mountain

PEST:

TITLE: Potato top killing

NAME AND AGENCY: CALLBECK, L. C., Research Station, Canada Department of Agriculture, Charlottetown, Prince Edward Island.

MATERIALS: Amounts given are for one acre, applied in 120 gallons of water. Des-I-Cate, 3 and 5 gal.; diquat, 1 pt. and 1 qt.; paraquat, 1 qt. and 1 pt. + 2 gal. fuel oil + 8 oz. wetting agent; sodium arsenite, 1 gal.; WD-1, 1 pt., 1 qt. and 1 pt. + 0.5 pt. sodium arsenite; WL9385, 4 lb. and 4 lb. + 2 gal. fuel oil.

METHODS: The chemicals were applied to healthy, large plants on September 11. Weather conditions were good. Daytime temperatures for the week beginning September 11 averaged 68.6°F. The maximum was 77.0. Except for a trace of rain on the first day, fine weather prevailed, 5 days being sunny.

RESULTS: The reactions were observed daily and at the end of one week the test materials were rated Good (complete death), Moderate (some green stems), Fair (incomplete kill of leaves), Poor (only light leaf injury).

Good - Sodium arsenite at 1 gal.; diquat at 1 pt. and 1 qt.; paraquat at 1 qt. and at 1 pt. + 2 gal. oil + 8 oz. wetting agent; Des-I-Cate at 5 gal.

Moderate - Des-I-Cate at 3 gal.

Fair - WD-1 at 1 qt. and at 1 pt. + 0.5 pt. sodium arsenite; WL 9385 at 4 lb. + 2 gal. oil.

Poor - WD-1 at 1 pt.; WL 9385 at 4 lb.

RESIDUAL DATA: Nil

GENERAL OBSERVATIONS: Nil

CROP: Sugar beet

PEST: *Pythium* spp.

TITLE: Screening Fungicides and Insecticides as Seed Treatments for Sugar Beet

NAME AND AGENCY: PREE, D.J. and KONECNY, J., Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario.

MATERIALS: Dexon 70 WP, captan 50% WP, Terraclor 75 WP, Di-Syston Technical, 98% methyl bromide.

SOIL TYPE: Brookston clay, sandy spot phase, composted sod.

METHODS: Chemicals applied to dry seed (monogerm, size 8 - 9½) in plastic bags with 3 c.c. of tap water at 68°F. February 7, 1967. Seed and chemical shaken 2 minutes. Methyl bromide applied as a gas to soil in a sealed box. Plots seeded in greenhouse, 1 plot per flat, February 8, 1967, 100 seeds per plot, 4 replications. Total emergence recorded, counts twice weekly beginning February 17. Final counts April 7, 1967. Samples of soil and diseased seedlings examined by Dr. B.H. MacNeill, Department of Botany, University of Guelph.

RESULTS: See table.

CONCLUSIONS: Dexon alone or in combinations gave good control of *Pythium* in both seedling emergence and over the thirty day experimental period. Captan and captan-Di-Syston combinations gave good control at emergence but the stand was slightly reduced after thirty days. These reductions were significant only in the treatment having captan and Di-Syston at 2 + 2 oz/100 lb. Terraclor and Terraclor-Di-Syston combinations did not control Pythium. Check treatments and those having only Di-Syston showed reduced emergence and the seedling stand was significantly reduced after thirty days. Methyl bromide did not control Pythium. Combinations of Dexon, Terraclor and Di-Syston provided good control of Pythium at emergence and over the thirty day period. There were no indications that any of these chemicals were phytototix to sugar beets.

RESIDUE DATA: Nil.

OBSERVATIONS: Adequacy of the soil treatment using methyl bromide is suspect.

TABLE

Percentage Emergence and Percentage Stand at 30 Days

Treatment	Product /100 lb Seed	% Emergence	Stand at 30 Days %
Dexon	2 oz	100.0a	100.0a
	4 oz	95.3a	94.8ab
captan	2 oz	98.3a	93.3ab
	4 oz	99.0a	94.3ab
Terraclor	2 oz	54.8b	36.5d
	4 oz	56.3b	34.0d
Di-Syston Technical	2 oz	59.8b	35.8d
	4 oz	56.3b	32.3d
Dexon + Di-Syston	2 + 2 oz	99.5a	98.8a
	2 + 4 oz	97.8a	96.5ab
	4 + 2 oz	96.8a	95.8ab
	4 + 4 oz	95.8a	95.0ab
captan + Di-Syston	2 + 2 oz	94.8a	86.0b
	2 + 4 oz	98.8a	92.8ab
	4 + 2 oz	95.5a	90.8ab
	4 + 4 oz	95.5a	91.3ab
Terraclor + Di-Syston	2 + 2 oz	68.0b	51.8c
	2 + 4 oz	61.5b	40.5d
	4 + 2 oz	56.3b	34.3d
	4 + 4 oz	53.5b	33.3d
Terraclor + Dexon	2 + 2 oz	99.3a	99.3a
	2 + 4 oz	98.3a	97.5a
	4 + 2 oz	99.8a	99.8a
	4 + 4 oz	99.8a	99.3a
Terraclor + Dexon + Di-Syston	2 + 2 + 2 oz	97.8a	97.0a
	2 + 2 + 4 oz	96.5a	96.3ab
	2 + 4 + 2 oz	96.8a	96.5ab
	4 + 2 + 2 oz	99.3a	97.5a
	4 + 4 + 4 oz	98.5a	98.0a
	4 + 4 + 2 oz	97.8a	96.8a
	4 + 2 + 4 oz	100.0a	99.5a
	2 + 4 + 4 oz	95.8a	93.8ab
methyl bromide	5 oz/cu yd	59.3b	39.8bd
Check		59.0b	38.0bd

Note: Figures followed by similar lettering not significantly different at 5% level (Duncan's Multiple Range Test).

HOST: Flue-cured tobacco var. Hicks Broadleaf.

PEST: Fungi including Rhizopus spp. causing pole rot of tobacco leaves during curing.

TITLE: Chemical control of pole-rot of flue-cured tobacco.

NAME AND AGENCY: GAYED, S.K. and WALKER, E.K., Canada Agriculture Research Station, Delhi, Ontario.

MATERIAL: Allisan 50%: Boots product containing 50% dichloran (2,6-dichloro-4-nitroaniline).

METHOD:

Tobacco leaves approaching maturity were harvested and tied to laths. Sixty laths, each carrying 84 leaves were prepared for curing and subdivided into five groups of 12 laths each. Treatments in each group were as follows: (a) Leaves fully dipped in a suspension containing 1 lb Allisan 50% in 50 gal water; (b) Proximal half of leaves only dipped in same suspension; (c) Leaves fully dipped in water; (d) Proximal half of leaves only dipped in water; (e) Leaves untreated. The treated laths were hung in the open until drip-dry and all 60 laths then were randomized into four chambers each possessing three tiers. Yellowing conditions were imposed in the chambers for 7 days; colour fixation and drying required 3 days. The cured leaves were subsequently examined for presence of rot and were rated on a scale of 0 to 5 (0 = free, 5 = covered with rot).

RESULTS:

Pole Rot Assessment

Treatment of Tobacco Laths	No. of Laths Attacked	No. of Leaves Infected	Average rating, 0 to 5
Whole leaf dipped dichloran	3	7	0.5
Proximal half dipped dichloran	2	2	0.4
Whole leaf dipped water	8	31	0.75
Proximal half dipped water	6	22	1.00
Check(untreated)	10	61	1.2

CONCLUSIONS:

Treatment of the whole tobacco leaf or the proximal half of it with dichloran considerably reduced the incidence of pole rot. Dipping in water may also help reduce the amount of disease since such treatment may remove fungal vegetative or reproductive units from the leaf surface. The efficacy of dichloran in checking the disease was expressed by the reduction in number of attacked laths, by reduction in the total number of leaves attacked, and by reduction in disease rating.

RESIDUE DATA: Not yet determined.

HOST: Flue-cured Tobacco var. Hicks Broadleaf.

PEST: A fungus, Thielaviopsis basicola.

TITLE: Control of black root rot of flue-cured tobacco.

NAME AND AGENCY: GAYED, S. K., Canada Agriculture, Research Station, Delhi, Ontario.

MATERIALS: Vorlex, Vorlex 201, Chloropicrin, SD345 (Allylidene diacetate).

METHODS: Experiment was carried out at Paloots' Farm, Windham Township, Norfolk County; Brady sandy loam soil. Experiment contained 42 plots in 3 ranges. Plots of single rows separated by guard rows; plots 70' long, spaced 42" between rows and 24" between plants; 13 treatments and a check in a randomized block design; 3 replications. Previous crops: tobacco since 1955 and the soil is artificially infested with black root rot. Row applications of the fumigants were at the following rates per acre: Vorlex, 5, 10 and 15; Vorlex 201, 4, 8 and 12; chloropicrin 3, 6 and 9 gals. Chisel placement of the fumigants on May 24 using one row gravity-flow applicator. Ridges opened June 5 and tobacco planted June 8. SD345 was applied in the planting water at the rates 0.5, 1.0, 1.5 and 2.0 ml/5 gals water. Stand was rated on July 10; after harvesting data on topped stalks as well as roots were obtained and root lesion was rated.

RESULTS: See table on following page.

CONCLUSIONS: Row treatment with Vorlex at 10 and 15, Vorlex 201 at 12 and chloropicrin at 3, 6 and 9 gals/acre were effective in checking black root rot infection. SD345 treatment at 0.5, 1.0, 1.5 and 2.0 ml/5 gals planting water had no effect on black root rot infection and the last 3 levels were toxic to tobacco plants.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

Treatment		Stand Rating 10 = best	Shoot length cm	Topping height cm	Stalk dry wt. g	Root dry wt. g	Root lesion rating 0 - 5 5 = v. severe
Vorlex, 5 gals/acre		4.17	21.8	65.7	47.89	46.60	3.0
Velex, 10 " "		5.50	26.7	77.0	67.98	61.57	2.7
Vorlex 15 " "		6.67	32.3	77.7	70.00	65.49	2.3
Vorlex 201, 4 gals/acre		5.00	23.7	68.3	48.60	45.17	3.3
Vorlex 201, 8 " "		5.17	24.7	73.0	49.39	44.59	3.0
Vorlex 201, 12 " "		6.17	27.3	83.0	52.61	48.20	2.3
Chloropicrin, 3 gals/acre		7.33	33.0	86.7	57.48	53.68	2.3
Chloropicrin, 6 " "		7.83	34.7	74.7	58.80	53.45	2.0
Chloropicrin, 9 " "		7.67	33.7	74.7	48.60	46.26	2.3
SD345 0.5 ml/5 gals water		3.50	24.7	57.7	46.72	43.70	3.0
SD345 1.0 ml/" " "		3.50	20.7	68.3	51.70	48.56	3.0
SD345 1.5 ml/" " "		3.17	16.7	67.0	49.85	48.25	3.3
SD345 2.0 ml/" " "		2.83	16.7	64.7	55.52	51.29	3.0
Check		4.67	22.0	75.0	55.66	50.07	3.3
L.S.D.	.05	1.74	7.75	NS	11.87	11.11	.46
	.01	2.35	10.45		16.01	N.S.	.62
C.V.	%	20%	18%		13%	13%	10%

CROP: Field tomatoes, var. Heinz 1350

PESTS: Septoria leaf spot, *Septoria lycopersici* Speg.; anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes.

TITLE: Evaluation of Fungicides to Control Septoria Leaf Spot and Anthracnose on Tomatoes

NAME AND AGENCY: SLINGSBY, K. and C.D. McKEEN, Research Station, Harrow, Ontario.

MATERIALS: Rates given are for 100 Imp. gal/acre.
Dithane M-22 Special 80% W.P. 3 lb; Dithane M-45 80% W.P. 3 lb; Polyram 80% W.P. 3 lb; Difolatan 80% W.P. 3 lb; Daconil 2787 75% W.P. 3 lb; Organil 66 2 lb; Micene 2 lb; Siaprit 3 lb; Dyrene 50% W.P. 3 lb; duPont 1991 9 oz + surfactant F. 2 oz; Dithane Z-78 2 lb; Triton B-1956 spreader sticker was used in all sprays with the exception of duPont 1991.

METHODS: The experiment consisted of a randomized block design with 12 treatments including check replicated 6 times. Rows were spaced 5 feet apart with an unsprayed buffer row separating each sprayed row in the block. Each plot measured 20 feet in length and contained 9 plants spaced $2\frac{1}{2}$ feet apart in the row. Commencing July 4 and continuing to September 18 nine fungicide sprays were applied at 7- to 8-day intervals using low pressure knapsack sprayers. All the plants were sprayed to the point of run-off. On August 1 a water suspension of Septoria leaf spot inoculum was sprayed over the entire block. Seasonal insect control was maintained by making regular applications of Thiodan 50% W.P. 1 lb/100 gal. using a John Bean field sprayer operated at 400 p.s.i. On August 29 and September 18 all the plots were rated for incidence of Septoria leaf spot. On September 13 and again September 18 one bushel of red ripe tomatoes was picked at random from each of the treatments and check. The tomatoes were held in a non-heated shed for 5 days and then rated for infection with anthracnose.

RESULTS: See table.

CONCLUSIONS: Due to the dryness of the season Septoria leaf spot infection developed late and with less severity than that experienced during previous years. All fungicides, however, gave some control of Septoria leaf spot. Du Pont 1991 and Micene, in particular, appear to be very promising. Most of the fungicides also gave good control of anthracnose. No phytotoxicity was observed from any of the treatments at the rates of applications used.

RESIDUE DATA: Tomato samples were collected by the Diamond Alkali Company for Daconil 2787 residue analysis. No results to date.

GENERAL OBSERVATIONS: Incidence of blossom-end rot and Verticillium wilt were higher than usual.

TABLE:

Effect of Fungicides on Septoria Leaf Spot and Anthracnose of Fruit

Fungicide	Septoria Leaf Spot Rating	% Anthracnose Infected Fruit	Average No. of Lesions per Infected Fruit
Difolatan	1.6*	3.0	1.8
Daconil 2787	1.0	3.0	2.0
Dyrene	0.5	4.5	2.1
Polyram	0.8	8.0	2.3
Dithane M-22	0.5	8.0	2.6
Dithane M-45	0.3	10.0	2.7
Micene	0.1	6.5	5.0
Organil	0.3	10.0	3.3
Dithane Z-78	0.5	10.5	4.0
Siaprit	0.5	12.5	3.4
du Pont 1991	0.1	14.0	3.5
Check	2.0	25.0	4.4

*Rating of Septoria leaf spot was on the scale of 0-5, 0 representing freedom from infection and 5 representing heavy infection.

DISEASES OF CEREAL AND FORAGE CROPS

edited by

H.A.H. Wallace

CROP: Barley, var. Conquest.

PEST: Common root rot, *Cochliobolus sativus*.

TITLE: Effects of seed treatments on
I. common root rot
II. yield of grain

NAME AND AGENCY: MILLS, J. T., Research Laboratory Canada Agriculture, Winnipeg, Manitoba.

MATERIALS: Panogen Px (P.C.P. No. 9201) and Pandrinox A-Px (P.C.P. No. 9472) from Morton Chemical Company, G696-75W from Uniroyal Chemical Company and Polyram-80WP (P.C.P. No. 9818) from Niagara Chemical Company.

METHOD: A 5 x 5 latin square of 12 x 20 ft. plots. Each plot had 16 rows, 9 inches apart. The seed was treated and sown 3 inches deep in clay loam soil at Glenlea Manitoba on 5 June 1967. A 4 row self propelled seeder set at 2 bushels per acre was used. The moisture supply was adequate at seeding and further supplemented by 1.8 inches of rain during the subsequent 15 days. For dosages of chemicals see table 1.

