2000
INSECT AND DISEASE MANAGEMENT

RIDGETOWN COLLEGE
UNIVERSITY OF GUELPH
Ridgetown, Ontario
Dr. R.E. Pitblado

Trial Results may be seen on the Ridgetown College website:

www.ridgetownc.on.ca

December, 2000

To Those Interested in Insect and Plant Disease Controls:

We appreciate the cooperation and assistance provided by the chemical companies and their representatives, their ideas and the chemical samples they have provided for the research work carried out at Ridgetown College, University of Guelph. Field crop and vegetable processors have also contributed both financially and have aided in the direction of our research program.

We also appreciate the cooperation of our farmer cooperators who have provided land and assist in working the land, applying fertilizer, herbicides and planting the crop.

We are indebted to those companies, processor and grower groups who feel this type of research program is desirable and are prepared to financially support this endeavour.

Technical assistance was expertly directed by Ms. Phyllis May of our college staff, and aided by Petra Biondi and Steven Moore. I wish to thank them.

We trust that the information provided by this research will further the science of insect and plant disease control, and to assist companies in furthering their registrations of agricultural chemicals that will prove beneficial to our Ontario farmers.

Yours truly,

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ONTARIO TOMATO RESEARCH INSTITUTE
RESEARCH RESULTS

THE DEVELOPMENT OF PEST MANAGEMENT STRATEGIES FOR INSECTS AND PLANT DISEASES IN PROCESSING TOMATOES - 2000

Dr. Ron Pitblado
RIDGETOWN COLLEGE University of Guelph

URMULE

A URMULE was submitted for KOCIDE 101 for the control of bacterial speck, spot and canker on tomatoes and bacterial spot on peppers seedling plug transplants grown in Ontario greenhouses. I have submitted the proposal on behalf of the vegetable seedling and processing tomato and pepper industry with support from the manufacturer, Griffin L.L.C., the Ontario Tomato Seedling Growers Marketing Board, the Ontario Processing Vegetable Growers, the Nabisco Ltd processing company and a pepper grower from the Dresden area. I have been in constant contact with the PMRA authorities, Doug Rothwell who indicated to me that he has received the approval from 3 out of the 4 agencies which need to sign off. It looks favourable but until we get the full clearance we are only partially there.

PACLOBUTRAZOL

For several years, Dr. Vince Souza-Machado and I have been working with Paclobutrazol in an effort to improve the quality of tomato plug transplants both in the management within the seedling greenhouses as well as in the field for improved establishment. Our initial efforts using the material as a seed treatment caused significant emergence problems and an anticipated logistical problem that of having to treat the seed prior to it being commercially coated. Our efforts have been more favourable once we began to test the material as a foliar application at the 2 leaf stage in the greenhouse and with the process of nutrient loading the plug. We have worked with the research department at Heinz and have shown both increased standability and earliness in the Leamington area. This year we again showed excellent results. The cooperation with Dr. Jim Dick of Nabisco and the results of the trials that he ran in Dresden reinforced the anticipated value of this material for the benefit of the tomato industry.
TOM3 Efficiency of biocontrol agent T-22 with Paclobutrazol to control black root rot in tomato plugs for enhanced field establishment. Location: Ridgetown and Dresden.

BACTERIAL DISEASES

Five trials were conducted this year on both tomatoes and peppers to establish if there where any new products that would provide better disease control than the combination of BRAVO 500 and KOCIDE 101. None did. This combination is still our most effective choice, however this year we saw first hand that under weather conditions favourable to bacterial disease spread, control of bacterial diseases are not effectively controlled with foliar applications of this copper combination. Observations from greenhouse plug plantings, early season field observations, numerous mid season surveys were undertaken and matched with weather data provided through the Ontario Weather Network (OWN), provided a profile of this year's bacterial disease scenario. It again demonstrated that early season detection was related to seed or transplant source, and that weather conditions played the ultimate role in determining the degree of "hurt" the industry would feel. Noting the incidence of bacterial canker in grower fields, a bacterial disease that is known to be difficult to control using seed treatments and then noting this years incidence of even more bacterial spot, which is considered much easier to control through seed treatments, suggested once again that the industry needs to investigate how effectively they are treating their seeds.

TOM8 Use of surfactants to improve the effectiveness of copper for the control of foliar disease in tomatoes.
TOM 9 Timing of copper for the control of bacterial spot in tomatoes.
TOM13 Control of foliar diseases in processing tomatoes using Rezist.
PEP3 Use of surfactants to improve the effectiveness of copper for the control of foliar disease in peppers.
PEP4 Bacterial spot control in peppers using assistor.

FUNGAL DISEASES

Several new fungicides were evaluated that show considerable promise for the tomato industry for the control of early blight, septoria leaf spot and Anthracnose. In fact this year for the first time in over 25 years at Ridgetown College, I had the opportunity to evaluate fungicides for their relative effectiveness against late blight. As the industry knows we have been relying on the BRAVO and mancozeb fungicides for the past few years and recently have been waiting for the registration of ICIA5504= Quadris in the USA. The US has had the use of this product for the past two years however the company has been reluctant to register Quadris in Canada for tomatoes for fear of injuring apple trees. They may have waited too long as both BASF and BAYER have two excellent fungicides with different chemistry that out performs even Quadris. Both these new products in addition to controlling the more common fungal diseases we have to deal with also are extremely effective in controlling late blight.

TOM1 Evaluation of fungicides for the control of foliar diseases in field tomatoes.
TOM2 Evaluation of candidate fungicides for the control of foliar diseases in field tomatoes.
TOM5 TOMCAST spraying using new tomato fungicides.
TOM6 Development of TOPAS as a fungicide used for field tomatoes.
TOM14 Comparison research study between TOMCAST delivery utilizing the lakewood data logger versus the adcon weather station.

INSECTS

Two new insecticides ACTARA 25WG and Thiamethoxam 240SC have showed outstanding control of Colorado potato beetles. Trials conducted in both tomatoes and potatoes on this insect show that either of these products applied either in-furrow, in the transplant water, as a seedling tray dip or as a foliar spray, all control Colorado potato beetles effectively, equal or better than the now standard ADMIRE 140F. A study was initiated to monitor and track stink bugs using the weather stations operated by the Ontario Weather Network (OWN) to determine if sprays can be timed based on weather parameters. A review paper was written and will be submitted to the Ontario Tomato Research Institute with my final report.

TOM4 Effectiveness of ACTARA and THIAMETHOXAM SC for the control of Colorado potato beetles, aphids and flea beetles in processing tomatoes.
TOM13 A report on Stink bugs.

SUSTAINABILITY

Growers have reported for years the benefits of growing tomatoes in so called “virgin” fields. An effort was made to look at other ways to improve the quality of our soils using mushroom spent compost. The results were outstanding allowing a range used constantly in the past to grow tomatoes and experiencing significant yield declines to be used once again.

TOM7 Evaluation of the benefits of soil amendments in the growth and productivity of processing tomatoes.

My complete research abstracts are available through your board office or accessible through the Ridgetown College Web site: www.ridgetownc.on.ca

ONTARIO PROCESSING VEGETABLE GROWERS

RESEARCH RESULTS

THE DEVELOPMENT OF PEST MANAGEMENT STRATEGIES FOR INSECTS AND PLANT DISEASES IN PROCESSING VEGETABLES - 2000.

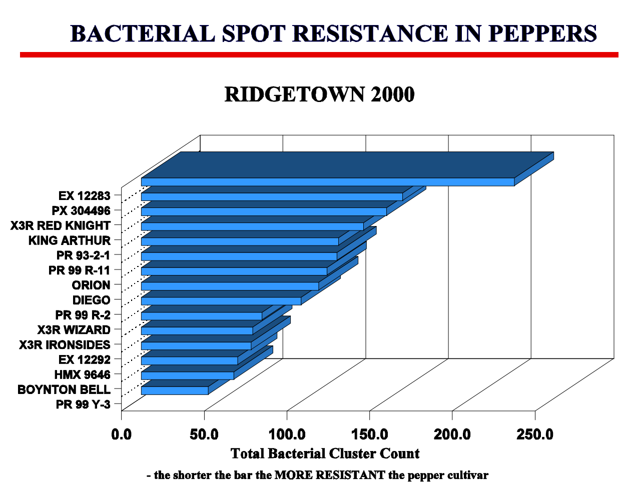
Dr. Ron Pitblado
RIDGETOWN COLLEGE, University of Guelph

My complete research abstracts are available through your board office or accessible through the Ridgetown College Web site: www.ridgetownc.on.ca

PEPPERS

A URMULE was submitted for KOCIDE 101 for the control of bacterial speck, spot and canker on tomatoes and bacterial spot on peppers seedling plug transplants grown in Ontario greenhouses. I have submitted the proposal on behalf of the vegetable seedling and processing tomato and pepper industry with support from the manufacturer, Griffin L.L.C., the Ontario Tomato Seedling Growers Marketing Board, the Ontario Processing Vegetable Growers, the Nabisco Ltd processing company and a pepper grower from the Dresden area. I have been in constant contact with the PMRA authorities, Doug Rothwell who indicated to me that he has received the approval from 3 out of the 4 agencies which need to sign off. It looks favourable but until we get the full clearance we are only partially there.

RESISTANCE LEVELS IN PEPPER CULTIVARS TO BACTERIAL SPOT
The range of resistance to bacterial spot in peppers is listed in order from high to low resistance levels found in this years pepper cultivar test. The number of new pepper cultivars having levels of resistance to bacterial spot is improving. PR 99 Y-3, BOYNTON BELL, HMX 9646, EX 12292 , X3R IRONSIDES and X3R WIZARD were highly resistant to bacterial spot. They were followed by PR 99 R-2, DIEGO, ORION, PR 99 R-11 and PR 93-2-1 which showed moderate levels of spot resistance. KING ARTHUR, X3R RED KNIGHT and PX 304496 appeared to be very susceptible to bacterial spot while EX 12283 was extremely susceptible to bacterial spot.



USE OF SURFACTANTS TO IMPROVE THE EFFECTIVENESS OF COPPER FOR THE CONTROL OF BACTERIAL DISEASES IN PEPPERS

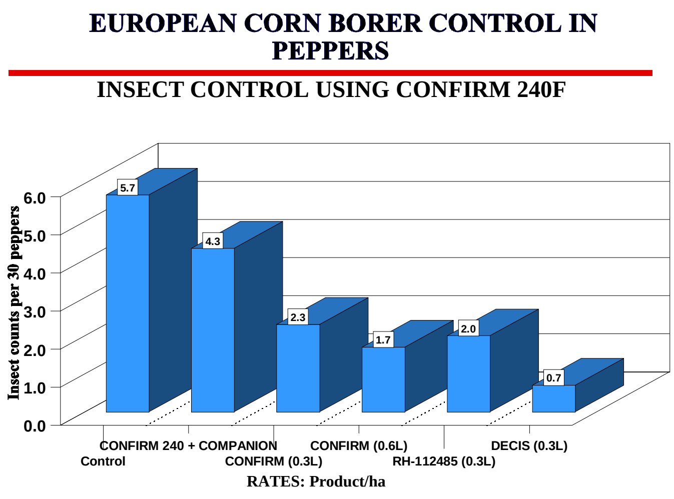
KOCIDE 101 significantly reduced the number of bacterial spot lesions on the foliage of pepper plants. This level of bacterial spot control observed was not high especially considering the number of spray applications that were made, i.e. 10, and several surfactants were evaluated to determine if the level of bacterial control could be elevated. However non of the surfactants tested including NUFILM-17, SIL WETT and AG BALANCE could improve KOCIDE 101s level of bacterial control. This trial again confirmed that BRAVO 500 applied by itself provides no control of bacterial spot.

BACTERIAL SPOT CONTROL IN PEPPERS USING ASSISTOR

Significant bacterial spot disease was observed and recorded in this plot. The level of disease began to rise in July but started to decline in August then increased again in September due to the influence of weather. By the first evaluation on July 17, five applications of ASSISTOR had been applied with GARLIC OIL only being included in the last two applications. ASSISTOR when applied alone did not appear to have any beneficial influence on reducing the level of bacterial spot in peppers. On the second evaluation, on August 5, the GARLIC OIL treatment with ASSISTOR seemed to have reduced the number of bacterial spot clusters on the pepper foliage. By August 25 the weather conditions no longer favoured the incidence of bacterial spot with the foliage growing well with no significant bacterial symptoms. By late September the amount of bacterial disease had increased substantially however the last spray was made on August 16 and any beneficial effect that GARLIC OIL plus ASSISTOR may have made could not be observed.

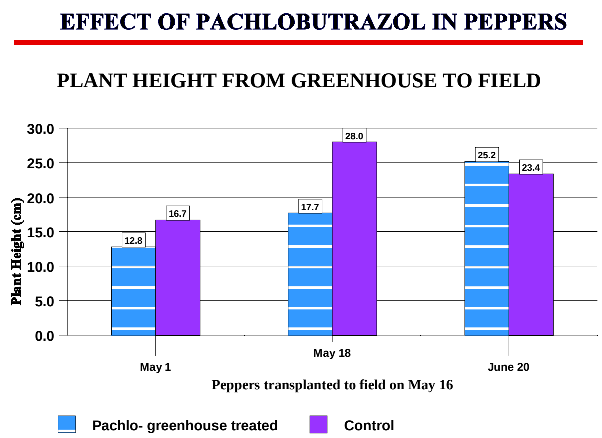
EUROPEAN CORN BORER CONTROL IN PEPPERS USING CONFIRM 240F AND RH-2485 240SC

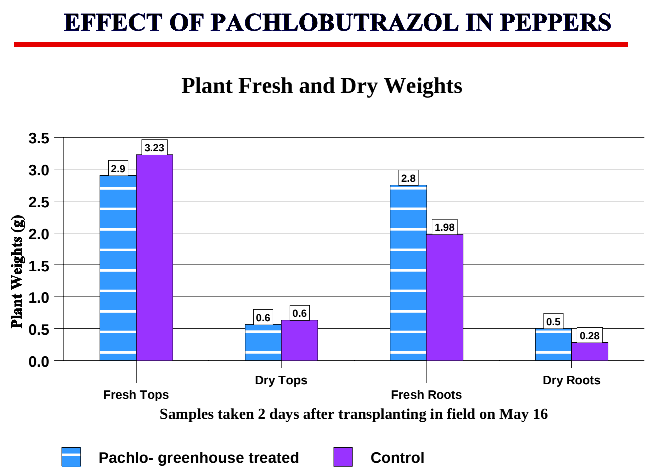
DECIS 5EC provided the highest numeric level of European corn borer control with equivalent control observed using CONFIRM 240F at either rate and the rate tested for RH-112485 240SC. The addition of COMPANION to CONFIRM 240F did not improve the level of corn borer control than when CONFIRM 240F was used alone.



THE EFFECT OF PACLOBUTRAZOL ON THE GROWTH AND YIELD OF PEPPERS

Paclobutrazol applied in the greenhouse to pepper seedlings at the 2 leaf stage at a rate of 5ppm reduced plant height and significantly increased the fresh and dry weights of pepper roots at time of transplanting. Under conditions of controlled plant growth in the greenhouse by the grower there was no difference in stem diameter or foliage weights. The grower was not prepared to apply additional nutrients to the pepper

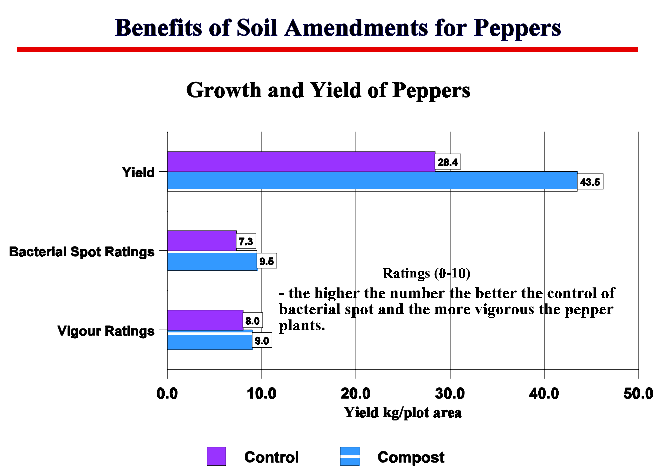




plants in the greenhouse for fear of encouraging uncontrolled pepper growth which commercially causes difficulty at time of transplanting. Seeing the controlled growth of the Paclobutrazol treated seedlings, he would be prepared to apply additional nutrients in the future with the anticipated increase in foliage wet and dry weights and possibly stem diameter to produce a much sturdier pepper transplant one that could possibly better stand the shock of field establishment. The Paclobutrazol transplants outgrew the delayed growth effect observed in the greenhouse once established in the field however there was a slight hold back in fruit production on June 21 but the plants easily caught up soon thereafter. There were no differences in yield.

EVALUATION OF THE BENEFITS OF SOIL AMENDMENTS IN THE GROWTH AND PRODUCTIVITY OF PROCESSING PEPPERS

The vigour ratings early in the season where not as dramatic as observed with the tomatoes next to them . It was only later in the season that differences in foliage became evident. This in some regard was related to the amount of bacterial spot disease in the non composted plot area. There was a significant amount of bacterial spot especially in the yellow banana variety but only in the plot area where compost had not been applied. This suggests that the vigour of the plant created by the more favourable growing conditions when spent mushroom compost was applied created conditions that the plant could ward off bacterial infection. The benefits from this fact alone was noted in the total yields of the yellow banana peppers. It was interesting that the bell peppers did not respond to the addition of spent mushroom compost. It was noticed there were considerably fewer weeds in the spent mushroom plot area.



SWEET CORN

EUROPEAN CORN BORER CONTROL IN SWEET CORN USING CONFIRM 240F AND RH-2485 240SC - RIDGETOWN

European corn borer insect pressures were high this year with the unsprayed plots averaging 14.8 infested cobs per 20 or 74% of the sweet corn cobs having insect damaged ears. All of the insecticides tested showed effective control. This included CONFIRM 240F with or without the surfactant COMPANION, the new insecticide RH-112485 240SC and the standard insecticide used in this trial CYMBUSH 250EC.

EVALUATION OF DIPEL 2XDF FOR THE CONTROL OF EUROPEAN CORN BORER IN SWEET CORN - RIDGETOWN

European corn borer insect pressures were high this year with the unsprayed plots averaging 15.5 infested cobs per 20 or 78% of the sweet corn cobs having insect damaged ears. The most effective treatment was the commercial standard insecticide CYMBUSH 250EC. Under the heavy insect pressures noted in this year's trials the higher commercial rate of DIPEL 2XDF was required but was not as effective as the CYMBUSH 250EC treatment. The addition of either of the two surfactants ASSISTOR nor BOD BALANCE provided any benefit either when used alone or to help raise the level of insect control when using half rates of DIPEL 2XDF.

