2001
INSECT AND DISEASE MANAGEMENT

PROCESSING VEGETABLES

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

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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, Jennifer Martens and Joal Sikkema. 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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Dr. Ron Pitblado
Ridgetown College University of Guelph

URMULE
The registration submission to PMRA for the use of KOCIDE 101 in the greenhouse for the control of bacterial diseases was finally granted.

FUNGAL DISEASES
EVALUATION OF BRAVO ULTREX VS BRAVO 500F AND QUADRIS 250SC FOR THE CONTROL OF EARLY BLIGHT, SEPTORIA AND ANTHRACNOSE IN FIELD TOMATOES

Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

BRAVO 500F alone or applied every other spray with QUADRIS 250SC provided outstanding control of foliar and fruit diseases affecting field tomatoes. BRAVO ULTREX 82.5DG was also an effective fungicide treatment for tomatoes but was not as effective as the BRAVO 500F formulation. All treatments controlled anthracnose with the higher rates of QUADRIS alternated with BRAVO 500F reducing the anthracnose numbers to the lowest counts.

CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES - Trial 1.

The fungicide combination AMSF187 15WG + AMS21618 250SC provided outstanding control of the tomato foliar diseases. The addition of the surfactant AGRAL 90 did not improve this combination treatments overall disease control. FLINT 50WG was less effective in controlling foliar diseases as noted on September 15 although quite effective nevertheless. FLINT 50WG reduced the % anthracnose numbers lowest of all the treatments especially at the higher rate.

CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES - Trial 2.

Although all of the treatments tested proved to be effective fungicides for disease control in field tomatoes the fungicide combination AMSF187 15WG + AMS21618 250SC provided the most consistent control throughout the season. The addition of the surfactant AGRAL 90 did not improve this combination treatments overall foliar disease control however the % Anthracnose counts were lower with the addition of AGRAL 90. Although not statistically different the lower rate of FLINT 50WG was numerically slightly less effective in controlling foliar diseases. The higher rate of FLINT 50WG reduced the % anthracnose numbers equal to BRAVO ULTREX 82.5WG and the combination fungicide treatment AMSF187 15WG + AMS21618 250SC including the surfactant AGRAL 90.

EVALUATION OF TANOS AS A FUNGICIDE FOR USE IN FIELD TOMATOES

Weather conditions mid way through the season were fairly dry, delaying disease development until late into August. The two chlorothalonil formulations, BRAVO ULTREX 82.5DG and BRAVO 500F effectively controlled the level of foliar fungal diseases throughout the entire season as well as reduced the fruit rot caused by anthracnose. MANZATE 200 DF was relatively ineffective in controlling both foliar fungal diseases, although clearly more effective than the non sprayed plot, as well as being ineffective in controlling fruit anthracnose late in the season. The addition of TANOS 50% WG, at either of the two rates tested following the initial two MANZATE 200 DF sprays, did not improve either the foliar fungal disease control or did it reduce the level of anthracnose control beyond the level controlled by MANZATE 200 DF applied alone.

EFFECT OF HEADLINE 250EC AND CABRIO 20WG FOR THE CONTROL OF TOMATO FOLIAR AND FRUIT DISEASES

Many growers are no longer following a 7-day fungicide spray program which significantly increases the number of sprays often extending the spray timing depending on the weather conditions. Many follow the spray guidelines of the weather timed spray program called TomCast.

A seven-day spray schedule of HEADLINE 250EC, BRAVO 500 and the combination BRAVO 500 + CABRIO 20WG were the most effective treatments for the control of foliar fungal diseases in field tomatoes. Control of these same diseases using CABRIO 20WG alone was slightly less, however still at a very high commercial level of disease control. Both HEADLINE 250EC and CABRIO 20WG effectively controlled the fruit disease anthracnose.

EFFECT OF FOLIAR APPLICATIONS OF AMMONIUM LIGNOSULFONATE AND POTASSIUM PHOSPHATE FOR THE CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES

KOCIDE 101 provided the highest level of foliar fungal disease control however the combination of ALS + Acetic acid also proved to be as effective. ALS (ammonium lignosulfonate) and potassium phosphate provided moderate disease control while Actigard 50WG, Neem oil and fish emulsions were significantly less effective in controlling tomato foliage diseases. There was little difference between the treatments for the control of fruit anthracnose with KOCIDE 101 providing the least amount of anthracnose control.

BACTERIAL AND FUNGICIDAL EVALUATION FOR THE CONTROL OF FOLIAR AND FRUIT DISEASES IN FIELD TOMATOES

BRAVO ULTREX 82.5DG + KOCIDE 101, PENNCOZEB 75DG with or without Cuprofix 20% and DITHANE DF NT + KOCIDE 101 provided the highest level of fungal disease control. KOCIDE 101 was more effective in controlling fungal diseases than Cuprofix 20% while non of the Systemic Acquire Resistance products including Alexin, Messenger nor Resist were very effective in controlling fungal diseases in tomatoes. The weather conditions mid season was extremely dry, conditions that did not allow for the build up of bacterial diseases.

BACTERIAL DISEASES

TIMING OF KOCIDE 101 APPLICATIONS IN TOMATO PLUG TRANSPLANTS

KOCIDE 101 applied at the cotyledon and first true leaf stage of seedling plug plants had no significant adverse effects on tomato transplants even when sprayed up to 9 applications prior to transplanting. The multiple applications of KOCIDE 101 did increase the greenness of the seedling foliage.

A SIMPLE TEST TO DETERMINE WHETHER OR NOT SEEDS HAVE BEEN TREATED

The use of a simple test to identify whether or not tomato or pepper seeds were treated with either acid (HCL) or chlorine would be extremely useful for this industry. One hundred and thirty-five (135) seed samples, a combination of tomato and pepper seeds were collected from seedling greenhouses at the end of March 2001 to determine the effectiveness of these seed assay tests. The test for chlorine treated seeds was very good while the acid test appeared to give both false positives and negatives. The test required a judgment on the intensity of the colour change. Seeds with ratings above 3 would indicate a strong possibility of having been acid treated while seeds having a rating of 1 may be indicating the natural acids found on seeds. Also the low acid reading may be the result of being absorbed onto the seed pellet material which becomes problematic for this test. It was interesting that some seeds must have been both acid and chlorine treated while many others may not have been treated at all.

PACLOBUTRAZOL

CONTROL OF BACTERIAL SPECK APPLIED TO SEEDLING TOMATO PLUG PLANTS USING ACTIGARD AND PACLOBUTRAZOL AND THE SUBSEQUENT EFFECTS IN THE FIELD

Plant heights in the greenhouse were kept within a range of 1-2 cm through cultural activities so that each treatment could be transplanted in the filed all at one time. There was a significant increase in plant weight when paclobutrazol was applied and a loss in plant weight when Actigard was applied. There appears to be a significant phytotoxic reaction when Actigard is applied to seedling tomatoes. The addition of paclobutrazol was able to make up for the phyto effect of the Actigard treatment. The application of paclobutrazol to seedling tomatoes increased the number of flowers observed earlier in the season. The slight phyto effect of Actigard remained after transplanting at least into June 20-25 as the plants taken from the field showed a lower fresh and dry weight than the untreated control. Paclobutrazol on the other hand significantly increased the fresh and dry weight of all four tomato cultivars. A506 also had a safening effect of Actigard although not nearly to the degree that paclobutrazol provided. Actigard was not able to reduce either the fruit anthracnose fungal disease or the nutritional disorder blossom end rot. Plants treated with paclobutrazol appeared to have more blossom end rot a point suggesting that the plants were growing very fast during the period of drought observed in southwest Ontario this growing season. Actigard was able however to reduce the number of bacterial speck lesions on the foliage compared to the untreated control. The addition of A506 did not improve the level of control of bacterial speck however as mentioned A506 appears to safen the adverse phyto effect that Actigard has on tomato transplants. An interesting observation not anticipated was the remarkably high level of bacterial control when paclobutrazol was added to Actigard. Paclobutrazol applied alone had no substantial effect on reducing the number of bacterial speck populations or disease lesion however when combined with Actigard, it not only increased the safeness of Actigard reducing its apparent phyto effect on tomato plants but also improved the level of bacterial speck control in field tomatoes.

EFFECT OF PACLOBUTRAZOL TREATED PLUG TRANSPLANTS ON THE ESTABLISHMENT AND YIELD OF FIELD TOMATOES

There were no differences in plant establishment, i.e., plant stand counts however there was a significant difference in plant vigour between treatments. Paclobutrazol treated transplants applied at the two leaf stage in the greenhouse had a significant benefit improving the plant vigour in all three tomato cultivars N1069, CC337 and Peto 696 in the field throughout the summer. There were also significant differences observed, although not to the extent noted with paclobutrazol, with T22, the beneficial antagonistic fungi, Trichoderma, later in the season in tomato cultivar CC337 and with earlier benefits in Peto 696. The improved plant vigour ratings using paclobutrazol continued to show higher and earlier numbers of flowers, higher fresh and dry plant weights, significant advancement in fruit maturity and higher tomato yields. Although not statistically different there appeared to be a consistent trend across all three tomato cultivars with an increase in the number of fruit with blossom end rot when treated with paclobutrazol. This shows a significant difference in the rate of plant growth in a year that was extremely dry, conditions that favour blossom end rot in fast growing plants.

COLORADO POTATO BEETLES

USE OF CALYPSO FOR THE CONTROL OF TOMATO INSECTS

CALYPSO 480SC, at both rates tested, along with the commercial standard, ADMIRE 240F, effectively controlled the populations of Colorado potato beetles in field tomatoes. There were no significant differences in insect control amongst the sprayed treatments however all were significantly different in providing Colorado potato beetle control when compared to the non-sprayed control.

SOIL AMENDMENTS

RESIDUAL BENEFITS OF A SINGLE YEAR'S APPLICATION OF SOIL AMENDMENTS (COMPOST) IN THE GROWTH AND PRODUCTIVITY OF PROCESSING TOMATOES

Even after a year, the residual effect of applying spent mushroom compost to soil that was considered in "poor health" showed remarkable advantage in tomato growth. Unfortunately the summer of 2001 was extremely dry with the consequence that tomato yields were extremely low in this light soil. The increase in blossom end rot in the spent compost treatment is as much of a reflection of greater growth in those plots.

ALEXIN & NUTRAPLUS

THE EFFECT OF ALEXIN ON THE GROWTH AND DISEASE SUPPRESSION IN FIELD TOMATOES

Foliar applications of Alexin delayed the maturity of tomatoes resulting with fewer red fruits on the assessment day of August 29. It has been noted that many of the Systemic Acquired Resistant (SAR) products set back plant growth and are now being tested with fewer applications and in combination with products that promote plant growth.

THE EFFECT OF NUTRAPLUS ON THE VIGOUR AND YIELD OF PROCESSING TOMATOES

The benefits of foliar applications of NutraPlus could only be observed with multiple applications. Plant vigour was significantly improved.

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 SUMMARY RESULTS

THE DEVELOPMENT OF PEST MANAGEMENT STRATEGIES FOR INSECTS AND PLANT DISEASES IN PROCESSING VEGETABLES - 2001.

Dr. Ron Pitblado
Ridgetown College, University of Guelph

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BROCCOLI

BLACK ROT CONTROL IN COLE CROPS USING SAR PRODUCTS

Four days after the broccoli seedlings were sprayed with the treatments, the plants showed smaller leaf appearances with the paclobutrazol treatments. The foliage 10 days after treatment of Actigard turned slightly yellow, while the non treated control seedlings began to grow spindly while all of the other treatments where greener and sturdier with shortened plant heights. The treatments containing Alexin and Acadian with paclobutrazol looked the healthiest with the greatest plant vigour. Paclobutrazol controlled the height of seedling and transplant broccoli plants both in the greenhouse and in the field. The addition of Alexin to paclobutrazol improved the root fresh wts at the seedling stage while improving the plant vigour and plant height ratings throughout the summer. Actigard 50WG resulted in a slight phytotoxic effect reducing the seedling root fresh weight however this early negative effect was short lived with improved broccoli yields compared to the control. At the time of transplanting the combination of Paclobutrazol + Actigard 50WG were the shortest in plant height however the plants recovered quickly once in the field with higher yields by the end of the season compared to the untreated control.

CABBAGE

CONTROL OF CABBAGE INSECTS

Only RH-2485 240F + Companion, at the rate of 0.3L product/ha + 0.1%v/v, provided equal control to the very effective commercial insecticide DECIS 5.0EC for the control of cabbage foliar feeding insects. It was noted however there was a lag of several days for RH-2485 240F + Companion to reach the high level of control observed almost immediately with DECIS 5.0EC. Once that control was present it remained throughout the season providing equal insect control to that of DECIS 5.0EC. The addition of the surfactant Companion under this years weather conditions of hot and dry, significantly improved insect control. The higher rate of RH-2485 240F was more effective than the medium and lower rates however not as effective as the medium rate with the addition of the surfactant Companion. Confirm 240F provided good initial control but was less effective than either the higher rate of RH-2485 240F or the medium rate of RH-2485 240F with the surfactant Companion. Although there were significant differences in insect control amongst the various treatments as outline all were significantly better than the non-sprayed control.

CONTROL OF CABBAGE FOLIAR INSECTS USING AGRIBAC Btk MATERIALS

AGRIBAC 48 LC at the higher application rate of 1500 ml product/ha provided the highest level of foliar insect control in cabbage. This was followed by AGRIBAC 64 ES, AGRIBAC 2X WDG then AGRIBAC 2X WP. All of these Btk materials were equal or better than the standard Bt material DIPEL WP. The level of control in this years trials were less than expected possibly due to the dry, hot and sunny summer.

CONTROL OF CABBAGE INSECTS & DISEASE USING MESSENGER

Messenger applied to the foliage of cabbage was not able to induce any sort of insect control. Messenger was ineffective in controlling foliar insects in cabbage. The incidence of cabbage foliage disease was low with no ratings recorded.

EFFECT OF ALEXIN ON INSECT & DISEASE IN CABBAGE
Alexin, when applied to the foliage of cabbage was not able to induce any sort of insect control. Dipel WP was effective in controlling foliar insects in cabbage but the level of insect control was not significantly improved with the addition of Alexin. The incidence of cabbage foliage disease was low with no ratings recorded.

PEPPERS

RESISTANCE LEVELS TO BACTERIAL SPOT IN PEPPER CULTIVARS
The range of resistance to bacterial spot in peppers is listed in order from high to low resistance levels found in this year's pepper cultivar test. The number of new pepper cultivars having levels of resistance to bacterial spot is improving. BOYNTON BELL, SPP8124, PR 99 Y-3 and ORION were highly resistant to bacterial spot. They were followed by SPP6112, MASTER 714 and PRESIDENTE which showed moderate levels of spot resistance. BELL KING AND HMX 0644 appeared to be very susceptible to bacterial spot.

RESIDUAL BENEFITS OF A SINGLE YEAR'S APPLICATION OF SOIL AMENDMENTS (COMPOST)IN THE GROWTH AND PRODUCTIVITY OF PEPPERS
Even after a year, the residual effect of applying spent mushroom compost to soil that was considered in "poor health" showed remarkable advantage in pepper growth and yield. The number of leaves were increased, the plant vigour was even more pronounced this season than in the previous season and the number of fruit produced this year was highly significant. Due to the dry year the fruit numbers did not increase yields as the plot area was severely drought stricken.