All the plants were harvested on 25 August. Root rot was assessed on 26 September from 100 plants chosen at random from each plot.

RESULTS: Disease ratings for common root rot and yields of grain were as in Tables 1 & 2.

Table 1.

Treatment	Dosage (oz./ bushel)	Common Root Rot* ($)					
		Replicate					Means
		1	2	3	4	5	
Control	-	44.4	45.8	45.2	45.2	43.0	44.7
Panogen Px	2.0	40.6	43.2	42.6	39.8	35.6	40.4
Pandrinox A-Px	2.5	43.2	44.0	39.2	45.0	28.6	40.0
G696	1.0	43.4	30.8	39.2	41.6	35.6	38.1
Polyram	2.0	44.0	41.6	40.4	36.4	36.4	39.8

*Assessed on scale 0-5.

Table 2.

Treatment	Yield (grams per 240 sq. ft. plot)					Means
	Replicate					
	1	2	3	4	5	
Control	3435	3547	4470	4285	3020	3751
Panogen Px	4730	3330	3127	4324	3960	3894
Pandrinox A-Px	3227	4200	4030	4305	3993	3951
G696	2880	3027	3440	4250	3665	3452
Polyram	3583	4187	4134	3670	3820	3879

Common root rot ratings did not differ significantly between the treatments and the untreated control. Yields of grain were also not significantly affected by the seed treatments.

CONCLUSIONS: Panogen PX, Pandrinox A-Px, G696 and Polyram applied to seed did not reduce infection of barley by *C. sativus*. None of the seed treatments produced significant increases in yield of grain as compared to the control.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The barley seed used had 60% *C. sativus* infection as shown by a filter paper test. Sub-crown internodes from plants in the control, Panogen, and Pandrinox treated plots were examined for lesions 24 and 57 days after sowing. Lesions were apparent at 24 days on control plants only and at 57 days on plants in the control, Panogen and Pandrinox treated plots. Treatment with Panogen and Pandrinox probably controlled the *C. sativus* infection from the seed. *C. sativus* was isolated from 95% of lesions on plants in the control, Panogen, Pandrinox, G696 and Polyram treated plots at harvesting time. Later infection of the internodes was probably from the soil.

CROP: Barley

PEST: Common root rot, *Cochliobolus sativus*

TITLE: Effects of seed treatments on
I common root rot
II yield of grain

NAME AND AGENCY: Tinline, R. D. and B. J. Sallans, Research Station, Canada Agriculture, Saskatoon, Saskatchewan.

MATERIALS: Orthocide 75 (Captan), 1 3/4 oz/cwt; Panogen 15, 3/4 fl. oz/bu.

METHODS: Treated and untreated seed of four barley varieties was sown in split-plot randomized block tests having six replications, at three locations in Saskatchewan. Seed was treated 2 to 4 weeks prior to planting. Plot land was fallow in 1966 and cropped to wheat in 1965. Depth of seeding was 2½ to 3 inches.

RESULTS: Table 1. Common root rot ratings (%)

Experiment	Location	Seed treatment	Olli	Conquest	Parkland	Montcalm	Treatment means
1	Regina	None	73	32	42	58	51
		Captan	73	38	40	61	53
		Panogen	70	36	38	54	49
2	Scott	None	83	50	49	78a	65
		Captan	82	45	48	71a	62
		Panogen	79	50	53	58 b	60
3	Saskatoon	None	72	69	69	77	72
		Captan	84	67	65	82	74
		Panogen	91	71	64	70	74

Treatment means unlettered or appended by the same letter do not differ significantly within varieties or experiments.

Table 2. Yields of grain (g/33 ft^2 of plot)[1]

Experiment[2]	Location	Seed treatment	Olli	Conquest	Parkland	Montcalm	Treatment means
2	Scott	None	121	504	370	504	374
		Captan	192	484	413	475	391
		Panogen	175	506	431	454	392
3	Saskatoon	None	500	695	677	678	637
		Captan	560	674	677	691	650
		Panogen	497	745	688	673	650

[1] Means do not differ significantly.
[2] Severe shattering precluded comparisons of plot yields in experiment 1.

CONCLUSIONS: The seed treatment compounds generally had little influence on common root rot and yields of grain.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Good varietal differences in disease reaction maintained except at Saskatoon where the level of disease was uniformly high.

CROP: Oats

PEST: Stem rust, Puccinia graminis Pers. f. sp. avenae Erikss. & Henn. and crown rust, Puccinia coronata Corda f. sp. avenae Erikss. & Henn.

TITLE: Assessment of chemicals for the control of rusts of oats.

NAME AND AGENCY: HAGBORG, W. A. F., Research Station, Canada Agriculture, Winnipeg.

MATERIALS: 2,3-Dihydro-5-carboxanilido-6-methyl-1,4-oxathiin-4,4-dioxide (Plantvax, F461) 75W; nickel chloride hexahydrate; Dithane Z-78 (zineb) 65%.

METHODS: A 6 x 6 latin square with test plots of Kelsey oats each having guard rows of winter wheat on both sides and both ends. Plots, 5 rows 12 ft. long of which 10 ft. of the three central rows were harvested. On Red River clay soil at Glenlea, Man. Fertilizer 41 lb N 82 lb P as P_2O_5/ac. Inoculation with crown rust June 29, 1967. For dosages of chemicals and dates of application, please see Table 1. A surfactant, Triton X-100 at 0.1% was used throughout the test. Examinations for crown rust and stem rust were on July 7.

RESULTS: Please see Table 1.

CONCLUSIONS: All treatments reduced crown rust on the flag leaves and stem rust significantly and increased yield only slightly though significantly.

RESIDUE DATA: Being determined by supplier

GENERAL OBSERVATIONS: The monetary increase per acre was small in oats ($4.53 - $5.92/acre) and might not cover costs of material and application.

Table 1. Control of crown rust and stem rust in Kelsey oats with Plantvax (F461) and nickel-zineb applied to the foliage at Glenlea, Man. in 1967.

Fungicide and rate of application (lb/ac[+])	Dates applied: July 11	July 21	Aug. 2	Crown rust, flag leaf (%)	Crown rust, lower leaves (%)	Stem rust (%)	Bushel weight (lb)	Yield (bu/ac)	Official grade	Monetary gross per acre basis lakehead ($)	Monetary increase per acre ($)
Plantvax 3 3 3	X	X	X	0.6 a	48 a	19 ab	38.5 abc	59.8 a	Ex 3 CW	55.32	5.00
Plantvax 3 3	X	X		0.8 a	52 ab	15 ab	38.4 bc	60.2 a	Ex 3 CW	55.69	5.37
Plantvax 3 3	X		X	0.6 a	49 a	15 ab	39.1 a	60.8 a	Ex 3 CW	56.24	5.92
Plantvax 3 3		X	X	0.9 a	52 ab	25 b	38.3 bc	59.3 a	Ex 3 CW	54.85	4.53
Nickel-zineb 2.3 2.3 2.3	X	X	X	0.5 a	45 a	7 a	38.8 ab	60.2 a	2 CW	57.34	7.02
Surfactant only	X	X	X	8.2 b	65 b	40 c	37.9 c	54.4 b	Ex 3 CW	50.32	--

+ Basis pure chemical

‡ Means flanked by the same letter are not significantly different at the 5% level (Duncan's multiple range test).

<u>CROP</u>: Rape

<u>PESTS</u>: Grey leaf spot, *Alternaria brassicae* (Berk.) Sacc.
Western flea beetle, *Phyllotreta pusilla* Horn.

<u>TITLE</u>: Effect of seed treatments on stand of rape.

<u>NAME AND AGENCY</u>: WALLACE, H. A. H., Research Station, Canada Agriculture, Winnipeg.

<u>MATERIALS</u>: Thiralin, Gammasan, Lindasan, G696-75W, Polyram, F849, Drillbox Bunt-no-more, Polyram-lindane.

<u>METHODS</u>: Tests replicated six times were planted at Experimental Farms at Morden, Brandon and Winnipeg. Two hundred seeds were sown per plot and stand counts were made 4 to 6 weeks after seeding. Although some plants were eaten off to ground level they were included in the emergence counts.

<u>RESULTS</u>:

Pesticide	Dosage (oz. per lb.)	Stand			
		Winnipeg	Morden	Brandon	Mean
None	-	142	76	37	85
Thiralin	0.5	149	102	142	131
Thiralin + oil	1.5	151	106	133	130
Gammasan	0.5	159	100	131	130
Lindasan	0.5	157	102	111	124
Polyram-lindane	0.5	163	102	121	129
Polyram	0.5	142	73	43	86
G696-75W	0.5	135	63	28	75
DB Bunt-no-more	0.5	145	83	41	90
F849	0.5	106	39	7	51
Min. Sign. Diff.	-	16	22	20	27

<u>CONCLUSIONS</u>: Seed treated with fungicides did not give a significantly better stand than the control. Conversely treatment with F849 reduced the stand significantly. All dual purpose treatments gave significantly better stands than the check, apparently because insect damage was reduced.

<u>RESIDUE DATA</u>: Nil.

<u>GENERAL OBSERVATIONS</u>: Seedlings grown from seed treated with dual-purpose materials were better able to withstand flea beetle attack. Fungicides, in this test, were of no value, or decreased emergence. Diseased seed was either not a factor, or masked by the flea beetle attack.

CROP: Rapeseed, var. Tanka

PEST: Naturally occuring soil-borne organisms and the Western Black Flea beetle, *Phyllotreta* sp.

TITLE: Effect of seed applied insecticides and fungicides on rapeseed production.

NAME AND AGENCY: Laurin, R. E. and Dever, D. A. Niagara Brand Chemicals, Regina, Sask.

MATERIAL: Thiralin a dry formulation containing 75% lindane and 10% thiram; Polylin a dry formulation containing 75% lindane and 10% Polyram; Polyram Seed Treater containing 53.3% polyram and Furadan as a 10% granular material.

METHOD: The required amount of seed treatment material was mixed with 15.5 pounds of rapeseed which was sufficient to plant two acres. The grass seed attachment on the grain drill was calibrated with untreated rapeseed, no further adjustment of the seeding mechanism was made. The seedbed was a well tilled burned over wheat stubble to which 100#/Acre of Urea had been applied. The rapeseed was planted with 30#/Acre of 11-48-0 fertilizer. The experimental field design was a four replicate drill width strip test. Plant counts and yield samples were taken at ten predetermined points in each 200 foot long strip.

RESULTS:

Treatment	Grams actual/pound rapeseed Insecticide		Fungicide		Plant count per sq. yd.*		Yield pound per acre
Untreated check	0	0	0	0	47	a	1413
Polylin	lindane	10.6	Polyram	1.4	41	ab	1466
Polyram Treater	0	0	Polyram	1.5	40	b	1374
Thiralin	lindane	10.6	Thiram	1.4	38	bc	1382
Furadan 10G	Furadan	14.6	0	0	34	bc	1329
--- --- ---	Furadan	14.6	Polyram	1.5	32	c	1374
Statistical significance at 5% level					Yes		No

*Duncans multiple range test—means followed by the same letter are not significantly different at 5% level.

Seedling diseases and flea beetle numbers did not develope to the point where normal crop production was hampered.

CONCLUSIONS: The reduced plant count from all seed treatment materials is probably a reflection of the reduced seeding rate caused by the change in flow characteristics of the seed. Yield differences were not significant which would suggest that the rapeseed plants were able to compensate for any reductions in stand.

RESIDUE DATA: Rapeseed samples have been submitted for analysis.

GENERAL OBSERVATIONS: Nil

CROP: Wheat

PEST: Common root rot, Cochliobolus sativus

TITLE: Effects of seed treatments on
I common root rot
II yield of grain

NAME AND AGENCY: Tinline, R. D. and B. J. Sallans, Research Station, Canada Agriculture, Saskatoon, Sask.

MATERIALS: Agrox C, ½ oz/bu; Orthocide 75 (Captan), 1½ oz/cwt; Panogen 15, 3/4 fl. oz/bu.

METHODS: Experiments were conducted on land fallow in 1966 and cropped to wheat in 1965, at five locations in Saskatchewan. Four wheat varieties differing in resistance to common root rot were seeded in six replicates in split-plot randomized block tests. Seed lots for the four sub-plots were treated with chemicals 2 or more weeks prior to seeding. Grain produced at each location in 1966 was used for seed at the same location in 1967, except Saskatoon seed was used for the Regina test.

RESULTS: Table 1. Common root rot ratings (%)

Experiment	Location	Seed treatment	Cypress	Manitou	Park	Selkirk	Treatment means
1	Saskatoon	None	30	17	17	25	22
		Captan	27	28	15	27	24
		Agrox	31	23	19	26	25
		Panogen	25	27	18	29	24
2	Regina	None	24	14	15	19	18a
		Captan	12	17	14	15	15ab
		Agrox	14	13	9	12	12 b
		Panogen	14	15	12	15	14ab
3	Scott	None	50	26	28	36	35
		Captan	51	26	27	26	32
		Agrox	49	26	25	28	32
		Panogen	45	26	26	32	32
4	Melfort	None	13 b	15	27a	29	21
		Captan	17ab	15	19ab	28	20
		Agrox	25a	16	22a	28	23
		Panogen	23a	12	12 b	30	19
5	Swift Current	None	62	16	13	24	29
		Captan	62	11	17	17	27
		Agrox	70	21	14	19	31
		Panogen	74	24	15	20	33

Treatment means unlettered or appended by the same letter do not differ significantly within varieties or experiments.

Table 2. Yields of grain (g/33 ft^2 of plot)

Experiment	Location	Seed treatment	Cypress	Manitou	Park	Selkirk	Treatment means
1	Saskatoon	None	658	673	630	648	652a
		Captan	663	650	635	640	647a
		Agrox	640	636	637	603	629 b
		Panogen	635	639	640	644	640ab
2	Regina	None	319	362	352	343	344a
		Captan	322	308	305	330	316 b
		Agrox	321	309	303	344	319 b
		Panogen	350	309	314	347	330ab
3	Scott	None	424	513	490	413	460
		Captan	439	509	471	422	460
		Agrox	429	524	463	385	450
		Panogen	419	506	469	386	445
4	Melfort	None	580	601	597	582	590
		Captan	513	591	605	579	572
		Agrox	516	594	583	568	565
		Panogen	518	593	577	580	565
5	Swift Current	None	265	269	245	278 b	264
		Captan	247	287	242	270 b	261
		Agrox	249	280	272	273 b	268
		Panogen	267	248	241	319a	269

Treatment means unlettered or appended by the same letter do not differ significantly within varieties or experiments.

Treatments had little effect on disease severity except at Regina where Agrox appeared to reduce it, and at Melfort where there was a significant interaction between treatments and varieties. Disease ratings were taken after harvest in the Regina plots. Since secondary invasions by saprophytic soil organisms readily occur in dead plants, the ratings at Regina seem less reliable than those at the other locations. Increased yields of grain over that of the control did not occur as a result of treatment except at Swift Current where Selkirk seed treated with Panogen produced the most grain. Some reductions in yield following seed treatment were obtained.

CONCLUSIONS: In the tests treatment of seed with Agrox, Orthocide, or Panogen, generally did not protect wheat plants from attack by *C. sativus*, or produce significant increases in yield of grain.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: *C. sativus* was isolated from lesions of the sub-crown internodes of the wheat varieties as follows: Regina, 82%; Scott, 97%; Melfort, 73%; and Swift Current, 87%. These data indicate that *C. sativus* was the primary pathogen causing the common root rot infections.

CROP: Wheat

PEST: Stem rust, *Puccinia graminis* Pers. f. sp. *tritici* Erickss. & Henn., and leaf rust, *P. recondita* Rob. ex Desm.

TITLE: Assessment of chemicals for the control of cereal rusts.

NAME AND AGENCY: HAGBORG, W. A. F., Research Station, Canada Agriculture, Winnipeg.

