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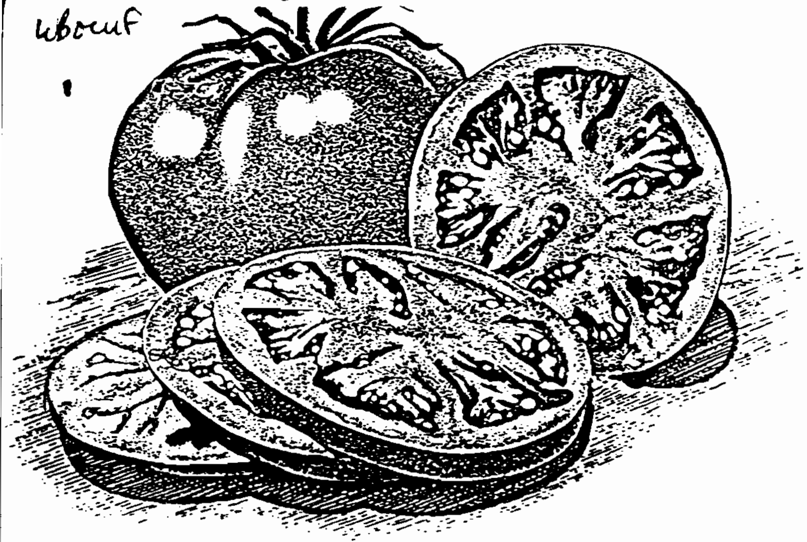
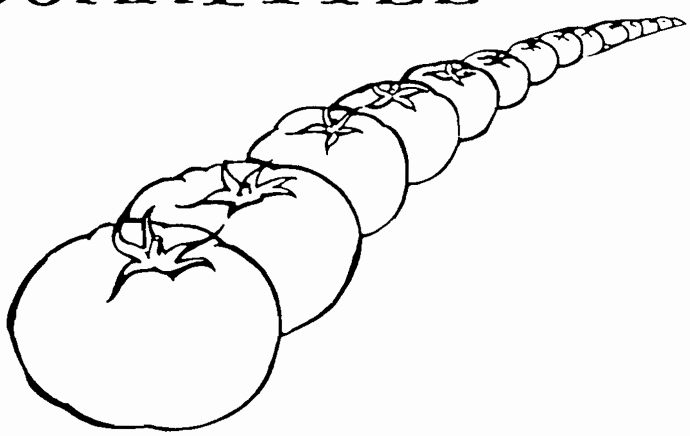


1989 ABSTRACTS

ONTARIO TOMATO RESEARCH PROJECTS

ONTARIO TOMATO COMMITTEE



Not for Publication

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1989 ONTARIO TOMATO RESEARCH PROJECTS

III. INSECTS & DISEASES:

R.E. Pitblado, R.C.A.T., Ridgetown:

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Disease incidence in twin versus single rows in field tomatoes
Screening fungicides for disease control in field tomatoes
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BREEDING OR CULTIVAR TESTING

TOMATO BREEDING: BACTERIAL CANKER RESISTANCE

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

Bacterial canker, caused by *Clavibacter michiganensis* subsp *michiganensis,* can be a very destructive pathogen of tomatoes. While the most cost effective and environmentally benign control method would be the development of genetically resistant lines, this has proven very difficult to do. Development of methods to assure disease free seed would greatly reduce the potential negative impact of this disease.

A total of 70 breeding lines, 5 resistant check lines and one susceptible check line were evaluated in two replications following controlled root dip inoculations in the greenhouse in Spring, 1989. Disease development was uniform across the flats and moderately severe. Plants were rated on a 1 (dying) to 5 (fully healthy) scale 10 days after inoculation.

The most resistant check, a selection from PLOVDIV 812, had an average score of 4.2 48% of the plants were resistant (score of 5). The susceptible check, H2653, had an average score of 2.4; no plant in this line was resistant. The best breeding line, a selection from 85-300 (which has resistance derived from Hawaii-7998, Okitsu Sozai, and Plovdiv-812), had an average score of 4.5; 65% were resistant. In all, 7 breeding lines (10%) were scored higher than the best resistant check, while over two thirds of the lines were not significantly less resistant than the best check. Two lines from North Carolina, NC 409 and NC 710, both showed very good levels of resistance.

Only plants rated 4 or 5 were transplanted to the field. Only a modified bulk harvest could be made in the field, due to the flooding stress.

RESISTANCE OF TOMATO BREEDING LINES TO ARTIFICIAL INFECTION WITH BACTERIAL CANKER.

GENOTYPE	PEDIGREE	SCORE	% RESISTANT
85-300-1-1-3	84-332/84-334	4.5	65
86-194-1-1	85-305/85-321	4.5	60
85-300-2-2-2	84-332/84-334	4.4	53
NC-409-1-1	-	4.2	58
88-147-2	84-190/84-372	4.2	58
85-300-1-1-1	84-332/84-334	4.2	49
85-305-2-1-2	84-342/84-332	4.2	49
PLOVDIV-8-12-1-1	-	4.2	48
NC-710-1W	-	4.1	50
88-147-1	84-190/84-372	3.9	50
88-154-2	86-194/85-305		3.951
84-372-2-3-2	PT-1057/PT-1498		3.855
H2653		-	2.40

TOMATO BREEDING: UTILIZATION OF *L. PERUVIANUM,* 1989

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

A major project was continued at HRS in 1989 to overcome the severe incongruity barrier which has prevented tomato breeders from making efficient use of the extensive genetic variability available in *L. peruvianum.*

We grew some 250 HRS developed F-1 to F-4 and BC-1 to BC-4 populations possessing *L. peruvianum* germplasm. Using the HRS developed bridge lines, EPP-1, EPP-2, EEP-1 and PP-1, and the embryo callus technique for rescuing interspecific hybrids, we have been able to make additional crosses and backcrosses to *L. peruvianum* accessions. We now have populations derived from 15 *L. peruvianum* accessions which are reasonably crossable with tomato. This represents a major expansion in the range of *L. peruvianum* germplasm available to the tomato breeder.

Preliminary screening of this material identified several populations with high levels of resistance to Septoria leaf spot, FORL, and corky root rot. These genes for resistance are being evaluated to determine their allelic relation to previously identified genes for resistance and are being crossed into adapted cultivars.

TOMATO BREEDING: UTILIZATION OF *L. HIRSUTUM*

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

L. hirsutum is a large and diverse species which possesses several desirable traits including low temperature tolerance, insect resistance, fungal disease resistance, bacterial disease resistance and earliness. Several of these traits can not be adequately evaluated in the wild species or early generations of the interspecific crosses with tomato as they are totally confounded by the very low fruit:foliage ratio of the wild species.

In 1989 some 150 F-1 to F-5 and BC-1 to BC-4 populations (3000 plants) derived from *L. hirsutum* were evaluated. Due to the flooding only limited selection pressure could be applied and 115 selections were harvested.

The Harrow tomato breeding program continued to place emphasis on developing tomato lines with Colorado Potato Beetle resistance in 1989. The *L. hirsutum* sources of very high resistance to CPB, which we previously identified, were advanced another generation. With the very high level of CPB infestation at planting, several lines which appeared to have good resistance at the seedling stage were identified. These will be screened again this winter to verify their level of resistance.

