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R. Chase

# 1976 Research Report

# MONTCALM EXPERIMENTAL FARM

## Michigan State University
## Agricultural Experiment Station

## ACKNOWLEDGMENTS

Research personnel working at the Montcalm Branch Experiment Station have received much assistance in various ways. A special thanks is due each of these individuals, private companies and government agencies who have made this research possible. Many valuable contributions in the way of fertilizers, chemicals, seed, equipment, technical assistance, personal services, and monetary grants were received and are hereby gratefully acknowledged.

Special recognition is given to Mr. Theron Comden for his devoted cooperation and assistance in many of the day-to-day operations and personal services.

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# *MONTCALM BRANCH EXPERIMENT STATION RESEARCH REPORT*

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## *INTRODUCTION*

The Montcalm Branch Experiment Station was established in 1966 with the first experiments initiated in 1967. This report marks the completion of ten years of studies. The 40-acre facility is leased from Mr. Theron Comden and is located in west-central Michigan, one mile west of Entrican. The farm is used primarily for research on potatoes and is located in the heart of a major potato producing area.

This report is designed to coordinate all of the research obtained at this facility during 1976. Much of the data herein reported represents projects in various stages of progress; so results and interpretations may not be final. RESULTS PRESENTED HERE SHOULD BE TREATED AS A PROGRESS REPORT ONLY as data from repeated trials are necessary before definite conclusions and recommendations can be made.

## *WEATHER*

Tables 1 and 2 summarize the 9-year temperature and rainfall data. Average maximum temperature for April was unusually high particularly in comparison with 1975 and the 9-year average. Temperatures from April 14 to 18 ranged from 78 to 84 and many days were in the 60's. May, however, was a cooler than usual month with the balance of the growing season about normal.

The rainfall distribution however was 10 inches less in 1976 than 1975 and about 5 inches below the 9-year average. July, August and September were far below the 9-year average which necessitated the need for more intensive irrigation. The total rainfall recorded from April through September was the second lowest since records were initiated at the Farm in 1968.

Irrigation applications of approximately one inch each were made 14 times (July 9, 12, 17, 22, 26 and August 2, 6, 10, 18, 21, 24, 27, 30 and September 7).

## *SOIL TESTS*

For specific projects where more detailed analysis are needed the results are in the individual reports. Soil test results for the general plot area are:

| | Pounds per Acre | | | |
|---|---|---|---|---|
| pH | P | K | Ca | Mg |
| 6.7 | 360 | 288 | 778 | 209 |

Table 1. The 9-year summary of recorded maximum and minimum temperatures during the growing season at the Montcalm Branch Experiment Station.

| Year | April | | May | | June | | July | | August | | September | | 6-month average | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min |
| 1968 | 61 | 37 | 62 | 41 | 74 | 53 | 80 | 55 | 81 | 58 | 74 | 50 | 73 | 50 |
| 1969 | 56 | 35 | 67 | 43 | 70 | 50 | 80 | 59 | 82 | 56 | 73 | 49 | 74 | 49 |
| 1970 | 54 | 35 | 65 | 47 | 72 | 55 | 80 | 60 | 80 | 57 | 70 | 51 | 73 | 45 |
| 1971 | 53 | 31 | 65 | 39 | 81 | 56 | 82 | 55 | 80 | 53 | 73 | 54 | 76 | 48 |
| 1972 | 47 | 30 | 70 | 47 | 72 | 50 | 79 | 57 | 76 | 57 | 69 | 49 | 73 | 48 |
| 1973 | 54 | 36 | 63 | 42 | 77 | 58 | 79 | 60 | 80 | 60 | 73 | 48 | 74 | 51 |
| 1974 | 57 | 36 | 62 | 41 | 73 | 52 | 81 | 57 | 77 | 56 | 68 | 45 | 70 | 48 |
| 1975 | 48 | 28 | 73 | 48 | 75 | 56 | 80 | 57 | 79 | 58 | 65 | 44 | 70 | 49 |
| 1976 | 58 | 35 | 63 | 41 | 79 | 57 | 81 | 58 | 80 | 53 | 70 | 46 | 71 | 48 |
| 9-year average | 54 | 34 | 66 | 43 | 75 | 54 | 80 | 58 | 79 | 56 | 71 | 48 | | |

Table 2. The 9-year summary of precipitation (inches per month) recorded the growing season at the Montcalm Station.

| Year | April | May | June | July | August | September | Total |
|---|---|---|---|---|---|---|---|
| 1968 | 2.84 | 4.90 | 3.74 | 1.23 | 1.31 | 3.30 | 17.32 |
| 1969 | 3.33 | 3.65 | 6.18 | 2.63 | 1.79 | 0.58 | 18.16 |
| 1970 | 2.42 | 4.09 | 4.62 | 3.67 | 6.54 | 7.18 | 28.52 |
| 1971 | 1.59 | 0.93 | 1.50 | 1.22 | 2.67 | 4.00 | 11.91 |
| 1972 | 1.35 | 1.96 | 2.51 | 3.83 | 7.28 | 2.60 | 19.53 |
| 1973 | 3.25 | 3.91 | 4.34 | 2.36 | 3.94 | 1.33 | 19.13 |
| 1974 | 4.07 | 4.83 | 4.69 | 2.39 | 6.18 | 1.81 | 23.97 |
| 1975 | 1.81 | 2.05 | 4.98 | 2.71 | 11.25 | 3.07 | 25.87 |
| 1976 | 3.27 | 4.03 | 4.22 | 1.50 | 1.44 | 1.40 | 15.86 |
| 9-year average | 2.66 | 3.37 | 4.09 | 2.39 | 4.71 | 2.81 | 20.0 |

## *FERTILIZERS USED*

Except for the specific fertility studies where the fertilizers are specified in the report, the following fertilizers were used on the potato plot area:

Banded at planting - 20-10-10 - 650 lbs/A
Sidedressed - 45-0-0 - 200 lbs/A
Red clover plowed down.

## *HERBICIDES*

Preemergence - metribuzin (Sencor) 1/2 lbs/A + alachlor (Lasso) at 1-1/2 qts/A May 14.

Directed postemergence - metribuzin (Sencor) 1/4 lbs/A June 21 and 22.

## *DISEASE AND INSECT CONTROL*

The systemic insecticide Temik was applied at planting at 3 pounds per acre.

Foliar fungicide and insecticide sprays, applied with an air blast sprayer, were as follows:

| | |
|---|---|
| June 25 | Sevin |
| July 24 | Bravo + Thiodan |
| July 31 | Bravo + Monitor |
| August 7 | Bravo + Monitor |
| August 18 | Bravo + Monitor |
| August 27 | Bravo + Thiodan |
| September 6 | Bravo + Cygon |

# *POTATO YIELD TRIALS 1976*

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Twenty-five advanced seedlings and named varieties were planted at the Montcalm Research Farm in three blocks to permit harvests on August 10, September 1 and September 20.

Yield of marketable tubers, total solids, chip ratings and after cooking darkening are shown in the following tables. Several cultivars demonstrated characteristics desirable in our Michigan program and will be increased for seed.

When harvested August 10, the two seedlings AK37-19 and MS 002-171 produced equally high yields of US #1 potatoes that made exceptionally good potato chips. The total solids of the seedling AK37-19 were very high. MS 002-171 is a yellow fleshed potato with higher than average total solids. The Atlantic variety, while lower in yield, possessed high solids and made excellent chips. At later harvests AK37-19 and Atlantic increased in yield, maintained the high solids and chipped well. Two seedlings MS 706-34 and MS 711-8 exceeded 400 cwt/A. These are general purpose table varieties that store and cook well and have demonstrated the high yield over a period of years. Limited amounts of seed of these two seedlings are available for increase in seed programs. The seedling 003-69, a yellow flesh potato, makes excellent chips at harvest and after storage and reconditioning. It normally produces an average yield but its chip record over the past three years could make it very useful.

Several newer seedlings in the replicated yield trials or in seedling increase plots will be included in trials in 1977.

## Varieties Selected for Increase 1977
## Table Stock

| Variety | Marketable cwt/A | Specific Gravity | Chip Rating |
|---|---|---|---|
| | Early - August 10 | | |
| 235-2 | 255 | 1.087 | 4 |
| | Mid-Season - September 1 | | |
| 706-34 | 449 | 1.079 | 3 |
| 711-8 | 413 | 1.077 | 3 |
| 235-2 | 396 | 1.083 | 4 |
| AK37-5 | 374 | 1.081 | 4 |
| | Late - September 20 | | |
| 706-34 | 470 | 1.075 | 5 |
| 711-8 | 372 | 1.077 | 4 |
| AK37-5 | 365 | 1.083 | 4 |
| | Yellow Flesh | | |
| 002-302 | 298 | 1.091 | 1 |
| 003-69 | 289 | 1.090 | 1 |

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## Seedling Increase Plots 1976
## Planted May 13 - Harvested September 20

| Seedling | Marketable tubers cwt/A | Maturity* | Specific Gravity | Chip Rating |
|---|---|---|---|---|
| 102-2 | 326 | M | 1.095 | 4 |
| 103-54 | 355 | M | 1.081 | 1 |
| 105-2 | 377 | M | 1.090 | 2 |
| 108-5 | 370 | VL | 1.097 | 4 |
| 203-2 | 304 | E | 1.085 | 1 |
| 231-2 | 304 | E | 1.081 | 5 |
| 305-15 | 507 | L | 1.078 | 6 |
| 305-17 | 312 | VL | 1.086 | 4 |
| 305-19 | 312 | L | 1.099 | 4 |
| 305-22 | 341 | E | 1.076 | 6 |
| 305-24 | 326 | E | 1.072 | 7 |
| 307-1 | 283 | L | 1.102 | 3 |
| 307-6 | 341 | VL | 1.100 | 4 |

* E - early, M = medium, L = late, VL = very late
When compared to Katahdin maturity.

## Yield Trial 1976 - Second Harvest
## Montcalm Research Station
## September 1

| Variety | Marketable tubers cwt/A | Specific Gravity | Chip* rating 50° Harvest | Chip* rating 50° 2 mos. | After cooking darkening** 1 hr. | After cooking darkening** 24 hrs. |
|---|---|---|---|---|---|---|
| 706-34 | 449 | 1.079 | 3 | 6 | 3 | 3 |
| AK37-19 | 435 | 1.106 | 2 | 7 | 1 | 1 |
| 711-8 | 413 | 1.077 | 3 | 5 | 1 | 3 |
| 235-2 | 396 | 1.083 | 4 | 3 | 4 | 4 |
| A6789-7 | 394 | 1.080 | 3 | 4 | 1 | 2 |
| Atlantic | 388 | 1.100 | 1 | 2 | 3 | 3 |
| Snowchip | 382 | 1.081 | 5 | 5 | 3 | 3 |
| 645-2 | 380 | 1.082 | 4 | 2 | 2 | 2 |
| 231-2 | 378 | 1.081 | 5 | 4 | 2 | 2 |
| 709 | 376 | 1.078 | 3 | 7 | 2 | 3 |
| AK37-5 | 374 | 1.081 | 4 | 6 | 2 | 2 |
| 305-15 | 357 | 1.075 | 5 | 5 | 2 | 2 |
| 002-408 | 357 | 1.092 | 2 | 2 | 1 | 2 |
| Bellisle | 351 | 1.094 | 5 | 5 | 3 | 3 |
| 645-1 | 351 | 1.091 | 2 | 5 | 1 | 1 |
| 103-59 | 347 | 1.092 | 4 | 6 | 1 | 2 |
| 007-201 | 346 | 1.070 | 4 | 7 | 1 | 2 |
| Bison | 322 | 1.073 | 4 | 1 | 2 | 2 |
| 503 | 318 | 1.082 | 3 | 5 | 2 | 3 |
| 002-171 | 312 | 1.082 | 2 | 8 | 3 | 4 |
| 002-302 | 298 | 1.091 | 1 | 1 | 2 | 2 |
| 004-198 | 298 | 1.086 | 1 | 1 | 2 | 2 |
| 003-69 | 289 | 1.090 | 2 | 8 | 1 | 1 |
| Wischip | 244 | 1.078 | 1 | 1 | 3 | 3 |
| Centennial Russet | 234 | 1.079 | 5 | 1 | 2 | 2 |

*Scale 1 white, 10 dark, 3 or less acceptable.
**Scale 1 white, 5 dark, 3 or less acceptable.

Yield Trial 1976 - First Harvest
Montcalm Research Station
August 10

| Variety | Marketable tubers cwt/A | Specific Gravity | Chip Rating |
|---|---|---|---|
| AK37-19 | 314 | 1.101 | 2 |
| 002-171 | 293 | 1.086 | 1 |
| 004-198 | 263 | 1.084 | 2 |
| 645-2 | 261 | 1.083 | 4 |
| 235-2 | 255 | 1.087 | 4 |
| Atlantic | 252 | 1.100 | 1 |
| 007-201 | 244 | 1.068 | 3 |
| 709 | 240 | 1.081 | 3 |
| Bison | 236 | 1.076 | 4 |
| AK37-5 | 234 | 1.078 | 5 |
| 706-34 | 232 | 1.075 | 6 |
| 503 | 228 | 1.081 | 3 |
| 003-69 | 226 | 1.095 | 2 |
| Snowchip | 211 | 1.080 | 3 |
| 645-1 | 199 | 1.087 | 6 |
| 002-302 | 193 | 1.090 | 2 |
| 103-59 | 187 | 1.087 | 4 |
| Centennial Russet | 187 | 1.082 | 5 |
| 711-8 | 185 | 1.076 | 4 |
| Wischip | 181 | 1.080 | 3 |
| A6789-7 | 156 | 1.073 | 7 |
| Bellisle | 154 | 1.081 | 6 |

## Varieties Selected for Increase 1977
## Processing

| Variety | Marketable cwt/A | Specific Gravity | Chip Rating |
|---|---|---|---|
| | Early - Harvested August 10 | | |
| AK37-19 | 314 | 1.101 | 2 |
| 002-171 | 293 | 1.086 | 1 |
| 004-198 | 263 | 1.084 | 2 |
| Atlantic | 251 | 1.100 | 1 |
| | Mid-Season - Harvested September 1 | | |
| AK37-19 | 435 | 1.106 | 2 |
| A6789-7 | 394 | 1.080 | 3 |
| Atlantic | 388 | 1.100 | 1 |
| 002-408 | 357 | 1.092 | 2 |
| | Late - Harvested September 20 | | |
| 103-59 | 425 | 1.095 | 3 |
| A6789-7 | 404 | 1.082 | 3 |
| AK37-19 | 376 | 1.102 | 2 |
| 002-408 | 365 | 1.090 | 2 |

# THE EFFECT OF TYPE OF SEED PIECE AND SIZE ON GROWTH, YIELD AND QUALITY OF RUSSET BURBANK

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A study was conducted in 1976 to evaluate the effect of seed piece type and size on the growth and yield of Russet Burbank potatoes. Whole and cut seed were compared using 1, 1½, 2 and 2½ ounce seed pieces of each type. Whole tubers were selected and sized for each category and 6 to 8 ounce tubers were selected from which the properly sized seed pieces were cut. The cut seed pieces were obtained from a comparable position (apical) from each tuber to avoid differences which might occur due to using an apical or stem end seed piece. The tubers were cut and well suberized before planting. Ten seed pieces were hand planted per plot with four replications. Observations were made on emergence and growth. At harvest, number of stems, number of tubers and yield were determined for each hill.

## RESULTS

Table 1 summarizes the yield for each seed type and size. The one ounce seed piece for both the whole and cut seed resulted in smallest yields. Current recommendations for seed piece size are 1½ to 2 ounces. Except for the two ounce the cut seed tended toward greater yields, however, this difference was not significant. The reduced yield of the two ounce cut seed is inconsistent with the trend of the yields from the 1½ or 2½ seed size.

There was an increasing number of tubers per hill as seed piece size increased (Table 2). Whole seed had a greater number of tubers per hill, however, this was not a significant difference. The number of tubers per hill closely related to the numbers of stems per hill (Table 3). Again there were more stems with the larger seed pieces and a greater number with whole vs. the cut seed. There was no effect from any of these variables on specific gravity readings.

These data tend to substantiate the current recommendation for using a 1½ to 2 ounce seed piece. There was a yield reduction from using seed of one ounce or smaller whether whole or cut.

Table 1. The total yield (cwt/A) of Russet Burbank potatoes planted with two seed types of four sizes.

| | Seed Size | | | | |
|---|---|---|---|---|---|
| Seed Type | 1.0 oz. | 1.5 oz. | 2.0 oz. | 2.5 oz. | Average |
| Whole | 353 | 388 | 408 | 410 | 390 |
| Cut | 377 | 431 | 387 | 455 | 413 |
| Average | 366 | 410 | 397 | 432 | |

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Table 2. The total number of tubers harvested per hill of Russet Burbank potatoes planted with two seed types of four sizes.

| Seed Type | 1.0 oz. | 1.5 oz. | 2.0 oz. | 2.5 oz. | Average |
|---|---|---|---|---|---|
| Whole | 6.7 | 7.5 | 8.3 | 8.9 | 7.8 |
| Cut | 6.3 | 7.1 | 7.4 | 8.2 | 7.3 |
| Average | 6.5 | 7.3 | 7.9 | 8.5 | |

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Table 3. Number of stems per hill of Russet Burbank potatoes planted with two seed types and four sizes.

| Seed Type | 1.0 oz. | 1.5 oz. | 2.0 oz. | 2.5 oz. | Average |
|---|---|---|---|---|---|
| Whole | 3.0 | 3.5 | 4.4 | 4.6 | 3.9 |
| Cut | 2.7 | 3.1 | 3.6 | 4.0 | 3.3 |
| Average | 2.8 | 3.3 | 4.0 | 4.3 | |

## FERTILIZER STUDIES WITH POTATOES

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Two fertilizer studies were conducted with potatoes in 1976 at the Montcalm Experimental Farm. N-SERVE, a nitrification inhibitor, was evaluated at four rates of nitrogen, 0, 50, 100 and 150 pounds of N per acre on Russet Burbank potatoes. The nitrogen was applied as anhydrous ammonia, knifed into the soil April 13 several weeks before planting. Three rates of nitrogen were compared with and without one-half pound of N-SERVE. In addition, all plots received 650 pounds of a 20-10-10 starter fertilizer banded at planting time.

Potato yield, size and specific gravity measurements were taken on each plot and the data are presented in Table 1. Total yield was significantly reduced at the 100 and 150 pound rates when N-SERVE was used. These findings support research information from Wisconsin and Indiana indicating that potatoes prefer nitrate-nitrogen rather than ammonium-nitrogen. N-SERVE at these two rates gave a smaller percentage of large tubers (over 10 oz.) but a larger percent of knobby tubers. Specific gravity was increased at the 50 pound rate but decreased at the 150 pound rate.

A starter fertilizer study was established at the Montcalm Experimental Farm to evaluate different fertilizer materials and ground-up alfalfa hay on yield and quality of potatoes. Russet Burbank was used as the test variety. The experiment was initially designed so as to create visual differences in growth for the 1976 spudtacular field day recognizing that the treatments were not necessarily a practice which potato growers might follow. The rate of the various fertilizer materials was determined by the initial setting of the planter fertilizer bins which applied 650 pounds of a 20-10-10 fertilizer. The setting for other materials was not changed since there was essentially no way to obtain equal rates of application without using some type of filler material. Thus, each material was applied using the same setting on the planter and the rate was determined primarily by the physical properties of the material and its nutrient composition.

The data for this experiment are shown in Table 2. Specific gravity ranged from 1.071 to a high of 1.080. Straight potash (0-0-60) produced the lowest specific gravity as could have been predicted by its high salt index. This treatment should also serve warning to those growers who use a fertilizer high in potassium at planting time. Mono-ammonium phosphate (12-62-0) and super phosphate (0-46-0) with no potash had the highest specific gravity. Straight urea (46-0-0) and the mixed fertilizer (20-10-10 treatment 5) had significantly lower specific gravity than the previously mentioned treatments. When alfalfa hay was banded with the mixed fertilizer, specific gravity was significantly increased (treatment 7 versus 5).

Total yield was significantly increased by the addition of N, P and K (treatments 2, 3 and 4 versus 1), however, a combination of N-P-K tended to yield slightly better, particularly mono-ammonium phosphate and the 20-10-10 fertilizer with alfalfa. What effect alfalfa hay is having on yield is not known. Additional research will be required to assess if these differences are real and what constituent of alfalfa is affecting the growth process of the potato.

Table 1. Effect of nitrogen rate and "N-SERVE" on yield, specific gravity and size of irrigated Russet Burbank potatoes at the Montcalm Experimental Farm.

| Treatment Lb /NA | Specific Gravity | Size Distribution % Knobs | % Small | % Med. | % Large | Total Yield cwt/ Acre |
|---|---|---|---|---|---|---|
| 0 | 1.078 | 20.7 | 14.5 | 53.0 | 11.8 | 282 |
| 50 | 1.076 | 18.0 | 14.5 | 54.8 | 12.7 | 281 |
| 50 + N-SERVE | 1.080 | 18.3 | 13.7 | 55.5 | 12.5 | 293 |
| 100 | 1.080 | 16.2 | 11.4 | 54.5 | 17.9 | 323 |
| 100 + N-SERVE | 1.078 | 25.1 | 11.6 | 50.1 | 13.1 | 269 |
| 150 | 1.080 | 17.0 | 14.1 | 51.4 | 17.5 | 320 |
| 150 + N-SERVE | 1.076 | 21.4 | 16.6 | 50.7 | 11.2 | 269 |
| LSD (.05) | 0.003 | 5.6 | N.S. | N.S. | 4.7 | 33 |

Planted: May 11, 1976
Row spacing: 34 inches
Seed spacing: 12 inches
Basic fertilizer: 650 lb 20-10-10
at planting
Irrigation: 14 inches
Harvested: October 7, 1976
Harvest area: 142 Sq. Ft.

Table 2. Effect of starter fertilizer materials on size, yield and specific gravity of Russet Burbank potatoes.

| Treat | Starter[1] Fertilizer Treatment | Fertilizer Rate | Salt Index | Specific Gravity | Knobs | Small | Medium | Large | Total Yield |
|---|---|---|---|---|---|---|---|---|---|
| | | Lbs/A | | g/cc | --- | --- % | ------- | ---- | cwt/A |
| 1 | None | 0 | - | 1.079 | 26.0 | 14.1 | 48.4 | 11.5 | 243 |
| 2 | 46-0-0 | 454 | 75 | 1.077 | 19.6 | 14.1 | 49.4 | 16.9 | 287 |
| 3 | 0-46-0 | 681 | 10 | 1.080 | 25.9 | 11.2 | 47.0 | 15.8 | 298 |
| 4 | 0-0-60 | 733 | 116 | 1.071 | 27.0 | 8.8 | 46.6 | 17.7 | 295 |
| 5 | 20-10-10 | 650 | - | 1.076 | 19.0 | 10.4 | 46.7 | 23.8 | 304 |
| 6 | 12-62-0 | 611 | 30 | 1.080 | 17.2 | 12.2 | 52.2 | 18.3 | 315 |
| 7 | 20-10-10<br>+ alfalfa | 650<br>461 | - | 1.079 | 22.2 | 13.2 | 45.0 | 19.6 | 335 |
| LSD (.05) | | | | .003 | NS | 3.6 | NS | 6.0 | 36 |

[1] All plots received an additional 90 pounds of N per acre sidedressed June 21

Planted: May 11, 1976
Row spacing: 34 inches
Seed spacing: 12 inches
Irrigation: 14 inches
Harvested: October 7, 1976
Harvest area: 142 sq. ft.
Soil tests: pH=6.7, P=360, K=288, Ca=778, Mg=209

# WEED CONTROL IN THE PRODUCTION MANAGEMENT SYSTEM

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## PROCEDURE

Foundation seed of the Russet Burbank variety was planted on May 10, 1976. Five preplant incorporated and preemergence herbicide treatments were applied to 16 row plots and replicated three times. On June 21, at the time that urea was sidedressed and the crop was hilled, four directed, postemergence herbicide applications were made on four row plots within each preemergence treatment. The preemergence and postemergence entries were as follows:

| PREEMERGENCE ENTRY | lbs/A |
|---|---|
| EPTC (Eptam) ppi | 4 |
| linuron (Lorox) | 1½ |
| linuron (Lorox) + alachlor (Lasso) | 1 + 1½ |
| metribuzin (Sencor) + alachlor (Lasso) | ½ + 1½ |
| metribuzin (Sencor) | ½ |

| POSTEMERGENCE ENTRY | lbs/A |
|---|---|
| metribuzin (Sencor) | ¼ |
| metribuzin (Sencor) + alachlor (Lasso) | ¼ + 1 |
| metribuzin (Sencor) + alachlor (Lasso) | 3/8 + 1½ |
| none - check | |

Weed control ratings at harvest, yields and specific gravity determinations were made.

## RESULTS

There was no significant difference in the resulting total yield among any of the preemergence or postemergence treatments (Table 1). There was a lower yield in the Eptam treated plots because of inadequate broadleaf weed control. Except for this deviation there appears to be no apparent difference in yield. There was similarly no effect on specific gravity readings.

Table 2 summarizes the at harvest weed control data for each of the preemergence entries. These data show that Eptam did not adequately control the broadleaf weeds, especially barnyard grass and pigweed. The principle observation to note is the degree of barnyard grass control was not adequate. Where a known barnyard grass or a similar grassy weed problem exists, the use of materials such as EPTC (Eptam) or alachlor (Lasso) are most effective on grass.

Table 1. The total yield (cwt/A) of Russet Burbank potatoes when treated with different preemergence and postemergence herbicides.

| Preemergence Treatment | Directed Postemergence Treatment: Sencor | Sencor + Lasso | Sencor + Lasso | None | Average |
|---|---|---|---|---|---|
| Eptam | 289 | 301 | 325 | 314 | 307 |
| Lorox | 316 | 314 | 339 | 336 | 326 |
| Lorox + Lasso | 364 | 361 | 359 | 341 | 356 |
| Sencor + Lasso | 368 | 369 | 346 | 366 | 363 |
| Sencor | 353 | 363 | 352 | 336 | 351 |
| Average | 338 | 342 | 345 | 338 | |

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Table 2. The effect of several preemergence herbicides on the control of certain weed species.

| Preemergence Treatment | Weed Control Ratings* | | |
|---|---|---|---|
| | Lambsquarter | Pigweed | Barnyard grass |
| Eptam | 3.9 | 2.5 | 8.6 |
| Lorox | 9.8 | 9.3 | 6.2 |
| Lorox + Lasso | 10.0 | 9.7 | 9.6 |
| Sencor + Lasso | 10.0 | 9.5 | 9.3 |
| Sencor | 9.8 | 9.0 | 5.5 |

* Weed Control Rating 0 = no control, 10 = complete control.

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Table 3. The effect of postemergence herbicides on the control of certain weed species.

| Postemergence Treatment | Weed Control Ratings** | | |
|---|---|---|---|
| | Lambsquarter | Pigweed | Barnyard grass |
| Sencor | 8.6 | 7.8 | 7.4 |
| Sencor + Lasso | 8.8 | 8.4 | 8.2 |
| Sencor + Lasso | 8.7 | 8.3 | 8.0 |
| Check-none | 8.7 | 7.4 | 7.7 |

* These four postemergence treatments were made on plots treated with a preemergence herbicide.

** 0 = no control, 10 = complete control.

# HERBICIDE-INSECTICIDE INTERACTIONS ON POTATOES

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A study to determine the possible interaction of selected preemergence herbicides and soil systemic insecticides applied on potatoes at planting was conducted at the Montcalm Farm in 1976. The plots were established on May 10 using Superior and Russet Burbank variety seed in three replications of adjacent single 25 foot rows. The insecticides were banded with the fertilizer at the time of planting and the herbicides were applied to the soil surface in two-row plots covering both varieties and all insecticides prior to emergence of the potatoes. One plot was not treated with the systemics at planting to serve as a control for the study. Included in the herbicide component was a treatment of preplant incorporated Eptam whereas the other herbicide treatments were applied preemergence. The DiSyston treatment plot was sidedressed with another application prior to hilling. All of the plots received a full foliar program of insecticides and fungicides during the season in addition to the soil systemics.

The plots were examined carefully during emergence and periodically through the season to determine any abnormal symptoms which may have been caused by any of the herbicide or insecticide components alone or in combination with each other. The weed and insect control in the treated plots were excellent throughout the season and were not a limiting factor in the final yield except for the Eptam treatment. The plots were harvested on September 23 to determine the overall yields and size distribution of the tubers. Samples of the tubers from each plot were later checked for specific gravity. The list of herbicide and insecticide treatments and the yields of tubers from both varieties are presented in Table 1.