MATERIALS: 2,4-Dimethyl-5-carboxanilido thiazole (G696) 75W; 2,3-Dihydro-5-carboxanilido-6-methyl-1,4-oxathiin-4,4-dioxide (Plantvax, F461) 75W; nickel chloride hexahydrate; Dithane Z-78 (zineb) 65%; and Manzate D (maneb) 80%.

METHODS: Two 6 x 6 latin squares, (a) and (b), with test plots of Marquis wheat each having guard rows of winter wheat at both sides and both ends. Plots, 5 rows 12 ft. long of which 10 ft. of the 3 central rows were harvested. On Red River Clay soil at Glenlea, Man. Fertilizer 41 lb N 82 lb P as P_2O_5/ac. Inoculation with mixture leaf rust and stem rust June 27, 1967. For dosages and dates of application please see Table 1. A surfactant, Triton X-100 at a concentration of 0.1% was used throughout the test. Examination for leaf rust was on Aug. 8 and for stem rust on Aug. 9.

RESULTS: Please see Tables 1 and 2.

CONCLUSIONS: (a) All treatments reduced leaf and stem rusts significantly and increased yield significantly. Three applications of nickel-zineb gave a significantly lower yield increase than three applications of Plantvax in experiment (a) but not in experiment (b).

In experiment (b), G696, Plantvax, nickel-maneb, and nickel-zineb gave substantially equal and significant reductions in leaf rust and stem rust and increases in yield. G696 at a total of 3 lb/acre in 3 applications gave significantly less improvement than at 9 lb/acre but was significantly better than the control.

RESIDUE DATA: Being determined by the supplier.

GENERAL OBSERVATIONS: Nil

Table 1(a). Control of leaf and stem rusts in Marquis wheat with Plantvax (F461) and nickel-zineb applied to the foliage at Glenlea, Man., in 1967.

Fungicide and rate of application (lb/ac[+])	Dates applied: July 11	July 21	Aug. 2	Aug. 4	Leaf rust (%)	Stem rust (%)	Bushel weight (lb)	Yield (bu/ac)	Official grade	Monetary gross per acre basis lakehead ($)	Monetary increase per acre ($)
Plantvax 3 3 3	X	X		X	3 a[‡]	26 a	64.0 a	39.9 a	2°	77.41	23.67
Plantvax 3 3	X	X			9 b	26 a	63.8 a	38.6 ab	2°	74.88	21.14
Plantvax 3 3	X			X	11 b	43 b	63.8 a	35.3 c	1°	69.19	15.45
Plantvax 3 3		X		X	4 a	42 b	63.8 a	36.1 bc	1°	70.76	17.02
nickel-zineb 2.3 2.3 2.3	X	X		X	2 a	45 b	63.5 a	35.5 c	2°	68.87	15.13
Surfactant only	X	X	X		47 c	67 c	60.1 b	27.7 d	2°	53.74	--

[+] Basis pure chemical

[‡] Means flanked by the same letter are not significantly different at the 5% level (Duncan's multiple range test).

Table 2(b). Control of leaf and stem rusts in Marquis wheat with G696, Plantvax, nickel-maneb, and nickel-zineb applied to the foliage at Glenlea, Man., in 1967.

Fungicide and rate of application (lb/ac[+])	Dates applied: July 11	July 21	Aug. 2	Aug. 4	Leaf rust (%)	Stem rust (%)	Bushel weight (lb)	Yield (bu/ac)	Official grade	Monetary gross per acre basis lakehead ($)	Monetary increase per acre ($)
G696 0.75 0.75 0.75	X	X		X	17 b	47 c	63.8 a	35.2 b	1°	68.99	14.70
G696 3 3 3	X	X		X	5 a	20 a	64.7 a	39.4 a	1°	77.22	22.93
Plantvax 3 3 3	X	X		X	4 a	27 ab	64.8 a	39.2 a	1°	76.83	22.54
nickel-maneb 2.6 2.6 2.6	X	X		X	1 a	28 ab	64.1 a	39.5 a	2°	76.63	22.34
Nickel-zineb 2.3 2.3 2.3	X	X		X	1 a	37 abc	64.0 a	39.1 a	1°	76.64	22.35
Surfactant only	X	X	X		43 c	63 d	61.3 b	27.7 c	1°	54.29	--

+ Basis pure chemical

‡ Means flanked by the same letter are not significantly different at the 5% level (Duncan's multiple range test).

CROP: Wheat, var. Garnet; barley, var. Galt.

PESTS: Leaf rust, *Puccinia recondita*; stem rust, *Puccinia graminis tritici*; common root rot, *Cochliobolus sativus*.

TITLE: Effect of fungicides applied in pellet form on
I. Leaf and stem rust of wheat,
II. Common root rot of wheat and barley.

NAME AND AGENCY: HELGASON, S. B., SCHREIBER, K.
Department of Plant Science, University of Manitoba,
and MILLS, J. T., Research Station, Canada Agriculture, Winnipeg.

MATERIALS: F427-75W; F461-75W, from Uniroyal Company, Chemical Division.

METHOD: Three randomized blocks of four treatments on each crop. A plot consisted of three 18 ft. rows 12 inches apart. The chemicals were applied in pellets designed to give different rates of release. The chemicals were incorporated with styrene and ethocel into pellets around a nucleus of silica sand; the coatings were varied to provide three different rates of release, rapid, 30 days after sowing, and 60 days after sowing. The pellets were made in the Wurster air suspension equipment. A rate of 4 lb. per acre of the fungicide was used in each case. A three-row self-propelled seeder was used to sow the seed and pellets together at a depth of 3 inches in Riverdale clay soil on the University experimental plot area on June 14, 1967. The soil was moderately dry at seeding. Rainfall was 0.50 inches in the 2 weeks prior to sowing and 0.92, 1.85, 1.30 and 2.23 inches in successive 2-week periods following sowing.

Rust readings were taken, using standard percentage scales, at heading on July 31, at the milk stage on August 17, and at the early dough stage on August 29. The centre row of each plot, less 1 foot at each end, was harvested on September 10. One hundred plants in the same rows were assessed for root rot on September 11.

RESULTS: Wheat;- Rust and yield data are shown in Table 1, common root rot ratings in Table 2.

Table 1.

	Stem rust*		Leaf rust*		Kernel Wt.	Yield
Treatment	Milk	Ey.dough	Milk	Ey.dough	gm/1000	gm/plot
Control	43	72	53	70	15.0	176.6 a**
F461, rapid release	38	65	35	42	17.7	249.3 b
F461, single ethocel	43	67	47	63	15.5	214.0 ab
F461, double ethocel	40	68	45	66	15.8	216.3 b

* Earliest readings not given; all plots rated Tr.-10% stem rust, Tr. leaf rust.
** Means appended by the same letter are not significantly different at the 5% level (Duncan's Multiple Range Test).

Table 2.

Treatment	Common root rot %* Replicate 1	2	3	Means
Control	24.4	25.0	29.6	26.3
F461, rapid release	31.6	20.8	26.8	26.4
F461, single ethocel	25.2	23.4	22.6	23.7
F461, double ethocel	25.2	19.4	25.4	23.3

* Common root rot ratings did not differ significantly between treatments.

Barley;- Common root rot ratings and mean plot yields are shown in Table 3.

Table 3.

Treatment	Common root rot % Replicate 1	2	3	Means	Mean yield gm/plot
Control	38.2	34.2	37.0	36.5	722
F427, rapid release	39.0	24.8	29.4	31.1	776
F427, single ethocel	37.8	39.8	31.0	36.2	752
F427, double ethocel	32.8	33.0	34.6	33.5	786

Differences in common root rot ratings and yield of grain were not significant. Leaf disease incidence was too low to justify readings.

CONCLUSIONS: F461 appeared to have little effect on stem rust or common root rot of wheat, but gave partial control of leaf rust, especially from rapid-release pellets. The effect was reflected in significant yield increases, but kernel development was considerably restricted even in the most effective treatment. No significantly beneficial effects of F427 on barley were demonstrated.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Only the rapid-release material had a readily discernible effect. Leaf rust readings were difficult because only the upper leaves showed restricted pustule development, and the basal portion of these leaves were sometimes heavily infected. Most of the fungi isolated from lesions of the sub-crown internodes were found to be *C. sativus*; *Fusarium culmorum* was not observed. Leaf disease incidence on the barley was very light.

<u>CROP</u>: Wheat, var Red Bobs and Pembina; oats, var Vanguard; barley, var Plush; flax, var Marine.

<u>PESTS</u>: Bunt, <u>Tilletia</u> <u>foetida</u> (Wallr.) Liro; covered smut of oats, <u>Ustilago</u> <u>kolleri</u> Wille; covered smut of barley, <u>Ustilago</u> <u>hordei</u> (Pers.) Lagerh.; soil fungi.

<u>TITLE</u>: Supplementary seed treatment trials 1967.

<u>NAME AND AGENCY</u>: WALLACE, H. A. H., C.D.A. Research Station, Winnipeg, Manitoba.

<u>MATERIALS</u>: From Morton Chemical Co., EP-279, EP-342, EP-346, EP-351, EP-352, EP-363, EP-371A, EP-371B, EP-371C, Panogen 15B. From Olin Mathieson Chemical Corporation, Terrachlor Super X + Heptachlor (various concentrations). From Chipman Chemicals #16-67.

<u>METHOD</u>: Clean Red Bobs wheat, naturally contaminated oats and barley were each also artificially contaminated (1:200 w/w) with the respective smuts. All crops were grown at Winnipeg, Morden and Brandon. Pembina wheat with low germinability was used for the emergence test. Disease rating was based on 200 heads per row, and emergence counts on 200 seeds per row.

<u>RESULTS</u>: Please see Table 1.

<u>CONCLUSIONS</u>: EP-279, EP-342, EP-371A, EP-371B, EP-371C applied at 2 ounces per bushel, and the two Terrachlor Super X + Heptachlor 0.53 formulations applied at 6 ounces per bushel gave good control of the smut diseases. Other treatments and dosages were less effective in controlling smut; some were phytotoxic to wheat seed.

<u>RESIDUE DATA</u>: Nil

<u>GENERAL OBSERVATIONS</u>: The amount of heptachlor applied to the seed for all Terrachlor Super X formulations was the same. However, as the concentration of heptachlor was increased in the formulation, the effectiveness of Terrachlor Super X in controlling oat and barley smuts decreased.

TABLE 1

Formulation	Dosage (oz/bu.) Cereals	Flax	Disease rating (%) Bunt	Oat Smut	Barley Smut	Emergence (%) Flax	Wheat
EP-279	0.5	1.0	0.13	1.5	1.1	65.8	19.8
	1.0	2.0	0.17	0.42	0.21	69.5	22.7
	2.0	4.0	0.00	0.00	0.17	62.7	15.4
EP-342	1.0	2.0	0.00	3.0	3.3	66.7	18.1
	2.0	4.0	0.00	1.1	0.8	67.1	15.6
EP-346	0.75	0.75	10.7	6.4	3.9	64.0	15.2
	1.5	1.50	7.9	4.1	6.0	68.8	17.5
	3.0	3.0	6.2	2.1	5.8	67.6	12.7
EP-351	1.5	1.5	5.1	2.1	3.1	68.0	17.6
	3.0	3.0	7.1	0.6	0.4	68.8	11.9
EP-352	1.5	1.5	2.5	1.6	3.7	64.9	13.2
	3.0	3.0	0.63	0.25	1.2	63.9	12.2
EP-363	1.5	1.5	8.3	3.7	8.0	73.0	16.2
	3.0	3.0	4.3	2.2	5.6	65.8	13.5
EP-371A	2.0	4.0	0.08	0.13	0.04	75.5	26.5
EP-371B	2.0	4.0	0.00	0.00	0.18	72.4	22.5
EP-371C	2.0	4.0	0.04	0.04	0.08	74.3	18.3
Panogen 15B	0.75	1.5	0.00	0.08	2.5	86.3	32.4
2.0-0.5-1.6*	2.0	2.0	0.04	4.6	0.8	74.0	24.8
2.0-0.5-0.8*	4.0	4.0	0.00	1.0	1.4	73.5	25.0
2.0-0.5-0.53*	6.0	6.0	0.00	1.0	0.32	66.0	23.3
2.0-1.0-1.6*	2.0	2.0	0.04	5.7	2.3	73.2	23.9
2.0-1.0-0.8*	4.0	4.0	0.00	1.5	0.51	75.7	25.4
2.0-1.0-0.53*	6.0	6.0	0.00	0.38	0.08	74.3	27.0
#16-67	2.0	4.0	0.33	0.00	0.33	81.8	27.7
No treatment	-	-	12.7	9.2	4.9	79.1	18.9
Least Sign. Difference			5.0	2.0	2.2	6.3	4.6

* Terrachlor - Terrazole - Heptachlor = Terrachlor Super X - Heptachlor. Figures represent pounds per gallon.

CROP: Wheat, var. Manitou; Barley, var. Montcalm; and Oats, var. Harmon

PEST: Naturally occurring soil-borne pathogens

TITLE: Effect of fungicide seed treatment on establishment and yield of wheat, barley, and oats.

NAME AND AGENCY: LAURIN, R. E., Niagara Brand Chemicals, Regina. Cooperation with Canada Department of Agriculture Research Station Staff; ATKINSON, T. G., at Lethbridge; PIENING, L. J., at Lacombe; KEYS, C. H., at Scott; BALLANTYNE, H. R., at Melfort; HAY, J. R., at Regina; McCURDY, E. V., at Indian Head; JOHNSTON, W. H., at Brandon; WALLACE, H. A. H., at Winnipeg; and AUSTENSON, H. M., of Crop Science Department, University of Saskatchewan, Saskatoon.

MATERIALS: Polyram Seed Protectant containing 53.3% active ingredient. Mercury Seed Treatment containing 1.43% Methyl mercury 8-hydroxyquinolinate.

METHODS: The wheat, barley, and oat seed for these tests was obtained from the same local area; "good" and "poor" quality seed being obtained from sucessive generations of each crop. The test was a 6-replicate, split split plot, randomized block design. Each plot consisted of 4 rows in an area 3 ft. x 18½ ft. except at Saskatoon where the rows were 16 ft. long. In the accompanying tables, which indicate the split-plot layout, the following headings are used:

Good quality seed — clean, disease-free seed with high germinability (wheat 92%, barley 95%, oats 97%).

Poor quality seed -- clean, disease-free seed with low germinability, possibly due to frost (wheat 50%, barley 79%, oats 49%).

High rate -- a seeding rate equivalent to 16 seeds per square foot based on a 3 ft. x 18½ ft. plot or, approximately, wheat 0.85 bu./A., barley 1.7 bu./A., oats 1.4 bu./A.

Low rate — a seeding rate equivalent to 8 seeds per square foot.

Polyram — 3 oz. formulated product per bushel of seed.

Mercury — 2 oz. formulated product per bushel of seed.

Plant stands were taken on a 5 ft. section of one centre row in each plot about 2-3 weeks after emergence. Yield samples were harvested from 16½ ft. of the two centre rows in each plot except at Melfort and Saskatoon where 10 ft. and 14 ft. lengths of row were harvested, respectively. Analyses of variance were carried out by the Lethbridge Research Station on the I.B.M. 1130 computer.

