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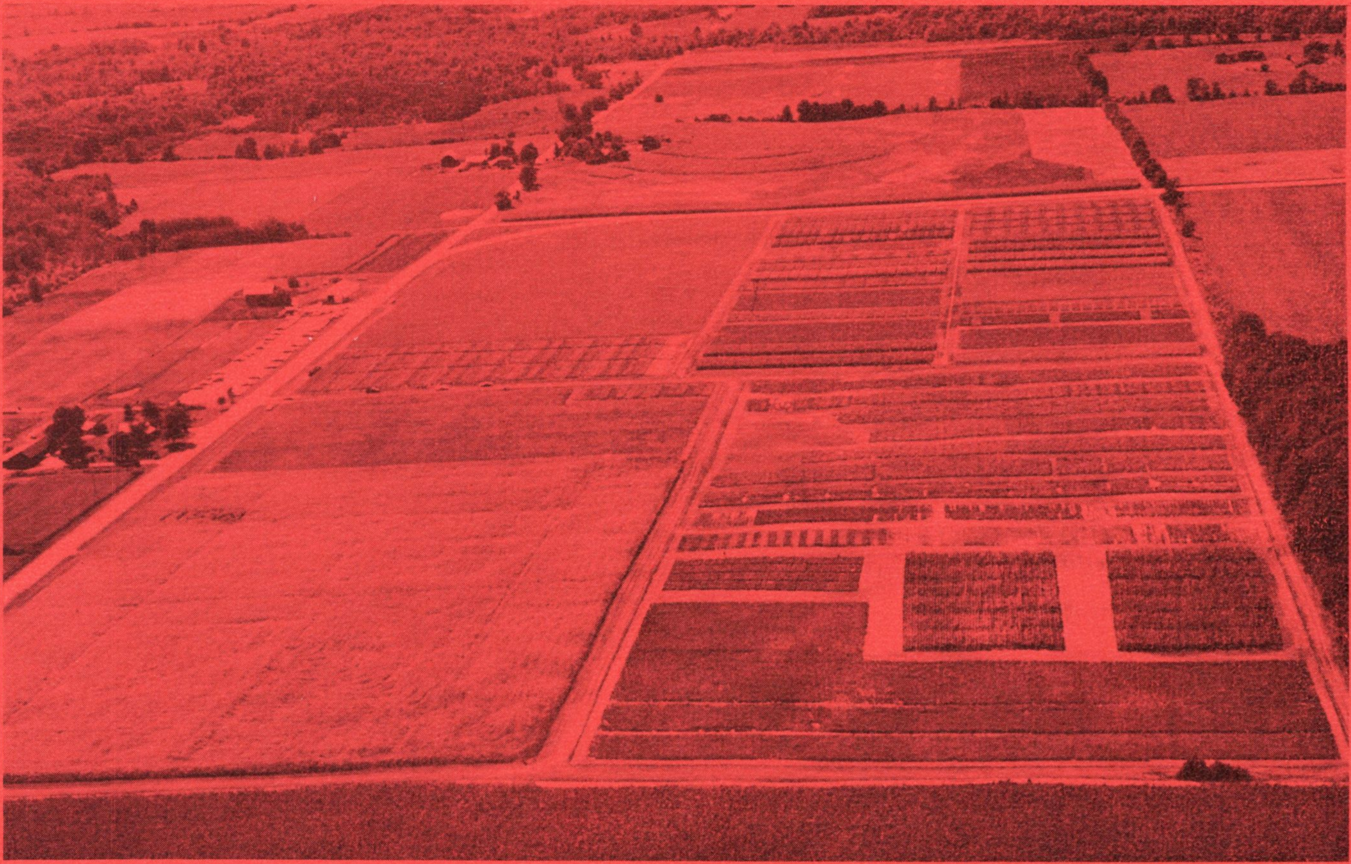
1974 Research Report



MONTCALM EXPERIMENTAL FARM

Michigan State University
Agricultural Experiment Station

ACKNOWLEDGEMENTS

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 eight 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 1974. Much of the data herein reported represents projects in various stages of progress so complete 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

Temperature and rainfall recordings for the 1974 season are shown in Figure 1. Tables 1 and 2 summarize the 7-year rainfall and temperature data. Average maximum and minimum temperatures for 1974 were similar to those of the 7-year average. For the months of August and September, the 1974 average maximum was lower than the 7-year average and for each individual year. The average minimum of 45° for September, 1974 was the lowest of any of the seven years. In July there were nine days that the temperature exceeded 85°.

The 1974 total rainfall of 23.97 inches for the 6 months period in 1974 was the second highest of 7 years for which records at the Farm are available. One-fourth of the total rain came in August. Rainfall in July and September was less than the 7-year average.

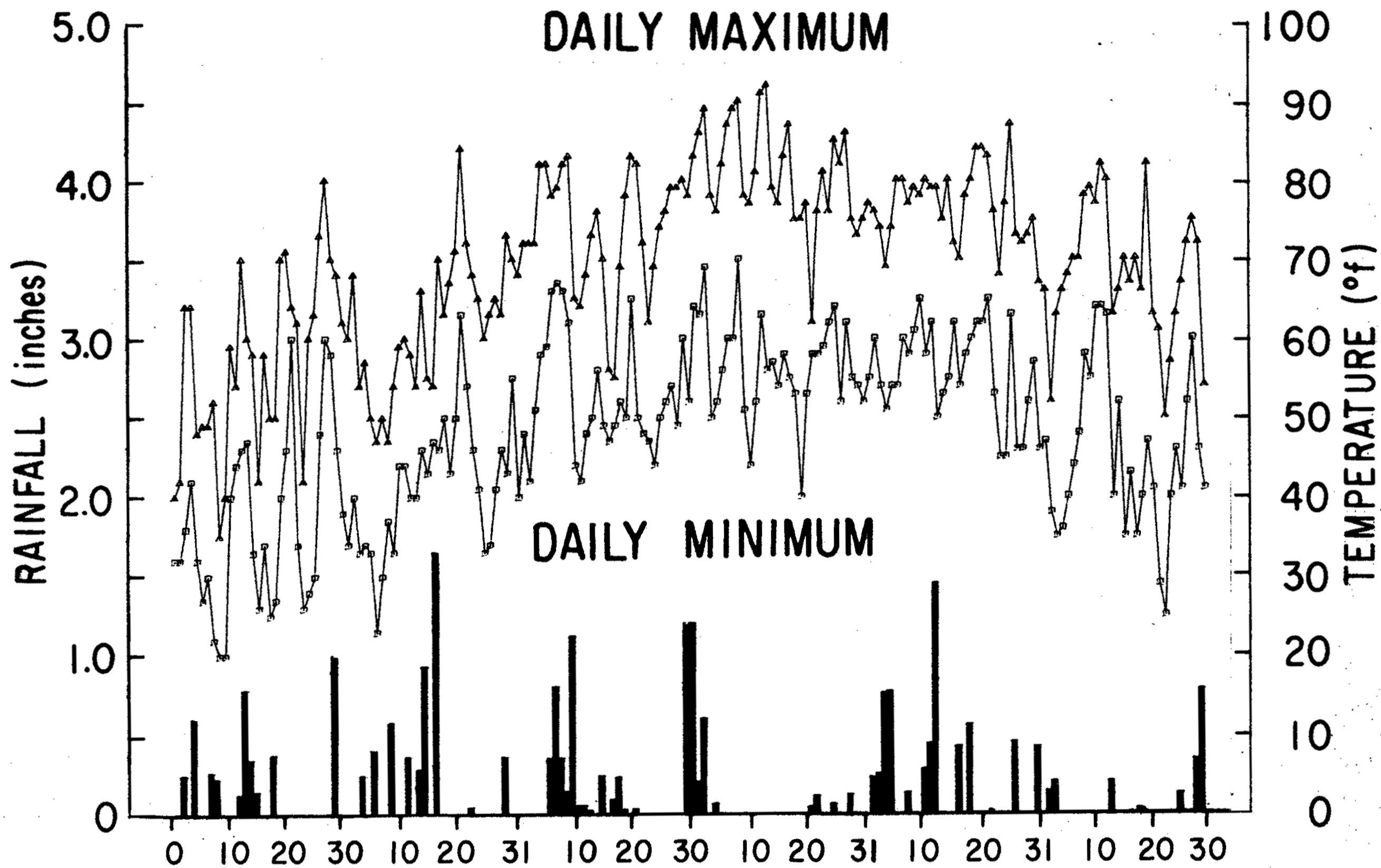
Irrigation applications of approximately one inch each were made 7 times (July 10, 15, 22, 27, 30 August 2 and September 7).