EUROPEAN CORN BORER CONTROL IN SWEET CORN USING ASSISTOR -RIDGETOWN

CYMBUSH 250EC applied at the recommend commercial rate significantly controlled European Corn Borers in sweet corn. Even the half rate of CYMBUSH 250EC lowered the damage caused by corn borers. ASSISTOR when applied alone did not reduce the number of corn borers at either rate tested. The combination of ASSISTOR with GARLIC OIL did not show any improvements in European corn borer control nor did the addition of ASSISTOR improve the level of insect control when combined with CYMBUSH 250EC.

USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART'S WILT - RIDGETOWN

Populations of flea beetles were not noticed until July 17 and in low numbers. Thus the resultant infection of Stewart's Wilt came late in July with no differences noted between seed treatments. However early in the season there was considerable numbers of thrips which caused noticeable leaf scaring and assessments were taken as there appeared to be an effect amongst the seed treatments tested. Sweet corn cultivar BSS, Tables 1 & 2, had the lowest germination and emergence however there was no treatment effect noticed. GSS 9377, Tables 1 & 4 had the next lowest seed germination ratings with early stand counts indicating a significant trend towards improved stands compared to the untreated check plot using the lowest rate of GAUCHO 600. As the GAUCHO rates increased the early stand counts decreased with a significant loss of stand count between the lowest, 83.3 vs. the highest 833 ml/100 kg rates of seed treatments. This delayed emergence observation disappeared within a 10 days of this observation with no significant differences in total plant stand amongst seed treatments. GH 1861 had the highest seed germination counts Table 1, and a significant improvement in plant stands using the combination seed treatment of APRON XL + MAXIM 4FS and GAUCHO 600. There did not appear to be any difference between the two GAUCHO formulations of 480 and 600.
Seed treatments with increasing rates of GAUCHO significantly decreased the numbers of thrips found on sweet corn seedling leaves and consequently reduced the damage caused by thrips. The most effective treatments were the highest rates of the two GAUCHO formulations of 600 and 480 used at rates of 833 and 520 ml product/100 kg of seed respectively.

CONTROL OF LEAF RUST IN SWEET CORN

Control of common rust in sweet corn was achieved with the fungicides FOLICUR 3.6F and TOPAS 250 EC. BRAVO 500 also reduced the degree of rust on the foliage of sweet corn but not nearly to the extent as did FOLICUR and TOPAS. The amount of rust in this trial was significant causing a reduction in yield. Yields were significantly improved using especially the FOLICUR and TOPAS treatments but also with BRAVO 500. The increase in yield was noted in an increase in both numbers and weight of cobs harvested and of a marketable size.

EUROPEAN CORN BORER CONTROL IN SWEET CORN USING CONFIRM 240F AND RH-2485 240SC - STRATHROY

European corn borer insect pressures were high this year with the unsprayed plots averaging 5.8 infested cobs per 20 or 29% of the sweet corn cobs having insect damaged ears. All of the insecticides tested showed effective control. This included CONFIRM 240F with or without the surfactant COMPANION, the new insecticide RH-112485 240SC and the standard insecticide used in this trial, CYMBUSH 250EC.

EVALUATION OF DIPEL 2XDF FOR THE CONTROL OF EUROPEAN CORN BORER IN SWEET CORN - STRATHROY

European corn borer insect pressures were high this year with the unsprayed plots averaging 5.5 infested cobs per 20 or 28% of the sweet corn cobs having insect damaged ears. The most effective treatment was the commercial standard insecticide CYMBUSH 250EC. Under the heavy insect pressures noted in this year’s trials and only two applications made, neither of the rates of DIPEL 2XDF were sufficient to control this insect. Similarly neither of the two surfactants ASSISTOR nor BOD BALANCE provided any benefit either when used alone or to help raise the level of insect control when using half rates of DIPEL 2XDF.

EUROPEAN CORN BORER CONTROL IN SWEET CORN USING ASSISTOR -STRATHROY

CYMBUSH 250EC applied at the recommend commercial rate significantly controlled European Corn Borers in sweet corn. Even the half rate of CYMBUSH 250EC lowered the damage caused by corn borers. ASSISTOR when applied alone did not reduce the number of corn borers at either rate tested. Although not significantly different the addition of GARLIC OIL with ASSISTOR appeared to have reduced the number of corn borers found in this trial.

USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART’S WILT - BALLYMOTE

The emergence counts in two of the three sweet corn cultivars was significantly improved using seed treatments with the combination treatment APRON XL + MAXIM 4FS + GAUCHO 600 averaging the greatest improvement. The highest rate of GAUCHO 600 or 480 did not appear to result in any seedling emergence damage.

Thrips damage was significantly controlled with all seed treatments with the lowest rate of GAUCHO 600 having the lowest numerical control rating, i.e. less control observed.

There was a definite increase in plant foliage vigour when using any of the seed treatments with even the number of plant surviving emergence increased with the combination APRON XL + MAXIM 4FS + GAUCHO 600.

The amount of Stewart’s Wilt came late in the season showing no benefits from the seed treatments. If anything the observations were that due to the increased vigour of the sweet corn treated with seed treatments there was a slight increase in the incidence of Stewart’s Wilt.

USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART'S WILT - ST. THOMAS

Seedling emergence from two of the three sweet corn cultivars was significantly improved by using seed treatments containing GAUCHO 600 or 480, CAPTAN-APRON FL or a combination of APRON XL + MAXIM 4FS + GAUCHO. In this location south of St. Thomas there were no Thrips, Flea beetles nor Stewart's Wilt to be recorded.

COLE CROPS

FOLIAR INSECT CONTROL USING ASSISTOR

The organic insecticide ASSISTOR was not very effective in controlling cabbage foliar insects. Even when added to either of the two standard products CYMBUSH 250 EC and DIPEL 2XDF used at half-rates the ASSISTOR did not improve the level of insect control. The addition of GARLIC OIL to ASSISTOR was also ineffective. High levels of cabbage foliar insect control was however achieved with the half rate of CYMBUSH 250 EC (standard recommended rate is 140 ml product/ha), while the low rate of DIPEL 2XDF was not nearly as effective at these lower than recommended rates.

The initial spray application on June 19 was repeated 3 days later on June 22 due to rainfall soon after application. Further investigations on the rainfall occurrences may help explain the ineffectiveness of the water soluble natural insecticide ASSISTOR.

CUCURBITS

EFFECTIVENESS OF SOVRAN 50WG FOR THE CONTROL OF POWDERY MILDEW IN SQUASH - Watford

Powdery mildew was extensive and severe in this commercial field, significantly defoliating the remainder of the field at assessment time on September 20. The only green vine present was observed in our research plots. The trial was sprayed two times with excellent powdery mildew control observed. Foliage of squash sprayed with SOVRAN 50WG remained green and healthy into September at all the rates tested. The 14-day spray program of SOVRAN 50WG was basically sprayed only one time on August 10 and although showed signs of powdery mildew it was an improvement over the non sprayed control and provided equal powdery mildew control than the BRAVO 500 treatment that was sprayed two times. Only the highest rate of SOVRAN 50WG and the nonsprayed control was harvested. Yields were significantly improved when squash was protected from infections of powdery mildew bu spraying two times with the fungicide SOVRAN 50WG.

EFFECTIVENESS OF SOVRAN 50WG FOR THE CONTROL OF POWDERY MILDEW ON CUCURBITS - Ridgetown

Powdery mildew severely affected the foliage beginning in early September, with the first being noticed on September 6. Control of the disease was observed in both squash and pumpkins early in September with the low rate of SOVRAN 50WG showing a little weakness. However by September 20, the two lowest rates of SOVRAN 50WG became infected especially in the squash plots as did BRAVO 500 and when the spray interval was extended from 7 to 14 days with SOVRAN 50WG. SOVRAN 50WG at rates of 0.3, 0.6 kg product/ha, applied on a 7-day spray schedule effectively controlled powdery mildew in squash and pumpkins. Numbers of fruit harvested nor their total weights were affected by any of these treatments. Assessments for the cucumber plots could not be made as they had ripened prior to any visual symptoms of powdery mildew.

COLE CROPS

TITLE: **FOLIAR INSECT CONTROL USING ASSISTOR**

CROP: Cabbage, cv. Green Cup
PEST: Imported cabbageworm, *Artogeia rapae* (L.), diamondback moth, *Plutella xylostella* (L.)

NAME AND AGENCY:
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MATERIALS: ASSISTOR (natural insecticide), GARLIC OIL (Garlic oil extract), CYMBUSH 250EC (cypermethrin), DIPEL 2XDF (*Bacillus thuringiensis var. kurstaki*)**.**

METHODS: Cabbage was planted in two-row plots in the research plots at Ridgetown College, 7 m in length with rows spaced 1 m apart, replicated four times in a randomized complete block design. Plants were transplanted using a commercial transplanter on May 31, 2000. Foliar treatments were applied using a specialized, small plot research CO_2 sprayer with a two-nozzled, hand-held boom applying 200L/ha of spray mixture on June 19, 22, July 7, 17,28, and August 5. The initial two applications in treatment #7 was at a 1% v/v rate of ASSISTOR alone however subsequent applications were made with a combination of GARLIC OIL plus ASSISTOR at a rate of 1.0% v/v. Assessments were taken by rating insect feeding damage per plot on July 17, 29 and August 5. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The organic insecticide ASSISTOR was not very effective in controlling cabbage foliar insects. Even when added to either of the two standard products CYMBUSH 250 EC and DIPEL 2XDF used at half-rates the ASSISTOR did not improve the level of insect control. The addition of GARLIC OIL to ASSISTOR was also ineffective. High levels of cabbage foliar insect control was however achieved with the half rate of CYMBUSH 250 EC (standard recommended rate is 140 ml product/ha), while the low rate of DIPEL 2XDF was not nearly as effective at these lower than recommended rates.

The initial spray application on June 19 was repeated 3 days later on June 22 due to rainfall soon after application. Further investigations on the rainfall occurrences may help explain the ineffectiveness of the water soluble natural insecticide ASSISTOR.

Table 1. Control of foliar insects causing damage to cabbage.

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings (0-10)[1/]		
		July 17	July 29	August 5
ASSISTOR	0.5% v/v	6.5 bc*	4.0 c	4.0 de
ASSISTOR	1.0% v/v	6.0 c	4.0 c	4.6 d
CYMBUSH 250 EC	70.0 ml	8.6 a	8.6 a	9.0 a
CYMBUSH 250EC + ASSISTOR	70.0 ml 1.0% v/v	8.3 a	8.1 a	8.8 a
DIPEL 2XDF	100 g	7.0 b	6.1 b	7.6 b
DIPEL 2XDF + ASSISTOR	100 g 1.0% v/v	6.8	6.4 b	6.5 c
ASSISTOR + GARLIC OIL	2.0% v/v	4.0 d	4.0 c	3.5 e
CONTROL		4.0 d	4.4 c	3.8 de
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		9.1	6.9	10.9

* Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/]/Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

COLE CROPS

TITLE: **CONTROL OF CABBAGE FOLIAR INSECTS USING AGRIBAC Btk MATERIALS**

CROP: Cabbage, cv. Galaxy
PEST: Imported cabbageworm, *Artogeia rapae* (L.), diamondback moth, *Plutella xylostella* (L.)

NAME AND AGENCY:
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MATERIALS: AGRIBAC 2X WP, WDG, AGRIBAC 48 LC, AGRIBAC 64 ES (Bt experimental materials), MATADOR 120EC (lambda-cyhalothrin), CYMBUSH 250EC (cypermethrin), DIPEL 2XDF (*Bacillus thuringiensis var. kurstaki*)**.**

METHODS: Cabbage was planted in two-row plots in the research plots at Ridgetown College, 7 m in length with rows spaced 1 m apart, replicated four times in a randomized complete block design. Plants were transplanted using a commercial transplanter on May 30, 2000. Foliar treatments were applied using a specialized, small plot research CO_2 sprayer with a two-nozzled, hand-held boom applying 200L/ha of spray mixture on June 28, July 7, 17,28, and August 5. Assessments were taken by rating insect feeding damage per plot on July 17, 29 and August 5. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: All four of the AGRIBAC formulations provided outstanding foliar insect control in cabbage. The one formulation, AGRIBAC 2X WDG, early in the season appeared not to be as effective as the other AGRIBAC materials. All three of the standard materials, DIPEL 2XDF, MATADOR 120EC and CYMBUSH 250EC performed well providing high levels of foliar insect control in cabbage.

Table 1. Control of foliar insects causing damage to cabbage.

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings (0-10)[1/] July 17	July 29	August 5
AGRIBAC 2X WP	1,135 g	9.3 a*	9.4 ab	9.6 ab
AGRIBAC 2X WDG	1,135 g	7.0 c	8.5 c	9.0 b
AGRIBAC 48 LC	3,105 ml	8.5 ab	10.0 a	9.8 ab
AGRIBAC 64 ES	2,350 ml	8.0 bc	9.38 ab	9.8 ab
DIPEL 2XDF	550 g	7.3 c	8.63 bc	9.3 ab
MATADOR 120EC	42 ml	9.3 a	9.9 a	10.0 a
CYMBUSH 250 EC	140 ml	7.5 bc	9.3 abc	9.5 ab
CONTROL		5.0 d	5.3 d	6.0 c
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		8.5	5.8	6.6

* Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/]/Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

CUCURBITS

TITLE: **EFFECTIVENESS OF SOVRAN 50WG FOR THE CONTROL OF POWDERY MILDEW IN SQUASH - Watford**

CROP: Squash, cv. Tayebell
PEST: Powdery Mildew (*Erysiphe cichoracearum* DC, *Sphaerotheca fulinginea (schlechtend ˆFr.) Pollacci*

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MATERIALS: SOVRAN 50WG (kresoxim-methyl), BRAVO 500 (chlorothalonil)

METHODS: Squash was planted in a commercial field by Tony Hogenvorst in June, 2000 in a field along HWY 7 east of county road 79 and north of Watford. Plots were established in the field prior to spraying, 2 m wide and 10 m long replicated four times in a randomized block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three-nozzled hand-held boom, applying 200 L/ha of spray mixture on August 10 and 18 . Assessments were taken by rating the severity and coverage of the powdery mildew in each plot on September 20. Yields were taken on October 21, counting, harvesting and weighing the inner 20 m^2 per designated plots. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Powdery mildew was extensive and severe in this commercial field, significantly defoliating the remainder of the field at assessment time on September 20. The only green vine present was observed in our research plots. The trial was sprayed two times with excellent powdery mildew control observed. Foliage of squash sprayed with SOVRAN 50WG remained green and healthy into September at all the rates tested. The 14-day spray program of SOVRAN 50WG was basically sprayed only one time on August 10 and although showed signs of powdery mildew it was an improvement over the non sprayed control and provided equal powdery mildew control than the BRAVO 500 treatment that was sprayed two times. Only the highest rate of SOVRAN 50WG and the nonsprayed control was harvested. Yields were significantly improved when squash was protected from infections of powdery mildew by spraying two times with the fungicide SOVRAN 50WG.

Table 1. Powdery Mildew control ratings and effects of fungicides on squash yields.

Treatments[2/]	Rate Product/ha	Foliar Damage Ratings (0-10)[1/]	# Fruit Harvested	Wt.Per Fruit (kg)	Yield Per Plot (kg)
SOVRAN 50WG - 7day	0.12 kg	9.0 ab*			
SOVRAN 50WG - 7 day	0.24 kg	8.8 b			
SOVRAN 50WG - 7 day	0.30 kg	9.5 a			
SOVRAN 50WG - 7 day	0.60 kg	9.5 a	35.0 a	2.5 a	86.1 a
SOVRAN 50WG - 14 day	0.30 kg	8.0 c			
BRAVO 500 - 7 day	4.8 L	8.0 c			
CONTROL		5.0 d	37.0 a	2.1 b	81.1 b
ANOVA P#0.05		s	ns	s	s
Coefficient of Variation (%)		5.6		2.8	12.1

*These values are the means of three replications. Numbers within a column followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P#0.05)

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2/] spray applications either 7 or 14 day intervals

CUCURBITS

TITLE: **EFFECTIVENESS OF SOVRAN 50WG FOR THE CONTROL OF POWDERY MILDEW ON CUCURBITS - Ridgetown**

CROP: Squash, cv. Tayebell, Pumpkin, cv. Howden, Cucumbers cv. Fancipak 85% + Sumpter 15%

PEST: Powdery Mildew (*Erysiphe cichoracearum* DC, *Sphaerotheca fulinginea (schlechtend ˆFr.) Pollacci*

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MATERIALS: SOVRAN 50WG (kresoxim-methyl), BRAVO 500 (chlorothalonil)

METHODS: Three different types of cucurbits, squash, pumpkins and cucumbers were planted on June 23, 2000, at the research station in Ridgetown. The varieties were planted in 5 row blocks with the plots running across covering each of the three cucurbit cultivars. Plots were 2 m wide and 10 m long across each of the cucurbit cultivars, and were replicated three times in a randomized block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three-nozzled hand-held boom, applying 200 L/ha of spray mixture on August 9, 23, and16. Assessments were taken by rating the severity and coverage of the powdery mildew in each plot on September 10 and 20. Yields were taken on September 29, harvesting the inner 20 m^2 per plot. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Powdery mildew severely affected the foliage beginning in early September, with the first being noticed on September 6. Control of the disease was observed in both squash and pumpkins early in September with the low rate of SOVRAN 50WG showing a little weakness. However by September 20, the two lowest rates of SOVRAN 50WG became infected especially in the squash plots as did BRAVO 500 and when the spray interval was extended from 7 to 14 days with SOVRAN 50WG. SOVRAN 50WG at rates of 0.3, 0.6 kg product/ha, applied on a 7-day spray schedule effectively controlled powdery mildew in squash and pumpkins. Numbers of fruit harvested nor their total weights were affected by any of these treatments. Assessments for the cucumber plots could not be made as they had ripened prior to any visual symptoms of powdery mildew.

Table 1. Powdery Mildew control ratings on the foliage of three different types of cucurbits.

Treatments[2/]	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] September 10			Foliar Damage Ratings (0-10)[1/] September 20		
		Squash	Pumpkins	Cucumbers	Squash	Pumpkins	Cucumbers
SOVRAN 50WG - 7day	0.12 kg	7.5 b*	9.0 b*	na [3/]	6.3 c	4.7 b	na [3/]
SOVRAN 50WG - 7 day	0.24 kg	10.0 a	10.0 a	na	7.5 c	8.0 a	na
SOVRAN 50WG - 7 day	0.30 kg	10.0 a	10.0 a	na	9.0 ab	9.2 a	na
SOVRAN 50WG - 7 day	0.60 kg	10.0 a	10.0 a	na	9.3 a	9.3 a	na
SOVRAN 50WG - 14 day	0.30 kg	10.0 a	10.0 a	na	7.3 c	7.7 a	na
BRAVO 500 - 7 day	4.8 L	10.0 a	10.0 a	na	7.7 bc	4.3 b	na
CONTROL		4.5 c	4.0 c	na	1.7 d	1.3 c	na
ANOVA P#0.05		s	s		s	s	
Coefficient of Variation (%)		4.5	3.9		10.8	17.0	

*These values are the means of three replications. Numbers within a column followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P#0.05)

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2/] spray applications either 7 or 14 day intervals

[3/] na - not applicable - cucumbers had ripened prior to the onset of powdery mildew.