TOMATO BREEDING: UTILIZATION OF *L. CHEESMANII*, *L. CHMIELEWSKII*, AND *L. PENNELLII*, 1989

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

A major objective in the processing tomato breeding program is the development of lines with higher total solids levels than are presently available in the adapted tomato cultivars. One approach to obtain this objective is through the utilization of genes from 'high solids' accessions of the related species *L. cheesmanii*, *L. chmielewskii*, and *L. pennellii*.

In 1989 we tested 75 backcross-1 F-4 and 10 backcross-4 lines derived from crosses with *L. chmielewskii* as well as approximately 100 BC-1, 50 BC-2, and 50 BC-3 lines derived from crosses with *L. cheesmanii* and 20 lines derived from crosses with *L. pennellii*. The wild relatives had up to 16% soluble solids, compared to 5-6% in the best tomato lines. By using about 20 different sources of high solids from these species, it is anticipated that there might be scope for combining different selections to further increase the level of soluble solids. Inbred backcross lines will be developed from these populations to determine if they possess different, complimentary genes for high solids. These lines will then be intercrossed to maximize the level of improvement in soluble solids levels obtained from *L. cheesmanii*, *L. chmielewskii*, and *L. pennellii*.

Within these populations, several lines are returning to the tomato fruit size, maturity, yield, and fruit firmness while retaining higher soluble solids levels.

Some 35 crosses involving selected *L. chmielewskii* and *L. cheesmanii* lines were successfully made in 1989.

As the extreme flooding stress imposed on the crop by the July 20 flood invalidated any evaluation of total are soluble solids, the material was advanced one generation by a modified bulk selection procedure, which selected against lines with low fertility, orange fruit colour, or indeterminate growth.

TOMATO BREEDING: UTILIZATION OF OTHER WILD SPECIES

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

In addition to *L. peruvianum, L. hirsutum, L. cheesmanii, L. pennellii,* and *L. chmielewskii,* the wild species *L. chilense, L. parviflorum, L. pimpinellifolium, Solanum lycopersicoides, S. rickii,* and *S. ochranthum* are evaluated and utilized in the Harrow tomato breeding program.

Despite the loss of about 1/3 of the plots in our interspecific nursery due to the flood, we were able to advance lines from the *L. chilense* accessions LA 1965 and LA 1971 and backcross these to tomato to obtain useful sources of resistance to diseases and abiotic stresses.

Only one F-2 population derived from *L. parviflorum,* which can also be a useful source of resistance to disease and abiotic stresses, survived the flood.

Accessions of *L. pimpinellifolium,* which is readily crossable with *esculentum,* can provide early blight and other disease resistance, low temperature tolerance, earliness, and improved fruit quality traits. Some 20 F-4, and backcross populations (400 plants) involving 10 piminellifolium accessions were advanced by modified bulk harvest method, as they were too severely affected by the flood for any meaningful selection.

An intergeneric F-1 hybrid between *L. esculentum* and *Solanum lycopersicoides* was obtained from the University of Guelph. *S. lycopersicoides* has very high levels of low temperature tolerance relative to tomato or other *Lycopersicon* species. This line, however, has completely sterile pollen, even following chromosomal doubling with colchicine. Using the peruvianum bridge line and embryo callus culture, we have been able to obtain hybrids involving *S. lycopersicoides, L. esculentum,* and *L. peruvianum.* This line was selfed and backcrossed to tomato. To date we have obtained one F-2 plant through embryo callus culture. The improved fertility shown in this material, relative to the original intergeneric hybrid, is very encouraging for the possibility of transferring more genes from *S. lycopersicoides* into tomato. A joint project with PRC, Ottawa, which is attempting to bypass this barrier through somatic backfusion of hybrid protoplasts with tomato, has regenerated several somatic hybrid plants between the original intergeneric hybrid and peruvianum hybrids. These have been transferred to Harrow for evaluation and backcrossing with tomato.

Neither the *S. rickii,* which died in the flood, nor the *S. ochranthum* accessions flowered in the field. Cuttings were made of the latter to try to hasten flowering in the growth room by grafting onto other rootstocks or by using hormones.

SOMACLONAL VARIATION IN LOCALLY ADAPTED TOMATO CULTIVARS

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

Somaclonal variation is the genetically stable variability which is frequently encountered in plants regenerated in vitro from calli derived from somatic (non-reproductive) tissue. In tomato relatively high frequencies of these mutations have been reported.

Five hundred R2 tomato lines regenerated from calli of Purdue 812 or Ohio 7814 following exposure to varying doses of EMS or UV, each replicated twice, were evaluated at HRS in 1989. Due to the flooding induced stress, only qualitative variation could be monitored. The frequency of sterile, dwarf, or tetraploid plants did not appear to be significantly correlated with increasing doses of the mutagens in any study. With some treatments over 90% of the plots had at least one variant phenotype. No beneficial variation was identified in this material.

In a separate study, 200 R2 Purdue 812 lines were screened for disease response to the causal organisms for Septoria leaf spot, FORL, and bacterial canker. No line with resistance superior to the seed derived check Purdue 812 line was identified.

It must be concluded, after evaluating over 5000 R2 tomato plants regenerated from calli after various periods in culture or after mutagen treatments, that beneficial somaclonal variation occurs at a very low frequency in the tomato lines evaluated and that this is not an effective means of improving the genetic variability in tomato. It is possible to recommend the use of somaclonal variation only for those cases where in vitro selection can be imposed at the cellular or callus level.

TOMATO BREEDING: SEPTORIA LEAF SPOT RESISTANCE

V. Poysa, Agriculture Canada, Research Station, Harrow, Ontario N0R 1G0

Septoria leaf spot, caused by *Septoria lycopersici*, can be a very destructive leaf pathogen of tomatoes. While some control can be obtained through use of chemicals, the most cost effective and environmentally benign control method would be the development of genetically resistant lines.

A total of over 200 lines (15,000 plants) were evaluated in two replications under controlled inoculation conditions in the greenhouse in 1989. Disease development was erratic, with very low levels of disease developing in the growth roms and moderately severe levels developing in the greenhouse. Plants were rated on a 1 (dying) to 5 (fully healthy) scale 10 to 20 days after inoculation, depending on timing of disease development.

The best breeding line, a selection from a bulk from the peruvianum nursery, had an average score of 4.8; 91% were scored 5. Several other lines identified from the interspecific breeding nurseries also had very high levels of resistance. Many of these lines were lost in the flood. Those lines surviving the flood were subjected to a modified bulk harvest for further evaluation next year.

Several promising new sources of resistance have been identified in a second round of screening of interspecific selections. These will be backcrossed to tomato and further evaluated.

FRESH MARKET TOMATO BREEDING

V. POYSA, Agriculture Canada, Research Station, Harrow, Ont. N0R 1G0

In 1989 the fresh market tomato breeding program at Harrow comprised some 33,000 F-1 to F-6 plants in 725 lines, which were evaluated primarily for earliness, fruit size, fruit firmness, and yield. Due to the flooding stress experienced by the tests, selection pressure was modified to avoid losing potentially valuable material. Approximately 400 plants (1%) in 130 lines were selected for further evaluation next year.