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
6.1	395	300	1067	211



	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.
AVERAGE MONTHLY TEMP.	MAX. 57 MIN. 36	MAX. 62 MIN. 41	MAX. 73 MIN. 52	MAX. 81 MIN. 57	MAX. 77 MIN. 56	MAX. 68 MIN. 45
RAINFALL	4.07 inches	4.83 inches	4.69 inches	2.39 inches	6.18 inches	1.81 inches

Figure 1. Climatology Observations at the Montcalm Experimental Farm in 1974.

Table 1. The 7-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
7-year average	55	34	65	43	74	53	80	58	79	57	71	49		

Table 2. The 7-year summary of precipitation (inches per month) recorded during 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
7-year average	2.69	3.47	3.94	2.48	4.24	2.97	19.79

Fertilizers Used

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

plow down with rye cover crop	0-0-60	150 lbs/A
banded with planter	20-10-10	500 lbs/A
sidedressed	45-0-0	320 lbs/A

Disease and Insect Control

A granular systemic insecticide (phorate) was applied at 3 pounds per acre to most of the potato plots at planting. A second application of disulfotan at 3 lb/A was applied to the late maturing varieties at the same time that the 45-0-0 was sidedressed and the crop hilled.

The foliar spray program was initiated on June 29 and continued on a weekly basis. All applications were made with an air blast sprayer. The foliar insecticides used were: Endosulfan (Thiodan), Meta-Systox R, Cygon 267 and Monitor. Linuron (Lorox) at 1½ lb/A applied pre-emergence was used for weed control. Bravo and Kocide 101 were used as the fungicides. Des-i-cate at 2 gallons per acre plus a crop oil at 1 gallon per acre was used as the top-killer.

THE EFFECT OF PLANTING AND HARVEST DATES ON THE PRODUCTION PERFORMANCE OF RUSSET BURBANK SEED POTATOES

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Department of Crop and Soil Sciences

Procedure

Foundation Russet Burbank seed was planted on May 9, 18 and June 1 and harvested on August 15, 30, September 17, and October 1 in 1973. A one-bushel sample was collected from each treatment for storage and subsequent planting in 1974. Before placement in the 40F storage, the samples were stored for approximately 2 weeks at 60-65F and 80-85% relative humidity to allow for proper curing and wound healing.

Five days before planting in 1974 the seed was removed from storage and warmed to 50-55F. The seed was planted on May 2, 1974 in one-row plots and six replicates. Except for the treatment of the June 1 planting and August 15 harvest when the tubers did not size, all plantings were made from one seed piece cut from each tuber in the sample. The balance of the tuber was discarded, therefore each plant represented a different tuber. Data on emergence, plant stand, virus disease readings, vigor, yield and quality were obtained.

Results and Discussion

Table 1 summarizes the yield performance of seed planted and harvested at different intervals. In all cases the total yield is the greatest from seed harvested at the two earlier dates and the lowest yield occurred with the latest harvested seed. Similar response was obtained in 1973, however, the magnitude of reduced yields for the last harvested seed was much greater in 1973. There appears to be no consistent trend in the effect on the percent size distribution and there is no effect on specific gravity.

Vigor ratings made early in the growing season relates very closely to the yield results, with the most vigorous and uniform stands producing the greatest yields. The incidence of visual virus leaf roll was the greatest with the late harvested seed indicating that the delay in harvest does increase the hazard of late season leaf roll infections in the seed harvested (Table 2). Aphids were a serious problem in 1973 and this coupled with the high concentration of commercial potato production in the adjacent area resulted in considerable late season virus leaf roll infection. Seed harvested on August 15, 1973 had a zero reading for leaf roll infection in 1974. That harvested on August 30 averaged 3.9%; September 17 averaged 9.9% and the October 1 harvested seed averaged 17.2%. If there is a delay in both the planting date and harvest date then the problem became more serious. The seed planted on June 1 and harvested on October 1, 1973 had leaf roll readings of 26.1% in the 1974 crop whereas the seed planted on May 9 and harvested on October 1, 1973 had leaf roll readings of 11.6%. Of the two factors, harvest date seems to have a greater influence on the incidence of late season virus leaf roll infections than does the planting date.

Table 1. The total yield, size distribution and specific gravity of Russet Burbank potatoes planted on three different dates and harvest on four different dates.

Planting date	Harvest date	No. days planting* to harvest	Total cwt/A**	Percent size distribution: less than 1 7/8	over 10 oz.	off type	1 7/8 to	Specific gravity
May 9	Aug. 15	98	368	9.3	13.5	6.5	70.7	1.079
	Aug. 30	113	397	12.2	13.2	5.9	68.7	1.079
	Sept. 17	131	331	8.8	20.1	12.8	58.3	1.077
	Oct. 1	145	344	10.7	18.3	10.7	60.3	1.077
May 18	Aug. 15	89	392	12.8	11.1	7.4	68.7	1.080
	Aug. 30	104	373	13.0	13.5	7.0	66.5	1.079
	Sept. 17	122	364	8.6	19.7	8.1	63.6	1.079
	Oct. 1	136	334	9.5	14.8	14.7	61.0	1.080
June 1	Aug. 15	76	369	9.8	12.7	9.1	68.4	1.079
	Aug. 30	91	381	11.6	14.9	10.6	62.9	1.079
	Sept. 17	109	345	10.2	19.9	6.0	63.9	1.078
	Oct. 1	123	322	9.5	17.2	16.7	56.6	1.079

* Dates are for seed grown in 1973.
** Yields, percent size distribution and specific gravity are from 1974 harvests.