## Results

All of the plots emerged uniformally with the systemic treatments slightly ahead of the untreated plots which has been noted in previous studies. This poor broadleaf weed control in the Eptam plot is reflected in the lower yields across all of the insect control treatments. The insect control was very good in all plots and probably did not affect the yield. The increased yields in the soil systemic plots were probably due to the early plant development which has been noted in other studies. This could be a response from nematode protection since it is most prominent in the Temik and Furadan plots. No adverse symptoms were observed on either variety which could be associated with the chemical treatments. The data are being analyzed statistically for further study.

Table 1. List of Herbicide and Insecticide Treatments and Resulting Yields on both Varieties.

A. List of Chemical Treatments: All treatment rates are active ingredient per acre (insecticides based on 34" rows).

| Herbicide Treatments | |
|---|---|
| Eptam 7 E.C. | 4 lb ppi |
| Lorox 50 W.P. | 1½ lb pre |
| Sencor 50 W.P. | ½ lb pre |
| Lorox 50 W.P. + Lasso 4 E.C. | 1 lb<br>1½ lb pre |
| Sencor 50 W.P. + Lasso 4 E.C. | ½ lb<br>1½ lb pre |

| Insecticide Treatments | |
|---|---|
| Control (Foliars only) | |
| Temik 15 G | 3 lb |
| Furadan 10 G | 3 lb |
| DiSyston 15 G | 3 lb |

B. Superior Variety - Total Yields (cwt)/A

| | | Insecticide | | |
|---|---|---|---|---|
| Herbicide | Foliars | Temik | Furadan | DiSyston |
| Eptam | 140 | 220 | 193 | 163 |
| Lorox | 165 | 250 | 238 | 187 |
| Sencor | 174 | 281 | 250 | 215 |
| Lorox + Lasso | 187 | 257 | 214 | 185 |
| Sencor + Lasso | 161 | 285 | 213 | 184 |

C. Russet Burbank - Total Yields (cwt)/A

| | | Insecticide | | |
|---|---|---|---|---|
| Herbicide | Foliars | Temik | Furadan | DiSyston |
| Eptam | 234 | 269 | 213 | 249 |
| Lorox | 209 | 338 | 300 | 285 |
| Sencor | 269 | 367 | 330 | 288 |
| Lorox + Lasso | 249 | 351 | 300 | 273 |
| Sencor + Lasso | 236 | 369 | 325 | 294 |

# EFFECT OF PRE-STORAGE SEED TREATMENT ON POTATO PRODUCTION

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*Department of Botany and Plant Pathology*

Tests were conducted to determine effect of pre-storage treatment of seed potatoes with fungicides and bactericides on stand improvement and productivity. In the fall of 1975 washed and unwashed seed potatoes, variety Minona, were treated before storing with 7 different fungicide and bacteriacide combinations to combat Fusarium dry rot and bacterial soft rot. Treated tubers were held in a commercial storage (temperature $40^{0}$ - $45^{0}$ F) from early October until the end of April 1976.

Seed was selected at random from treated tubers held in storage, rated for dry and soft rot infection.

Seed was cut and planted by hand (row width, 34", plant spacing 9") at the Montcalm Research Farm on May 11, 1976. Treatments were randomized in 2 adjacent blocks and replicated 4 times. Individual plots consisted of a single row 25" long.

Fungicide and insecticide sprays were applied at regular intervals throughout the growing season, and plots were irrigated when necessary.

A stand count was made six weeks after planting. Plots were harvested during the second week in October.

Results:

| Treatment | Rate | Condition | % diseased tubers* | | Stand* | Yield - cwt/A* | |
|---|---|---|---|---|---|---|---|
| | (PPM) | of tubers | Dry Rot | Soft Rot | % | U.S. #1 | B |
| Mertect 340 + Chlorine | 1500+200 | washed | 5 c | 0 b | 91 b | 251.2 c | 22.2 b |
| Mertect 340 + Chlorine | 1500+200 | unwashed | 8 c | 1 b | 93 b | 249.9 c | 20.9 b |
| Mertect 340 + Nabac 25 EC | 1500+100 | washed | 6 c | 2 b | 94 b | 243.9 c | 25.3a |
| Mertect 340 + Nabac 25 EC | 1500+100 | unwashed | 8 c | 1 b | 96 b | 284.0 d | 21.1 b |
| Benlate 50W+ Chlorine | 1500+200 | washed | 5 c | 0 b | 96 b | 282.7 c | 21.0 b |
| Benlate 50W+ Chlorine | 1500+200 | unwashed | 10 c | 1 b | 94 b | 263.6 c | 22.2 b |
| Benlate 50W+Nabac 25EC | 1500+100 | washed | 7 c | 0 b | 94 b | 260.0 c | 20.9 b |
| Benlate 50W+Nabac 25EC | 1500+100 | unwashed | 9 c | 0 b | 93 b | 264.6 c | 19.9 b |
| Topsin M + Chlorine | 1500+200 | washed | 8 c | 1 b | 92 b | 251.5 c | 19.0 b |
| Topsin M + Chlorine | 1500+200 | unwashed | 8 c | 1 b | 91 b | 253.3 c | 21.6 b |
| Topsin M + Nabac 25 EC | 1500+100 | washed | 10 c | 0 b | 93 b | 277.2 c | 21.2 b |
| Topsin M + Nabac 25 EC | 1500+100 | unwashed | 10 c | 0 b | 93 b | 272.3 c | 22.0 b |
| Bravo 6F + Chlorine | 1500+200 | washed | 33ab | 1 b | 85a | 212.2 b | 19.0 b |
| Bravo 6F + Chlorine | 1500+200 | unwashed | 24 b | 2 b | 84a | 218.5 b | 19.1 b |
| No treatment | | washed | 43a | 5a | 79a | 178.0a | 34.4a |
| No treatment | | unwashed | 29 b | 6a | 80ab | 190.3ab | 32.0a |

*Average of 4 replications. Values followed by a common letter do not differ significantly at the 5% level (Duncan's Multiple Range Test).

Summary: Treatment containing Mertect Benlate and Topsin were very effective in reducing the incidence of Fusarium dry rot in stored tubers. Bacterial soft rot was kept to a minimum with the addition of either chlorine or Nabac. All treatments except for those containing Bravo improved the stand and increased yields of U.S. #1 tubers.

## CROP ROTATION AND THE INFLUENCE OF ROOT-LESION NEMATODES ON MICHIGAN POTATO PRODUCTION

*G.W. Bird*
*Department of Entomology*

The objective of this study was to evaluate the influence of various crops grown in rotation with potatoes on tuber yield losses caused by the root-lesion nematode (Pratylenchus penetrans).

A range containing five replicate plots of sudax, red clover, potatoes (Russet Burbank), corn and fallowing established at the MSU Montcalm Potato Farm in 1975 and planted with potatoes (cv Norchip) in 1976. Half of the range was maintained as soil infested with the root-lesion nematode and the other half was maintained in a relatively nematode-free environment. Nematode population density dynamics were monitored throughout the growing season, and the crop harvested.

Root-lesion nematode population densities were highest where red clover was grown in 1975 (TABLE 1). During the early part of the growing season, populations of the root-lesion nematode were significantly higher (P=0.05) where red clover was planted the previous year (TABLE 2). In the presence of Temik 15G, the previous crop had no influence on population densities; whereas, in the absence of a nematicide, there were significant differences among the populations. Nematode control had a much greater influence on tuber yields than the previous crop (TABLE 3).

TABLE 1

Population densities of Pratylenchus penetrans following five crops at the Montcalm Potato Research Farm

| 1975 Crop | No. per $100cm^3$ soil | | | No. per gram root |
|---|---|---|---|---|
| | 11/25/75 | 2/27/76 | 4/27/76 | 11/25/76 |
| Corn | 11b[1] | 13a | 22a | 0a |
| Sudax | 15a | 29a | 51a | 10a |
| Red Clover | 15a | 50a | 80a | 109b |
| Potato | 14ab | 40a | 51a | 1a |
| Fallow | 11b | 11a | 25a | 15a |

[1] Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Newman-Kuels Multiple Range Test.

TABLE 2

Influence of crop rotation and chemical control on population densities of root-lesion nematodes (*Pratylenchus penetrans*) associated with potato roots

| 1976 treatment and 1975 crop | No. per 100cm$^3$ soil 6/4/76 | No. per 100cm$^3$ soil 7/16/76 | No. per gram root 7/16/76 |
|---|---|---|---|
| DiSyston | | | |
| Corn | 31ab[1] | 7abc | 3.6ab |
| Sudax | 41ab | 15bc | 12.8b |
| Red Clover | 55b | 19c | 11.8b |
| Potato | 30ab | 1a | 0.8a |
| Fallow | 39ab | 10abc | 0.8a |
| Temik | | | |
| Corn | 27ab | 1a | 0.4a |
| Sudax | 21a | 5ab | 0.4a |
| Red Clover | 58b | 12abc | 2.4a |
| Potato | 17a | 3ab | 0.0a |
| Fallow | 13a | 4ab | 0.6a |

[1] Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Newman-Kuels Multiple Range Test.

TABLE 3

Influence of crop rotation and chemical control of nematodes on yields of Norchip potatoes.

| 1976 treatment and 1975 crop | Yield (ctw/acre) | | | |
|---|---|---|---|---|
| | A's | J's | B's | Total |
| DiSyston | | | | |
| Corn | 228abc [1] | 0a | 38c | 266ab |
| Sudax | 203ab | 0a | 32b | 235a |
| Red Clover | 192a | 0a | 40c | 232a |
| Potato | 218abc | 0a | 41c | 259ab |
| Fallow | 216abc | 0a | 39c | 255a |
| Temik | | | | |
| Corn | 295c | 4ab | 28ab | 327c |
| Sudax | 288bc | 4ab | 32b | 324c |
| Red Clover | 291c | 9b | 26a | 326c |
| Potato | 264bc | 6b | 27a | 297bc |
| Fallow | 298c | 8b | 27a | 333c |

[1] Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Knewman-Kuels Multiple Range Test.

## INFLUENCE OF EXPERIMENTAL NEMATICIDES ON CONTROL OF ROOT-LESION NEMATODES AND POTATO YIELDS

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Eleven formulations of nematicides were evaluated for control of root-lesion nematodes (Pratylenchus penetrans) associated with potato (cv Monona) at the Michigan State University Montcalm Potato Research Farm. Each treatment was replicated four times in a randomized block design, with each plot consisting of four rows, 34 inches apart and 50 ft in length. All of the fumigant nematicides were injected to a 6-8 inch soil depth on April 21, 1976. Soil samples for nematode analysis (Centrifugation-flotation technique) were taken from each plot immediately before application of the soil fumigants. The non-fumigant nematicides and DiSyston 15G insecticide were applied at planting on May 13, 1976. Soil and root samples from nematode analysis (centrifugation-floation and shaker techniques) were taken at mid-season (July 26, 1976) and at harvest (September 9, 1976). The center two rows of each plot were harvested, graded and analyzed for quality. During the growing season the plants were maintained under normal commercial fertility, irrigation, insect control and disease control practices.

There were no significant differences in initial soil population densities of P. penetrans among the experimental plots, and in all cases the population densities were above the estimated threshold levels for most potato cultivars grown in Michigan. There were no significant differences among the soil population densities of P. penetrans associated with the nematicide treatments during the middle of the growing season or at harvest (see table). Based on P. penetrans recovered from root tissue, the corn cob formulation of Temik 15G resulted in the best nematode control. Vorlex and Vydate 10G also appeared to lower root population densities of P. penetrans. NA 060, Dacamox 10G, Furadan 10G and the Nemacur-DiSyston 15G formulation appeared to have less than desirable nematicidal activity in this test. While similar initial population densities of P. penetrans at this site significantly (P = 0.05) reduced yields of cv Superior and cv Russet Burbank potatoes in 1973, 1974, 1975, and 1976, they did not significantly inhibit yields of Monona in this test. The corn cob formulation of Temik 15G, however, did significantly (P = 0.05) increase total tuber yield compared with the Dacomox 10G, Mocap 10G and Nemacur-DiSyston 15G treatments. The corn cob formulation of Temik 15G also significantly (P = 0.05) increased jumbo Grade yields compared with NA 061 and Nemacur-DiSyston 15G, and B Grade yields compared with Mocap 10G and Nemacur-DiSyston 15G. Three generalizations can be developed from these data; 1) Monona is very likely more tolerant to P. penetrans than Superior or Russet Burbank, 2) the corn cob formulation of Temik 15G, Vorlex and Vydate 10G appeared to suppress population densities of P. penetrans to a greater degree than the other materials evaluated in this test, and 3) NA 060, Furadan 10G, Dacamox 10G, Mocap 10G and Nemacur-DiSyston 15G did not perform as well as expected. None of the nematicide treatments had any significant influence on the specific gravity of the tubers. The plots treated with Mocap 10G suffered from poor early-season insect control. Furadan 10G would most likely have performed better if it had been applied in a band instead of in-row.

| Treatment, rate per acre and method of application | Yield (ctw/care) | | | | Specific gravity | *P. penetrans*/100 $cm^3$ soil | | *P. penetrans*/g root tissue | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Jumbo grade | A grade | B grade | | 4/23 | 7/26 | 7/26 | 9/13 |
| Check (DiSyston 15G, 20 lb, in-row) | 187ab[1] | 44ab | 139a | 3.4ab | 1.079a | 105a | 48a | 83ab | 115b |
| Vorlex, 10 gal, broadcast + DiSyston 15G, 20 lb, in-row | 180ab | 35ab | 140a | 4.1ab | 1.080a | 79a | 31a | 11a | 56ab |
| NA 061, 6.7 gal, broadcast + DiSyston 15G, 20 lb, in-row | 178ab | 26b | 147a | 5.1ab | 1.079a | 130a | 44a | 85ab | 69ab |
| NA 060, 10 gal, broadcast + DiSyston 15G, 20 lb, in-row | 176ab | 37ab | 136a | 2.8ab | 1.076a | 97a | 17a | 100ab | 91b |
| NA 055, 10 gal, broadcast + DiSyston 15G, 20 lb, in-row | 190ab | 31ab | 155a | 4.5ab | 1.074a | 47a | 14a | 115ab | 46ab |
| Temik 15G, gypsum, 20 lb, in-row | 192ab | 45ab | 144a | 3.0ab | 1.078a | 139a | 36a | 23ab | 34ab |
| Temik 15G, corn cob, 20 lb, in-row | 209a | 57a | 148a | 5.5a | 1.076a | 118a | 30a | 10a | 0a |
| Vydate 10G, 30 lb, in-row | 183ab | 33ab | 138a | 3.9ab | 1.078a | 51a | 18a | 33ab | 2ab |
| Nemacur-DiSyston 15G, 20 lb, in-row | 160b | 19b | 138a | 2.7b | 1.076a | 60a | 16a | 155b | 79ab |
| Mocap 10G, 30 lb, in-row | 171b | 39ab | 129a | 2.7b | 1.075a | 47a | 17a | 43ab | 65ab |
| Furadan 10G, 30 lb, in-row | 183ab | 41ab | 134a | 4.9ab | 1.079a | 95a | 58a | 310b | 43ab |
| Dacamox 10G, 30 lb, in-row | 168b | 43ab | 126a | 4.2ab | 1.073a | 123a | 51a | 261b | 70ab |

[1]Column means followed by the same letter are not significantly different (P = 0.05) according to the Student-Newman-Kuels Multiple Range Test.

# INSECTICIDE EVALUATION ON POTATOES

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*Department of Entomology*

A study to evaluate experimental insecticides for the control of foliar insects on potatoes and their resulting yields at harvest was conducted at the Montcalm Farm. Onaway and Russet Burbank seed were used in the study to represent the early and late maturing varieties. The plots were planted on May 11 using Premier Foundation seed in three replications of paired 25 foot rows each.

The Onaway plot included ten treatments of soil systemic insecticides applied in a four inch band in the seed row at the time of planting and 20 foliar treatments applied with a $CO_2$ sprayer on June 18 and July 21. Five leaf samples were taken from each of the treatment plots on July 13 to evaluate the materials for potato leaf hopper nymphs and early aphid control. The plots were examined weekly after the second foliar application but aphid populations did not build up sufficiently for enumeration. The plots were harvested on August 31 and September 1 and graded for size and yields determined. The specific gravities of tuber samples from each plot were determined later. The list of treatments, insect data and harvest data are presented in Table 1.

The Russet Burbank plot included 17 treatments of soil systemic insecticides and 13 foliar treatments applied as described above on the Onaways.

Five leaf samples were taken from each of the plots on July 13 to evaluate the materials for potato leaf hopper nymphs and early aphid control. Ten sweep samples with an insect net were obtained from each plot on July 28 to further evaluate the foliage feeding insects. The plots were examined weekly for aphids but the populations did not build up. Another sweep sample was obtained on August 27 but was lost before analysis. The plots were harvested on September 22 and 23 to determine yields and specific gravities on tuber samples. The data are presented in Table 2.

Table 1. Insecticide Evaluation on Onaway Variety

| Material and Formulation | Lb Tox* | Insects/15 leaves: Pot.Leaf Hop.Nymphs | Insects/15 leaves: Aphids | Yields: Cwt/A | Yields: % by Size: to $1\frac{7}{8}$ | Yields: % by Size: $1\frac{7}{8}$-$3\frac{1}{4}$ | Yields: % by Size: $3\frac{1}{4}$+ | Gran |
|---|---|---|---|---|---|---|---|---|
| Soil Systemics | | | | | | | | |
| Nemacur 15% - Disyston 15% G | 12 lb | 0 | 2 | 363 | 6 | 75 | 19 | 1.0757 |
| Disyston 15G | 3 lb | 1 | 0 | 335 | 4 | 80 | 16 | 1.0770 |
| Disyston 15G | 3 lb | | | | | | | |
| + Disyston 15G (Sidedress) | 3 lb | 0 | 0 | 312 | 7 | 81 | 12 | 1.0767 |
| Furadan 10G | 3 lb | 0 | 4 | 319 | 5 | 83 | 12 | 1.0797 |
| Furadan 10G | 3 lb | | | | | | | |
| + Furadan 4F (Foliar) | 1 lb | 0 | 1 | 375 | 5 | 78 | 17 | 1.0770 |
| Dacamox 10G | 3 lb | 0 | 1 | 334 | 3 | 81 | 16 | 1.0783 |
| Temik 15G | 2 lb | 0 | 0 | 404 | 4 | 79 | 17 | 1.0780 |
| Temik 15G | 3 lb | 1 | 0 | 344 | 6 | 81 | 13 | 1.0773 |
| Temik 15G (1/2 rate N) | 3 lb | 0 | 0 | 374 | 5 | 80 | 15 | 1.0790 |
| Temik 15G (No N) | 3 lb | 0 | 0 | 382 | 5 | 80 | 15 | 1.0787 |
| Foliars | | | | | | | | |
| Mobil 9087 2 EC | 3/4 lb | 11 | 7 | 324 | 7 | 86 | 7 | 1.0780 |
| GCP 9646 4 EC | 1/2 lb | 47 | 1 | 332 | 5 | 78 | 17 | 1.0787 |
| Zolone 3 EC | 1 lb | 57 | 2 | 346 | 4 | 83 | 13 | 1.0750 |
| PP 557 2 E | 1 oz | 14 | 2 | 316 | 5 | 84 | 11 | 1.0810 |
| PP 557 2 E | 2 oz | 15 | 5 | 339 | 5 | 84 | 11 | 1.0780 |
| Vydate 2 E | 0.5 lb | 32 | 9 | 322 | 5 | 80 | 15 | 1.0777 |
| Bay SRA 12869 6 EC | 1 lb | 22 | 4 | 330 | 7 | 84 | 9 | 1.0763 |
| Croneton 4 E | 1/2 lb | | | | | | | |
| + Guthion 2 S | + 1/2 lb | 49 | 3 | 314 | 5 | 78 | 17 | 1.0767 |
| Guthion 2 S | 1/2 lb | 64 | 8 | 357 | 5 | 87 | 8 | 1.0773 |
| Bay NTN 9306 6 EC | 1 lb | 8 | 4 | 333 | 5 | 82 | 13 | 1.0770 |
| Bay NTN 9306 6 EC | 1 lb | | | | | | | |
| + Monitor 4 WM | + 3/4 lb | 4 | 0 | 309 | 4 | 79 | 17 | 1.0770 |
| Monitor 4 WM | 3/4 lb | 13 | 4 | 337 | 6 | 80 | 14 | 1.0777 |
| Orthene 75 S | 1 lb | 2 | 1 | 339 | 5 | 83 | 12 | 1.0780 |
| Furadan 4 F | 1 lb | 1 | 9 | 363 | 4 | 83 | 13 | 1.0767 |
| Pirimor 50 W | 4 oz | 32 | 7 | 340 | 7 | 84 | 9 | 1.0777 |
| SD-43775 2.4 EC | 0.1 lb | 5 | 1 | 311 | 6 | 80 | 14 | 1.0773 |
| SD-41706 2.4 EC | 0.1 lb | 8 | 0 | 344 | 5 | 81 | 14 | 1.0793 |
| Thiodan 3 EC | 3/4 lb | 23 | 0 | 330 | 7 | 84 | 9 | 1.0790 |
| Imidan 50 W | 1 lb | | | | | | | |
| + Pirimor 50 W | 4 oz | 42 | 2 | 319 | 5 | 85 | 10 | 1.0783 |
| DPX 3853 2 EC | 1/2 lb | 8 | 2 | 306 | 6 | 83 | 11 | 1.0775 |
| Untreated | -- | 28 | 4 | 295 | 5 | 90 | 5 | 1.0773 |
| Untreated | -- | 30 | 6 | 309 | 6 | 84 | 10 | 1.0807 |

*Soil treats (In-row and Sidedress) rates based on 34" rows (15,390 ft/A.). Foliar treats applied in water at 50 gal/A.

able 2. Insecticide Evaluation on Russet Burbank Variety

| aterial and Formulation | Lb Tox /A* | Insects/15 leaves: Pot Leaf Hop. Nymphs | Insects/15 leaves: Aphids | Insects/30 Sweeps: Pot Lf Hops | Insects/30 Sweeps: Potato Beetles | Insects/30 Sweeps: Aphids | Yield Cwt/A | Spec Gran |
|---|---|---|---|---|---|---|---|---|
| oil Systemics | | | | | | | | |
| emacur 15%-Disston 15% Gran | 12 lb | 5 | 0 | 6 | 9 | 3 | 320 | 1.0863 |
| isyston 15G | 3 lb | 1 | 1 | 30 | 12 | 3 | 272 | 1.0870 |
| isyston 15G | 3 lb | | | | | | | |
| + Disyston 15G (Sidedress) | 3 lb | 0 | 0 | 8 | 5 | 1 | 287 | 1.0867 |
| uradan 10G | 3 lb | 1 | 1 | 20 | 3 | 17 | 301 | 1.0847 |
| uradan 10G | 3 lb | | | | | | | |
| + Furadan 4F (Foliar) | 1 lb | 1 | 0 | 3 | 0 | 12 | 318 | 1.0843 |
| acamox 10G | 3 lb | 0 | 0 | 6 | 0 | 8 | 293 | 1.0843 |
| emik 15G | 2 lb | 1 | 0 | 7 | 3 | 3 | 352 | 1.0903 |
| emik 15 G | 3 lb | 0 | 0 | 1 | 0 | 2 | 335 | 1.0867 |
| emik 15G (1/2 rate Nitrogen) | 3 lb | 0 | 0 | 7 | 0 | 1 | 341 | 1.0873 |
| emik 15G (No Nitrogen) | 3 lb | 0 | 0 | 5 | 0 | 3 | 374 | 1.0890 |
| acamox 10G | 2 lb | 0 | 0 | 7 | 1 | 12 | 306 | 1.0863 |
| S-15647 CR 10G | 2 lb | 6 | 0 | 6 | 5 | 6 | 318 | 1.0880 |
| emik Gyp 15G | 2 lb | 0 | 0 | 9 | 2 | 2 | 304 | 1.0880 |
| emik Gyp 15G | 3 lb | 0 | 0 | 4 | 2 | 4 | 358 | 1.0900 |
| C - 21865 75 WP | 1-1/2 lb | 2 | 0 | 13 | 15 | 0 | 308 | 1.0883 |
| C - 21865 75 WP | 3 lb | 0 | 0 | 13 | 17 | 6 | 317 | 1.0887 |
| C - 21865 75 WP | 6 lb | 0 | 0 | 8 | 4 | 6 | 311 | 1.0880 |
| oliars | | | | | | | | |
| roneton 4E (Bay Hox 1901) | 1/2 lb | | | | | | | |
| + Guthion 2S | + 1/2 lb | 43 | 2 | 12 | 0 | 4 | 266 | 1.0840 |
| uthion 2S | 1/2 lb | 47 | 4 | 10 | 0 | 3 | 279 | 1.0857 |
| ay NTN 9306 6 EC | 1 lb | 27 | 3 | 11 | 1 | 2 | 248 | 1.0840 |
| ay NTN 9306 6 EC | 1 lb | | | | | | | |
| + Monitor 4 WM | + 3/4 lb | 7 | 1 | 3 | 1 | 2 | 292 | 1.0863 |
| onitor 4 WM | 3/4 lb | 10 | 7 | 7 | 7 | 4 | 294 | 1.0867 |
| rthene 75S | 1 lb | 2 | 1 | 2 | 14 | 5 | 297 | 1.0860 |
| uradan 4F | 1 lb | 0 | 9 | 3 | 0 | 2 | 346 | 1.0853 |
| irimor 50W | 4 oz | 34 | 8 | 3 | 6 | 0 | 261 | 1.0843 |
| D-43775 2.4 EC | 0.1 lb | 14 | 1 | 4 | 0 | 0 | 292 | 1.0860 |
| D-41706 2.4 EC | 0.1 lb | 6 | 2 | 1 | 0 | 5 | 285 | 1.0870 |
| hiodan 3 EC | 3/4 lb | 57 | 17 | 14 | 8 | 4 | 276 | 1.0857 |
| midan 50 W | 1 lb | | | | | | | |
| + Pirimor 50 W | 4 oz | 15 | 5 | 8 | 2 | 0 | 289 | 1.0837 |
| PX 3853 2 EC | 1/2 lb | 26 | 1 | 10 | 7 | 1 | 296 | 1.0867 |
| ntreated | -- | 51 | 6 | 14 | 11 | 13 | 246 | 1.0850 |
| ntreated | -- | 49 | 4 | 20 | 22 | 7 | 241 | 1.0860 |

*Soil (In-row and Sidedress) treats rates based on 34" rows (15,390 ft/A.). Foliar reats applied in water at 50 gal/A.

Results

Very few aphids developed in the plots of either variety during the season although the leaf samples on July 13 indicated their presence and potential increase. The potato leaf hopper nymphs were held in check by the soil systemics and most of the foliars even though it had been over three weeks since the first foliar application. The first sweep samples indicated very few differences between any of the treatments. It is doubtful if these are statistically significant if analyzed. There is a wide variation in the yields from the different plots from either variety with the soil systemics generally higher. The apparent differences can not be explained by insect control only without further analysis. There appears to be no differences between the specific gravities of any of the tuber samples.

# VALIDATION OF POTATO PEST ON-LINE COMPUTER SIMULATION

*G.W. Bird*
*Department of Entomology*

The objective of this investigation was to validate the interactive potato root-lesion nematode computer simulation developed at M.S.U., and to convert it to potato varieties of economic significance in Michigan.

Ninety-six 50 ft. rows of potatoes (32 of Superior, 32 of Onaway and 32 of Russet Burbank) were planted at the Montcalm Potato Farm (5/12/76). Half of the plants were maintained in a soil environment containing the root-lesion nematode (Pratylenchus penetrans) and half were maintained in a relatively nematode-free environment. The area was divided into eight separate blocks. Beginning on 5/21/76, 48 plants (16 from each variety, 8 from each soil environment, and 6 from each block) were harvested every seven days through 9/7/76. On each date, the following parameters were measured:

1. Tuber fresh weight
2. Tuber dry weight
3. Stolon fresh weight
4. Stolon dry weight
5. Root fresh weight
6. Root dry weight
7. Shoot fresh weight
8. Shoot dry weight
9. Mother tuber fresh weight
10. Mother tuber dry weight
11. Shoots per mother tuber
12. Root distribution
13. Nematodes per plant
14. Nematodes per gram root tissue
15. Nematodes per 100 $cm^3$ soil
16. Number of second order roots

Some of these data are presented in Figures 1-28, and are being used to convert the M.S.U. Potato-Pest Computer Simulation from the original German varieties to Russet Burbank, Superior and Onaway. A systems scientist and several individuals employed by the M.S.U. Pest Management program are working on this project, and should be completed within the next six months. The potato simulation is unique and has been demonstrated to a diverse and large segment of the scientific community. It has been received with favor and recognition of its potential for pest-crop ecosystem prediction has been even better than expected.