The performance of the most promising F-4 to F-6 lines, relative to the checks, is summarized below on a 1 (poor) to 5 (excellent) scale. Data are averaged over replications.

Genotype	Mat.	Fruit Size	Yield	Overall Quality	Rating
BHN48-4	3	4	3.5	4	3.5
BHN48-6		4	4	3.5	3.53.5
BHN60-6		3	4	3	44
BHN47-5		3	4	3.5	44
HY9023-5	4	4	3.5	3	3.5
HY9023-6	3.5	4.5	3.5	3.5	3.5
86-106-2	3.5	4	3	3.5	3.5
86-108-2	3.5	4	3	3	3
86-110-3	4	4	3	3.5	3.5
84-487		3.5	4	3	43.5
ACX8412-1-4-1	2.5	4.5	3	4	3.5
BHN24-1-3-3	2.5	4	3.5	3.5	3.5
BHN24-1-3-2	3	4	3	4	4
83-204-1-1	3.5	4	3	3.5	3.5
84-093-3-2	4	4	3	3.5	3.5
84-093-2-1	3.5	4	3.5	4	4
FTE-F3-1-2	3.5	4	3	4	3.5
DUKE-2-1	3	4	3	4	3.5
BARON-4-1	4	4	3.5	3	3
PIKRED	3.3	4	3.3	3.5	3.3
FRESHPAK	3.2	3.3	3.1	3.5	3.2
DUKE	2.5	3.5	3.2	3.5	3.2

Multilocation Wholepack Tomato Cultivar Trial, 1989

S.A. Loewen, Ridgetown College of Agricultural Technology, Ridgetown, Ont.

Two open pollinated cultivars (Ohio 7983, Ont 871) and three F1 hybrid cultivars (Peto 696, 2196, 2296) were compared with a standard open pollinated cultivar (Ohio 7814). Locations were chosen from various tomato growing areas in Kent and Essex counties in order to sample a range of soil types. Data are reported for 5 out of 6 sites. The sixth site was not considered to be a reliable representation of the performance of the cultivars as a result of severe weather conditions. Due to difficulties in scheduling harvest dates at different sites, and differences in maturity between cultivars, yield data are reported as total yield or yield potential (= total harvestable fruit). Significant differences between cultivars were found at only one location. Based on this year's results and those of previous seasons, the cultivar 'Ohio 7983' is recommended for use in Ontario. The yield potential of this cultivar is at least as good as Ohio 7814 and in 1989 it was observed to be about 3 days earlier in maturity than Ohio 7814. The remaining cultivars (Ont 871, Peto 696, 2196, 2296) have only been widely tested in Ontario for one year and merit further testing for an additional year before any firm recommendations can be made. If yield data are similar in the coming season then processing qualities will be used to make the final decision.

Yield Potential (tons/acre) for Six Wholepack Tomato Cultivars grown on twin rows at locations in Kent and Essex Counties, 1989

Location Cultivar Name	Ridgetown	Leamington	Lighthouse Cove	Stoney Point	Dresden
Ohio 7983	24.0	31.7	49.4 b	19.1	48.1
Ohio 7814	27.7	27.6	50.0 b	16.6	51.4
Ont 871	22.3	28.1	72.7 a	19.1	46.3
Peto 2196	28.7	33.6	54.0 b	19.3	67.0
Peto 2296	31.1	33.2	54.0 b	18.2	53.5
Peto 696	31.5	32.2	72.5 a	18.8	56.8
	NS	NS		NS	NS

Means within columns followed by the same letter are not significantly different, (protected LSD at 5%).

Wholepack Tomato Processing Trial, 1989

S.A. Loewen, Ridgetown College of Agricultural Technology, Ridgetown, Ont.

Tomato samples were collected from each of 7 locations and evaluated for processing characteristics. The locations represented different soil types and row configurations (single or twin row). A representative sample of "deliverable" fruit from each site was lye peeled and lye peeling losses were measured. No significant differences between cultivars were found for pH, or the percent of cannable fruit after peeling (= defects due to blotchy ripening or difficulty in peel removal).

Processing Characteristics of Six Wholepack Tomato Cultivars grown on twin rows at locations in Kent and Essex Counties, 1989

Cultivar	Agtron	Soluble Solids	% Peeling Loss
Ohio 7983	26.5 b	5.05 a	7.1 b
Ohio 7814	26.1 b	4.96 a	8.3 b
Ont 871	24.4 b	4.48 b	8.5 b
Peto 2196	25.9 b	5.10 a	8.8 ab
Peto 2296	30.4 a	5.21 a	10.9 a
Peto 696	30.1 a	5.03 a	7.8 b

Means followed by the same letter are not significantly different (protected LSD at 5%)

Based on data for the 1989 season the cultivar Ohio 7983 can be recommended to the industry not only for its field performance but also for its processing qualities. Results show that it has potential for desirable Agtron readings and low peeling losses. The other cultivars evaluated (Ont 871, Peto 696, 2196, 2296) will be evaluated for an additional year before recommendations are made. Initial results suggest that Peto 2296 may have unacceptably high peeling losses when compared with the other cultivars tested.

Wholepack Tomato Breeding, 1989

S.A. Loewen, Ridgetown College of Agricultural Technology, Ridgetown, Ont.

The primary objective of the Ridgetown tomato breeding programme is to introduce cultivars suitable for wholepack processing use in Ontario. Required characteristics include good colour, high yield, disease resistance, corelessness, jointless pedicel, uniform maturity, and good vine holding ability.

The RCAT programme is taking a two-pronged approach in that both F1 hybrids and open pollinated lines will be considered for introduction, however the main emphasis will be on open pollinated cultivars.

In 1989 evaluation and selection was done on breeding material resulting from the HES-RCAT breeding programme. During the winter of 1989 F1 hybrid tomato seed was produced in the greenhouse and 400 RCAT F1 hybrid lines were evaluated during the summer. Three lines were retained for further evaluation as F1 hybrids.

The RCAT effort is also involved in co-operation with Dr. Poysa of the Harrow Research Station to evaluate and select material from the HRS programme with potential for wholepack use. F5 and F6 material was received from the Harrow programme and selections were made for good fruit characteristics.

Wholepack Tomato Cultivar Screening Trials
S.A. Loewen, Ridgetown College of Agricultural Technology, Ridgetown, Ont.

Tomato cultivars from various commercial seed sources were grown in replicated trials at RCAT. Visual ratings were taken on a number of different characteristics considered important for wholepack use. Emphasis was placed on lines with good yield and good fruit colour. The predominating problem with most entries submitted to the trial was blotchy ripening.

Table 1 shows acceptable lines that have been evaluated for only one year. Table 2 shows lines that have been evaluated for two years. These lines were considered to be acceptable for wholepack use based on 1989 season performance and will be evaluated for at least one more year.

Ratings are based on a scale of 1 to 9 with 1 being least desirable and 9 being most desirable. The reported ratings are means based on evaluation of 2 replications of 10 plants grown in single rows. Any line with an overall rating of 4.5 or greater was considered acceptable for additional evaluation since overall ratings were generally quite low.

Table 1. Ratings for Wholepack Tomato Lines Evaluated For The First Time in 1989 at RCAT.