Table 2. The incidence of visual leaf roll symptoms in 1974 plantings from Russet Burbank seed planted and harvested at different times in 1973.

Planting date	Harvest date	Percent of plants showing visual virus leaf roll symptoms
May 9	Aug. 15	0
	Aug. 30	5.1
	Sept. 17	7.3
	Oct. 1	11.6
May 18	Aug. 15	0
	Aug. 30	4.4
	Sept. 17	3.6
	Oct. 1	13.8
June 1	Aug. 15	0
	Aug. 30	2.2
	Sept. 17	18.8
	Oct. 1	26.1

Table 3 summarizes the yield performance of seed planted on three different dates disregarding the harvest date. In 1974 there was no yield or quality difference whereas in 1973 the yield difference between the earliest and latest planted seed was 43 cwt per acre in favor of the earlier planting. When one evaluates the harvest date only and disregards the planting date, Table 4, then there is a general decline in the yield performance as the harvest date is delayed. Similar resuts did occur in 1973. The increased incidence of virus leaf roll infection with the late harvested seed is a factor here also.

Based on these two years data and observations it does appear that production management does have an influence on subsequent seed performance. Earlier harvested seed does result in a more uniform and vigorous crop growth the following year with resulting higher yields and the incidence of late season virus leaf roll spread is lessened.

Table 3. The total yield, specific gravity and size distribution of Russet Burbank potatoes grown from seed planted at 3 different times.

Planting date*	1974 Total cwt/A	Percent size distribution: Less than 1 7/8	Over 10 oz.	Off type	1 7/8-10 oz.	Specific gravity
May 9	360	10.3	16.1	8.8	64.8	1.078
May 18	365	11.1	14.7	9.2	65.0	1.079
June 1	354	10.3	16.1	10.4	63.2	1.078

* Planting dates are for the seed grown the previous year.

Table 4. The total yield, specific gravity and size distribution of Russet Burbank potatoes grown from seed harvested at 4 different times.

Harvest date*	1974 Total cwt/A	Percent size distribution: Less than 1 7/8	Over 10 oz.	Off type	1 7/8-10 oz.	Specific gravity
August 15	376	10.7	12.4	7.7	69.2	1.079
August 30	383	12.3	13.9	7.8	66.0	1.079
September 17	346	9.2	19.9	8.9	62.0	1.078
October 1	333	9.9	16.8	14.0	59.3	1.078

* Harvest dates are for the seed grown the previous year.

THE EFFECT OF PLANTING DATE AND HARVEST DATE ON RUSSET BURBANK YIELD AND QUALITY

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Department of Crop and Soil Sciences

Procedure

New Foundation seed of the Russet Burbank variety was planted on three different planting dates and harvested on four different dates in 1972, 1973 and 1974. The seed planted was predominantly whole seed, however when necessary the larger size tubers were split before planting. The seed was planted with a commercial two row picker-planter and recommended cultural practices of fertilization, irrigation, insect, disease and weed control were followed.

On four different dates, three-two row plots were harvested from each of the three plantings. Yields, size distribution and specific gravity readings were determined. No topkiller was used and the vines were allowed to continue to grow until harvested.

Planting dates and harvest dates for each of the three years are summarized as follows.

		1972	1973	1974
Planting dates:	early:	May 9	May 9	May 2
	intermediate:	May 18	May 18	May 20
	late:	May 31	June 1	June 4
Harvest dates:	1.	Aug. 15	Aug. 15	Aug. 16
	2.	Sept. 1	Aug. 30	Sept. 3
	3.	Sept. 15	Sept. 18	Sept. 17
	4.	Oct. 4	Oct. 1	Oct. 2

Results and Discussion

Table 1 summarizes the total yield data for each year and the combined 3 years. As expected, the greatest yields did occur with the earliest planting. The difference between the early and intermediate average yields is only 24 cwt/acre; however, the difference in yields between the early and late planting of 109 cwt/acre and the 85 cwt/acre difference between the intermediate and late is much more substantial.

One interesting observation is that even though the top growth was still green and actively growing, for both the early and intermediate plantings, there was no increased yield obtained from delaying harvest from mid-September to early October. Even with the late planting where there was a yield increase between harvests 3 and 4, the difference is only 18 cwt/acre and this is not significant. September 22 and 23 of 1974 with low recorded temperatures of 29F and 25F, respectively were the only times during the 3 years of the study that the September temperature went below freezing and this was not sufficient to completely kill all top growth. Active, green top growth was still visible on the last harvest date in 1974.

Table 1. The total yield (cwt/A) of Russet Burbank planted at 3 different times and harvested on 4 different dates (1972-1974).

Planting time:	early				intermediate				late			
Harvest time:	1	2	3	4	1	2	3	4	1	2	3	4
Year												
1972	289	335	376	368	244	313	365	370	97	169	277	289
1973	217	281	329	303	169	252	294	287	114	226	291	292
1974	250	337	399	389	230	315	375	371	92	186	248	288
3-year average	252	318	368	356	214	293	345	343	101	194	272	290

The daily growth rate expressed as cwt/A/day is greater during the two-week interval between harvests 1 and 2 than it is between harvests 3 and 4. The rate of growth is most rapid with the later planted lots, however the resulting final yield is the lowest. The average daily growth rate for the early and intermediate planting is 5.2 cwt/A/day from mid-August to early-September and 3.6 cwt/A/day from early-September to mid-September. The average daily growth for the late planting is 6.6 cwt/A/day from mid-August to early-September and drops to 5.6 cwt/A/day from early to mid-September.

Table 2 summarized the data obtained for specific gravity readings. Again it is interesting to note that specific gravity readings increased with the later harvests however there was a marked decrease each year between mid-September and early-October regardless of the planting date. The only two exceptions to this trend were in 1974 when for the intermediate planting the specific gravity remained the same between harvests 3 and 4 and with the late planting it actually increased from 1.077 to 1.082 between harvests 3 and 4.

Table 2. The specific gravity of Russet Burbank planted at 3 different times and harvested on 4 different dates (1972-74).

Planting time	early				intermediate				late			
Harvest time	1	2	3	4	1	2	3	4	1	2	3	4
Year												
1972	1.074	1.075	1.076	1.073	1.075	1.076	1.079	1.073	1.065	1.070	1.077	1.073
1973	1.076	1.087	1.084	1.083	1.075	1.086	1.083	1.079	1.070	1.082	1.082	1.079
1974	1.081	1.082	1.085	1.082	1.078	1.080	1.084	1.084	1.070	1.074	1.077	1.082
3-year average	1.077	1.081	1.082	1.079	1.076	1.081	1.082	1.079	1.068	1.075	1.079	1.078

The effect of planting dates and harvest dates on percent size distribution is not as pronounced or consistent. In general, the later planted crop will produce a greater percentage of tubers under 1 7/8 inches and tubers over 10 ounces are much less as one would expect. Also, the mid-August harvest, regardless of planting date, produces a much higher percentage of B size tubers than the later harvests. For both the early and intermediate planting dates, the percentage of B size tubers at 10-14% was established by the early September harvest and remained in this range for the subsequent harvests. The maximum percent of tubers over 10 ounces reached its peak by the mid-September harvest. For the late planted crop there was about a two-week lag in the growth patterns.