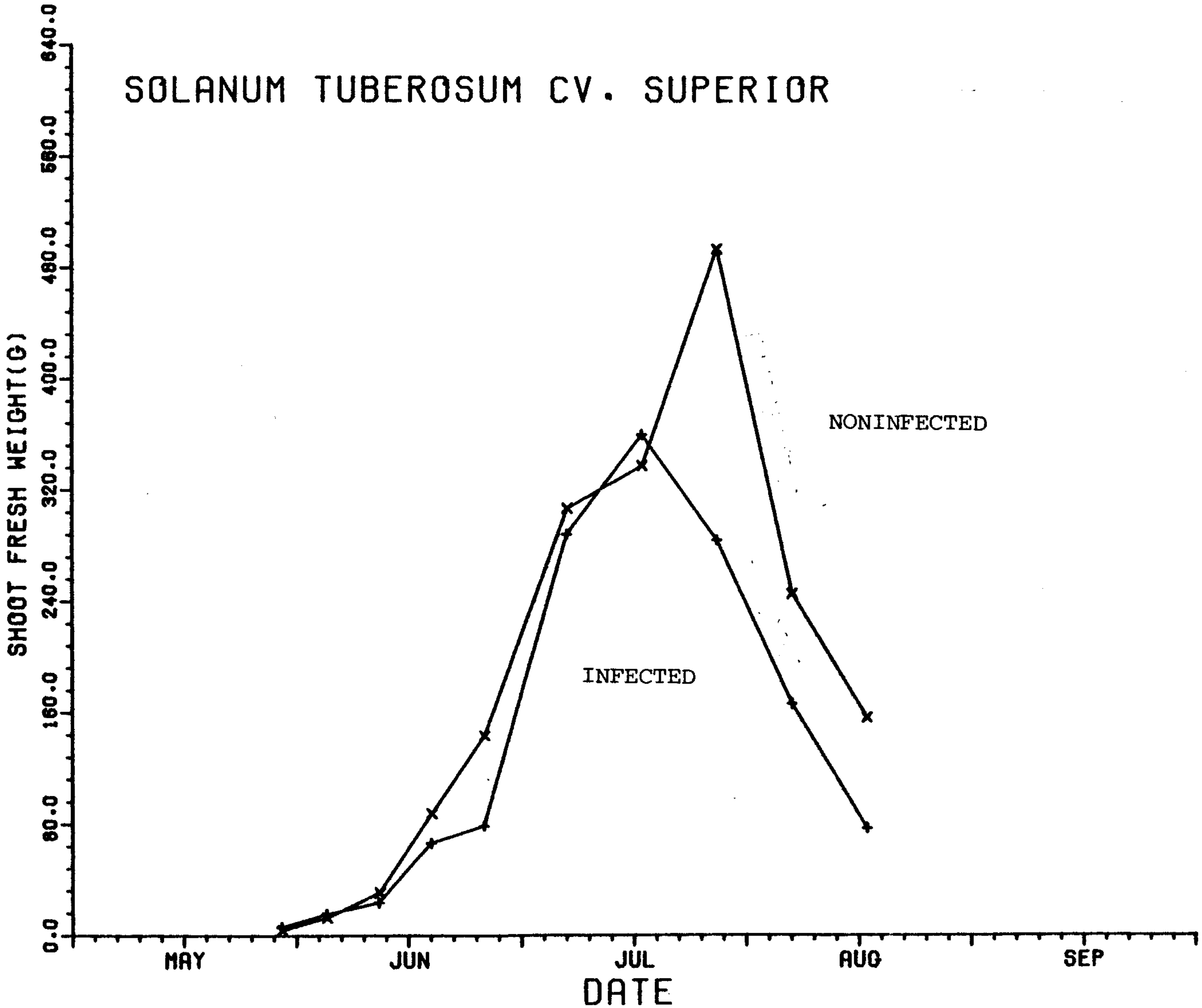

SOLANUM TUBEROSUM CV. SUPERIOR
SHOOT FRESH WEIGHT(G)
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
MAY
JUN
JUL
AUG
SEP
DATE
NONINFECTED
INFECTED

FIGURE 1

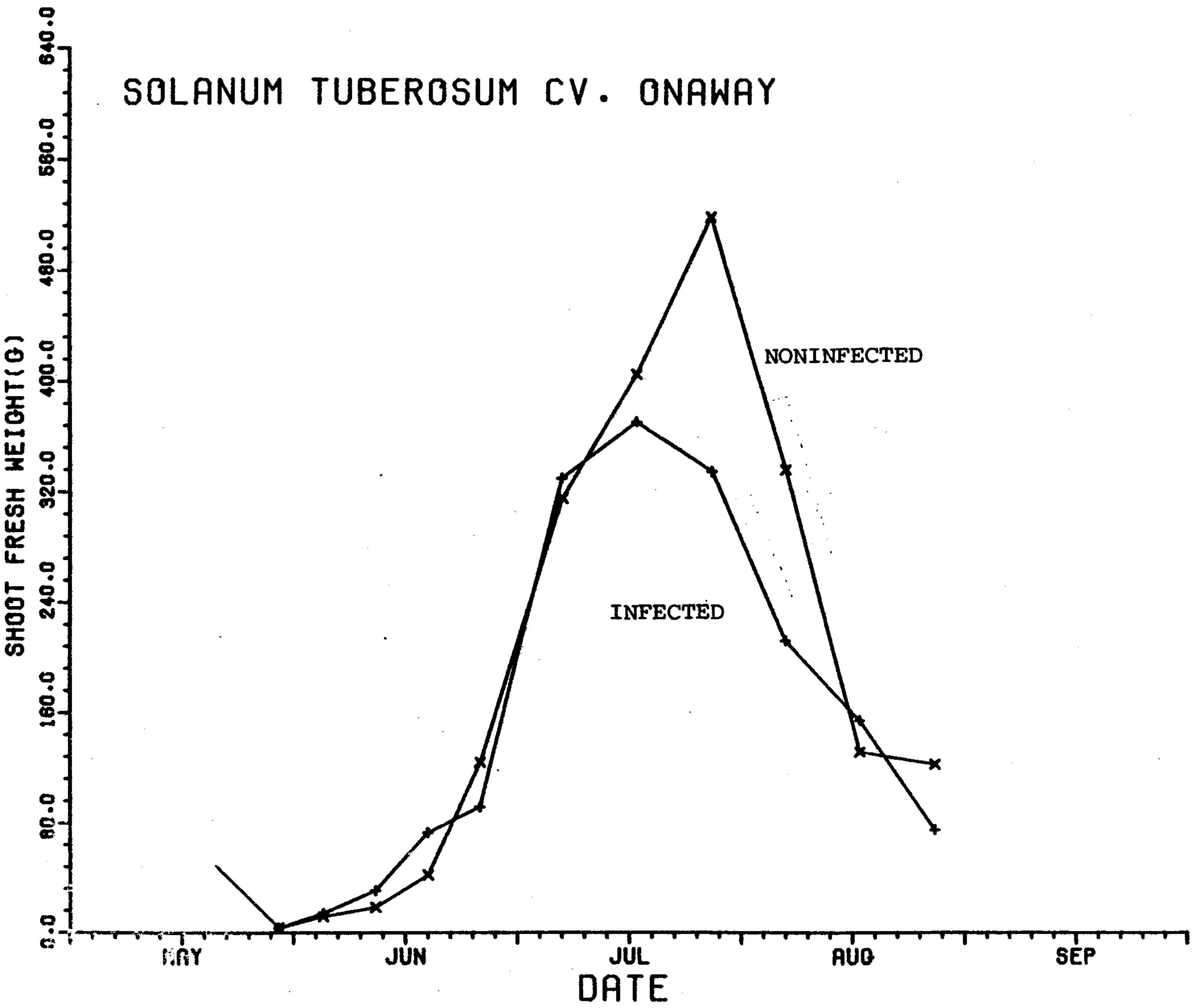

SOLANUM TUBEROSUM CV. ONAWAY
640.0
560.0
480.0
400.0
320.0
240.0
160.0
80.0
0.0
SHOOT FRESH WEIGHT(G)
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 2

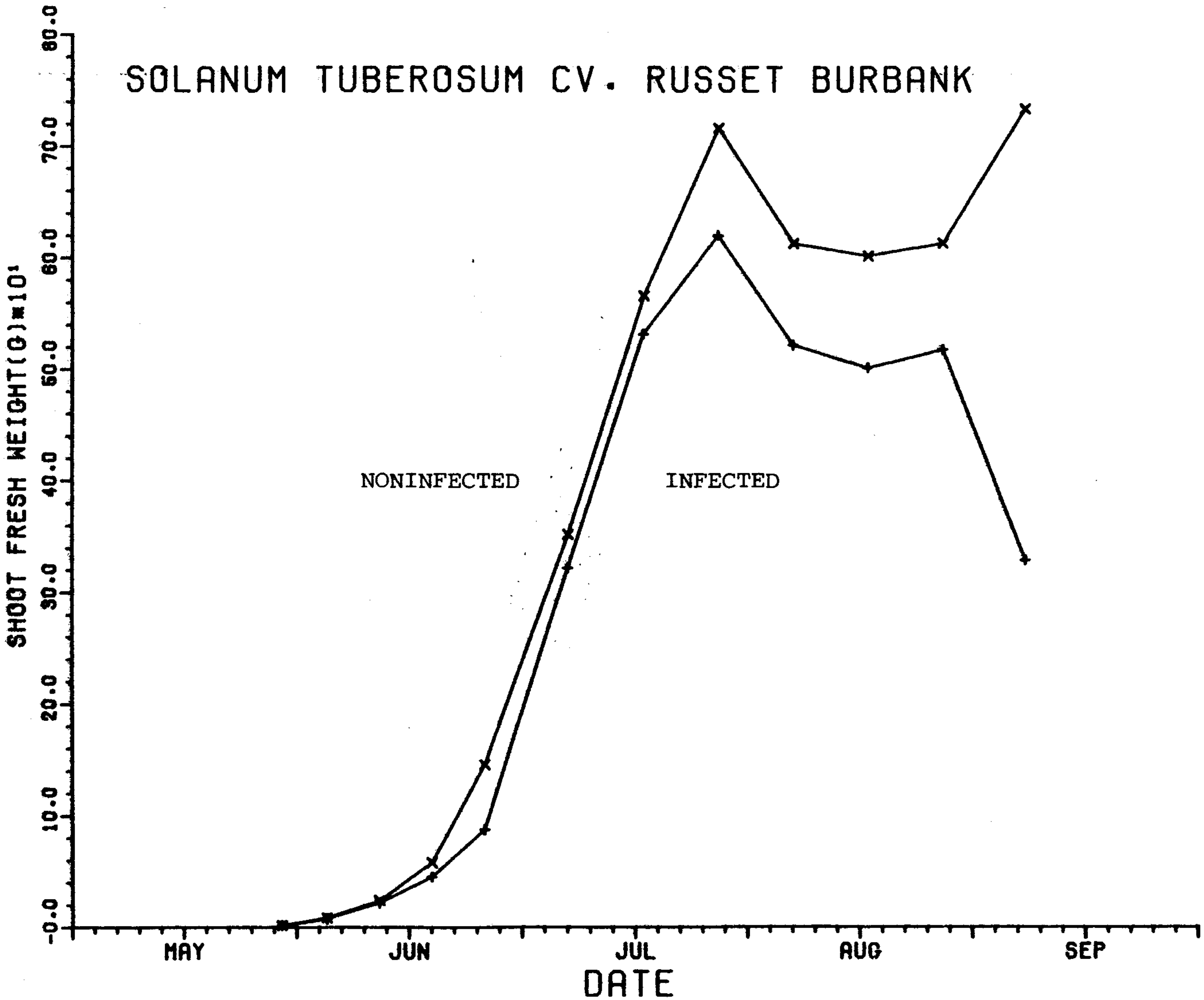

SOLANUM TUBEROSUM CV. RUSSET BURBANK
SHOOT FRESH WEIGHT(G)x10¹
-0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 3

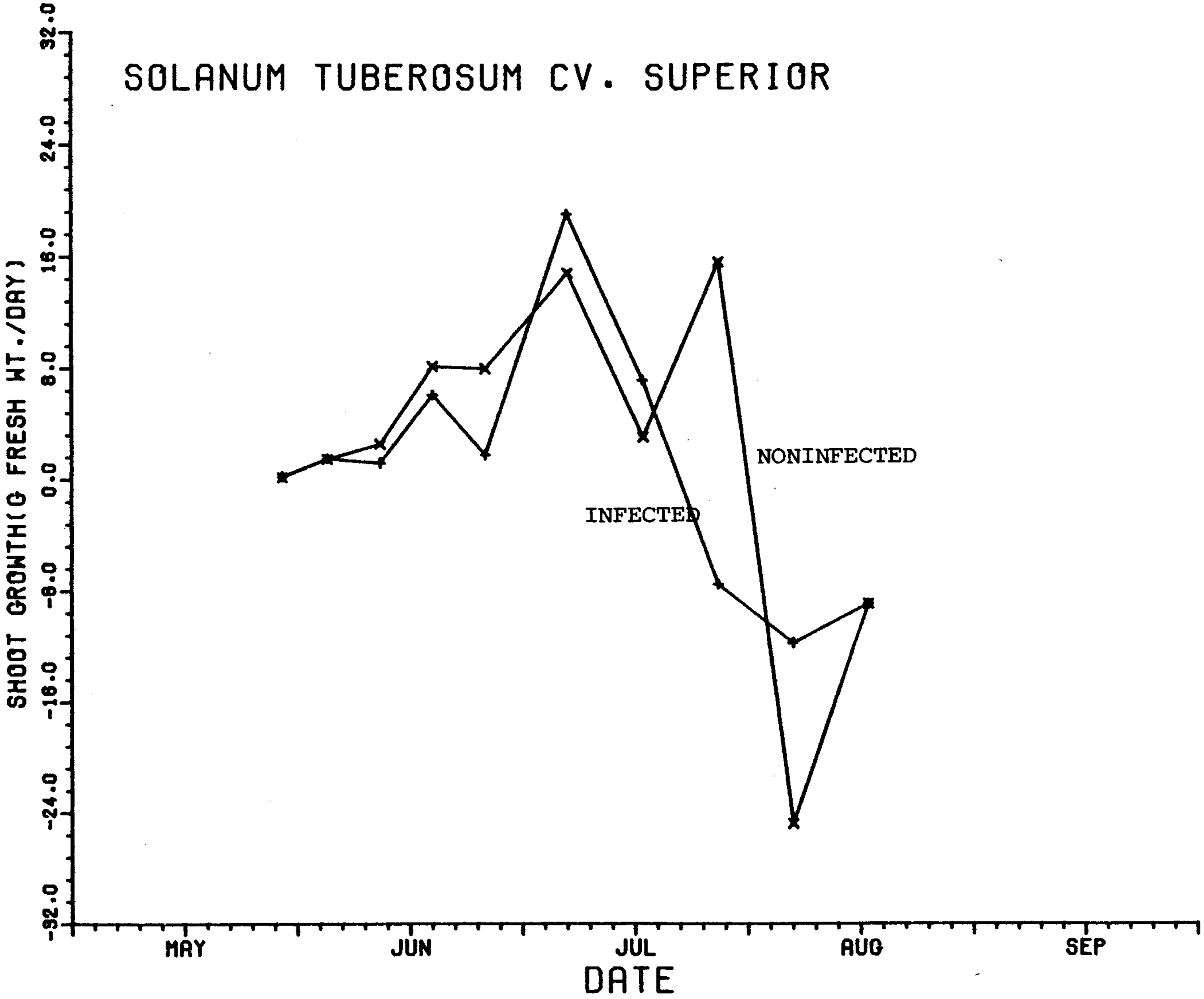
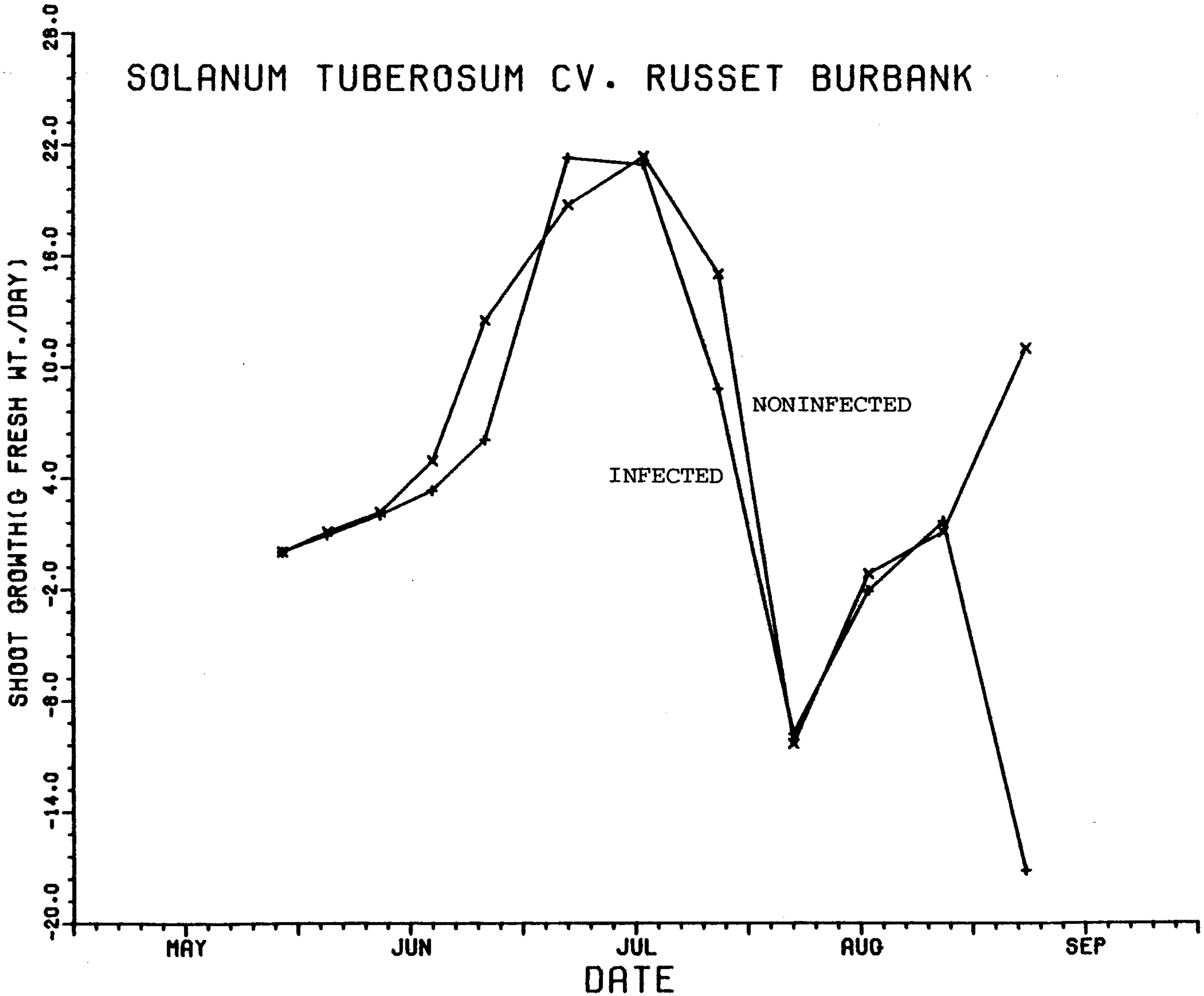
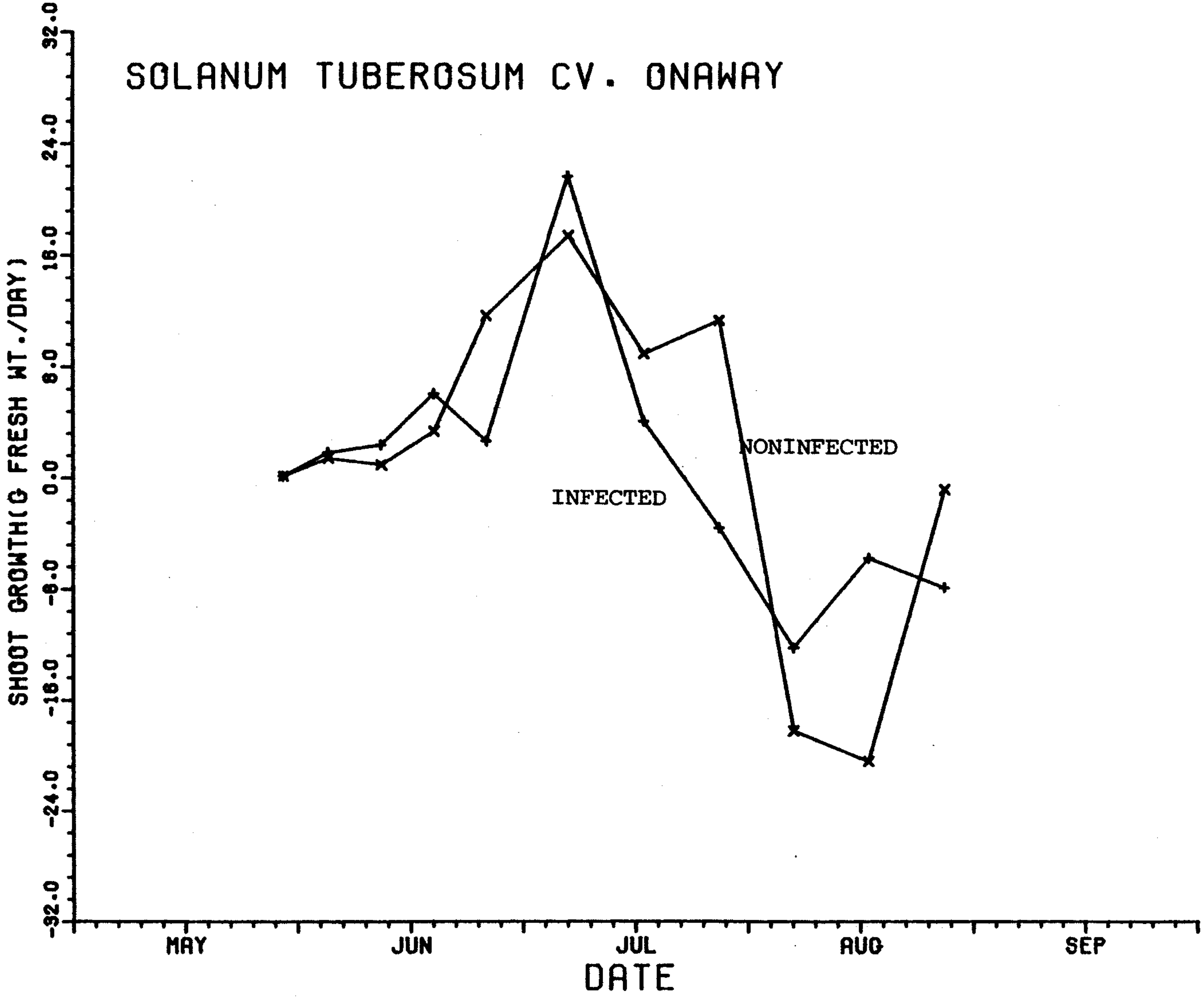

SOLANUM TUBEROSUM CV. SUPERIOR
SHOOT GROWTH(G FRESH WT./DAY)
32.0
24.0
16.0
8.0
0.0
-8.0
-16.0
-24.0
-32.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 4



SOLANUM TUBEROSUM CV. RUSSET BURBANK
SHOOT GROWTH(G FRESH WT./DAY)
28.0
22.0
16.0
10.0
4.0
-2.0
-8.0
-14.0
-20.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE


FIGURE 5


SOLANUM TUBEROSUM CV. ONAWAY
SHOOT GROWTH(G FRESH WT./DAY)
32.0
24.0
16.0
8.0
0.0
-8.0
-16.0
-24.0
-32.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FINGURE 6

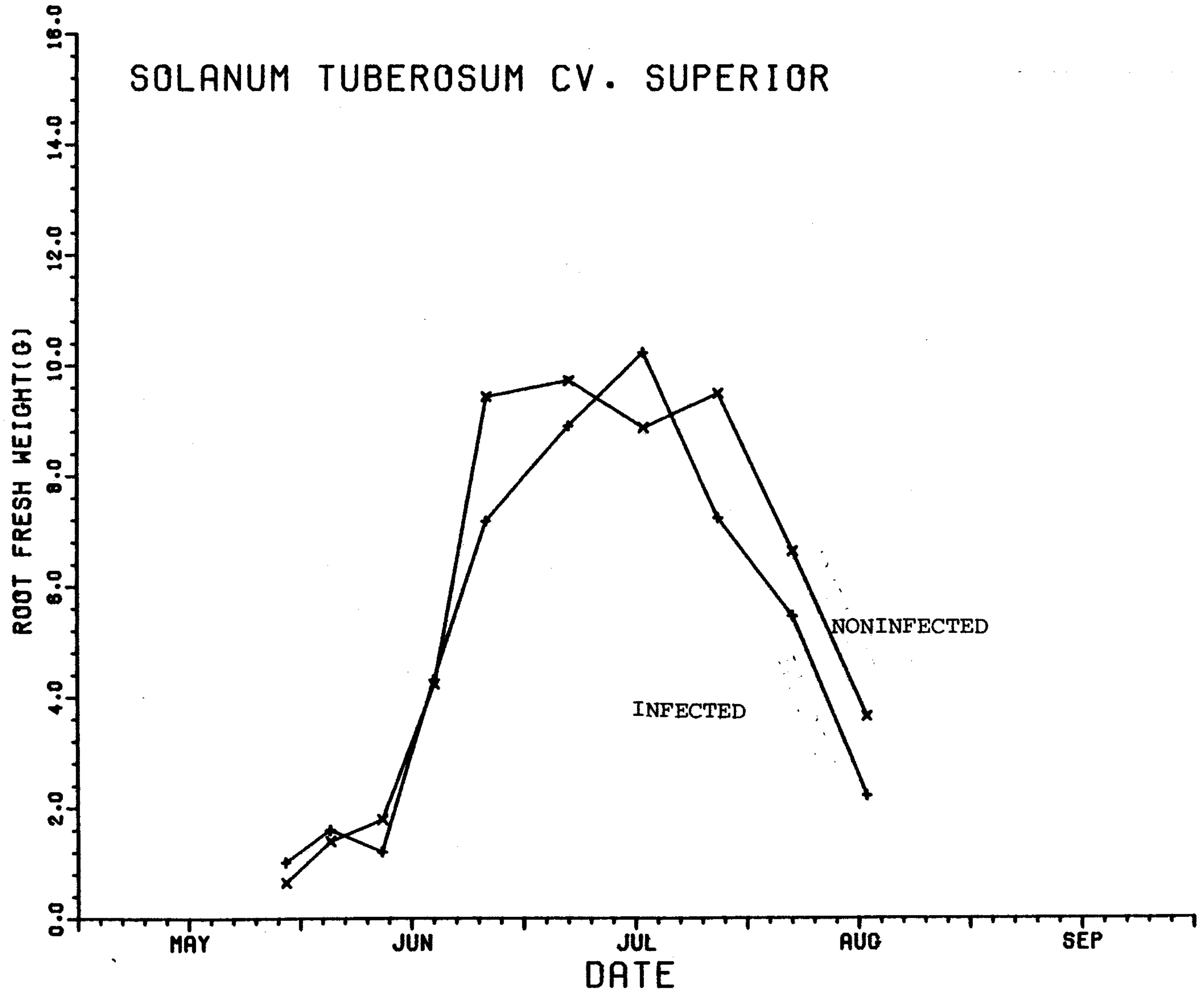
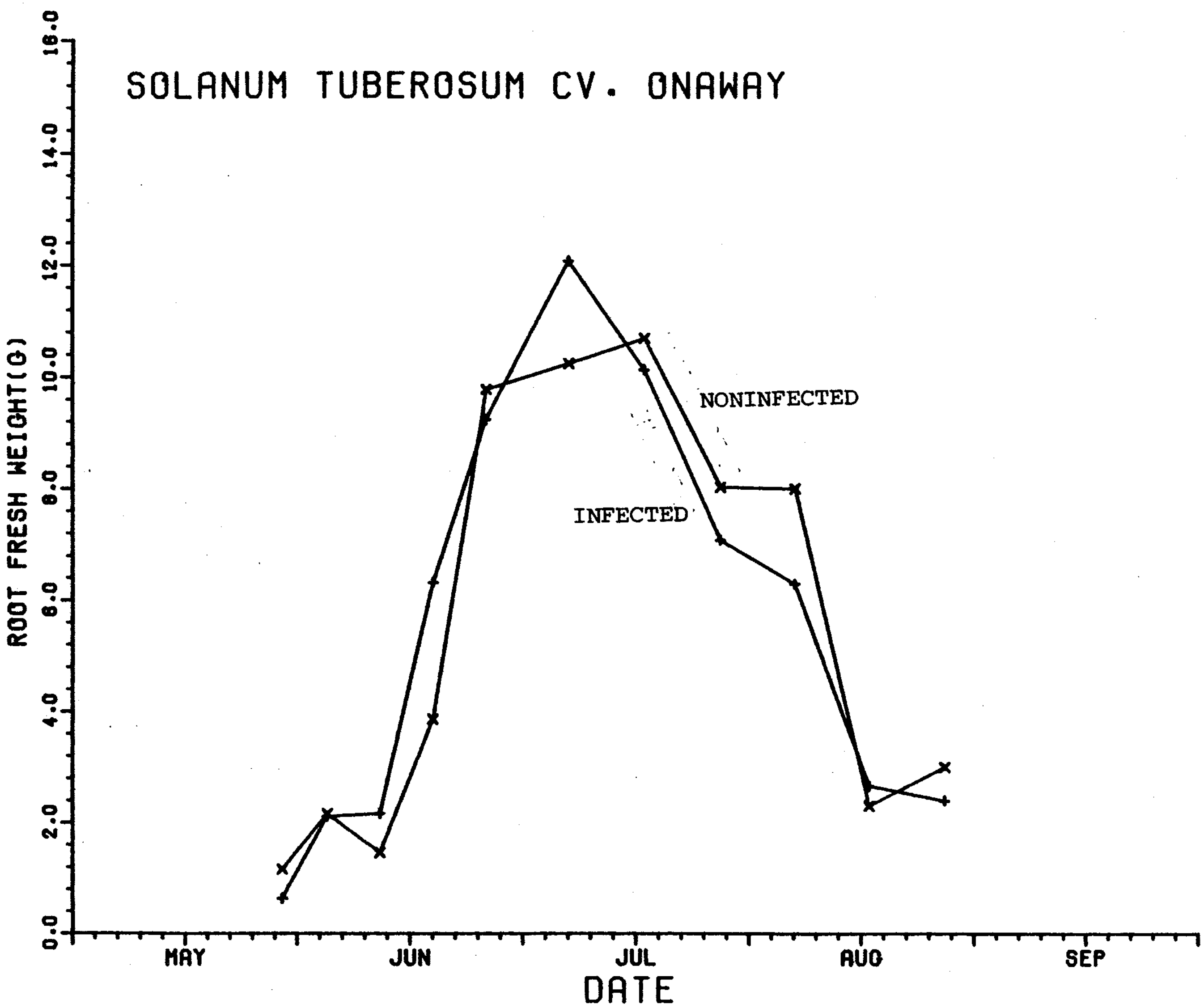