Table 2. Effect of Powdery Mildew control on yields of squash and pumpkins.

Treatments[1/]	Rate Product/ha	Squash		Pumpkins	
		# fruit in $20m^2$	Yield kg/$20m^2$	#fruit in $20m^2$	Yield kg/$20m^2$
SOVRAN 50WG - 7day	0.12 kg	41.3 a*	39.8 ab	6.7 a	38.6 a
SOVRAN 50WG - 7 day	0.24 kg	42.7 a	43.4 a	13.3 a	70.5 a
SOVRAN 50WG - 7 day	0.30 kg	39.0 a	40.0 ab	9.3 a	81.2 a
SOVRAN 50WG - 7 day	0.60 kg	31.0 a	30.5 b	7.5 a	44.0 a
SOVRAN 50WG - 14 day	0.30 kg	33.7 a	33.2 ab	10.0 a	58.9 a
BRAVO 500 - 7 day	4.8 L	38.3 a	39.3 ab	8.3 a	55.4 a
CONTROL		35.0 a	35.7 ab	9.0 a	49.9 a
ANOVA P#0.05		ns	s	ns	ns
Coefficient of Variation (%)			16.7		

*These values are the means of three replications. Numbers within a column followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P#0.05)

[1/] spray applications either 7 or 14 day intervals.

PEPPERS - BACTERIAL SPOT

TITLE: **RESISTANCE LEVELS IN PEPPER CULTIVARS TO BACTERIAL SPOT**

CROP: Pepper cultivars
PEST: Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye

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MATERIALS: Pepper cultivars

METHODS: Peppers were transplanted in single row plots, 8 m in length with rows spaced 1 m apart, replicated four times in a randomized complete block design. Seedlings were transplanted using a commercial transplanter on June 19, 2000. Plots were inoculated with a liquid culture of 10^6 cells/ml of the bacterial spot disease casual agent *Xanthomonas campestris pv. vesicatoria* on June 13. Foliar disease assessments were made on July 17, August 5, 25 and September 20. The number of clusters of bacterial disease observed on the pepper foliage were counted per plot. Each plant was examined along the length of the plot row, accumulating the number of bacterial disease symptoms per plot. The number of bacterial disease sites counted reflects on the level of natural resistance to bacterial spot. Treatments with lower numbers are more resistant than those with higher disease counts. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The range of resistance to bacterial spot in peppers is listed in order from high to low resistance levels found in this years pepper cultivar test. The number of new pepper cultivars having levels of resistance to bacterial spot is improving. PR 99 Y-3, BOYNTON BELL, HMX 9646, EX 12292 , X3R IRONSIDES and X3R WIZARD were highly resistant to bacterial spot. They were followed by PR 99 R-2, DIEGO, ORION, PR 99 R-11 and PR 93-2-1 which showed moderate levels of spot resistance. KING ARTHUR, X3R RED KNIGHT and PX 304496 appeared to be very susceptible to bacterial spot while EX 12283 was extremely susceptible to bacterial spot.

The July 17 rating was made only from the first replicate and therefore statistical analysis was not carried forward. Early symptoms suggested that all pepper cultivars were able to support significant bacterial spot lesions and that some pepper cultivars were able to grow out of the damage producing clean heathy leaves while other cultivars the bacterial infections appeared to be able to keep up to the rapid foliage growth causing significant damage to the plant.

Table 1. Levels of Bacterial spot resistance in processing peppers.

Pepper Cultivars	Bacterial Disease Cluster Counts[1/]				
	July 17	August 5	August 25	Sept. 20	Total Disease Cts
PR 99 Y-3	18.0	16.5 d*	16.6 fg	7.5 ef	40.6
BOYNTON BELL	60.0	19.3 cd	31.8 d-g	4.8 f	55.9
HMX 9646	39.0	42.0 bc	12.8 g	3.5 f	58.3
EX 12292	64.0	35.8 cd	20.3 efg	10.3 ef	66.4
X3R IRONSIDES	24.0	17.0 cd	30.5 d-g	20.5 de	67.5
X3R WIZARD	65.0	17.8 cd	45.0 cd	10.3 ef	73.1
PR 99 R-2	42.0	36.8 bcd	41.3 cde	18.5 de	96.6
DIEGO	19.0	30.8 cd	38.5 c-f	38.0 c	107.3
ORION	50.0	60.0 ab	21.8 efg	30.5 cd	112.3
PR 99 R-11	43.0	28.0 cd	47.8 cd	42.5 c	118.3
PR 93-2-1	14.0	33.0 cd	50.5 cd	35.8 c	119.3
KING ARTHUR	60.0	17.3 cd	81.3 a	35.8 c	134.4
X3R RED KNIGHT	69.0	39.5 bcd	73.8 ab	35.0 c	148.3
PX 304496	60.0	39.5 bcd	57.5 bc	61.0 b	158.0
EX 12283	68.0	74.3 a	76.8 ab	74.5 a	225.6
ANOVA P#0.05		s	s	s	
Coefficient of Variation (%)		44.4	32.2	29.0	

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Bacterial Disease Cluster Counts - the number of bacterial disease clusters counted per length of row. The higher the number the greater numbers of disease sites and the more susceptible the pepper cultivar is to bacterial spot infections.

The July 17 rating was made only from the first replicate.

PEPPERS - BACTERIAL SPOT

TITLE: **USE OF SURFACTANTS TO IMPROVE THE EFFECTIVENESS OF COPPER FOR THE CONTROL OF BACTERIAL DISEASES IN PEPPERS**

CROP: Pepper cv. Inferno
PEST: Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye

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MATERIALS: KOCIDE 101 (50% copper hydroxide), BRAVO 500 (chlorothalonil), NUFILM-17 (surfactant), SIL WETT (surfactant), AG BALANCE (surfactant).

METHODS: Peppers were transplanted in single row plots, 8 m in length with rows spaced 1.65 m apart, replicated four times in a randomized complete block design. The transplants were obtained from a greenhouse grower who reported considerable bacterial spot on the foliage of the plants. We were able to retrieve some of these pepper transplants just prior to the seedling lot being destroyed. Seedlings were transplanted using a commercial transplanter on May 30, 2000. In addition the plots were inoculated with a culture of bacterial spot obtained through the AAFC laboratory in London, Dr. Diane Cuppels. Plots were sprayed with a 10^{6} bacterial cells/ml suspension on June 13. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture on June 16, 23, 28, July 5, 12, 19, 26, August 2, 5, 16. Foliar disease assessments were made on July 17, August 25 and September 20, by counting the number of bacterial spot disease clusters observed on the pepper foliage. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: KOCIDE 101 significantly reduced the number of bacterial spot lesions on the foliage of pepper plants. This level of bacterial spot control observed was not high especially considering the number of spray applications that were made, i.e. 10, and several surfactants were evaluated to determine if the level of bacterial control could be elevated. However non of the surfactants tested including NUFILM-17, SIL WETT and AG BALANCE could improve KOCIDE 101s level of bacterial control. This trial again confirmed that BRAVO 500 applied by itself provides no control of bacterial spot.

Table 1. Foliar disease control ratings.

Treatments	Rate Product/ha	Bacterial Disease Cluster Counts [1]		
		July 17	August 25	September 20
KOCIDE 101	2.25 kg	8.5 b*	50.0 b	38.3 b
BRAVO 500	2.8 L	14.5 ab	79.5 a	67.3 a
KOCIDE 101 + BRAVO 500	2.25 kg 2.8 L	11.0 ab	54.5 b	32.3 b
NUFILM-17 + KOCIDE 101	1.17 L 2.25 kg	5.8 b	49.8 b	31.0 b
SIL WETT + KOCIDE 101	0.1 % v/v 2.25 kg	7.3 b	54.3 b	42.5 b
AG BALANCE + KOCIDE 101	10.0 L 2.25 kg	11.0 ab	53.8 b	33.3 b
CONTROL		21.3 a	87.5 a	74.3 a
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		62.7	22.4	27.0

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Bacterial Disease Cluster Counts - the number of bacterial disease clusters counted per length of row. The higher the number the greater numbers of disease sites and the less effective the treatment.

PEPPERS - BACTERIAL SPOT

TITLE: **BACTERIAL SPOT CONTROL IN PEPPERS USING ASSISTOR**

CROP: Peppers cv. Inferno
PEST: Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye

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MATERIALS: ASSISTOR (natural insecticide), GARLIC OIL (Garlic oil extract)

METHODS: Peppers were transplanted in single row plots, 8 m in length with rows spaced 1 m apart, replicated four times in a randomized complete block design. The transplants were obtained from a greenhouse grower who reported considerable bacterial spot on the foliage of the plants. We were able to retrieve some of these pepper transplants just prior to the seedling lot being destroyed. Seedlings were transplanted using a commercial transplanter on May 30, 2000. In addition the plots were inoculated with a culture of Bacterial spot obtained through the AAFC laboratory in London, Dr. Diane Cuppels. Plots were sprayed with a 10^{6} bacterial cells/ml suspension on June 13. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture on a 5 day schedule on June 16, 23, 28, July 5, 12, 19, 26, Aug. 2, 5 and 16. The first three spray applications did not contain any Garlic Oil treatment, but was used in subsequent spray applications. Foliar disease assessments were taken on July 17, August 5, 25 and September 20. The number of clusters of bacterial disease observed on the pepper foliage were counted per plot. Each plant was examined along the length of the plot row, counting and accumulating the number of bacterial disease symptoms per plot. The number of bacterial disease sites counted reflects on the effectiveness of the treatment. Treatments with lower numbers are more efficacious than those with higher disease counts. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Significant bacterial spot disease was observed and recorded in this plot. The level of disease began to rise in July but started to decline in August then increased again in September due to the influence of weather. By the first evaluation on July 17, five applications of ASSISTOR had been applied with GARLIC OIL only being included in the last two applications. ASSISTOR when applied alone did not appear to have any beneficial influence on reducing the level of bacterial spot in peppers. On the second evaluation, on August 5, the GARLIC OIL treatment with ASSISTOR seemed to have reduced the number of bacterial spot clusters on the pepper foliage. By August 25 the weather conditions no longer favoured the incidence of bacterial spot with the foliage growing well with no significant bacterial symptoms. By late September the amount of bacterial disease had increased substantially however the last spray was made on August 16 and any beneficial effect that GARLIC OIL plus ASSISTOR may have made could not be observed.

Table 1. Bacterial spot foliar symptom results

Treatments	Rate Product/ha	Bacterial Disease Cluster Counts[1/] July 17	August 5	August 25	September 20
ASSISTOR	0.5 % v/v	9.0 a*	12.0 a	3.0 a	62.5 a
ASSISTOR	1.0 % v/v	18.5 a	9.8 ab	3.0 a	55.0 a
ASSISTOR + GARLIC OIL	0.5% + 1.0% v/v	14.3 a	2.8 b	2.0 a	65.0 a
CONTROL		16.8 a	8.8 ab	4.a	62.5 a
ANOVA P#0.05		ns	s	ns	ns
Coefficient of Variation (%)			54.9		

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Bacterial Disease Cluster Counts **-** the number of bacterial disease clusters counted per length of row. The higher the number the greater numbers of disease sites and the less effective the treatment.

PEPPERS - EUROPEAN CORN BORER

TITLE: **EUROPEAN CORN BORER CONTROL IN PEPPERS USING CONFIRM 240F AND RH-2485 240SC**

CROP: Peppers cv. Commandant
PEST: European corn borer, *Ostrinia nubilalis (L.)*
.
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MATERIALS: CONFIRM 240F (tebufenozide), COMPANION (spreader/sticker, octlphenoxtpolyethoxy-(9)-ethanol), RH-112485 240SC (experimental), DECIS 5EC (deltamethrin).

METHODS: Peppers were transplanted in two row plots, 6 m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Seedlings were transplanted using a commercial transplanter on May 31, 2000. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two-nozzled hand-held boom, applying 200 L/ha of spray mixture on July 12, 19, 26, August 2, 5, and 16. Corn borer assessments were made on September 11 by counting the number of corn borers or their feeding damage in 30 peppers per plot. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: DECIS 5EC provided the highest numeric level of European corn borer control with equivalent control observed using CONFIRM 240F at either rate and the rate tested for RH-112485 240SC. The addition of COMPANION to CONFIRM 240F did not improve the level of corn borer control than when CONFIRM 240F was used alone.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 30 Peppers per Plot) September 11
CONFIRM 240F + COMPANION	0.3 L 0.1 % v/v	4.3 ab*
CONFIRM 240F	0.3 L	2.3 bc
CONFIRM 240F	0.6 L	1.7 bc
RH-112485 240SC	0.3 L	2.0 bc
DECIS 5EC	0.3 L	0.7 c
CONTROL		5.7 a
ANOVA P#0.05		s
Coefficient of Variation (%)		56.4

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

PEPPERS - PACHLOBUTRAZOL

TITLE: **THE EFFECT OF PACLOBUTRAZOL ON THE GROWTH AND YIELD OF PEPPERS**

CROP: Peppers cv. Inferno

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MATERIALS: Paclobutrazol

METHODS: Pepper transplants were grown in a commercial greenhouse near Blenheim. Paclobutrazol was sprayed onto the pepper foliage using a hand squeezed bottle applicator using a concentration of 5 ppm. The spray was applied onto the pepper foliage at the 2 leaf seedling stage wetting the foliage without any runoff. Four, 200 cell transplant trays were sprayed and 4 were left as the control. No additional fertilizer was applied in this the first exposure of this product to this greenhouse grower. Peppers were transplanted in single row plots, 7 m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Seedlings were transplanted using a commercial transplanter on May 18, 2000. Assessments were made by measuring the plant height and stem diameter first in the greenhouse on May 1 and then at transplanting on May 18 and again a month later in the field on June 20. Fresh and dry weights of both foliage (tops) and roots were taken at time of transplanting on May 18 a month later on June 20 and although not reported they were taken again on July 31 and August 15. Pepper yields were harvested on June 21, July 31 and August 16 reporting the number per 3 plants and total yields both numbers and weights, averaged per plot. Plant vigour ratings were also taken on July 2 and 17. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Tables 1, 2, and 3.

CONCLUSIONS: Paclobutrazol applied in the greenhouse to pepper seedlings at the 2 leaf stage at a rate of 5ppm reduced plant height and significantly increased the fresh and dry weights of pepper roots at time of transplanting. Under conditions of controlled plant growth in the greenhouse by the grower there was no difference in stem diameter or foliage weights. The grower was not prepared to apply additional nutrients to the pepper plants in the greenhouse for fear of encouraging uncontrolled pepper growth which commercially causes difficulty at time of transplanting. Seeing the controlled growth of the Paclobutrazol treated seedlings, he would be prepared to apply additional nutrients in the future with the anticipated increase in foliage wet and dry weights and possibly stem diameter to produce a much sturdier pepper transplant one that could possibly better stand the shock of field establishment. The Paclobutrazol transplants outgrew the delayed growth effect observed in the greenhouse once established in the field however there was a slight hold back in fruit production on June 21 but the plants easily caught up soon thereafter. There were no differences in yield.

Table 1. Plant heights and stem diameters. Peppers transplanted to field on May 16.

	Plant Height/5 transplants (cm)			Stem Diameter/5 transplants (cm)		
Treatments	May 1	May 18	June 20	May 1	May 18	June 20
Paclobutrazol (5ppm) Greenhouse treatment at the 2 leaf stage	12.8 b*	17.7 b	25.2 a	0.30 a	0.30 a	0.42 a
Control	16.7 a	28.0 a	23.4 a	0.30 a	0.30 a	0.40 a
ANOVA P#0.05	s	s	ns	ns	ns	ns
Coefficient of Variation (%)	7.8	1.9				

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

Table 2. Plant fresh and dry weights from field assessments.

	Plant weights (g) May 18				Plant weights (g) June 20			
Treatments	Fresh Tops	Dry Tops	Fresh Roots	Dry Roots	Fresh Tops	Dry Tops	Fresh Roots	Dry Roots
Paclobutrazol (5ppm) Greenhouse treatment at the 2 leaf stage	2.78 a*	0.56 a	2.75 a	0.50 a	28.35 a	2.24 a	14.91 a	5.52 a
Control	3.23 a	0.63 a	1.98 b	0.28 b	19.88 b	2.07 a	13.75 a	6.33 a
ANOVA P#0.05	ns	ns	s	s	s	ns	ns	ns
Coefficient of Variation (%)			12.1	34.5	19.7			

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

Table 3. Pepper yields and plant vigour ratings.

Treatments	# Fruit per 3 Pepper Plants			Plant Vigour Ratings (0-10)[1]		Harvest August 30	
	June 21	July 31	Aug. 16	July 2	July 17	Total # of Fruit	Yield (kg per plot)
Paclobutrazol (5ppm) Greenhouse treatment at the 2 leaf stage	0.0 b*	33.0 a	34.0 a	9.0 a	10.0 a	158 a	6.1 a
Control	5.0 a	33.8 a	32.8 a	9.0 b	10.0 a	151 a	6.4 a
ANOVA P#0.05	s	ns	ns	ns	ns	ns	ns
Coefficient of Variation (%)	40.0						

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Plant Vigour Ratings (0-10) - 0, extremely poor growth, foliage severely damaged; 10, healthy vigorous plant growth.

PEPPERS - SOIL AMENDMENTS

TITLE: **EVALUATION OF THE BENEFITS OF SOIL AMENDMENTS IN THE GROWTH AND PRODUCTIVITY OF PROCESSING PEPPERS**

CROP: Peppers cv. Commandant - Bell peppers, Bounty -Sweet Yellow Banana
PEST: Bacterial Spot, Xanthomonas *campestris pv. vesicatoria* (Doidge) Dye

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MATERIALS: Spent mushroom compost - Kingsville Mushrooms Ltd., Kingsville, Ontario

METHODS: Spent mushroom compost was spread onto a field (Range A6) at Ridgetown College that had shown signs of reduced yields. The analysis in the spring of 2000 indicated that it was low in organic matter, Table 2. Plots were staked out in a 4 replicate block design, Diagram 1, each plot area being 30m x 20m in size with compost being applied to half of each replicate (15m x 20m). Fifteen manure spreader loaders each containing 1600 kg of spent mushroom compost were spread onto the surface equating to a rate of 200 t/ha and disced into the soil on April 26, 2000. The entire field, including where the spent mushroom compost had been applied, was fertilized using 120 kg/ha of 46-0-0 and 125 kg/ha of 0-46-0 on May 10.. Peppers were transplanted on June 6 in 4 row plots, 14 m in length with rows spaced 1.0 m apart using a commercial transplanter. A cover spray of the insecticide MATADOR at 120 ml/ha was applied on June 16 and July 13 for the control of European corn borers. Plots were assessed by visually rating the plants for vigour on June 15, July 2, 17 and August 8 and for the bacterial spot damage on August 25. Pepper yields were taken on August 3, 10, 22, 29, September 22 and totalled. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1, 2, and Graph 1.