The results observed in this study suggest that in terms of yield and specific gravity there is no value in delaying harvest beyond mid-September. The risk and hazard of damage from cold weather also becomes greater as the harvest is delayed. It further suggests that by mid-September the potato crop has reached its greatest yield and quality.

SOIL FERTILITY STUDIES WITH POTATOES

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In 1924, two soil fertility experiments were conducted. One was a liming study to evaluate the effect of lime on potato yield, quality and incidence of scab disease. This study was a follow-up to several previous studies where yields were positively correlated with soil pH.

The second study was a time of nitrogen application study first initiated in 1972. Nitrogen fertilizer applied through the irrigation system and spaced throughout the growing season was compared with nitrogen applied as a side-dress application.

Lime Study

This experiment included 3 lime rates (0, 2 and 4 tons/acre) and 2 liming materials (dolomitic agriculture limestone, Dry and Moist). The dry bin-storage lime had a moisture content of zero while the moisturized stockpiled lime had 14% moisture. Both materials had a neutralizing value of 106. The actual amount of lime applied was adjusted according to neutralizing value and moisture so that treatments 2 and 3 received an equivalent amount of lime based on a neutralizing value of 100 (pure calcium carbonate) as treatments 4 and 5. This was done so that each material would neutralize approximately the same amount of acidity. If applied strictly on a weight basis the dry lime would have neutralized considerably more acidity.

The results of the study are shown in Table 1. The cultural and management practices are listed at the bottom of the table. Potato tubers were sized into three categories (those greater than 3 1/4 inches, those less than 1 7/8 inches and those between 1 7/8 and 3 1/4 inches). Specific gravity of tubers was determined by the hydrometer method at East Lansing shortly after harvest. Scab ratings were made in the field at the time of harvest by rating from 0 to 10. Those receiving 0 - rating had no evidence of scab while a rating of 10 would be a tuber with the entire surface covered with scab.

Table 1. Effect or rate and source of lime on yield, size and specific gravity or irrigated Kennebec and Katahdin potatoes.

	Kennebec						Katahdin					
Lime treatments[a]	Total yield	Over 3 1/4"	1 7/8" to 3 1/4"	less than 1 7/8"	SP GR	Scab rating	Total yield	Over 3 1/4"	1 7/8" to 3 1/4"	less than 1 7/8"	SP GR	Scab rating
	cwt/A	---	%	---		%	cwt/A	---	%	---		%
No lime	273	13	73	8	1.065	5	294	14	76	11	1.067	15
2 Ton Dol-Ag Lime (dry)	289	10	77	9	1.066	10	263	10	78	12	1.065	10
4 Ton Dol-Ag Lime (dry)	250	9	75	10	1.066	10	276	13	75	12	1.068	15
2 Ton Dol-Ag Lime (moist)	233	9	75	10	1.064	10	254	13	77	10	1.068	15
4 Ton Dol-Ag Lime (moist)	276	10	75	9	1.066	8	301	14	77	9	1.068	12
LSD (.05)	NS	NS	NS	2	NS	NS	NS	NS	NS	2	NS	NS

[a] Lime was applied on an equivalent basis using a neutralizing value of 100 for pure calcium carbonate.

Planted: May 7, 1974
Row spacing: 32 inches
Basic fertilizer: 500 lbs. 20-10-10 at planting
Seed spacing: 10 inches
Irrigation: 7 inches
Harvested: October 3, 1974
Harvest area: 266 sq. ft.
Soil tests: pH = 6.0, P = 230, K = 302, Ca = 939, Mg = 126

Table 2. Effect of time of nitrogen application on yield, size and specific gravity of Kennebec and Russet Burbank potatoes.

Nitrogen[a] applications	Kennebec					Russet Burbank					
	Total yield	Over 3 1/4"	1 7/8" to 3 1/4"	less than 1 7/8"	Specific gravity	Total yield	Over 10 oz	1 7/8" to 10 oz	less than 1 7/8"	Off type	Specific gravity
	cwt/A	---------- %	----------	----------		cwt/A	------------- %	-------------	-------------	-------------	
100 PT, 120 ESD	418	13	78	9	1.070	358	12	68	13	7	1.079
100 PT, 60 ESD, 3*20 Irr.	468	11	81	8	1.072	386	13	71	12	4	1.077
100 PT, 6*20 Irr.	466	17	76	6	1.072	385	13	72	11	4	1.079
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[a] PT = planting time, 5/13/74, ESD = Early sidedress, 6/24/74
3*20 Irr. = three bi-weekly applications of 20 lb N/A; 6*20 = six weekly applications of 20 lb N/A through the irrigation system.

Planted: May 13, 1974
Row spacing: 34 inches
Basic fertilizer: 500 lbs 20-10-10 at planting
Irrigation: 7 inches
Seed spacing: 12 inches
Harvested: October 10, 1974
Harvest area: 283 sq. ft.

The two varieties, Kennebec and Katahdin, were not significantly affected by any of the treatments. Scab ratings were very low with average ratings of less than 1 (less than 10%). These varieties were selected because of their susceptibility to scab disease. Many growers are afraid to lime because they fear that liming may cause scab. This study does not substantiate their fears. Yield and specific gravity likewise were uneffected by liming.

Time of N Application Study

Nitrogen fertilizer was applied to obtain 3 comparable treatments, all receiving the same amount but at various times of application throughout the growing season. All treatments received 100 lbs N/A as a starter fertilizer. The first treatment received 120 lbs N/A in one sidedress N on June 24 and another 20 lbs N/A biweekly through the irrigation system for the next 6 weeks. The third treatment received 20 lbs N/A on a weekly schedule through the irrigation system over a 6-week period.

Neither yield nor specific gravity were significantly affected by the nitrogen treatments (Table 2). Both varieties, however, tended to yield better where N was applied through the irrigation system. The three-year average (Table 3) would indicate that N through the irrigation system in either weekly or biweekly intervals has a 30 to 40 hundredweight advantage over the conventional method of sidedress application.

Table 3. Three year average for total yield and specific gravity of Kennebec and Russet Burbank varieties as affected by nitrogen applied through the irrigation system (1972-74).

	Kennebec		Russet Burbank		Overall Average	
Nitrogen[a] applications	Total yield	Specific gravity	Total yield	Specific gravity	Total yield	Specific gravity
PT + ESD	399	1.071	354	1.075	376	1.073
PT + ESD + 3 Irr.	454	1.073	381	1.073	418	1.073
PT + 6 Irr.	451	1.072	390	1.074	420	1.073

(a) PT = Planting time N, ESD = Early sidedress N
3 Irr. = 3 biweekly applications in irrigation water
6 Irr. = 6 weekly application in irrigation water
Nitrogen rates varied slightly from year to year, however, the total amount applied each year was between 220 and 240 lbs N/Acre for each treatment.

POTATO WEED CONTROL

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Dept. of Crop & Soil Science

Preemergence and Postemergence Weed Control Evaluations in Potatoes Montcalm County, Michigan 1974.