SOLANUM TUBEROSUM CV. SUPERIOR
ROOT FRESH WEIGHT(G)
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
MAY
JUN
JUL
AUG
SEP
DATE
NONINFECTED
INFECTED

FIGURE 7



SOLANUM TUBEROSUM CV. ONAWAY
ROOT FRESH WEIGHT(G)
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE


FIGURE 8

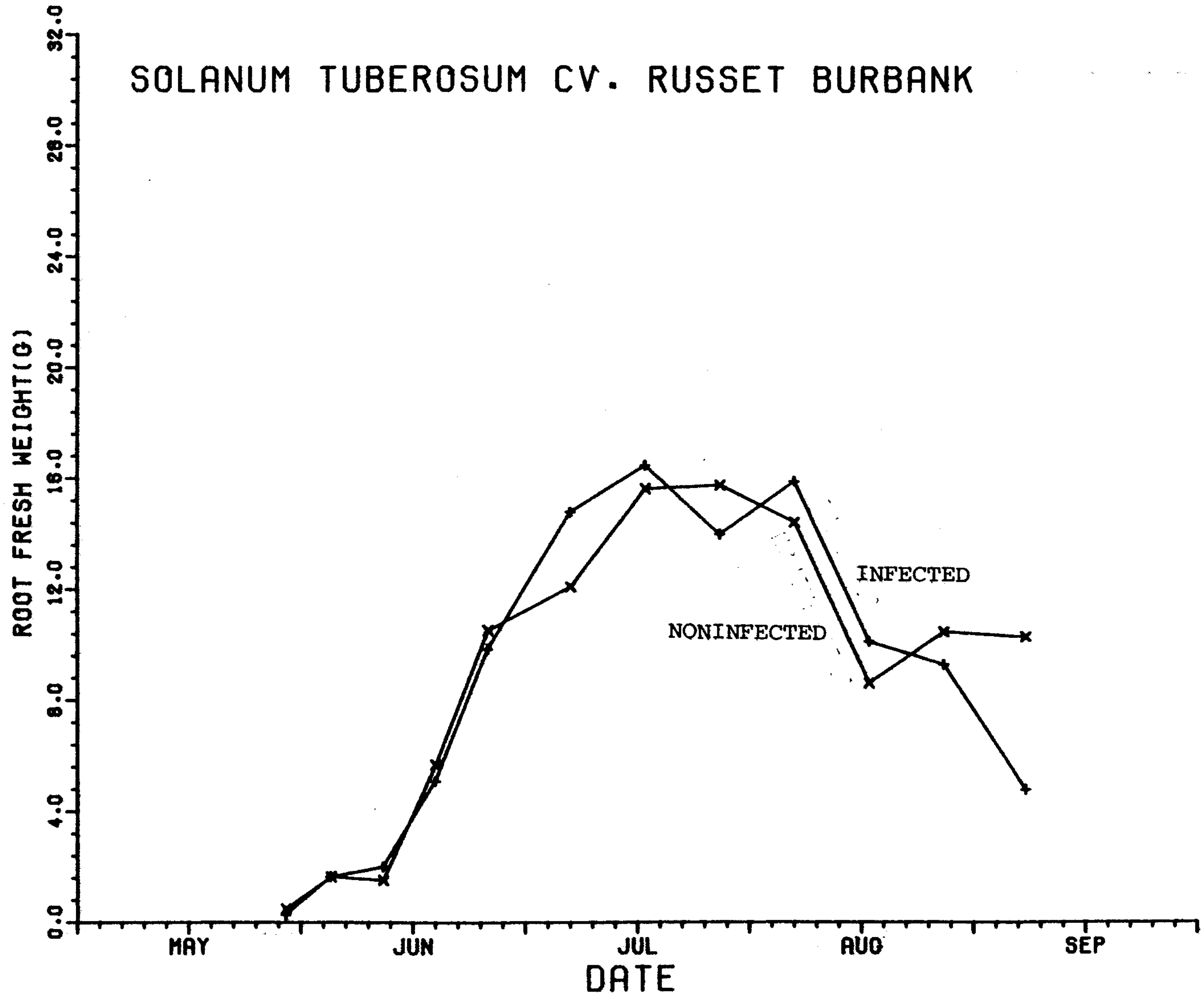

SOLANUM TUBEROSUM CV. RUSSET BURBANK
ROOT FRESH WEIGHT(G)
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0
0.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 9

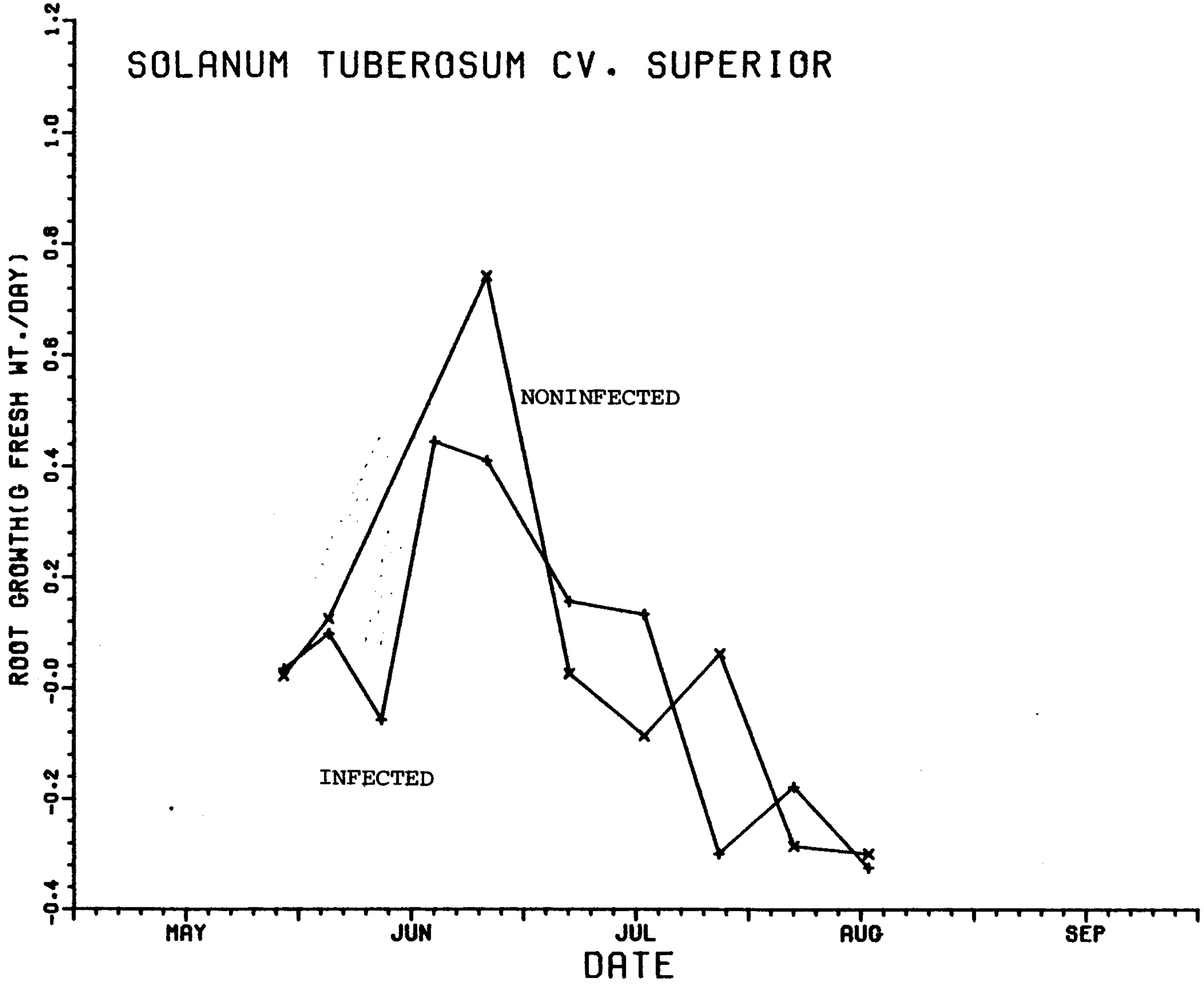

SOLANUM TUBEROSUM CV. SUPERIOR
ROOT GROWTH(G FRESH WT./DAY)
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
-0.4
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 10

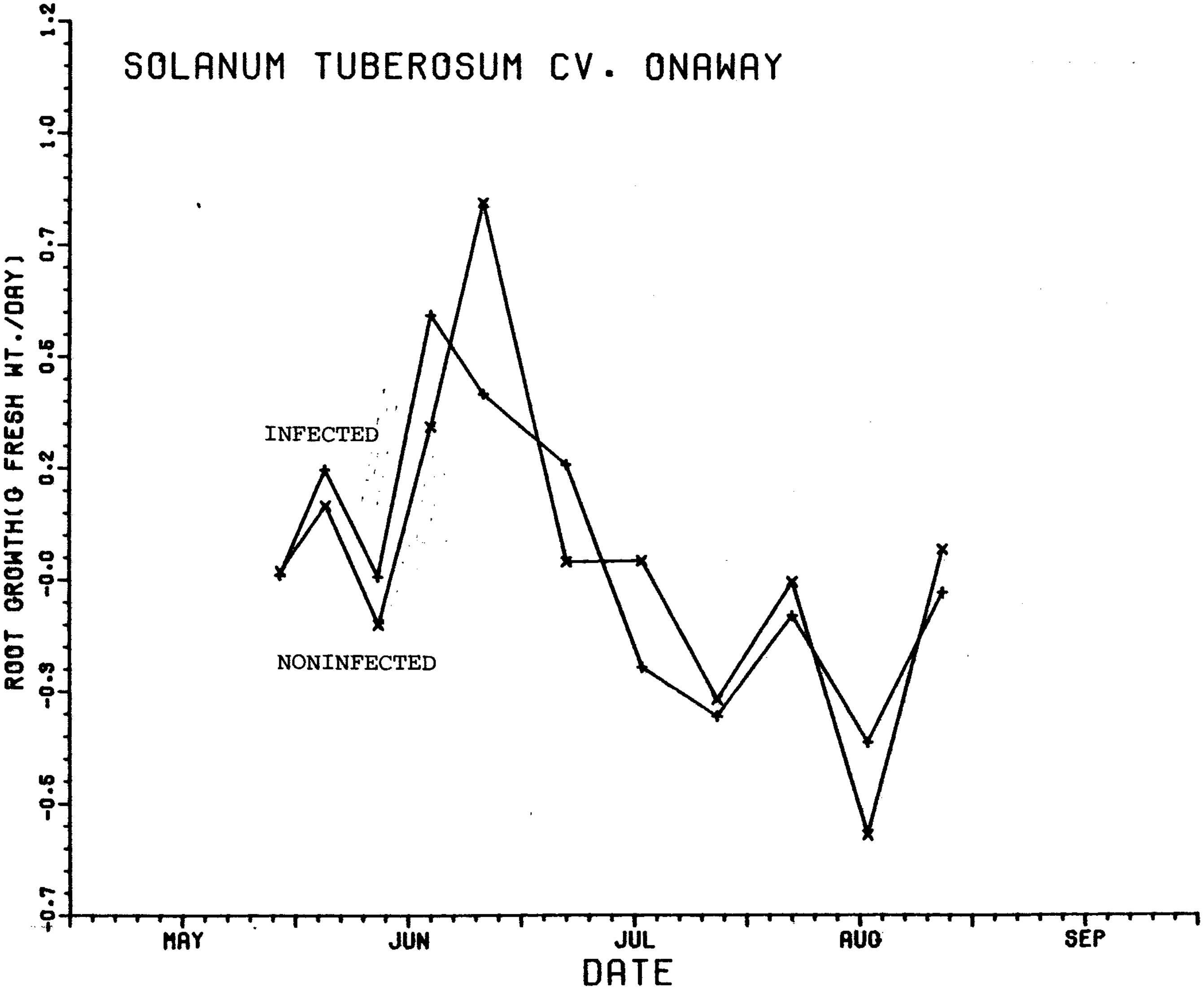
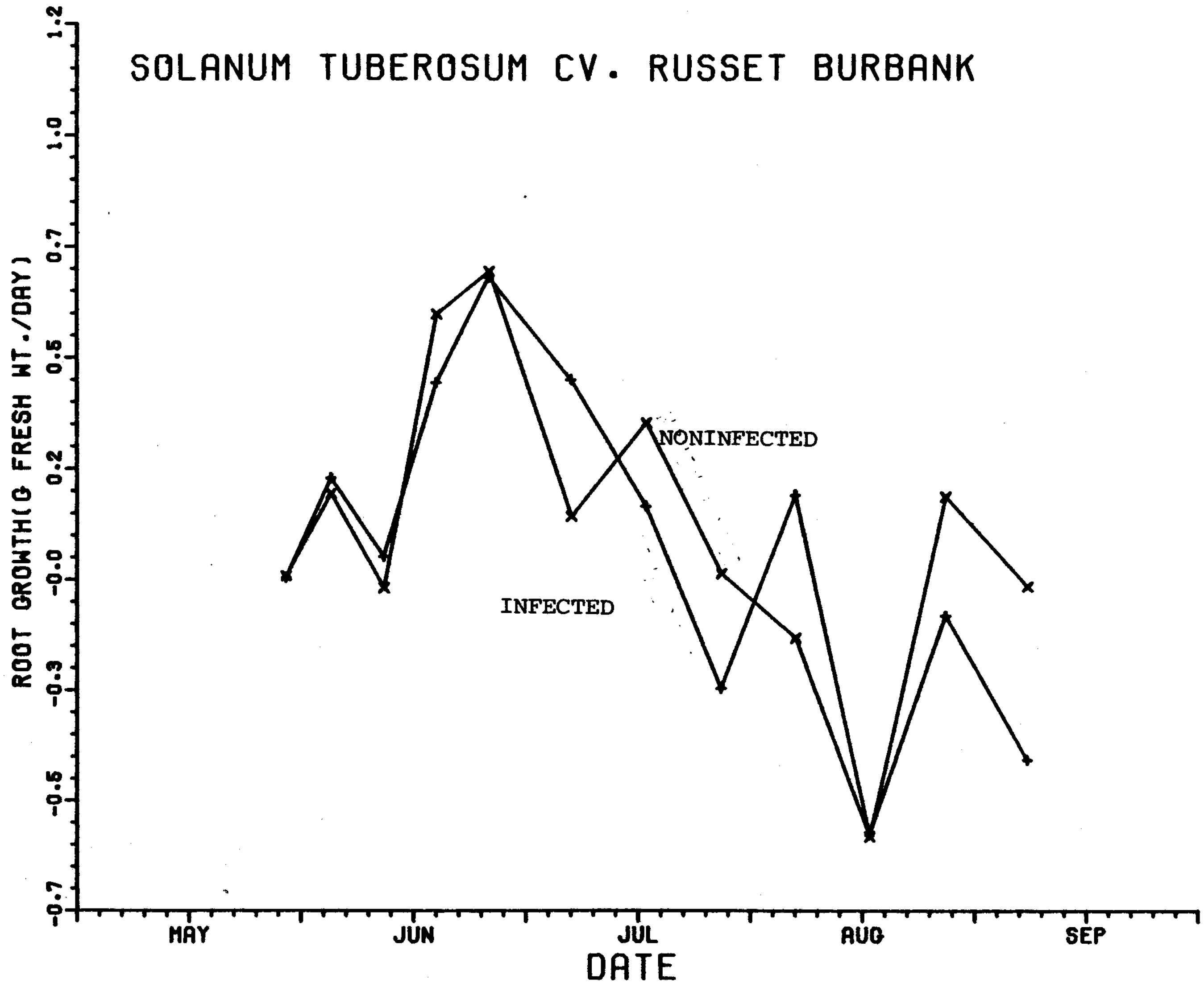

SOLANUM TUBEROSUM CV. ONAWAY
INFECTED
NONINFECTED
ROOT GROWTH(G FRESH WT./DAY)
1.2
1.0
0.7
0.5
0.2
-0.0
-0.3
-0.5
-0.7
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 11



SOLANUM TUBEROSUM CV. RUSSET BURBANK
ROOT GROWTH(G FRESH WT./DAY)
1.2
1.0
0.7
0.5
0.2
-0.0
-0.3
-0.5
-0.7
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE


FIGURE 12

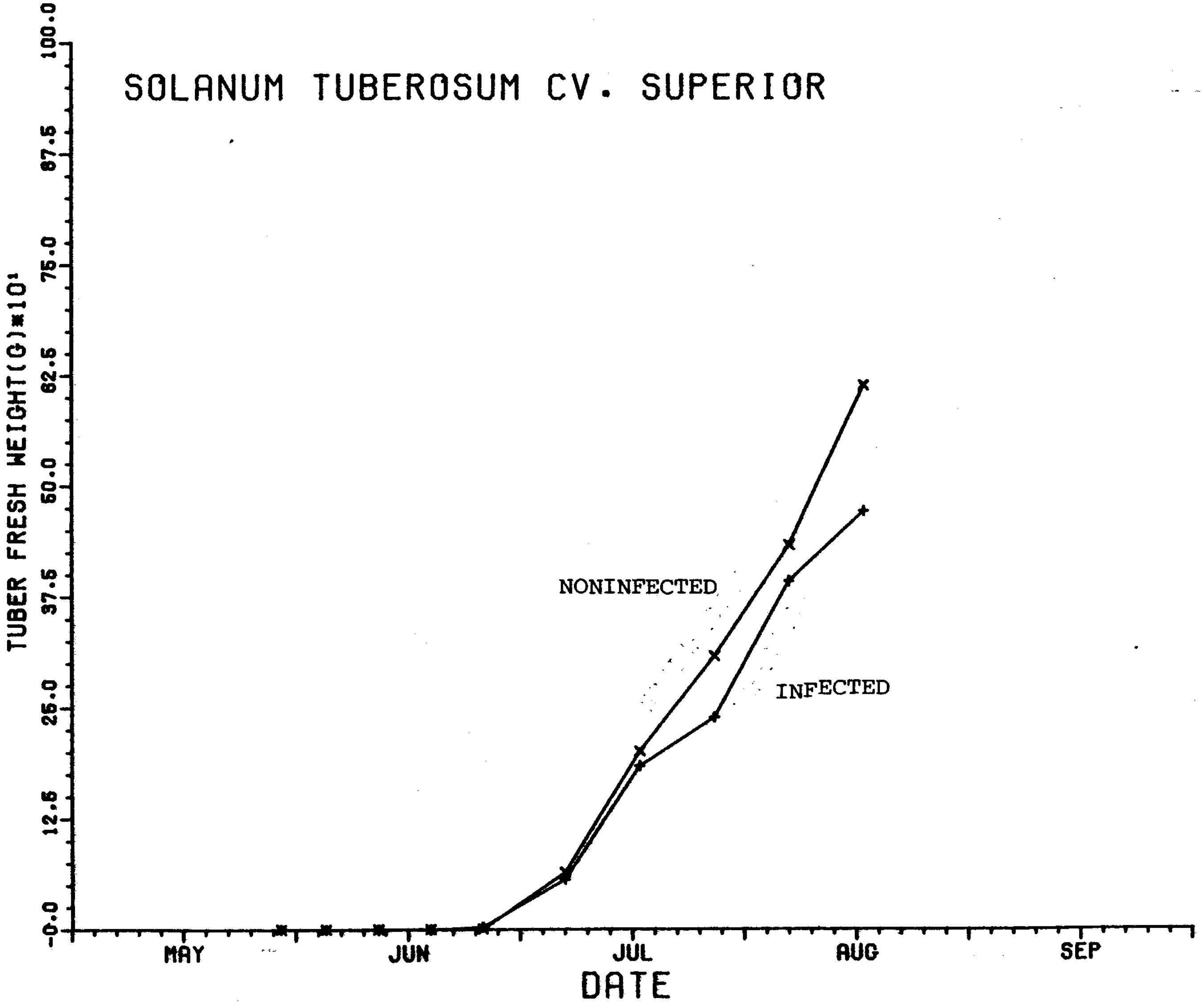

SOLANUM TUBEROSUM CV. SUPERIOR
TUBER FRESH WEIGHT(G)*10$^{1}$
100.0
87.5
75.0
62.5
50.0
37.5
25.0
12.5
0.0
-0.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 13

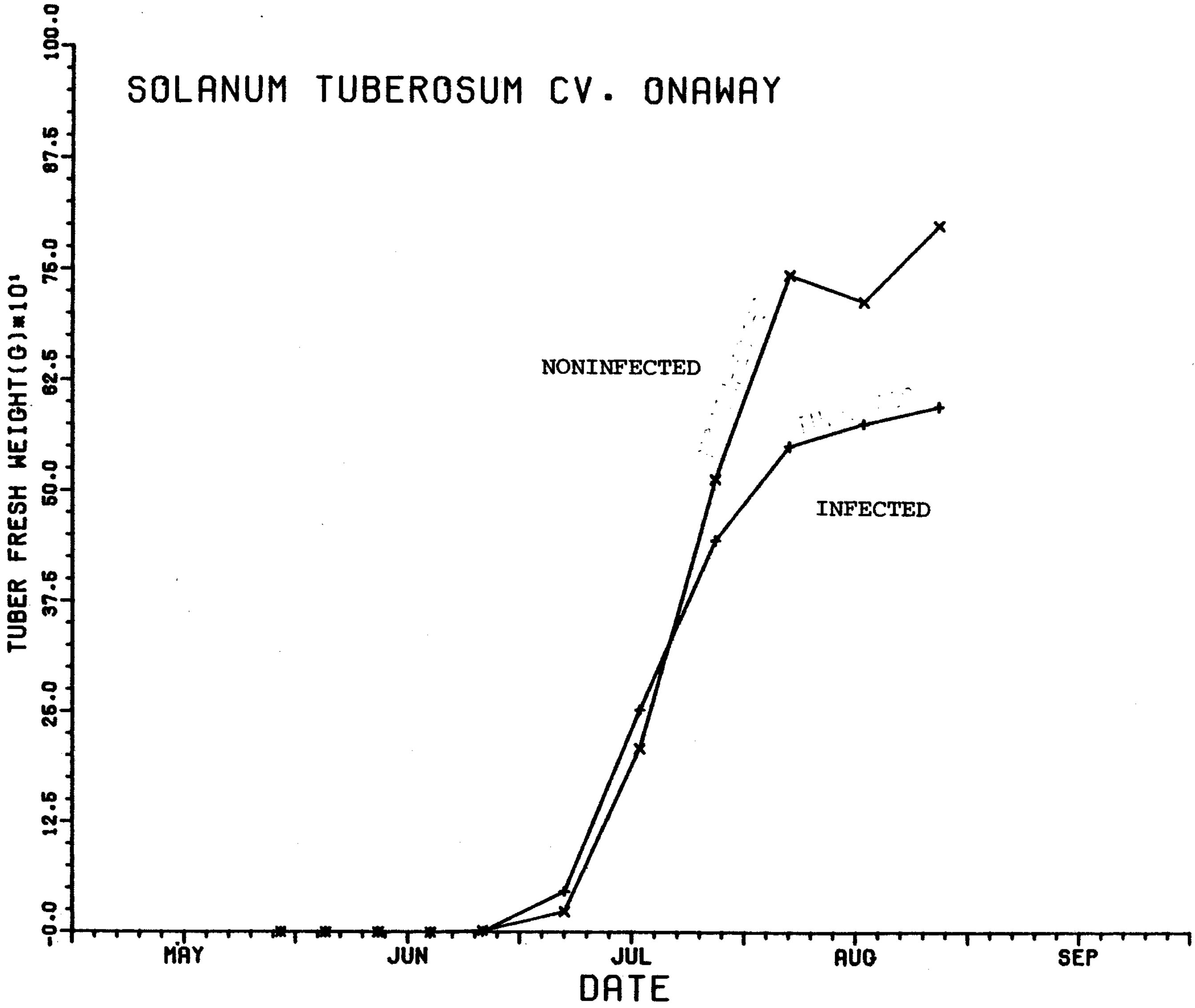

SOLANUM TUBEROSUM CV. ONAWAY
TUBER FRESH WEIGHT(G)*10¹
100.0
87.5
75.0
62.5
50.0
37.5
25.0
12.5
-0.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 14