Name	Yield	Shoulder Colour	Interior Colour	Overall Rating
Ohio 8444	5	5.5	7.5	4.5
NS 213	7	6.5	7.5	5
Pur 882	7	6.5	7.5	5.5
Ohio 7814	6.5	8	7.5	6

Table 2. Ratings for Wholepack Tomato Lines Evaluated For The Second Year in 1989 at RCAT.

Name	Yield	Shoulder Colour	Interior Colour	Overall Rating
Har 84-193-5-1	7	5	6	4.5
Peto 1196	7	6	6	5
Peto 30496	5.5	4.5	7	5
Ohio 7814	7.5	7.5	6.5	5.5
Peto 1996	8	7.5	5.5	6.5

Fresh Market Tomatoes 1989
Smithfield Experimental Farm

A total of 63 varieties were screened for fresh market production in eastern Ontario. Promising varieties included BHN #39, BHN #130, HAR 091-698, Mountain Pride, MTH 781, NC87263, Sunre 6568, and XPH 5551.

In the advanced Fresh Market Trial, the best cultivars screened were Mountain Pride, Pilgrim and NC86210.

Seventeen lines from Harrow were evaluated in a separate trial. None of the lines looked particularly promising at Smithfield.

Processing Tomatoes 1989
Smithfield Experimental Farm

Seventeen of Jack Metcalf's processing lines were grown in comparison with four industry standards. The two most promising lines were:

SY-167 - smooth, firm fruit with small core and few scars; good internal structure

SY-171 - firm fruit with few scars, small core, and stems easily

CULTURAL PRACTICES

MULCHES, ROW COVERS AND DRIP IRRIGATION FOR FRESH MARKET TOMATOES

R.W. Garton and W.R. Balkwill

Trials were conducted to evaluate the influence of plastic mulches, row covers and drip irrigation on fresh market tomato production. Clear and black plastic mulches raised soil temperatures, and improved early yields as compared to brown photodegradable mulch. There was some weed growth under the clear mulch which could compete with tomato growth if moisture was limited.

Drip irrigation under plastic mulch increased early yields, but not total yield, as compared to the mulched, and unmulched check treatments. The tomato crop did not respond as well to drip irrigation under this season's high rainfall conditions, as in the drought conditions of 1988.

White plastic row covers did not advance maturity, or improve early season yields as compared to the uncovered treatments. The row cover treatments improved early vegetative growth, but fruitset was delayed until after the covers were removed in early June. Row covers do not appear to be beneficial for use in fresh market tomato crops under Southwestern Ontario conditions.

RESULTS

Treatment	Early Yield (t/ha)	Total Yield (t/ha)
Clear Mulch + Drip	12.7	23.5
Black Mulch + Drip	9.4	18.2
Brown Mulch + Drip + Row Cover	9.2	14.8
Brown Mulch + Drip	8.1	17.0
Check	6.4	10.8

TEMPORARY STORAGE OF TOMATO PLUG TRANSPLANTS

R.W. Garton and W.R. Balkwill

One of the major advantages of using plug tray grown transplants for processing tomato crops is the ability to hold plants when weather conditions do not permit field planting. This experiment was conducted to determine how plug transplants should be stored to maximize stand establishment after planting.

Transplants were stored for up to 18 days after their scheduled planting date, with no reduction in plant stand or yield, as compared to a not-stored check. Plants which were stored for 18 days had slightly reduced stands and fruit yields compared to those stored for 10 days. Over the storage period, transplants which were stored in a greenhouse, or outside, performed as well as the check. Plants which were stored in a barn had reduced stands and fruit yield. These plants were very spindly, and chlorotic when planted. The lack of exposure to sunlight likely depleted the plants carbohydrate reserves, resulting in reduced survival in the field.

Fertilization of greenhouse-stored plants during storage, reduce plant survival and fruit yield. The fertilized plants were longer and more tender than the non-fertilized plants. Fertilization did not have a negative effect on stand, when plants were stored outside.

These results indicate that plug transplants can be held for extended periods as long as they are managed properly. Storage of plants, either in a greenhouse, or outside on elevated racks, is acceptable. If plants are to be held for a long period in a greenhouse, fertilizer applications should be reduced to prevent stretching. Plug transplants should not be held in a barn, or any covered area, for an extended period of time.

RESULTS

	Fruit Yield (t/ha)	
Storage Treatment	10 day	18 day
Outside	48.4	42.3
Greenhouse	48.3	43.0
Barn	19.0	15.7
Check	40.8	40.8

PLANT POPULATIONS FOR PROCESSING TOMATO CULTIVARS

R.W. Garton and W.R. Balkwill

Many of the machine harvest processing tomato cultivars currently used in Ontario are relatively low yielding at conventional single row plant populations. Most of these compact plant type cultivars have much greater yield potential when grown at higher populations using a twin row planting arrangement. These trials were conducted to determine the optimum plant populations for four tomato cultivars. Plant population treatments included single rows at 8700 plants/acre, and twin rows at 10,500, 13,000 and 17,400 plants/acre.

All four cultivars produced higher yields when grown on twin rows with higher plant populations. There were not significant differences in yields between the 13,000 and 17,400 plant/acre treatments. On 1.5m wide beds, 13,000 plants per acre appears to be the optimum population for the cultivars HY 9464, HY 9478 and FM 6203. H 722 produced highest yields on twin rows with the 10,500 plant /acre population.

In this study, plant population did not appear to influence crop maturity, as population treatment did not change the proportion of ripe, green or overmature fruit in any variety.

RESULTS

(average of all four cultivars)

Treatment	Yield (t/ha)
Twin @ 13,000	58.5
Twin @ 17,400	59.1
Twin @ 10,500	53.5
Single @ 8,700	49.3

PRE-TRANSPLANT CONDITIONING OF TOMATO TRANSPLANTS

R.W. Garton and W.R. Balkwill

In recent years, Ontario processing tomato growers have used an increasing number of greenhouse-grown plug transplants as an alternative to southern bare-root plants. This experiment was conducted to evaluate several treatments which could be used to improve field survival of plug transplants under adverse environmental conditions. The conditioning treatments included holding the plants outside for 3 or 7 days prior to planting, a foliar application of ethephon at 10 days before planting, and clipping the plants to a uniform 15 cm height at 5 days before planting.

Clipping of tomato plug transplants before transplanting reduced plant stands and fruit yield. The clipped plants showed a much higher incidence of bacterial canker than the non-clipped plants, accounting for the reduced stand and yield. By harvest time almost all the clipped plants showed bacterial canker symptoms, indicating that the clipping procedure spread the disease from infected plants to healthy plants.

Otherwise, pretransplant conditioning treatments did not have a significant effect on stand or yield. The plants which were held outside for 7 days prior to planting tended to have better stands and higher yields than the untreated check. These plants appeared to suffer less transplant shock, and resume growth faster than those which were planted immediately after removal from the greenhouse.