Herbicide applications on potatoes in 1974 indicated excellent control of broadleaved and annual grass weeds.

Sencor (metribuzin) delayed preemergence or postemergence provided complete control. In this program it is possible to use Sencor preemergence and follow with a postemergence application if necessary.

Lorox & Lasso and Sencor & Lasso add a new possibility of controlling weeds that have emerged prior to a delayed preemergence treatment and also providing extended control especially of barnyard grass which is becoming more of a problem.

Two new materials Gulf S-6044 and Ortho 17111 offer promise for furture development in potato weed control.

At present there are no registrations for use of Sencor, Sencor & Lasso or Lorox & Lasso in potatoes.

Preemergence and Postemergence Weed Control Evaluations in Potatoes
Montcalm County, Michigan 1974.

Planted: May 2, 1974
Treated: Pre May 29, 1974
Post June 27, 1974

Variety: Burbanks
Soil Type: Sandy Clay Loam
Organic Matter: 2.4%

Weeds Present: Pigweed, Barnyard Grass

Tmt. No.	Treatments Pre	Post	lbs/A	Injury	Weed Control Ratings PW	BG
1	Sencor	-	½	0.0	10.0	10.0
2	Sencor	-	1	0.7	10.0	10.0
3	Sencor +	Sencor	½+½	0.0	10.0	10.0
4	-	Sencor	½	0.0	10.0	10.0
5	Sencor+Lasso	-	½+2	0.1	10.0	10.0
6	DNBP+Lasso	-	4½+2	0.2	10.0	10.0
7	Lorox+Lasso	-	1+2	2.7	10.0	10.0
8	Maloran+Lasso	-	1¼+2	2.7	10.0	10.0
9	S-6044	-	2	0.0	10.0	10.0
10	S-6044	-	4	0.0	10.0	10.0
11	Probe	-	2	3.3	9.7	9.3
12	Probe+Lasso	-	½+2	3.0	10.0	10.0
13	Ortho 17111	-	1	0.3	10.0	10.0
14	Ortho 17111	-	2	1.3	10.0	10.0
15	- -	Ortho 17111	1	0.7	8.7	5.7
16	- -	Ortho 17111	2	2.3	10.0	9.3
17	Ortho 16973	-	2	1.7	10.0	9.7
18	Ortho 16973	-	1	1.0	9.7	9.7
19	Lorox	-	1½	2.7	10.0	10.0
20	No Treatment	-	-	0.0	0.0	0.0

0 = No control and no injury; 10 = complete control or kill.

USE OF ROW APPLICATIONS OF SOIL FUMIGANTS FOR CONTROL OF ROOT-LESION NEMATODE IN POTATO PRODUCTION

G. W. Bird
Department of Entomology

Plant parasitic nematodes cause approximately 10% or four million dollars in annual losses in Michigan potato production. Most of this damage is caused by the root-lesion nematode (*Pratylenchus penetrans*). Fall applications of broadcast rates of soil fumigants are recommended for the control of plant parasitic nematodes in potato fields. Chemical costs are in excess of $40.00 per acre and will only control nematodes for a single growing season. Row applications of soil fumigants are not presently recommended for potato production in Michigan, but would decrease both the cost and amount of chemical used by 60%. The objective of this investigation was to determine the efficacy and feasibility of the use of row applications of soil fumigants for control of root-lesion nematode in potato production in Michigan.

Two registered fumigant nematicides and two experimental granular nematicides were evaluated (Table 1) in this experiment at the Montcalm Experimental Farm (M.S.U.). Each treatment was replicated four times in a randomized block design, containing plots 11 ft 4 inches wide and 50 ft in length. Broadcast applications of Vorlex and Terr-o-cide 15D were injected to a depth of 6-8 inches, and row applications were made by injecting one-half of the fumigant at a 6-inch depth and the other half at an 18-inch depth. All soil fumigants were applied on April 26, 1974. On May 20, all plots were planted with four 34-inch rows of Russet Burbank potatoes. Granular nematicides were applied at planting and incorporated to a 2-4 inch depth. The plots were maintained under commercial fertility, weed, insect and disease control programs, and irrigated when necessary. Plant growth data and nematode population dynamics determinations were made at several intervals throughout the growing

Table 1. Influence of broadcast and row applications of soil fumigants and granular nematicides on (*Pratylenchus penetrans*) and yield of Russet Burbank potatoes, Montcalm, Michigan, 1974.

Treatment, method of application and rate per acre (active)	*Pratylenchus penetrans* per g root (7/16/74)	Total yield (ctw per acre)
Check (no treatment)	25 a[1]	380 a
Terr-o-cide 15D (10.0 gal, broadcast)	15 ab	437 b
Terr-o-cide 15D (4.0 gal, row)	13 ab	439 b
Vorlex (30.0 gal, broadcast)	2 b	431 b
Vorlex (10.0 gal, broadcast)	8 b	467 b
Vorlex (4.0 gal, row)	6 b	451 b
Nemacur 15G (4.0 lb, 8-inch band)	3 b	420 b
Furadan 10G (3.0 lb, 8-inch band)	13 ab	427 b

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

season. The tubers were harvested and graded on October 9, 1974.

All treatments appeared to retard population development of root-lesion nematodes (Table 1). The three treatments with Vorlex and the granular application of Nemacur gave the best nematode control. All treatments resulted in significant increases in yield. The treatments had no influence on potato grade. The data demonstrate that row applications of soil fumigants can be used in Michigan for the control of root-lesion nematodes. It is highly probable that a slightly greater rate of Terr-o-cide 15D would have resulted in a significantly greater suppression of root-lesion nematodes. It should be remembered that Russet Burbank potatoes are significantly less susceptible to root-lesion nematode damage than most of the cultivars grown in Michigan.

Based on the present investigation, the Michigan Cooperative Extension Service will recommend row application of soil fumigants for control of root-lesion nematodes in potato production in 1975.

INFLUENCE OF SUBSOILING BENEATH THE PLANTING ROW ON TOLERANCE OF POTATOES TO ROOT-LESION NEMATODES

G. W. Bird
Department of Entomology

Soil compaction can directly inhibit normal growth, development and yield of many economically important plants. Soil compaction can also indirectly cause crop plants to be more susceptible to damage caused by parasitic nematodes. Recently several commercial agricultural equipment companies have developed equipment for subsoiling immediately beneath the planting row. This type of land preparation has been shown to alleviate both the direct and indirect detrimental influences of soil compaction on crop growth and yields. The objective of this investigation was to determine the influence of subsoiling beneath the planting row on population dynamics of root-lesion nematodes and on the growth, development and yields of potatoes.

Subsoiling beneath the planting row was evaluated at the Montcalm Experimental Farm (M.S.U.). The treatments (Table 2) were replicated five times in a randomized block design, containing plots 11 ft 4 inches wide and 50 ft in length. Half of the plots were subsoiled beneath the planting row and bedded on April 26, 1974. They were planted on May 20, with four 34-inch rows of Russet Burbank potatoes. The plots were maintained under commercial fertility, weed, insect and disease control programs, and irrigated when necessary. Growth data and nematode population dynamics determinations were made at several intervals throughout the growing season. The tubers were harvested and graded on October 8.