CONCLUSIONS: 1. Regardless of seed quality, all crops showed a distinct trend towards denser stands with fungicide treatment. This effect was most pronounced with wheat and oats. It should be noted that a difference of 5 plants in stand count represents an additional 58,000 plants per acre. 2. The increased stands resulting from fungicide treatment only partially compensated for the low germinability of the wheat and oat seed used. 3. There was a slight overall trend for fungicide-treated seed to yield more than untreated seed when low seeding rates or poor quality seed was used but good quality seed at the "high" rate did not show this trend.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: Nil

WHEAT — STAND DATA (PLANTS/5 FT. OF ROW)

SEED			STATION								
Quality	Rate	Treatment	Brandon	Indian Head	Regina	Melfort	Saskatoon	Scott	Lacombe	Lethbridge	Mean of all Stations
GOOD	HIGH	Polyram	48	35	46*	46	63	45*	35	52	46
		Mercury	51	37	43	43	69*	50**	41	56	49
		Untreated	47	35	41	40	61	39	36	49	44
	LOW	Polyram	27	22	30*	27*	37	26	20	25	27
		Mercury	25	21	31*	25	39*	24	21	29	27
		Untreated	25	16	25	20	31	28	22	26	24
POOR	HIGH	Polyram	28	20	32*	23	28	26*	23	23	25
		Mercury	27	23	29	25	34*	22	25	21	26
		Untreated	26	17	27	23	25	20	22	21	23
	LOW	Polyram	17	15*	21	14	15	15	10	10	15
		Mercury	15	13	20	13	18	15	13	14	15
		Untreated	16	8	20	10	12	17	6	8	12
L.S.D. - for comparison of means WITHIN treatment subplots		- 0.05	5	7	4	7	8	6	8	8	
		- 0.01	7	10	6	10	11	8	10	11	
INTERACTIONS											
Quality x Rate			**	N.S.	*	*	**	**	N.S.	**	
Quality x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	
Rate x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	**	N.S.	N.S.	
Quality x Rate x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	

WHEAT — YIELD OF GRAIN (BU./A.)

SEED			STATION								
Quality	Rate	Treatment	Brandon	Indian Head	Regina	Saskatoon	Melfort	Scott	Lacombe	Lethbridge	Mean of all Stations
GOOD	HIGH	Polyram	44.8	31.2	18.9	39.0	26.7	25.5	50.6	19.0	32.0
		Mercury	43.2	29.3	17.1	39.8	24.4	25.5	53.9	18.7	31.5
		Untreated	44.2	31.9	18.3	40.4	25.1	24.3	51.2	18.0	31.7
	LOW	Polyram	40.2	29.2*	17.2	37.2	27.6	24.2	43.9*	16.5	29.5
		Mercury	40.9	28.9	15.8	39.1	28.2	24.0	43.6	16.9	29.7
		Untreated	39.7	24.3	18.0	37.0	26.5	22.9	38.6	16.9	28.0
POOR	HIGH	Polyram	40.7*	27.4	16.7	38.2	26.8	21.7	44.7	16.1	29.0
		Mercury	42.6**	29.9	16.6	39.9	26.5	23.4	47.2*	16.8*	30.4
		Untreated	37.5	27.2	16.3	38.3	27.7	21.0	40.6	14.6	27.9
	LOW	Polyram	32.2	23.4	11.9	39.6*	22.0	17.8	25.6**	12.7	23.2
		Mercury	33.7	26.4	13.6	41.5**	25.7	20.5**	30.6**	14.4*	25.8
		Untreated	31.8	22.2	12.4	36.2	24.7	16.7	18.8	12.7	21.9
L.S.D. - for comparison of means WITHIN treatment subplots		- 0.05	3.4	4.7	2.7	2.7	3.0	2.9	5.1	2.0	
		- 0.01	4.5	6.2	3.6	3.6	4.0	3.8	6.8	2.7	
INTERACTIONS											
Quality x Rate			*	N.S.	*	N.S.	**	N.S.	**	N.S.	
Quality x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	
Rate x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	
Quality x Rate x Treatment			N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	

BARLEY — STAND DATA (PLANTS/5 FT. OF ROW)

SEED			STATION				Mean of all Stations
Quality	Rate	Treatment	Winnipeg	Saskatoon	Scott	Lacombe	
GOOD	HIGH	Polyram	48	67**	35	40	48
		Mercury	49	66**	37	41	48
		Untreated	43	50	33	42	42
	LOW	Polyram	26	32	27	22	27
		Mercury	28	32	32	24	29
		Untreated	21	32	33	16	26
POOR	HIGH	Polyram	39	54	34	41	42
		Mercury	48	58	38	45	47
		Untreated	49	49	33	36	42
	LOW	Polyram	21	29	30	23*	26
		Mercury	24	30	31	21	27
		Untreated	24	27	26	13	23
L.S.D. - for comparison of means <u>WITHIN</u> treatment subplots	- 0.05		11	10	10	10	
	- 0.01		15	13	13	13	
<u>INTERACTIONS</u>							
Quality × Rate			N.S.	N.S.	N.S.	N.S.	
Quality × Treatment			N.S.	N.S.	N.S.	N.S.	
Rate × Treatment			N.S.	*	N.S.	N.S.	
Quality × Rate × Treatment			N.S.	N.S.	N.S.	N.S.	

BARLEY — YIELD OF GRAIN (BU./A.)

SEED			STATION				Mean of all Stations
Quality	Rate	Treatment	Winnipeg	Saskatoon	Scott	Lacombe	
GOOD	HIGH	Polyram	87.4	49.8	33.9	65.2	59.1
		Mercury	95.7	53.0	35.6	65.2	62.4
		Untreated	90.3	52.7	35.1	65.9	61.0
	LOW	Polyram	76.2	49.2	33.7	55.8	53.7
		Mercury	77.6	49.6	33.5	58.7	54.9
		Untreated	71.4	49.8	35.3	55.4	53.0
POOR	HIGH	Polyram	89.1	50.8	30.9	63.3	58.5
		Mercury	92.9	49.3	31.9	66.2	60.1
		Untreated	87.0	50.0	31.4	62.0	57.6
	LOW	Polyram	74.1	47.9	29.8	55.9**	51.9
		Mercury	78.3	50.7**	31.7	55.8**	54.1
		Untreated	71.2	44.5	29.6	49.3	48.7
L.S.D. - for comparison of means WITHIN treatment subplots		- 0.05	9.9	3.7	4.3	4.8	
		- 0.01	13.2	5.0	5.7	6.5	
INTERACTIONS							
Quality x Rate			N.S.	N.S.	N.S.	N.S.	
Quality x Treatment			N.S.	N.S.	N.S.	N.S.	
Rate x Treatment			N.S.	N.S.	N.S.	N.S.	
Quality x Rate x Treatment			N.S.	N.S.	N.S.	N.S.	

OATS -- STAND DATA (PLANTS/5 FT. OF ROW)

SEED			STATION				Mean of all Stations
Quality	Rate	Treatment	Winnipeg	Indian Head	Melfort	Saskatoon	
GOOD	HIGH	Polyram	48	39**	44	60**	48
		Mercury	43	36*	49**	64**	48
		Untreated	50	29	42	48	42
	LOW	Polyram	28*	21	30**	32	28
		Mercury	31**	21	34**	31	29
		Untreated	19	25	21	28	23
POOR	HIGH	Polyram	30	21	31	27	27
		Mercury	39*	20	32	30	30
		Untreated	29	17	29	26	25
	LOW	Polyram	16	15	17	17	16
		Mercury	16	11	19	15	15
		Untreated	13	12	17	15	14
L.S.D. - for comparison of means WITHIN treatment subplots		- 0.05	9	7	5	6	
		- 0.01	12	10	6	9	
INTERACTIONS							
Quality X Rate			N.S.	N.S.	N.S.	**	
Quality X Treatment			N.S.	N.S.	*	N.S.	
Rate X Treatment			N.S.	N.S.	N.S.	N.S.	
Quality X Rate X Treatment			*	N.S.	N.S.	N.S.	

OATS — YIELD OF GRAIN (BU./A.)

SEED: Quality	SEED: Rate	SEED: Treatment	STATION: Winnipeg	STATION: Indian Head	STATION: Melfort	STATION: Saskatoon	Mean of all Stations
GOOD	HIGH	Polyram	120.4	38.2	45.3	71.4	68.8
		Mercury	120.0	38.7	47.0	75.0	70.2
		Untreated	122.2	39.1	45.4	73.3	70.0
	LOW	Polyram	118.0	38.2	46.6	73.0	69.0
		Mercury	117.0	37.2	46.6	70.5	67.8
		Untreated	114.4	34.0	46.7	70.5	66.4
POOR	HIGH	Polyram	119.9*	35.2	47.8	65.2	67.0
		Mercury	115.8	34.7	46.8	64.7	65.5
		Untreated	111.0	33.2	43.7	65.2	63.3
	LOW	Polyram	104.7	29.2	45.6	65.3	61.2
		Mercury	100.4	31.8	48.3	67.3	62.0
		Untreated	100.7	32.6	45.5	63.5	60.6
L.S.D. - for comparison of means WITHIN treatment subplots - 0.05			8.6	4.6	4.3	7.0	
- 0.01			11.5	6.1	5.8	9.3	
INTERACTIONS							
Quality x Rate			N.S.	N.S.	N.S.	N.S.	
Quality x Treatment			N.S.	N.S.	N.S.	N.S.	
Rate x Treatment			N.S.	N.S.	N.S.	N.S.	
Quality x Rate x Treatment			N.S.	N.S.	N.S.	N.S.	

BASIC STUDIES ON FUNGICIDES

edited by

C.D. McKeen

CROPS: Barley, tomato, cucumber, and pea.

PESTS: *Monilinia fructicola* (Wint.) Honey and *Pythium ultimum* Trow.

TITLE: Fungitoxicity and phytotoxicity in an homologous series of *N*-alkyldithiocarbamates.

NAME AND AGENCY: RICHARDSON, L.T., and G.D. THORN, Research Institute, Canada Agriculture, London, Ontario.

MATERIALS: Chemically pure sodium *N*-methyldithiocarbamate (metam-sodium or Vapam) and homologs with 2 to 10 carbon atoms in the alkyl group, synthesized in the laboratory.

METHODS: Each compound was tested in solution in phosphate buffer at 7.8. Fungitoxicity was evaluated by standard spore-drop bioassay using *M. fructicola* conidia. To compare phytotoxic effects, solutions were applied in various ways: as a seed soak with barley; as a soil drench with barley seedlings and young tomato plants; and as a foliar spray on older tomato plants. Roots of cucumber and roots and cut stems of tomato were also immersed in the solutions for several hours then transferred to water. In a combined test both fungitoxic and phytotoxic effects were indicated by the emergence from pea seeds planted in sand-vermiculite mixture containing various proportions of *P. ultimum* inoculum and drenched with solutions of each chemical as a dosage series.

RESULTS:

Dithiocarbamate	No. of carbons in alkyl group	Fungitoxicity (*M. fructicola*) ED_{50}-μM	Phytotoxicity (Barley Seed) ED_{50}-mM
Methyl	1	9	0.9
Ethyl	2	8	1.5
Propyl	3	7	2.1
Butyl	4	6	2.5
Amyl	5	12	3.4
Hexyl	6	230	4.3
Heptyl	7	45	3.8
Octyl	8	40	3.0
Nonyl	9	15	5.3
Decyl	10	15	12.0

Contrary to expectations, none of the chemicals had any observable effect on tomato plants when applied to the foliage at concentrations up to 10 mM (129 ppm Vapam). When applied to roots or cut stems, however, the effects were quite drastic in many instances. As in the barley seed germination test, the homoloques with the lower carbon numbers were the most phytotoxic, causing wilt, necrosis, and stem collapse. At the upper erd of the series it was noted that tomato leaves did not wilt even when the stem collapsed, suggesting that the solutions of these chemicals were not taken up by the plants. In the pea tests, non-emergence of seedlings due to chemical toxicity was found to decrease progressively with increasing number of carbon atoms in the alkyl group from the methyl to the amyl homologue, then increase to the decyl. The latter effect, not observed in the barley seed test, resulted from abortion or necrosis of the seedling shoot after germination whereas the roots were little affected. In some instances emergency was greater in treated infested soil than in non-infested soil. The degree of control of pre-emergence damping-off caused by *P. ultimum* decreased progressively from the methyl compound to the hexyl and was virtually nil from the octyl to the decyl. Complete disease control without any chemical damage was obtained with certain combinations of inoculum concentration and chemical dosage with the methyl, ethyl, propyl and butyl homologues.

CONCLUSIONS: Differential fungitoxic and phytotoxic effects between members of this series of chemicals have been demonstrated. The basic member of the series is known to yield methyl isothiocyanate on decomposition. With increasing length of the carbon chain the rate of production of this highly toxic substance is likely to decrease and the tendency to form thiuram disulfide is likely to increase. These factors may possibly be involved in the mechanism of action.

RESIDUE DATA: Nil (Chemicals highly unstable, especially in acid medium).

GENERAL OBSERVATIONS: Nil

NEMATODES

edited by

W. B. Mountain

<u>CROP</u>: Potatoes

<u>PEST</u>: Golden nematode (*Heterodera rostochiensis*)

<u>TITLE</u>: Persistence of 1,3 dichloropropene in two types of soil

<u>NAME AND AGENCY</u>: WILLIAMS, I.H., Research Station, Canada Agriculture, Vancouver, British Columbia.

<u>MATERIALS</u>: DD mixture (1,3 dichloropropene and 1,2 dichloropropane)

<u>METHODS</u>: DD mixture was applied at the rate of 200 gal per acre to a muck soil and 100 gal per acre to a sandy loam. After 8 months (October to May) representative samples of each soil at two levels (horizons) were taken for analysis. Untreated soil samples from the same areas were taken as controls. Samples were extracted with acetonitrile, partitioned into n-hexane and analysed for cis and trans 1,3 dichloropropene by GLC with EC detection. Recoveries from untreated soil samples spiked with cis and trans 1,3 dichloropropene at the 1 ppm and 10 ppm level were determined by the same method of analysis and at the same time.

<u>RESULTS</u>:

Soil	DD Treatment	Depth Sampled	Residues found (ppm) cis 1,3 dichloropropene	trans 1,3 dichloropropene
muck	200 gal/acre	0"-4"	0.68 (1.4)*	1.6 (3.2)
"	" " "	4"-8"	0.92 (1.8)	2.4 (4.8)
"	untreated	0"-8"	nil	nil
"	1 ppm added	0"-8"	0.54	0.54
"	10 " "	0"-8"	6.5	6.4
sandy loam	100 gal/acre	0"-4"	nil	nil
" "	" " "	4"-8"	0.28 (0.30)	0.36 (0.39)
" "	untreated	0"-8"	nil	nil
" "	1 ppm added	0"-8"	0.93	0.92
" "	10 " "	0"-8"	7.5	7.2

*Results in brackets are corrected values based on recoveries from spiked samples.

CONCLUSIONS: Contrary to previously published data on the rapid hydrolysis of 1,3 dichloropropene in soil, significant amounts of the original compound were found after 8 months contact with two types of soil.

RESIDUE DATA: See above. Some evidence of the breakdown product 3 chloro-2-propen-1-ol was found but not confirmed.

GENERAL OBSERVATIONS: Better methods of extraction are required for muck soils.

HOST: Flue-cured Tobacco var. Hicks Broadleaf.

PEST: Mainly *Pratylenchus penetrans* a root-lesion nematode and to a much less extent a fungus *Thielaviopsis basicola* causing black root rot.

TITLE OF PROJECT: Control of black root rot fungus and root-lesion nematode in flue-cured tobacco.

NAME AND AGENCY: GAYED, S. K., and OLTHOF, Th. H. A., Canada Agriculture, Research Station, Delhi, Ontario and Research Station, Vineland, Ontario, respectively.

MATERIALS: Vorlex, Vorlex 201, Chloropicrin, SD_{345} (Allylidene diacetate).

METHODS: Experiment was carried out at the Research Station, Delhi, 72 plots each 31' 8" long and of 3 rows (2 rows treated and 1 guard row); 42" between rows and 24" between plants. Fox loamy sand; 17 treatments and a check in a randomized block design; 4 replications. Previous crops; 1964 rye; 1965 tobacco; 1966 rye. Row application of the fumigant at different rates (table). Chisel placement of fumigant was carried out on May 12 using especially constructed one-row gravity-flow applicator. Ridges opened on May 23 and planting on June 5. Stand rating on June 30, shoot height measured on July 21 and maturity based on flowering was rated on July 31. Soil samples for nematode counts were collected on July 12.