RESULTS

Treatment	Plant Stand (%)	Fruit Yield (t/ha)
Outside 7 Day	81	60.5
Check	76	57.1
Clipped	53	37.2

NITROGEN NUTRITION OF PROCESSING TOMATO CULTIVARS

R.W. Garton and W.R. Balkwill

Proper application of nitrogen fertilizer is one of the most important cultural practices in processing tomato production. Excessive application of nitrogen can reduce tomato yield and fruit quality. These trials were conducted to develop recommendations for N rates to be used on sandy soils which will promote maximum yields without overapplication of nitrogen. Four tomato cultivars, representing a range of maturities and plant types, were tested. Nitrogen treatments consisted of four preplant rates (0, 50, 100, 150 kg/ha) and two sidedress rates (0 or 35 kg/ha). The sidedress treatments were applied 3 weeks after planting.

High preplant nitrogen rates resulted in yield increases in all four cultivars, with the 150 kg/ha and 100 kg/ha treatments producing the highest yields. The yield increase with the high N preplant rates may have been due to nitrate leaching, or to stunting of the plants by the cool, wet soil conditions in May and June.

Sidedressing of 35 kg/ha of nitrogen, 3 weeks after planting, increased vegetative growth of the foliage and resulted in more vigorous looking plants throughout the season. However, this treatment did not always result in improved yields. Sidedressing increased yield with 0 or 50 N preplant rates, but did not increase yield when higher preplant rates were used. In the case of HY 9464 and HY 9478, sidedressing nitrogen when high preplant N rates were used, resulted in a split set and increased the yield of green fruit.

FOLIAR FERTILIZER TRIALS

R.W. Garton and W.R. Balkwill

This was the third year of studies on foliar fertilization of processing tomatoes. Three machine harvest tomato cultivars, H 2653, FM 6203 and H 722 were used. The foliar fertilizer treatments consisted of a 9-18-9 liquid fertilizer, applied at a rate of 18 l/ha, applied 6 times throughout the season. The fertilizer was applied alone, and tankmixed with Bravo fungicide. The Foliar Fertilizer + Bravo, and Bravo check treatments received 6 more fungicide applications than the Untreated Check and Foliar Fertilizer treatments.

Foliar fertilizer did not increase yields in any of the three cultivars in any of the three years of testing. Mixing the fertilizer with Bravo fungicide did not increase yields as compared to the Bravo check. The treatments which received additional applications of fungicide had increased yields in the 1987 season, but not in 1988 or 1989.

The use of foliar fertilizer does not appear to be beneficial to tomato crops under Ontario conditions.

RESULTS

(Average Yields of 1987,88 and 89 Trials)

	Yield (t/ha)		
Treatment	H2653	FM 6203	H 722
Check	38.1	47.9	50.4
Foliar Fert.	35.6	46.6	47.3

LONG TERM EVALUATION OF STRIP TILLAGE INTO FALL SOWN COVER CROPS

A.W. McKeown[1], R. Cerkauskas[2] and J. Potter[2]

Horticultural Experiment Station, Simcoe[1] and Agriculture Canada, Vineland[2]

The objective of this ongoing trial is to evaluate potential crop management and pest problems with machine harvested tomatoes grown in a strip-tillage soil conservation system. Plots have been on the same site for three seasons to maximize biological pressure on the system. Fall-sown cover crops are Rye (Tetra Petkus); Wheat (Frederick) and perennial ryegrass sown Sept. 14 after tomato harvest in early September. Tillage treatments are: 1) conventional clean till; 2) strip till into chemically killed cover crops. A two-year tomato-rye cover rotation is included as a control. Plots are arranged in a split-plot design with three replications with cover crops as the main plot and tillage the sub-plots. Tomatoes, cv. FM6203, were transplanted on May 23. Plots were machine harvested on Sept. 5. In addition to yield, plant diseases are monitored as well as plant parasitic nematode populations. No differences were detected in marketable yield. Yields (t/ha) for cover crops were as follows: wheat 38.7, rye 47.6, perennial ryegrass 38.6, rotation rye-tomatoes 42.5; tillage, conventional 43.7 and strip-till 35.1. The trial will be continued for at least 2 more years to monitor possible interactions of cover crop and tillage.

INSECTS AND DISEASES

CROP: Tomato, cv. Ohio 7814

PEST: Early Blight, Alternaria solani, Septoria Leaf Spot Septoria lycopersici, Anthracnose, Colletotrichum coccodes

TITLE OF PROJECT: Comparison of several fungicide spray models

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario

MATERIALS: BRAVO 500 (chlorothalonil), DITHANE M45 (80% mancozeb)

METHODS: Tomatoes were transplanted on May 17 at RCAT in three row plots, spaced 1.4m apart. Two rows were sprayed while the third was left untreated. Plots were 8m in length and replicated 4 times in a randomized complete block design. The original plot had to be abandoned due to a severe outbreak of Bacterial canker. The change necessitated that a new tomato location be found with the initial spray application being applied to all treatments on June 27 several days to two weeks later than the various spray models would have recommended. After this date BRAVO 500 was scheduled to be applied every 20 Disease Severity Values (DSV) and DITHANE M45 every 15 DSV. Some variation from these indices occurred especially over weekend periods. The daily disease severity values were calculated using three different spray models. The three spray models were (i) TOM-CAST based on hourly temperature and leaf wetness values recorded at the site; (ii) TC-HOURLY using hourly temperatures recorded at the RCAT Campbell Scientific weather station and a formula developed the previous year using hourly dew points from the Windsor and London weather stations; (iii) TC-Daily using hourly temperature calculated from the daily maximum and minimum temperatures taken on site along with a formula developed the previous year using hourly dew points from the Windsor and London weather stations. The fungicides were applied at the times indicated using a back pack airblast sprayer using 240 L/ha of water. Assessments were taken by visually rating the foliar damage caused by Early Blight and Septoria Leaf Spot on Aug. 7, 27 and Sept. 6 and by randomly selecting 100 red fruits per plot at harvest and counting the number of fruits damaged by anthracnose on Sept. 20.

Table 1. Dates of fungicide application

Bravo 500		Dithane M45	
TOM-CAST	**DSV***	**TOM-CAST**	**DSV**
June 27 initial	45	June 27 initial	45
July 14	22	July 10	17
July 26	19	July 24	18
Aug. 9	21	Aug. 1	15
Aug. 24	23	Aug. 14	18
		Aug. 24	17
TC-HOURLY	**DSV**	**TC-HOURLY**	**DSV**
June 27 initial	67	June 27 initial	65
July 10	18	July 10	18
July 24	23	July 24	23
Aug. 9	28	Aug. 4	21
Aug. 24	25	Aug. 16	18
		Aug. 28	19
TC-DAILY	**DSV**	**TC-DAILY**	**DSV**
June 27 initial	55	June 27 initial	55
July 14	20	July 9	15
July 26	21	July 24	22
Aug. 9	23	Aug. 3	16
Aug. 24	23	Aug. 14	17
		Aug. 24	17
10-DAY SCHEDULE	**DSV**	**10-DAY SCHEDULE**	**DSV**
June 27 initial	-	June 27 initial	-
July 7	14	July 7	14
July 17	9	July 17	9
July 27	20	July 27	20
Aug. 8	19	Aug. 8	19
Aug. 18	10	Aug. 18	10
Aug. 28	16	Aug. 28	16

*DSV - intervals of disease severity values between spray applications.