Subsoiling beneath the planting row significantly increased yields of cv Russet Burbank potatoes (Table 2). It had no influence on tuber grade or nematode population dynamics. This change in growth and development patterns of the plant was detected as early as 30 days after planting.

It is highly probable that subsoiling beneath planting furrow increased the tolerance limit of Russet Burbank in relation to the root-lesion nematode. The yield increase obtained with this treatment is similar to that obtained by controlling root-lesion nematodes with soil fumigants. It should be remembered that Russet Burbank potatoes are significantly less susceptible to root-lesion nematode damage than most of the other cultivars grown in Michigan.

Table 2. Influence of subsoiling beneath the planting row on the growth and development of Russet Burbank potatoes and recoverable populations of *Pratylenchus penetrans*.

Potato growth and nematode population density parameters	Commercial soil preparation	Subsoiling beneath the planting row
Early season potato growth data (6/27/74)		
Root weight (g) per plant	12 A[1]	22 B
Tuber weight (g)	0.4 C	1.6 D
Tubers per plant	3 E	7 E
Mid-season potato growth data (7/19/74)		
Root weight (g) per plant	51 F	54 F
Tuber weight	12 G	11 G
Tubers per plant	13 H	17 H
Yield (ctw/acre, 10/8/74)		
Total tuber weight	400 I	440 J
10 oz tubers	94 K	89 K
A tubers	240 L	263 L
B tubers	23 M	29 M
Knobby tubers	45 N	63 N
Pratylenchus penetrans per g root tissue		
6/27/74	23 Ø	11 Ø
7/19/74	79 P	61 P

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

USE OF TEMIK 10G AND OTHER GRANULAR NEMATICIDES FOR CONTROL OF ROOT-LESION NEMATODES IN POTATO PRODUCTION

G. W. Bird
Department of Entomology

Until the spring of 1974, only fumigant nematicides were registered for use on land to be planted with potatoes. On April 17, 1974, Temik 10G was registered by E.P.A. for control of root-lesion and root-knot nematodes in potato fields. Unfortunately, however, the date of this registration was too late to benefit Michigan potato growers during 1974. Temik 10G is registered for nematode control at a rate of 30.0 lb per acre, and for insect control at 20.0 to 30.0 lb per acre. The objects of the present investigation were to determine the nematicidal efficacy of Temik at an insecticide rate, compared with experimental granular nematicides.

Eleven granular nematicide treatments (Table 3) were evaluated for control of root-lesion nematodes at the Sodus Vegetable Experimental Farm (M.S.U.). Each treatment was replicated five times in a randomized split block design containing plots 5-ft wide and 25 ft in length. Each plot was completely surrounded by a 5-ft border area. The plots were planted on May 1, 1974, with 30-inch rows of Russet Burbank potatoes. All nematicide applications were made at planting. The banded and post-plant side-dress materials were incorporated to a depth of 2 inches, and the in-furrow applications were placed in the planting furrow. The plots were maintained under commercial fertility, weed, insect and disease control programs, and irrigated when necessary. Plant growth data and nematode population dynamics determinations were made at various intervals throughout the growing season. The tubers were harvested and graded on October 18, 1974.

Table 3. Influence of Temik 10G and experimental granular nematicides on root-lesion nematodes and yield of Russet Burbank potatoes (Sodus, Michigan, 1974).

Treatment, method of application and lb per acre (active)	*Pratylenchus penetrans* per g root tissue 7/1/74	*Pratylenchus penetrans* per g root tissue 9/6/74	Total Yield (ctw per acre, 10/18/74)
Check (non-treated)	56.2 a[1]	137.2 ab	272 a
SD 8332 10G (1.0, 8-inch band)	7.6 b	202.4 ab	302 a
SD 8332 10G (2.5, 8-inch band)	63.8 a	148.8 ab	298 a
SD 8332 10G (4.0, 8-inch band)	4.6 b	117.2 ab	321 a
SD 8332 10G (5.0, 8-inch band)	28.0 a	185.6 ab	306 a
CGA 1223 10G (3.0, 8-inch band)	1.4 b	24.8 b	314 a
CGA 1223 10G (1.5 + 1.5, 8-inch band + side dress)	1.2 b	12.0 b	251 a
UC 21865 50WP (2.0, in-furrow)	60.2 a	422.8 a	321 a
Temik 10G (2.0, in-furrow)	2.6 b	94.4 ab	310 a
Vydate 10G (4.0, 8-inch band)	36.6 ab	285.6 ab	312 a
Nemacur 15G (4.0, 8-inch band)	2.4 b	50.0 b	353 a
Furadan 10G (4.0, 8-inch band)	6.8 b	32.0 b	348 a

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

While CGA 1223, Temik, Nemacur, Furadan and two rates of SD 8332 Significantly suppressed early-season population development of root-lesion nematodes, only CGA 1223, Nemacur and Furadan reduced populations to a low enough level to maintain control through most of the growing season (Table 3). Although there were no significant yield differences among the various treatments, higher yields were generally associated with successful root-lesion nematode control. It should also be noted that Russet Burbanks are less susceptible to root-lesion nematode damage than most potato cultivars grown in Michigan.

While a limited amount of early-season root-lesion nematode control was obtained with the lowest registered insecticidal rate of Temik, population suppression at this rate was not as good as more appropriate rates of other comparable experimental nematicides. It must be concluded, that if an initial root-lesion nematode population is above the tolerance limit for the potato cultivar used, and if Temik is chosen for nematode control, it is essential that the registered nematicidal rate be applied. When used properly, Temik is an excellent nematicide, and it will be recommended in 1975 by the Michigan State University Cooperative Extension Service for control of root-lesion nematodes in Michigan potato production.

VARIETY DEVELOPMENT - BREEDING

N. R. Thompson
Department of Crop and Soil Sciences

One hundred and four advanced selections from 1970 crosses were grown at both the Montcalm Experimental Farm and Foundation Seed Farm, E. Lansing. Thirty-two of these were discarded because of lack of yield tuber shape or disease. Of the remaining 72 nineteen have been selected for consistent yield, high solids and good culinary qualities. Ten cultivars with high yield and consistent processing qualities will be increased as rapidly as possible. Two of these have yellow flesh.

From 1971 crosses 12 outstanding selections were made from the 32 cultivars planted. These require an additional year of testing to determine consistency.

Forty-eight selections based on yield and type were made from 1972 crosses. Two thousand seedlings from 1973 crosses were grown in the greenhouse to be planted in the field in 1975.

All cultivars planted at the Foundation Seed Farm, East Lansing were harvested as hills and one tuber from each is being grown in the Florida test. Increase proposals will be dependant upon Florida readings.

VARIETY DEVELOPMENT PROGRAM

N. R. Thompson and R. W. Chase
Department of Crop and Soil Sciences

Good new potato varieties have been released in the past few years. Some of these appear well adapted to Michigan. While the single all purpose variety is not at hand, at least one of those tested should provide an additional choice for fresh pack, frozen processing, chips.