SWEET CORN

CONTROL OF LEAF RUST AND EUROPEAN CORN BORER IN SWEET CORN USING COMBINATIONS OF TILT AND MATADOR
TILT 250E proved to be an effective rust control fungicide when properly timed as was MATADOR 120EC an effective European corn borer insecticide when properly timed. The weather condition during this trial period was considered extremely dry being not conducive to disease development resulting in the decision to apply the fungicide timed treatments only once on August 7. However greater rust control was observed in treatment 4,when the fungicide TILT 250E was applied twice in late July, 23 and 31 as a combination treatment with MATADOR 120EC and timed for corn borer control. Early applications were apparently needed for effective rust control than perceived. The timing and application of MATADOR 120EC proved very effective for the control of European corn borer. The timing considered necessary for insect control with MATADOR 120Ec proved not only effective for European corn borer control but also proved effective for rust control. If the timing was left up to an application for leaf rust control alone most often, the application of the fungicide would be too late. There were no phytotoxicity effects noted during the season with the tank mix treatments of TILT 250E plus MATADOR 120EC.

CONTROL OF LEAF RUST AND EUROPEAN CORN BORER IN SWEET CORN USING COMBINATIONS OF TILT AND WARRIOR
TILT 250E showed to be an effective rust control fungicide when properly timed. Due to the dry weather conditions the number of TILT 250E applications considered necessary were only on August 21 and September 4. The results clearly showed however that treatments with 4 applications rather than the 2 prescribed necessary significantly reduced leaf rust to a higher level. Apparently the two earlier sprays on August 13 and 21 increased the level of rust control with TILT 250E. The level of insect control with WARRIOR 122 CS, especially for Corn Earworm control, was lower than expected. There were no phytotoxicity effects noted during the season with the tank mix treatments of TILT 250E plus WARRIOR 122 CS.

CONTROL OF LEAF RUST IN SWEET CORN
QUADRIS 250SC provided the highest level of sweet corn rust control in this trial. Although both TOPAS 250E and TILT 250E contain the same active ingredient, propiconazole, the disease control ratings suggest that TOPAS 250E proved more effective in reducing the amount of rust disease in sweet corn than TILT 250E. FOLICUR 3.6F did not provide a high level of rust control but it was significantly better than the untreated control and both of the

BRAVO formulations. BRAVO 500F and BRAVO ULTREX 82.5 DG was ineffective in controlling leaf rust in sweet corn this season, although both provided a measure of disease control over the untreated control.

EFFECT OF HEADLINE 250EC FOR THE CONTROL OF LEAF RUST ON SWEET CORN

HEADLINE 250EC provided higher levels of leaf rust control for a longer period of time than did BRAVO 500F. There was a gradient in leaf rust control as the rate of HEADLINE 250EC was increased with rates of 0.6L product/ha and above proving effective.

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

Populations of flea beetles were not noticed until late July and in low numbers. Thus, the resultant infection of Stewart's Wilt were minimal with no differences noted between seed treatments. However early in the season there were considerable numbers of thrips which caused noticeable leaf scaring and assessments were taken as there appeared to be an effect between the seed treatments tested. The addition of MAXIUM XL provided excellent disease control at the seedling stage as the number of total emergence counts on June 14 was substantially higher than the untreated control. Although at the time of assessment, when the numbers of thrips counted were no different amongst the treatments, there was a significant difference in thrips damage ratings. All seed treatments were able to reduce the numbers of thrips feeding scars on sweet corn.

SQUASH

EFFECTIVENESS OF NOVA 40WP FOR THE CONTROL OF POWDERY MILDEW IN SQUASH

Under severe powdery mildew pressures late in the season, BRAVO 500 provided longer residual disease control than NOVA 40WP. On the earlier September 1 rating, a rate response with NOVA 40WP was observed with the highest rate of 350 g product/ha being most effective. The level of control after the last spray on September 6 showed a higher level of powdery mildew control with BRAVO 500.

PMR REPORT # **SECTION B: INSECTS of VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

CROP: Broccoli, cv. Windsor
PEST: Black rot, *Xanthomonas campestris pv. campestris* (Pammel) Dowson

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TITLE: **BLACK ROT CONTROL IN COLE CROPS USING SAR PRODUCTS**

MATERIALS: Bonzi 4EC (paclobutrazol), Actigard 50WG (acibenzolar-S-methyl), Alexin (SAR), Acadian (SAR - seaweed extract).

METHODS: Broccoli was sprayed at the two leaf stage in the greenhouse in plug trays on June 19. Materials were applied just to runoff at 100 ml of spray solution per tray, two 200 cell trays per treatment. Transplants were planted in single-rows 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 July 3, 2001. Assessments were taken by rating plant growth (heights) and vigour both while in the greenhouse and in the field, above ground and root fresh weights at time of transplanting on July 3, and yield. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Tables 1-3.

Four days after the broccoli seedlings were sprayed with the treatments, the plants showed smaller leaf appearances with the paclobutrazol treatments. The foliage 10 days after treatment of Actigard turned slightly yellow, while the nontreated control seedlings began to grow spindly while all of the other treatments where greener and sturdier with shortened plant heights. The treatments containing Alexin and Acadian with paclobutrazol looked the healthiest with the greatest plant vigour.

CONCLUSIONS: Paclobutrazol controlled the height of seedling and transplant broccoli plants both in the greenhouse and in the field. The addition of Alexin to paclobutrazol improved the root fresh wts at the seedling stage while improving the plant vigour and plant height ratings throughout the summer. Actigard 50WG resulted in a slight phytotoxic effect reducing the seedling root fresh weight however this early negative effect was short lived with improved broccoli yields compared to the control. At the time of transplanting the combination of Paclobutrazol + Actigard 50WG were the shortest in plant height however the plants recovered quickly once in the field with higher yields by the end of the season compared to the untreated control.

Table 1. Transplant evaluations at time of transplanting, July 3

Treatments	Rate Product	Plant Height (cm)	Plant Fresh Wts (kg)	Root Fresh Wts (kg)
Paclobutrazol	5 ppm	7.0 c*	0.78 b	1.46 ab
Paclobutrazol	2.5 ppm	7.8 bc	1.04 ab	1.23 abc
ACTIGARD 50WG	70 ppm	10.8 a	1.01 ab	0.88 c
Paclobutrazol + ACTIGARD 50WG	5 ppm 70 ppm	7.3 bc	1.01 ab	1.13 abc
Paclobutrazol + ACTIGARD 50WG	2.5 ppm 70 ppm	7.8 bc	0.97 b	1.19 abc
Paclobutrazol + Alexin	5 ppm 5,000 ppm	8.0 b	1.02 ab	1.60 a
Paclobutrazol + Acadian	5 ppm 5,000 ppm	8.0 b	0.97 b	1.26 abc
CONTROL		10.0 a	1.34 a	1.06 bc
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		6.4	21.2	23.5

* 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. Plant Vigour Ratings - in field

Treatments	Rate Product/ha	Plant Vigour Ratings (0-10)[1/] June 29	July 9	July 18	Aug. 10	Sept. 1
Paclobutrazol	5 ppm	7.0 d*	9.3 ab	7.8 a	6.5 d	7.5 c
Paclobutrazol	2.5 ppm	8.0 c	10.0 a	8.5 a	8.3 bc	8.3 bc
ACTIGARD 50WG	70 ppm	9.0 b	7.8 c	8.3 a	8.0 cd	7.8 c
Paclobutrazol + ACTIGARD 50WG	5 ppm 70 ppm	5.0 e	10.0 a	10.0 a	8.8 abc	8.5 bc
Paclobutrazol + ACTIGARD 50WG	2.5 ppm 70 ppm	5.0 e	10.0 a	9.0 a	8.5 abc	8.3 bc
Paclobutrazol + Alexin	5 ppm 5,000 ppm	8.0 c	9.8 a	8.8 a	10.0 a	10.0 a
Paclobutrazol + Acadian	5 ppm 5,000 ppm	8.0 c	9.5 ab	8.9 a	9.5 abc	8.6 bc
CONTROL		10.0 a	8.8 b	9.8 a	9.8 ab	9.1 ab
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		9.3	6.3	17.2	12.3	9.6

* 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/]Plant Vigour Ratings (0-10) - 0 short, stunted, yellowing; 10, tall, healthy.

Table 3. Plant heights and yield

Treatments	Rate Product/ha	Plant heights (cm) July 18	Plant heights (cm) Aug. 24	Yield (g) Sept. 5	wt/head Sept. 5	Yield (g) Aug. 20
Paclobutrazol	5 ppm	4.5 b*	34.3 b	0.18 a	0.05 b	1.92 b
Paclobutrazol	2.5 ppm	5.3 ab	36.3 ab	0.67 a	0.08 ab	2.80 ab
ACTIGARD 50WG	70 ppm	7.1 ab	38.0 ab	0.64 a	0.07 ab	3.83 a
Paclobutrazol + ACTIGARD 50WG	5 ppm 70 ppm	6.1 ab	39.8 ab	0.74 a	0.07 ab	2.84 ab
Paclobutrazol + ACTIGARD 50WG	2.5 ppm 70 ppm	7.7 a	35.8 ab	0.59 a	0.06 b	2.21 b
Paclobutrazol + Alexin	5 ppm 5,000 ppm	6.7 ab	39.3 ab	1.61 a	0.13 a	2.67 ab
Paclobutrazol + Acadian	5 ppm 5,000 ppm	6.7 ab	41.8 a	1.64 a	0.10 ab	2.71 ab
CONTROL		7.7 a	35.8 ab	1.07	0.07 ab	1.91 b
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		27.4	10.8	114.9	55.0	28.1

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

PMR REPORT # **SECTION B: INSECTS of VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

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

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TITLE: **CONTROL OF CABBAGE INSECTS - 2001**

MATERIALS: RH-2485 240F (methoxyfenozide), COMPANION (surfactant), CONFIRM 240F (tebufenozide), DECIS 5.0EC (deltamethrin).

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 June 7, 2001. 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 27, July 11, 17, 24, August 1 and 7. Assessments were taken by rating insect feeding damage per plot on July 9, 18, August 3 and 10. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Only RH-2485 240F + Companion, at the rate of 0.3L product/ha + 0.1%v/v, provided equal control to the very effective commercial insecticide DECIS 5.0EC for the control of cabbage foliar feeding insects. It was noted however there was a lag of several days for RH-2485 240F + Companion to reach the high level of control observed almost immediately with DECIS 5.0EC. Once that control was present it remained throughout the season providing equal insect control to that of DECIS 5.0EC. The addition of the surfactant Companion under this years weather conditions of hot and dry, significantly improved insect control. The higher rate of RH-2485 240F was more effective than the medium and lower rates however not as effective as the medium rate with the addition of the surfactant Companion. Confirm 240F provided good initial control but was less effective than either the higher rate of RH-2485 240F or the medium rate of RH-2485 240F with the surfactant Companion. Although there were significant differences in insect control amongst the various treatments as outline all were significantly better than the non-sprayed control.

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

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings: Feeding Damage (0-10)[1/] July 9	# of Feeding Sites July 18	Feeding Damage (0-10)[1/] July 18	# of Feeding Sites Aug. 3	Feeding Damage (0-10)[1/] Aug. 10
RH-2485 240F	0.15 L	5.0 d*	65.3 bc	4.0 d	91.3 ab	5.0 d
RH-2485 240F	0.30 L	6.6 c	68.8 bc	5.0 c	86.0 b	6.0 b
RH-2485 240F + Companion	0.3 L 0.1%v/v	7.3 bc	39.0 d	7.8 a	48.3 d	7.6 a
RH-2485 240F	0.60 L	7.0 bc	55.3 c	6.0 b	72.5 c	5.8 bc
Confirm 240F	0.60 L	8.0 b	70.8 b	6.5 b	88.8 b	5.4 cd
DECIS 5.0EC	0.20 L	9.3 a	19.5 e	8.4 a	40.5 d	7.6 a
CONTROL		4.0 e	90.0 a	3.5 d	99.0 a	3.0 e
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		9.7	14.9	8.8	8.0	6.1

* 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.

# of Feeding Sites = the higher the number the more damage and less effective the material.

PMR REPORT # **SECTION B: INSECTS of VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

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

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TITLE: CONTROL OF CABBAGE FOLIAR INSECTS USING AGRIBAC Btk MATERIALS - 2001

MATERIALS: AGRIBAC 2X WP, WDG, AGRIBAC 48 LC, AGRIBAC 64 ES (Bt experimental materials), DIPEL WP (*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 June 7, 2001. 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 27, July 4, 11, 17, 24, August 1 and 7. On July 4 there was a change in rate for treatment #3 AGRIBAC 2X WDG from 412 g product/ha to 1100 g product/ha and new product was used for this material thereafter. Assessments were taken by rating insect feeding damage per plot on July 9, 18, August 3 and 10. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: AGRIBAC 48 LC at the higher application rate of 1500 ml product/ha provided the highest level of foliar insect control in cabbage. This was followed by AGRIBAC 64 ES, AGRIBAC 2X WDG then AGRIBAC 2X WP. All of these Btk materials were equal or better than the standard Bt material DIPEL WP. The level of control in this years trials were less than expected possibly due to the dry, hot and sunny summer.

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

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings: Feeding Damage (0-10)[1/] July 9	# of Feeding Sites July 18	Feeding Damage (0-10)[1/] July 18	# of Feeding Sites Aug. 3	Vigour Ratings (0-10)[1/] Aug. 10
AGRIBAC 2X WP	412 g	5.5 e*	69.0 b	5.3 d	81.3 b	5.0 d
AGRIBAC 2X WP	550 g	6.0 de	66.0 bc	4.0 e	84.3 b	5.0 d
AGRIBAC 2X WDG	1100 g	7.0 c	69.3 b	6.0 c	89.5 b	5.0 d
AGRIBAC 2X WDG	550 g	8.3 a	57.8 cd	6.0 c	83.8 b	6.0 c
AGRIBAC 48 LC	1125 ml	6.8 cd	43.5 e	7.4 b	59.0 b	6.1 c
AGRIBAC 48 LC	1500 ml	7.3 bc	34.5 f	8.1 a	57.8 b	7.9 a
AGRIBAC 64 ES	885 ml	8.0 ab	57.5 cd	6.0 c	86.8 b	6.8 b
AGRIBAC 64 ES	1180 ml	7.0 c	53.3 d	7.0 b	84.5 b	5.3 d
DIPEL WP	550 g	7.5 abc	66.3 bc	5.0 d	87.0 b	5.0 d
CONTROL		5.3 e	85.5 a	3.0 f	172.3 a	2.8 e
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		7.7	5.7	6.8	53.8	5.3

* 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.

# of Feeding Sites = the higher the number the more damage and less effective the material.

[1/]/Vigour Ratings (0-10) - 0, poor growth, lots of feeding damage; 10, excellent foliage free of insect feeding.

PMR REPORT # **SECTION B: INSECTS of VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

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

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TITLE: **CONTROL OF CABBAGE INSECTS & DISEASE USING MESSENGER - 2001**

MATERIALS: Messenger (systemic acquired resistance, experimental)

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 June 7, 2001. 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 July 5, 11, 17, 24, August 1 and 7. Assessments were taken by rating insect feeding damage per plot on July 18, August 3 and 10. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Messenger applied to the foliage of cabbage was not able to induce any sort of insect control. Messenger was ineffective in controlling foliar insects in cabbage. The incidence of cabbage foliage disease was low with no ratings recorded.

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

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings # of Feeding Sites July 18	Feeding Damage (0-10)[1/] July 18	# of Feeding Sites Aug. 3	Feeding Damage (0-10)[1/] Aug. 10
Messenger	630 g	82.0 a*	3.0 a	95.8 a	3.0 a
CONTROL		85.5 a	3.0 a	98.8 a	3.0 a
ANOVA P#0.05		ns	ns	ns	ns
Coefficient of Variation (%)					

* 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.
# of Feeding Sites = the higher the number the more damage and less effective the material.