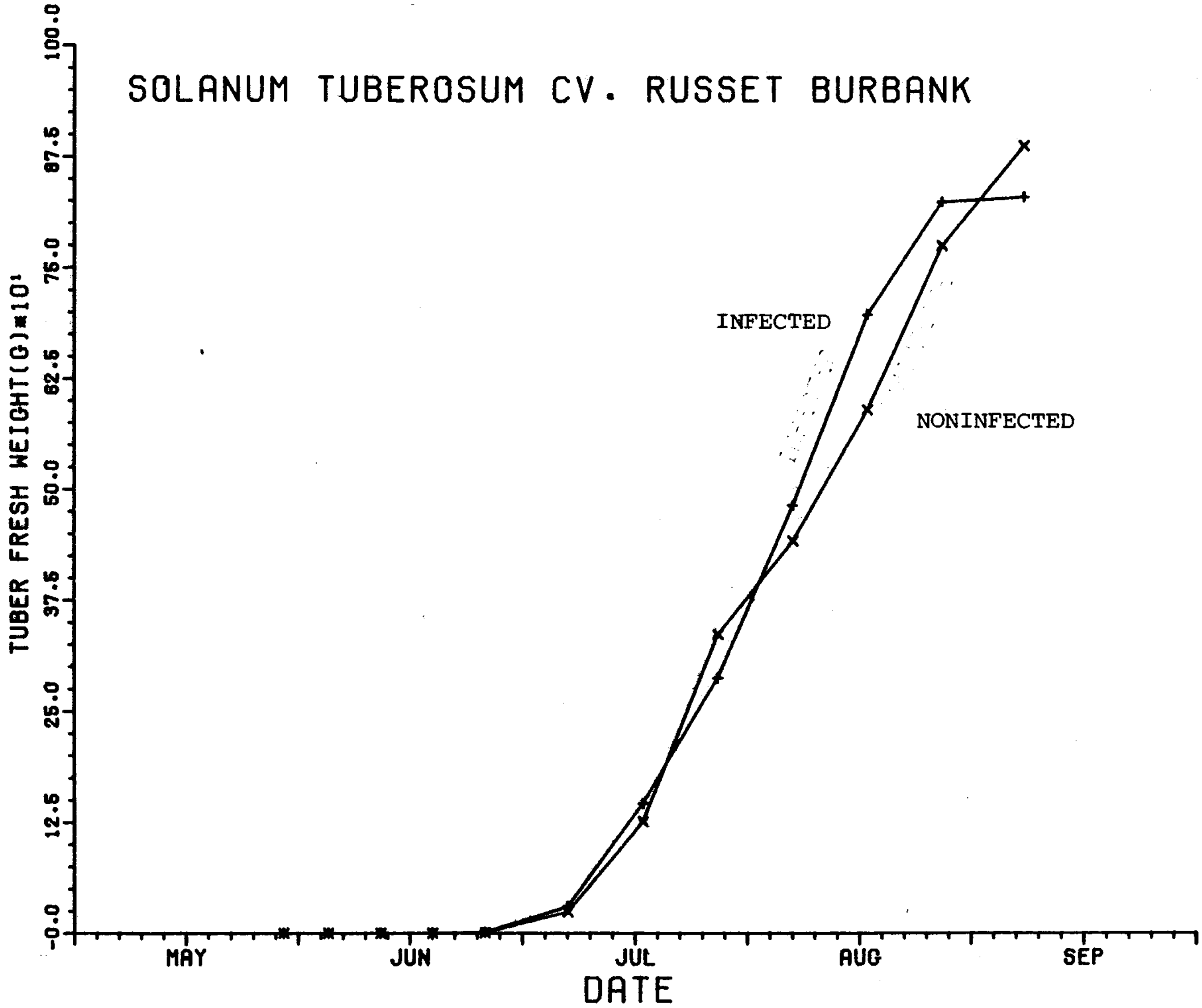

SOLANUM TUBEROSUM CV. RUSSET BURBANK
TUBER FRESH WEIGHT(G)*10¹
100.0
87.5
75.0
62.5
50.0
37.5
25.0
12.5
-0.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 15

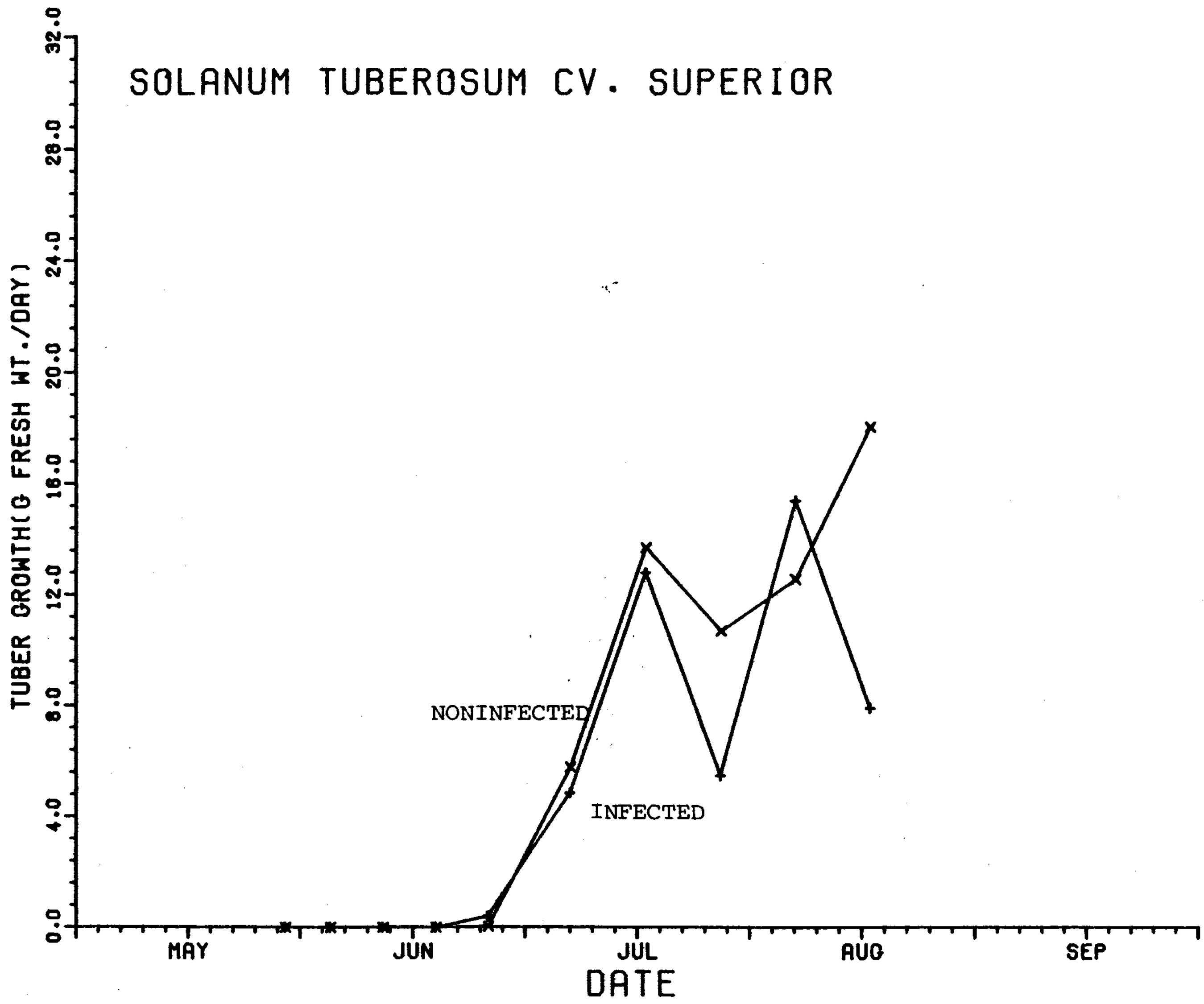

SOLANUM TUBEROSUM CV. SUPERIOR
TUBER GROWTH(G FRESH WT./DAY)
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0
0.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 16

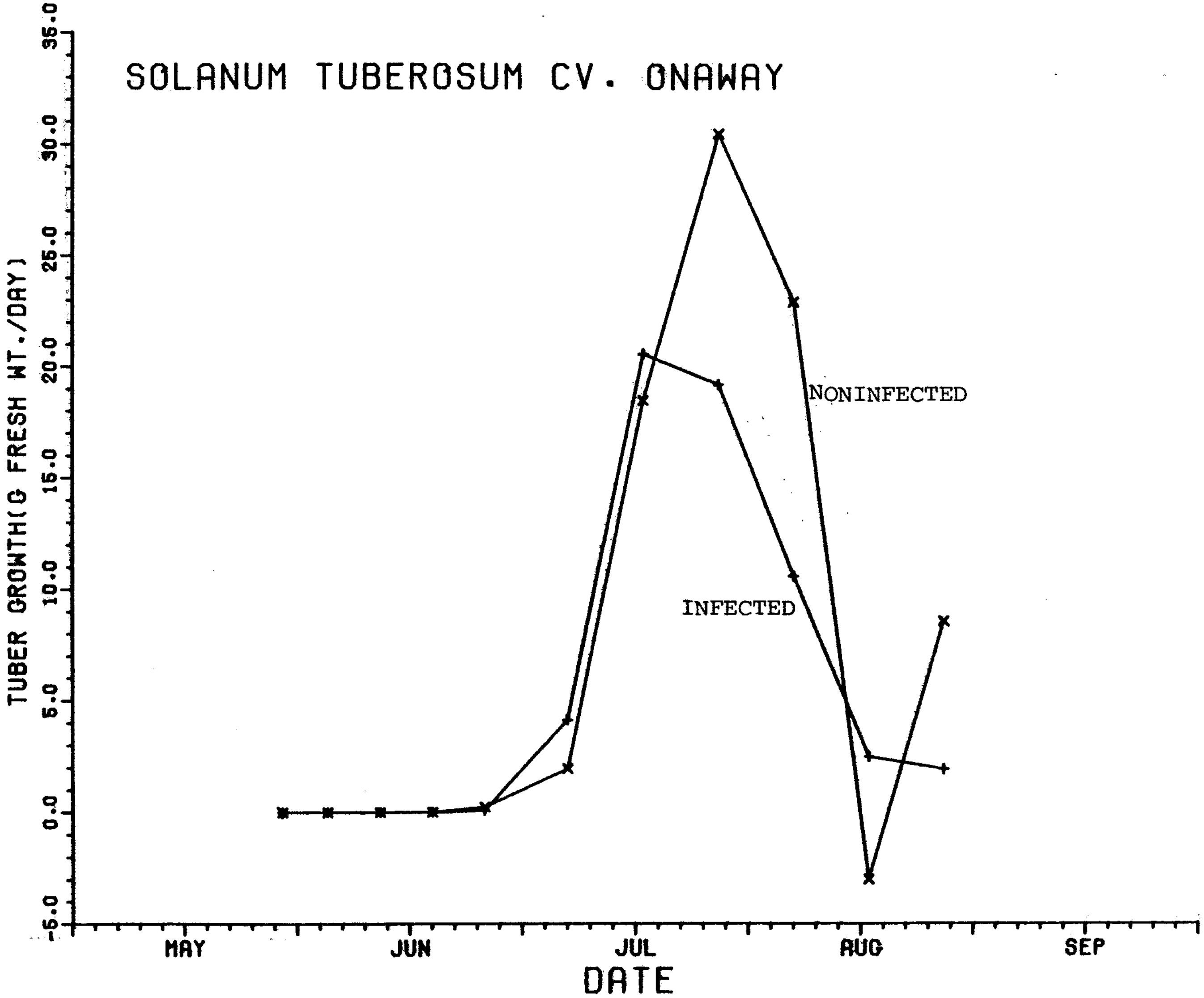

SOLANUM TUBEROSUM CV. ONAWAY
TUBER GROWTH(G FRESH WT./DAY)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 17

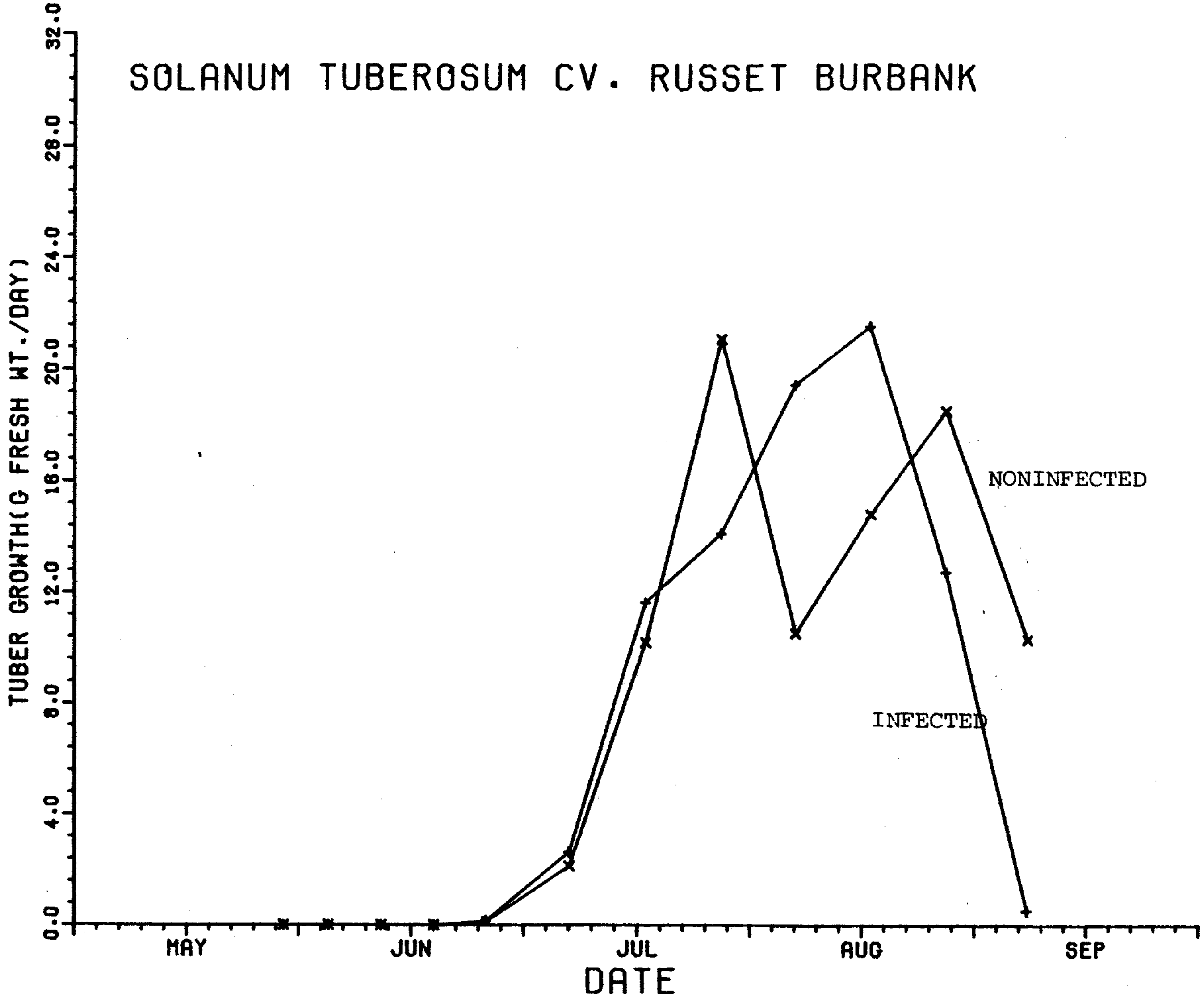

SOLANUM TUBEROSUM CV. RUSSET BURBANK
TUBER GROWTH(G FRESH WT./DAY)
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0
0.0
NONINFECTED
INFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 18

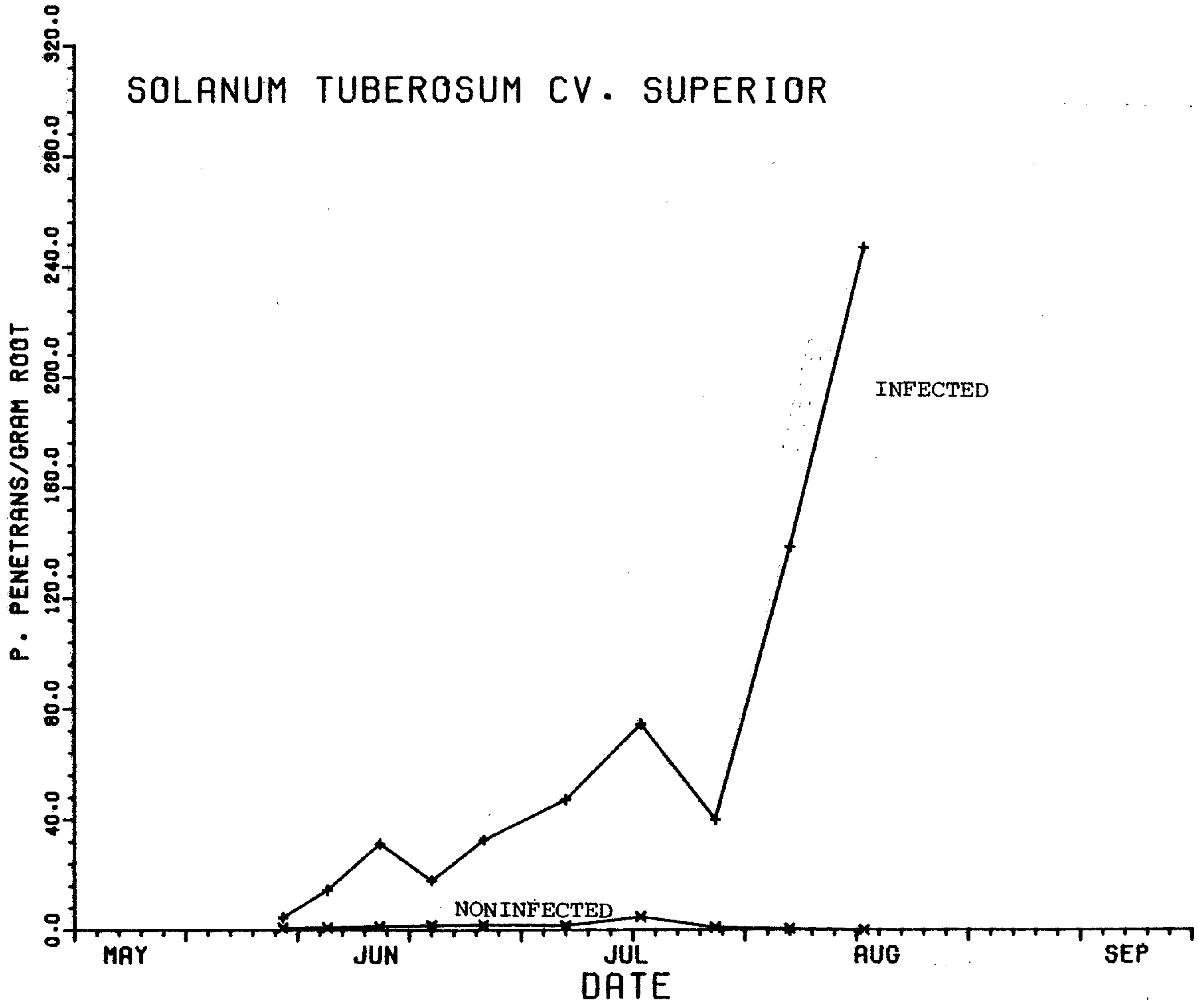

SOLANUM TUBEROSUM CV. SUPERIOR
P. PENETRANS/GRAM ROOT
0.0
40.0
80.0
120.0
160.0
200.0
240.0
280.0
320.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 19