A. Overstate Variety Trials.

Seventeen varieties or numbered cultivars were grown in six locations. The overall average yields are given in table 1. The detailed data for yields, specific gravity, chip color and after cooking darkening for the Montcalm location are shown in Table 2. The consistent high yield of the Hudson variety will be appreciated by producers of fresh pack potatoes. This variety released for resistance to the golden nematode produces bright, white skinned potatoes with medium total solids. The tubers tend to be large as evidenced by the high percentage of marketable tubers. However, cultural practices such as spacing, fertilization and supplemental irrigation may have to be adjusted to produce the most desirable size for market demands.

The acceptance of Nampa and Targhee will be dependent upon processor demand. While both yield well and have high solids contents, Nampa has exhibited shape problems and Targhee is subject to air checks and after cooking darkening.

For the potato chip industry, Wischip and the three N. Dakota entries all showed good reversion resistance when held at 58 F. Wischip yields were lower than anticipated and the foliage showed severe speckle leaf damage. This variety has performed better in previous trials when tested as Wisc. 629. The red cultivar, ND 6634-2R, looks promising as few reds are consistent chippers and has now been officially released as Bison.

The two M.S.U. entries are in the seed increase program. MS 503 is a good general purpose potato. It consistently cooks white and can be reconditioned for chips. Yields of MS 709 were below normal. Seed quality is important to any crop and the quality of available seed of MS 709 was questionable. Its potential has been established in past trials.

B. Seed Increase

1. Foundation Seed Farm, East Lansing.

For the past two years, the Michigan Foundation Seed Association has made available an acre of irrigated land south of their headquarters on Jolly Rd. This is used for hill increase and tuber units from greenhouse or southern tested cultivars in the breeding program. The proximity to the University permits intensive screening for disease symptoms throughout the growing season. One-half acre was treated by Dr. G. Bird with Vorlex for 1975 plantings to attempt to eliminate problems that could confuse disease expressions.

2. Lennard Farms-Newberry.

A three acre plot isolated from other potatoes provided ideal increase for several promising seedling from the breeding program.

1111-2 - One acre of clonal increase plus hills which passed the southern test. This is the earliest maturing cultivar in the program. The tubers are white and smooth. It makes an attractive fresh pack. While chip color is good from the field it does not recondition.

Table 1. The overall average yield (U.S. No. 1 cwt/A) of seventeen potato varieties grown at six locations.

Variety	Montcalm	Bay	Emmet	VanBuren	Presque Isle	Allegan	Ave.
Hudson	525	497	455	591	511	550	522
Nampa	423	322	393	517	417	417	415
Targhee	466	318	276	482	345	503	398
Onaway	406	443	328	460	415	325	396
Katahdin	378	361	395	458	427	316	389
MS 503	437	371	296	433	386	335	376
R. Burbank	345	386	330	505	294	364	371
Shurchip	273	343	229	450	400	339	339
W 623	398	355	239	417	328	278	336
Hi Plains	293	337	283	431	333	328	334
Rushmore	283	349	304	365	359	335	333
MS 709	384	365	263	374	328	218	322
ND 6634-2R	267	240	198	429	377	252	294
Norchip	207	368	255	367	287	238	287
ND 7196-18	316	244	255	341	306	205	278
Wischip	177	216	159	306	310	230	233
ND 7878-1	123	275	177	197	245	104	187
Ave.	335	341	284	420	357	314	342

Table 2. The yield, specific gravity, chip rating and after cooking darkening of several potato varieties grown at the Montcalm Exp. Farm in 1974.*

Variety	Yield Total (cwt/A)	Yield Marketable (cwt/A)	Yield % Marketable	Specific Gravity	Chip color** (11/18)	After Cooking Color*** 0 hr.	After Cooking Color*** 1 hr.	After Cooking Color*** 24 hrs.
Hudson	540	525	97	1.074	7	1	1	1
Targhee	509	466	92	1.091	6	1	3	5
MS 503	456	437	96	1.079	4	1	1	1
Tampa	454	423	93	1.088	5	1	1	1
Onaway	440	406	92	1.065	7	1	2	2
Wis 623	468	398	85	1.079	3	1	1	1
MS 709	418	384	92	1.070	5	1	1	1
Katahdin	427	378	86	1.072	3	1	2	3
R. Burbank	427	345	81	1.085	5	1	2	2
ND 7196-18	404	316	78	1.072	2	1	2	2
Hi-Plains	335	293	87	1.074	3	2	2	2
Rushmore	317	283	89	1.066	2	1	2	3
Shurchip	320	273	85	1.068	3	1	2	2
ND 6634-2R	326	267	85	1.065	2	1	2	2
Norchip	265	207	78	1.075	2	1	2	2
Wischip	264	177	67	1.073	2	1	1	1
ND 7878-1	193	123	64	1.077	2	1	2	2
Ave.	386	335	87	1.075				

* Planted May 7 and harvested September 11, 1974

** Based on 1 to 10 scale. 1 = lightest and 10 = darkest chip color.

*** Based on 1 to 5 scale. 1 = white with no darkening and 5 severe darkening throughout tuber.

711-8 - hill increase - a high yielding smooth white potato for fresh pack. it does not chip.

645-1 - hill increase - the tubers are slightly rough but has rated high in chip tests.

645-2 - hill increase - a high yielding mid-season large smooth tuber which chips at harvest.

706-32 - hill increase - one of our highest yielding seedlings. The tubers are slightly irregular in shape. Fresh pack only.

All seedlings grown on the Lennard farms have been released to the Foundation Seed Association. Increases will depend upon Florida readings.

3. Brasington Farms - Edmore

One acre of hill increase MS 709 was planted for possible seed use. Growth was vigorous but a mild mottle in some plants was too widespread to make rogueing practical. The plot was abandoned to commercial production.

POTATO INSECT RESEARCH

Arthur L. Wells
Department of Entomology

The 1974 entomological research on potatoes was aimed at better understanding the effects of insect control programs on seed production as well as the evaluation of new soil systemic and foliar insecticides.

A. Evaluation of Production Techniques on Seed Qaulity at the Montcalm Experimental Farm

The green peach aphid continues to be the prime target for most control programs on potatoes. Since it is the vector of most of the potato viruses, especially leaf roll, effective control or management programs must be followed to grow acceptable seed. It is not known when the principle time of innoculation takes place in the plants but it is suspected as being in late summer. If this time can be determined it is possible to protect the plants up to this time and then kill the vines to prevent any further infection from developing. As the vines are wilting down they may need protecting from late aphid movement and feeding.

Since there are several approaches to insect control available to the grower it was decided to compare three of these, Double systemics, Single systemic plus foliars and Double systemics plus foliars with an untreated area.

Double Systems: Thimet 15 G applied at planting time (May 10) at 3 lb ai and Disyston 15 G sidedressed at 3 lb ai at the time of killing (June 24).