CONCLUSIONS: The vigour ratings early in the season where not as dramatic as observed with the tomatoes next to them . It was only later in the season that differences in foliage became evident. This in some regard was related to the amount of bacterial spot disease in the non composted plot area. There was a significant amount of bacterial spot especially in the yellow banana variety but only in the plot area where compost had not been applied. This suggests that the vigour of the plant created by the more favourable growing conditions when spent mushroom compost was applied created conditions that the plant could ward off bacterial infection. The benefits from this fact alone was noted in the total yields of the yellow banana peppers. It was interesting that the bell peppers did not respond to the addition of spent mushroom compost.

It was noticed there were considerably fewer weeds in the spent mushroom plot area.

Table 1. Plant vigour ratings and pepper yields.

Treatments	Plant Vigour Ratings (0-10)[1/]			Bacterial Disease Ratings (0-10)[2/]		Yield kg/plot area	
	June 15	July 17	Aug. 8	Bell Peppers	Yellow Peppers	Bell Peppers	Yellow Peppers
Spring Applied Spent Mushroom Compost	9.0 a*	10.0 a	9.0 a	9.8 a	9.5 a	38.2 a	43.5 a
Control	8.0 a	9.0 a	6.0 b	9.0 a	7.3 b	37.6 a	28.4 b
ANOVA P#0.05	ns	ns	s	ns	s	ns	s
Coefficient of Variation (%)			1.5		15.9		32.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Plant Vigour Ratings (0-10) - 0, extremely poor growth, foliage severely damaged; 10, healthy vigorous plant growth.

[2/] Bacterial Disease Ratings (0-10) - 0, high incidence of bacterial spot, foliage severely damaged; 10, healthy vigorous plant growth with little to no bacterial lesions.

Graph 1. Layout of plots in Range A6

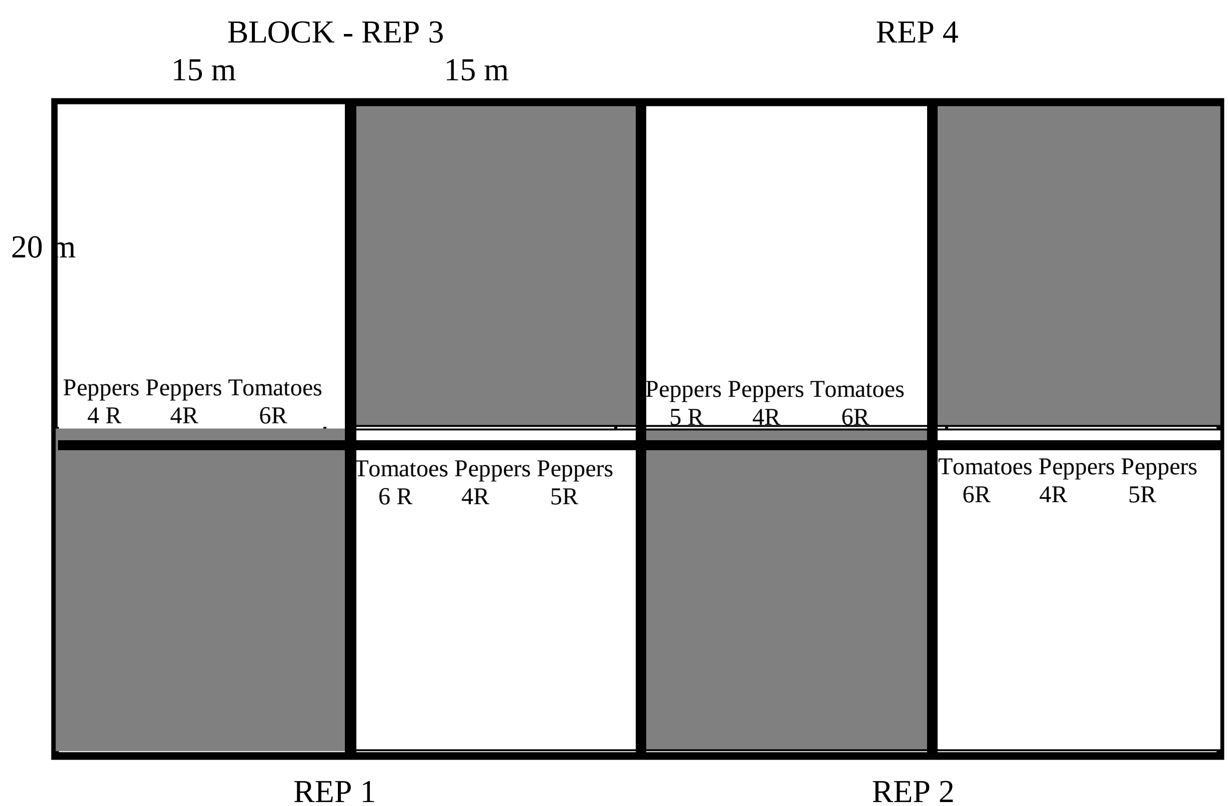

Table 2. Soil test results taken in the spring of 2000.

Field Site	% Organic Matter	Phosphorous Bicarb P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	CEC
Range A6	1.5	43	229	80	700	6.6	9.6
Range A4	1.2	39	148	60	510	6.9	4.6
Range A5	2.3	43	324	90	1000	6.5	12.6

Field Site	Sulfur S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Saturation P %	K/Mg Ratio
Range A6	7	28.5	37.5	100	1.8	12	0.87
Range A4	2	23	27	87	1.5	15	0.76
Range A5	12	31	43	107	2.3	12	1.1

POTATO - COLORADO POTATO BEETLES, LEAFHOPPERS, FLEA BEETLES

TITLE: **EFFICACY OF ACTARA AND THIAMETHOXAM FOR THE CONTROL OF COLORADO POTATO BEETLES AND LEAFHOPPERS IN POTATOES**

CROP: Potatoes cv. Superior
PEST: Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say), Potato Leafhopper, *Empoasca fabae* (Harris).

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MATERIALS: ACTARA 25WG (thiamethoxam), THIAMETHOXAM 240SC (thiamethoxam), ADMIRE 240F (imidacloprid)

METHODS: Potatoes were planted in four-row plots, 7m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Potato seed-pieces were planted with a commercial planter on May 5, 2000. THIAMETHOXAM 240 SC, treatments #4&5, and ADMIRE 240F, treatment #7, were sprayed into the planted furrow just prior to being covered on May 5. The in-furrow application along with the foliar spray applications were applied using a specialized small plot research CO_2 sprayer using a single nozzled hand-held boom. The foliar applications applied 200 L/ha of spray mixture on June 12 and 30. The foliar spray applications were timed at 30% CPB egg hatch, followed approximately 14 days later with a second foliar application. Assessments were taken by counting the number of CPB larvae per plot (centre row) on June 15, 26, July 7, 13, and August 3 and CPB adults on June 19, July 7, and 13 and by foliage damage ratings caused by CPB and leafhopper feeding damage on July 2, 17, and August 8. Yields were taken on August 22. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in tables 1 & 2.

CONCLUSIONS: THIAMETHOXAM 240 SC applied in-furrow at planting time provided the highest level of both Colorado Potato Beetle and Leafhopper control in potatoes throughout the summer. The in-furrow ADMIRE 240F application was also effective for the first 3 months, however the level of season long control became less by August for both Colorado Potato Beetles and especially leafhopper control. Two applications of either ACTARA 25WP or ADMIRE 240F provided equal control of Colorado Potato Beetles, both beginning to decline in their effectiveness at a similar degree, 4 weeks after the second foliar application on June 30. There was a significant difference in the level of leafhopper control between the higher rate of ACTARA 25WP and the commercial rate used of ADMIRE 240F. ACTARA 25WP and THIAMETHOXAM 240 SC (applied in-furrow) appear to have equal to greater Colorado Potato Beetle activity than ADMIRE 240F applied foliar or in-furrow and definitely greater levels of leafhopper control.

Table 1. Colorado potato beetle larval and adult counts.

Treatments	Rate Product /ha	Insect Larvae Counts/Plot					Adult Counts/Plot		
		June 15	June 26	July 7	July 13	Aug. 3	June 19	July 7	July 13
CONTROL		93.8a*	290.0a	10.8 a	6.8 a	35.0 a	102.5 a	5.8 a	44.0 a
ACTARA 25WP (foliar)	104 g	11.3 b	0.5 b	0.0 b	0.8 b	63.8 a	0.0 b	0.3 b	0.8 b
ACTARA 25WP (foliar)	210 g	1.3 b	0.0 b	0.0 b	0.0 b	62.3 a	0.0 b	0.0 b	0.5 b
THIAMETHOXAM 240SC (in-furrow)	3.4 ml/ 100m[1/]	0.0 b	0.5 b	0.0 b	1.0 b	44.5 a	0.0 b	0.3 b	0.3 b
THIAMETHOXAM 240SC (in-furrow)	6.3 ml/ 100 m	2.5 b	0.0 b	0.0 b	0.0 b	14.0 b	0.0 b	0.0 b	0.0 b
ADMIRE 240F (foliar)	200 ml	8.8 b	10.0 b	0.0 b	2.5 ab	61.8 a	0.0 b	0.0 b	2.0 b
ADMIRE 240F (in-furrow)	10.0ml/ 100 m	2.5 b	0.0 b	0.3 b	0.0 b	24.8 c	0.0 b	0.3 b	0.5 b
ANOVA P#0.05		s	s	s	s	s	s	s	s
Coefficient of Variation (%)		206.2	202.8	257.7	182.9	79.5	210.9	359.5	71.8

*****These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
/[1] in-furrow rates; ml/ 100m of row

Table 2. Foliar insect damage results and yields.

Treatments	Rate Product /ha	Foliar Damage Ratings (0-10)[2/] Colorado Potato Beetles			Leafhoppers		Yield kg/plot
		July 2	July 17	Aug. 8	July 17	Aug. 8	Aug. 22
CONTROL		6.8 b*	3.0 c	3.5 e	2.0 d	2.2 d	49.3 c
ACTARA 25WP (foliar)	104 g	10.0 a	9.3 ab	7.0 d	9.3 a	5.8 c	87.3 ab
ACTARA 25WP (foliar)	210 g	10.0 a	10.0 a	7.8 cd	10.0 a	8.0 b	91.4 a
THIAMETHOXAM 240SC (in-furrow)	3.4 ml/ 100m[1/]	10.0 a	9.8 ab	8.8 ab	9.8 a	8.0 b	89.5 a
THIAMETHOXAM 240SC (in-furrow)	6.3 ml/ 100 m	10.0 a	10.0 a	9.4 a	10.0 a	9.5 a	87.6 ab
ADMIRE 240F (foliar)	200 ml	10.0 a	8.9 b	7.4 cd	6.0 c	3.3 d	67.2 bc
ADMIRE 240F (in-furrow)	10.0ml/ 100 m	10.0 a	9.8 ab	8.0 bc	7.0 b	3.3 d	82.9 ab
ANOVA P#0.05		s	s	s	s	s	s
Coefficient of Variation (%)		1.9	6.4	8.3	8.5	12.3	17.1

*****These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

/[1] in-furrow rates; ml/ 100m of row.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

POTATO - COLORADO POTATO BEETLES, LEAFHOPPERS, FLEA BEETLES

TITLE: **FOLIAR INSECT CONTROL IN POTATOES USING ASSISTOR**

CROP: Potatoes cv. Superior
PEST: Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say), Potato Leafhopper, *Empoasca fabae* (Harris).

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MATERIALS: ASSISTOR (natural insecticide), GARLIC OIL (garlic oil), CYMBUSH 250 EC (cypermethrin)

METHODS: Potatoes were planted in four-row plots, 7m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Potato seed-pieces were planted with a commercial planter on May 5, 2000. The foliar spray applications were applied using a specialized small plot research CO_2 sprayer using a single nozzled hand-held boom. The foliar applications applied 200 L/ha of spray mixture on June 12, 23, July 4, 14 and 19. The initial foliar spray application was timed at 30% CPB egg hatch. Garlic oil was added to treatment 6 by the third spray date on July 4 and thereafter for the next two applications. Assessments were taken by counting the number of CPB larvae per plot (centre row) on June 15, 23, July 7, 13, and 28 and CPB adults on June 19, July 7, and 13 and by foliage damage ratings caused by CPB and leafhopper feeding damage on July 2, 17, and August 8. Yields were taken on August 22. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in tables 1 & 2.

CONCLUSIONS: Under high insect pressures, commercial control of both Colorado Potato Beetles and leafhoppers were not achieved with either ASSISTOR alone or in combination with GARLIC OIL. The commercial standard CYMBUSH 250EC was effective even at half rates. The addition of ASSISTOR to the half rate of CYMBUSH 250 EC did not provide any additional control benefits. The level of insect control was reflected in potato yields with the highest yields obtained with the CYMBUSH 250 EC treatments and significantly lower yields with ASSISTOR with and without GARLIC OIL.

Rainfall may have influenced the effectiveness of the water soluble ASSISTOR as two hours after the initial spray application on June 12 a slight drizzle occurred and again a more substantial rainfall after the July 14 application.

Table 1. Colorado potato beetle larval and adult counts.

Treatments	Rate Product /ha	Insect Larvae Counts/Plot June 15	June 23	July 7	July 13	July 28	Adult Counts/Plot June 19	July 7	July 13
ASSISTOR	0.5% v/v	132.5a*	243.8 a	148.8 a	34.8 abc	10.0 ab	5.3 a	9.0 b	42.3 a
ASSISTOR	1.0% v/v	113.8 a	246.3 a	101.3ab	42.5 ab	16.3 ab	5.0 a	9.8 b	56.3 a
CYMBUSH 250 EC	140 ml	12.8 c	91.3 b	53.3 b	11.0 c	31.8 ab	2.0 a	0.8 c	20.5 b
CYMBUSH 250 EC	70 ml	22.5 c	121.3 b	82.5 b	12.8 bc	42.0 a	3.0 a	0.3 c	25.3 b
ASSISTOR + CYMBUSH 250 EC	0.5% v/v 70 ml	38.3 bc	125.0 b	66.3 b	25.8 abc	29.3 ab	3.3 a	4.5 bc	18.0 b
ASSISTOR + GARLIC OIL	0.5% v/v 1.0% v/v	125.0 a	272.5 a	73.8 b	34.5 abc	11.0 ab	3.0 a	27.5 a	43.8 a
CONTROL		87.5 ab	231.3 a	106.3ab	51.3 a	6.3 b	3.8 a	6.3 b	49.8 a
ANOVA P#0.05		s	s	s	s	s	s	s	s
Coefficient of Variation (%)		45.6	29.9	40.2	61.9	100.8	57.4	114.3	98.5

*****These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

Table 2. Foliar insect damage results and yields.

Treatments	Rate Product /ha	Foliar Damage Ratings (0-10)[1/] Colorado Potato Beetles July 2	July 17	Aug. 8	Leafhoppers July 17	Aug. 8	Yield kg/plot Aug. 22
ASSISTOR	0.5% v/v	4.8 f*	2.0 c	2.3 c	3.3 b	1.8 b	26.9 b
ASSISTOR	1.0% v/v	5.0 ef	2.0 c	2.3 c	3.3 b	1.8 b	26.8 b
CYMBUSH 250 EC	140 ml	9.3 a	9.0 a	6.0 a	9.8 a	7.5 a	55.5 a
CYMBUSH 250 EC	70 ml	8.0 b	7.0 b	6.0 a	8.8 a	6.3 a	50.9 a
ASSISTOR + CYMBUSH 250 EC	0.5% v/v 70 ml	7.0 c	6.6 b	6.0 a	8.8 a	6.5 a	52.9 a
ASSISTOR + GARLIC OIL	0.5% v/v 1.0% v/v	6.3 d	2.5 c	3.0 b	3.5 b	2.5 b	32.2 b
CONTROL		5.5 e	2.5 c	3.0 b	3.3 b	1.5 b	30.7 b
ANOVA P#0.05		s	s	s	s	s	s
Coefficient of Variation (%)		7.2	13.5	5.9	11.3	25.7	13.7

*****These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

POTATO - FUNGAL DISEASES, EARLY BLIGHT

TITLE: **FOLIAR FUNGAL DISEASE CONTROL IN POTATOES**

CROP: Potato, cv. Superior
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout

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MATERIALS: BRAVO 500F (chlorothalonil), DITHANE DF 75% NT (75% mancozeb), DITHANE M-45 80WP (80% mancozeb), PENNCOZEB 80 WP, (80% mancozeb), PENNCOZEB 75 DF (75% mancozeb), ICIA5504 250SC (azoxystrobin), KOCIDE 101 (50% copper hydroxide),BAS 500 250 EC (experimental).

METHODS: Potatoes were planted in three-row plots, 7m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Potato seed-pieces were planted with a commercial planter on May 5, 2000. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on June 7, 23, July 4, and August 2. Foliar disease assessments were made on August 8 and 15. Results were analysed using the Duncan’s multiple range test (P# 0.05).

RESULTS: Data are presented in table 1 and Graph 1.

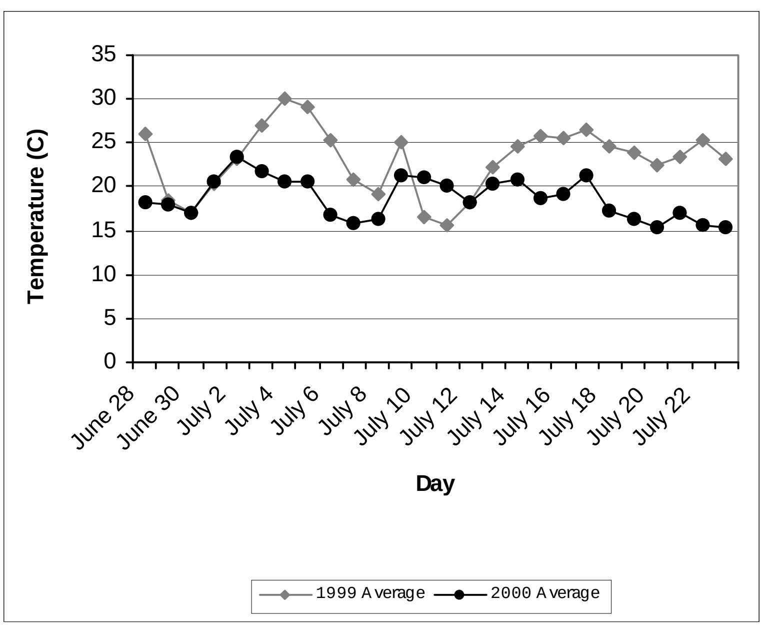
CONCLUSIONS: The weather conditions as shown on Graph 1 indicated that the temperatures were significantly lower in June and July comparing 1999 and 2000. This resulted in lower disease pressure with no early blight infections of any consequence. The foliar disease ratings indicate the disease free status of the potatoes. The potatoes were harvested on August 15 prior to Early Blight damage. The effectiveness of the fungicide treatments therefore could not be determined.