PMR REPORT # **SECTION B: INSECTS of VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

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

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TITLE: **EFFECT OF ALEXIN ON INSECT & DISEASE IN CABBAGE**

MATERIALS: Alexin (systemic acquired resistance, experimental), Dipel WP (*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 June 8, 2001. 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 29, July 5, 11, 17, 25, August 1 and 7. Assessments were taken by rating insect feeding damage per plot on July 18, and August 10. Results were analyzed using the Duncan's Multiple Range Test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Alexin, when applied to the foliage of cabbage was not able to induce any sort of insect control. Dipel WP was effective in controlling foliar insects in cabbage but the level of insect control was not significantly improved with the addition of Alexin. The incidence of cabbage foliage disease was low with no ratings recorded.

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

Treatments	Rate Product/ ha	Insect Foliage Damage Ratings		
		# of Feeding Sites	Feeding Damage (0-10)[1/]	Feeding Damage (0-10)[1/]
Alexin	4 L	74.8 a*	4.0 b	3.0 b
Alexin + Dipel WP	4 L 1.1 kg	60.3 b	6.3 a	7.0 a
CONTROL		70.5 a	4.0 b	3.0 b
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		8.4	10.5	9.9

* 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.
# of Feeding Sites = the higher the number the more damage and less effective the material.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

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

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TITLE: RESISTANCE LEVELS TO BACTERIAL SPOT IN PEPPER CULTIVARS

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 7, 2001. 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 20, 29, July 12 and August 23. Foliar disease assessments were made on August 20, 27, September 1, 15 and 29. 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., BOYNTON BELL, SPP8124, PR 99 Y-3 and ORION were highly resistant to bacterial spot. They were followed by SPP6112, MASTER 714 and PRESIDENTE which showed moderate levels of spot resistance. BELL KING AND HMX 0644 appeared to be very susceptible to bacterial spot.

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

Pepper Cultivars	Bacterial Disease Cluster Counts[1/]					
	Aug. 20	Aug. 27	Sept. 1	Sept 15	Sept. 29	Total Disease Cts
BOYNTON BELL	1.5 c*	0.8 ab	1.8 d	2.8 d	1.3 c	8.2
SPP8124	1.5 c	0.0 b	2.5 d	2.0 d	3.3 c	9.3
PR99Y-3	2.8 bc	0.8 ab	2.0 d	6.5 d	1.0 c	13.1
ORION	2.5 bc	0.5 b	4.0 d	6.5 d	4.0 c	17.5
SPP6112	1.5 c	0.8 ab	7.0 cd	17.5 cd	5.5 c	32.3
MASTER 714	7.3 abc	4.5 ab	13.0 ab	28.8 bcd	12.5 b	66.1
PRESIDENTE	11.3 abc	6.0 ab	11.5 bc	46.0 ab	15.3 b	90.1
BELL KING	16.0 a	8.0 a	18.3 a	38.8 abc	21.3 a	102.4
HMX 0644	13.5 ab	6.0 ab	11.0 bc	57.5 a	23.0 a	111.0
ANOVA P#0.05	s	s	s	s	s	
Coefficient of Variation (%)	108.1	145.9	45.9	74.9	33.8	

*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.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

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

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TITLE: **BACTERIAL AND FUNGICIDAL EVALUATION FOR THE CONTROL OF FOLIAR AND FRUIT DISEASES IN PEPPERS - 2001**

MATERIALS: Cuprofix 20% (TD 2389-01), PENNCOZEB 75DG (mancozeb), ALEXIN (SAR) MESSENGER (SAR) REZIST (SAR), KOCIDE 101 (copper hydroxide), BRAVO ULTREX 82.5DG (chlorothalonil), DITHANE DF NT (mancozeb)

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 31, 2001. 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 August 15. 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 20, 27, 29, July 4, 11, 17, 24, Aug. 1, 8, 15, 22, 29, Sept. 5, 12 and 18. Foliar disease assessments were taken on, August 5, 15, 25 and September 1. 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: Due to the dry weather the bacterial populations did not increase sufficiently to provide observable bacterial lesions for an effective comparisons between treatments.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

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

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TITLE: **EVALUATION OF TANOS 50%WG FOR BACTERIAL DISEASE CONTROL IN FIELD PEPPERS**

MATERIALS: TANOS 50%WG (experimental), KOCIDE 101 (50% copper hydroxide).

METHODS: Peppers were transplanted in single row plots, 6 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 31, 2001. 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 July 9 and August 15. 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 29, July 4, 11, 17, 25, Aug. 1, 8, 15 and 22. Foliar disease assessments were taken numerous times throughout the summer but due to the dry weather conditions bacterial disease did not develop. An assessment record was made on August 27. Results were analysed using the Duncan's multiple range test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Due to the dry summer conditions, bacterial spot did not develop in this trial and therefore no comparisons between spray materials could be made.

Table 1. Bacterial spot control results.

Treatments[1/]	Rate Product/ha	Foliar Bacterial Damage Ratings (0-10)[2/] August 27
TANOS 50% WG	0.56 kg	10.a *
KOCIDE 101	3.36 kg	8.3 a
TANOS 50% WG	0.84 kg	10.0 a
TANOS 50% WG + KOCIDE 101	0.56 kg + 3.36 kg	10.0 a
TANOS 50% WG + KOCIDE 101; KOCIDE 101	0.84 kg + 3.36 kg; 3.36 kg	10.0 a
CONTROL		10.0 a
ANOVA P#0.05		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/] Treatments, + = tank mixed, ; = alternate spray timing

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

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Peppers cv. Tam Veracruz

PEST: Bacterial Spot, Xanthomonas *campestris pv. vesicatoria* (Doidge) Dye

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TITLE: **RESIDUAL BENEFITS OF A SINGLE YEAR'S APPLICATION OF SOIL AMENDMENTS (COMPOST)IN THE GROWTH AND PRODUCTIVITY OF PEPPERS - 2001**

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

METHODS: Spent mushroom compost had been spread onto a field (Range A6) at Ridgetown College that had shown signs of reduced yields in the spring of 2000. The soil 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 in the previous year and again in the same location with no additional fertilizer or compost added in the spring of 2001 on May 31 in 4 row plots, 14 m in length with rows spaced 1.0 m apart using a commercial transplanter. Plots were assessed by counting the number of leaves per 5 plants on June 29, by visually rating the plants for vigour on July 9, August 2 and September1. Pepper yields were taken on August 23. 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: Even after a year, the residual effect of applying spent mushroom compost to soil that was considered in "poor health" showed remarkable advantage in pepper growth and yield. The number of leaves were increased, the plant vigour was even more pronounced this season than in the previous season and the number of fruit produced this year was highly significant. Due to the dry year the fruit numbers did not increase yield as the plot area was severely drought stricken.

Table 1. Plant vigour ratings and pepper yields one year after application of spent mushroom compost.

Treatments	Average # of Leaves per 5 plant sample	Plant Vigour Ratings (0-10)[1/]			Yield		Total Yield kg/plot
		July 9	Aug. 18	Sept. 1	# greens	# reds	
Spring Applied Spent Mushroom Compost	23.0 a*	10.0 a	7.0 a	8.0 a	205.0 b	42.0 a	2.52 a
Control	18.0 b	6.0 b	3.8 b	4.0 b	224.3 a	19.8 b	2.80 a
ANOVA P# 0.05	s	s	s	s	s	s	ns
Coefficient of Variation (%)	12.5	15.4	12.7	4.5	32.8	25.9	

*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/] 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

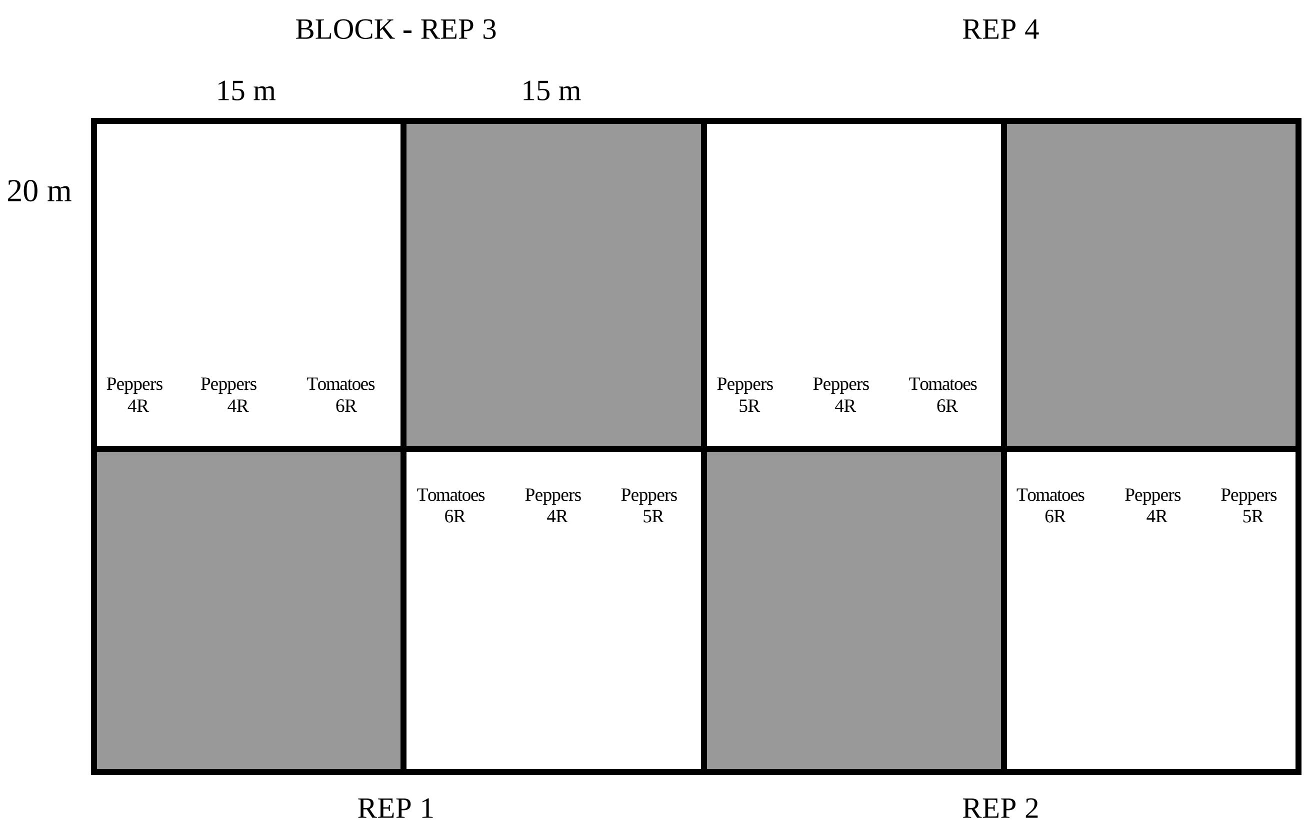

Table 2. Soil test results taken in the spring of 2000.

Field Site	% Organic Matter	Phosphorous Bicarb P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	CEC
Range A6	1.5	43	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

PMR REPORT # **SECTION C: POTATO INSECTS**
ICAR: 61006535

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

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TITLE: USE OF CALYPSO FOR THE CONTROL OF POTATO INSECTS

MATERIALS: ADMIRE 240FL (imidacloprid), CONFIDOR 200SL (experimental), CALYPSO 480SC (experimental), YRC2894 240 SL-OS (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 April 26, 2001. Foliar applications were applied to two of the three row plots 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 7, 21, 25 and July 2. The initial foliar spray applications were timed at 30% CPB egg hatch. The materials used for treatments 7&8, YRC2894 240 SL-OS were not received in time for all but the last spray application on July 2. No spray applications were made on June 7 to these plots, with the test products being substituted with an application of ADMIRE 240 FL at 200 ml product/ha for the second and third spray applications on June 21 and 25. Assessments were taken by counting the number of CPB larvae per plot (two sprayed rows) on June 20, 25, June 29, and July 5 and CPB adults on July 5, 11, and 18 and by foliage damage ratings caused by CPB and leafhopper feeding damage on July 9 and 18. Yields were taken from the two sprayed rows on August 2. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in tables 1 & 2.

CONCLUSIONS: CALYPSO 480SC provided the highest level of Colorado potato beetle (CPB) and leafhopper control of the products tested. The CPB larval counts on June 20 reflected the level of control from the initial spray date on June 7. CPB control was noted especially at the highest rate of CALYPSO 480SC tested. ADMIRE 240FL and CONFIDOR 200SL both significantly reduced the CPB populations compared to the untreated control but to a lesser extent than did CALYPSO 480SC. At this assessment period YRC2894 SL-OS had not yet been received nor sprayed resulting in CPB populations equal to the control plots. By the second assessment period the benefits of subsequent spray applications were apparent with again CALYPSO 480SC having the lowest CPB insect numbers counted with the other two insecticides, ADMIRE 240FL and CONFIDOR 200SL, showing much higher control levels than the earlier assessments, statistically equal to CALYPSO 480SC. The foliar damage ratings reflected the outstanding CPB control provided by CALYPSO 480SC, the effective control of ADMIRE 240FL and CONFIDOR 200SL but definitely less than CALYPSO 480SC and the eventual effectiveness of the YRC2894 240 SL-OS treated plots. Similarly CALYPSO 480SC proved to be the most effective product for the control of potato leafhoppers along with YRC2894 240 SL-OS. Both ADMIRE 240FL and CONFIDOR 200SL provided early leafhopper control but could not sustain leafhopper control throughout the summer. Yields were not significantly different however all of the insecticide treated plots showed higher numerical potato weights than the untreated control plots. The weather conditions during the spring were normal however it was followed by an extremely dry summer.

Table 1. Colorado potato beetle larval and adult counts.

Treatments	Rate Product ml/ha	Insect Larvae Counts/Plot				Adult Counts/Plot		
		June 20	37066	37070	37076	37076	37082	37089
ADMIRE 240FL	200	102.5 cd*	125.0 c	2.0 b	0.0 b	0.3 b	10.3 b	47.8 a
ADMIRE 240 FL	104	212.8 bc	10.5 c	3.8 b	0.3 b	0.5 b	17.3 b	29.8 ab
CONFIDOR 200SL	125	111.8 cd	8.0 c	2.8 b	0.0 b	0.0 b	11.5 b	42.8 a
CALYPSO 480SC	52	68.5 d	0.5 c	0.5 b	0.0 b	0.3 b	3.5 b	6.0 c
CALYPSO 480SC	78	28.3 d	0.3 c	0.0 b	0.0 b	0.5 b	2.5 b	2.0 c
CALYPSO 480SC	104	9.0 d	0.3 c	0.3 b	0.0 b	0.3 b	5.5 b	3.8 c
YRC2894 240 SL-OS	104	331.3 ab	412.5 b	3.8 b	0.0 b	2.5 b	5.3 b	4.3 c
YRC2894 240 SL-OS	156	320.0 ab	440.0 b	3.0 b	0.3 b	1.0 b	2.8 b	4.8 c
CONTROL		382.5 a	623.8 a	176.3 a	101.5 a	22.5 a	87.5 a	15.8 bc
ANOVA P#0.05		s	s	s	s	s	s	s
Coefficient of Variation (%)		50.9	68.5	58.9	224.7	184.6	66.9	80.5

***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 ml/ha	Foliar Damage Ratings (0-10)[1/] Colorado Potato Beetles		Leafhoppers		Yield kg/plot
		July 9	July 18	July 9	July 18	Aug. 2
ADMIRE 240FL	200	9.8 a*	8.0 b	8.0 bc	6.3 c	18.7 a
ADMIRE 240 FL	104	9.8 a	7.3 b	8.5 abc	5.3 d	19.0 a
CONFIDOR 200SL	125	10.0 a	7.5 b	7.5 c	5.0 d	16.0 a
CALYPSO 480SC	52	10.0 a	9.8 a	8.0 bc	4.5 de	16.5 a
CALYPSO 480SC	78	10.0 a	10.0 a	8.8 ab	9.0 ab	17.6 a
CALYPSO 480SC	104	10.0 a	10.0 a	9.3 a	9.3 a	19.0 a
YRC2894 240 SL-OS	104	7.5 b	10.0 a	8.3 abc	9.0 ab	17.6 a
YRC2894 240 SL-OS	156	6.5 c	9.5 a	7.8 bc	8.3 b	16.5 a
CONTROL		4.0 d	3.0 c	4.0 d	4.0 e	14.9 a
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		7.5	7.2	9.2	8.0	16.3

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

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Potatoes cv. Superior

PEST: Early Blight, *Alternaria solani* (Ell. & Mart.) L.R.Jones & Grout
Late Blight, *Phytophthora infestans* (Mont.) De Bary

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TITLE: **WEATHER-TIMED SPRAYING FOR THE CONTROL OF BLIGHT IN POTATOES**

MATERIALS: BRAVO ULTREX 82.5 WG (chlorothalonil).