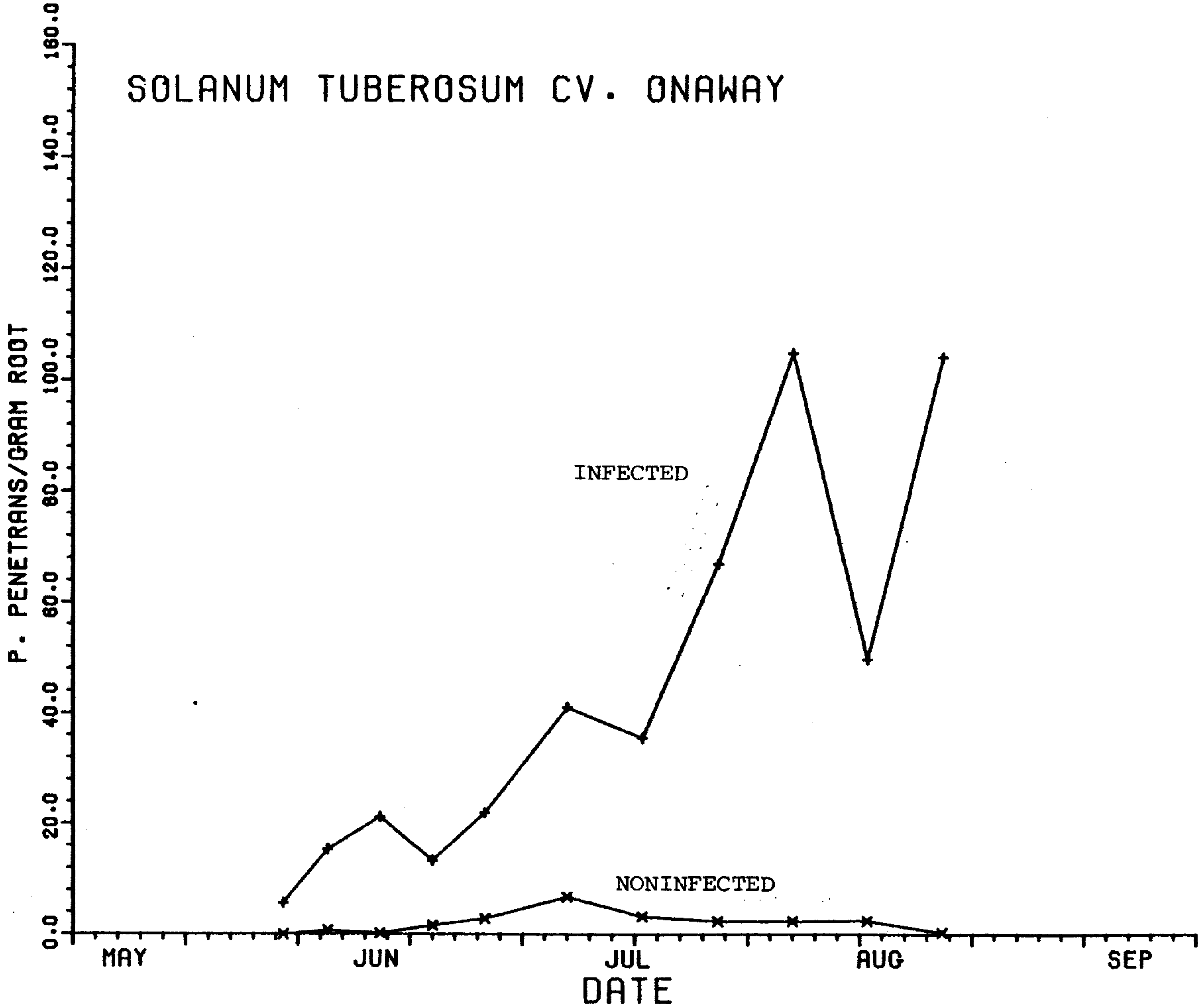

SOLANUM TUBEROSUM CV. ONAWAY
P. PENETRANS/GRAM ROOT
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 20

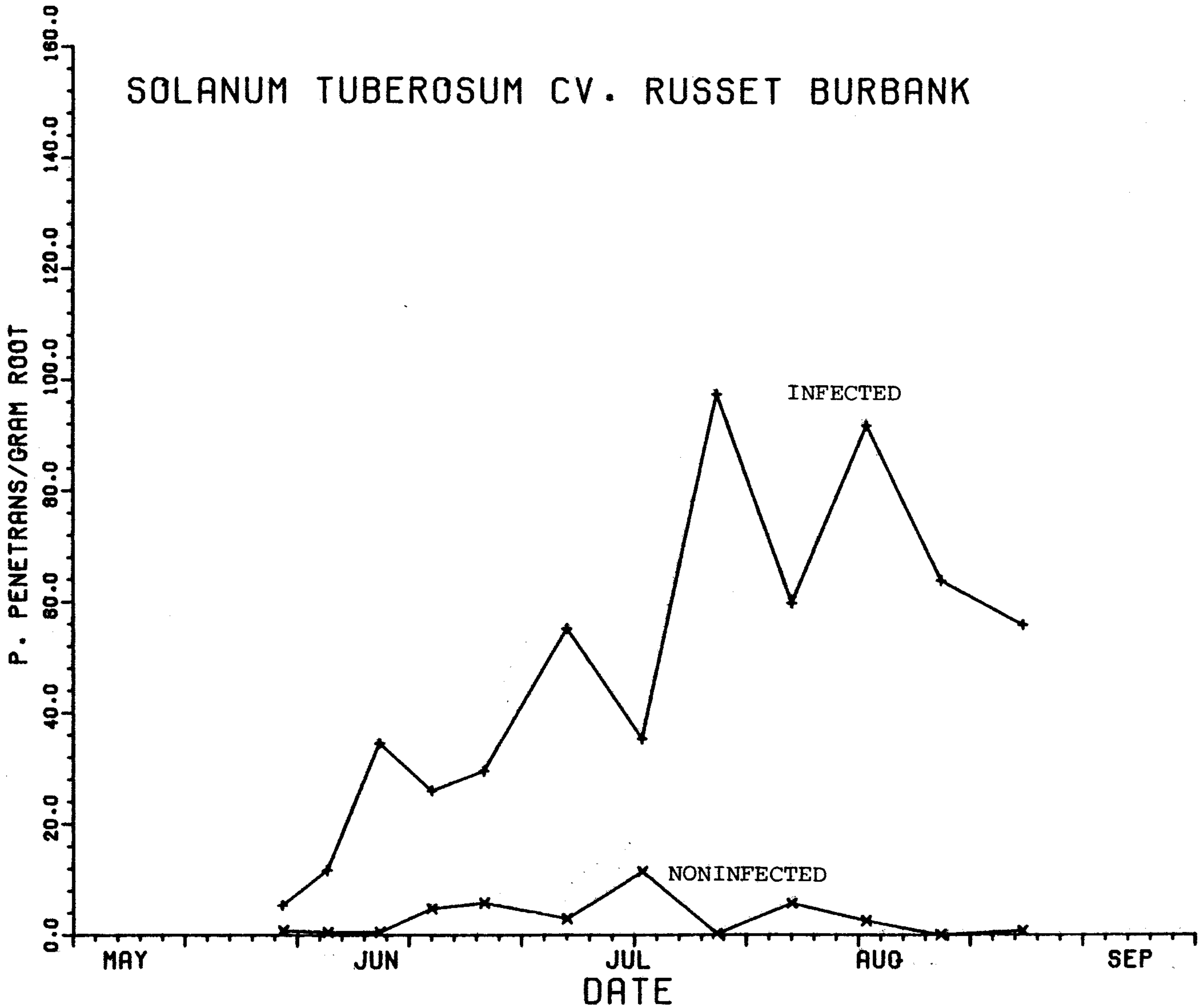

SOLANUM TUBEROSUM CV. RUSSET BURBANK
P. PENETRANS/GRAM ROOT
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 21

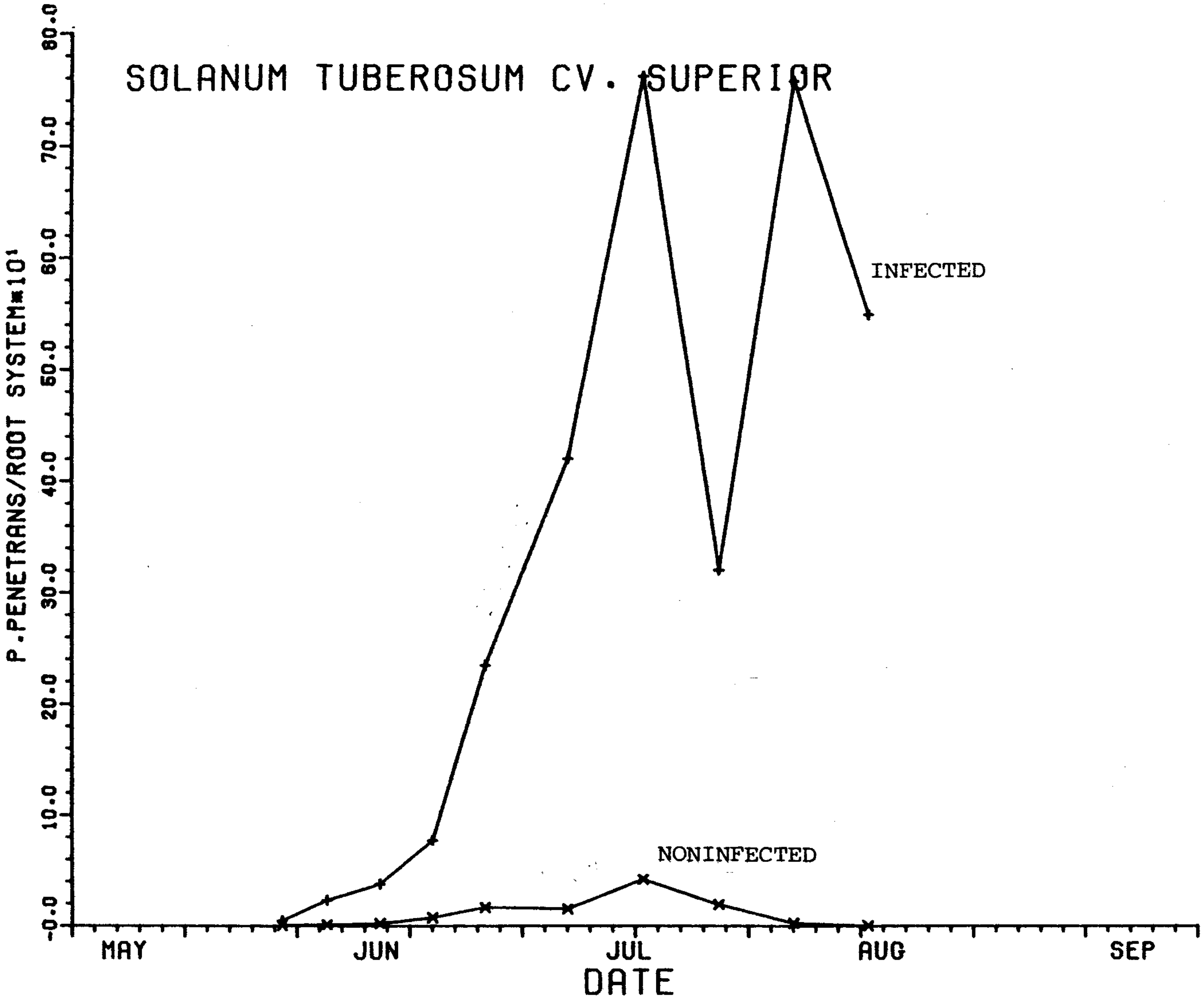

SOLANUM TUBEROSUM CV. SUPERIOR
P.PENETRANS/ROOT SYSTEM*10'
-0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 22

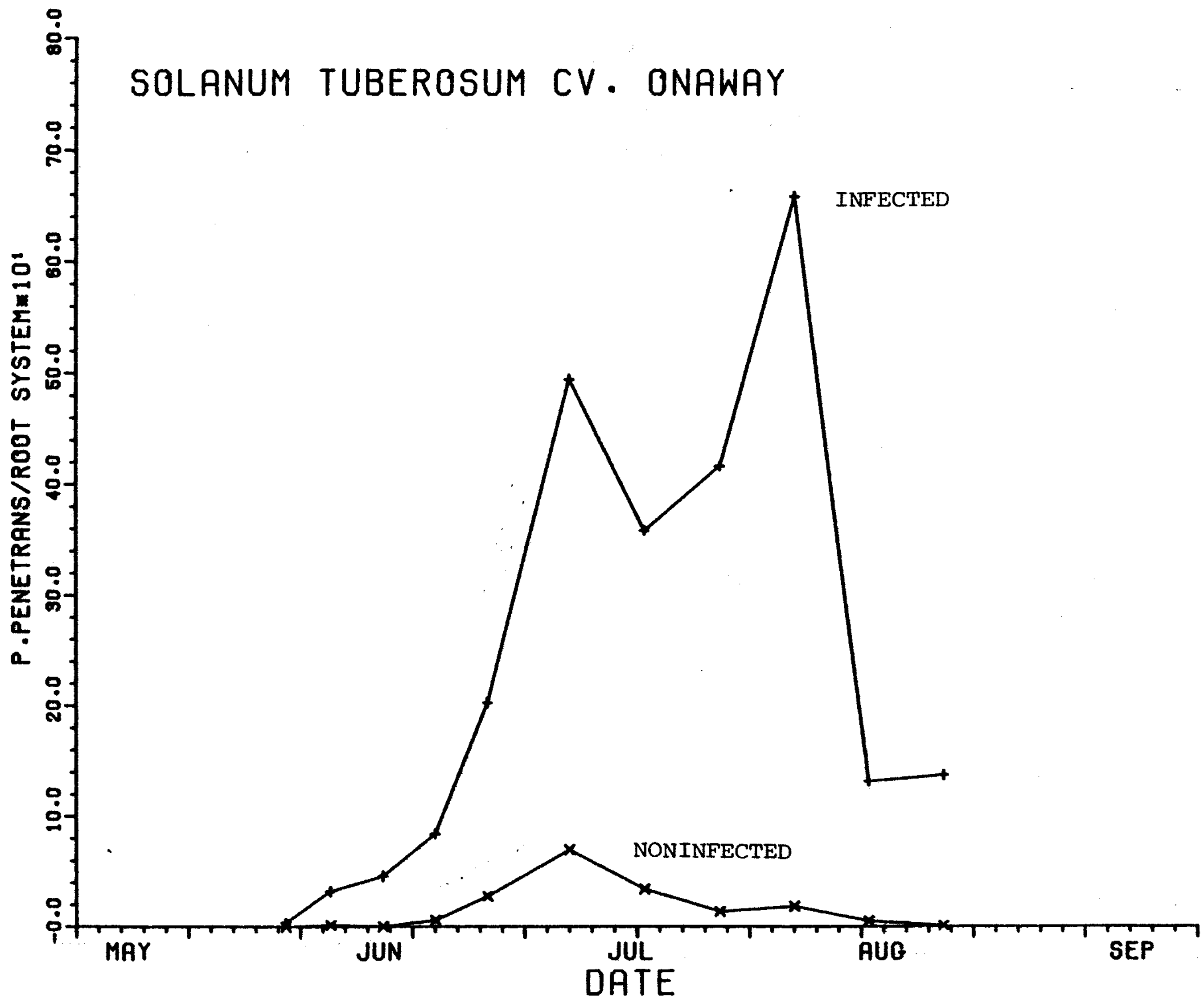

SOLANUM TUBEROSUM CV. ONAWAY
INFECTED
NONINFECTED
P.PENETRANS/ROOT SYSTEM*10'
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-0.0
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 23

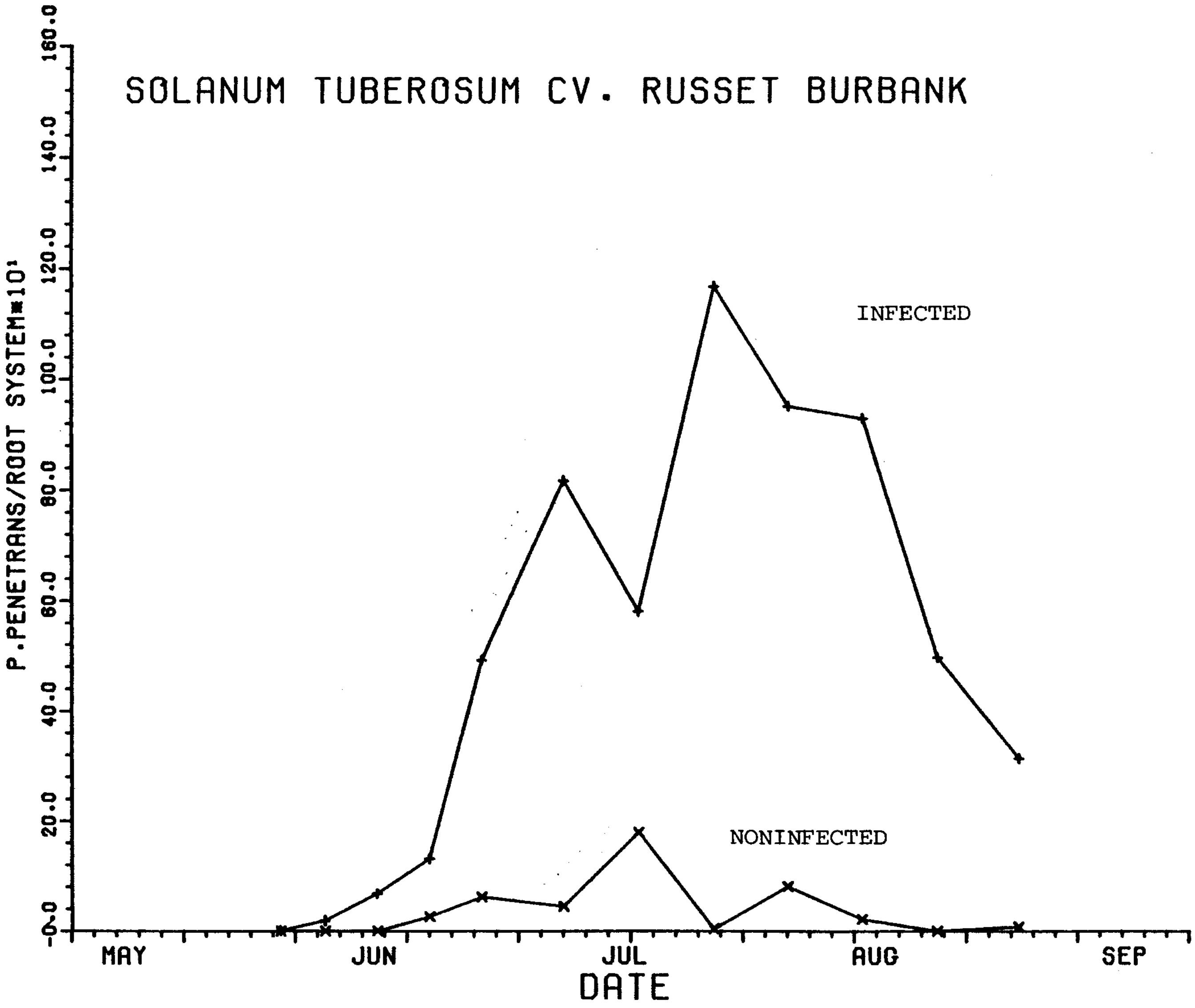

SOLANUM TUBEROSUM CV. RUSSET BURBANK
P.PENETRANS/ROOT SYSTEM*10¹
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
INFECTED
NONINFECTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 24

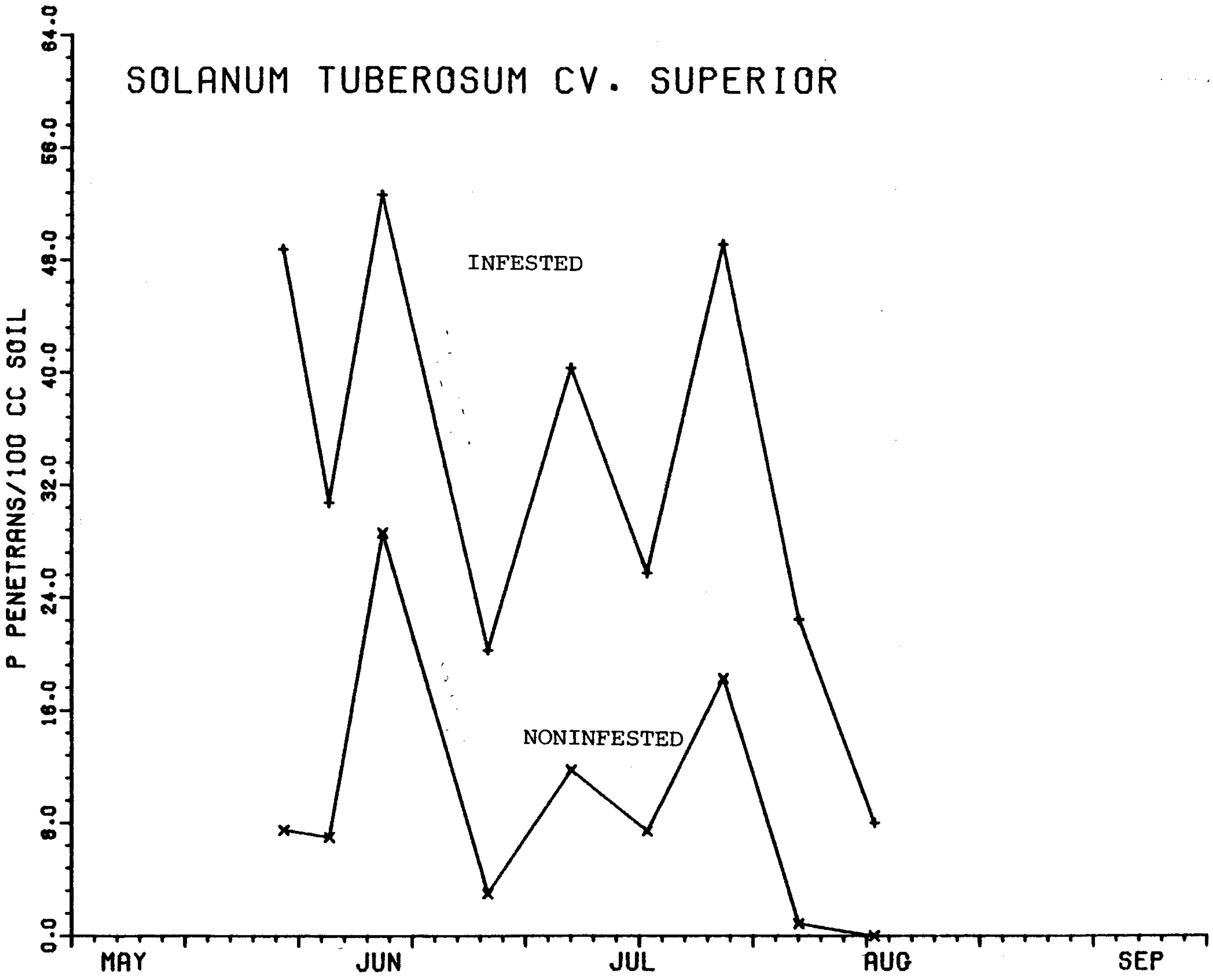

SOLANUM TUBEROSUM CV. SUPERIOR
INFESTED
NONINFESTED
P PENETRANS/100 CC SOIL
0.0
8.0
16.0
24.0
32.0
40.0
48.0
56.0
64.0
MAY
JUN
JUL
AUG
SEP

FIGURE 25

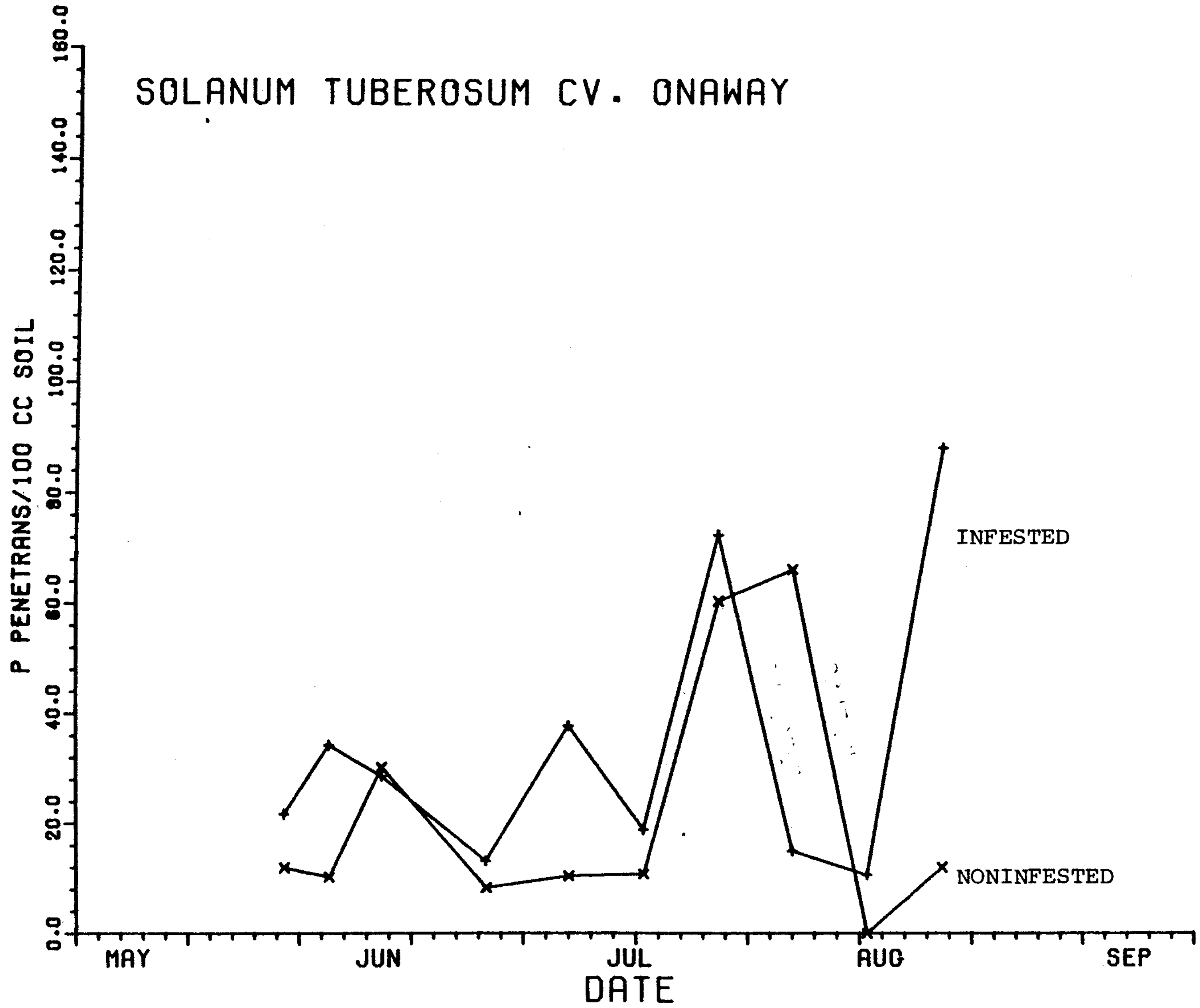

SOLANUM TUBEROSUM CV. ONAWAY
P PENETRANS/100 CC SOIL
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
INFESTED
NONINFESTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 26

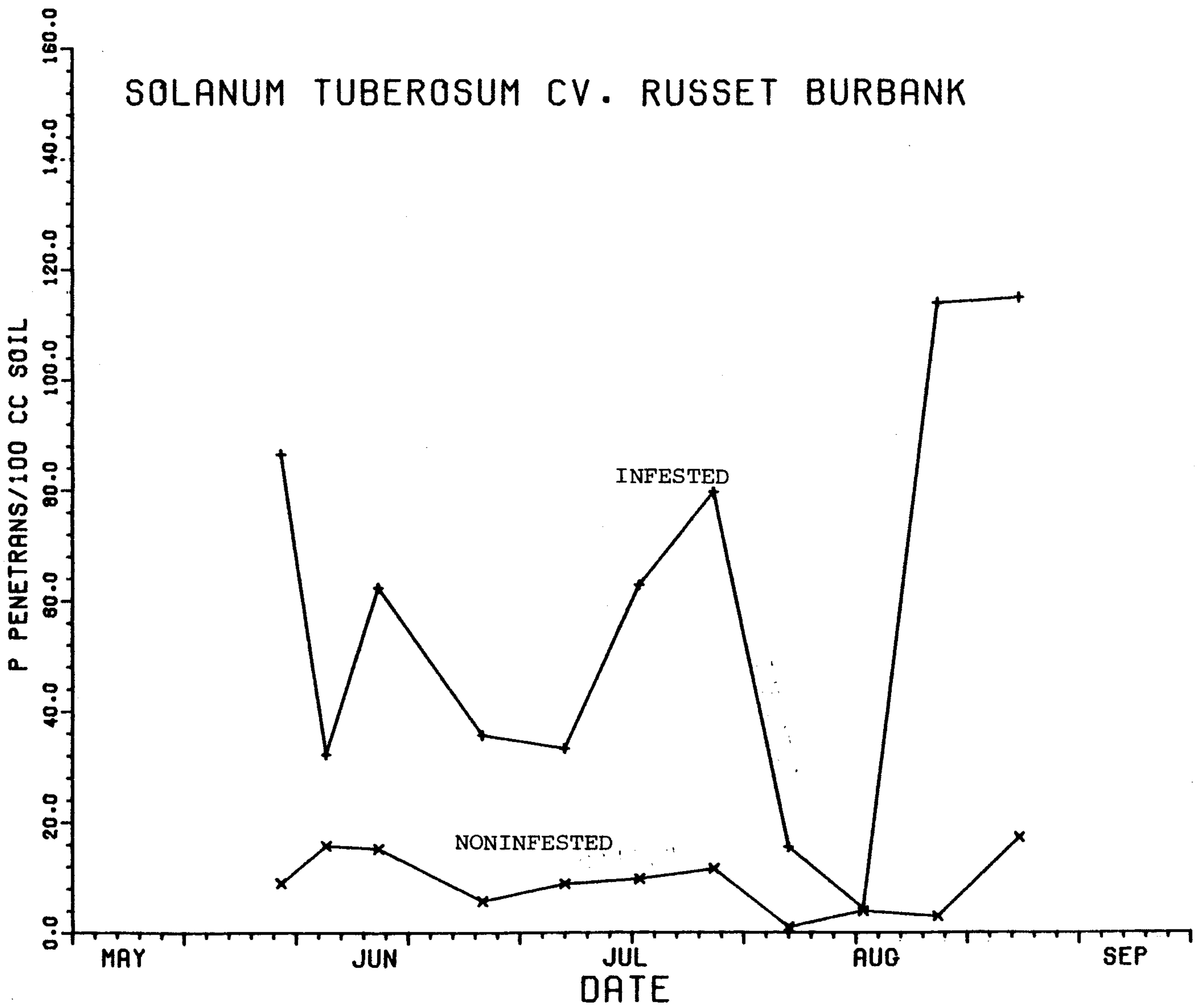

SOLANUM TUBEROSUM CV. RUSSET BURBANK
P PENETRANS/100 CC SOIL
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
INFESTED
NONINFESTED
MAY
JUN
JUL
AUG
SEP
DATE

FIGURE 27

## CORN HYBRIDS, PLANT POPULATION AND IRRIGATION

*E. C. Rossman and Bary Darling*
*Department of Crop and Soil Sciences*

Performance data for 80 commercial corn hybrids evaluated in 1976 with irrigation and without irrigation are presented in Table 1. Twelve inches of supplemental water were supplied in ten applications on July 12, 17, 22, 26 and August 2, 6, 10, 18, 21, 24. Bouyoucous soil moisture blocks were placed at 6, 12, 18 and 24 - inch depths in both irrigated and unirrigated plot areas.

Irrigated yields averaged 84.6 bushels per acre more than unirrigated -- 156.4 vs 71.8, an increase of 118%. Hybrids ranged from 120.2 to 183.2 irrigated and 48.9 to 92.6 bushels per acre without irrigation. Hybrids significantly better than the average yield (arranged in order of increasing moisture content at harvest) are listed below. Sixteen of the nineteen hybrids were in the highest yielding group for both irrigated and unirrigated plots. The correlation of irrigated with unirrigated yields was highly significant, .490**, indicating that the hybrids tended to respond alike in both situations. The correlation was not as high as in other years when it ranged from .7 - .9.

| Irrigated | Unirrigated |
|---|---|
| Cowbell PSX 7300 (2X) | Cowbell PSX7300 (2X) |
| Northrup King PX32 (2X) | Northrup King PX32 (2X) |
| Michigan 4122 (2X) | Michigan 4122 (2X) |
| Michigan 407-2X (2X) | Michigan 407-2X (2X) |
| Pioneer 3780 (2X) | Pioneer 3780 (2X) |
| Security SS102 (2X) | Security SS102 (2X) |
| Pioneer 3709 (MSX) | Blaney EX7305 (2X) |
| Golden Harvest H-2450 (2X) | Pioneer 3709 (MSX) |
| Funk G-4444 (2X) | Golden Harvest H-2450 (2X) |
| | |
| Super Crost S27 (2X) | Funk G-4444 (2X) |
| Asgrow RX58 (2X) | Pick XR44 (2X) |
| Pick XR44 (2X) | Blaney B606 (2X) |
| Blaney B606 (2X) | Michigan 5802 (2X) |
| Michigan 5802 (2X) | Funk G-4321A (2X) |
| Funk G-4321A (2X) | Acco UC3301 (2X) |
| U.S. Steel 0011 | Migro M-0301 (2X) |
| Acco UC3301 (2X) | |
| Migro M-0301 (2X) | |

Average, highest and lowest yields for corn hybrids irrigated not irrigated for a 9-year period, 1968 - 1976, are given in Table 2. The average yielding hybrid has given a response of 49 bushels to irrigation. The highest yielding hybrids have responded with 62 bushels added yield while the lowest yielding hybrids have given only 32 bushels added yield when irrigated. These results demonstrated the importance of choosing high yielding hybrids to maximize returns from irrigation with little, if any, additional cost.

## Plant Population x Irrigation

Five adapted hybrids at four plant population irrigated and not irrigated were grown in each of nine years, 1968 - 1976, Table 3. Over the nine-year period, a population of 23,200 has given the highest average yield (172 bushels) when irrigated while 19,100 has given the highest yield (113 bushels) without irrigation. The 23,200 population irrigated has given the highest yield in eight of the nine years. The average 9-year increase due to irrigation has been 71 bushels per acre at the 23,300 population.

Moisture content of grain at harvest has averaged .5 - 1.0% higher for the higher plant populations. Stalk lodging has increased slightly with increased plant population.