Table 1. Foliar disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] August 8	August 15
BRAVO 500F	2.25 L	9.7	9.8
DITHANE DG 75% NT	2.25 kg	9.9	9.9
DITHANE M-45 80WP	2.25 kg	9.9	9.8
PENNCOZEB 80WP	2.25 kg	9.8	9.8
PENNCOZEB 75DF	2.25 kg	9.9	9.9
PENNCOZEB 75DF; ICIA5504 250SC	2.25 kg 0.3 L	9.9	9.9
KOCIDE 101	2.25 kg	9.7	9.7
ICIA5504 250SC	0.3 L	9.8	9.8
BAS 500 20WG	0.44 L	9.9	9.9
CONTROL		9.8	9.8
ANOVA P#0.05		ns	ns
Coefficient of Variation (%)			

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Graph 1. Average daily temperatures at Ridgetown College comparing 1999 to 2000 between the months of late June and July.



SWEET CORN - EUROPEAN CORN BORER

TITLE: **EUROPEAN CORN BORER CONTROL IN SWEET CORN USING CONFIRM 240F AND RH-2485 240SC - RIDGETOWN**

CROP: Sweet Corn, cv. CNS 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: CONFIRM 240F (tebufenozide), COMPANION (spreader/sticker, octlphenoxtpolyethoxy-(9)-ethanol), RH-112485 240SC (experimental), CYMBUSH 250EC (cypermethrin).

METHODS: Sweet corn was planted on May 27, 2000, in four- row plots spaced 0.75 m apart on the campus farm Range J2. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on July 25, August 3 and 14. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 24. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: European corn borer insect pressures were high this year with the unsprayed plots averaging 14.8 infested cobs per 20 or 74% of the sweet corn cobs having insect damaged ears. All of the insecticides tested showed effective control. This included CONFIRM 240F with or without the surfactant COMPANION, the new insecticide RH-112485 240SC and the standard insecticide used in this trial CYMBUSH 250EC.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 20 cobs) August 24
CONFIRM 240F + COMPANION	0.5 L 0.1 % v/v	5.5 b*
CONFIRM 240F	0.5 L	7.0 b
CONFIRM 240F	1.0 L	5.5 b
RH-112485 240SC	0.5 L	6.5 b
CYMBUSH 250EC	0.28 L	3.3 b
CONTROL		14.8 a
ANOVA P#0.05		s
Coefficient of Variation (%)		35.3

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - EUROPEAN CORN BORER

TITLE: **EVALUATION OF DIPEL 2XDF FOR THE CONTROL OF EUROPEAN CORN BORER IN SWEET CORN - RIDGETOWN**

CROP: Sweet Corn, cv. CNS 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: DIPEL 2XDF (*Bacillus thuringiensis var. kurstaki*), BOD BALANCE (bio surfactant) ASSISTOR (surfactant), CYMBUSH 250EC (cypermethrin).

METHODS: Sweet corn was planted on May 27, 2000, in four- row plots spaced 0.75 m apart on the campus farm Range J2. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on July 25, August 3 and 14. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 24. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: European corn borer insect pressures were high this year with the unsprayed plots averaging 15.5 infested cobs per 20 or 78% of the sweet corn cobs having insect damaged ears. The most effective treatment was the commercial standard insecticide CYMBUSH 250EC. Under the heavy insect pressures noted in this year's trials the higher commercial rate of DIPEL 2XDF was required but was not as effective as the CYMBUSH 250EC treatment. The addition of either of the two surfactants ASSISTOR nor BOD BALANCE provided any benefit either when used alone or to help raise the level of insect control when using half rates of DIPEL 2XDF.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 20 cobs) August 24
DIPEL 2XDF	0.56 kg	11.5 ab*
DIPEL 2XDF	1.12 kg	9.0 b
DIPEL 2XDF + BOD BALANCE	0.56 kg 10.0 L	13.5 a
DIPEL 2XDF + ASSISTOR	0.56 kg 0.5 % v/v	12.3 ab
ASSISTOR	1.0 % v/v	14.0 a
CYMBUSH 250EC	0.28 L	3.5 c
CONTROL		15.5 a
ANOVA P#0.05		s
Coefficient of Variation (%)		22.1

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - EUROPEAN CORN BORER

TITLE: **EUROPEAN CORN BORER CONTROL IN SWEET CORN USING ASSISTOR - RIDGETOWN**

CROP: Sweet Corn, cv. CNS 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: ASSISTOR (natural insecticide), GARLIC OIL (garlic oil), CYMBUSH 250 EC (cypermethrin)

METHODS: Sweet corn was planted on May 27, 2000, in four- row plots spaced 0.75 m apart on the campus farm Range J2. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on July 25, August 3, and 14. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 24. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: CYMBUSH 250EC applied at the recommend commercial rate significantly controlled European Corn Borers in sweet corn. Even the half rate of CYMBUSH 250EC lowered the damage caused by corn borers. ASSISTOR when applied alone did not reduce the number of corn borers at either rate tested. The combination of ASSISTOR with GARLIC OIL did not show any improvements in European corn borer control nor did the addition of ASSISTOR improve the level of insect control when combined with CYMBUSH 250EC.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (Per 20 cobs) August 24
ASSISTOR	0.5% v/v	11.3 a*
ASSISTOR	1.0% v/v	10.8 a
CYMBUSH 250EC	280 ml	3.5 b
CYMBUSH 250EC	140 ml	4.8 b
ASSISTOR + CYMBUSH 250EC	0.5% v/v 140 ml	4.3 b
ASSISTOR + GARLIC OIL	0.5% v/v 1.0% v/v	11.5 a
CONTROL		14.0 a
ANOVA P#0.05		s
Coefficient of Variation (%)		24.22

*****These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - EUROPEAN CORN BORER

TITLE: **EUROPEAN CORN BORER CONTROL IN SWEET CORN USING CONFIRM 240F AND RH-2485 240SC - STRATHROY**

CROP: Sweet Corn, cv. Crookham 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: CONFIRM 240F (tebufenozide), COMPANION (spreader/sticker, octlphenoxtpolyethoxy-(9)-ethanol), RH-112485 240SC (experimental), CYMBUSH 250EC (cypermethrin).

METHODS: Sweet corn was planted on July 3, 2000, in four- row plots spaced 0.75 m apart on a grower's field near Strathroy in cooperation with Strathroy Foods.. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on August 1 and 10. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 21. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: European corn borer insect pressures were high this year with the unsprayed plots averaging 5.8 infested cobs per 20 or 29% of the sweet corn cobs having insect damaged ears. All of the insecticides tested showed effective control. This included CONFIRM 240F with or without the surfactant COMPANION, the new insecticide RH-112485 240SC and the standard insecticide used in this trial, CYMBUSH 250EC.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 20 cobs) August 21
CONFIRM 240F + COMPANION	0.5 L 0.1 % v/v	0.8 b
CONFIRM 240F	0.5 L	0.8 b
CONFIRM 240F	1.0 L	0.3 b
RH-112485 240SC	0.5 L	1.0 b
CYMBUSH 250EC	0.28 L	0.3 b
CONTROL		5.8 a
ANOVA P#0.05		s
Coefficient of Variation (%)		56.8

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - EUROPEAN CORN BORER

TITLE: **EVALUATION OF DIPEL 2XDF FOR THE CONTROL OF EUROPEAN CORN BORER IN SWEET CORN - STRATHROY**

CROP: Sweet Corn, cv. Crookham 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: DIPEL 2XDF (*Bacillus thuringiensis var. kurstaki*), BOD BALANCE (bio surfactant) ASSISTOR (surfactant), CYMBUSH 250EC (cypermethrin).

METHODS: Sweet corn was planted on July 3, 2000, in four- row plots spaced 0.75 m apart on a grower's field near Strathroy in cooperation with Strathroy Foods. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on August 1 and 10. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 21. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: European corn borer insect pressures were high this year with the unsprayed plots averaging 5.5 infested cobs per 20 or 28% of the sweet corn cobs having insect damaged ears. The most effective treatment was the commercial standard insecticide CYMBUSH 250EC. Under the heavy insect pressures noted in this year's trials and only two applications made, neither of the rates of DIPEL 2XDF were sufficient to control this insect. Similarly neither of the two surfactants ASSISTOR nor BOD BALANCE provided any benefit either when used alone or to help raise the level of insect control when using half rates of DIPEL 2XDF.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 20 cobs) August 21
DIPEL 2XDF	0.56 kg	6.8 ab*
DIPEL 2XDF	1.12 kg	6.3 ab
DIPEL 2XDF + BOD BALANCE	0.56 kg 10.0 L	5.3 ab
DIPEL 2XDF + ASSISTOR	0.56 kg 0.5 % v/v	8.5 a
ASSISTOR	1.0 % v/v	5.0 ab
CYMBUSH 250EC	0.28 L	2.0 b
CONTROL		5.5 ab
ANOVA P#0.05		s
Coefficient of Variation (%)		54.1

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - EUROPEAN CORN BORER

TITLE: **EUROPEAN CORN BORER CONTROL IN SWEET CORN USING ASSISTOR - STRATHROY**

CROP: Sweet Corn, cv. Crookham 710
PEST: European corn borer, *Ostrinia nubilalis* (L.)

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MATERIALS: ASSISTOR (natural insecticide), GARLIC OIL (garlic oil), CYMBUSH 250 EC (cypermethrin)

METHODS: Sweet corn was planted on July 3, 2000, in four- row plots spaced 0.75 m apart on a grower's field near Strathroy in cooperation with Strathroy Foods. Plots were 7m in length, replicated four times in a randomized complete block design. Spray applications were made using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on August 1, and 10. Assessments were conducted by counting the number of insect feeding sites observed in the cob ears, inspecting 20 plants per plot on August 21. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: CYMBUSH 250EC applied at the recommend commercial rate significantly controlled European Corn Borers in sweet corn. Even the half rate of CYMBUSH 250EC lowered the damage caused by corn borers. ASSISTOR when applied alone did not reduce the number of corn borers at either rate tested. Although not significantly different the addition of GARLIC OIL with ASSISTOR appeared to have reduced the number of corn borers found in this trial.

Table 1. European corn borer control.

Treatments	Rate Product/ha	Number of Corn Borers (per 20 cobs) August 21
ASSISTOR	0.5% v/v	4.5 ab*
ASSISTOR	1.0% v/v	5.5 a
CYMBUSH 250EC	280 ml	1.5 b
CYMBUSH 250EC	140 ml	2.0 ab
ASSISTOR + CYMBUSH 250EC	0.5% v/v 140 ml	3.5 ab
ASSISTOR + GARLIC OIL	0.5% v/v 1.0% v/v	3.5 ab
CONTROL		5.6a
ANOVA P#0.05		s
Coefficient of Variation (%)		41.3

***These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

SWEET CORN - STEWART'S WILT/FLEA BEETLES

TITLE: **USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART'S WILT - RIDGETOWN**

CROP: Sweet Corn, cv. 5362 Copola (BSS 5362), GH 1861, GSS 9377
PEST: Thrips, Corn Flea beetles (*Chaetocnema pulicaria* Melsheimer), Stewart's wilt (*Xanthomonas stewartii*)

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MATERIALS: GAUCHO 600 (imidacloprid), CAPTAN 400C(captan), APRON FL(metalaxyl) APRON XL (metalaxyl), Maxim 4FS (fludioxonil).

METHODS: Three distinct trials were conducted on the research farm in Ridgetown planting three sweet corn varieties. Sweet corn was planted on June 8, 2000, in two- row plots spaced 0.75 m apart on the campus farm in Ranges J1 and J2. Plots were 7m in length, replicated four times in a randomized complete block design. Seeds were treated on June 2, six days prior to planting adding the treatments into a plastic bag containing a weighed amount of seed and mixing gently for excellent seed coverage. Assessments were conducted by conducting seed germination tests prior to treating, while in the field total stand counts were taken on June 15 and 26, flea beetle and Stewart's Wilt disease assessments throughout the summer and thrips counts and damage ratings on June 26 and July 11. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Tables 1-4.

CONCLUSIONS: Populations of flea beetles were not noticed until July 17 and in low numbers. Thus the resultant infection of Stewart's Wilt came late in July with no differences noted between seed treatments. However early in the season there was considerable numbers of thrips which caused noticeable leaf scaring and assessments were taken as there appeared to be an effect amongst the seed treatments tested.

Sweet corn cultivar BSS, Tables 1 & 2, had the lowest germination and emergence however there was no treatment effect noticed. GSS 9377, Tables 1 & 4 had the next lowest seed germination ratings with early stand counts indicating a significant trend towards improved stands compared to the untreated check plot using the lowest rate of GAUCHO 600. As the GAUCHO rates increased the early stand counts decreased with a significant loss of stand count between the lowest, 83.3 vs. the highest 833 ml/100 kg rates of seed treatments. This delayed emergence observation disappeared within 10 days of this observation with no significant differences in total plant stand amongst seed treatments. GH 1861 had the highest seed germination counts Table 1, and a significant improvement in plant stands using the combination seed treatment of APRON XL + MAXIM 4FS and GAUCHO 600.

Seed treatments with increasing rates of GAUCHO significantly decreased the numbers of thrips found on sweet corn seedling leaves and consequently reduced the damage caused by thrips. The most effective treatments were the high rates of GAUCHO 600, at rates of 520 and 833 ml product/100 kg of seed.

Table 1. Sweet corn seed sources and quality assessments

Sweet Corn Cultivar	% Germination	Weight (g) of 100 seeds
Capola BSS 5362	87	16.02
GH 1861	95	20.53
GSS 9377	90	13.61

Table 2. Insect control using seed treatments on sweet corn cultivar BSS 5362.

Treatments	Rate Product ml/100 kg seed	Total Stand Counts (Per 2 rows) June 15	June 26	# plants/10 with Thrips June 26	Thrips Damage Ratings (0-10)[1] June 26	July 11
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	28 a*	57 a	6.0 b	3.5 b	4.5 a
GAUCHO 600 + CAPTAN-APRON FL	150 500	29 a	65 a	3.5 cd	1.5 c	4.4 a
GAUCHO 600 + CAPTAN-APRON FL	200 500	25 a	57 a	4.0 bc	0.8 cd	4.1 a
GAUCHO 600 + CAPTAN-APRON FL	417 500	24 a	61 a	1.8 cde	0.3 d	4.3 a
GAUCHO 600 + CAPTAN-APRON FL	520 500	34 a	64 a	0.8 e	0.0 d	4.0 ab
GAUCHO 600 + CAPTAN-APRON FL	833 500	23 a	59 a	0.8 e	0.0 d	3.5 b
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	31 a	64 a	1.3 de	0.3 d	4.3 a
CONTROL		29 a	55 a	8.5 a	9.8 a	4.3 a
ANOVA P#0.05		ns	ns	s	s	s
Coefficient of Variation (%)				44.5	28.4	8.8

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Damage Ratings (0-10); 0- no damage plant foliage was green and healthy, 10- severe thrips damage, foliage was white with feeding scars.

Table 3. Insect control using seed treatments on sweet corn cultivar GH 1861.

Treatments	Rate Product ml/100 kg seed	Total Stand Counts (Per 2 rows) June 15	June 26	# plants/10 with Thrips June 26	Thrips Damage Ratings (0-10)[1] June 26	July 11
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	41 a*	73 ab	8.0 a	5.0 b	nt [2]
GAUCHO 600 + CAPTAN-APRON FL	150 500	52 a	70 b	8.0 a	2.0 c	nt
GAUCHO 600 + CAPTAN-APRON FL	200 500	45 a	74 ab	6.5 ab	1.3 c	nt
GAUCHO 600 + CAPTAN-APRON FL	417 500	46 a	69 b	4.0 bc	0.0 d	nt
GAUCHO 600 + CAPTAN-APRON FL	520 500	52 a	70 b	2.5 c	0.0 d	nt
GAUCHO 600 + CAPTAN-APRON FL	833 500	53 a	71 b	2.3 c	0.0 d	nt
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	55 a	80 a	4.5 bc	0.0 d	nt
CONTROL		51 a	69 b	8.3 a	10.0 a	nt
ANOVA P#0.05		ns	s	s	s	
Coefficient of Variation (%)			7.0	36.2	28.1	

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Damage Ratings (0-10); 0- no damage plant foliage was green and healthy, 10- severe thrips damage, foliage was white with feeding scars.

[2]nt - non taken - Thrips damage rating assessments were not taken on July 11 as there was too much rust lesions on the foliage at that time.

Table 4. Insect control using seed treatments on sweet corn cultivar GSS 9377.

Treatments	Rate Product ml/100 kg seed	Total Stand Counts (Per 4 rows) June 15	June 26	# plants/10 with Thrips June 26	Thrips Damage Ratings (0-10)[1] June 26	July 11
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	116 a*	135 a	9.5 a	7.3 a	3.4 ab
GAUCHO 600 + CAPTAN-APRON FL	150 500	112 ab	127 a	7.8 ab	4.0 b	3.5 ab
GAUCHO 600 + CAPTAN-APRON FL	200 500	120 a	135 a	8.8 a	2.5 bc	3.5 ab
GAUCHO 600 + CAPTAN-APRON FL	417 500	109 abc	140 a	5.3 b	0.8 cd	3.9 ab
GAUCHO 600 + CAPTAN-APRON FL	520 500	103 abc	132 a	1.8 c	0.3 cd	4.9 a
GAUCHO 600 + CAPTAN-APRON FL	833 500	93 c	129 a	1.3 c	0.0 d	3.4 ab
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	108 abc	134 a	5.3 b	1.5 cd	2.9 b
CONTROL		96 bc	127 a	9.0 a	8.5 a	2.9 b
ANOVA P#0.05		s	ns	s	s	s
Coefficient of Variation (%)		10.8		26.9	48.8	31.3

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Damage Ratings (0-10); 0- no damage plant foliage was green and healthy, 10- severe thrips damage, foliage was white with feeding scars.

SWEET CORN - STEWART'S WILT/FLEA BEETLES

TITLE: **USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART'S WILT - BALLYMOTE**

CROP: Sweet Corn, cv. 5362 Copola (BSS 5362), GH 1861, GSS 9377
PEST: Thrips, Corn Flea beetles (*Chaetocnema pulicaria* Melsheimer), Stewart's wilt (*Xanthomonas stewartii*)

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MATERIALS: GAUCHO 600 (imidacloprid), CAPTAN 400C (captan), APRON FL(metalaxyl) APRON XL (metalaxyl), Maxim 4FS (fludioxonil).

METHODS: Three distinct trials were conducted in a growers field planting three sweet corn varieties. Sweet corn was planted on July 3, 2000, in four- row plots spaced 0.75 m apart on a farm near Ballymote north of London, Ontario. Plots were 8 m in length, replicated four times in a randomized complete block design. Seeds were treated on June 2, by adding the treatments into a plastic bag containing a weighed amount of seed and mixing gently for excellent seed coverage. Assessments were conducted by conducting seed germination tests prior to treating, while in the field total stand counts and Thrips control ratings were taken on July 18, plant vigour ratings on August 1, number of plants over a 1m row length and plant height across 10 plants per plot on August 10 and Stewart's Wilt disease assessments on August 28 and September 7. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Tables 1-4.