METHODS: A commercial potato field in the Burford area managed by Wally Vanderstelt of Van Farms was monitored throughout the summer of 2001. The Ontario Weather Network group installed an ADCON weather station to record hourly temperature, leafwetness, relative humidity and rainfall. The weather station was placed in the potato field and the data was retrieved through telemetry data collection system to Ridgetown College. The weather information was sent to our cooperator in Holland where the data was put through their late blight model and emailed back the disease severity values. Dacom from Holland has been advising growers when to spray fungicides based on weather information for a number of years across Europe. The trial was established to apply fungicides on an area set aside by the grower and spayed based on the Dacom PlantPlus spray model. The grower would continue to spray according to his previous timing determinations.

RESULTS: Due to the dry weather during the summer, the conditions were not favourable for the infection of foliage fungal diseases and as a result there was no opportunity to compare the relative effectiveness of the grower's vs the modelled spray timings.

CONCLUSIONS: The potato grower applied 6 foliar sprays onto his crop for the control of foliage diseases based on his intuition of the need. The plot that was designated to be sprayed only when warranted, based on weather data and a spray model developed by Dacom a company in Holland, had no fungicide sprays applied as the weather conditions were extremely dry and the model did not reach a spray threshold anytime throughout the summer. The grower acknowledged that there were no disease symptoms in ether of the non sprayed research plot nor in his own commercial potato field. Using this model, the grower could have saved all 6 of the fungicides sprayed onto his crop.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

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

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TITLE: **FUNGICIDE EVALUATION FOR THE CONTROL OF POTATO FOLIAR DISEASES**

MATERIALS: CUPROFIX 20%(TD 2389-01), PENNCOZEB 75DG (mancozeb), BRAVO 500F and BRAVO ULTREX 82.5 WG (chlorothalonil).

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. Non-sprayed guard rows were planted on either side of the treated rows to establish uniform disease pressure. Potato seed-pieces were planted with a commercial planter on April 26, 2001. 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 20, 29 and July 9. Foliar disease assessments were made throughout the summer. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Due to the dry weather during the summer, the conditions were not favourable for the infection of foliage fungal diseases and as a result there was no opportunity to compare the relative effectiveness of the treatments.

PMR REPORT # **SECTION C: POTATO**
ICAR: 61006535

CROP: Potatoes cv. Superior

PEST: Potato Topkill

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TITLE: **EFFECTIVENESS OF DESICATE II 2S AS A POTATO DESICCANT**

MATERIALS: Desicate II 2S (experimental), Ammonium sulphate (fertilizer activator), LI 700 (surfactant), Reglone (diquat), Cuprofix 20% (TD 2389-01).

METHODS: The trial was conducted in a commercial potato field near Burford, Ontario. Due to the severe drought this past year a field that had been irrigated with the foliage remaining green was selected, however the timing of the top killing of the potatoes was considered earlier than normal. Most growers under the dry conditions this past year did not apply desiccants or top killing materials as the potato foliage began to collapse under the dry conditions as the season advanced. The decision to apply topkill products earlier than most growers had an influence on anticipated yields however the differences observed amongst treatments was felt to be indicative of their effectiveness regardless of when applied. Plots were created within the commercial field using 3 row per treatments, 7m in length with rows spaced 1m apart, replicated four times in a randomized complete block design. Foliar applications were applied to two of the three row plots 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 August 14 and 21. Assessments were taken by rating the degree of foliage "burn" or yellowing or desiccation of the foliage on August 17, 21, 24 and 28.Yields were taken from the two sprayed rows on August 28. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in table1.

CONCLUSIONS: Significant potato foliage topkilling took place with the initial spray application of Desicate II 2S + ammonium sulphate + LI 700. It appeared that the ammonium sulphate and not the Desicate II 2 product did most of the desiccation. There was little apparent immediate topkilling effect when Desicate II 2S was mixed with the bactericide/fungicide Cuprofix plus the surfactant LI 700. The application of Reglone on August 21 caused significant topkilling as observed 3 days later on August 24 and to a greater degree than the repeated application of Desicate II 2S + ammonium sulphate + LI 700. Yields were not significantly different amongst treatments under the moisture stress of this past season.

Table 1. Potato desiccation and yield.

Treatments	Rate Product /ha	Application Dates	Desiccation Ratings (0-10)[1] (kg/plot)				Yield
			Aug. 17	Aug. 21	Aug. 24	Aug. 28	37130
Desicate II 2S + Ammonium sulphate + LI 700	2.85 L 5.67 kg 1.44 L	Aug. 14 & 21	4.8 b*	4.0 a	5.8 c	4.0 a	6.0 a
Desicate II 2S + Cuprofix 20% + LI 700	2.85 L 6.80 kg 1.44 L	Aug. 14 & 21	8.8 a	8.4 b	8.6 b	8.6 b	5.5 a
Desicate II 2S + Ammonium sulphate + LI 700;	2.85 L 5.67 kg 1.44 L	Aug. 14	4.5 b	4.3 a	2.8 d	3.5 a	7.1 a
Reglone + LI 700	2.85 L 2.85 L	Aug. 21					
Desicate II 2S + Cuprofix 20% + LI 700;	2.85 L 6.80 kg 1.44 L	Aug. 14	8.8 a	8.5 b	2.6 d	2.8 a	5.5 a
Reglone + LI 700	1.44 L 1.44 L	Aug. 21					
CONTROL			9.0 a	9.0 b	9.5 a	9.2 c	6.5 a
ANOVA P#0.05			s	s	s	s	ns
Coefficient of Variation (%)			11.6	35.4	7.4	12.5	

*****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).

[1]/ Desiccation Ratings (0-10) ; 0 = completely defoliated, 10= foliage remains green and healthy.

PMR REPORT # **SECTION I: DISEASES of VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Sweet corn cv. Jubilee

PEST: Common Rust, *Puccinia sorghi* Schwein, European Corn Borer, *Ostrinia nubilalis* (L.)**,**

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TITLE: CONTROL OF LEAF RUST AND EUROPEAN CORN BORER IN SWEET CORN USING COMBINATIONS OF TILT AND MATADOR

MATERIALS: TILT 250E (propiconazole), MATADOR 120EC (lambda-cyhalothrin)**.**

METHODS: Sweet corn was planted on May 19, 2001, in four- row plots spaced 0.75 m apart on the campus farm. 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 a two-nozzled hand-held boom, applying 200 L/ha of spray mixture. Timing of spray applications were to coincide with the incidence of European corn borer insects for treatments 2 and 4 on July 23 and 30 and Aug. 7 and for leaf rust for treatments 1 and 3 on August 7. Assessments were conducted by rating the amount of foliar rust observed on August 24, and 28 and for European corn borer August 10 and 20. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: TILT 250E proved to be an effective rust control fungicide when properly timed as was MATADOR 120EC an effective European corn borer insecticide when properly timed. The weather conditions during this trial period was considered extremely dry being not conducive to disease development resulting in the decision to apply the fungicide timed treatments only once on August 7. However greater rust control was observed in treatment 4,when the fungicide TILT 250E was applied twice in late July, 23 and 31 as a combination treatment with MATADOR 120EC and timed for corn borer control. Early applications were apparently needed for effective rust control than perceived. The timing and application of MATADOR 120EC proved very effective for the control of European corn borer. The timing considered necessary for insect control with MATADOR 120Ec proved not only effective for European corn borer control but also proved effective for rust control. If the timing was left up to an application for leaf rust control alone most often the application of the fungicide would be too late.

There were no phytotoxicity effects noted during the season with the tank mix treatments of TILT 250E plus MATADOR 120EC.

Table 1. Common leaf rust disease and European corn borer control ratings in sweet corn - first planting, May 19

Treatments	Rate Product/ha	Foliar Rust Occurrence Ratings (0-18)[3/]		European Corn Borer (ECB) Ratings # Broken Tassels (2 rows)	European Corn Borer (ECB) Ratings # of ECB infected cobs/20
		August 24	August 28	August 10	August 20
TILT 250E [/1]	500 ml	5.5 bc*	14.8 ab	8.0 a	12.8 a
MATADOR 120EC [/2]	83 ml	9.0 ab	22.3 a	4.5 a	5.3 bc
TILT 250E + MATADOR 120EC [/1]	500 ml + 83 ml	7.7 abc	15.0 ab	6.0 a	10.3 ab
TILT 250E + MATADOR 120EC [/2]	500 ml + 83 ml	4.5 c	11.8 b	5.5 a	3.5 c
CONTROL		11.5 a	21.5 a	8.0 a	11.5 a
ANOVA P#0.05		s	s	ns	s
Coefficient of Variation (%)		33.7	36.2		44.0

[/1] Initial spray timing = to first incidence of disease
[/2] Initial spray timing = to first incidence of insects
[3/] Foliar Rust Occurrence Ratings (0-18)[3/]- 0, no rust lesions present; 18, foliage severely damaged, numerous rust lesions observed.
*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).

PMR REPORT # **SECTION I: DISEASES of VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Sweet corn cv. GSS 9377

PEST: Common Rust, *Puccinia sorghi* Schwein, European Corn Borer, *Ostrinia nubilalis* (L.)**,** Corn Earworm, *Helicoverpa zea* (Boddie)

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TITLE: **CONTROL OF LEAF RUST AND EUROPEAN CORN BORER IN SWEET CORN USING COMBINATIONS OF TILT AND WARRIOR**

MATERIALS: TILT 250E (propiconazole), WARRIOR 122 CS (lambda-cyhalothrin)

METHODS: Sweet corn was planted on June 27, 2001, in four- row plots spaced 0.75 m apart on the campus farm. 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 a two-nozzled hand-held boom, applying 200 L/ha of spray mixture. Timing of spray applications were to coincide with the incidence of European corn borer insects for treatments 2 and 4 on August 13, 21, 27 and September 6 and for leaf rust for treatments 1 and 3 on August 21 and September 4. Assessments were conducted by rating the amount of foliar rust observed on August 27, 28, September 11 and 15 while assessments for European corn borer and Earworm were taken on September 17. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table1.

CONCLUSIONS: TILT 250E showed to be an effective rust control fungicide when properly timed. Due to the dry weather conditions the number of TILT 250E applications considered necessary were only on August 21 and September 4. The results clearly showed however that treatments with 4 applications rather than the 2 prescribed necessary significantly reduced leaf rust to a higher level. Apparently the two earlier sprays on August 13 and 21 increased the level of rust control with TILT 250E. The level of insect control with WARRIOR 122 CS, especially for Corn Earworm control, was lower than expected.

There were no phytotoxicity effects noted during the season with the tank mix treatments of TILT 250E plus WARRIOR 122 CS.

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

Treatments	Rate Product/ha	Foliar Disease Ratings (0-10)[3/]	**Foliar Rust Occurrence Ratings (0-24)[4/]**			Insect Counts/ 20 cobs[/5] ECB	CEW	Total
		Aug. 27	**Aug. 28**	**Sept. 11**	Sept. 15	Sept. 17	Sept. 17	Sept. 17
TILT 250E [/1]	500 ml	8.3 ab*	16.3 ab	14.3 b	5.8 c	8.5 a	3.3 b	11.8 b
WARRIOR 122 CS[/2]	82 ml	7.0 b	20.8 a	18.3 ab	3.8 d	7.8 a	8.0 a	15.8 a
TILT 250E + WARRIOR 122 CS [/1]	500 ml + 82 ml	8.0 b	15.0 b	13.3 b	8.0 b	6.3 a	7.0 ab	13.3 ab
TILT 250E + WARRIOR 122CS [/2]	500 ml + 82 ml	9.5 a	3.3 c	4.3 c	9.3 a	7.3 a	8.7 a	16.0 a
CONTROL		7.8 b	20.5 a	20.3 a	2.5 e	5.8 a	5.0 ab	10.8 b
ANOVA P#0.05		s	s	s	s	ns	s	s
Coefficient of Variation (%)		10.3	18.5	22.2	6.8		39.51	15.7

[/1] Initial spray timing = to first incidence of disease
[/2] Initial spray timing = to first incidence of insects
[3/] Foliar Disease Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.
[4/] Foliar Rust Occurrence Ratings (0-24) 0, no rust lesions present; 24, foliage severely damaged, numerous rust lesions observed.
[/5] Insect Counts/ 20 cobs; ECB= number of European Corn Borer larvae per 20 cobs; CEW= number of Corn Earworms per 20 cobs per replicate.
*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)

PMR REPORT # **SECTION I: DISEASES of VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Sweet corn cv. GSS 9377

PEST: Common Rust, *Puccinia sorghi* Schwein

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

MATERIALS: BRAVO 500F (chlorothalonil), BRAVO ULTREX 82.5DG (chlorothalonil), TOPAS 250E (propiconazole), FOLICUR 3.6F (hexaconazole), QUADRIS 250SC (azoxystrobin), TILT 250E (propiconazole).

METHODS: Sweet corn was planted on June 27, 2001, in four- row plots spaced 0.75 m apart on the campus farm. 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 a two-nozzled hand-held boom, applying 200 L/ha of spray mixture. Spray applications were made on August 21, September 12 and 22. Assessments were conducted by rating the amount of foliar rust observed on August 24 and 28, September 15 and 29. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table1.

The early sweet corn season was extremely dry however rust lesions became noticeable near the end of the season. This trial was planted late in the season to increase the opportunity to assess the later arriving sweet corn rust observed in this geographical region.

CONCLUSIONS: QUADRIS 250SC provided the highest level of sweet corn rust control in this trial. Although both TOPAS 250E and TILT 250E contain the same active ingredient, propiconazole, the disease control ratings suggest that TOPAS 250E proved more effective in reducing the amount of rust disease in sweet corn than TILT 250E. FOLICUR 3.6F did not provide a high level of rust control but it was significantly better than the untreated control and both of the BRAVO formulations. BRAVO 500F and BRAVO ULTREX 82.5 DG was ineffective in controlling leaf rust in sweet corn this season, although both provided a measure of disease control over the untreated control.