Table 2. Average, highest and lowest yields for corn hybrids irrigated and not irrigated for nine years, 1968 - 1976.

| Year | No. of hybrids tested | AVERAGE | | HIGHEST | | LOWEST | |
|---|---|---|---|---|---|---|---|
| | | Irrigated | Not irrigated | Irrigated | Not irrigated | Irrigated | Not irrigated |
| 1976 | 80 | 156 | 72 | 183 | 93 | 120 | 49 |
| 1975 | 75 | 154 | 125 | 207 | 157 | 106 | 80 |
| 1974 | 76 | 112 | 103 | 134 | 122 | 65 | 58 |
| 1973 | 72 | 114 | 101 | 138 | 120 | 78 | 73 |
| 1972 | 72 | 157 | 137 | 206 | 179 | 99 | 91 |
| 1971 | 56 | 163 | 28 | 211 | 42 | 91 | 11 |
| 1970 | 64 | 144 | 103 | 194 | 128 | 95 | 70 |
| 1969 | 63 | 146 | 86 | 185 | 109 | 97 | 56 |
| 1968 | 56 | 136 | 96 | 182 | 123 | 92 | 65 |
| Average | | 143 | 94 | 182 | 120 | 93 | 61 |

Table 3. Average yield at four plant populations irrigated and not irrigated for nine years, 1968 - 1976.

| Year | 15,200 | | 19,100 | | 23,200 | | 27,500 | |
|---|---|---|---|---|---|---|---|---|
| | Irrigated | Not irrigated | Irrigated | Not irrigated | Irrigated | Not irrigated | Irrigated | Not irrigated |
| 1976 | 153 | 72 | 174 | 84 | 181 | 81 | 161 | 68 |
| 1975 | 158 | 136 | 183 | 164 | 196 | 151 | 172 | 146 |
| 1974 | 118 | 100 | 130 | 111 | 135 | 98 | 120 | 94 |
| 1973 | 108 | 97 | 134 | 116 | 128 | 106 | 108 | 102 |
| 1972 | 152 | 132 | 187 | 159 | 191 | 149 | 161 | 144 |
| 1971 | 173 | 37 | 189 | 35 | 191 | 20 | 181 | 11 |
| 1970 | 122 | 91 | 144 | 112 | 158 | 93 | 151 | 85 |
| 1969 | 126 | 91 | 158 | 109 | 173 | 96 | 148 | 86 |
| 1968 | 144 | 114 | 169 | 130 | 193 | 107 | 178 | 89 |
| Average | 140 | 97 | 163 | 113 | 172 | 101 | 153 | 92 |

Table 1 NORTH CENTRAL MICHIGAN Zone 3

Montcalm County Trial - Irrigated vs. Not Irrigated

One, Two, Three Year Averages - 1976, 1975, 1974

| Hybrid (Brand - Variety) | % Moisture 1976 | % Moisture 2 yrs. | % Moisture 3 yrs. | Bushels per Acre 1976 Irrig | Bushels per Acre 1976 Not Irrig | Bushels per Acre 2 years Irrig | Bushels per Acre 2 years Not Irrig | Bushels per Acre 3 years Irrig | Bushels per Acre 3 years Not Irrig | % Stalk lodging 1976 Irrig | % Stalk lodging 1976 Not Irrig | % Stalk lodging 2 years Irrig | % Stalk lodging 2 years Not Irrig | % Stalk lodging 3 years Irrig | % Stalk lodging 3 years Not Irrig |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northrup King PX20 (2X) | 17.4 | 20 | 23 | 128.0 | 58.8 | 132 | 85 | 124 | 90 | 1.5 | 4.5 | 5 | 4 | 3 | 3 |
| Pick 185 (Sp.) | 18.0 | --- | --- | 131.2 | 48.9 | --- | --- | --- | --- | 12.3 | 30.6 | -- | -- | -- | -- |
| Pride 2206 (2X) | 18.2 | --- | --- | 133.7 | 64.7 | --- | --- | --- | --- | 3.6 | 10.2 | -- | -- | -- | -- |
| Pick 6266 (Sp.) | 18.5 | --- | --- | 117.8 | 55.4 | --- | --- | --- | --- | 2.3 | 6.3 | -- | -- | -- | -- |
| Michigan 280 (4X) | 18.6 | 20 | 23 | 133.0 | 57.8 | 128 | 75 | 124 | 86 | 6.7 | 19.8 | 8 | 15 | 6 | 11 |
| Funk G-5191 (4X) | 18.8 | --- | --- | 137.8 | 69.4 | --- | --- | --- | --- | 9.2 | 6.2 | -- | -- | -- | -- |
| Michigan EXP7502 (3X) | 18.8 | --- | --- | 140.5 | 68.0 | --- | --- | --- | --- | 6.0 | 14.5 | -- | -- | -- | -- |
| Sohigro 12 (2X) | 18.9 | --- | --- | 120.2 | 53.1 | --- | --- | --- | --- | 8.6 | 15.7 | -- | -- | -- | -- |
| Migro M-0101 (2X) | 19.1 | 21 | 24 | 139.2 | 66.3 | 140 | 88 | 130 | 91 | 2.9 | 11.7 | 4 | 8 | 3 | 6 |
| Michigan 2853 (3X) | 19.2 | 21 | 23 | 138.3 | 66.2 | 134 | 83 | 130 | 92 | 3.6 | 9.6 | 5 | 8 | 4 | 6 |
| Pick P23 (Sp.) | 19.2 | --- | --- | 137.4 | 64.0 | --- | --- | --- | --- | 5.7 | 10.5 | -- | -- | -- | -- |
| DeKalb XL12 (2X) | 19.6 | 21 | 26 | 147.4 | 62.4 | 136 | 83 | 129 | 90 | 4.4 | 16.1 | 11 | 17 | 7 | 12 |
| Michigan 333-3X (3X) | 19.7 | 21 | 24 | 144.0 | 78.9 | 144 | 97 | 137 | 103 | 2.2 | 3.3 | 2 | 6 | 2 | 4 |
| Wolverine W128 (2X) | 19.7 | 21 | 23 | 129.6 | 56.0 | 126 | 78 | 119 | 85 | 1.4 | 7.4 | 3 | 4 | 4 | 4 |
| Super Crost 1610 (2X) | 20.4 | 22 | 24 | 124.5 | 54.6 | 130 | 81 | 123 | 89 | 10.4 | 9.2 | 7 | 5 | 4 | 4 |
| Pride 3315 (2X) | 20.4 | --- | --- | 138.4 | 59.6 | --- | --- | --- | --- | 0.7 | 1.6 | -- | -- | -- | -- |
| Michigan 3093 (3X) | 20.5 | 22 | --- | 150.9 | 76.4 | 155 | 101 | --- | --- | 3.7 | 10.5 | 3 | 6 | -- | -- |
| Funk G-4195 (3X) | 20.8 | 21 | 26 | 148.6 | 63.6 | 141 | 86 | 131 | 93 | 6.0 | 26.0 | 7 | 15 | 4 | 10 |
| Funk G-4141 (2X) | 21.3 | 22 | --- | 152.2 | 75.2 | 154 | 95 | --- | --- | 4.4 | 13.0 | 3 | 7 | -- | -- |
| Michigan 396-3X (3X) | 21.4 | 23 | 27 | 155.9 | 68.3 | 158 | 98 | 148 | 104 | 6.5 | 12.3 | 3 | 7 | 2 | 4 |
| Michigan 3102 (2X) | 21.5 | 23 | 26 | 159.6 | 76.0 | 158 | 104 | 147 | 108 | 2.2 | 9.0 | 3 | 6 | 2 | 4 |
| Blaney B443 (3X) | 21.5 | 24 | --- | 157.7 | 76.9 | 156 | 99 | --- | --- | 7.3 | 19.0 | 6 | 10 | -- | -- |
| Funk G-4252 (3X) | 21.6 | 23 | 27 | 149.5 | 73.7 | 147 | 93 | 138 | 96 | 8.7 | 9.1 | 7 | 6 | 5 | 4 |
| Blaney B302 (2X) | 21.7 | 22 | 25 | 154.3 | 72.3 | 148 | 94 | 139 | 99 | 5.2 | 20.1 | 3 | 12 | 2 | 9 |
| Asgrow RX2345 (2X) | 21.7 | --- | --- | 149.7 | 73.0 | --- | --- | --- | --- | 3.6 | 7.2 | -- | -- | -- | -- |

Table 1 Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Michigan EXP7501 (3X) | 21.8 | --- | --- | 155.3 | 74.6 | --- | --- | --- | --- | 3.7 | 14.8 | -- | -- | -- | -- |
| | Wolverine W155 (2X) | 21.8 | --- | --- | 153.1 | 76.5 | --- | --- | --- | --- | 8.2 | 18.6 | -- | -- | -- | -- |
| 1,2 | Cowbell PSX7300 (2X) | 22.1 | 24 | 28 | 170.8 | 84.2 | 158 | 103 | 139 | 99 | 0.8 | 25.4 | 4 | 16 | 3 | 11 |
| | Pioneer 3958 (2X) | 22.1 | 23 | 26 | 149.9 | 73.4 | 155 | 100 | 140 | 100 | 3.0 | 9.4 | 2 | 6 | 1 | 4 |
| | Super Crost 1692 (2X) | 22.1 | 22 | 25 | 147.7 | 66.6 | 139 | 85 | 133 | 94 | 2.9 | 9.0 | 3 | 7 | 2 | 5 |
| | Sohigro 22 (2X) | 22.1 | --- | --- | 130.9 | 62.7 | --- | --- | --- | --- | 5.3 | 9.7 | -- | -- | -- | -- |
| | Blaney B401 (2X) | 22.4 | 23 | --- | 140.6 | 73.8 | 149 | 102 | --- | --- | 2.2 | 14.4 | 4 | 8 | -- | -- |
| | Golden Harvest H-2370 (2X) | 22.5 | --- | --- | 154.0 | 70.7 | --- | --- | --- | --- | 4.5 | 13.6 | -- | -- | -- | -- |
| | Asgrow RX53 (2X) | 22.5 | 25 | 27 | 151.8 | 72.4 | 161 | 105 | 148 | 108 | 3.0 | 10.6 | 2 | 6 | 1 | 4 |
| | Super Crost 2350 (2X) | 22.5 | --- | --- | 162.0 | 75.1 | --- | --- | --- | --- | 1.5 | 9.7 | -- | -- | -- | -- |
| | Cowbell MSX102 (2X) | 22.5 | 24 | --- | 141.5 | 65.5 | 135 | 86 | --- | --- | 5.7 | 16.4 | 5 | 13 | -- | -- |
| | Acco U334 (3X) | 22.6 | 25 | --- | 147.3 | 68.5 | 157 | 96 | --- | --- | 6.0 | 16.9 | 9 | 11 | -- | -- |
| | Acco UC2301 (2X) | 22.7 | 24 | 27 | 161.4 | 76.9 | 160 | 105 | 146 | 105 | 1.5 | 18.8 | 4 | 18 | 3 | 12 |
| | Funk G-4343 (2X) | 22.7 | 24 | 28 | 153.3 | 65.9 | 159 | 101 | 140 | 95 | 7.0 | 15.4 | 7 | 11 | 5 | 8 |
| | Migro M-1020 (2X) | 22.8 | 23 | 26 | 161.8 | 69.9 | 151 | 92 | 139 | 96 | 3.9 | 12.3 | 3 | 8 | 2 | 6 |
| | Blaney B303A (2X) | 22.8 | --- | --- | 160.7 | 71.1 | --- | --- | --- | --- | 10.9 | 18.0 | -- | -- | -- | -- |
| | Blaney B605WX (2X) | 23.1 | --- | --- | 149.6 | 67.4 | --- | --- | --- | --- | 0.9 | 14.9 | -- | -- | -- | -- |
| 1,2 | Northrup King PX32 (2X) | 23.1 | 25 | 28 | 172.1 | 79.8 | 170 | 108 | 153 | 107 | 0.7 | 13.7 | 3 | 10 | 2 | 7 |
| 1,2 | Michigan 4122 (2X) | 23.2 | 25 | --- | 180.0 | 88.9 | 180 | 115 | --- | --- | 3.7 | 10.2 | 2 | 5 | -- | -- |
| 1,2 | Michigan 407-2X (2X) | 23.2 | 25 | 28 | 176.8 | 80.6 | 173 | 109 | 160 | 113 | 0.7 | 12.1 | 2 | 6 | 1 | 5 |
| | Pride 4404 (2X) | 23.2 | 25 | --- | 169.2 | 75.6 | 169 | 103 | --- | --- | 3.3 | 7.6 | 2 | 5 | -- | -- |
| 1,2 | Pioneer 3780 (2X) | 23.2 | 26 | 30 | 178.9 | 81.8 | 173 | 107 | 154 | 108 | 3.8 | 16.1 | 4 | 10 | 3 | 7 |
| | Sohigro 44 | 23.4 | --- | --- | 155.6 | 64.6 | --- | --- | --- | --- | 2.9 | 11.5 | -- | -- | -- | -- |
| | Super Crost 1901 (2X) | 23.6 | 26 | 30 | 154.9 | 61.6 | 155 | 90 | 148 | 100 | 3.0 | 24.0 | 2 | 13 | 2 | 9 |
| | Wolverine W166 (2X) | 23.6 | 25 | --- | 166.2 | 68.2 | 173 | 103 | --- | --- | 3.9 | 6.1 | 5 | 7 | -- | -- |
| 1,2 | Security SS102 (2X) | 23.8 | --- | --- | 176.0 | 84.1 | --- | --- | --- | --- | 6.2 | 18.7 | -- | -- | -- | -- |
| 2 | Blaney EX7305 (2X) | 23.8 | 25 | 28 | 169.3 | 78.9 | 163 | 106 | 144 | 105 | 3.8 | 11.5 | 3 | 8 | 2 | 6 |
| | Michigan 572-3X (3X) | 23.9 | 25 | 30 | 164.5 | 68.0 | 160 | 98 | 148 | 104 | 3.2 | 3.8 | 5 | 5 | 3 | 3 |
| | Michigan 410-2X (2X) | 24.0 | 25 | 29 | 170.4 | 78.2 | 164 | 106 | 154 | 108 | 6.9 | 9.8 | 6 | 7 | 4 | 5 |
| | Cowbell PSX4100 (2X) | 24.0 | 26 | 30 | 158.5 | 75.8 | 149 | 94 | 137 | 96 | 6.9 | 13.5 | 7 | 9 | 5 | 6 |

Table 1 Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2 | Pioneer 3709 (MSX) | 24.2 | --- | --- | 178.6 | 92.6 | --- | --- | --- | --- | 3.7 | 8.1 | -- | -- | -- | -- |
| 1,2 | Golden Harvest H-2450 (2X) | 24.5 | --- | --- | 170.9 | 81.1 | --- | --- | --- | --- | 0.0 | 21.3 | -- | -- | -- | -- |
| | Pride R290 (2X) | 24.7 | 26 | 29 | 163.7 | 68.2 | 161 | 101 | 152 | 106 | 10.8 | 15.5 | 9 | 11 | 6 | 8 |
| 1,2 | Funk G-4444 (2X) | 24.8 | 27 | 30 | 183.2 | 79.8 | 175 | 107 | 160 | 112 | 0.7 | 20.3 | 2 | 12 | 2 | 8 |
| 1,2 | Super Crost S27 (2X) | 24.9 | 27 | 30 | 179.6 | 86.4 | 170 | 113 | 148 | 104 | 1.5 | 19.4 | 2 | 13 | 1 | 9 |
| | Michigan 5443 (3X) | 24.9 | 26 | --- | 168.4 | 78.0 | 168 | 105 | --- | --- | 3.0 | 13.2 | 3 | 9 | -- | -- |
| | U.S. Steel 0050 | 25.3 | --- | --- | 161.6 | 70.5 | --- | --- | --- | --- | 2.9 | 22.0 | -- | -- | -- | -- |
| 1 | Asgrow RX58 (2X) | 25.4 | --- | --- | 171.0 | 75.6 | --- | --- | --- | --- | 3.7 | 16.2 | -- | -- | -- | -- |
| 1,2 | Pick XR44 (2X) | 25.6 | --- | --- | 179.5 | 89.4 | --- | --- | --- | --- | 2.2 | 13.3 | -- | -- | -- | -- |
| 1,2 | Blaney B606 (2X) | 25.8 | 26 | 31 | 171.5 | 90.3 | 174 | 117 | 153 | 112 | 0.7 | 3.3 | 2 | 3 | 1 | 2 |
| | Golden Harvest EXP445 (2X) | 25.8 | --- | --- | 164.2 | 73.0 | --- | --- | --- | --- | 1.6 | 6.9 | -- | -- | -- | -- |
| 1,2 | Michigan 5802 (2X) | 25.8 | 28 | --- | 178.2 | 88.2 | 183 | 120 | --- | --- | 3.5 | 14.5 | 2 | 8 | -- | -- |
| | Funk G-4366 (2X) | 26.2 | 28 | 31 | 167.6 | 73.8 | 169 | 103 | 148 | 101 | 0.8 | 18.1 | 1 | 12 | 1 | 8 |
| | Migro M-1130 (2X) | 26.3 | 28 | 32 | 163.2 | 65.6 | 167 | 102 | 153 | 104 | 2.2 | 5.1 | 4 | 5 | 2 | 3 |
| 1,2 | Funk G-4321A (2X) | 26.9 | --- | --- | 173.4 | 80.3 | --- | --- | --- | --- | 0.7 | 18.7 | -- | -- | -- | -- |
| 1 | U.S. Steel 0011 | 27.1 | --- | --- | 174.0 | 73.0 | --- | --- | --- | --- | 8.4 | 28.0 | -- | -- | -- | -- |
| 1,2 | Acco UC3301 (2X) | 27.6 | 30 | 33 | 173.4 | 79.9 | 190 | 118 | 167 | 114 | 1.5 | 18.1 | 1 | 10 | 1 | 7 |
| | Pioneer 3535 (2X) | 27.6 | 30 | --- | 167.5 | 74.5 | 184 | 116 | --- | --- | 1.5 | 2.3 | 2 | 2 | -- | -- |
| | Michigan 575-2X (2X) | 27.7 | 28 | 32 | 169.7 | 76.2 | 169 | 106 | 156 | 109 | 3.7 | 6.9 | 4 | 6 | 3 | 4 |
| 1,2 | Migro M-0301 (2X) | 28.7 | --- | --- | 173.5 | 87.0 | --- | --- | --- | --- | 3.7 | 6.9 | -- | -- | -- | -- |
| | Average | 22.7 | 24 | 28 | 156.4 | 71.8 | 158 | 99 | 143 | 101 | 4.1 | 13.3 | 4 | 9 | 3 | 6 |
| | Range | 17.4 to 28.7 | 20 to 30 | 23 to 33 | 120.2 to 183.2 | 48.9 to 92.6 | 126 to 190 | 75 to 120 | 119 to 167 | 85 to 114 | 0.0 to 12.3 | 1.5 to 30.5 | 1 to 11 | 2 to 18 | 1 to 7 | 2 to 12 |
| | Least significant difference | 1.1 | 0.8 | 0.7 | 14.4 | 6.8 | 8 | 7 | 5 | 5 | | | | | | |

[1]Significantly better than average yield, irrigated, 1976.
[2]Significantly better than average yield, not irrigated, 1976.

Table 1 Continued

| | | 1976 | 1975 | 1974 |
|---|---|---|---|---|
| Planted | | May 5 | May 7 | May 4 |
| Harvested | | October 29 | October 15 | October 26 |
| Soil Type | | Montcalm sandy loam | Montcalm sandy loam | Montcalm sandy loam |
| Previous Crop | | Clover | Clover | Sorghum - sudan seeded to rye in fall |
| Population | | 19,300 | 20,700 | 20,500 |
| Rows | | 30" | 30" | 30" |
| Fertilizer | | 336-156-156 | 255-110-110 | 150-120-170 |
| Irrigation | | 12 inches | 9 inches | 8 inches |
| Soil Test: | pH | 6.7 | 6.5 | 6.1 |
| | P | 403 (very high) | 268 (very high) | 340 (very high) |
| | K | 163 (medium) | 257 (high) | 198 (medium) |

Farm Cooperator: Theron Comden, Lakeview

County Extension Director: James Crosby, Stanton

# 1976 WEED CONTROL STUDIES ON PICKLING CUCUMBERS, PEAS AND SNAP BEANS

*A.R. Putnam, Paul F. Boldt and A. Paul Love*
*Department of Horticulture*

Summary

Cucumbers. More consistent weed control treatments are still needed for seeded cucumbers. Of the new chemicals tested, HOE-23408 and VEL-5052 continued to look promising. Several combinations involving HOE-23408 gave excellent results. Poor soil moisture after treatment made it impossible to accurately assess crop safety with EL-161. Several methods were evaluated to allow safe use of chloramben (AMIBEN) on cucumbers. The only method which looked promising was the use of activated charcoal sprayed in a 2 inch band over the seeded row. Both paraquat and glyphosate gave good weed knockdown prior to seeding cucumbers in a stale stale seedbed.

Peas. Since we had not conducted herbicide trials on peas for several seasons, and since the acreage has increased considerably in the Montcalm area, tests were established to evaluate pea and weed response to a large number of products. In an early trial with low weed densities, good weed control was obtained with most of the chemicals tested. All of the PPI dinitroanilines except profluralin (TOLBAN) caused some visible injury or stand reduction on peas. Several preemergence combinations including propachlor (RAMROD) + dinoseb (PREMERGE), HOE-23408 + dinoseb, and penoxalin (PROWL) + dinoseb gave good weed control without injury. Postemergence applications of MCPA (DOW MCP AMINE) + HOE-23408, or dinoseb + HOE-23408 also gave excellent results. In a late planting,

under dry conditions, the PPI dinitroaniline chemicals were effective and safe. The preemergence and postemergence combinations mentioned above also provided good results in this test.

Snap Beans. Many of the same chemicals evaluated on peas have been evaluated on snap beans for several seasons. In a PPI test, CGA-24705 was safe at rates up to 2.5 lb/A. Of several dinitroanilines tested, tolerance to dinitroamine (COBEX) and penoxalin (PROWL) was marginal. Surface preemergence applications of CGA-24705 and ethofumesate (NORTRON) gave satisfactory weed control without injuring beans. The use of dinoseb (PREMERGE 3) as an overlay or in combination with other herbicides often improved the results on broadleaf weeds. Both paraquat (PARAQUAT CL) and glyphosate (ROUNDUP) performed satisfactorily to kill emerged weeds in a stale seedbed.

Key to abbreviations used in data tables:

BYGR = Barnyardgrass
CIR = Crop injury rating
COLQ = Common lambsquarters
CUCU = Cucumber
GRD = Grade
LACG = Large crabgrass
PO = Postemergence
PPI = Preplant incorporated
PRE = Preemergence
RRPW = Redroot pigweed
SNBE = Snap bean
TEND = Tenderometer

Rating system:

0 = No weed control or crop injury
7.5 = Acceptable weed control
10.0 = Complete weed control or complete crop kill

Cucumber Evaluation, Stale Seedbed

Location: Montcalm Experimental Farm, Entrican
Soil type: McBride Sandy Loam
Date of planting: June 18, 1976 Variety: Carolina
Plot size: 4' x 20' Replication: 3 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APPLIED | DATE | AIR T. | SOIL T | SOIL MOIST | WIND | SKY |
|---|---|---|---|---|---|---|
| PRE | JUNE 18 | 78° | 83° | MOIST | 5-8 MPH | SUNNY |

NOTE: Weed growth June 18, RRPW 4 leaf, BYGR 3-5 leaf, COLQ 4-6 leaf. Weeds per sq ft June 29, RRPW 4.2, BYGR 2.2, COLQ 3.4

CUCU76331

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | GRD-1 LBS/PL 081276 | GRD-2 LBS/PL 081276 | GRD-3 LBS/PL 081276 | OVRSZ LBS/PL 081276 | YIELD T/A 081276 | BYGR RATING 062976 | RRPW RATING 062976 | COLQ RATING 062976 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | WEEDED CONTROL | | | | 2.0 | 3.1 | 6.2 | 6.9 | 4.9 | 10.0 | 10.0 | 10.0 |
| 3 | PARAQUAT + X-77 | 2EC | .50 | PRE | 1.8 | 3.4 | 8.2 | 9.5 | 6.2 | 5.7 | 5.0 | 5.0 |
| 4 | PARAQUAT + X-77 | 2EC | 1.00 | PRE | 1.7 | 2.7 | 7.0 | 10.7 | 6.0 | 6.0 | 5.7 | 5.3 |
| 5 | MON 2133 | 3WS | .75 | PRE | 1.9 | 4.0 | 8.2 | 10.8 | 6.7 | 4.7 | 4.3 | 4.0 |
| 6 | MON 2133 | 3WS | 1.50 | PRE | 1.9 | 3.4 | 7.0 | 7.7 | 5.4 | 6.7 | 6.3 | 5.7 |
| LSD AT FIVE PERCENT LEVEL | | | | | .5 | .7 | 3.0 | 2.6 | 1.4 | 2.1 | 1.0 | .5 |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 17. | 13. | 27. | 19. | 16. | 21. | 10. | 6. |

# Preemergence Herbicide Evaluation in Pickling Cucumbers

Location: Montcalm Experimental Farm, Entrican
Soil type: McBride Sandy Loam
Date of planting: June 4, 1976 Variety: Carolina
Plot size: 4' x 20' Replications: 3 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APP | DATE | AIR T | SOIL T | SOIL MOIST | RH | WIND | SKY |
|---|---|---|---|---|---|---|---|
| PRE | JUNE 4 | 82° | 87° | ADEQUATE | 44% | 3-5 MPH | SUNNY |

NOTE: No rainfall occurred within 8 days after application. Plots were irrigated on June 12. Weeds per 1 ft. June 18, 1976, BYGR 2.0, RRPW 5.9, COLQ 2.1.

CUCU76332

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 061876 | RRPW RATING 061876 | COLQ RATING 061876 | CUCU CIR 061876 | STAND COUNT 062476 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 52.3 |
| 2 | WEEDED CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 60.0 |
| 3 | EL-161 | 3EC | 0.75 | PRE | 1.0 | .7 | .7 | 0.0 | 51.3 |
| 4 | EL-161 | 3EC | 1.00 | PRE | .7 | 2.3 | 2.7 | .7 | 50.0 |
| 5 | EL-161 | 3EC | 1.25 | PRE | 1.3 | 1.7 | 2.0 | 1.0 | 58.0 |
| 6 | HOE-23408 | 3EC | 1.00 | PRE | 1.0 | 1.7 | 1.7 | .7 | 48.3 |
| 7 | HOE-23408 | 3EC | 2.00 | PRE | 7.0 | 4.3 | 4.7 | 1.3 | 52.3 |
| 8 | VEL 5052 | 2EC | 1.00 | PRE | 6.3 | 3.0 | 3.0 | .3 | 54.0 |
| 9 | VEL 5052 | 2EC | 2.00 | PRE | 7.3 | 6.0 | 6.0 | 2.0 | 48.3 |
| 10 | VEL 5052 | 2EC | 3.00 | PRE | 7.0 | 4.3 | 4.3 | 1.0 | 55.3 |
| 11 | DINOSEB | 3EC | 1.00 | PRE | 2.7 | 2.3 | 2.7 | 1.3 | 39.0 |
| 12 | DINOSEB | 3EC | 2.00 | PRE | .7 | 5.0 | 5.3 | 1.7 | 41.0 |
| 13 | NAPTALAM | 2WS | 4.00 | PRE | 7.0 | 7.7 | 7.3 | 1.7 | 44.0 |
| 14 | BENSULIDE | 4EC | 4.00 | PRE | .7 | 1.0 | 1.7 | .3 | 50.7 |
| 15 | CHLORAMBEN ME | 2EC | 1.50 | PRE | 1.7 | 5.0 | 5.0 | 1.3 | 56.7 |
| 16 | NAPTALAM<br>HOE-23408 | 2WS<br>3EC | 4.00<br>1.00 | PRE<br>PRE | 7.0 | 8.0 | 7.3 | 1.7 | 52.3 |
| 17 | NAPTALAM<br>BENSULIDE | 2WS<br>4EC | 4.00<br>4.00 | PRE<br>PRE | 7.0 | 7.7 | 6.3 | 1.7 | 44.3 |
| 18 | CHLORAMBEN ME<br>HOE-23408 | 3EC<br>3EC | 1.50<br>1.00 | PRE<br>PRE | 5.7 | 5.3 | 5.7 | 1.3 | 61.7 |
| 19 | CHLORAMBEN ME<br>BENSULIDE | 3EC<br>4EC | 1.50<br>4.00 | PRE<br>PRE | 1.3 | 4.7 | 5.0 | 1.7 | 55.0 |
| 20 | NAPTALAM<br>DINOSEB | 2WS<br>3EC | 4.00<br>1.00 | PRE<br>PRE | 5.3 | 7.0 | 6.7 | 1.7 | 58.0 |
| | LSD AT FIVE PERCENT LEVEL | | | | 1.7 | 2.1 | 2.3 | 1.0 | 18.3 |
| | COEFFICIENT OF VARIATION (PERCENT) | | | | 29. | 33. | 35. | 59. | 21. |

## Evaluation of Chloramben and Combinations on Pickling Cucumbers

**Location:** Montcalm Experimental Farm, Entrican
**Soil type:** McBride Sandy Loam
**Date of planting:** June 4, 1976 Variety: Carolina
**Plot size:** 4' x 20' Replications: 3 GPA: 36

**HERBICIDE APPLICATION INFORMATION:**

| HOW APP | DATE | AIR T | SOIL T | SOIL MOIST | RH | WIND | SKY |
|---|---|---|---|---|---|---|---|
| PRE | JUNE 4 | 82° | 87° | ADEQUATE | 44% | 3-5 MPH | SUNNY |
| PO | JUNE 14 | 85° | 88° | SURFACE DRY | 65% | 3-5 MPH | CLOUDY |

**NOTE:** No rainfall occurred within 8 days of application. Plots were irrigated on June 12. Weeds per sq. ft. on June 18, RRPW 8.1, COLQ 3.3, BYGR 1.3. Stand count is plants per 20' of row. Cucumbers at time of PO spraying had the first true leaf just enlarging.