CONCLUSIONS: The emergence counts in two of the three sweet corn cultivars was significantly improved using seed treatments with the combination treatment APRON XL + MAXIM 4FS + GAUCHO 600 averaging the greatest improvement. The higher rate of GAUCHO 600 did not appear to result in any seedling emergence damage.

Thrips damage was significantly controlled with all seed treatments with the lowest rate of GAUCHO 600 having the lowest numerical control rating, i.e. less control observed.

There was a definite increase in plant foliage vigour when using any of the seed treatments with even the number of plant surviving emergence increased with the combination APRON XL + MAXIM 4FS + GAUCHO 600.

The amount of Stewart's Wilt came late in the season showing no benefits from the seed treatments. If anything the observations were that due to the increased vigour of the sweet corn treated with seed treatments there was a slight increase in the incidence of Stewart's Wilt.

Table 1. Sweet corn seed sources and quality assessments

Sweet Corn Cultivar	% Germination	Weight (g) of 100 seeds
Capola BSS 5362	87	16.02
GH 1861	95	20.53
GSS 9377	90	13.61

Table 2. Insect and disease control using seed treatments on sweet corn cultivar BSS 5362.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Stewart's Wilt Rating # of disease sites[3] Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	61.8 ab*	7.8 a	7.8 a	18.3 ab	48.9 b	14.8 a	36.8 a
GAUCHO 600 + CAPTAN-APRON FL	150 500	59.8 ab	8.5 a	8.6 a	18.8 ab	61.9 ab	10.0 ab	38.3 a
GAUCHO 600 + CAPTAN-APRON FL	200 500	70.0 a	8.5 a	8.3 a	22.0 a	61.3 ab	14.3 a	40.0 a
GAUCHO 600 + CAPTAN-APRON FL	417 500	59.3 ab	8.8 a	8.5 a	18.3 ab	67.1 ab	11.0 ab	35.0 ab
GAUCHO 600 + CAPTAN-APRON FL	520 500	55.8 b	8.3 a	9.0 a	19.5 a	69.5 a	8.3 b	30.0 ab
GAUCHO 600 + CAPTAN-APRON FL	833 500	61.5 ab	8.5 a	8.0 a	17.0 ab	61.0 ab	9.0 ab	30.0 ab
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	65.5 ab	8.5 a	8.6 a	19.3 a	66.8 ab	10.0 ab	37.5 a
CONTROL		35.8 c	1.5 b	4.8 b	13.5 b	55.9 ab	12.3 ab	26.3 b
ANOVA P#0.05		s	s	s	s	s	s	s
Coefficient of Variation (%)		12.1	11.8	15.4	18.2	19.1	31.9	18.3

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

Table 3. Insect and disease control using seed treatments on sweet corn cultivar GH 1861.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Stewart's Wilt Rating # of disease sites[3] Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	70.0 a*	7.5 b	8.5 a	21.0 ab	76.4 ab	4.0 a	3.1 a
GAUCHO 600 + CAPTAN-APRON FL	150 500	77.5 a	8.3 ab	7.8 a	19.0 b	77.5 ab	2.5 ab	3.9 a
GAUCHO 600 + CAPTAN-APRON FL	200 500	77.5 a	8.8 a	9.3 a	20.0 ab	80.6 a	1.8 ab	3.9 a
GAUCHO 600 + CAPTAN-APRON FL	417 500	74.0 a	8.3 ab	9.0 a	21.8 ab	80.9 a	2.0 ab	2.3 a
GAUCHO 600 + CAPTAN-APRON FL	520 500	76.5 a	9.0 a	8.5 a	20.3 ab	80.1 a	0.5 b	0.0 a
GAUCHO 600 + CAPTAN-APRON FL	833 500	73.5 a	8.3 ab	8.8 a	19.3 b	76.1 ab	2.3 ab	0.0 a
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	75.0 a	9.0 a	9.5 a	23.3 a	82.0 a	1.3 ab	5.4 a
CONTROL		72.0 a	1.0 c	4.3 b	18.5 b	67.6 b	1.8 ab	5.6 a
ANOVA P#0.05		s	s	s	s	s	s	ns
Coefficient of Variation (%)		11.4	8.7	13.4	11.7	8.8	98.1	

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

Table 4. Insect and disease control using seed treatments on sweet corn cultivar GSS 9377.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	63.3 bc*	7.8 a	7.3 abc	16.3 ab	60.8 a	13.5 b	35.8 a
GAUCHO 600 + CAPTAN-APRON FL	150 500	71.5 ab	8.5 a	7.0 bc	17.8 ab	61.4 a	16.3 ab	48.0 a
GAUCHO 600 + CAPTAN-APRON FL	200 500	71.3 ab	8.3 a	8.0 ab	19.3 ab	65.4 a	21.3 a	53.5 a
GAUCHO 600 + CAPTAN-APRON FL	417 500	62.0 bc	9.0 a	6.5 c	17.5 ab	63.9 a	13.3 b	40.3 a
GAUCHO 600 + CAPTAN-APRON FL	520 500	68.3 ab	8.3 a	7.5 abc	16.8 ab	62.6 a	16.5 ab	44.8 a
GAUCHO 600 + CAPTAN-APRON FL	833 500	66.8 ab	8.8 a	7.5 abc	16.5 ab	61.9 a	11.8 b	35.0 a
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	75.3 a	9.0 a	8.3 a	20.3 a	62.0 a	13.5 b	50.0 a
CONTROL		55.8 c	2.3 b	5.3 d	15.3 b	55.9 a	12.3 b	40.8 a
ANOVA P#0.05		s	s	s	s	s	s	ns
Coefficient of Variation (%)		9.6	9.8	10.6	16.7	10.3	27.2	

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

SWEET CORN - STEWART'S WILT/FLEA BEETLES

TITLE: **USE OF SEED TREATMENTS FOR THE CONTROL OF THRIPS, FLEA BEETLES AND STEWART'S WILT - ST. THOMAS**

CROP: Sweet Corn, cv. 5362 Copola (BSS 5362), GH 1861, GSS 9377
PEST: Thrips, Corn Flea beetles (*Chaetocnema pulicaria* Melsheimer), Stewart's wilt (*Xanthomonas stewartii*)

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MATERIALS: GAUCHO 600 (imidacloprid), CAPTAN 400C(captan), APRON FL(metalaxyl) APRON XL (metalaxyl), Maxim 4FS (fludioxonil).

METHODS: Three distinct trials were conducted in a growers field planting three sweet corn varieties. Sweet corn was planted on July 4, 2000, in four- row plots spaced 0.75 m apart on a farm near St. Thomas south of London, Ontario. Plots were 8 m in length, replicated four times in a randomized complete block design. Seeds were treated on June 2, by adding the treatments into a plastic bag containing a weighed amount of seed and mixing gently for excellent seed coverage. Assessments were conducted by conducting seed germination tests prior to treating, while in the field total stand counts and Thrips control ratings were taken on July 18, plant vigour ratings on August 1, number of plants over a 1m row length and plant height across 10 plants per plot on August 10 and Stewart's Wilt disease assessments on August 28 and September 7. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Tables 1-4.

CONCLUSIONS: Seedling emergence from two of the three sweet corn cultivars was significantly improved by using seed treatments containing GAUCHO 600, CAPTAN-APRON FL or a combination of APRON XL + MAXIM 4FS + GAUCHO.

In this location south of St. Thomas there were no Thrips, Flea beetles nor Stewart's Wilt to be recorded.

Table 1. Sweet corn seed sources and quality assessments

Sweet Corn Cultivar	% Germination	Weight (g) of 100 seeds
Capola BSS 5362	87	16.02
GH 1861	95	20.53
GSS 9377	90	13.61

Table 2. Insect and disease control using seed treatments on sweet corn cultivar BSS 5362.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Stewart's Wilt Rating # of disease sites[3] Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	62.0 ab*						
GAUCHO 600 + CAPTAN-APRON FL	150 500	65.3 ab						
GAUCHO 600 + CAPTAN-APRON FL	200 500	65.5 ab						
GAUCHO 600 + CAPTAN-APRON FL	417 500	60.3 ab						
GAUCHO 600 + CAPTAN-APRON FL	520 500	63.5 ab						
GAUCHO 600 + CAPTAN-APRON FL	833 500	57.8 b						
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	67.3 a						
CONTROL		48.0 c						
ANOVA P#0.05		s	ns	ns	ns	ns	ns	ns
Coefficient of Variation (%)		8.7						

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

Table 3. Insect and disease control using seed treatments on sweet corn cultivar GH 1861.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	76.3 a*						
GAUCHO 600 + CAPTAN-APRON FL	150 500	74.8 a						
GAUCHO 600 + CAPTAN-APRON FL	200 500	81.5 a						
GAUCHO 600 + CAPTAN-APRON FL	417 500	81.0 a						
GAUCHO 600 + CAPTAN-APRON FL	520 500	78.8 a						
GAUCHO 600 + CAPTAN-APRON FL	833 500	78.8 a						
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	79.5 a						
CONTROL		80.0 a						
ANOVA P#0.05 Coefficient of Variation (%)		ns	ns	ns	ns	ns	ns	ns

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

Table 4. Insect and disease control using seed treatments on sweet corn cultivar GSS 9377.

Treatments	Rate Product ml/100 kg of seed	Emerg. Counts (2 rows) July 18	Thrips Control Ratings (0-10)[1] July 18	Vigour Ratings (0-10)[2] Aug. 1	# plants/m Ave. 4 rows Aug. 10	Ave. Plant Heights cm/10 plants Aug.10	Stewart's Wilt Rating # of disease sites[3] Aug.28	Sept. 7
GAUCHO 600 + CAPTAN-APRON FL	83.3 500	58.3 a*						
GAUCHO 600 + CAPTAN-APRON FL	150 500	56.5 a						
GAUCHO 600 + CAPTAN-APRON FL	200 500	55.8 a						
GAUCHO 600 + CAPTAN-APRON FL	417 500	58.5 a						
GAUCHO 600 + CAPTAN-APRON FL	520 500	55.8 a						
GAUCHO 600 + CAPTAN-APRON FL	833 500	53.8 a						
APRON XL + MAXIM 4FS + GAUCHO 600	2.9 12.0 417	61.3 a						
CONTROL		46.3 b						
ANOVA P#0.05		s	ns	ns	ns	ns	ns	ns
Coefficient of Variation (%)		8.3						

*These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Thrips Control Ratings (0-10); 0- no control, severe thrips damage, foliage was white with feeding scars, 10 - excellent control with no damage, plant foliage was green and healthy.

[2] Vigour Ratings (0-10); 0- no vigour plants stunted, 10- healthy growth foliage green.

[3] Stewart's Wilt Rating # of disease sites; the number of disease sites observed on foliage over a 2 row length of plot.

SWEET CORN - LEAF RUST

TITLE: **CONTROL OF LEAF RUST IN SWEET CORN**

CROP: Sweet corn cv. CNS 710
PEST: Common Rust, *Puccinia sorghi* Schwein

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MATERIALS: BRAVO 500 (chlorothalonil), TOPAS 250EC (propiconazole), FOLICUR 3.6F (tebuconazole).

METHODS: Sweet corn was planted on May 27, 2000, in four- row plots spaced 0.75 m apart on the campus farm Range J1. Plots were 7 m in length, replicated four times in a randomized complete block design. Spray applications were made on the middle two rows using a specialized small plot research CO_2 sprayer with two-nozzled hand-held boom, applying 200 L/ha of spray mixture on July 12, 19, 26 and August 8. Assessments were conducted by rating the amount of foliar rust observed on July 27, August 5, and 25. Sweet corn yields were taken on August 25. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Control of common rust in sweet corn was achieved with the fungicides FOLICUR 3.6F and TOPAS 250 EC. BRAVO 500 also reduced the degree of rust on the foliage of sweet corn but not nearly to the extent as did FOLICUR and TOPAS. The amount of rust in this trial was significant causing a reduction in yield. Yields were significantly improved using especially the FOLICUR and TOPAS treatments but also with BRAVO 500. The increase in yield was noted in an increase in both numbers and weight of cobs harvested and of a marketable size.

Table 1. Common leaf rust disease control ratings in sweet corn.

Treatments	Rate Product/ha	Foliar Disease Ratings (0-10)[1/]			Yield - August 25			
		July 27	Aug. 5	Aug. 25	Total # of cobs	Weight of cobs (kg)	# of saleable sized cobs	Weight of saleable cobs
BRAVO 500	3.2 L	1.5 b*	3.0 b	6.8 b	45.0 ab	11.3 b	24.8 b	8.1 b
TOPAS 250 EC	500.0 ml	8.8 a	8.0 a	7.8 ab	51.8 a	13.9 a	32.5 a	11.2 a
FOLICUR 3.6F	292.0 ml	8.8 a	8.0 a	8.6 a	48.0 a	13.2 a	29.3 ab	10.1 a
CONTROL		1.8 b	3.0 b	2.0 c	37.3 b	7.3 c	9.5 c	2.9 c
ANOVA P#0.05		s	s	s	s	s	s	s
Coefficient of Variation (%)		18.3	18.5	11.3	13.1	9.2	14.9	14.3

*These values are the means of three replications. Numbers within a column followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P#0.05)

[1/] Foliar Disease Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TOMATOES - FOLIAR DISEASES - FUNGAL

TITLE: **EVALUATION OF FUNGICIDES FOR THE CONTROL OF FOLIAR DISEASES IN FIELD TOMATOES**

CROP: Field Tomatoes cv. Heinz 9553
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes Late Blight, *Phytophthora infestans* (Mont.) De Bary

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MATERIALS: BAS 500F 250EC, 20 WG (experimental), ABOUND 250FL (experimental), BRAVO 500 (chlorothalonil).

METHODS: Tomatoes, H9553, were transplanted in two, twin-row plots, 7m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. Non-sprayed guard rows were planted on either side of the treated rows to establish uniform disease pressure. Seedlings were transplanted using a commercial transplanter on May 16, 2000. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on June 25, July 5, 12, 19, 26, August 2, 8 and 23. Foliar disease assessments were made on August 25, September 2 and 20. Yields were taken on September 22 by counting and weighing greens, reds and rotten fruits. Anthracnose counts were made by randomly sampling 50 red fruit at time of harvest, storing them in a shed for 6 days and counting the number of fruits showing Anthracnose fruit symptoms on September 28. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was late blight. The disease was noted around August 18. The season had been cooler than normal with little to no early blight and septoria leaf spot.

Data are presented in Tables 1 and 2.

CONCLUSIONS: The occurrence of late blight showing up on tomatoes on the research farm in Ridgetown is rare. This is the first time in 25 years that this level of late blight severity has been observed. The disease was noticed on August 18 and within a week had spread evenly throughout the entire plot.

BAS 500F 250EC effectively controlled a severe infection of late blight at rates from 0.64 L product/ha and above on a 7 day spray schedule. The two lower rates of 0.22 and 0.44 L product/ha provided early control of late blight but efficacy became less by the later disease rating on September 2 and 20. Similarly the 14 day spray schedule of BAS 500F 250EC, 0.88 L product/ha, last sprayed on August 8 provided excellent control on August 25 but by September 2 the degree of control had lessened. Late Blight was not effectively controlled with ABOUND 250 FL. BRAVO 500 sprayed on a 7 day interval

effectively controlled late blight.
Similarly fruit anthracnose was reduced under extreme pressures with increasing rates of BAS 500F 250EC along with the 20WG formulation and BRAVO 500. ABOUND 250FL appeared to be ineffective in controlling heavy pressures of anthracnose. Under these conditions tomato red fruit yields were significantly reduced. Yields however were significantly improved with the fungicides BAS 500F 250EC and 20WG formulations and BRAVO 500. ABOUND 250FL, having shown lower levels of disease control had more green fruit than any of the treatments and lower red fruit yields equal to the unsprayed control plots.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Timing (#)of Application [1/]	Foliar Damage Ratings (0-10)[2/]			% Anthracnose
			Aug. 25	Sept. 2	Sept. 20	Sept. 28
BAS 500F 250EC	0.22 L	7 days (8)	8.0 ab*	5.5 d	3.6 d	30.5 a
BAS 500F 20WG	0.55 kg	7 days (8)	7.0 b	5.8 d	5.3 c	24.0 ab
BAS 500F 250EC	0.44 L	7 days (8)	8.3 ab	7.4 c	5.5 c	22.5 ab
BAS 500F 250EC	0.64 L	7 days (8)	9.0 a	8.0 bc	7.3 b	20.3 b
BAS 500F 250EC	0.88 L	7 days (8)	8.6 a	7.9 bc	7.8 ab	21.8 b
BAS 500F 250EC	0.88 L	14 days (4)	8.0 ab	5.3 d	3.8 d	18.8 b
BAS 500F 250EC	1.76 L	7 days (8)	8.9 a	8.5 ab	8.5 a	10.0 c
BRAVO 500	3.8 L	7 days (8)	9.0 a	8.8 a	8.8 a	18.0 b
ABOUND 250 FL	0.44 L	7 days (8)	5.0 c	2.9 e	2.0 e	5.3 c
CONTROL			1.5 d	1.0 f	1.0 e	18.8 b
ANOVA P#0.05			s	s	s	s
Coefficient of Variation (%)			11.7	7.9	14.6	28.9

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Timing (#) of Applications: applied either on a 7 or 14 day spray schedule.
[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Tomato yields.

Treatments	Rate Product/ha	Timing (#)of Application [1/]	Yields - September 22- kg per plot		
			Red Fruit	Green Fruit	Rotten Fruit
BAS 500F 250EC	0.22 L	7 days (8)	30.3 ab*	0.8 c	2.0 a
BAS 500F 20WG	0.55 kg	7 days (8)	32.8 a	1.0 c	1.4 ab
BAS 500F 250EC	0.44 L	7 days (8)	30.9 ab	0.9 c	1.4 ab
BAS 500F 250EC	0.64 L	7 days (8)	33.5 a	1.5 bc	1.6 ab
BAS 500F 250EC	0.88 L	7 days (8)	30.9 ab	1.5 bc	1.0 bc
BAS 500F 250EC	0.88 L	14 days (4)	31.7 a	0.8 c	2.0 a
BAS 500F 250EC	1.76 L	7 days (8)	32.9 a	2.9 b	0.7 bc
BRAVO 500	3.8 L	7 days (8)	32.4 a	1.8 bc	1.0 bc
ABOUND 250 FL	0.44 L	7 days (8)	24.8 bc	6.8 a	0.2 c
CONTROL			23.5 c	2.5 bc	1.3 ab
ANOVA P#0.05			s	s	s
Coefficient of Variation (%)			13.9	56.6	46.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: applied either on a 7 or 14 day spray schedule.