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

Treatments	Rate Product/ha	Foliar Rust Occurrence Ratings (0-24)[1/]			Disease Control Ratings (0-10)[2/]	
		Aug. 24	Aug. 28	Sept. 15	Sept. 15	Sept. 29
BRAVO 500F	3.2 L	11.3 a*	21.8 a	18.8 ab	3.0 d	4.3 c
BRAVO ULTREX 82.5DG	1.9 L	8.8 a	19.5 ab	18.3 abc	3.5 d	4.3 c
TOPAS 250E	500 ml	9.8 a	14.8 c	15.0 bc	7.5 b	8.8 a
FOLICUR 3.6F	292 ml	10.3 a	16.0 bc	15.3 bc	6.5 c	6.5 b
QUADRIS 250SC	500 ml	3.8 b	5.0 d	6.0 d	9.1 a	9.3 a
TILT 250E	500 ml	11.3 a	14.3 c	14.5 c	6.1 c	6.0 b
CONTROL		11.5 a	21.5 a	20.5 a	2.5 d	2.3 d
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		19.9	17.6	15.8	11.8	10.6

*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 Rust Occurrence Ratings (0-24) 0, no rust lesions present; 24, foliage severely damaged, numerous rust lesions observed.

[2/] Disease Control Ratings (0-10); 0 no control, foliage severely infected with rust pustules; 10 - excellent control, foliage healthy with no rust lesions visible.

PMR REPORT # **SECTION I: DISEASES of VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Sweet corn cv. Jubilee

PEST: Common Rust, *Puccinia sorghi* Schwein

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TITLE: **EFFECT OF HEADLINE 250EC FOR THE CONTROL OF LEAF RUST ON SWEET CORN**

MATERIALS: HEADLINE 250EC (BAS 500), BRAVO 500F (chlorothalonil)**.**

METHODS: Sweet corn was planted on May 19, 2001, in four- row plots spaced 0.75 m apart on the campus farm. 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 a two-nozzled hand-held boom, applying 200 L/ha of spray mixture. Spray applications were made on August 7 and 16. Assessments were conducted by rating the amount of foliar rust observed on August 24 and 28. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table1.

The early sweet corn season was extremely dry however rust lesions became noticeable near the end of the planting maturity period

CONCLUSIONS: HEADLINE 250EC provided higher levels of leaf rust control for a longer period of time than did BRAVO 500F. There was a gradient in leaf rust control as the rate of HEADLINE 250EC was increased with rates of 0.6L product/ha and above proving effective.

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

Treatments	Rate Product/ha	Foliar Rust Occurrence Ratings (0-24)[1/]	
		Aug. 24	Aug. 28
HEADLINE 250EC	0.2 L	11.8 ab*	15.5 ab
HEADLINE 250EC	0.4 L	11.3 ab	9.8 bc
HEADLINE 250EC	0.6 L	7.8 bc	8.8 bc
HEADLINE 250EC	0.8 L	8.0 bc	8.8 bc
HEADLINE 250EC	1.6 L	4.0 c	3.8 c
BRAVO 500F	3.2 L	15.0 a	21.3 a
CONTROL		14.8 a	21.8 a
ANOVA P#0.05		s	s
Coefficient of Variation (%)		35.8	33.5

*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 Rust Occurrence Ratings (0-24) 0, no rust lesions present; 24, foliage severely damaged, numerous rust lesions observed.

PMR REPORT # **SECTION B: VEGETABLES and SPECIAL CROPS**
ICAR: 61006535

CROP: Sweet Corn, cv. GH 1861

PEST: Thrips, Corn Flea beetles (*Chaetocnema pulicaria* Melsheimer), Stewart's wilt (*Xanthomonas stewartii*)

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

MATERIALS: GAUCHO 480 (L0110-A1 - imidacloprid), GAUCHO 480 (G7014-02 - imidacloprid), AMS 600Fl (G7009-00 - clothianidin), MAXIM XL (L0281-A1 - fludioxonil + mefenoxam).

METHODS: Sweet corn was planted at the Ridgetown College research station on May 31, 2001, in four-row plots, 7 m in length, spaced 0.75 m apart, replicated four times in a randomized complete block design. Seeds were treated on May 15-16, fifteen days prior to planting, adding the treatments into a plastic bag containing a weighed amount of seed and mixing gently for excellent seed coverage. MAXIM XL was applied to all treatments except the control on May 15 and allowed to dry overnight. Treatments 2-4 were applied the next day allowing 3 hours to dry before being bagged for seeding. The seeding rate was 50 seeds in 8m of row, plots were shortened to 7m. Assessments were conducted by conducting plant emergence counts on June 14, thrip counts on July 9, plant vigour ratings on July 9 and flea beetle and Stewart's Wilt assessments throughout the growing season. Results were analyzed using the Duncan's Multiple Range Test (P#0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Populations of flea beetles were not noticed until late July and in low numbers. Thus the resultant infection of Stewart's Wilt were minimal 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 between the seed treatments tested.

The addition of MAXIUM XL provided excellent disease control at the seedling stage as the number of total emergence counts on June 14 were substantially higher than the untreated control. Although at the time of assessment, when the numbers of thrips counted were no different amongst the treatments, there was a significant difference in thrips damage ratings. All seed treatments were able to reduce the numbers of thrips feeding scars on sweet corn.

Table 1. Emergence counts, insect control and plant vigour ratings of seed treatments on sweet corn.

Treatments	Rate Product/100 kg seed	Total Emergence Counts (Per 2 rows) June 14	# plants/10 with Thrips July 9	Thrips Damage Ratings (0-10)[1] July 9
MAXIUM XL	11 ml	55.3 a*	4.1 a	7.0 a
MAXIUM XL + AMS 600Fl (G7009-00)	11 ml 417 ml	62.5 a	2.6 a	8.3 a
MAXIUM XL + GAUCHO 480 (G7014-02)	11 ml 521 ml	54.8 a	7.0 a	7.8 a
MAXIUM XL + GAUCHO 480 (L0110-A1)	11 ml 521 ml	56.8 a	7.0 a	7.3 a
CONTROL		26.8 b	6.5 a	3.5 b
ANOVA P#0.05		s	ns	s
Coefficient of Variation (%)		16.7		17.5

*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).

[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.

PMR REPORT # **SECTION I: DISEASES of VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

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

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TITLE: **EFFECTIVENESS OF NOVA 40WP FOR THE CONTROL OF POWDERY MILDEW IN SQUASH**

MATERIALS: NOVA 40WP (myclobutanil), BRAVO 500 (chlorothalonil)

METHODS: Squash was seeded on July 4, 2001, at the research station in Ridgetown. Plots were 2 rows, 7 m in length with row widths 2m apart, and replicated four times in a randomized complete 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 16, 27 and Sept.6. Assessments were taken by rating the severity and coverage of the powdery mildew in each plot on September 1, 15 and 29. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Under severe powdery mildew pressures late in the season, BRAVO 500 provided longer residual disease control than NOVA 40WP. On the earlier September 1 rating, a rate response with NOVA 40WP was observed with the highest rate of 350 g product/ha being most effective. The level of control after the last spray on September 6 showed a higher level of powdery mildew control with BRAVO 500.

Table 1. Powdery Mildew control ratings on the foliage of squash.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/]		
		Sept. 1	Sept. 15	Sept. 29
NOVA 40WP	88 g	8.8 b*	5.5 c	5.3 c
NOVA 40WP	175 g	8.8 b	5.5 c	7.0 b
NOVA 40WP	350 g	9.3 a	8.5 b	7.5 b
BRAVO 500	4800 ml	9.4 a	9.8 a	9.4 a
CONTROL		5.0 c	2.0 d	2.8 d
ANOVA P#0.05		s	s	s
Coefficient of Variation (%)		6.1	5.8	16.0

*These values are the means of four 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.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **EVALUATION OF BRAVO ULTREX VS BRAVO 500F AND QUADRIS 250SC FOR THE CONTROL OF EARLY BLIGHT, SEPTORIA AND ANTHRACNOSE IN FIELD TOMATOES**

MATERIALS: BRAVO ULTREX 82.5 DG and BRAVO 500 F (chlorothalonil), QUADRIS 250SC (azoxystrobin).

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 actually replanted after the initial planting on May 10 was damaged due to cool temperatures, using a commercial transplanter on May 31, 2001. 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 29, July 9, 19, 30, August 10, 20, 29 and September 7. Foliar disease assessments were made on August 24, September 15 and 29. 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 October 5. Results were analysed using the Duncan's multiple range test ($P \leq 0.05$).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

BRAVO 500F alone or applied every other spray with QUADRIS 250SC provided outstanding control of foliar and fruit diseases affecting field tomatoes. BRAVO ULTREX 82.5DG was also an effective fungicide treatment for tomatoes but was not as effective as the BRAVO 500F formulation. All treatments controlled anthracnose with the higher rates of QUADRIS alternated with BRAVO 500F reducing the anthracnose numbers to the lowest counts.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 24	Sept. 15	Sept. 29	% Anthracnose Oct. 5
BRAVO ULTREX 82.5 DG	1.5 kg	9.3 a*	8.3 a	7.9 a	14.8 b
BRAVO 500F	2.4 L	8.5 a	8.3 a	8.8 a	11.8 b
QUADRIS 250SC; BRAVO 500F	0.3 L 2.4 L	9.0 a	9.0 a	9.0 a	13.3 b
QUADRIS 250SC; BRAVO 500F	0.5 L 4.0 L	8.8 a	8.5 a	9.0 a	9.9 b
CONTROL		8.3 a	6.0 b	5.0 c	25.5 a
ANOVA $P \leq 0.05$		ns	s	s	s
Coefficient of Variation (%)			11.2	6.3	26.1

*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 ($P \leq 0.05$).
[1/]Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.
Treatments - treatments separated with a ";" indicate the applications were alternated throughout the season.

PMR REPORT # **SECTION C:** **VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES - Trial 1.**

MATERIALS: AMSF187 15WG, AMS21618 250SC, AGRAL 90 (surfactant), BRAVO ULTREX 82.5 WG (chlorothalonil), FLINT 50WG.

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 actually replanted after the initial planting on May 10 was damaged due to cool temperatures, using a commercial transplanter on May 31, 2001. 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 29, July 9, 19, 30, August 10, 20, 29 and September 7. Foliar disease assessments were made on August 24, September 15 and 29. 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 October 5. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

The fungicide combination AMSF187 15WG + AMS21618 250SC provided outstanding control of the tomato foliar diseases. The addition of the surfactant AGRAL 90 did not improve this combination treatments overall disease control. FLINT 50WG was less effective in controlling foliar diseases as noted on September 15 although quite effective never the less. FLINT 50WG reduced the % anthracnose numbers lowest of all the treatments especially at the higher rate.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/]			% Anthracnose
		Aug. 24	Sept. 15	Sept. 29	Oct. 5
AMSF187 15WG + AMS21618 250SC + AGRAL 90	0.267 kg 0.448 L 0.1% v/v	8.0 ab*	8.3 a	8.5 a	15.8 abc
AMSF187 15WG + AMS21618 250SC	0.267 kg 0.448 L	8.9 a	9.0 a	9.0 a	18.5 ab
BRAVO ULTREX 82.5WG	3.03 kg	7.4 b	8.8 a	9.0 a	18.0 ab
FLINT 50WG	0.21 kg	8.4 ab	7.0 b	8.5 a	10.8 bc
FLINT 50WG	0.28 kg	8.3 ab	7.3 b	8.1 a	8.0 c
CONTROL		7.6 b	5.0 c	5.0 b	22.5 a
ANOVA P#0.05		s	s	s	s
Coefficient of Variation (%)		8.3	8.2	7.9	32.2

*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.
Treatments - treatments separated with a "+" indicate the applications were tank mixed and applied at the same time.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES - Trial 2.**

MATERIALS: AMSF187 15WG, AMS21618 250SC, AGRAL 90 (surfactant), BRAVO ULTREX 82.5 WG (chlorothalonil), FLINT 50WG.

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 16, 2001. 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 29, July 9, 19, 30, August 10, 20, 29 and September 7. Foliar disease assessments were made on August 24, September 1, 15 and 29. 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 October 5. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

Although all of the treatments tested proved to be effective fungicides for disease control in field tomatoes the fungicide combination AMSF187 15WG + AMS21618 250SC provided the most consistent control throughout the season. The addition of the surfactant AGRAL 90 did not improve this combination treatments overall foliar disease control however the % Anthracnose counts were lower with the addition of AGRAL 90. Although not statistically different the lower rate of FLINT 50WG was numerically slightly less effective in controlling foliar diseases. The higher rate of FLINT 50WG reduced the % anthracnose numbers equal to BRAVO ULTREX 82.5WG and the combination fungicide treatment AMSF187 15WG + AMS21618 250SC including the surfactant AGRAL 90.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/]				% Anthracnose
		Aug. 24	Sept. 1	Sept. 15	Sept. 29	Oct. 5
AMSF187 15WG + AMS21618 250SC + AGRAL 90	0.267 kg 0.448 L 0.1% v/v	7.6 a*	8.0 a	7.8 a	8.3 a	4.5 bc
AMSF187 15WG + AMS21618 250SC	0.267 kg 0.448 L	8.1 a	9.3 a	7.3 a	8.3 a	12.1 a
BRAVO ULTREX 82.5WG	3.03 kg	7.9 a	8.0 a	6.8 ab	7.3 a	3.0 c
FLINT 50WG	0.21 kg	8.4 a	9.0 a	6.0 ab	7.3 a	7.0 abc
FLINT 50WG	0.28 kg	8.6 a	9.0 a	7.6 a	8.0 a	4.0 c
CONTROL		8.6 a	7.8 a	5.3 b	5.3 b	11.5 ab
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		15.5	20.4	15.8	11.3	62.8

*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.
Treatments - treatments separated with a "+" indicate the applications were tank mixed and applied at the same time.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **EVALUATION OF TANOS AS A FUNGICIDE FOR USE IN FIELD TOMATOES**

MATERIALS: TANOS 50%WG (experimental), MANZATE 200 DF (mancozeb), BRAVO ULTREX 82.5 DG and BRAVO 500 F (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 10, 2001. 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 29, July 9, 19, 30, August 10, 20, 29 and September 7. Foliar disease assessments were made on August 28, September 1 and 16. 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 12. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were fairly dry, delaying disease development until late into August. The two chlorothalonil formulations, BRAVO ULTREX 82.5DG and BRAVO 500F effectively controlled the level of foliar fungal diseases throughout the entire season as well as reduced the fruit rot caused by anthracnose. MANZATE 200 DF was relatively ineffective in controlling both foliar fungal diseases, although clearly more effective than the non sprayed plot, as well as being ineffective in controlling fruit anthracnose late in the season. The addition of TANOS 50% WG, at either of the two rates tested following the initial two MANZATE 200 DF sprays, did not improve either the foliar fungal disease control nor did it reduce the level of anthracnose control beyond the level controlled by MANZATE 200 DF applied alone.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Timing (#)of Application[1/]	Foliar Damage Ratings (0-10)[2/]			% Anthracnose
			Aug. 28	Sept. 1	Sept. 16	Sept. 12
MANZATE 200 DF ; TANOS 50% WG	2.24 kg; 0.56 kg	2 appl. 6 appl.	8.0 a*	8.0 b	6.8 b	16.0 bc
MANZATE 200DF ; TANOS 50% WG	2.24 kg; 0.84 kg	2 appl. 6 appl.	8.5 a	8.0 b	7.3 b	21.5 ab
BRAVO ULTREX 82.5DG	1.5 kg	8 appl.	9.4 a	9.5 a	8.8 a	8.0 c
MANZATE 200 DF	2.24 kg	8 appl.	8.6 a	6.8 b	7.3 b	30.3 a
BRAVO 500F	2.5 L	8 appl.	9.5 a	9.5 a	8.5 a	12.8 bc
CONTROL			5.0 b	3.8 c	2.5 c	21.6 ab
ANOVA P#0.05			s	s	s	s
Coefficient of Variation (%)			14.0	11.5	9.3	40.5

*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 on a 7 day spray schedule. Treatments 1 and 2; 2 consecutive applications of MANZATE 200 DF followed by 6 consecutive applications of TANOS 50% WG.