RESULTS: See table on following page.

CONCLUSIONS: In spite of the high variation, nematode population was cut down by the fumigants; chloropicrin at 3 gals/acre was effective in this respect. Fumigation induced early maturation (based on flowering) of tobacco plants. SD_{345} was uneffective on the nematode population and phytotoxic to tobacco plants through most of its experimental concentrations..

RESIDUAL DATA: Nil

GENERAL OBSERVATIONS: Nil

Treatment		Stand rating 10 = best	Shoot height cm	Maturity rating based on flowering 10 = best	*P. penetrans* per 1 lb soil
Vorlex, 5 gals/acre		7.62	95.25	7.25	927.0
Vorlex, 10 gals/acre		7.75	99.05	7.87	134.5
Vorlex, 15 gals/acre		7.25	95.67	7.75	360.0
Vorlex, 30 gals/acre		5.75	90.95	6.12	69.7
Vorlex 201, 4 gals/acre		7.50	96.15	7.50	773.7
Vorlex 201, 8 gals/acre		7.50	97.22	7.75	292.5
Vorlex 201, 12 gals/acre		7.25	98.92	8.00	112.5
Vorlex 201, 24 gals/acre		6.37	96.60	7.37	461.2
Chloropicrin, 3 gals/acre		7.37	96.05	7.25	175.0
Chloropicrin, 6 gals/acre		7.62	103.25	7.12	393.7
Chloropicrin, 9 gals/acre		7.00	103.45	7.12	371.2
Chloropicrin, 18 gals/acre		7.12	102.07	7.50	427.5
SD_{345} 0.5 ml/5 gals water		5.00	—	3.50	843.7
SD_{345} 1.0 ml/5 gals water		3.87	—	2.00	1775.0
SD_{345} 1.5 ml/5 gals water		3.62	—	1.75	393.7
SD_{345} 2.0 ml/5 gals water		3.50	—	1.75	1563.7
SD_{345} 4.0 ml/5 gals water		2.75	—	1.50	2418.7
Check		5.87	76.65	4.75	1811.2
L.S.D.	.05	1.15	9.92	1.42	1282.8
	.01	1.53	13.29	1.89	1710.4
C.V.	%	13%	7%	17%	1221%

HOST: Flue-cured tobacco var. Delcrest 66.

PEST: A fungus *Thielaviopsis basicola* and a root lesion nematode *Pratylenchus penetrans*.

TITLE OF PROJECT: Chemical control of black root rot fungus and root lesion nematode in flue-cured tobacco.

NAME AND AGENCY: GAYED, S. K. and OLTHOF, Th. H. A., Canada Agriculture, Research Station, Delhi, Ontario and Research Station, Vineland, Ontario respectively.

MATERIALS: Vorlex, Vorlex 201, Chloropicrin and SD345 (Allylidene diacetate).

METHODS: Experiment was carried out at C. Moore's farm, Haldimand Township, Baltimore, Ontario; Brighton sandy loam. The experiment contained 48 single-row plots separated by guard rows. The row as 40' long spaced 42" between rows and 24" between plants; 11 treatments and a check in a randomized block design. Previous crops: 1963 wheat; 1964 tobacco, 1965 oats. Row application of each fumigant by chisel placement using one-row gravity-flow applicator. Fumigants applied on May 16, rows opened May 24, planting and application of SD345 in the planting water on June 1. Stand was rated July 4 and August 9; shoot length on July 4; topped height, dry weight of stalks and roots and root lesion rating at the end of the season. Soil samples for nematode counts were collected on July 26.

RESULTS: See table on following page.

CONCLUSIONS: There is significant reduction in *P. penetrans* population in all treated plots; lowest counts were in those treated with Vorlex 201 at 8 and 12 gals/acre. Chemical treatment did not significantly change the root lesion rating. SD345 treatment was phytotoxic to tobacco plants.

RESIDUE DATA: Nil

Treatment		Stand Rating 10 = best July 4	Aug. 9	Shoot length cm July 4	Root dry wt g	Stalk dry wt g	Root lesion rating 0-5	P. penetrans per lb soil
Vorlex 5 gal/acre		6.6	6.1	27.55	42.58	64.43	2.90	259
Vorlex 10 gal/acre		7.0	6.6	27.90	47.51	70.56	2.77	191
Vorlex 15 gal/acre		8.3	7.3	32.40	44.69	68.59	2.67	551
Vorlex 201 4 gal/acre		6.3	5.5	24.65	46.43	67.96	2.40	214
Vorlex 201 8 gal/acre		7.0	6.6	31.70	59.69	75.71	2.60	124
Vorlex 201 12 gal/acre		7.8	7.0	32.30	57.96	69.69	2.33	135
Chloropicrin 3 gal/acre		7.3	5.5	25.05	47.31	63.17	2.45	563
Chloropicrin 6 gal/acre		7.6	6.5	32.50	49.12	63.77	2.06	653
Chloropicrin 9 gal/acre		7.8	6.8	29.35	48.06	70.92	2.65	317
SD345 1.0 ml/ 5 gal water		5.0	4.1	20.40	32.71	51.60	2.50	270
SD345 2.0 ml/ 5 gal water		4.0	3.9	22.40	30.27	58.55	3.02	551
Check		6.5	6.3	27.65	55.92	73.43	2.38	1080
L.S.D.	0.05	1.62	1.61	5.57	N.S.	N.S.	N.S.	388
	0.01	2.18	2.16	7.87				520
C.V.	%	19%	17%	14%	27%	21%		66%

CROP: Tomato, var. Heinz 1350

PEST: Southern root-knot nematode, Meloidogyne incognita (Chitwood)

TITLE: Evaluation of Chemicals for Control of Southern Root-knot Nematode

NAME AND AGENCY: BIRD, G. W., Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: For amounts of chemicals applied see Table of results. Pre-plant chemicals: Telone, Vorlex, and Vapam. Chemicals applied at planting: Nemagon 25 G, Temik 10 G, Lannate 90 WD, and Dasanit 10 G.

METHODS: The entire experimental area was fumigated with 25 gal./A. of Telone on May 4. Chemicals were evaluated in 68 ft. single row plots containing 48 plants, 19 inches apart and replicated four times. On May 24 nematodes, at the rate of 2,500 juveniles per site, were added to the seedling sites in the plots to be treated with pre-plant chemicals. Pre-plant chemicals were injected into soil at a depth of 8 inches on May 25. Nematodes were added to the remaining seedling sites on June 7. Seedlings were planted on June 8 and the remaining treatments applied June 9. Lannate was mixed in one gal. of water. This and the granular materials were applied in bands six inches from the seedlings and covered with 3 inches of soil. One acre inch of irrigation water was applied on June 9, June 10, and once a week through August 25. Tomatoes were harvested on five dates at weekly intervals. On October 3 the yields remaining in each plot were estimated and the roots of ten plants selected at random from each plot were indexed as follows: 0 = no infection; 1 = very light infection; 2 = light infection; 3 = moderate infection; 4 = severe infection; 5 = very severe infection.

RESULTS: See Table.

CONCLUSIONS: Southern root-knot nematode significantly reduced yields by approximately 10%. All treatments significantly improved root condition. Plants in soil treated with Vorlex or Vapam were completely free of root galls. Temik was the only material which significantly increased yields. Lannate was phytotoxic at the rates used.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The technique used to infest soil was satisfactory in that yields were reduced by approximately 10%. Yields would have been reduced more if the population had a longer time to increase, thereby allowing an additional number of treatments to have a significant effect on yield. The fact that Telone was applied to the entire experimental area before evaluation of the chemicals, may have had some influence on the amount of phytotoxicity observed.

Yields of Tomatoes Infected with Southern Root-knot Nematode and Treated with Various Commercial and Experimental Nematocides

Treatments	Cumulative Yields Tons/Acre						Mean Fruit Weight (lb.)	Root-knot Index
	Aug. 29	Sept. 5	Sept. 12	Sept. 19	Sept. 26	Oct. 3		
Check	2.3	8.2	20.3	34.2	46.9	47.9	.69	0.0
Pre-plant southern root-knot	2.5	7.2	19.2	29.8	42.1	42.3	.64	4.4
Telone (25 gal./A.)	2.2	7.0	17.2	30.4	42.7	43.3	.62	0.5
Vorlex (35 gal./A.)	1.9	5.8	12.8	27.7	39.8	40.5	.53	0.0
Vapam (30 gal./A.)	2.5	8.1	16.6	30.0	42.7	43.0	.51	0.0
Southern root-knot at planting	2.4	7.4	17.0	31.1	42.7	42.9	.59	4.2
Nemagon (30 lb./A.)	2.6	7.0	14.7	26.1	37.6	38.6	.55	2.8
Temik (50 lb./A.)	2.0	6.8	16.4	32.1	45.3	46.5	.68	0.5
Lannate (6 lb./A.)	0.6	2.2	6.0	16.6	28.2	29.6	.72	1.6
Lannate (12 lb./A.)	0.0	0.5	1.4	4.7	10.8	12.8	.68	1.6
Dasanit (12 lb./A.)	2.4	7.8	16.6	27.5	36.6	37.0	.53	3.2
Dasanit (24 lb./A.)	1.8	6.4	14.6	26.8	40.8	41.4	.64	2.5
Difference required for significance								
at .05% level	1.0	2.2	3.7	3.9	3.4	3.1	N.S.	0.6
at .01% level	1.3	2.9	5.0	5.2	4.6	4.1	—	0.8

RESIDUE STUDIES

edited by

H.V. Morley

CROP: Carrots

PEST: --

TITLE: Sorption and translocation of aldrin and dieldrin from contaminated irrigated soils in southern Alberta

NAME AND AGENCY: CHARNETSKI, W. A., Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: Aldrin 40% E. C.

METHODS: In 1966 field plots were established (randomized block design with four replicates) in Lethbridge loam soil (a dark brown, alluvial-lacustrine chernozem soil). Aldrin was applied at levels of 0, 2.5, 5.0, and 20.0 lb. actual per acre (4 gal. per acre) by a low-volume, low-pressure broadcast boom and was immediately incorporated into the soil by rotatilling to a depth of 7 in. Three varieties of carrots (Yellow Belgium, Royal Chantenay, and Scarlet Nantes) were grown and harvested.

The centre two rows of each plot were harvested, weighed, and washed. The carrot roots were sliced and divided into three groups. The first group was blanched in 190° F. water and quick frozen, while the second was quick frozen immediately after slicing. A sub-sample of this group was taken for determination of percentage moisture, dry matter content, and carotene level. The third group was canned and cooked by the normal food processing method. Frozen materials were stored at -40° C. Soil samples were taken at monthly intervals, at 0-12 in., 0-7 in., and 7-12 in. levels using a 3/4-in. soil probe. Samples were taken 'in row' and 'between row' after the carrot tops reached a height of 4 in. These samples were stored at -40° C. and were analyzed for aldrin and dieldrin residues.

In 1967 the same carrot varieties were planted early in the year with the rows adjusted to be in the 'between row' spacings of 1966. Due to a very poor spring and subsequent poor germination, it was necessary to reseed. Sampling procedures for the soil and carrots were similar to those of 1966.

Carrot tops taken in both 1966 and 1967 were chopped finely, sub-sampled, and the sub-samples stored at -40° C. until analyzed for aldrin and dieldrin.

ANALYTICAL TECHNIQUES: Frozen carrot roots and tops were thawed and a 50-gm. sample homogenized with 100-ml. acetonitrile, centrifuged and the acetonitrile decanted. This was repeated two more times with 50-gm. acetonitrile . The combined extracts were partitioned three times with n-hexane and 2% NaCl. This n-hexane portion was dried with Na_2SO_4, concentrated to 5 ml. and quantitatively transferred to the top of a 20-mm. column of 15 gm. Alumina (basic, activity II) and eluted with 300 ml. n-hexane. The eluant was concentrated and an aliquot was analyzed for aldrin and dieldrin.

This method was also used for the canned carrot roots.

Soil samples were air dried overnight at 105° C., cooled and the moisture level brought up to 20% by distilled water. The water-soil mixture was allowed to equilibrate for two hr. A 100-gm. soil sample was extracted three times with acetonitrile, centrifuged, and decanted. The acetonitrile extract was partitioned three times into n-hexane with 2% NaCl. The n-hexane fraction was dried through Na_2SO_4, concentrated to 5 ml., added to the top of a 20-mm. column of 10 gm. Alumina (basic, activity II), and eluted with 300 ml. redistilled n-hexane. This eluant was concentrated and an aliquot was analyzed for aldrin and dieldrin residues.

Aldrin and dieldrin were determined by gas chromatography and an electron-capture detector system utilizing a 5 ft. x 1/8 in. Pyrex glass column packed with 6% QF-1 and 4% SE-30 on chromosorb W 60/80, A/W.

RESULTS: Carotene determinations indicate a significant difference between varieties and treatment levels; however, correlations with residues of aldrin and dieldrin in carrot roots and tops are not complete.

Results of the food processing portion of the study show a variation in the level of aldrin and dieldrin residues depending on the degree of the processing.

Residue determinations are incomplete at this time.

CONCLUSIONS: Residue levels in carrot roots can be significantly reduced by some food processing techniques.

The rate of translocation of aldrin and dieldrin differed between various varieties of carrots when grown in contaminated soil under irrigation.

CROP: Carrots

PEST: --

TITLE: Aldrin and dieldrin translocation as influenced by nitrogen fertilization

NAME AND AGENCY: CHARNETSKI, W. A. and SOMMERFELDT, T. G.
Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: Aldrin 40% E. C.; Ammonium nitrate fertilizer 33.5-0-0.

METHODS: Replicated field plots were established in Lethbridge loam soil (a dark brown, alluvial-lacustrine chernozem soil). Aldrin was applied in 1966 by spraying (4 gallons per acre) at the rates of 0, 2.5, 5.0, and 20.0 pounds actual aldrin per acre by a low-volume, low-pressure boom, and was immediately incorporated into the soil by rotatilling to a depth of 7 inches. Three varieties of carrots (Yellow Belgium, Royal Chantenay, and Scarlet Nantes) were grown and harvested in 1966.

In 1967 the Royal Chantenay carrot plots in the 0 and 20 pounds per acre aldrin treatments were split and nitrogen was applied at the rate of 0 and 80 pounds per acre prior to planting.

Soil samples from each plot were taken at monthly intervals until harvest, were immediately frozen at -40° C., and will be analyzed at a later date.

Oxygen, soil moisture, and temperature measurements were made bimonthly.

Carrot roots and tops were harvested in the fall for aldrin and dieldrin analysis. Two centre rows were harvested, washed, and the carrot roots diced and tops chopped finely. Sub-samples were frozen at -40° C. until analyzed.

Duplicate 50-gram carrot root and top samples were extracted 3 times in a blender. This extract was combined with 500 ml. 2% NaCl and then partitioned 3 times (100 ml., 50 ml., 50 ml.) into n-hexane. This n-hexane extract was washed with 200 ml. 2% NaCl and then dried (by Na_2SO_4) and concentrated. This concentrate was 'cleaned up' on 15 grams of Alumina (activity II, basic) and an aliquot injected into a Varian Aerograph Model 600-D gas chromatograph equipped with 5 foot x 1/8 inch Pyrex column (packed with 6% QF.1 and 4% SE-30 on chromosorb W 60/80 A/W) and an electron-capture detector.

RESULTS: Results are forthcoming.

CROP: Carrots, Early Nantes Half-long

PEST: Carrot rust fly, *Psila rosae* (Fab.)