TOMATOES - FOLIAR DISEASES - FUNGAL

TITLE: **TOMCAST SPRAYING USING NEW TOMATO FUNGICIDES**

CROP: Field Tomatoes cv. Heinz 9553
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes Late Blight, *Phytophthora infestans* (Mont.) De Bary

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MATERIALS: ICIA5504 250SC (azoxystrobin), BRAVO 500 (chlorothalonil)

METHODS: Tomatoes were transplanted in two, twin-row plots, 7m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. Non-sprayed guard rows were planted on either side of the treated rows to establish uniform disease pressure. Seedlings were transplanted using a commercial transplanter on May 25, 2000. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture. The initial spray application was made on June 23 with an cumulative Disease Severity Value (DSV) of 34 following the TOMCAST forecaster model with subsequent spray applications applied every 25, 30 or 40 DSV. Foliar disease assessments were made on August 25 and September 5. Yields were taken on September 6 by counting and weighing greens, reds and rotten fruits. Anthracnose counts were made by randomly sampling 50 red fruit at time of harvest, storing them in a shed for 2 days and counting the number of fruits showing anthracnose fruit symptoms on September 8. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Late Blight. The disease was noted around August 18. The season had been cooler than normal with little to no Early Blight and Septoria Leaf Spot. Data are presented in Tables 1, 2 and 3.

CONCLUSIONS: The occurrence of late blight showing up on tomatoes on the research farm in Ridgetown is rare. This is the first time in 25 years that this level of late blight severity has been observed. The disease was noticed on August 18 and within a week had spread evenly throughout the entire plot.

The spray program was NOT carried out as initially planned. Earlier in the season there was very little early blight and septoria leaf spot due to the unusual cool summer and the trial was stopped. Soon after the last sprays were applied, leaving the plots unprotected, late blight infected the entire plot area. The disease ratings in this trial therefore do not reflect the effectiveness of fungicide sprays timing using TOMCAST but rather the relative effectiveness between BRAVO 500 and ICIA5504.

A measure of control of late blight was noted in the 25 and 30 DSV sprayed plots on August 25, particularly when BRAVO 500 was used more so than when ICIA5504 was used. The last spray of BRAVO was on Aug. 18 and Aug. 8 in the two respective treatments with significant control of late blight recorded. The level of control under this years events suggested that BRAVO 500 could provide equal disease control and even better anthracnose control than the fungicide ICIA5504 250SC.

Table 1. Treatment spray dates.

Actual spray dates based on cumulative (DSVs)			**Calculated** spray dates based on cumulative (DSVs)		
25 DSV	30 DSV	40 DSV	25 DSV	30 DSV	40 DSV
June 23 (34)	June 23 (34)	June 23 (34)	June 23 (34)	June 23 (334)	June 23 (34)
July 1 (25)	July 10 (35)	July 13 (41)	July 4	July 8	July 13
Missed	July 26 (21)	Aug. 4 (39)	July 18	July 29	Aug. 7
Aug. 18 (43)	Aug. 8 (33)		Aug. 2	Aug. 9	
Aug. 18 (27)			Aug. 14		
Total # of Sprays					
4 + 1	**4**	**3**	**5**	**4**	**3**

Table 2. Foliar disease (Late blight) and fruit anthracnose control ratings.

Treatments	Rate Product/ha	Timing (#)of Applications [1/]	Foliar Damage Ratings (0-10)[2/]		% Anthracnose
			Aug. 25	Sept. 5	Sept. 8
BRAVO 500	2.8 L	25 DSV	5.0 a*	4.0 a	10.0 b
BRAVO 500	2.8 L	30 DSV	4.8 a	4.0 a	11.0 b
BRAVO 500	2.8 L	40 DSV	2.5 bc	4.0 a	14.3 b
ICIA5504 250SC	0.4 L	25 DSV	2.8 b	4.0 a	12.0 b
ICIA5504 250SC	0.4 L	30 DSV	2.0 bc	4.0 a	13.3 b
ICIA5504 250SC	0.4 L	40 DSV	1.3 bc	4.0 a	22.8 a
Control			1.0 c	1.0 b	17.8 ab
ANOVA P#0.05			s	s	s
Coefficient of Variation (%)			34.3	23.5	36.6

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: see Table 1, DSV = Cumulative Disease Severity Values based on TOMCAST.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 3. Tomato yields.

Treatments	Rate Product/ha	Timing (#)of Applications [1/]	Yields - September 6 - kg per plot Red Fruit	Green Fruit	Rotten Fruit	TOTAL
BRAVO 500	2.8 L	25 DSV	14.2 a*	5.0 a	2.1 a	19.2 a
BRAVO 500	2.8 L	30 DSV	15.7 a	5.0 a	1.4 a	20.6 a
BRAVO 500	2.8 L	40 DSV	12.8 a	2.3 bc	3.5 a	15.1 ab
ICIA5504 250SC	0.4 L	25 DSV	14.3 a	2.8 b	2.0 a	17.1 ab
ICIA5504 250SC	0.4 L	30 DSV	15.8 a	2.0 bc	2.4 a	17.8 a
ICIA5504 250SC	0.4 L	40 DSV	10.6 a	1.7 bc	3.1 a	12.3 b
Control			14.1 a	1.0 c	2.3 a	15.1 ab
ANOVA P#0.05			ns	s	s	s
Coefficient of Variation (%)				33.2	71.6	20.1

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: see Table 1, DSV = Cumulative Disease Severity Values based on TOMCAST.

TOMATOES - FOLIAR DISEASES - FUNGAL

TITLE: **DEVELOPMENT OF TOPAS AS A FUNGICIDE USED FOR FIELD TOMATOES**

CROP: Field Tomatoes cv. Heinz 9553
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes

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MATERIALS: TOPAS 250EC, (propiconazole)

METHODS: Tomatoes were transplanted in two, twin-row plots, 7 m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. Non-sprayed guard rows were planted on either side of the treated rows to establish uniform disease pressure. Seedlings were transplanted using a commercial transplanter on May 25, 2000. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture. The initial spray application was made at time of early bloom, on July 5, with a subsequent spray applications applied 14 days later on July 19. Foliar disease assessments were made on August 25 and September 5. Yields were taken on September 6 by counting and weighing greens, reds and rotten fruits. Anthracnose counts were made by randomly sampling 50 red fruit at time of harvest, storing them in a shed for 5 days and counting the number of fruits showing anthracnose fruit symptoms on September 11. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Late Blight. The disease was noted around August 18. The season had been cooler than normal with little to no Early Blight and Septoria Leaf Spot.

Data are presented in Tables 1, and 2.

CONCLUSIONS: The occurrence of Late Blight showing up on tomatoes on the research farm in Ridgetown is rare. This is the first time in 25 years that this level of Late Blight severity has been observed. The disease was noticed on August 18 and within a week had spread evenly throughout the entire plot**.**

Neither of the TOPAS 250EC treatments, sprayed one or two times, were sufficient to control a severe infection of Late Blight. The foliage and fruit were devastated by foliage collapse resulting in an increase in fruit anthracnose. Yields were significantly lowered as a result of the Late blight disease with neither of the fungicide treatments able to improve the situation.

This was an unusual situation and TOPAS 250EC could not be evaluated under a more "normal" situation with Early Blight, Septoria Leaf Spot and fruit anthracnose being the predominant diseases in most years.

Table 1. Foliar disease (Late blight) and fruit anthracnose control ratings.

Treatments	Rate Product/ha	Timing (#)of Applications [1/]	Foliar Damage Ratings (0-10)[2/]		% Anthracnose
			Aug. 25	Sept. 5	Sept. 8
TOPAS 250EC	500 ml	1st Appl. Early bloom	5.3 a*	4.0 a	27.0 a
TOPAS 250EC	500 ml	1st Appl. Early bloom 2nd Appl. 14 days later	5.2 a	4.0 a	28.5 a
Control			5.3 a	4.0 a	27.5 a
ANOVA P#0.05 Coefficient of Variation (%)			ns	ns	ns

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: 1st application sprayed on July 5; 2nd application sprayed on July 19.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Tomato yields**.**

Treatments	Rate Product/ha	Timing (#)of Applications [1/]	Yields - September 6 - kg per plot			
			Red Fruit	Green Fruit	Rotten Fruit	TOTAL
TOPAS 250EC	500 ml	1st Appl. Early bloom	11.8 a*	1.0 a	3.2 a	16.0 a
TOPAS 250EC	500 ml	1st Appl. Early bloom 2nd Appl. 14 days later	12.5 a	1.1 a	3.6 a	17.2 a
Control			11.6 a	1.2 a	4.6 a	17.4 a
ANOVA P#0.05 Coefficient of Variation (%)			ns	ns	ns	ns

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: 1st application sprayed on July 5; 2nd application sprayed on July 19.

TOMATOES - FOLIAR DISEASES - BACTERIAL

TITLE: **USE OF SURFACTANTS TO IMPROVE THE EFFECTIVENESS OF COPPER FOR THE CONTROL OF FOLIAR DISEASES IN TOMATOES**

CROP: Field Tomatoes cv. Heinz 9502
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg. Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye

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MATERIALS: KOCIDE 101 (50% copper hydroxide), BRAVO 500 (chlorothalonil), PENNCOZEB 75DG (75% mancozeb), NUFILM-17 (surfactant), SIL WETT (surfactant), AG BALANCE (surfactant), ASSISTOR (surfactant), GARLIC OIL (garlic oil).

METHODS: Tomatoes were transplanted in single, twin-row plots, 8 m in length with rows spaced 1.65 m apart, replicated four times in a randomized complete block design. The transplants, H9502, were obtained from a greenhouse grower who reported considerable bacterial spot on the foliage of the plants. We were able to retrieve some of these tomato transplants just prior to the seedling lot being destroyed. Seedlings were transplanted using a commercial transplanter on May 30, 2000. In addition the plots were inoculated with a culture of Bacterial spot obtained through the AAFC laboratory in London, Dr. Diane Cuppels. Plots were sprayed with a 10^{6} bacterial cells/ml suspension on June 13. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture on June 19, 26, July 4, 19, August 7, and 14. Foliar disease assessments were made on July 17 by counting the number of bacterial spot disease clusters observed on the tomato foliage, on August 22 by rating the amount of total disease, both fungal and bacterial on the foliage and on August 25 by counting the number of fruit infected with bacterial spot lesions. Yields were taken on August 25 by counting and weighing both green and red tomato fruit. Results were analysed using the Duncan’s multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Overall foliar disease control, comprising mainly of Early blight and Septoria leaf spot which are both fungal diseases, was obtained using BRAVO 500 or PENNCOZEB 75DG alone or in combination with KOCIDE 101. The addition of the surfactants NUFILM-17, SIL WETT, AG BALANCE or ASSISTOR did not improve the level of foliar disease control when combined with KOCIDE 101. The surfactant ASSISTOR or when combined with GARLIC OIL provided no foliar disease control in tomatoes at all. There were no significant differences amongst any of the treatments in reducing the foliar nor fruit symptoms caused by the bacterial disease Bacteria Spot. There were no treatment effects on tomato yields and so they were not reported.

Table 1. Foliar disease control ratings.

Treatments	Rate Product/ha	Bacterial Cluster cts [1] July 17	Foliar disease ratings (0-10) [2] August 22	% of fruit showing bacterial spot lesions
KOCIDE 101	2.25 kg	16.8 ab*	7.3 b	27.5 a
BRAVO 500	2.8 L	25.5 ab	8.5 ab	23.8 a
KOCIDE 101 + BRAVO 500	2.25 kg 2.8 L	21.5 ab	9.1 a	25.3 a
KOCIDE 101 + PENNCOZEB 75DG	2.25 kg 2.25 kg	14.0 b	8.3 ab	21.5 a
NUFILM-17 + KOCIDE 101	1.17 L 2.25 kg	23.5 ab	7.4 b	23.8 a
SIL WETT + KOCIDE 101	0.1 % v/v 2.25 kg	16.8 ab	7.3 b	28.3 a
AG BALANCE + KOCIDE 101	10.0 L 2.25 kg	13.3 b	7.3 b	22.3 a
ASSISTOR	1.0 % v/v	18.8 ab	1.5 c	21.0 a
ASSISTOR + GARLIC OIL	1.0 % v/v 1.0 % v/v	28.3 a	2.3 c	24.5 a
ASSISTOR + KOCIDE 101	1.0 % v/v 2.25 kg	11.5 b	7.3 b	29.8 a
CONTROL		22.8 ab	1.3 c	22.0 a
ANOVA P#0.05		s	s	ns
Coefficient of Variation (%)		43.5	14.9	

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Bacterial Disease Cluster Counts - the number of bacterial disease clusters counted per length of row. The higher the number the greater numbers of disease sites and the less effective the treatment.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TOMATOES - FOLIAR DISEASES - BACTERIAL

TITLE: **TIMING OF COPPER FOR THE CONTROL OF BACTERIAL SPOT IN TOMATOES**

CROP: Field Tomatoes cv. Heinz 9901
PEST: Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye
Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes

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MATERIALS: KOCIDE 101 (50% copper hydroxide), BRAVO 500 (chlorothalonil).

METHODS: Tomatoes were transplanted in single, twin-row plots, 8 m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. The transplants, H9901, were obtained from a greenhouse grower who reported considerable bacterial spot on the foliage of the plants. We were able to retrieve some of these tomato transplants just prior to the seedling lot being destroyed. Seedlings were transplanted using a commercial transplanter on May 30, 2000. In addition the plots were inoculated with a culture of Bacterial spot obtained through the AAFC laboratory in London, Dr. Diane Cuppels. Plots were sprayed with a 10^{6} bacterial cells/ml suspension on June 13. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture. Treatment 1 had 3 sprays applied prior to flowering on June 19, 26 and July 4 and one just after flowering on July 19. The second treatment was sprayed after flowering on July 19, August 7 and 14. Foliar disease assessments were made on July 17 by counting the number of bacterial spot disease clusters observed on the tomato foliage, on August 5 and 25 by rating the amount of total disease, both fungal and bacterial on the foliage and on August 25 by counting the number of fruit infected with bacterial spot lesions. Yields were taken on August 18 by counting and weighing both green and red tomato fruit. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 and 2.

CONCLUSIONS: Even though the tomato transplants were visually infected with bacterial spot at the time of transplanting the progress of the disease was minimized early in the season and by the first bacterial disease rating on July 17, very little bacterial disease symptoms were detected. The bacterial diseases became more evident later on as the weather became warmer and wet resulting in significant bacterial lesions on the tomato fruit however the number of fruit showing bacterial lesions were not controlled by any of the treatments in this trial. The degree of the fungal diseases such as Early blight and Septoria came on later in the season and were assessed on August 5 and 25. Spraying only at the early portion of the season prior to flowering did not provide sufficient protection of the tomato foliage. The last three spray applications late in July and into August significantly controlled the foliar fungal diseases in this trial.

Yields were not significantly different.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product /ha	Spray Timing	Bacterial Cluster cts [1] July 17	Foliar disease ratings (0-10) [2] August 5	August 25	% of fruit showing bacterial spot lesions
KOCIDE 101 + BRAVO 500	2.25 kg 2.8 L	Up to Flowering	3.5 b*	4.8 b	3.0 c	47.0 a
KOCIDE 101 + BRAVO 500	2.25 kg 2.8 L	After Flowering	3.0 b	5.3 b	8.5 b	40.6 a
KOCIDE 101 + BRAVO 500	2.25 kg 2.8 L	Full Season	3.0 b	7.3 a	9.0 a	46.0 a
CONTROL			4.8 b	4.8 b	1.0 d	42.0 a
ANOVA P#0.05			ns	s	s	ns
Coefficient of Variation (%)				10.5	5.4	

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

1/ Bacterial Disease Cluster Counts - the number of bacterial disease clusters counted per length of row. The higher the number the greater numbers of disease sites and the less effective the treatment.

2/ Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TOMATOES - FOLIAR DISEASES - BACTERIAL

TITLE: **CONTROL OF FOLIAR DISEASES IN PROCESSING TOMATOES USING REZIST**

CROP: Field Tomatoes cv. Heinz 9553
PEST: Bacterial Spot, *Xanthomonas campestris pv. vesicatoria*, Dye
Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes

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MATERIALS: REZIST (2% Zinc, 2% Manganese, 2% Copper - all with polyamines, salicylic acid, nitrogen and cytokinin mimics)

METHODS: Tomatoes were transplanted in single, twin-row plots, 8 m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. Seedlings were transplanted using a commercial transplanter on May 16, 2000. The recommendation from the supplier was to apply REZIST only once either before or even after the onset of disease. The foliar application was therefore applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200L/ha of spray mixture on July 14. Foliar disease assessments were made on August 5 and 25 by rating the foliage for damage caused by either fungal or bacterial diseases and by counting the number of fruit with bacterial spot lesions at harvest. Yields were taken on August 29 by counting and weighing both green and red tomato fruit. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Late Blight. The disease was noted around August 18. The season had been cooler than normal with little to no Early Blight and Septoria Leaf Spot.

Data are presented in Table 1.

CONCLUSIONS: The occurrence of Late Blight showing up on tomatoes on the research farm in Ridgetown is rare. This is the first time in 25 years that this level of Late Blight severity has been observed. The disease was noticed on August 18 and within a week had spread evenly throughout the entire plot.

REZIST was ineffective in controlling either the bacterial diseases or the foliar fungal diseases in this trial.

Table 1. Foliar and fruit disease control ratings and yield.

Treatments	Rate Product /ha	Foliar disease ratings (0-10) [1] August 5	August 25	% of fruit showing bacterial spot lesions	Total Yields kg per plot
REZIST	2.5 L	5.6 a*	2.1 a	28.3 a	34.9 a
CONTROL		5.4 a	1.9 a	23.6 a	36.0 a
ANOVA P#0.05		ns	ns	ns	ns
Coefficient of Variation (%)					

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TOMATOES - COLORADO POTATO BEETLES

TITLE: **EFFECTIVENESS OF ACTARA AND THIAMETHOXAM SC FOR THE CONTROL OF COLORADO POTATO BEETLES, APHID AND FLEA BEETLES IN PROCESSING TOMATOES**

CROP: Tomato: Field A - H9553 and Field B - H9413
PEST: Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say)

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MATERIALS: ACTARA 25WG (thiamethoxam), Thiamethoxam 240 SC (thiamethoxam), ADMIRE 240F(imidacloprid).

METHODS: Two fields were established, one on the research farm at Ridgetown College - Field A and the other on a commercial site near Leamington - Field B. Tomatoes were transplanted in three twin-row plots, 8m in length with rows spaced 1.65m apart, replicated four times in a randomized complete block design. Seedlings were transplanted using a commercial transplanter on May 25, 2000 at Field A and June 7 in Field B. Treatments were applied either by dipping a tray of tomato transplants into a solution of treatment for 15 minutes (DIP), in the transplant water (TWT) at the time of transplanting or in a BAND over the row immediately after transplanting. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two nozzled hand-held boom applying 200 L/ha of spray mixture on July 12 at both sites. Assessments taken by counting the number of small and large CPB larvae per plot on June 19 and July 11 as well as on the day prior to spraying on July 11and 3 days after spraying on July 15. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in table 1.

CONCLUSIONS: The numbers of insects attacking tomatoes were extremely low at both test locations. Relative control assessments could not be made.

Table 1. Colorado potato beetle larval counts.