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

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909

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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TITLE: **EFFECT OF HEADLINE 250EC AND CABRIO 20WG FOR THE CONTROL OF TOMATO FOLIAR AND FRUIT DISEASES**

MATERIALS: HEADLINE 250EC (BAS 500), CABRIO 20WG (BAS 50002 F), 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 16, 2001. 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. Applications on a 7-day schedule were applied on June 29, July 5, 13, 20, 26, August 2, 10, 16, 23, 29, September 6, 14 and 22. Applications on a 14-day schedule were applied on June 29, 13, 26, August 10, 23, September 6 and 22. Foliar disease assessments were made on August 28, September 1, 15 and 29. 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 October 5. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

Many growers are no longer following a 7-day fungicide spray program which significantly increases the number of sprays often extending the spray timing depending on the weather conditions. Many follow the spray guidelines of the weather timed spray program called TomCast.

A seven-day spray schedule of HEADLINE 250EC, BRAVO 500 and the combination BRAVO 500 + CABRIO 20WG were the most effective treatments for the control of foliar fungal diseases in field tomatoes. Control of these same diseases using CABRIO 20WG alone was slightly less, however still at a very high commercial level of disease control. Both HEADLINE 250EC and CABRIO 20WG effectively controlled the fruit disease anthracnose.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/]				% Anthracnose
		Aug. 28	Sept. 1	Sept. 15	Sept. 29	Oct. 5
HEADLINE 250 EC - 7 day	0.44 L	9.5 a*	10.0 a	8.3 a	9.4 a	2.0 b
CABRIO 20WG - 7 day	0.55 kg	9.4 a	9.8 a	8.0 a	8.0 b	2.5 b
CABRIO 20WG - 7 day	0.80 kg	9.9 a	10.0 a	8.8 a	8.1 b	1.3 b
CABRIO 20WG - 14 day	0.80 kg	9.6 a	10.0 a	8.5 a	8.5 ab	4.5 b
CABRIO 20WG - 14 day	1.10 kg	9.6 a	9.8 a	8.0 a	8.0 b	4.8 b
CABRIO 20WG; BRAVO 500 - 7 day	0.80 kg 3.8 L	9.3 a	10.0 a	8.0 a	8.8 ab	1.5 b
BRAVO 50- 7 day	3.8 L	9.9 a	10.0 a	9.0 a	9.4 a	2.8 b
CONTROL		8.0 b	6.8 b	4.5 b	3.5 c	14.0 a
ANOVA P#0.05		s	s	s	s	s
Coefficient of Variation (%)		11.1	11.1	10.6	9.9	110.0

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

Treatments - 7 vs 14 day spray intervals - treatments separated with a ";" indicate the applications were alternated from one to the other throughout the season.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **EFFECT OF FOLIAR APPLICATIONS OF AMMONIUM LIGNOSULFONATE AND POTASSIUM PHOSPHATE FOR THE CONTROL OF FUNGAL DISEASES IN FIELD TOMATOES**

MATERIALS: ACTIGARD 50WG (acibenzolar-S-methyl), AMMONIUM LIGNOSULFONATE - ALS, ACETIC ACID, POTASSIUM PHOSPHATE, NEEM OIL, FISH EMULSIONS, KOCIDE 101 (copper hydroxide)

METHODS: Tomatoes were transplanted in single, twin-row plots, 7m 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 24, 2001. 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 20, 27, July 4, 11, 17, 25, August 1, 8, 15, 22, 29, September 5 and 12. Foliar disease assessments were made on September 1, 15 and 29. 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 October 5. Results were analysed using the Duncan's multiple range test ($P \leq 0.05$).

RESULTS: The predominant foliar disease was Septoria Leaf Spot and then Early Blight. Data are presented in Table 1.

CONCLUSIONS: Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September. The number of fungicide spray applications were actually increased due to the trial protocol fixed scheduled spray program so that the treatment differences could be evaluated under conditions favourable for disease development.

KOCIDE 101 provided the highest level of foliar fungal disease control however the combination of ALS + Acetic acid also proved to be as effective. ALS (ammonium lignosulfonate) and potassium phosphate provided moderate disease control while Actigard 50WG, Neem oil and fish emulsions were significantly less effective in controlling tomato foliage diseases. There was little difference between the treatments for the control of fruit anthracnose with KOCIDE 101 providing the least amount of anthracnose control.

Table 1. Foliar and fruit disease control ratings.

Treatments	Rate Product	Foliar Damage Ratings (0-10)[1/] Sept. 1	Sept. 15	Sept. 29	% Anthracnose Oct. 5
ACTIGARD 50WG	70 ppm	9.8 a*	6.3 bc	6.8 cd	12.0 b
ALS	2% v/v	9.9 a	8.3 ab	7.1 bcd	15.0 b
ALS	4% v/v	9.8 a	8.0 ab	7.3 bcd	15.4 ab
ALS + ACETIC ACID	2% v/v 0.05% v/v	9.1 a	7.8 ab	9.0 a	14.8 b
POTASSIUM PHOSPHATE	25 ppm	10.0 a	8.6 ab	7.8 abc	13.0 b
POTASSIUM PHOSPHATE + ACTIGARD 50WG	25 ppm 70 ppm	9.8 a	6.5 bc	8.3 ab	14.0 b
POTASSIUM PHOSPHATE + ALS	25 ppm 2% v/v	9.5 a	7.5 abc	6.1 de	13.3 b
NEEM OIL	0.5% v/v	9.8 a	9.0 a	6.6 cd	15.4 ab
FISH EMULSIONS	0.5% v/v	9.5 a	6.5 bc	7.0 bcd	14.5 b
KOCIDE 101	2.25 kg/ha	9.3 a	7.9 ab	9.0 a	19.4 a
CONTROL		10.0 a	5.3 c	5.3 e	13.8 b
ANOVA $P \leq 0.05$		ns	s	s	s
Coefficient of Variation (%)			19.4	12.0	18.8

*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 ($P \leq 0.05$).
[1/]Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control..

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9144

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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TITLE: BACTERIAL AND FUNGICIDAL EVALUATION FOR THE CONTROL OF FOLIAR AND FRUIT DISEASES IN FIELD TOMATOES - 2001

MATERIALS: Cuprofix 20% (TD 2389-01), PENNCOZEB 75DG (mancozeb), ALEXIN (SAR) MESSENGER (SAR) REZIST (SAR), KOCIDE 101 (copper hydroxide), BRAVO ULTREX 82.5DG (chlorothalonil), DITHANE DF NT (mancozeb).

METHODS: Tomatoes 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 tomato transplants just prior to the seedling lot being destroyed. Seedlings were transplanted using a commercial transplanter on May 31, 2001. 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 August 15. 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 27, 29, July 4, 11, 17, 25, Aug. 1, 8, 15, 22 and 29. Foliar disease assessments were taken on, August 20, 25, 27 and September 1. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: BRAVO ULTREX 82.5DG + KOCIDE 101, PENNCOZEB 75DG with or without Cuprofix 20% and DITHANE DF NT + KOCIDE 101 provided the highest level of fungal disease control. KOCIDE 101 was more effective in controlling fungal diseases than Cuprofix 20% while non of the Systemic Acquire Resistance products including Alexin, Messenger or Resist were very effective in controlling fungal diseases in tomatoes. The weather conditions mid season was extremely dry, conditions that did not allow for the build up of bacterial diseases.

Table 1. Foliar disease control ratings.

Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 20	Aug. 25	Aug. 27	Sept. 9
Cuprofix 20%	6.8 kg	6.5*	6.3 b	4.8 c	5.8 d
PENNCOZEB 75DG	3.4 kg	8.5 ab	9.0 a	7.0 b	8.1 bc
Cuprofix 20% + PENNCOZEB 75DG	6.8 kg 3.4 kg	9.4 a	9.0 a	8.4 ab	8.6 ab
Alexin	4.0 L	4.5 cd	3.8 c	3.3 cd	2.8 e
Messenger	0.63 kg	4.0 d	2.8 c	2.3 d	1.8 ef
REZIST	2.5 L 1Appl	3.3 d	3.3 c	2.3 d	1.5 f
REZIST	2.5 L	3.0 d	3.0 c	2.8 d	1.5 f
KOCIDE 101	2.25 kg	8.5 ab	8.5 a	7.1 b	7.1 c
KOCIDE 101 + BRAVO ULTREX 82.5DG	2.25 kg 1.5 kg	9.3 a	9.8 a	9.4 a	9.4 a
KOCIDE 101 + DITHANE DF NT	2.25 kg 2.25 kg	7.8 ab	9.1 a	7.9 ab	9.1 ab
CONTROL		3.8 d	3.3 c	2.5 d	2.0 ef
ANOVA $P \leq 0.05$		s	s	s	s
Coefficient of Variation (%)		26.3	16.9	21.8	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 ($P \leq 0.05$).
[1/]Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes

PEST: Bacterial Speck, *Pseudomonas syringae* pv. tomato (Okabe) Young et al.

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TITLE: **TIMING OF KOCIDE 101 APPLICATIONS IN TOMATO PLUG TRANSPLANTS**

MATERIALS: KOCIDE 101 (copper hydroxide)

METHODS: On April 3, tomato seeds were sown in 288 cell black plastic seedling trays and placed in a germination chamber for 3 days, then left on the greenhouse bench for the remainder of the experiement. Tomato seedlings at the cotyledon stage and at the first true leaves, 2 ½ weeks after seeding, were sprayed with KOCIDE 101 at varying water volumes and spray intervals. Treatments included three applications every 3 days either as a spray to runoff at 100 ml of liquid per 288 cell tray or applied as a drench at 200 ml of liquid per tray. A third timing was the application of KOCIDE 101 every 3 days as a spray to runoff treatment to a maximum of 9 applications. The rate of KOCIDE 101 was 2.25 kg/ha or 0.03 g/tray. Assessments were taken on April 17 recording the plant heights and foliage colour and on May 2 the average plant heights were recorded again. Treatments were replicated three times. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: KOCIDE 101 applied at the cotyledon and first true leaf stage of seedling plug plants had no significant adverse effects on tomato transplants even when sprayed up to 9 applications prior to transplanting. The multiple applications of KOCIDE 101 did increase the greeness of the seedling foliage.

Table 1. Seedling tomato assessments.

Initial Spray KOCIDE 101, 2.25 kg product\/ha	Subsequent Sprays # of days	Total # of sprays	Water Volumes	Plant Height (cm) April 17	Colour; yellow =1, green=10 April 17	Plant Height (cm) May 2
Cotyledons	3,3	3	spray to run off	15.0 ab*	5.7 ab	22.7 a
Cotyledons	3,3	3	drench	15.7 ab	6.0 ab	21.7 a
Cotyledons	every 3 days	9	spray to run off	15.8 ab	7.0 a	21.6 a
first true leaves	3,3	3	spray to run off	14.3 b	6.7 ab	18.8 a
first true leaves	3,3	3	drench	14.7 b	5.3 b	20.7 a
first true leaves	every 3 days	9	spray to run off	14.8 ab	6.3 ab	20.5 a
CONTROL		0		16.8 a	4.0 c	22.6 a
ANOVA P#0.05				s	s	ns
Coefficient of Variation (%)				7.1	12.2	

*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).

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes and Peppers

PEST: seed borne diseases

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TITLE: **A SIMPLE TEST TO DETERMINE WHETHER OR NOT SEEDS HAVE BEEN TREATED**

MATERIALS: pH test indicator strips, HACH water chlorine test kit

METHODS: Most seeds are now treated with either HCL (acid) or chlorine. Both treatments are effective if done correctly. Dr. Jim Dick, from Nabisco Ltd., has shared the following techniques to determine within minutes whether or not pepper or tomato seeds have been previously treated.

ACID: - use a pH test indicator strip
- wet strips with distilled water
- place seeds onto the dark portion of the test strip (pH of 3-4)
- if the seed has been treated with an acid the test strip will turn yellow quickly
- most if not all seeds have some natural acids which will turn the test paper yellow but not as fast or as dramatically as seeds treated with HCL.

CHLORINE: - this test is a little more complicated as you will need some special chemicals that can be ordered from any laboratory supply company. In this trial we used chemicals from an HACH water chlorine test kit.
- mix one of the very small foil packages of a sulfamic acid powder pillow with a potassium iodide reagent packet into 25 ml of water. Dip a white paper towel or preferably a filter paper into the solution. Place several seeds onto the treated filter paper and within seconds the paper underneath the seed will turn black if chlorine is detected.

Seeds were collected from greenhouses growers in Essex and Kent counties at the end of March 2001. Samples were taken at random recording the lot number on the container. Since many of the seedling growers grow for similar companies there were many duplicates, however each sample was processed. Most of the tomato seeds were pelletized. The clay pellet was removed mechanically by pressing onto the seeds “squishing” the pellet away.

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The use of a simple test to identify whether or not tomato or pepper seeds were treated with either acid (HCL) or chlorine would be extremely useful for this industry. One hundred and thirty-five (135) seed samples, a combination of tomato and pepper seeds were collected from seedling greenhouses at the end of March, 2001 to determine the effectiveness of these seed assay tests. The test for chlorine treated seeds was very good while the acid test appeared to give both false positives and negatives. The test required a judgment on the intensity of the colour change. Seeds with ratings above 3 would indicate a strong possibility of having been acid treated while seeds having a rating of 1 may be indicating the natural acids found on seeds. Also the low acid reading may be the result of being absorbed onto the seed pellet material which becomes problematic for this test. It was interesting that some seeds must have been both acid and chlorine treated while many others may not have been treated at all.

Table 1. The determination of whether pepper or tomato seeds had been previously treated with either chlorine or acid.