TITLE: Residues of diazinon in carrots after treatment against cyclodiene-resistant carrot rust fly.

NAME AND AGENCY: FINLAYSON, D.G., WILLIAMS, I.H., Research Station, Canada Agriculture, Vancouver, and FULTON, H.G., Entomology Sub-Station, Canada Agriculture, Chilliwack, British Columbia.

MATERIALS: Diazinon 5 G and 50 E.C.

METHODS: In-furrow granular application of 2 lb. toxicant per acre was supplemented with weekly drenches at 10, 20, and 30 oz. toxicant per acre (1X, 2X, and 3X recommended dosage) starting 28 days after seeding. Plots, sown May 1, consisted of four 20-foot rows 16 inches apart, and replicated three times. Sampling began August 8, 100 days after seeding. The samples, 10 carrots at random from each replicate, were taken 1, 3, 5 and 7 days after treatment No. 11 and No. 12; 1 and 7 days after No. 13; and 1, 3, 5, 7, 14, 21, 28, 35, 42, 56 and 70 days after No. 14, the final application. The number of carrots was reduced to 8 per replicate as the carrots increased in size and diminished in numbers remaining in the plots. Additional samples of small carrots were taken 28 and 56 days after the last application. Carrots were held in frozen storage until analysis, then scrubbed, shredded on a Braun Multimix, tumbled, and a sub-sample of 50 g blended with acetonitrile. The extract was partitioned into n-hexane and cleaned up on a column containing in sequence from the top, anhydrous sodium sulfate, Florisil, Sea Sorb 43, Norit A and anhydrous sodium sulfate. Elution was with 250 ml of 15:85 ethyl ether:n-hexane. After concentration of the eluent to a suitable volume, analysis was carried out on a 10-foot column containing 3% XE 60 on Anakrom ABS operated at 210°C using a Ni^{63} detector. Some of the samples were cross-checked on a recently acquired Melpar flame photometric detector, specific for phosphorus compounds.

RESULTS: Untreated samples are not shown in the table. Analysis of samples taken August 28, October 2 and 10 gave zero phosphorus readings.

Residues of diazinon in carrots after applications of 1, 2, and 3, times the recommended weekly dosage*

Date of and days after treatment	1X	2X	3X
Aug. 7 (No. 11)			
1-day	0.71	2.30	4.05
3-day	0.53	1.08	2.40
5-day	0.39	0.98 (0.77)	1.05 (1.00)
7-day	0.30	1.37 (1.46)	2.10 (2.06)
Aug.14 (No. 12)			
1-day	0.66	1.22	2.60
3-day	0.65	1.17	1.42 (1.41)
5-day	0.65	1.18	1.48
7-day	0.53 (0.33)*	0.61	1.40
Aug.21 (No. 13)			
1-day	0.50	1.21	2.30
7-day	0.35	1.05 (0.75)	1.80
Aug.28 (No. 14)			
1-day	0.57	1.10 (1.19)	1.50 (1.51)
3-day	0.80 (0.64)	1.50 (1.34)	1.88
5-day	0.43	1.30	1.50
7-day	0.45	1.18	1.75
14-day	0.46	0.94	1.43
21-day	0.28	0.83	0.74 (0.74)
28-day	0.25 (0.29)	0.96	1.10
35-day	0.28	0.60	0.80
42-day	0.35	0.48	1.13
56-day	0.18	0.45	0.90
70-day	0.33	0.65 (0.53)	1.01
28-day small	0.51 (0.58)	1.13	1.48
56-day small	0.21	0.34	1.30

*Values in brackets represent repeated analyses of anomalous results.

CONCLUSIONS: Diazinon applied at the recommended rates, 2 lb. toxicant in the furrow at planting supplemented with drenches at 10 oz. toxicant at 7 to 10 days apart with a 10-day period from last application to harvest, does not result in residues above tolerance. Increases in rates of application or harvest prior to the 10-day period could result in above tolerance residues.

RESIDUE DATA: See above.

GENERAL OBSERVATIONS: Nil.

CROP: Grapes

PEST: Grape berry moth and grape leaf hopper

TITLE: DDT residues in grapes

NAME AND AGENCY: CHIBA, M., Research Branch, Canada Agriculture, Vineland Station, Ontario.

MATERIALS: DDT, 50% WP

METHODS: The treated plot, adjoining an untreated one, was sprayed four times (pre-bloom, post bloom and two cover sprays) with DDT 2 lb. per 100 gal. at 200 gal. per acre by hand gun.)

RESULTS: Not completed at time of writing.

CONCLUSIONS: The work has not been completed but the results obtained to date have indicated several points of interest. The deposit of DDT on the fruit after spraying sometimes reached close to 100 ppm, but at harvest residual DDT was below the tolerance level of 7 ppm. Most of the residual DDT in the fruit was found in the grape skins. Spray drift was found to be a special problem. Samples collected from the control area three hours after spraying were always found to be containminated with slight amounts of DDT even though the spray was only done when the wind was away from the control area. The possibility of DDT translocation from soil to fruit was strongly suggested by the finding of small amounts of DDT (less than 0.1 ppm) in the leaves and pre-bloom clusters which were collected early in the season from both sprayed and unsprayed plots before DDT sprays were applied in the vicinity, since the soil in this grapery contained about 5 ppm DDT from treatments in previous years.

RESIDUE DATA: Available on request later.

GENERAL OBSERVATION: Fruit produced in the sprayed area was found to be much better in quality than that in the unsprayed area.

CROP: Pepper

PEST: Nil

TITLE: Determination of Residues of Disulfoton and Metabolites

NAME AND AGENCY: von STRYK, F.G., Research Station, Canada Agriculture, Harrow, Ontario

MATERIALS: Disulfoton 10% granular

METHODS: Fruit and leaf samples were collected and kept in frozen storage until analyzed. (See submission by Dr. W. H. Foott.) The residue determinations were carried out according to the Chemagro Report No. 18, 537 applying a gas chromatographic method and using a thermionic detection system. 50 g samples of leaves or fruits were macerated and extracted with 200 ml. of chloroform. After filtration 100 ml. of the filtrate was transferred to a flask and evaporated to dryness on a water bath. The residue was then dissolved in 4 ml. of benzene and was ready for injection. Under these conditions a peak of 40 nanograms of a standard solution corresponds to 1.6 ppm. in the unknown (4 µl.). All data relevant to residue analysis were corrected for percentage recovery and were the means of two separate analysis for each sample.

RESULTS: The fruit samples of the treated pepper plants did not contain disulfoton or any of its metabolites. The leaves, however, did contain metabolites of disulfoton in appreciable amounts. This was proven by the fact that the chromatograms of the treated leaves of each pepper variety showed 4 distinct peaks, which were not present in fruit or check samples. Two of these peaks were identified as disulfoton sulphoxide and disulfoton sulphone, based on their retention time. The two remaining peaks have so far not been positively identified and are probably non-toxic phosphate metabolites of disulfoton. The presence of disulfoton P=O sulphone could not be proven.

CONCLUSIONS: Disulfoton is taken up by the roots of the plant and translocated to the leaves but not to the fruits. Disulfoton is oxidized and degraded inside the plant to toxic oxidation products and non-toxic phosphates.

RESIDUE DATA: Residue of Disulfoton Found in Pepper Leaves from Plots Treated with 10% Granular Disulfoton (Chemagro Chemical Co.)

Variety	Application	Harvest	Total Disulfoton Applied lb./acre	Disulfoton found a. Sulphoxide b. Sulphone P.P.M.
Keystone	June 12, 1967	July 24, 1967	2 (active)	a.0.2
"	"	"	"	b. 1.6
"	"	Aug. 1, 1967	"	a. trace
"	"	"	"	b. 1.2
"	"	Aug. 11, 1967	"	a. - -
"	"	"	"	b. 0.8
Staddon	June 12, 1967	July 24, 1967	2 (active)	a. 0.2
"	"	"	"	b. 1.8
"	"	Aug. 1, 1967	"	a. trace
"	"	"	"	b. 2.1
"	"	Aug. 11, 1967	"	a. trace
"	"	"	"	b. 2.3
Yellow hot	"	July 24, 1967		a. 1.2
"	"	"		b. 2.6
"	"	Aug. 1, 1967		a. 0.1
"	"	"		b. 2.4
"	"	Aug. 11, 1967		a. 0.1
"	"	"		b. 2.4

GENERAL OBSERVATIONS: Nil

CROP: --

PEST: --

TITLE: Influence of ions on endrin solubility in water

NAME AND AGENCY: CHARNETSKI, W. A. and SOMMERFELDT, T. G.
Research Station, Canada Agriculture, Lethbridge, Alberta

MATERIALS: Endrin 96% from Nutritional Biochemical Corporation; water; and aqueous solutions of KCl, K_2SO_4, K_2CO_3, KNO_3, K_3PO_4.

METHODS: Endrin (at levels of 0, 0.25, 0.50, 1.00, 2.00, and 4.00 ppm) was equilibrated with water and aqueous solutions of the above-listed salts. The salt concentration was 1 meq. per litre.

Various amounts (depending on endrin concentration) of the aqueous endrin solutions were taken and analyzed by the following method, utilizing gas-liquid chromatography equipped with an electron-capture detector: A measured amount of endrin solution was extracted in a separatory funnel by 100, 50, and 50 ml. of redistilled n-hexane. The hexane extracts were collected and dried by filtering through 10 gm. Na_2SO_4. The dried n-hexane extract was concentrated and an aliquot injected into the gas chromatograph (Varian Aerograph Model 600-D gas chromatograph utilizing a 19 in. x 1/8 in. Pyrex column (packed with 1% SE-30 polyester (NPGA terminated) on Anakrom ABS, 80/90 mesh) and an electron-capture detector was used).

RESULTS: The results indicated that the specific conductance was not sufficiently sensitive (x 10^{-4} mhos) to detect differences in the endrin concentration of the solutions. The gas chromatographic data indicated that endrin solubility was influenced by ions present in the system. This influence appeared to also fluctuate with the level of endrin. Endrin solubility was greatest in the presence of the NO_3^- ion.

CONCLUSIONS: Solubility of endrin was influenced by the anions present in an aqueous solution and by the initial levels of endrin.

REMARKS: The results of this study indicated far-reaching implications. The authors are investigating some of these.

CROP:

PEST:

TITLE: Estimation of chlorinated pesticide residues in animal and vegetable oils

NAME AND AGENCY: SINGH, J. and LANTHIER, J.D. Scientific Services Laboratory, Plant Products Division, P and M Branch, Canada Department of Agriculture, C.E.F., Ottawa

MATERIALS: Aldrin, p,p'-DDT, dieldrin, heptachlor, heptachlor epoxide and lindane. Butter oil, Seal oil, cottonseed oil, hydrogenated marine oil and beef tallow

METHOD: The spiked sample (2 grams) of oil is spread in the form of a thin film over a large surface area provided by Celite 545. The pesticides are extracted from the oil-coated Celite with 80% aqueous acetonitrile and partitioned into Skellysolve F. Further removal of fat is achieved by cleanup on a column of basic alumina using Skellysolve F as eluent. Qualitative and quantitative determinations are made by GLC with electron capture detector.

RESULTS: (See tables)

CONCLUSION: The method yields an average recovery at levels of 0.1 ppm and 0.25 ppm ranging between 82 - 106%.

RESIDUE DATA: Nil

GENERAL OBSERVATIONS: The method is believed to be applicable to all the acetonitrile soluble pesticides which may be found in oil, provided that they can be eluted from alumina III under the conditions described.

Table 1.- Percentage Recovery of Pesticides Added to Oils at 0.1 ppm Level

Pesticides	Butter oil			Beef tallow			Cottonseed oil			Seal oil			Marine oil		
	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range
Lindane	94	4	91-100	95	6	85-100	86	2	85- 89	99	5	93-106	85	4	80- 92
Heptachlor	90	6	80- 98	91	6	84-100	89	4	85- 92	96	3	91- 99	101	5	91-108
Aldrin	88	4	85- 93	90	5	83- 95	86	3	83- 90	90	3	87- 94	86	5	80- 91
Heptachlor epoxide	92	3	89- 96	88	4	85- 93	95	2	91-100	90	2	87- 92	96	6	88-104
Dieldrin	94	7	83-100	95	7	88-106	95	2	93- 97	96	4	92-102	88	5	84- 95
pp'DDT	101	10	82-118	106	8	100-116	92	5	86-100	82	3	80- 90	95	6	89-103

The above results are the average recovery of five determinations in each substrate.

Table 2.- Percentage Recovery of Pesticides Added to Oils at 0.24 ppm Level

Pesticides	Butter oil[1]			Beef tallow[1]			Cottonseed oil			Seal oil			Marine oil		
	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range	Av.	±SD	Range
Lindane				92	7	80- 93	91	3	89- 94	92	3	88-105	93	4	87- 99
Heptachlor	102	2	100-110	86	6	81- 95	87	4	81- 90	95	2	92-101	98	5	91-103
Aldrin	92	2	90-101	86	5	80- 93	90	5	83- 97	82	3	80- 94	96	5	85-100
Heptachlor epoxide	94	4	90-102	89	4	86- 98	91	6	85-100	92	4	88- 97	94	5	86-100
Dieldrin	105	4	100-112	97	5	90-109	100	5	94-103	92	2	90-105	94	4	90- 99
pp'DDT	101	7	88-104	90	7	81-100	98	6	91-105	97	3	95-107	103	5	95-108

[1]The results are the average recovery of five determinations in each substrate, except in the case of Butter oil and Beef tallow, where ten determinations were made.

Table 3.- Percentage Purification of Oils

Sample[1]	Fat in SK-F after partition (grams)	Fat left after Al_2O_3 cleanup (grams)	Average % removal of fat
Butter oil	.0655	.0007	99.97
	.0650	.0008	99.96
Beef tallow	.0254	.0009	99.96
	.0204	.0009	99.96
Cottonseed oil	.0299	.0010	99.95
	.0220	.0006	99.97
Seal oil	.0715	.0008	99.96
	.0728	.0007	99.97
Marine oil	.0354	.0008	99.96
	.0304	.0007	99.97

[1] Two grams of sample were analyzed in each case.

CROP:

PEST:

TITLE: Endrin retention by Lethbridge loam and its components

NAME AND AGENCY: SOMMERFELDT, THERON G., and W. A. CHARNETSKI, Research Station, Canada Agriculture, Lethbridge, Alberta.

MATERIALS: Endrin (96% from Nutritional Biochemical Corporation), H_2O, acetone, n-hexane, acetonitrile, and soil materials - sand, silt, clay, soil less organic matter (removed with H_2O_2), and soil with organic matter. Source of soil materials was from Lethbridge loam, a Dark Brown alluvial-lacustrine Chernozemic soil.

METHODS: Samples of sand, silt, clay, soil less organic matter, and soil with organic matter were equilibrated in different endrin solutions. The solutions were acetone, n-hexane, and acetonitrile, each containing 10 mg. of endrin per liter and H_2O saturated with endrin. Fifty grams of soil material were equilibrated in 100 ml. of solution. Equilibration times were 4 and 96 hours. Following equilibration the solvent was separated from the soil material by centrifugation. The supernatant solution was decanted and analysed for endrin content. By difference in endrin content in the solution before and after equilibration it was possible to determine the endrin retention by the soil components.

Analyses for endrin content of the solutions before equilibration and of the supernatant solutions after equilibration were done by gas liquid chromatography (GLC) using an electron capture detector.

The solutions were stored in sealed vials until analysed, at which time they were filtered through glass filter pads, rinsing adequately. Then the different solutions were handled as follows:-

a) Water-endrin solution.—Extracted initially by 100 ml. of n-hexane in a separatory funnel, followed by two extractions using 50 ml. of n-hexane. The n-hexane dried by filtering through Na_2SO_4.

b) Hexane-endrin solution.—This solution was dried by filtering through Na_2SO_4.

c) Acetonitrile-endrin and acetone-endrin solutions.—These were diluted with 2% NaCl solutions and partitioned with n-hexane, partitioning repeated three times. The n-hexane extracts were washed with 2% NaCl solution and then dried by filtering through Na_2SO_4.