CUCU76333

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 061876 | RRPW RATING 061876 | COLQ RATING 061876 | CUCU CIR 061876 | CUCU CIR 062976 | STAND COUNT 062976 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 66.0 |
| 2 | WEEDED CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53.3 |
| 3 | CHLORAMBEN | 2EC | 0.75 | PRE | .3 | 2.7 | 2.3 | 1.3 | 1.3 | 53.0 |
| 4 | CHLORAMBEN | 2EC | 1.50 | PRE | 1.0 | 5.3 | 3.3 | 2.7 | 5.0 | 54.3 |
| 5 | CHLORAMBEN | 10 G | 0.75 | PRE | 1.7 | 3.3 | 3.7 | 2.7 | 3.0 | 49.7 |
| 6 | CHLORAMBEN | 10 G | 1.50 | PRE | 3.7 | 6.0 | 4.0 | 3.0 | 5.0 | 52.0 |
| 7 | CHLORAMBEN<br>DINOSEB | 2EC<br>3EC | 0.75<br>0.75 | PRE<br>PRE | 2.3 | 4.0 | 3.7 | 1.0 | 0.0 | 70.3 |
| 8 | CHLORAMBEN<br>BUTRALIN | 2EC<br>4EC | 0.75<br>1.50 | PRE<br>PRE | 4.7 | 6.7 | 6.0 | 2.0 | 2.7 | 68.3 |
| 9 | CHLORAMBEN<br>HOE-2340A | 2EC<br>3EC | 0.75<br>1.00 | PRE<br>PRE | 6.0 | 4.7 | 5.0 | 1.3 | .7 | 72.3 |
| 10 | CHLORAMBEN<br>ACT. CHARCOAL | 2EC | 1.50<br>200 | PRE<br>PRE | 2.7 | 6.3 | 5.7 | 2.7 | 2.7 | 58.3 |
| 11 | CHLORAMBEN<br>ACT. CHARCOAL | 2EC | 1.50<br>400 | PRE<br>PRE | 2.3 | 5.3 | 3.7 | 1.7 | 2.0 | 64.7 |
| 12 | CHLORAMBEN<br>ACT. CHARCOAL | 2EC | 3.00<br>200 | PRE<br>PRE | 4.0 | 6.0 | 5.3 | 3.0 | 4.7 | 63.3 |
| 13 | CHLORAMBEN<br>ACT. CHARCOAL | 2EC | 3.00<br>400 | PRE<br>PRE | 4.0 | 6.3 | 5.7 | 2.7 | 4.3 | 67.3 |
| 14 | CHLORAMBEN ME | 2EC | 3.00 | PRE | 2.0 | 6.7 | 6.0 | 1.7 | 3.0 | 64.7 |
| 15 | CHLORAMBEN | 2EC | 0.75 | PO | .7 | 0.0 | 0.0 | 2.3 | 4.7 | 49.3 |
| 16 | CHLORAMBEN | 2EC | 1.50 | PO | .7 | .3 | .3 | 2.3 | 6.7 | 52.0 |
| 17 | CHLORAMBEN | 10 G | 0.75 | PO | 1.7 | .7 | 0.0 | 1.7 | 5.3 | 39.0 |
| 18 | CHLORAMBEN | 10 G | 1.50 | PO | 1.7 | 1.0 | .7 | 2.7 | 6.7 | 57.3 |
| LSD AT FIVE PERCENT LEVEL | | | | | 2.5 | 2.1 | 2.5 | 1.4 | 1.8 | 16.2 |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 68. | 34. | 48. | 44. | 33. | 17. |

## Early Herbicide Evaluations in Peas

Location: Montcalm Experimental Farm, Entrican
Soil type: McBride Sandy Loam
Date of planting: April 20, 1976 Variety: Green Giant #531
Plot size: 4' x 10' Replications: 3 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APP | DATE | AIR T | SOIL T | SOIL MOIST | WIND | SKY |
|---|---|---|---|---|---|---|
| PPI | APRIL 20 | 65° | 67° | SURFACE DRY | 4-8 MPH | CLEAR |
| PRE | APRIL 20 | 60° | 61° | LIGHT MIST | 2-4 MPH | CLOUDY |
| PO | MAY 26 | 74° | 77° | DRY | 0 | SUNNY |

NOTE: May 26: Peas had 6 nodes and were up to 5 inches high, RRPW up to 2 true leaves, COLQ up to 4 leaves, BYGR 1-3 leaves. Pea seed was treated with Captan 75 and methoxychlor. June 2: Weeds per 9" square, BYGR 5.8, RRPW 6.0, COLQ 1.7, LACG 0.4.

PEAS76051

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 052676 | RRPW RATING 052676 | COLQ RATING 052676 | PEAS CIR 052676 | STAND COUNT 052676 | YIELD (LB/A) | CONVERTED TO 103 TEND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 12.7 | 6816 | 5930 |
| 2 | WEEDED CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 15.0 | 5148 | 4525 |
| 3 | BUTRALIN | 4EC | 1.50 | PPI | 8.3 | 8.7 | 8.0 | .7 | 13.2 | 6212 | 5404 |
| 4 | BUTRALIN | 4EC | 3.00 | PPI | 9.7 | 9.7 | 9.3 | 3.0 | 8.7 | | |
| 5 | DINITRAMINE | 2EC | 0.33 | PPI | 8.0 | 8.3 | 9.3 | 2.0 | 9.8 | 4846 | 4458 |
| 6 | DINITRAMINE | 2EC | 0.50 | PPI | 9.3 | 9.3 | 9.7 | 3.0 | 9.7 | | |
| 7 | CGA-24705 | 6EC | 1.50 | PPI | 8.7 | 8.7 | 9.7 | 4.0 | 12.2 | | |
| 8 | CGA-24705 | 6EC | 3.00 | PPI | 9.3 | 9.0 | 8.7 | 6.0 | 5.8 | | |
| 9 | EL-161 | 3EC | 0.75 | PPI | 9.7 | 9.3 | 9.7 | 1.7 | 10.5 | 5236 | 4927 |
| 10 | EL-161 | 3EC | 1.50 | PPI | 9.7 | 9.7 | 10.0 | 4.0 | 7.0 | 4881 | 4793 |
| 11 | DINOSEB | 3EC | 6.00 | PPI | 7.0 | 8.0 | 9.0 | 1.3 | 14.3 | 4721 | 4107 |

Early Herbicide Evaluations in Peas (Continued)

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING | RRPW RATING | COLQ RATING | PEAS CTR | STAND COUNT | YIELD (LB/A) | TEND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | PROFLURALIN | 4EC | 0.50 | PPI | 9.3 | 9.3 | 9.7 | 1.0 | 11.0 | 5715 | 5298 |
| 13 | PROFLURALIN | 4EC | 0.75 | PPI | 9.3 | 9.3 | 8.0 | 1.0 | 12.5 | | |
| 14 | TRIFLURALIN | 4EC | 0.50 | PPI | 8.7 | 9.0 | 9.3 | 2.0 | 12.2 | 6195 | 5532 |
| 15 | TRIFLURALIN | 4EC | 0.75 | PPI | 9.3 | 10.0 | 10.0 | 2.3 | 10.7 | | |
| 16 | TRIFLURALIN<br>DINOSEB | 4EC<br>3EC | 0.50<br>6.00 | PPI<br>PPI | 9.3 | 9.3 | 9.3 | 2.3 | 11.5 | 4349 | 3979 |
| 17 | TRIFLURALIN<br>EL-161 | 4EC<br>3EC | 0.25<br>0.38 | PPI<br>PPI | 9.7 | 10.0 | 9.3 | 2.0 | 11.3 | 5431 | 4790 |
| 18 | CGA-24705 | 6EC | 1.50 | PRE | 9.7 | 9.0 | 9.0 | 4.0 | 9.5 | | |
| 19 | CGA-24705 | 6EC | 3.00 | PRE | 10.0 | 9.7 | 9.7 | 7.7 | 9.0 | | |
| 20 | HOE-23408 | 3EC | 1.00 | PRE | 10.0 | 7.3 | 7.3 | 0.0 | 16.0 | 6354 | 5750 |
| 21 | HOE-23408 | 3EC | 1.50 | PRE | 9.7 | 5.7 | 6.3 | .3 | 14.5 | | |
| 22 | ALACHLOR | 4EC | 1.50 | PRE | 10.0 | 9.7 | 10.0 | 6.0 | 13.5 | | |
| 23 | ALACHLOR | 4EC | 3.00 | PRE | 10.0 | 10.0 | 10.0 | 8.0 | 7.2 | | |
| 24 | ETHOFUMESATE | 1.5EC | 1.50 | PRE | 9.7 | 9.3 | 8.7 | 4.0 | 14.7 | 7206 | 6493 |
| 25 | ETHOFUMESATE | 1.5EC | 3.00 | PRE | 10.0 | 10.0 | 9.3 | 6.3 | 13.7 | 4934 | 5289 |
| 26 | DINOSEB | 3EC | 6.00 | PRE | 8.0 | 8.3 | 8.7 | 1.0 | 11.3 | 6674 | 6140 |
| 27 | DINOSEB | 3EC | 9.00 | PRE | 8.0 | 9.0 | 9.7 | 1.0 | 12.8 | | |
| 28 | PENOXALIN | 4EC | 0.50 | PRE | 7.3 | 8.0 | 8.3 | 0.0 | 13.5 | 6709 | 5877 |
| 29 | PENOXALIN | 4EC | 1.00 | PRE | 8.7 | 7.7 | 9.3 | 0.0 | 14.0 | 7686 | 6833 |
| 30 | PROPACHLOR | 65WP | 2.00 | PRE | 4.7 | 3.7 | 3.3 | 0.0 | 14.8 | 6869 | 5997 |
| 31 | PROPACHLOR | 65WP | 4.00 | PRE | 9.0 | 8.0 | 7.3 | 2.0 | 13.5 | 5467 | 5319 |
| 32 | R-33222 | 50WP | 2.00 | PRE | 9.7 | 10.0 | 10.0 | 1.3 | 15.5 | | |
| 33 | R-33222 | 50WP | 4.00 | PRE | 10.0 | 10.0 | 10.0 | 4.0 | 13.3 | | |
| 34 | CGA-24705<br>DINOSEB | 6EC<br>3EC | 1.50<br>6.00 | PRE<br>PRE | 10.0 | 9.3 | 10.0 | 3.7 | 13.5 | | |
| 35 | PROPACHLOR<br>DINOSEB | 65WP<br>3EC | 2.00<br>6.00 | PRE<br>PRE | 9.0 | 8.7 | 10.0 | 1.3 | 14.7 | 6337 | 6223 |
| 36 | HOE-23408<br>DINOSEB | 3EC<br>3EC | 1.00<br>6.00 | PRE<br>PRE | 10.0 | 7.3 | 9.7 | .3 | 13.8 | 6958 | 6292 |
| 37 | PENOXALIN<br>DINOSEB | 4EC<br>3EC | 0.50<br>6.00 | PRE<br>PRE | 8.7 | 8.7 | 9.3 | .3 | 14.3 | 5538 | 6070 |
| 38 | VEL 5052 | 2EC | 1.50 | PRE | 9.7 | 9.0 | 8.7 | 1.7 | 16.0 | | |
| 39 | VEL 5052 | 2EC | 3.00 | PRE | 10.0 | 9.0 | 9.3 | 3.3 | 13.3 | | |

Early Herbicide Evaluations in Peas (Continued)

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 060276 | RRPW RATING 060276 | COLQ RATING 060276 | PEAS CIR 060276 | STAND COUNT 052676 | YIELD (LB/A) | TEND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | HOE-23408 | 3EC | 0.75 | PO | 5.3 | 5.7 | 8.3 | 0.0 | 15.8 | 6248 | 5836 |
| 41 | HOE-23408 | 3EC | 1.50 | PO | 7.0 | 8.0 | 9.3 | 0.0 | 14.7 | | |
| 42 | MCPA | 4EC | 0.13 | PO | 6.0 | 6.0 | 6.0 | 0.0 | 13.8 | 5520 | 5078 |
| 43 | MCPA | 4EC | 0.25 | PO | 7.3 | 8.0 | 6.0 | 0.0 | 13.2 | 5378 | 6034 |
| 44 | MCPB | 4EC | 0.50 | PO | 5.7 | 5.7 | 4.0 | 0.0 | 11.0 | | |
| 45 | MCPB | 4EC | 1.00 | PO | 8.0 | 8.0 | 4.7 | 0.0 | 15.8 | | |
| 46 | DINOSEB | 3EC | 0.75 | PO | 7.0 | 9.0 | 6.7 | 0.0 | 15.3 | 5502 | 5403 |
| 47 | DINOSEB | 3EC | 1.50 | PO | 2.0 | 4.3 | 4.0 | 0.0 | 13.9 | | |
| 48 | MCPA<br>HOE-23408 | 4EC<br>3EC | 0.13<br>0.75 | PO<br>PO | 10.0 | 10.0 | 10.0 | 1.3 | 14.2 | 5680 | 5527 |
| 49 | DINOSEB<br>HOE-23408 | 3EC<br>3EC | 0.75<br>0.75 | PO<br>PO | 8.7 | 10.0 | 9.7 | 1.3 | 12.3 | 5591 | 5015 |
| 50 | BENTAZON | 4EC | 1.00 | PO | 9.3 | 9.3 | 5.0 | 0.0 | 13.2 | | |
| LSD AT FIVE PERCENT LEVEL | | | | | 1.6 | 1.6 | 1.8 | 1.1 | 3.6 | | |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 12. | 12. | 14. | 36. | 18. | | |

## Late Herbicide Evaluation in Peas

Location: Montcalm Experimental Farm, Entrican
Soil Type: McBride Sandy Loam
Date of Planting: June 2, 1976 Variety: Green Giant #531
Plot size: 6' x 20' Replications: 2 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APP | DATE | AIR T | SOIL T | RH | SOIL MOIST | WIND | SKY |
|---|---|---|---|---|---|---|---|
| PPI | JUNE 2 | 55° | 67° | 68% | MOIST | 3-5 MPH | SUNNY |
| PRE | JUNE 4 | 82° | 87° | 44% | MODERATE | 3-5 MPH | SUNNY |
| PO | JUNE 15 | 78° | 83° | - | DRY | 5-8 MPH | SUNNY |

NOTE: Weed counts per sq. ft. June 15: RRPW 8.9, BYGR 8.1, COLQ 1.7, LACG .1 and plant size RRPW 2-4 inches, BYGR 3-4 leaves, COLQ 4-6 leaves, LACG 2-3 leaves, peas up to 4 inches.

PEAS76052

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 061576 | RRPW RATING 061576 | PEAS CIR 061576 | STAND COUNT 062976 | YIELD (LB/A) | CONVERTED TO 103 TEND |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 12.4 | 2221 | 2594 |
| 2 | WEEDED CONTROL | | | | 0.0 | 0.0 | 0.0 | 14.4 | 3511 | 3939 |
| 3 | BUTRALIN | 4EC | 1.50 | PPI | 5.5 | 6.5 | 0.0 | 15.5 | 4362 | 5095 |
| 4 | BUTRALIN | 4EC | 2.50 | PPI | 9.0 | 8.0 | .5 | 14.9 | 3139 | 3817 |
| 5 | DINITRAMINE | 2EC | 0.33 | PPI | 7.5 | 8.5 | 0.0 | 15.0 | 2966 | 3678 |
| 6 | DINITRAMINE | 2EC | 0.50 | PPI | 8.5 | 9.0 | .5 | 14.2 | 3578 | 4351 |
| 7 | EL-161 | 3EC | 0.50 | PPI | 9.0 | 9.0 | 0.0 | 14.7 | 3950 | 4985 |
| 8 | EL-161 | 3EC | 1.00 | PPI | 8.5 | 9.5 | 1.0 | 14.4 | 4163 | 4617 |
| 9 | PROFLURALIN | 4EC | 0.50 | PPI | 7.5 | 8.5 | 0.0 | 15.2 | 3458 | 4440 |
| 10 | PROFLURALIN | 4EC | 0.75 | PPI | 8.0 | 9.0 | 0.0 | 14.3 | 4389 | 5442 |
| 11 | TRIFLURALIN | 4EC | 0.50 | PPI | 5.5 | 8.0 | 2.0 | 16.1 | 3538 | 4387 |
| 12 | TRIFLURALIN | 4EC | 0.75 | PPI | 9.0 | 9.0 | .5 | 13.1 | 3684 | 4892 |
| 13 | HOE-23408 | 3EC | 1.00 | PRE | 3.5 | 2.5 | 0.0 | 15.7 | 3285 | 4073 |
| 14 | DINOSEB | 3EC | 6.00 | PRE | 3.5 | 8.5 | 0.0 | 17.0 | 3285 | 3837 |
| 15 | PENOXALIN | 4EC | 0.50 | PRE | 2.0 | 2.5 | 0.0 | 14.8 | 2474 | 2776 |
| 16 | PENOXALIN | 4EC | 1.00 | PRE | 4.0 | 3.5 | 0.0 | 14.2 | 3365 | 4092 |
| 17 | VEL 5052 | 2EC | 1.00 | PRE | 3.5 | 2.5 | 0.0 | 16.0 | 3312 | 3792 |
| 18 | VEL 5052 | 2EC | 2.00 | PRE | 6.0 | 4.0 | .5 | 17.6 | 2926 | 3207 |
| 19 | DINOSEB<br>HOE-23408 | 3EC<br>3EC | 6.00<br>1.00 | PRE<br>PRE | 6.0 | 7.0 | .5 | 15.7 | 4017 | 4788 |
| 20 | PROPACHLOR<br>DINOSEB | 65WP<br>3EC | 3.00<br>6.00 | PRE<br>PRE | 8.0 | 9.0 | 1.0 | 15.0 | 4336 | 5273 |
| 21 | PENOXALIN<br>DINOSEB | 4EC<br>3EC | 0.50<br>6.00 | PRE<br>PRE | 7.0 | 8.5 | 0.0 | 15.0 | 3365 | 4092 |
| 22 | PROPACHLOR | 65WP | 3.00 | PRE | 8.5 | 5.0 | 0.0 | 13.8 | 3179 | 3942 |

PEAS76052

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 062976 | RRPW RATING 062976 | COLQ RATING 062976 | PEAS CIR 062976 | STAND COUNT 062976 | YIELD (LB/A) | CONVERTED TO 103 TEND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | MCPA | 4EC | 0.38 | PO | 0.0 | 1.5 | 1.5 | 1.0 | 15.3 | 2620 | 3060 |
| 24 | HOE-23408 | 3EC | 1.00 | PO | 9.5 | 0.0 | 0.0 | 0.0 | 16.0 | 2860 | 3275 |
| 25 | MCPA<br>HOE-23408 | 4EC<br>3EC | 0.25<br>1.00 | PO<br>PO | 10.0 | 4.5 | 6.0 | 3.5 | 16.0 | 2820 | 3745 |
| 26 | MCPA<br>HOE-23408 | 4EC<br>3EC | 0.38<br>1.00 | PO<br>PO | 10.0 | 5.5 | 7.0 | 5.0 | 15.4 | 2075 | 2893 |
| 27 | MCPA<br>DINOSEB | 4EC<br>3EC | 0.25<br>1.00 | PO<br>PO | 0.0 | 4.5 | 6.0 | 1.0 | 14.1 | 2567 | 3296 |
| 28 | DINOSEB | 3EC | 1.00 | PO | 0.0 | 1.0 | 2.5 | 1.0 | 14.0 | 2886 | 3579 |
| LSD AT FIVE PERCENT LEVEL | | | | | 2.4 | 1.8 | 2.2 | .9 | 2.3 | | |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 20. | 16. | 22. | 66. | 7. | | |

## Snapbean Evaluation, Stale Seedbed

Location: Montcalm Experimental Farm, Entrican
Soil type: McBride Sandy Loam
Date of planting: June 18, 1976 Variety: Spartan Arrow
Plot size: 4' x 20' Replications: 3 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APPLIED | DATE | AIR T. | SOIL T. | SOIL MOIST | WIND | SKY |
|---|---|---|---|---|---|---|
| PRE | JUNE 18 | 78° | 83° | MOIST | 5-8 MPH | SUNNY |

NOTE: Weed growth June 18, RRPW 2-4 leaf, COLQ 4-6 leaf, BYGR 3-4 leaf.
Weeds per sq ft June 29, RRPW 18, BYGR 1.8, COLQ 2.4.

SNBE76061

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 062976 | RRPW RATING 062976 | COLQ RATING 062976 | YIELD CWT/A 081276 |
|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | WEEDED CONTROL | | | | 10.0 | 10.0 | 10.0 | 29.1 |
| 3 | PARAQUAT + X-77 | 2EC | 0.5 | PRE | 7.0 | 5.7 | 5.3 | 38.6 |
| 4 | PARAQUAT + X-77 | 2EC | 1.0 | PRE | 6.7 | 6.3 | 6.0 | 28.4 |
| 5 | MON 2139 | 4EC | .75 | PRE | 6.3 | 4.0 | 4.7 | 34.0 |
| 6 | MON 2139 | 4EC | 1.5 | PRE | 8.0 | 5.7 | 6.0 | 31.2 |
| LSD AT FIVE PERCENT LEVEL | | | | | .8 | .9 | 1.5 | 11.8 |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 7. | 9. | 16. | 24. |

# Evaluation of Preemergence and Postemergence Herbicides on Snap Beans

Location: Montcalm Experimental Farm, Entrican
Soil type: McBride Sandy Loam
Date of planting: June 4, 1976 Variety: Spartan Arrow
Plot size: 4' x 20' Replications: 3 GPA: 36

HERBICIDE APPLICATION INFORMATION:

| HOW APP | DATE | AIR T | SOIL T | SOIL MOIST | RH | WIND | SKY |
|---|---|---|---|---|---|---|---|
| PRE | JUNE 8 | 80° | 93° | DRY SURFACE | 51% | 0-5 MPH | SUNNY |
| PO | JUNE 18 | 78° | 83° | DRY SURFACE | 68% | 5-8 MPH | PT. CLOUDY |

NOTE: No rainfall occurred within 8 days after application. Plots were irrigated June 12. Weeds per sq. ft. June 18, BYGR 5.5, RRPW 9.0, COLQ 1.5. At time of Preemergence application, a few RRPW and BYGR were emerging and snap beans were sprouting. Where post sprays were applied: snap beans: first true leaf with first trifoliate starting to enlarge, BYGR 3-4 leaves, RRPW 2-4 leaves, COLQ 4-6 leaves.

SNBE76063

| TRT NO | CHEMICAL | FORM | RATE | HOW APP | BYGR RATING 062976 | RRPW RATING 062976 | COLQ RATING 062976 | SNBE CIR 062976 | STAND COUNT 062976 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 51.3 |
| 2 | WEEDED CONTROL | | | | 0.0 | 0.0 | 0.0 | 0.0 | 50.3 |
| 3 | CGA-24705 | 6EC | 1.50 | PRE | 6.7 | 4.7 | 6.0 | .3 | 47.3 |
| 4 | CGA-24705 | 6EC | 2.00 | PRE | 7.3 | 5.3 | 6.0 | 1.7 | 44.3 |
| 5 | CGA-24705 | 6EC | 2.50 | PRE | 7.3 | 5.3 | 6.0 | 1.0 | 54.3 |
| 6 | CGA-24705<br>DINOSEB | 6EC<br>3EC | 1.50<br>3.00 | PRE<br>PRE | 8.7 | 8.3 | 9.0 | 2.0 | 43.7 |
| 7 | ETHOFUMESATE | 1.5EC | 2.00 | PRE | 4.3 | 6.7 | 6.7 | 1.3 | 48.0 |
| 8 | ETHOFUMESATE | 1.5EC | 3.00 | PRE | 6.0 | 8.3 | 8.7 | 2.3 | 45.0 |
| 9 | ETHOFUMESATE | 1.5EC | 4.00 | PRE | 6.7 | 8.7 | 8.7 | 2.7 | 51.7 |
| 10 | R-33222 | 50WP | 1.00 | PRE | 4.0 | 5.3 | 6.7 | 1.7 | 43.0 |
| 11 | R-33222 | 50WP | 2.00 | PRE | 5.7 | 8.3 | 8.0 | 5.0 | 28.3 |
| 12 | R-33222 | 50WP | 4.00 | PRE | 8.0 | 9.0 | 9.0 | 7.0 | 2.3 |
| 13 | R-37104 | 50WP | 4.00 | PRE | 3.3 | 5.7 | 8.0 | 5.0 | 30.0 |
| 14 | R-37104 | 50WP | 6.00 | PRE | 6.7 | 7.7 | 9.0 | 6.7 | 15.7 |
| 15 | PENOXALIN | 4EC | 0.75 | PRE | 2.7 | 5.0 | 6.3 | 1.7 | 41.7 |
| 16 | PENOXALIN | 4EC | 1.50 | PRE | 6.0 | 5.3 | 7.0 | 1.3 | 41.3 |
| 17 | DINOSEB | 3EC | 3.00 | PRE | 5.0 | 7.3 | 8.3 | 2.3 | 46.3 |
| 18 | ETHOFUMESATE | 1.5EC | 1.00 | PO | 0.0 | 1.3 | 0.0 | 0.0 | 42.3 |
| 19 | ETHOFUMESATE | 1.5EC | 2.00 | PO | .3 | 3.0 | 0.0 | 0.0 | 50.3 |
| 20 | BENTAZON | 4EC | 0.75 | PO | 0.0 | 1.7 | 0.0 | 0.0 | 43.0 |
| 21 | BENTAZON | 4EC | 1.50 | PO | 0.0 | 2.7 | 0.0 | 0.0 | 43.3 |
| LSD AT FIVE PERCENT LEVEL | | | | | 1.7 | 1.2 | 1.4 | 1.3 | 12.0 |
| COEFFICIENT OF VARIATION (PERCENT) | | | | | 24. | 14. | 15. | 40. | 18. |

# INFLUENCE OF NEMATICIDES AND SUBSOILING BENEATH THE PLANTING ROW ON THE DEVELOPMENT AND YIELD OF NAVY AND KIDNEY BEAN PLANTS

G.W. Bird
Department of Entomology

In 1975, yields and quality of dry beans grown in a sandy loam soil heavily infested with both the root-lesion (Pratylenchus penetrans) and stunt (Tylenchorhynchus nudus) nematodes were increased from 16.1 to 21.3 CTW PER ACRE through application of the nematicide carbofuran (Furadan 10G). There was a need to repeat this work and determine the reason for the increase in yield and assess its significance in relation to the overall aspects of Michigan dry bean production. A proposal was developed, submitted to the Michigan Dry Bean Commission, funded and carried out in Gratiot and Montcalm Counties during the 1976 growing season. Yields of dry beans in a Gratiot Co. field having a moderate population of the root-lesion nematode were increased from 15.3 to 21.0 CTW PER ACRE (TABLE 1) when carbofuran was applied during a subsoiling operation beneath the planting row. It was determined that approximately 50% of this increase was due to alleviation of direct soil compaction problems or indirectly as soil compaction influenced the tolerance limit of the plant to the root-lesion nematode. The remainder of the yield increase was attributed to control of the root-lesion nematode. At the Montcalm Potato Research Farm, yields of kidney beans and navy beans were increased with carbofuran from 6.4 to 11.3 CTW PER ACRE and from 11.3 to 15.7 CTW PER ACRE, respectively (TABLES 2 and 3). Yields of kidney beans at this site were increased from 6.4 to 12.2 CTW PER ACRE with aldicarb (TABLE 3). Subsoiling beneath the planting was not used in the Montcalm tests. As predicted in the 1975 report to the Michigan Dry Bean Production Advisory Board and Michigan Bean Commission, moving the nematology-bean research program from clay loam and silt loam soils to sandy loam and sandy soils has greatly increased the success of the project. The average yield increase in these tests was 32% (11.1 to 16.3 CTW PER ACRE). One of the projects described above was shown to a number of grower groups and the response was extremely favorable. It is my understanding that there are a number of commercial bean growers interested in the type of soil preparation described above. Unfortunately, however, very little is known about the use of this system in Michigan. For some soils, it is believed to be satisfactory. A research proposal for 1977 will be submitted to the Michigan Dry Bean Production Research Advisory Board and Michigan Bean Commission for continuation of this project.

TABLE 1. Influence of subsoiling beneath of planting row and carbofuran on 1976 yields of Gratiot Co. navy beans.

| Treatment | Yield (cwt/A) | Pratylenchus penetrans per 100 $cm^3$ soil (8/24/76) |
|---|---|---|
| Commercial tillage | 15.3a | --- |
| Subsoiling and bedding | 18.7a | 7.0a |
| Subsoiling and bedding plus carbofuran | 21.1c | 11.0a |

Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Newman-Kuels Multiple Range Test.

TABLE 2

Influence of nematicides on control of *Pratylenchus penetrans* and yields of kidney beans

| Treatment | Yield (ctw/A) | *P. penetrans* per 100 $cm^3$ soil |
|---|---|---|
| Check (nontreated) | 6.4a [1] | 0.4a |
| Furadan 10G (20 lb/A) | 10.9b | 0.4a |
| Temik 15G (13 lb/A) | 12.3b | 0.6a |
| Mocap 10G (10 lb/A) | 7.7a | 0.8a |
| CGA 12223 20G (15 lb/A) | 11.4b | 0.4a |

[1] Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Newman-Kuels Multiple Range Test.

TABLE 3

Influence of nematicides on control of *Pratylenchus penetrans* and yields of dry beans

| Treatment | Yield (ctw/A) | *P. penetrans* per 100$cm^3$ soil (6/29/76) | *P. penetrans* per gram root (9/13/76) |
|---|---|---|---|
| Check (nontreated) | 11.6a [1] | 89.6a | 2.2a |
| Furadan 10G (20 lb/A) | 15.7a | 64.8a | 1.0a |
| Temik 15G (13 lb/A) | 13.4a | 55.2a | 1.2a |
| Mocap 10G (10 lb/A) | 11.3a | 61.6a | 3.4a |
| CGA 12223 20G (15 lb/A) | 11.7a | 41.6a | 3.6a |

[1] Column means followed by the same letter are not significantly different (P=0.05) according to the Student-Newman-Kuels Multiple Range Test.