Cultivars -a mixture of pepper and tomato	Lot #	Pelletized Y=yes N=no	Chlorine Test Y=yes N=no	Acid Test colour range (0-5) 0 = no colour, 1= light yellow, 5 = bright orange - treated
Admiral	CE753425	Y	N	1
Admiral	CE6248A	Y	N	2
APT533	P418G	Y	N	0
Better Boy VFN	320	N	Y	4
BHN 410	198122	N	Y	1
BHN 410	198122	N	Y	1
Blue Jay	255D	N	N	0
Bounty	56638	N	N	0
Boynton Bell	142721019	Y	N	1
Brigadier	CE9617	N	N	4
Brigadier	HE8138C	N	N	0
Brigadier	PE8326B	N	N	0
Capri VF	400A	N	N	4
CC337	9903	Y	Y	1
CC390	9512	Y	Y	3
Cherry Bomb	1751	N	N	0
Cherry Bomb	231657	N	Y	2
Crimson Hot	111409	Y	N	1
Crimson Hot	264	N	N	5
Crusader	PE0203	N	N	3
Enterprise	93792	N	N	0
Ethnic Sweet	20571	N	N	2
Flamingo	9485A	N	N	0
Florida 47 VFF	324B	N	N	5

Cultivars -a mixture of pepper and tomato	Lot #	Pelletized Y=yes N=no	Chlorine Test Y=yes N=no	Acid Test colour range (0-5) 0 = no colour, 1= light yellow, 5 = bright orange - treated
Giant Marconi	111828	Y	N	1
Gold Finch	255-M	N	Y	4
Gold Finch	255-M	N	Y	4
H9144	01070B-6	Y	N	2
H9252	21051	Y	N	1
H9252	21059	Y	N	1
H9314	9109TC-6.5	Y	N	0
H9314	20163	Y	N	2
H9314	10109TCRT-6.6	Y	N	0
H9314	20163	Y	N	0
H9314	9109TC-7	Y	N	2
H9314	9	Y	N	1
H9364	22889-1	Y	N	3
H9423	81105-s	Y	N	1
H9428	118-1	Y	N	1
H9478	0621902TL-6.5	Y	N	1
H9478	H9207-49-c-6	Y	N	2
H9478	1621902	Y	N	1
H9478	118-1	Y	N	1
H9492	120-1	Y	N	0
H9553	049XL-6	Y	N	1
H9553		Y	N	1
H9553	0449XL-6	Y	N	2
H9553	049XL-6	Y	N	2
H9553		Y	N	0
H9553	117-1	Y	N	1
H9701	9690697HF-S	Y	N	2
H9909	0114TC-S	Y	N	1
H9909	0114TC-S	Y	N	1
H990	0114TC-S	Y	N	1
HP80	0116YC-S	Y	N	2
Hungarian Wax	266	N	Y	3
Hungarian Wax	266	N	Y	2
Hungarian Wax	9010	N	N	5
HY Color 312 M/C	143498	Y	N	0
Hy-Beef 9904 VF	332T	N	N	1
Hybrid 46	111338	N	Y	5
Hybrid 46	118	Y	N	1
Inferno	264N	N	N	3
Inferno	164182	N	Y	0

Cultivars -a mixture of pepper and tomato	Lot #	Pelletized Y=yes N=no	Chlorine Test Y=yes N=no	Acid Test colour range (0-5) 0 = no colour, 1= light yellow, 5 = bright orange - treated
Ironsides X3R	254P	N	N	0
Jalapeno	264B	N	N	1
King Arthur	221914/43554	N	Y	0
King Arthur	490963	N	N	0
Lafayette	CE9033C	N	N	5
Laparie	262B	N	N	0
Large Red Cherry	265A	N	N	4
Long Red Cayenr	264A	N	N	1
Macero II	19207-J01	N	N	5
Macero II	142290	N	N	2
Macero II	1839-L	N	N	1
Merlin	254-A	N	N	1
Merlin	254-A	N	N	0
Mountain Fresh	139720	N	N	4
Mountain Pride	403-F	N	Y	5
N1069	9801	Y	Y	1
N1082	9803	Y	Y	1
N1480E	9902	Y	Y	1
N1480L	0002	Y	Y	1
N1522	9807	Y	Y	1
Navarone	262E	N	N	4
Oriole	255C	N	N	2
OX-23 m/c	145470	Y	N	1
P696	51441-99	Y	N	1
Paladin	CE0063A	N	N	2
Pasillo Bajio	9034	N	N	4
PS 223515	181939	N	Y	3
Puebla	P418D	Y	N	1
Puebla	1035-A-455177	N	Y	5
Puebla VFFN	418-D	N	Y	4
Red Dawn	261J	N	Y	2
Red Dawn	261J	N	Y	2
Red Knight	111862	Y	N	0
Red Knight	260F	N	N	2
Red Knight 3XR	111843	Y	N	0
Red Knight X3R	106289	N	N	1
Red Sebastian		N	N	4
Redrider	12934-2	Y	N	0
Redrider VFF	P332R	Y	N	1
Redrider VFF	332R	N	N	4

Cultivars -a mixture of pepper and tomato	Lot #	Pelletized Y=yes N=no	Chlorine Test Y=yes N=no	Acid Test colour range (0-5) 0 = no colour, 1= light yellow, 5 = bright orange - treated
Redstart	111411	Y	N	0
Redstart	261F	Y	N	1
Redstart	261F	N	N	1
Redstart	163009	N	Y	1
Ring of Fire	265-C	N	Y	5
Sentry	CE90022A25	Y	N	1
Stella	P-1252	Y	Y	3
Sunbeam VFF	332H/7505	N	Y	5
Sunbeam VFF	332-H	N	N	5
Sunchief VFF	332-L	N	Y	5
Sunoma	7565	N	Y	5
Sunrise VF	332B	N	Y	5
Sunrise VF	332B	N	Y	5
Super Hungarian	264-S	N	Y	1
Super Marzano	14876	N	Y	3
Super Shepherd	262A	N	Y	1
Super Shepherd	262A	N	Y	3
Super Sweet Ban	267F	N	N	0
Superset	111854	Y	N	1
Sweet Spot	224415	N	N	0
Tam Veracruz	P0576741049A	N	N	1
TN-1		N	N	1
TSH4	9904	Y	Y	1
TSH5	9917	Y	Y	1
TSH5	9917	Y	Y	1
TSH7	0102	N	Y	3
TSH8	0103	N	Y	3
TSH9	0104	N	Y	4
X3R Camelot	P0080212400P	N	Y	2
X3R Camelot	1914-A/434871	N	N	0
X3R Hot Spot	11234/399562	N	Y	4

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes

PEST: Bacterial Speck, *Pseudomonas syringae* pv. tomato (Okabe) Young et al., Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes

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TITLE: **CONTROL OF BACTERIAL SPECK APPLIED TO SEEDLING TOMATO PLUG PLANTS USING ACTIGARD AND PACLOBUTRAZOL AND THE SUBSEQUENT EFFECTS IN THE FIELD**

MATERIALS: BONZI (4 g. ai/L paclobutrazol), ACTIGARD 50WG (CGA-245704 plant activator), A506 BlightBan (biocontrol agent *Pseudomonas fluorescens*).

METHODS: As part of a cooperative trial including Dr. Vince Machado, research scientist University of Guelph, Dr. Jim Dick, plant breeder for Nabisco Ltd., Dresden, Dr. Diane Cuppels, research scientist AAFC, London, four tomato cultivars varying in susceptibility to bacterial speck, OX52, H9704, O9241 and CC337 were seeded and grown in 288 cell plug trays as seedlings in the research greenhouse of Nabisco Brand Co. OX52 and O9241 are considered highly susceptible to speck, H9704 susceptible and CC337 speck tolerant. Two (2) trays per treatment per tomato cultivar were treated with the following treatments and timings. Bonzi was applied at the two leaf seedling stage at a rate of 5 ppm active paclobutrazol, using an aerosol sprayer wetting the tomato foliage to the point just prior to runoff with 100ml of solution per tray.12.5 ml of Bonzi was mixed into 1L of water to make a stock solution of 50 ppm paclobutrazol. 100 ml of this mixture was added to 900 ml of water to make up the desired 5ppm paclobutrazol. Actigard 50WG was applied as a drench 3, 4.5 and 6 weeks after seeding at a rate of 62 mg active /L of water applying 288 ml per 288 cell tray. The biocontrol agent BlightBan, A506 was applied as a foliar spray to the point of runoff at 3, 4, 5 and 6 weeks after seeding using a concentration of 2×10^8 cells/ml or 250×10^8 cfu/tray applying 288ml of the prepared suspension per 288 cell tray. The transplants were watered and fertilized as needed. One-half of the treatment trays were inoculated with the bacterial speck organism at week 5 with 2×10^8 cells/ml in the greenhouse prior to the plants being used in the field. The transplants were planted at the Ridgetown College site in single twin-row plots, 7m in length with rows spaced 1.65m apart, with each of the four tomato cultivars acting as separate replicate blocks in a randomized block design. Seedlings were transplanted using a commercial transplanter on May 14, 2001. Pest control products were used during the year to control weeds, insects and diseases with Sencor, Admire and Bravo respectively. Assessments were taken on the greenhouse transplants around the time of planting in the field measuring the plant height and weight on May 28. Field assessments were taken of plant vigour ratings on July 18, the number of flowers on June 15, fresh weights on June 20, dry weights on June 25, plant vigour ratings on July 18, fruit rot counts, blossom end rot (BER) counts and fruit yields on August 21. Bacterial speck assessments were taken at both the Ridgetown site and the cooperative site in Dresden. Assessments were taken by counting the number of bacterial speck cluster lesions. The higher the number the less effective the treatment. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: Plant heights in the greenhouse were kept within a range of 1-2 cm through cultural activities so that each treatment could be transplanted in the filed all at one time. There was a significant increase in plant weight when paclobutrazol was applied and a loss in plant weight when Actigard was applied. There appears to be a significant phytotoxic reaction when Actigard is applied to seedling tomatoes. The addition of paclobutrazol was able to make up for the phyto effect of the Actigard treatment. The application of paclobutrazol to seedling tomatoes increased the number of flowers observed earlier in the season. The slight phyto effect of Actigard remained after transplanting at least into June 20-25 as the plants taken from the field showed a lower fresh and dry weight than the untreated control. Paclobutrazol on the other hand significantly increased the fresh and dry weight of all four tomato cultivars. A506 also had a safening effect of Actigard although not nearly to the degree that paclobutrazol provided. Actigard was not able to reduce either the fruit anthracnose fungal disease nor the nutritional disorder blossom end rot. Plants treated with paclobutrazol appeared to have more blossom end rot a point suggesting that the plants were growing very fast during the period of drought observed in southwest Ontario this growing season. Actigard was able however to reduce the number of bacterial speck lesions on the foliage compared to the untreated control. The addition of A506 did not improved the level of control of bacterial speck however as mentioned A506 appears to safen the adverse phyto effect that Actigard has on tomato transplants. An interesting observation not anticipated was the remarkably high level of bacterial control when paclobutrazol was added to Actigard. Paclobutrazol applied alone had no substantial effect on reducing the number of bacterial speck populations or disease lesion however when combined with Actigard, it not only increased the safeness of Actigard reducing its apparent phyto effect on tomato plants but also improved the level of bacterial speck control in field tomatoes.

Table 1. Greenhouse evaluations, May 28

Treatments	Application Rate (active ppm)	Inoculated with Bacterial speck organism	Plant Height (cm)				Plant Weight (g)			
			OX52	H9704	09241	CC337	OX52	H9704	09241	CC337
Check		U	19.3cde*	19.7 bc	15.8 k-n	20.9 ab	1.64 f-k	1.37 j-o	1.38 i-o	1.68 f-i
Actigard	62 ppm	U	16.1 j-n	19.4 cd	15.4 l-o	18.6 c-f	1.11 opq	1.34 k-p	1.24 l-p	1.46 h-n
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	U	16.4 h-m	18.1 d-g	16.2 i-m	18.7 c-f	1.28 l-p	1.28 l-p	1.24 l-p	1.35 k-p
Actigard + Paclobutrazol	62 ppm + 5 ppm	U	15.0 mno	16.7 g-l	15.9 k-n	17.8 e-h	1.70 fgh	1.66 f-j	1.64 f-k	2.09 cd
Paclobutrazol	5 ppm	U	14.1 o	17.2 f-k	16.2 i-m	19.4 cd	2.06 cd	2.11 cd	1.75 fgh	2.67 ab
Check		X	16.5 h-m	18.6 c-f	14.1 o	15.1 l-o	1.48 h-m	1.28 l-p	1.28 l-p	1.38 i-o
Actigard	62 ppm	X	14.1 o	18.2 c-g	13.9 o	15.3 l-o	0.92 q	1.21 m-p	1.06 pq	1.16 n-q
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	X	14.5 no	17.6 f-j	14.9 mno	15.2 l-o	1.10 opq	1.22 l-p	1.10 opq	1.17 m-q
Actigard + Paclobutrazol	62 ppm + 5 ppm	X	16.0 k-n	18.5 c-f	16.2 i-m	18.1 d-g	1.78 efg	1.52 g-l	1.86 def	2.18 c
Paclobutrazol	5 ppm	X	15.7 k-n	21.2 a	16.0 k-n	17.7 f-i	1.62 f-k	2.88 a	2.03 cde	2.45 b
ANOVA P#0.05			s	s	s	s	s	s	s	s
Coefficient of Variation (%)			8.9	8.9	8.9	8.9	18.4	18.4	18.4	18.4

*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, plants in poor growth; 10, plants vigorous and growing well.

Table 2. Field evaluations

Treatments	Application Rate	Inoculated with Bacterial speck organism	# of Flowers June 15	Fresh wts (g) 5 plants June 20	Dry wts. (g) 5 plants June 25	Vigour Ratings (0-10)[1] July 18	Anthracn-ose cts (50) Aug. 23	BER Aug. 21	Yield Aug 21
Check		U	2.8 b*	281.0 ab	82.3 ab	7.0 de	1.5 b	10.5 b	29.6 ab
Actigard	62 ppm	U	3.5 b	252.0 ab	70.5 ab	6.5 e	0.8 b	17.5 ab	30.1 ab
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	U	4.0 b	291.8 ab	79.8 ab	7.5 cd	1.8 ab	19.0 ab	27.4 b
Actigard + Paclobutrazol	62 ppm + 5 ppm	U	2.8 b	260.0 ab	73.8 ab	10.0 a	2.5 ab	22.8 ab	32.9 a
Paclobutrazol	5 ppm	U	2.3 b	301.8 ab	77.8 ab	9.8 a	1.3 b	27.0 a	31.8 a
Check		X	2.3 b	253.8 ab	66.0 b	8.0 c	0.5 b	21.3 ab	29.6 ab
Actigard	62 ppm	X	1.3 b	248.3 ab	64.8 b	7.0 de	1.3 b	23.0 ab	29.7 ab
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	X	0.8 b	195.0 b	58.8 b	7.4 cd	1.3 b	19.5 ab	30.6 ab
Actigard + Paclobutrazol	62 ppm + 5 ppm	X	4.3 b	269.3 ab	72.3 ab	9.0 b	4.0 a	22.5 ab	30.4 ab
Paclobutrazol	5 ppm	X	10.3 a	356.8 a	98.8 a	10.0 a	2.8 ab	26.3 ab	31.8 a
ANOVA P#0.05			s	s	s	s	s	s	s
Coefficient of Variation (%)			111.3	23.9	26.4	6.0	89.1	45.7	8.2

*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, plants in poor growth; 10, plants vigorous and growing well.

Table 3. Control of Bacterial speck in the field as a consequence of the greenhouse treatments.

Treatments	Application Rate	Inoculated with Bacterial speck organism	Bacterial Speck Cluster Counts[1/]	
			Ridgetown Site June 14	Dresden Site June 5
Check		U	70.0a*	186.7 a
Actigard	62 ppm	U	26.7 bcd	63.3 c
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	U	23.3 bcd	56.7 c
Actigard + Paclobutrazol	62 ppm + 5 ppm	U	4.0 cd	0.3 d
Paclobutrazol	5 ppm	U	60.0 ab	126.7 b
Check		X	43.3 abc	6.7 d
Actigard	62 ppm	X	0.0 d	3.3 d
Actigard + A506	62 ppm + $250x10^8$ cfu/tray	X	1.7 d	1.3 d
Actigard + Paclobutrazol	62 ppm + 5 ppm	X	0.0 d	0.0 d
Paclobutrazol	5 ppm	X	16.7 cd	8.3 d
ANOVA P#0.05			s	s
Coefficient of Variation (%)			84.1	47.4

*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 Speck Cluster Counts; Bacterial lesions were counted in clusters. The higher the number of clusters the more bacterial disease was observed and the less effective the treatment.

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes
PEST: Anthracnose, *Colletotrichum coccodes* (Wallr.) Hughes

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TITLE: **EFFECT OF PACLOBUTRAZOL TREATED PLUG TRANSPLANTS ON THE ESTABLISHMENT AND YIELD OF FIELD TOMATOES**

MATERIALS: BONZI 4EC (paclobutrazol), T22 (*Trichoderma sp.* fungal organisms).