The dried n-hexane extracts were reduced to a given volume from which aliquots were taken for analysis by GLC (using a Varian Aerograph Model 600D equipped with a 19 x 1/8 inch Pyrex column packed with 1% SE 30 polyester (NPGA terminated) on Anakrom ABS 80/90 mesh and an electron capture detector).

RESULTS:

1. Differences in endrin retention by the different soil components were not evident because of equilibration period.
2. The degree of endrin retention varied with the solvent system from complete to no removal of endrin.

3. The degree of endrin retention, which was not necessarily related to surface area, varied with the specific component, increasing in the following order: sand, silt, soil with organic matter, soil without organic matter, and clay.

CONCLUSIONS:

1. The rate of retention by the soil components was rapid.

2. The solvent systems used affected the retention of endrin by the soil components.

3. Retention of endrin by the components of Lethbridge loam was not solely attributable to physical adsorption (i.e., Van der Waal type).

CROP:

PEST:

TITLE: Influence of endrin on the cation exchange capacity of Lethbridge loam and its components

NAME AND AGENCY: SOMMERFEIDT, THERON G., and W. A. CHARNETSKI, Research Station, Canada Agriculture, Lethbridge, Alberta.

MATERIALS: Endrin (96% from Nutritional Biochemical Corporation), acetone, 1N NaCl, 1N $NaC_2H_3O_2$, 1N $NH_4C_2H_3O_2$, sand, silt, clay, soil less organic matter (removed with H_2O_2), and soil with organic matter. Source of soil materials was from Lethbridge loam, a Dark Brown alluvial-lacustrine Chernozemic soil.

METHODS: Surface areas of the soil and its components were determined by the ethylene glycol retention method of Bower and Gschwend (1). Forty-gram samples of the soil and its components were equilibrated in 100 ml. of acetone-endrin solutions at five concentration levels, which were based on surface areas relative to that of the clay as shown below:-

Soil component	Surface area $m.^2/g.$	Endrin concentration in acetone mg./l.				
			x 10^2	x 10^2	x 10^2	x 10^2
Sand	34	0	5	10	15	20
Silt	75	0	12	25	38	50
Clay	300	0	50	100	150	200
Soil - O.M.	100	0	18	35	52	75
Soil + O.M.	145	0	25	50	75	100

After equilibration the soil materials were separated from the solutions by centrifugation and decanting the supernatant solution.

The cation-exchange capacity of the soil and its components was determined as outlined in U.S.D.A. Handbook 60 (2), with one modification. In saturating the materials with Na^+, NaCl was used as Na^+ source for three replications, and $NaC_2H_3O_2$ was used as Na^+ source for three replications. By using two sources of Na^+, the chloride effect (common ion with Cl^- in endrin) was determined.

The exchangeable Na^+ concentration was determined with an AutoAnalyzer. The endrin concentrations of the initial acetone solution and the final Na extraction solution are to be determined by gas liquid chromatography (GLC) using an electron capture detector.

RESULTS: Forthcoming.

REFERENCES:

1. Bower, C. A., and F. B. Gschwend. 1952. Ethylene glycol retention by soils as a measure of surface area and interlayer swelling. Soil Sci. Soc. Am. Proc. 16: 342-345.

2. United States Salinity Laboratory Staff. 1954. Diagnosis and improvement of saline and alkali soils. U. S. Dept. Agr. Handbook 60. Washington, D. C.

STORED PRODUCTS AND FUMIGANTS

edited by

H.A.U. Monro

CROP: Greenhouse plants

PEST: Citrus mealybug, Planococcus citri (Risso)

TITLE: Control of insects by phosphine

NAME AND AGENCY: MONRO, H.A.U. and UPITIS, E., Research Institute, Canada Agriculture, London, Ontario.

MATERIAL: Phosphine generated from tablets of aluminum phosphide.

METHODS: Tests were made to evaluate the possibility of the use of phosphine to control insects infesting growing plants. Twelve species of potted plants, some of them infested with the mealybug, were exposed to phosphine at different concentrations and for a 4 hour exposure period at 25°C.

RESULTS: The post-embryonic stages of the mealybug were controlled at all concentrations tested; but none of the treatments killed the eggs. The lowest treatment had a concentration x time product (c.t.) of 14 milligram hours per liter, the highest c.t. was 57 mg.hr./l.

a. Plants tolerant to all treatments
   Cyclamen
b. Plants tolerant to median treatment (31 mg.hr./l.)
   Anthericum, Asparagus fern, Cyclamen, Diefenbackia, Episcia, Pepperonia, Sanseveria
c. Plants slightly burned at lowest treatment (14 mg.hr./l.)
   Begonia, Tomato
d. Plants slightly burned at median treatment (31 mg.hr./l.)
   Poinsettia, Hoya, Nemesia

The injury sustained was burning of leaves and flowers but, subsequent to all treatments, the injured plants recovered.

RESIDUE DATA: None

CONCLUSIONS: Several species of greenhouse plants were tolerant to insecticidal fumigations with phosphine. Although the eggs of the mealybug were not controlled the possibility of the use of this fumigant for treating living plants should be explored further.

<u>CROP</u>: Stored food.

<u>PESTS</u>: <u>Tyrophagus</u> <u>putrescentiae</u> (Schrank) (Acarina: Acaridae).

<u>TITLE</u>: Time required for high phosphine dosages to kill 50% of <u>Tyrophagus</u> <u>putrescentiae</u> populations.

<u>NAME AND AGENCY</u>: BARKER, P. S., Research Station, Canada Department of Agriculture, Winnipeg 19, Manitoba.

<u>MATERIALS</u>: Phosphine (99% purity).

<u>METHODS</u>: The mites were exposed to phosphine at 66 and 75°F. The gas was measured and introduced into the exposure chambers by means of a gas buret. The exposure chambers were 1715 ml capacity mason jars. The dosages were 13.35 ml PH_3 per liter at 66°F and 8.00 mg PH_3 per liter at 75°F,. At each temperature 21 jars were used, three of which constituted "checks"; there were three repetitions. Times of exposure varied from 20 to 40 hours. The mites were placed in 5 cm diameter petri dish bottoms; a little silicone grease was smeared around the rims of the dishes to confine the mites. Mortality was assessed after 24 and 48 hours.

<u>RESULTS</u>: It was shown that an extremely high concentration X time (C x T) product was required to achieve a 50% kill of this species. A higher C x T was required at 66°F than at 75°F.

<u>CONCLUSIONS</u>: Phosphine did not have much effect on <u>T</u>. <u>putrescentiae</u> since very long times of exposure to high dosages were required to show 50% kill. The dosages used in this study were more than 2.5 times the maximum field dosages usually recommended.

Hours of exposure to highconcentrations of phosphine required to cause 50% mortality of T. putrescentiae at two temperatures.

F	Mg PH_3 per liter	LT_{50} (Hours)	C x T
66	13.35	22	293
75	8.00	21	168

CROP: Stored wheat

PEST: Rusty grain beetle, *Cryptolestes ferrugineus* (Stephens)

TITLE: Control of the rusty grain beetle.

NAME AND AGENCY: WATTERS, F. L. Research Station, Canada Agriculture, 25 Dafoe Road, Winnipeg 19, Manitoba.

MATERIALS: 0.13% pyrethrins plus 1.27% piperonyl butoxide in deodorized kerosene.

METHODS: The insecticide was applied with an electrically-powered aerosol fog generator at 1 gal per 9300 cu ft. Distribution and residual effectiveness of deposits on floor and wall targets consisting of glass, filter paper, smooth fir plywood, and grooved plywood to simulate structural crevices, were bioassayed at various periods after treatment with adults of the rusty grain beetle.

RESULTS: Floor targets received more insecticide than wall targets ($P < 0.01$). Loss of insecticide during treatment and non-uniform distribution of deposits on targets at different locations in the bin were attributed to air currents. Plywood floor targets and grooved plywood wall targets remained effective for 11 months when stored at 23 ± 3° C, 35 to 50% R.H.

CONCLUSIONS: A pyrethrins-piperonyl butoxide formulation applied with an aerosol fog generator at 1 gal per 9300 cu ft produced deposits on fir plywood targets that remained biologically effective for 11 months.

RESIDUE DATA: Nil.

GENERAL OBSERVATIONS: Fog generators may be used to apply residual insecticides on structural surfaces of empty grain bins that are more difficult and more costly to treat with insecticides applied as coarse sprays.

LIST OF PESTICIDES AND CHEMICAL DEFINITIONS

Pesticide	Chemical Definition
Abate	O,O,O',O'-tetramethyl O,O'-thiodi-p-phenylene phosphorothioate
AC 47031	2-(diethoxyphosphinylimino)-1,3-dithiolane
AC 47470	2-(diethoxyphosphinylimino)-4-methyl-1, 3-dithiolane
Acaralate	unknown
Agristrep	streptomycin sulfate
Agroil	an agricultural oil
Agrox C	phenyl mercury acetate 7% ethyl mercury chloride 1%
aldrin	a product containing 95 percent of 1,2,3,4, 10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1, 4-endo,exo-5,8-dimethanonaphthalene
allylidene diacetate	allylidene diacetate
Allisan	see - dichloran
aluminum phosphide	aluminum phosphide
Animert	see - Animert V-101
Animert V-101	p-chlorophenyl 2,4,5-trichlorophenyl sulphide
Anthio	see - formothion
Aphidan	O,O-diisopropyl-S-ethylsulphinylmethyl dithiophosphate
azinphos-methyl	3-(mercaptomethyl)-1,2,3-benzotrizain-4(3H)-one O,O-dimethyl phosphorodithioate
Azodrin	3-(dimethoxyphosphinyloxy)-N-methyl-cis-crotonamide
Bacillus thuringiensis (Berliner)	a bacterial insecticide
Banol	see - carbanolate
Basudin	see - diazinon

Pesticide	Chemical Definition
Bayer 5114	see - dichlofluanid
Bayer 25141	see - fensulfothion
Bayer 29493	see - fenthion
Bayer 37289	see - trichloronate
Bayer 39007	see - Baygon
Bayer 47531	see - dichlofluanid
Baygon	o-isopropoxyphenyl methylcarbamate
Baytex	see - fenthion
Bidrin	see - dicrotophos
binapacryl	2-sec-butyl-4,6-dinitrophenyl 3-methyl-2-butenoate
Birlane	see - chlorfenvinphos
Bordeaux mixture	lime-copper sulphate mixture
Brestan 60	a combination of triphenyltin acetate and maneb
bromophos	O,O-dimethyl-O-2,5-dichloro-4-bromophenyl thionophosphate
Bux Ten	a 3:1 mixture of: m-(1-methylbutyl)phenyl methylcarbamate and m-(1-ethylpropyl)phenyl methylcarbamate
B-25141	see - fensulfothion
B-37289	see - trichloronate
calcium polysulphide	calcium polysulphide
captan	-N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide
carbanolate	6-chloro-3,4-xylyl methylcarbamate
carbaryl	1-naphthyl methylcarbamate

Pesticide	Chemical Definition
carbofuran	2,3-dihydro-2,2-dimethyl-7-benzofuranyl N-methylcarbamate
carbophenothion	S-(p-chlorophenyl) thiomethyl O,O-diethyl phosphorodithioate
CDEC	2-chloroallyl diethyldithiocarbamate
Cela A-36	unknown
Chem 5461	S,S-diethyl chloromethylphosphonodithioate
Chemagro 4497	bis(1,2,2-Trichloroethyl) sulfoxide
Chipman I.F. Seed Treater	contains 15% diazinon plus 35% captan
Chipman No. 16-67	unknown
chlordane	1,2,4,5,6,7,8 8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan
chlorfenvinphos	diethyl 1-(2,4-dichlorophenyl)-2-chlorovinyl phosphate
chlorphenamide	see - chlorphenamidine
chlorphenamidine	N-(2-methyl-4-chlorophenyl)-N',N-dimethyl-formamidine
chloropicrin	trichloronitromethane
chloropropylate	isopropyl 4,4-dichlorobenzilate
Ciba 9643	confidential - but known to PTIO
Cidial	ethyl ester of O,O-dimethyldithiophosphoryl - phenyl acetic acid
C.O.C.S.	Copper oxychloride sulphate
Compound 4072	see - chlorfenvinphos
copper sulphate	copper sulphate
copper oxychloride sulphate	copper oxychloride sulphate

Pesticide	Chemical Definitions
Co-Ral	see - coumaphos
cottonseed oil	cottonseed oil
coumaphos	3-chloro-7-hydroxy-4-methylcoumarin O,O-diethyl phosphorothioate
Cufram Z	complex containing zinc, manganese and copper
Cygon	see - dimethoate
Cyprex	see - dodine
C-7019	2-azido-4-isopropylamino-6-methylmercapto-s-triazine
C-8353	2-(1,3-dioxolane-2-yl)-phenyl-N-methylcarbamate
C-8514	see - chlorphenamidine
C-8874	O,O-diethyl O-2,5-dichloro-4-iodophenyl thiophosphate
C-9491	O,O-dimethyl O-2,5-dichloro-4-iodophenyl thiophosphate
C-9643	O-(4-methyl-1,3-dioxalan-2-yl)-phenyl-N-methylcarbamate
DAC 2787	see - Daconil 2787
Daconil 2787	tetrachloroisophthalonitrile
Dasanit	see - fensulfothion
Dasanit 4497	mixture of Dasanit + Chemagro 4497
DCPA	dimethyl 2,3,5,6-tetrachloroterephthalate
D-D	mixture of 1,3-dichloropropene, 1,2-dichloropropane and related chlorinated C_3 hydrocarbons

Pesticide	Chemical Definitions
DDT	1,1,1-trichloro-2,2-bis(chlorophenyl) ethane (technical) is a complex mixture of chemicals in which para, para'-DDT predominates (>70% W/W)
Decafentin	unknown
Delan	2,3-dinitro-1,4-dithioanthraquinone
demeton	O,O-diethyl O-2-(ethylthio)ethyl phosphorothioate and O,O-diethyl S-2-(ethylthio)ethyl phosphorothioate
Des-I-Cate	N,N dimethyl-alkylamine) salt of endothall (3,6-endoxohexahydrophthalic acid)
Dessin	2-sec-butyl-4,6-dinitrophenyl isopropyl carbonate
Dexon	p-(dimethylamino) benzenediazo sodium sulfonate
diazinon	O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl)-phosphorothioate
dibasic ammonium phosphate	dibasic ammonium phosphate
Dibrom	see - naled
dicamba	3, 6-dichloro-o-anisic acid
dichlofluanid	N-(dichlorofluoromethylthio)-N',N'-dimethyl-N-phenylsulfamide
dichlone	2,3-dichloro-1,4-naphthoquinone
dichloran	2,6-dichloro-4-nitroaniline
1,3 dichloropropene	1,3-dichloropropene
dicofol	4,4'-dichloro-α-(trichloromethyl) benzhydrol
dicrotophos	2-dimethylcarbamoyl-1-methylvinyl dimethyl phosphate