Table 2. **Plant disease control** comparing 3 models

Treatments	Rate kg ai/ha	# of Applications	Foliar Disease Ratings (0-10)[1/] Aug. 7	Aug. 27	Sept. 6	% Anthracnose	Yield Tonnes/ha
TOM-CAST BRAVO 500	1.4	5	9.8a*	8.6a	8.6a	6.5bc	60.0b
TC-HOURLY BRAVO 500	1.4	5	9.0a	8.6a	8.0ab	9.0bc	63.3b
TC-DAILY BRAVO 500	1.4	5	7.8b	8.8a	7.5abc	6.8bc	56.8b
10-DAY SCHEDULE BRAVO 500	1.4	7	8.3ab	8.1a	7.5abc	9.5b	56.8b
TOM-CAST DITHANE M45	2.6	6	8.5ab	8.3a	7.0bc	6.8bc	63.3b
TC-HOURLY DITHANE M45	2.6	6	7.3bc	8.0a	6.4c	6.0bc	57.0b
TC-DAILY DITHANE M45	2.6	6	9.0ab	8.5a	8.4a	3.3c	72.0a
10-DAY SCHEDULE DITHANE M45	2.6	7	7.5bc	7.6a	6.9bc	5.8bc	58.4b
Check			6.0c	5.5b	3.8d	28.0a	35.5c

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

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

RESULTS:

Application of the foliar fungicides BRAVO 500 and Dithane M45 significantly reduced both the degree of defoliation due to Early Blight and Septoria Leaf Spot, the amount of fruit loss due to anthracnose, and significantly increased tomato yields. The additional two applications of BRAVO 500 (10-DAY SCHEDULE) and one additional application of DITHANE M45 did not measurably improve disease control.

One of the main differences between the 3 spray regimes was the accumulation of DSV early in the season prior to the first application. Unfortunately, having to relocate the trial to another field and tomato growing area necessitated by the bacterial canker problem as mentioned earlier, an evaluation of this important influence could not be measured.

CROP: Field Tomatoes, cv. Ohio 7814

PEST: Early Blight *Alternaria solani*, Septoria Leaf Spot *Septoria lycopersica* Anthracnose *Colletotrichum coccodes*

TITLE OF PROJECT: Disease incidence in twin versus single rows in field tomatoes

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario, NOP 2CO

MATERIALS: BRAVO 500 (chlorothalonil)

METHODS: Tomatoes were transplanted on May 17 in two row or bed plots having centers spaced, 1.6m apart. Plots were 8m in length and replicated 4 times. Spray applications were made with a back pack airblast sprayer at 240 L/ha of water. Dates of application were June 26, July 6, 17, 28, August 7 and 18. Foliar disease assessments were taken on August 7 and September 6. Anthracnose counts were taken by randomly selecting 100 red fruits per plot at harvest on September 18.

RESULTS:

Treatments	Rate kg ai/ha	Foliar Blight Ratings (0-10)1/ Aug. 7	Sept. 6	% Anthracnose	Yield Tonnes/ha
BRAVO 500 Twin Rows	1.4	8.0b*	7.3a	9.5bc	70.3a
CHECK Twin Rows		5.5c	2.5c	26.8a	44.5c
BRAVO 500 Single Rows	1.4	9.5a	8.0a	8.5c	56.0b
Check Single rows		6.8bc	4.0b	16.5b	31.3d

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

1/ Foliar Blight Ratings (0-10) - 0, no control, foliage severely damaged, 10, complete control

CONCLUSIONS:

There was an increase in the amount of foliar diseases in twin vs. single row plantings of the tomato cultivar Ohio 7814, yet there was a significant increase in yield with the twin rows. BRAVO 500 effectively reduced the amount of foliar diseases and fruit anthracnose in both row spacing but to a higher level in the single row plots having less foliage and a more open canopy. The change from single to twin rowing of Ohio 7814 significantly increased crop yields beyond the detrimental affect of increased disease.

CROP: Field Tomatoes, cv. HY 9230

PEST: Early Blight, *Alternaria solani*, Septoria Leaf Spot *Septoria lycopersici* Anthracnose *Colletotrichum coccodes*

TITLE OF PROJECT: Screening fungicides for disease control in field tomatoes

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario, NOP 2CO

MATERIALS: BRAVO 500, 90 DF (chlorothalonil), BRAVO CM (chlorothalonil + Copper oxychloride + maneb), DITHANE M45 (80% mancozeb), DITHANE 75DG (75% mancozeb), RHC-387, MANZATE 200 (80% mancozeb), MANZATE 200 75 DF (75% mancozeb), POLYRAM 80DF (80% metiram), DYRENE 50WP, 480F (anilazine), FOLICUR 143.8EC DAY-HWG-1608, BASIC H (surfactant) MICRO-MIST 100 (kelp *Acophyllum nodosum* extract)

METHODS: Tomatoes were transplanted on May 10 in two row plots spaced 1.25m apart. Plots were 8m in length, replicated 4 times in a randomized complete block design. Spray applications were made with a back pack airblast sprayer at 240 L/ha of water. Dates of applications were June 23, July 6, 17, 27 and August 7 and 18. Foliar disease assessments were taken on Aug. 7 and 27 for Early Blight and Septoria Leaf Spot. Anthracnose counts were taken by randomly selecting 100 red fruits per plot at harvest on Aug. 30.

RESULTS:

Treatment	Rate	Foliar Disease Rating (0–10)1/ Aug. 7	Aug. 27	% Anthracnose
BRAVO 500	1.4 kg ai/ha	8.8a*	8.00ab	2.8cd
BRAVO 500	1.9 kg ai/ha	8.5ab	7.63ab	2.8cd
BRAVO 90DF	1.4 kg ai/ha	8.5ab	7.75ab	10.5bc
BRAVO CM	6.0 kg p/ha	8.5ab	8.50a	1.8cd
DITHANE M45 80WP	2.6 kg ai/ha	5.5ef	5.75c	9.8bcd
DITHANE 75DG	2.4 kg ai/ha	6.8cd	7.50ab	6.0bcd
DITHANE 75DG + RHC-387	2.4 kg ai/ha 100 ml p/ha	7.5abc	8.50a	0.0d
MANZATE 200 75WP	2.6 kg ai/ha	5.5ef	7.50ab	3.0bcd
MANZATE 200 75DF	2.6 kg ai/ha	4.5f	6.00c	5.0bcd
POLYRAM 80DF	2.6 kg ai/ha	4.8f	7.00bc	2.8cd
DYRENE 50WP	1.5 kg ai/ha	8.0abc	8.25ab	7.8bcd
DYRENE 480F	1.5 kg ai/ha	8.8a	8.75a	2.0cd
FOLICUR 143.8EC	0.125 kg ai/ha	7.3bcd	7.50ab	13.0b
MANZATE 200 75WP + BASIC H	2.6 kg ai/ha 2.5 L p/ha	7.8abc	6.00c	9.3bcd
MANZATE 200 75WP + MICRO-MIST 100	2.6 kg ai/ha 5.0 L p/ha	6.3de	6.00c	8.5bcd
CHECK		3.0g	1.25d	38.5a

CONCLUSIONS:

All 3 formulations of BRAVO including 500 flowable, 90 dry flowable and CM, DITHANE 75DG + RHC-387 and the two formulations of DYRENE 50WP and 480F provided the highest level of foliar disease control of Early Blight and Septoria Leaf Spot. All the fungicides examined in this trial reduced the number of fruits with Anthracnose. There were no statistically significant differences amongst the chlorothalonil formulations for either the control of the two foliar diseases nor fruit anthracnose. In general as a group the BRAVO products gave the highest overall level of disease control in the trial. The DYRENE products were next effective group with the flowable formulation DYRENE 480F having at least a numerical advantage in controlling the examined tomato diseases. FOLICUR 143.8EC and the mancozeb formulations then followed. The 75DG formulation of DITHANE was significantly better than the 80WP formulation and it appeared that the addition of RHC-387 increased the level of disease control of the 75DG DITHANE formulation. There was no differences in disease control activity between DITHANE M45, MANZATE 200 nor POLYRAM 80DF. The 75DF formulation of MANZATE 200 did not provide superior control when compared to the 75WP formulation. The surfactant BASIC H when added to the MANZATE 200 75WP product improved disease control early in August but by the end of the season it did not provide any additional benefit over the level of disease control provided by MANZATE 200 75WP when used alone. There was no noticeable benefit in tomato disease control with the addition of MICRO-MIST 100.

CROP: Field Tomatoes, cv. HY 9230

TITLE OF PROJECT: Transplant water treatments for field tomatoes

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario, NOP 2C0

MATERIALS: ORTHENE 75WP (acephate), D-L-PLUS ST (seed treatment pre-package of diazinon, lindane and captan), MICRO-MIST 100 (liquid formulation of kelp Acophyllum nodosum) KELP MEAL G (granular formulation of kelp Acophyllum nodosum)

METHODS: Tomatoes were transplanted on May 11 in single row plots spaced 1.25m apart. Plots were 8m in length, replicated 4 times in a randomized complete block design. Applications were made by mixing the treatments in with transplant water containing a pre mixed fertilizer combination. The fertilizer rate was 150 ml of 6-24-6 liquid starter into 25L of water. The rate of application of the treatments were 300 ml of solution per transplant. The granular KELP MEAL was sprinkled over the intended row and incorporated into the soil with a rake prior to transplanting.

The fungicide DITHANE M45 was applied over all the treatments to control foliar diseases. Plant counts were taken on May 29 and plant vigour ratings throughout the summer on May 29, June 19 and July 9. Yields were taken on Aug. 30

RESULTS:

Treatment	Product Rate	% Plant Stand	Plant Vigour Ratings (0-10)[1/] May 29	June 19	July 9	T/ha
ORTHENE 75WP	1.3 g p/L	94a*	9.3a	10.0a	9.5	41.8ab
ORTHENE 75WP	2.6 g p/L	98a	7.3cd	8.8bc	9.8a	41.0abc
D-L-PLUS ST	0.4 g p/L	98a	7.0de	6.5d	7.3b	28.8c
D-L-PLUS ST	1.3 g p/L	100a	6.5e	5.3e	7.0b	29.5bc
MICRO-MIST 100	0.2 ml p/L	98a	9.0ab	8.0c	9.3a	39.8abc
MICRO-MIST 100	1.3 ml p/L	95a	9.0ab	8.0c	8.5a	42.0ab
KELP MEAL G	291 kg p/ha	90ab	7.5cd	8.0c	8.8a	42.0ab
KELP MEAL G	582 kg p/ha	84b	7.8c	9.0abc	8.8a	48.0a
CHECK		92ab	8.5b	9.8ab	9.0a	43.5a

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

Plant Vigour Ratings (0-10); 0, plant death, 10, healthy green foliage

CONCLUSIONS:

Early spring conditions were cool and wet providing conditions favourable to chemical damage. There was a loss in plant survival in treatments containing the high rate of KELP MEAL worked into the soil prior to transplanting. Noticeable early season foliar plant damage was observed when the powdered seed treatment D-L-PLUS was added to the transplant water as well as with both rates of KELP MEAL and the high rate of ORTHENE 75WP. By the end of the season only the D-L-PLUS treatment continued to cause plant damage resulting in a loss in yield. Under cool wet conditions plant injury can be caused by the addition of specific products added to the transplant water or incorporated into the soil prior to transplanting.

CROP: Tomato cv. 7814

PEST: Brown Stink bug, *Euschistus servus*

TITLE OF PROJECT: Control of stink bug damage in field tomatoes

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario, NOP 2CO

MATERIALS: CYMBUSH 500EC (cypermethrin)

METHODS: Trials were established in a commercial field north of Tilbury. Plots were single beds, spaced 1.5m apart with twin rows on each bed, 8m in length and replicated 4 times in a randomized complete block design. Spray applications were made with a back pack airblast sprayer at 240 L/ha of water on the dates indicated in the RESULTS. Assessments were taken on Aug. 29 at harvest.

RESULTS:

Treatments	Application Dates	# of Sprays	Rate g ai/ha	% Insect Infestation
CYMBUSH 500EC	July 1	1	70.0	54.8bc
CYMBUSH 500EC	July 15	1	70.0	43.5cd
CYMBUSH 500EC	July 30	1	70.0	62.0b
CYMBUSH 500EC	Aug. 15	1	70.0	51.0bc
CYMBUSH 500EC	July 11, 15	2	70.0	57.5bc
CYMBUSH 500EC	July 15, 30	2	70.0	43.8cd
CYMBUSH 500EC	July 31, Aug. 15	2	70.0	31.0d
CYMBUSH 500EC	July 11, 15, 30, Aug. 15	4	70.0	42.5cd
CHECK		0		80.0a

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

CONCLUSIONS:

High levels of stink bug damage were observed. Fruit injury was reduced in half with the use of the foliar insecticide CYMBUSH 250EC. It was difficult to suggest an exact timing or combination of timing other than to indicate high levels of fruit damage still remained. There is a possibility that insecticide sprays prior to July 1 may be required in some years.

CROP: Tomato cv. OHIO 7814

TITLE OF PROJECT: Rate of dissipation of tomato fungicide residues using two methods of timing applications

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, D. Goudy, J.R. French, Fermenta ASC, Painesville, Ohio

MATERIALS: BRAVO 500 (chlorothalonil), DITHANE M45 (mancozeb)

METHODS: Tomatoes were transplanted on May 17 in 5 row plots spaced 1.4m apart. Plots were 8m in length and replicated 4 times in a randomized complete block design. Treatments were applied every 10 days or when the disease severity values as determined by the weather-timed fungicide program TOM-CAST reached 20. Fungicides were applied at the commercial recommended rates of 1.4 kg ai/ha of BRAVO 500 and 2.6 kg ai/ha of DITHANE M45 using a back pack airblast sprayer applying 240 L/ha of water. Leaves were sampled just prior to spraying, immediately after spraying, and between spray intervals on day 5 of the 10 day scheduled spray program and at DSV of 12 on the TOM-CAST spray program. Ten tomato leaves in the mid canopy were taken per replicate of 4. Two 0.7 mm diameter leaf discs were randomly punched per sampled leaf, (not to include the mid rib) using a hand punch. BRAVO 500 leaf samples were placed into vials containing 10 ml pesticide grade of toluene while DITHANE M45 samples were slightly dried. All samples were kept in the dark and analyzed within 10 days of sampling. Samples of leaf tissue were analyzed by gas chromatography for either chlorothalonil or mancozeb. Weather information was recorded at the study site.