Treatments	Rate Product /ha	Application [1/]	Insect Larvae Counts/Plot Prior to Spraying		3 Days after Spraying	
			July 11 small larvae	July 11 large larvae	July 15 small larvae	July 15 large larvae
ACTARA 25WG	104 g	FOL				
ACTARA 25WG	210 g	FOL				
Thiamethoxam 240 SC	3.4 ml/100m	BAND				
Thiamethoxam 240 SC	6.3 ml/100m	BAND				
Thiamethoxam 240 SC	3.4 ml	TWT	NO	INSECT	COUNTS	AVAILABLE
Thiamethoxam 240 SC	6.3 ml	TWT				
Thiamethoxam 240 SC	1.0 ml/L	DIP				
ADMIRE 240 F	200 ml	FOL				
ADMIRE 240 F	10.0 ml/100m	BAND				
ADMIRE 240 F	10.0 ml	TWT				
ADMIRE 240 F	1.0 ml/L	DIP				
Control						
ANOVA P#0.05			ns	ns	ns	ns
Coefficient of Variation (%)						

*****These values are the means of four replications. Numbers within a column followed by the same letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/]FOL - Foliar
BAND - Banded over transplants immediately after planting
TWT - Transplant water treatment
DIP - Tray dip

STINK BUGS

Dr. Ron Pitblado
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Various species of stink bugs occur throughout the tomato-growing areas of Canada. Until recently, they have not been considered seriously as pests. However, recent changes in cultivar selection and cultural practices have enhanced stink bug presence and their damage to tomato fruits.
Stink bugs have a wide host range, which includes alfalfa, cereals, soybean, bean, pea, tomato, and many weeds.

Damage: As weedy areas dry out or mature during the summer, stink bugs move into tomato fields, presumably in search of their liquid diet. Consequently, damage to tomato fruit is often limited to the edge of the field nearest weedy areas. The piercing-sucking mouthparts of the stink bug adults and nymphs inflict damage to the surface of the tomato fruit, causing development of cloudy yellow blotches just below the skin of the fruit as a result of enzymes injected by the feeding insect. Surface depressions also can form at the feeding sites. Stink bug feeding causes fruit distortion and defects, such as peel “tags” remaining on the fruit and a yellow blemish in the tomato flesh. As fruits enlarge, sites of early feeding expand and may rupture the thin epidermis over the wound, permitting entry of secondary organisms. Increase in sorting costs or rejection of the entire load at the factory may result from stink bug injury to tomato fruit. Losses can be significant for the wholepack and fresh-market industries.

Identification: Stink bugs (family Pentatomide) are 10 to 15 mm long and vary in colour from green to brown. Their wings are folded flat over the abdomen with the membranous outer haves of the wings directed toward the rear of the body. The adults have pointed “shoulders” on the front part (pronotum) of the thorax. Nymphs are similar in appearance but lack fully developed wings and the pronotum is not as pointed.

Life History: Stink bugs overwinter as adults in protected areas, such as fencerows, ditches, windbreaks or other areas where plant litter is abundant. In early spring, when temperatures reach 21C or above, the adults become active. They feed initially on weeds. A single female may lay an average of 30 egg clusters during a month or more. Each egg cluster may contain 300 to 500 eggs. The nymphs hatch within a week and develop through five instars. The adult stage is attained after about six weeks. Repeat generations occurs at five-to-six week intervals during the summer. Adults and nymphs spend much of their time deep within the plant canopy and, at times, slightly below ground. Adults move out of weedy areas in search of moisture in tomato fruits, especially during dry summers.

Management

Cultural practices - Stink bug damage has increased with the introduction of programs that include conservation tillage, extensive use of cover crops, and preventative practices to control wind erosion. These practices inadvertently favour stink bugs by increasing the availability of hosts and hiding places. Tomato cultivars that have an extensive foliage cover can be damaged severely. Increased damage during relatively dry years suggests a greater and earlier dispersal from the weed hosts to secondary, crop hosts. Growers are advised to eliminate weedy patches near field edges.

Chemical control - Treatment thresholds and reliable sampling methods have not been developed for stink bugs on tomatoes, so growers are wise to adopt a conservative approach in countering stink bug damage. Morever, a proportion of some stink bug populations usually remains either on or in the soil where spray coverage is poor, resulting in inadequate control. Chemical insecticides normally would be applied in the latter part of July but may not be economical for an entire acreage. Spray applications, if necessary, should be directed around the field borders.

TRIAL - 2000

In the 2000 trial year there was an effort to monitor a field of tomatoes in the Dresden area where stink bug damage had been occurring for several years. Cooperation from Bill Thomas of Thomas Canning (Maidstone) Ltd. and Keith and Brain Broad, growers allowed for the inspection of several fields. Keith and Brian Broad had in the past sprayed the insecticide AMBUSH for stink bug control around July 11 for the earlier tomato cultivars when the fruits were sizing and not until July 22 for the later maturing cultivars. Seldom do they ever see the insects but do see the yellow blemish damage as a result of stink bug infestations. I suggested that this indicates to me they are spraying early enough as they were not seeing the holes in the fruit but spray coverage may be a problem. They spray with a boom sprayer at a low volume of 25 gal/A.

Dr. Jim Dick, Manager, Agricultural Research for Nabisco Ltd. has been following this increase in stink bugs in the Dresden area and provided the following abstract also suggesting that spray coverage is key to the control of this pest. In fact in the presentation that follows the author indicated that stink bugs were found “in the lower half of the canopy”, thus requiring special attention to spray volumes.

HIGH VOLUME APPLICATIONS TO IMPROVE CANOPY PENETRATION AND EFFICACY OF REDUCED RISK INSECTICIDES IN PROCESSING TOMATOES.

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The potential for high volume application of reduced risk insecticides to improve efficacy of these materials in processing tomatoes, *Lycopersicon esculentum* Miller, was assessed. Restrictions and potential cancellations of organophosphate insecticides are anticipated as a result of the 1996 US Food Quality Protection Act. Regulatory constraints will mandate reduced risk control options for tomato insect pests commonly treated with organophosphates, yet reduced risk insecticides applied at standard volumes have consistently failed to provide effective field control in tomatoes. Lack of canopy coverage is a plausible explanation for poor field control since efficacy of reduced risk materials is dependent upon contract activity with minimal residual effect. Treatments consisted of horticultural mineral oil applications using hollow, flat fan and air assisted hollow cone nozzles at 283, 568, 1135 and 1700 L/ha, respectively (or its equivalent 25, 50, 100, 150 gals/A).

Three 5.1 x 7.6 cm ^{2} water-sensitive dye cards per plant, positioned in top, inner and bottom canopy locations, were used to assess canopy coverage by treatment in a completely randomized block design. Water volume was statistically significant for improved canopy coverage at all three card positions, with 1135 - 1700 L/ha (100 - 150 gals/A) providing the best coverage. Nozzle type was significant for improved canopy coverage at top and inner positions, and marginally significant at the bottom position. Hollow cone nozzles without air assist provided the best coverage at all three card positions. Overall, interactions between water volume and nozzle type were not significant. Results of this study can be used to increase field efficacy of reduced risk insecticides by improving canopy penetration. This knowledge will allow growers to consider costs and benefits of targeting inner canopy and soil level insect pests with high volume applications.

<u>SUMMER 2000</u>

The tomato fields in Dresden belonging to Keith and Brain Broad were inspected 4 times during the summer to determine if a relationship between weather variables could be established. As indicated in the above abstract spray water volume is extremely important however timing of these insecticides is also critical for effective control. The expectation was to relate the observation of stink bugs to temperature or other weather variable using the closest weather station owned and operated by the Ontario Weather Network (OWN). The expectation was that as the season progressed and the weather turned dryer the stink bugs would migrate from their natural weed hosts which tends to dry down during the summer toward the more succulent tomato crop. This year Dresden experienced considerable rainfall in June and July and negated the conditions favourable toward stink bug attack.

TOMATOES - SOIL AMENDMENTS

TITLE: **EVALUATION OF THE BENEFITS OF SOIL AMENDMENTS IN THE GROWTH AND PRODUCTIVITY OF PROCESSING TOMATOES**

CROP: Field Tomatoes cv. Heinz 9553
PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout; Septoria Leaf Spot, *Septoria lycopersici*, Speg.; Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes
Bacterial Spot, Xanthomonas *campestris pv. vesicatoria* (Doidge) Dye
Bacterial Speck, Pseudomonas syringae pv. Tomato (Okabe) Young, Dye & Willis

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MATERIALS: Spent mushroom compost - Kingsville Mushrooms Ltd., Kingsville, Ontario

METHODS: Spent mushroom compost was spread onto a field (Range A6) at Ridgetown College that had shown signs of reduced yields. The analysis in the spring of 2000 indicated that it was low in organic matter, Table 2. Plots were staked out in a 4 replicate block design, Diagram 1, each plot area being 30m x 20m in size with compost being applied to half of each replicate (15m x 20m). Fifteen manure spreader loaders each containing 1600 kg of spent mushroom compost were spread onto the surface equating to a rate of 200 t/ha and disced into the soil on April 26, 2000. The entire field, including where the spent mushroom compost had been applied, was fertilized using 240 kg/ha of 46-0-0 and 125 kg/ha of 0-46-0 on May 10. Tomatoes were transplanted on May 17 in 6 twin row plots, 14 m in length with rows spaced 1.65 m apart using a commercial transplanter. A cover spray of the insecticide MATADOR at 120 ml/ha was applied on June 16 and July 13 for the control of Colorado potato beetles and a fungicide, QUADRIS for the control of foliar and fruit diseases in tomatoes on June 23, July 11 and 31.Plots were assessed by visually rating the plants for vigour on June 15, July 2, 17 and August 8. Tomato yields were taken separating the green immature fruit from the red harvestable fruit on September 18.Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1, 2, and Graph 1.

CONCLUSIONS: There was an almost immediate reaction to the application of spent mushroom compost. The tomatoes were more vigorous, both flowering earlier and filling in the rows much sooner. This effect was recorded in June and lasted throughout the summer. Harvestable tomato yields (red fruit) were significantly higher almost doubling the tomato yields. The effect was startling indicating the benefits of spent mushroom compost to assist in the sustainability of the tomato crop on "tired" soils.

It was noticed there were considerably fewer weeds in the spent mushroom plot area.

Table 1. Plant vigour ratings and tomato yields.

Treatments	Plant Vigour Ratings (0-10)[1/] June 15	July 2	July 17	Aug. 8	Yield, September 18 Reds kg/4m	Greens kg/4m	Total kg/4m
Spring Applied Spent Mushroom Compost	9.0 a*	9.8 a	9.9 a	9.9 a	44.2 a	0.9 a	52.7 a
Control	6.9 b	6.3 b	7.5 b	6.3 b	22.7 b	0.4 a	29.0 b
ANOVA P#0.05	s	s	s	s	s	ns	s
Coefficient of Variation (%)	2.2	8.8	4.7	4.4	17.2		12.6

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Plant Vigour Ratings (0-10) - 0, extremely poor growth, foliage severely damaged; 10, healthy vigorous plant growth

Graph 1. Layout of plots in Range A6

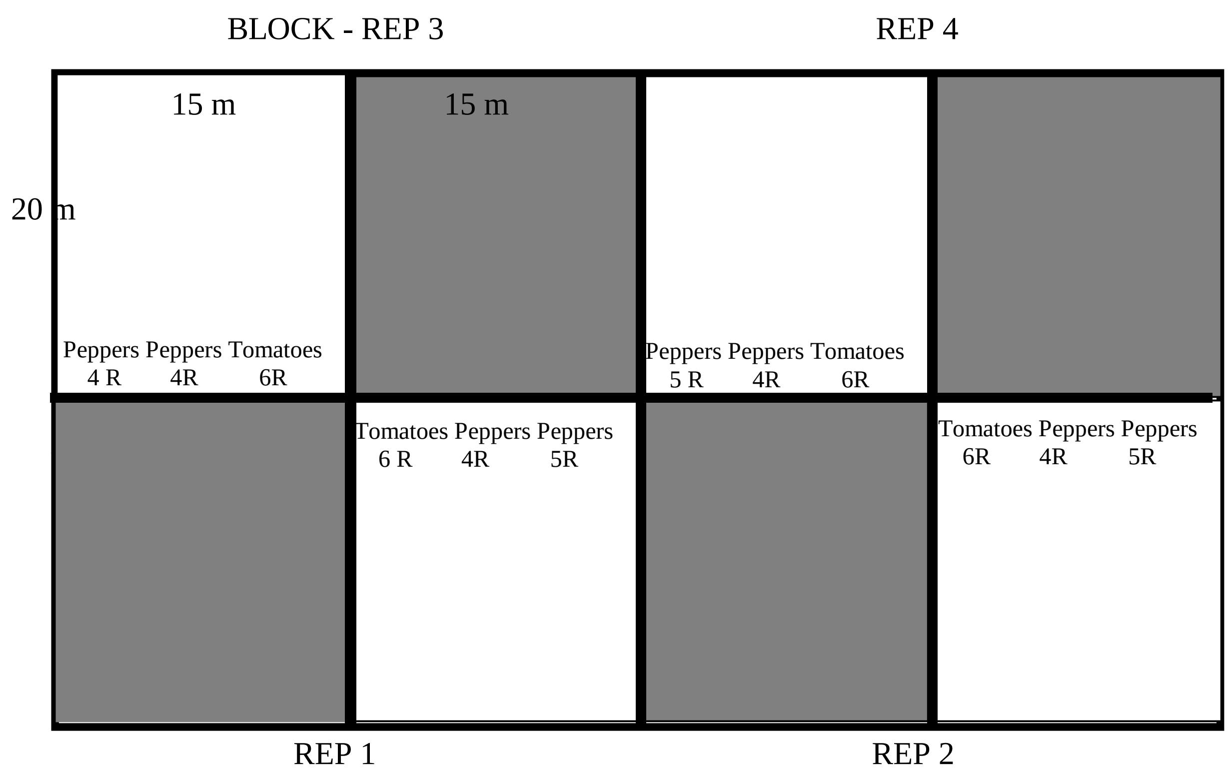

Table 2. Soil test results taken in the spring of 2000.

Field Site	% Organic Matter	Phosphorous Bicarb P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	CEC
Range A6	1.5	43.0	229	80	700	6.6	9.6
Range A4	1.2	39.0	148	60	510	6.9	4.6
Range A5	2.3	43.0	324	90	1000	6.5	12.6

Field Site	Sulfur S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Saturation P %	K/Mg Ratio
Range A6	7.0	28.5	37.5	100.0	1.8	12.0	0.87
Range A4	2.0	23.0	27.0	87.0	1.5	15.0	0.76
Range A5	12.0	31.0	43.0	107.0	2.3	12.0	1.10

TOMATO ES - PACHLOBUTRAZOL

TURF - DOLLAR SPOT

TITLE: **CONTROL OF DOLLAR SPOT WITH EAGLE WSP 40WP - 2000**

CROP: Bentgrass, cv Penncross
PEST: Dollar Spot, *Sclerotinia homeocarpa* F.T. Bennett

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MATERIALS: DACONIL 2787 F (chlorothalonil), EAGLE WSP 40WP (myclobutanil + mancozeb).

METHODS: A research bentgrass green located at Ridgetown College was allowed to become naturally infected with Dollar Spot. Three trials were conducted by applying the fungicides and evaluating the degree and length of control for several weeks after application. Fungicides were applied for Trial a on August 1, for Trial b on August 10 and for Trial c on August 31, 2000, in a curative management practice. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a two-nozzled hand-held boom, applying 200 L/ha of spray mixture. The plot size was 4 m by 1 m, replicated 4 times in a randomized complete block design. Assessments were made by visually rating the level of recovery compared to the untreated area on 3-4 day intervals. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Both fungicides EAGLE WSP 40WP and DACONIL 2787F applied alone or tank mixed together effectively controlled dollar spot in bentgrass turf. In trial a, both EAGLE WSP 40WP and the combination with DACONIL 2787F were able to keep the green almost free of dollar spot disease symptoms for longer than 24 days. In Trial b, the fungicides were not applied until August 10 when the incidence of dollar spot was considerable prior to the fungicides being applied. It took close to 11 days before the dollar spot was able to be controlled with both treatments providing equal levels of disease control. However in Trial c, where the fungicides were delayed even further to August 31, with considerable levels of dollar spot disease, recovery of the turf was not accomplished with the two products applied alone but only when tank mixed. The tank mix application of EAGLE WSP 40WP + DACONIL 2787F applied to a severely diseased green was able to control dollar spot over a 14 to 21 day period after which the persistence of control began to decline.

Table 1. Control of Dollar Spot in turf

Trial a. Fungicides applied on August 1.

Treatment	Rate Product /100m	Visual Disease Ratings (0-10)[1/] August 1	3	7	10	14	17	21	24
EAGLE WSP 40WP	20.0 g	7.0 a*	7.5 a	8.8 a	9.0 a	9.0 a	8.5 a	8.8 a	8.5 a
EAGLE WSP 40WP + DACONIL 2787F	20.0 g 95.0 ml	7.0 a	7.3 ab	8.0 a	8.5 a	8.8 a	8.8 a	8.8 a	8.5 a
CONTROL		7.0 a	6.8 b	5.0 b	2.5 b	2.0 b	3.5 b	1.8 b	1.8 b
ANOVA P#0.05		ns	s	s	s	s	s	s	s
Coefficient of Variation (%)			5.2	6.1	13.2	14.9	21.9	10.4	10.3

Trial b. Fungicides applied on August 10.

Treatment	Rate Product /100m	Visual Disease Ratings (0-10)[1/] August 10	14	17	21	24	September 13
EAGLE WSP 40WP	20.0 g	1.3 a*	1.5 a	4.3 a	8.5 a	8.5 a	4.3 b
EAGLE WSP 40WP + DACONIL 2787F	20.0 g 95.0 ml	2.0 a	1.8 a	5.3 a	7.8 a	8.0 a	7.0 a
CONTROL		1.8 a	1.8 a	1.5 b	1.3 b	1.5 b	1.0 c
ANOVA P#0.05		ns	ns	s	s	s	s
Coefficient of Variation (%)				19.8	10.3	9.6	13.5

Trial c. Fungicides applied on August 31.

Treatment	Rate Product /100m	Visual Disease Ratings (0-10)[1/] August 31	September 7	14	21	28
EAGLE WSP 40WP	20.0 g	2.0 a*	4.3 b	5.5 b	5.3 c	5.8 b
EAGLE WSP 40WP + DACONIL 2787F	20.0 g 95.0 ml	2.0 a	6.0 a	7.8 a	8.3 a	7.5 a
DACONIL 2787F	95.0 ml	2.0 a	4.3 b	6.0 b	6.5 b	6.0 b
CONTROL		2.0 a	1.8 c	1.0 c	2.3 d	3.5 c
ANOVA P#0.05		ns	s	s	s	s
Coefficient of Variation (%)			10.3	14.8	12.8	9.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Visual Disease Ratings (0-10) - 0, no recovery, no control, turf foliage severely damaged; 10, maximum recovery, complete control.