Pesticide	Chemical Definitions
dieldrin	a product containing 85 percent of 1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-exo-5,8-dimethanonaphthalene
diesel oil	diesel oil
Difolatan	N-(1,1,2,2-tetrachloroethylsulfenyl)-cis-Δ-cyclohexene-1,2-dicarboximide
dimethoate	O,O-dimethyl S-(N-methylcarbamoylmethyl) phosphorodithioate
dimethyl sulphoxide	dimethyl sulphoxide
dinocap	2-(1-methylheptyl)-4,6-dinitrophenyl crotonate
diquat	6,7-dihydrodipyrido(1,2-a2',1'-c) pyrazidinium (salt)
disulfoton	O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate
Di-Syston	see - disulfoton
Dithane M-22	see - maneb
Dithane M-22 Special	see - maneb
Dithane M-45	see - mancozeb
Dithane Z 78	see - zineb
DMSO	see - dimethyl sulfoxide
dodine	n-dodecylguanidine acetate
dormant oil	a mineral oil of 200-220 viscosity
Dowco 213	see - Plictran
Drillbox Bunt-No-More	hexachlorobenzene 10% captan 20%

Pesticide	Chemical Definitions
Drillbox Lindasan	37.5% lindane and 5% captan
Drillbox Onion Maggot Powder Green Cross	formulation not known
Drillbox Seed Treater	contains 25% diazinon plus an adhesive carrier
DuPont 1179	see - Lannate
DuPont 1642	S-methyl N-(carbamoyloxy) thioacetimidate
DuPont 1991	see - Fungicide 1991
Dursban	O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate
Du-Ter	triphenyltin hydroxide 20%
Dyfonate	O-ethyl-S-phenyl-ethylphosphonodithioate
Dylox	see - trichlorfon
Dyrene	2,4-dichloro-6-(o-chloroanilino)-s-triazine
D-342-59	unknown
D-735	2,3-dihydro-5-carboxanilido-6-methyl-1, 4-oxathiin
E.I. 47031	see - AC 47031
Ekatox	ethyl parathion 5%
Elgetol	sodium salt of dinitro-o-cresol
endosulfan	6,7,8,9,10, 10-hexachloro-1,5,5a,6,9, 9a-hexahydro-6, 9-methano-2,4,3-benzodioxathiepin-3-oxide
endrin	1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-endo-5,8-dimethanonaphthalene

Pesticide	Chemical Definition
EP-279	unknown
EP-342	unknown
EP-346	unknown
EP-351	unknown
EP-352	unknown
EP-363	unknown
EP-371A	unknown
EP-371B	unknown
EP-371C	unknown
E.P.N.	O-ethyl O-p-nitrophenyl phenylphosphonothioate
EPTC	ethyl di-n-propylthiolcarbamate
ethion	O,O,O',O'-tetraethyl S,S'-methylene bisphosphorodithioate
Ethion-Superior Oil 70	ethion in combination with a mineral oil of 70 sec. viscosity
fenazaflor	5,6-dichloro-1-phenoxycarbonyl-2-trifluromethyl benzimidazole
Fennite	confidential - known to P.T.I.O.
fenoflurazole	see - fenazaflor
fenson	p-chlorophenyl benzenesulphonate
fensulfothion	O,O-diethyl O-p-(methylsulfinyl)-phenyl phosphorothioate
fenthion	O,O-dimethyl O-(4-(methylthio)-m-tolyl) phosphorothioate
folpet	N-(trichloromethylthio)phthalimide

Pesticide	Chemical Definition
formothion	O,O-dimethyl-S-(N-methylcarbamoylmethyl) dithiophosphate
fuel oil	a mineral oil
Fungicide 1991	1-(butylcarbamoyl)-2-benzimidazole carbamic acid, methyl ester
Fungicide 4497	see - Chemagro 4497
Furadan	see - carbofuran
F-427	2,3-dihydro-5-orthophenylcarboxanilido-6-methyl-1,4-oxathiin
F-461	see - Plantvax
F-849	2-amino-4-methyl-5-carboxanalido-thiazole
Galecron	see - chlorfenamidine
Gammasan	lindane 75% captan 10%
Gardona	2-chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate
GC-4072	see - chlorfenvinphos
Genite	2,4-dichlorophenyl benzene sulphonate
Glyodex	dodine 16.35% + glyodin 50.09%
glyodin	2-heptadecyl-2-imidazoline acetate
G-696	2,4-dimethyl-5-carboxanilido thiazole
GS-12968	O,O-dimethyl S-(5-ethoxy-1,3,4-thiadiazol-2(3H)-onyl-(3)-methyl)phosphorodithioate
GS-13005	O,O-dimethyl S-(5-methoxy-1,3,4-thiadiazol-2(3H)-ohyl-3(3)-methyl)phosphorodithioate
Guthion	azinphos-methyl

Pesticide	Chemical Definition
heptachlor	1(or 3a),4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetahydro-4,7-methanoindene
heptachlor epoxide	1,4,5,6,7,8,8-heptachloro-2,3-epoxy-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
hydrated lime	calcium hydroxide
hydrogenated marine oil	a marine oil
hydroxyquinoline benzoate	hydroxyquinoline benzoate
I.F. Seed Treater	see - Chipman I.F. Seed Treater
Imidan	O,O-dimethyl (N-phthalimidomethyl) phosphorodithioate
iodine	iodine
JF-2067	see - PP-781
Karathane	see - dinocap
Kelthane	see - dicofol
Kem-Germ	a hospital disinfectant; contains 2-hydroxydiphenyl (8.9%) and chlorophenol (0.48%)
Kerosene, deodorized	refined kerosene
Kilval	see - vamidothion
Kolo-100	sulphur plus dichlone
Lannate	S-methyl N-((methylcarbamoyl)oxy)-thioacetimidate
Lanstan	1-chloro-2-nitropropane
lead arsenate	diplumbic hydrogen arsenate
lime sulphur	aqueous solution containing calcium polysulphides
lindane	a product containing a minimum of 99 percent gamma-BHC (q.v.)

Pesticide	Chemical Definition
Lindasan	lindane 37.5% captan 5.0%
Linuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea
L-600	S-(isopropyl-carbanyl-methyl) O,O-diethyl dithiophosphate
malathion	diethyl mercaptosuccinate S-(O,O-dimethyl phosphorodithioate)
mancozeb	zinc coordinated manganese ethylene bis-(dithiocarbamate)
maneb	manganese ethylenebis(dithiocarbamate)
Manzate D	see - maneb
Marlate	see - methoxychlor
mecarbam	ethyl(mercaptoacetyl)methylcarbamate O,O-diethyl phosphorodithioate
menazon	O,O-dimethyl S-(4,6-diamino-s-triazin-2-yl) methyl phosphorodithioate
mercuric chloride	mercuric chloride
Mercury Seed Treatment	1.43% methyl mercury 8-hydroxyquinolinate
metam-sodium	sodium methyldithiocarbamate
Meta-Systox-R	see - oxydemeton-methyl
methoxychlor	1,1,1-trichloro-2,2-bis(p-methoxyphenyl) ethane
methyl bromide	bromomethane
methylmercuric dicyandiamide	methyl mercuric dicyandiamide
methyl mercury 8-hydroxyquinolinate	methyl mercury 8-hydroxyquinolinate
metiram	zinc activated polyethylene thiuram disulfide

Pesticide	Chemical Definition
mevinphos	methyl 3-hydroxycrotonate dimethyl phosphate
Micasin	a mixture of 25% CPAS-(4-chlorophenyl 2,4,5-trichlorophenylazosulfide), 10% DDDS-(bis(4-chlorophenyl)disulfide); 15% DCPM-(bis(4-chlorophenoxy)methane
Micene	zinc complex salt of dithiocarbamic acid
Micro Niasul	92% sulfur
Milbex	a mixture of 25% CPAS (4-chlorophenyl 2,4,5-trichlorophenylazosulfide) and 25% DMC [1,1-bis(4-chlorophenyl)ethanol]
Morestan	see - oxythioquinox
Morocide	see - binapacryl
Murfotox	see - mecarbam
naled	1,2-dibromo-2,2-dichloroethyl dimethyl phosphate
NC-5016	see - fenazaflor
Neguvon	see - trichlorfon
Nemagon	1,2-dibromo-3-chloropropane
Neosolfan	sulfur
Nexion	see - bromophos
NIA-10242	see - carbofuran
nickel chloride hexahydrate	a nickel chloride hexahydrate
nicotine sulphate	nicotine sulphate
Nissol	N-methyl-N-(1-naphthyl) monofluoroacetamide
nitrofen	2,4-dichlorophenyl-4-nitrophenyl ether
N-2790	see - Dyfonate

Pesticide	Chemical Definition
N-4543	O-isopropyl S-(phthalimidomethyl) ethyl phosphonodithioate
OCS-21693	N-methoxy-N-methyl 2,3,5,6-tetrachloro-4-carbomethoxybenzamide
oil	petroleum hydrocarbon
Omite	2-(p-tert-butylphenoxy)cyclohexyl propargyl sulfite
Orchex 696 oil	a petroleum oil of 58.4 S.S.U. unsulfonated residue 95%
Orchex 796 Superior Oil	superior type oil, viscosity at 100 F. 71.7 S.S.U., unsulfonated residue 96%
Organil 66	unknown
Orthocide 75 Seed Protectant	see - captan
ovex	p-chlorophenyl p-chlorobenzenesulphonate
oxydemeton-methyl	O,O-dimethyl S-[2-(ethylsulphinyl)ethyl] phosphorothioate
oxythioquinox	6-methyl 2,3-quinoxalinedithiol cyclic carbonate
Pandrinox APX	aldrin 20.00% methyl mercury dicyandiamide 0.72% (metallic mercury 0.48%)
Panogen 15	methyl mercuric dicyandiamide 1.5% Hg
Panogen 15B	methyl mercuric dicyandiamide
Panogen PX	methyl mercury dicyandiamide 0.9%
paraquat	1,1'-dimethyl-4,4'-bipyridinium (salt)
parathion	O,O-diethyl O-p-nitrophenyl phosphorothioate
Pennsalt Superior Oil	a petroleum oil viscosity at 100°F; 70-75 S.S.U. unsulfonated residue 92%

Pesticide	Chemical Definition
pentachloronitrobenzene	see - quintozene
Perthane	1,1-dichloro-2,2-bis(p-ethylphenyl) ethane
PGSO-1 Oil	a petroleum oil of 68.2 S.S.U., unsulfonated residue 93%
PGSO-2 Oil	a petroleum oil of 90.0 S.S.U., unsulfonated residue 94%
Phaltan	see - folpet
Phenoflurazole	see - fenazaflor
phenthoate	O,O-dimethyl S-α-ethoxycarbonylbenzyl phosphorodithioate
phorate	O,O-diethyl S-[(ethylthio)methyl)] phosphorodithioate
phosalone	O,O-diethyl S-(6-chlorobenzoxazolone-3-yl methyl) phosphorodithioate
Phosdrin	see - mevinphos
phosphamidon	2-chloro-2-diethylcarbamoyl-1-methylvinyl dimethyl phosphate
phosphine	phosphine
phosphoric acid	esters of Phosphonic and Phosphinic acids
Phygon	see - dichlone
piperonyl butoxide	α-[2-(2-butoxyethoxy)ethoxy]-4,5-(methylenedioxy)-2-propyltoluene
Plantvax	2,3-dihydro-5-carboxanilido-6-methyl-1,4-oxathiin-4,4-dioxide
Plictran	tricyclohexyltin hydroxide
Polylin	75% lindane 10% metiram
Polyram	see - metiram

Pesticide	Chemical Definition
Polyram-lindane	see - Polylin
Polyram Seed Treater	metiram 53.3% carbofuran 10.0%
p,p'-DDT	para-para' isomer of 1,1,1-trichloro-2-2-bis-(chlorophenyl) ethane
PP-781	4-o-chlorophenylhydrazono-3-methylisoxazol
pyrethrin	a mixture of: 4-hydroxy-3-methyl-2(2,4-pentadienyl)-2-cyclopenten-1-one 2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate and 4-hydroxy-3-methyl-2-(2,4-pentadienyl)-2-cyclopenten-1-one 1-methyl-3-carboxy-α,2,2-trimethylcyclopropane acrylate ester
quintozene	pentachloronitrobenzene
R & H 90	unknown
RH-90	see - R & H 90
Rogor	see - dimethoate
R.P. 11,974	see - phosalone
Ruelene	O-(4-tert-butyl-2-chlorophenyl) O-methyl methylphosphoramidate
Ryania	main toxicant ryanodine
R-3422-S	ethyl N-(2-(O,O-dimethyl phosphorodithioyl) ethyl) carbamate
R-11913	unknown
Sayfos	see - menazon
SCL-210	unknown
SD-345	2-propene-1,1-diol acetate

Pesticide	Chemical Definition
SD-8447	see - Gardona
SD-9098	O-(2-chloro-1-(2,5-dichlorophenyl) vinyl) O,O-diethyl phosphorothioate
SD-9129	see - Azodrin
SD-11831	4(methylsulfonyl)-2,6-dinitro-N,N-dipropyl-aniline
seal oil	seal oil
Semesan Bel	a mixture of hydroxymercurinitrophenol and hydroxymercurichlorophenol
Sevin	see - carbaryl
Shell Neutrol Emulsible Dormant Spray Oil	a petroleum oil - viscosity 100°F. 200-215 S.S.U. unsulfonated residue 80%
Shell 8447	see - Gardona
Siaprit	ethylene thiuram monosulfide
sodium arsenite	sodium metaarsenite
streptomycin	streptomycin
sulphur	sulphur
superior oil	mineral oils of varying viscosities
Superior Oil 70	a mineral oil of 70 sec. viscosity
Supracide	see - GS-13005
Systox	see - demeton
Tartan	unknown
Tedion	see - tetradifon
Telone	1,3-dichloropropene and related chlorinated C_3 hydrocarbons
Temik	2-methyl-2-(methylthio)propionaldehyde O-(methylcarbamoyl)oxime

Pesticide	Chemical Definition
Terraclor	see - quintozene
Terraclor Super-X	quintozene and 5-ethoxy-3-trichloromethyl 1,2,4-thiadiazole
Terrazole	5-ethoxy-3-trichloromethyl 1,2,4-thiadiazole
tetradifon	4-chlorophenyl 2,4,5-trichlorophenyl sulphone
Thimet	see - phorate
Thiodan	see - endosulfan
thionazin	O,O-diethyl O-2-pyrazinyl phosphorothioate
Thiralin	thiram 10% lindane 75%
thiram	bis(dimethylthiocarbamoyl)disulphide
Thuricide	see - Bacillus thuringiensis (Berliner)
Thylate	see - thiram
Tiguvon	see - fenthion
Tok	see - nitrofen
toxaphene	chlorinated camphene having a chlorine content of 67-69 per cent
Tranid	3-chloro-6-cyano-2-norbornanone O-(methylcarbamoyl) oxime
trichlorfon	dimethyl(2,2,2-trichloro-1-hydroxyethyl) phosphonate
trichloronate	O-ethyl O-2,4,5-trichlorophenyl ethyl-phosphonothioate
trifluralin	a,a,a-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine

Pesticide	Chemical Definition
Trithion	see - carbophenothion
Triton B-1956	a phthalic glycerol alkyl resin
Triton X-100	alkylated aryl polyether alcohol
UC-21149	see - Temik
vamidothion	2- [(2-mercaptoethyl)thio]-N-methyl-propionamide S-(O,O-dimethyl phosphorothioate)
Vapam	see - metam-sodium
VCS-365	unknown
Volck Supreme Oil	a petroleum oil - viscosity at 100°F. 147 S.S.U. unsulfonated residue 94%
Vorlex	methyl isothiocyanate 20%, plus 1, 3-dichloropropene and related chlorinated C_3 hydrocarbons 80%
Vorlex 201	methyl isothiocyanate 17% chloropicrin 15% 1,3-dichloropropene and related chlorinated C_3 hydrocarbons 68%
WD-1	unknown
WL-9385	unknown
zinc sulphate	zinc sulphate
zineb	zinc ethylenebis(dithiocarbamate)
Zinophos	see - thionazin
Z.M.C. 5 80 WP	complex containing zinc, manganese and copper
Zolone	see - phosalone

INDEX