RESULTS:

Table 1. Comparison of the dissipation of the two fungicides BRAVO 500 and DITHANE M45 when used based on TOM-CAST application intervals

Dates of Application	Sampling Designed	Intervals[1/] # of day	Actual DVS	Micrograms of Active Fungicide/ cm^2 of Leaf Surface chlorothalonil	mancozeb
July 25	pre	00	00	0.02e*	0.00e
	post	0	0	11.25c	19.3a
Aug. 2	12 DSV	8	14	3.98de	2.03de
Aug. 4	20 DSV-pre	10-00	18-00	1.79de	2.10de
	20 DSV-post	0	0	13.79bc	14.93abc
Aug. 15	12 DSV	11	12	2.92de	3.55de
Aug. 21	20 DSV-pre	17-00	23-00	5.56d	2.48de
	20 DSV-post	0	0	15.78abc	17.10ab
Aug. 29	12 DSV	8	12	1.46de	0.00e
Sept. 5	20 DSV-pre	15-00	22	1.64de	0.14e
	20 DSV-post	0	0	15.44abc	14.14bc

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

1/ Sampling Intervals - Leaf samples taken for fungicide residue analysis
pre- just prior to spraying - 00
post - immediately after spraying - 0
DSV - disease severity values

Table 2. Comparison of the dissipation of the two fungicides BRAVO 500 and DITHANE M45 when used on a 10-day application interval

Dates of Application	Sampling Designed	Intervals1/ Actual # of days	Micrograms of Active fungicide/ cm^2 of leaf surface chlorothalonil	mancozeb
July 25	pre	00	0.02j*	0.00j
	post	0	19.86bcd	21.25bc
July 31	5 days	6	4.63hij	2.33ij
Aug. 4	10 days-pre	10-00	2.35ij	1.65ij
	10 days-post	0	11.77e-h	14.80c-f
Aug. 9	5 days	5	8.35f-i	6.25g-j
Aug. 15	10 days-pre	11-00	3.90ij	2.05ij
	10 days-post	0	17.43cde	36.65a
Aug. 18	5 days	3	12.65d-g	4.95hij
Aug. 24	10 days-pre	9-00	5.24hij	0.83ij
	10 days-post	0	3.10ij	0.00j
Aug. 29	5 days	5	2.88ij	1.95ij
Sept. 5	10 days-pre	12-00	1.61ij	1.68ij
	10 days-post	0	21.77bc	26.41b

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

1/ Sampling Intervals - Leaf samples taken for fungicide residue analysis
pre - just prior to spraying - 00
post - immediately after spraying - 0

Table 3. Weather information recorded at Ridgetown College

Date	Temperatures MAX °C	MIN °C	PRECIP mm	Date	Temperatures MAX oC	MIN °C	PRECIP mm
July 25	27.5	18.5	0	Aug. 21	25.8	10.2	0
26	28.8	16.2	0	22	25.2	6.8	0
27	29.5	14.6	.8	23	21.7	15.9	6.6
28	33.6	19.2	0	24	25.2	14.2	5.1
29	35.2	17.0	0	25	26.7	14.3	.3
30	33.6	20.5	17.5	26	24.4	12.0	0
31	28.2	16.5	0	27	25.1	11.5	0
Aug. 1	32.5	16.1	0	28	24.2	16.8	6.1
2	37.5	23.6	0	29	24.2	11.3	0
3	35.3	21.7	0	30	23.6	6.9	0
4	33.5	26.2	0	31	25.7	9.3	0
5	32.9	21	29.7	Sept. 1	26.9	13.2	0
6	30.2	20.5	0	2	27.4	18.5	4.3
7	29.68	14.96	0	3	21.8	19.4	2.5
8	32.7	17.3	0	4	23.04	15.7	35.8
9	31.5	23.9	0	5	16.5	7.0	1.8
10	30.9	22	19.6				
11	33.4	21.0	9.9				
12	31.9	21.7	0				
13	33.3	23.8	0				
14	33.1	26.1	.5				
15	31.0	18.6	0				
16	28.9	14.9	0				
17	35.0	21.8	0				
18	24.4	17.8	.8				
19	25.9	12.7	0				
20	27.1	10.6	0				

CONCLUSIONS:

There was a rapid dissipation of both fungicides BRAVO 500 and DITHANE M45 after each application. Five applications were applied on the 10 day schedule program whereas only 4 were applied on the TOM-CAST program. The levels of fungicide just prior to spraying on either spray program were not significantly different. There was very little numerical difference between the chemical residues of either fungicide at comparable interval throughout the season. It is felt that the level of mancozeb should be higher to give equivalent results to that of BRAVO. Rainfall played a role in residue dissipation. In the 10 day spray program the August 23rd 6.6mm rain that occurred just prior to the Aug. 24 application removed almost all of the rapidly depleting mancozeb residue to 0.83 compared to the 5.24 chlorothalonil residue. Similarly, rainfall occurring soon after the Aug. 24 application resulted in a minimal retention of either fungicide (3.10 vs. 0.00). In the TOM-CAST spray program it appeared the Aug. 28 6.1mm rainfall reduced the fungicide residues of both fungicides as recorded on the Aug. 29 sampling date.

CROP: Field Tomatoes, cv. HY 9464

TITLE OF PROJECT: Tomato transplant treatments prior to field setting

NAME OF CONTRIBUTOR(S) AND THEIR AGENCY: R.E. Pitblado, Ridgetown College of Agricultural Technology, Ridgetown, Ontario, NOP 2CO

MATERIALS: Bacterial suspension numbered STRAIN 61-9A, STRAIN 34-13 and STRAIN 2-114

METHODS: Bacterial suspensions were prepared by mixing 1 ml of bacterial conc. as provided by Allelix Crop Technologies to 1 L of water. One litre of the freshly prepared suspension was sprayed onto the foliage of tomatoes grown in 288 cell seedling trays for each of the 3 different bacterial strains. The bacterial applications were applied on May 11, 7 days prior to field transplanting. The 5 week old transplants were held an additional week in the greenhouse until transplanting on May 18. Treatments were planted in two row plots 8m in length with row spacings of 1.25m apart, replicated 4 times in a randomized complete block design. The fungicide DITHANE M45 was applied over all the treatments to control foliar diseases. Foliar vigour ratings were taken throughout the season as were the yields on Aug. 30

RESULTS:

Treatments	Plant Vigour Ratings (0-10)[1/] June 19	July 9	Yield T/ha
STRAIN 61-9A	10a*	10a	46.0a
STRAIN 34-13	10a	10a	52.3a
STRAIN 2-114	10a	10a	51.0a
CHECK	10a	10a	51.0a

*Values followed by the same letter are not significantly different at the 5% level. (Duncan's Multiple Range)

CONCLUSIONS:

Tomato transplants were neither injury nor growth improved with the addition of various proported growth enhancing bacterial strains.

WEED CONTROL