METHODS: As part of a cooperative trial including Dr. Vince Machado, research scientist University of Guelph and Dr. Jim Dick, plant breeder for Nabisco Ltd., Dresden, three tomato cultivars, N1069, CC337 and Peto 696 were seeded and grown in 288 cell plug trays as seedlings in the research greenhouse of Nabisco Brand Co. Three (3) trays per treatment were treated at the two leaf stage with either the growth regulator product paclobutrazol, using an aerosol sprayer wetting the tomato foliage to the point just prior to runoff with 100ml of solution per tray or the fungal antagonistic organism *Trichoderma sp* T22 applied as a drenched onto the trays or a combination of both. 12.5 ml of Bonzi was mixed into 1L to make a stock solution of 50 ppm paclobutrazol. 100 ml of this mixture was added to 900 ml of water to make up the desired 5ppm paclobutrazol. The drench application of T22 was made using 5 g of product into 2 liters of water applying 288ml of the prepared suspension per 288 cell tray, 1 ml = 25,000 spores. The transplants were watered and fertilized as needed. The transplants were planted at the Ridgetown College site in single twin-row plots, 7m 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 10, 2001. Pest control products were used during the year to control weeds, insects and diseases with Sencor, Admire and Bravo respectively. Assessments were taken on stand counts on May 15, and 25, plant vigour ratings on May 25, June 5, 15, July 9, and 18, the number of flowers on June 15, fresh weights on June 20, dry weights on June 26, fruit rot counts, blossom end rot (BER) counts and fruit yields on August 22. Results were analysed using the Duncan’s multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: There were no differences in plant establishment, i.e. plant stand counts however there was a significant difference in plant vigour between treatments. Paclobutrazol treated transplants applied at the two leaf stage in the greenhouse had a significant benefit improving the plant vigour in all three tomato cultivars N1069, CC337 and Peto 696 in the field throughout the summer. There were also significant differences observed, although not to the extent noted with paclobutrazol, with T22, the beneficial antagonistic fungi, Trichoderma, later in the season in tomato cultivar CC337 and with earlier benefits in Peto 696. The improved plant vigour ratings using paclobutrazol continued to show higher and earlier numbers of flowers, higher fresh and dry plant weights, significant advancement in fruit maturity and higher tomato yields. Although not statistically different there appeared to be a consistent trend across all three tomato cultivars with an increase in the number of fruit with blossom end rot when treated with paclobutrazol. This shows a significant difference in the rate of plant growth in a year that was extremely dry, conditions that favour blossom end rot in fast growing plants.

Table 1. Stand counts and plant vigour ratings

Tomato cultivars	Treatments	Application Rate	Stand Counts		Plant Vigour Ratings (0-10)[1]				
			May 15	May 25	May 25	June 5	June 15	July 9	July 18
N1069	Check		33.3 ab*	32.3 ab	2.8 c	5.8 b	5.8 cde	6.8 de	7.0 cde
	Paclo	5 ppm	31.5 ab	29.8 abc	7.3 a	9.0 a	9.0 a	8.5 ab	9.0 ab
	T22	0.63 g/tray	31.5 ab	28.5 abc	3.8 bc	5.3 b	6.8 bc	5.8 ef	6.3 e
	Paclo + T22	5 ppm + 0.63g/tray	30.8 ab	32.0 ab	7.8 a	8.5 a	10.0 a	8.0 bcd	8.0 bcd
CC337	Check		29.5 b	22.8 c	3.3 bc	5.0 b	4.8 e	5.8 ef	4.5 f
	Paclo	5 ppm	33.3 ab	31.0 abc	6.8 a	8.0 a	9.0 a	9.3 ab	9.0 ab
	T22	0.63 g/tray	32.0 ab	26.0 bc	2.3 c	4.8 b	5.3 de	5.3 f	6.3 e
	Paclo + T22	5 ppm + 0.63g/tray	32.0 ab	30.5 abc	7.3 a	8.0 a	9.5 a	8.3 bc	8.1 bcd
Peto 696	Check		32.5 ab	31.3 abc	3.8 bc	5.5 b	6.0 cd	7.0 cde	6.8 de
	Paclo	5 ppm	32.8 ab	35.3 a	8.0 a	8.8 a	9.6 a	9.8 a	10.0 a
	T22	0.63 g/tray	33.8 a	32.5 ab	4.8 b	8.0 a	7.4 b	8.0 bcd	8.3 bc
	Paclo + T22	5 ppm + 0.63g/tray	32.8 ab	33.0 ab	7.8 a	8.5 a	9.8 a	9.0 ab	9.8 a
ANOVA P#0.05			s	s	s	s	s	s	s
Coefficient of Variation (%)			7.7	17.8	21.6	20.3	9.5	11.7	11.9

*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/] Plant Vigour Ratings (0-10) - 0, plants in poor growth; 10, plants vigorous and growing well.

Table 2. Flower counts, Fresh and dry weights, number of fruit with colour, blossom end rot (BER) and yield.

Tomato cultivars	Treatments	Application Rate	Flower counts June 15	Fresh wts 5 plants (g) June 20	Dry Wts 5 plants (g) June 26	# fruit with colour August 22	# BER fruit August 22	Total Harvest per m block August 22
N1069	Check		16.3 b*	208.5 c	63.3 c	56.8 b	47.3 ab	13.6 a-d
	Paclo	5 ppm	54.8 a	393.3 ab	136.8 a	86.5 a	77.0 ab	14.4 a-d
	T22	0.63 g/tray	12.8 bc	237.0 bc	80.3 abc	37.3 bcd	49.3 ab	11.2 bcd
	Paclo + T22	5 ppm + 0.63g/tray	58.0 a	358.0 abc	128.8 ab	93.5 a	64.3 ab	17.6 abc
CC337	Check		0.0 d	187.5 c	54.5 c	15.0 cde	72.3 ab	9.9 cd
	Paclo	5 ppm	7.3 bcd	397.0 ab	132.3 ab	29.3 cde	85.0 ab	9.2 d
	T22	0.63 g/tray	0.0 d	191.5 c	57.0 c	10.3 e	67.8 ab	13.4 a-d
	Paclo + T22	5 ppm + 0.63g/tray	5.8 cd	417.3 ab	137.8 a	24.5 cde	127.3 a	13.5 a-d
Peto 696	Check		0.3 d	258.3 bc	63.3 c	15.0 cde	55.8 ab	15.5 a-d
	Paclo	5 ppm	13.5 bc	503.0 a	106.0 abc	41.0 bc	15.3 b	19.0 ab
	T22	0.63 g/tray	1.3 d	282.8 bc	74.8 bc	14.3 de	61.3 ab	16.4 a-d
	Paclo + T22	5 ppm + 0.63g/tray	12.3 bc	507.8 a	108.5 abc	34.8 b-e	16.0 b	20.2 a
ANOVA P#0.05			s	s	s	s	s	s
Coefficient of Variation (%)			42.8	33.8	37.8	42.4	78.9	34.2

*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).

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR:

CROP: Tomato cultivar H9909
PEST: Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say)

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TITLE: **USE OF CALYPSO FOR THE CONTROL OF TOMATO INSECTS**

MATERIALS: ADMIRE 240F(imidacloprid), CALYPSO 480SC (experimental).

METHODS: Tomatoes were transplanted in three twin-row plots, 7m 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 10, 2001. Foliar applications were applied to two of the three row plots 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 7. Assessments were taken by counting the number of CPB larvae per sprayed plot on June 20, 29 and July 5. Results were analyzed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in table 1.

CONCLUSIONS: CALYPSO 480SC, at both rates tested, along with the commercial standard, ADMIRE 240F, effectively controlled the populations of Colorado potato beetles in field tomatoes. There were no significant differences in insect control amongst the sprayed treatments however all were significantly different in providing Colorado potato beetle control when compared to the non-sprayed control.

Table 1. Colorado potato beetle larval counts.

Treatments	Rate Product ml/ha	Insect Larvae Counts/Plot		
		June 20	June 29	July 5
ADMIRE 240 F	200	0.0b*	0.3 b	0.3 a
CALYPSO 480SC	52	0.0 b	0.0 b	0.8 a
CALYPSO 480SC	104	0.0 b	1.5 b	0.0 a
Control		11.5 a	4.3 a	1.3 a
ANOVA P#0.05		s	s	ns
Coefficient of Variation (%)		75.8	108.9	

*****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).

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909

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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TITLE: **RESIDUAL BENEFITS OF A SINGLE YEAR'S APPLICATION OF SOIL AMENDMENTS (COMPOST) IN THE GROWTH AND PRODUCTIVITY OF PROCESSING TOMATOES - 2001**

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 in the previous year and again in the same location with no additional fertilizer or compost added in the spring of 2001 on May 23 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 fungicide, QUADRIS was sprayed onto the plots for the control of foliar and fruit diseases in tomatoes on July 4, 13 and 24.Plots were assessed by visually rating the plants for vigour on June 29, July 9, August 2 and Sept. 1. Tomato yields were taken separating the green immature fruit from the red harvestable fruit on August 27. 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: Even after a year, the residual effect of applying spent mushroom compost to soil that was considered in "poor health" showed remarkable advantage in tomato growth. Unfortunately the summer of 2001 was extremely dry with the consequence that tomato yields were extremely low in this light soil. The increase in blossom end rot in the spent compost treatment is as much of a reflection of greater growth in those plots.

Table 1. Plant vigour ratings and tomato yields.

Treatments	Plant Vigour Ratings (0-10)[1/] June 29	July 9	Aug. 2	Sept. 1	Yield, August 27 Reds kg/4m	Greens kg/4m	Rots (BER)
Spring Applied Spent Mushroom Compost	7.4 a*	9.9 a	6.3 a	8.2a	5.5 a	5.8 a	1.33 a
Control	6.6 b	6.0	4.0 b	4.1b	5.2 a	6.1 a	0.56 b
ANOVA P#0.05	s	s	s	s	ns	ns	s
Coefficient of Variation (%)	12.2	5.6	23.7	24.4			32.6

*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

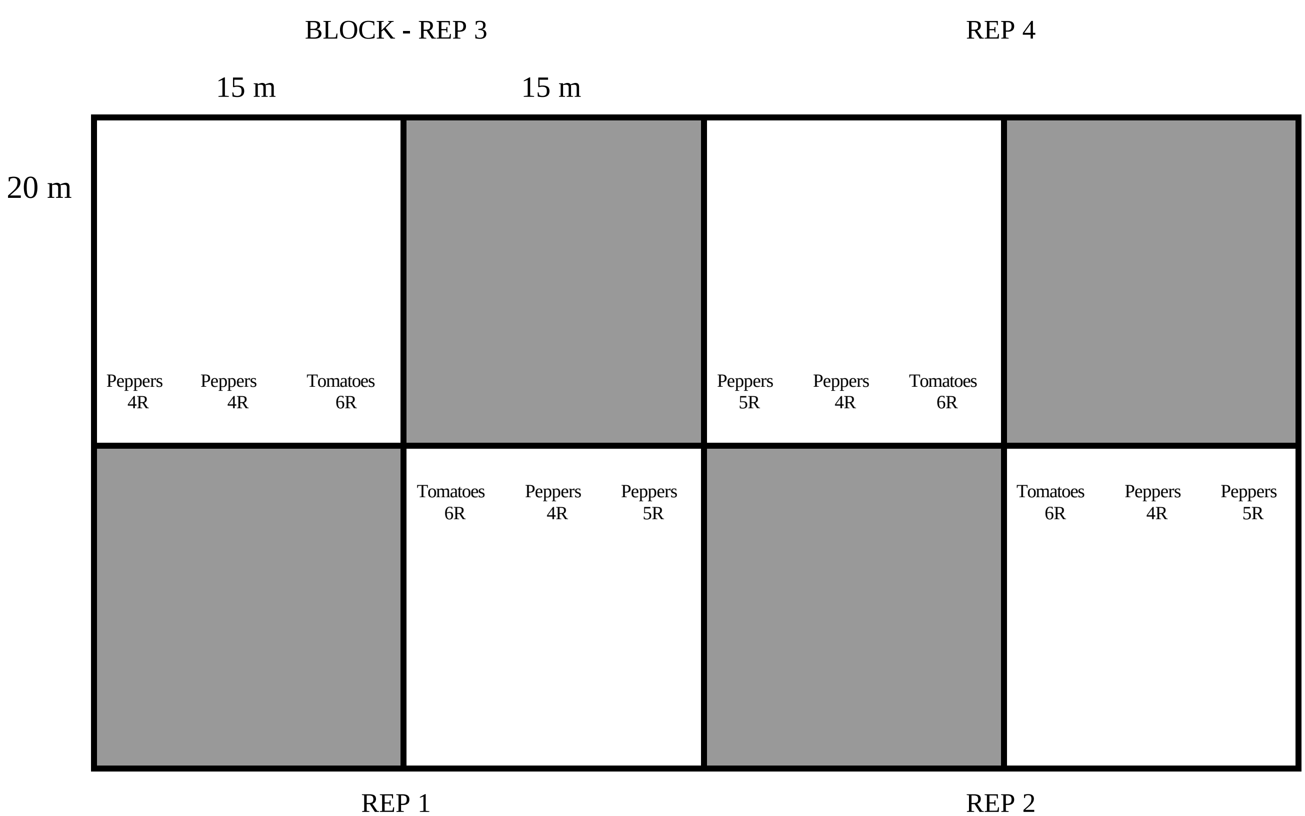

Table 2. Soil test results taken in the spring of 2000.

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

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9144
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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TITLE: **THE EFFECT OF ALEXIN ON THE GROWTH AND DISEASE SUPPRESSION IN FIELD TOMATOES**

MATERIALS: Alexin (SAR)

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 June 7, 2001. 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 July 2, 9, 19, 30, August 10, 20 and 29. Foliar disease assessments were made on July 18, August 24 and September 1. Fruit maturity ratings were made by two individuals on August 29 by counting the number of red mature fruit per plot. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.
Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September after the trial completion date thus disease assessments were not significant and are not recorded.

CONCLUSIONS: Foliar applications of Alexin delayed the maturity of tomatoes resulting with fewer red fruits on the assessment day of August 29. It has been noted that many of the Systemic Acquired Resistant (SAR) products set back plant growth and are now being tested with fewer applications and in combination with products that promote plant growth.

Table 1. Harvest maturity ratings.

Treatments	Rate Product/ha	Fruit maturity counts # of red fruit per plot (August 29)	
		Rating 1	Rating 2
Alexin	4 L	127.5 b*	112.5 b
CONTROL		179.0 a	135.3 a
ANOVA P#0.05		s	s
Coefficient of Variation (%)		14.3	35.6

*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).

PMR REPORT # **SECTION C: VEGETABLES and SPECIAL CROPS**
ICAR: 61006536

CROP: Field Tomatoes cv. Heinz 9909
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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TITLE: **THE EFFECT OF NUTRAPLUS ON THE VIGOUR AND YIELD OF PROCESSING TOMATOES**

MATERIALS: NutraPlus (experimental)

METHODS: Tomatoes were transplanted in single, twin-row plots, 7m 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 June 7, 2001. 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 May 7 at the two leaf stage in the greenhouse, on June 5, 3 days prior to being transplanted and on July 9 in the field at early flowering stage. Foliar disease assessments were made on July 18, August 24 and September 1. Plant vigour ratings were taken on June 29. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.
Weather conditions mid way through the season were extremely dry, delaying the development of tomato diseases until mid September after the trial completion date thus disease assessments were not significant and are not recorded. Yields were not taken due to the dry conditions as they would not reflect the normal growing conditions experienced in most years.

CONCLUSIONS: The benefits of foliar applications of NutraPlus could only be observed with multiple applications. Plant vigour was significantly improved.

Table 1. Plant Vigour Ratings June 29.

Treatments	Rate Product/ha	Application Timing	Plant Vigour Ratings (0-10)[1/]
NutraPlus	2.0 L	2 leaf - greenhouse	6.9 c*
NutraPlus	2.0 L	3 days prior to transplanting	6.8 c
NutraPlus	2.0 L	early flowering	6.8 c
NutraPlus	2.0L	All three timings	8.4 a
Control			7.3 bc
ANOVA P#0.05			s
Coefficient of Variation (%)			23.5

*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 = poor growth, 10= excellent growth.