Double Systemics plus Foliars: The above treatments with additional commercial foliar program: June 29-Thiodan + Cygon; July 7-Thiodan + Cygon; July 12-MSR; July 19-Monitor; July 27-MSR; August 5-Cygon; August 13-MSR; August 21-Monitor; August 28-Monitor; September 2-MSR.

Single Systemic plus Foliars: Thimet applied at planting but without the Disyston sidedress application. Foliars applied as above.

Untreated: Received only the Fungicide treatments.

The plots consisted of three replications of 16 rows each using Foundation Russet Burbank and Premier Foundation Sebago varieties. Leaf samples were taken at intervals and the aphid populations evaluated for movement or establishment in the plots (Table 1). Harvesting began on August 19-20 with yields and grade recorded for each variety. The adjacent two rows were killed by a vine killer and after wilting (3-5 days later) half of the rows were sprayed with an insecticide (Thiodan-Cygon) for study. This procedure was repeated on September 4-5, 16-17, and October 7-8. The last harvest did not receive the vine killer since a killing frost had terminated vine growth. The yields are presented in Tables 2 and 3.

A sample of "B" size tubers was saved from each treatment and have been submitted for indexing in the Florida testing program (Table 4). Duplicate samples of "A" size tubers were retained for indexing for seed quality at the Montcalm Farm in 1975.

Results

As shown in the insect counts the systemics were effective in holding early infestations down when compared to the adjacent untreated plots. The foliars gave excellent protection. The yields indicate that despite insect feeding on the foliage (i.e. there were heavy populations of Potato Beetles in the plot) good management practices can result in good yields early in the harvest season; however, the protection by the insecticides extended the growth and yield for later harvests. The results of the Florida test will determine if the treatments and dates of harvest have an affect on seed vigor and disease infection of the tubers.

Table 1. Aphid and Potato Leafhopper Populations on Potatoes from Montcalm Plots

	Burbank					Sebago				
	June		August		Sept.	June		August		Sept.
	24	28	16	27	11	24	28	16	27	11
	*For insect identification see footnote									
Double Systemics										
Aug 19	0	1 GPap	2 GPap 1 Gpal	7 GPap	1 GPap	0	0	6 GPap	6 GPap 1 GPal	1 Plh
Sep 4		0	1 GPap	9 GPap	4 GPap		0	47 GPap	16 GPap	2 GPap 5 Plh
Sep 16		1 GPap	5 GPap	7 GPap 1 GPal	0		0	13 GPap	10 GPap	1 GPap
Oct 7		0	3 GPap 1 PKap	5 GPap	3 BPap		0	8 GPap	9 GPap 1 GPal	1 GPap
Untreated										
Aug 19	2 GPap	0	2 GPap	10 GPap 1 GPal 1 PKap	0	0	6 GPap 2 PKap 8 Plh	9 GPap 4 Plh	8 GPap 1 PKap 1 Plh	5 GPap
Sep 4		3 PKap 3 GPap	1 GPap 1 GPal	2 GPap 1 PKap	11 GPap 1 PKap		3 GPap 7 PKap	10 GPap 4 PKap	4 GPap 11 PKap	8 GPap 3 PKap
Sep 16		1 GPap	2 GPap	7 GPap	2 GPap		6 GPap 5 PKap 4 Plh	5 GPap 2 PKap 5 Plh	5 GPap 1 PKap 1 PKal 10 Plh	5 GPap 8 Plh
Oct 7		1 GPal	1 GPap 4 PKap	2 GPap 1 PKap	2 GPap		3 GPap 6 PKap 4 Plh	20 GPap 3 PKap 3 Plh	4 GPap 1 PKap 6 Plh	1 GPap 5 Plh
Double + Foliar										
Aug 19	0	0	0	1 GPal	1 GPap 1 GPal	0	0	0	1 GPap	1 GPal
Sep 4		0	0	0	0		0	0	0	0
Sep 16		0	1 GPap	1 GPap	0		0	4 GPap	0	1 GPal
Oct 7		0	0	0	0		0	1 GPap	0	0
Single + Foliar										
Aug 19	0	0	0	1 GPap 2 GPal	0	0	0	0	0	0
Sep 4		0	1 GPap	0	0		0	1 GPap	0	1 GPal
Sep 16		0	0	1 GPap	0		0	0	0	0
Oct 7		0	1 GPap	0	0		0	0	0	1 GPal

* GPap = Green Peach (wingless) stet; GPal = Green Peach alate (winged); PKap = Pink apterous; Pkal = Pink alate and Plh = Potato leafhopper

Table 2. Yield and Size Dustribution of Potatoes from Montcalm Plots

a. Burbank

	Lb/100 ft	Yield/A Cwt	Yield/A Bu	% by size distribution to 1 7/8	1 7/8-10 oz	10 oz +	Off	Specific Gravity
Double Systemics								
Aug. 20	144.0 lb	222	370	16	79	--	5	1.081
Sept. 5	221.2	341	568	7	81	5	7	1.086
Sept. 17	249.8	385	643	8	75	9	8	1.084
Oct. 8	260.8	402	669	3	72	16	9	1.083
Untreated								
Aug. 20	176.2	271	452	14	81	1	4	1.082
Sept. 5	231.3	356	594	8	82	4	6	1.083
Sept. 17	250.3	386	645	8	80	6	6	1.088
Oct. 7	251.5	387	646	7	74	13	6	1.087
Single System + Foliars								
Aug. 19	153.9	237	395	17	79	--	4	1.082
Sept. 4	212.0	326	544	9	77	6	8	1.085
Sept. 16	227.2	350	585	9	74	9	8	1.086
Oct. 7	258.5	398	663	5	69	17	9	1.085
Double System + Foliars								
Aug. 19	154.9	239	398	17	80	--	3	1.081
Sept. 4	210.3	324	540	9	79	7	5	1.084
Sept. 16	247.5	381	636	9	73	8	10	1.086
Oct. 7	262.8	405	675	5	71	19	5	1.084

Table 3. Yield and Size Distribution of Potatoes from Montcalm Plots

B. Sebago

	Lb/100 ft	Yield/A CWT	Yield/A Bu	% by Size Distribution to 1 7/8 "B"	1 7/8-3 1/4 "A"	3 1/4 + "A"	Specific Gravity
Double Systemics							
Aug. 20	129.2	199	332	3%	86%	11%	1.067
Sept. 5	173.7	267	445	5	87	8	1.072
Sept. 17	206.5	318	531	5	80	15	1.074
Oct. 8	216.8	334	556	3	84	13	1.076
Untreated							
Aug. 20	145.7	224	373	7	87	6	1.067
Sept. 5	190.0	293	488	5	84	11	1.072
Sept. 17	215.0	331	553	5	77	18	1.075
Oct. 7	196.7	303	505	4	70	26	1.071
Single Systemic + Foliars							
Aug. 19	129.4	199	332	7	90	3	1.062
Sept. 4	152.5	235	392	4	81	15	1.067
Sept. 16	195.2	301	503	3	73	24	1.073
Oct. 7	197.3	304	506	2	75	23	1.071
Double Systemic + Foliars							
Aug. 19	117.1	180	300	6	86	8	1.063
Sept. 4	164.5	253	422	4	77	19	1.067
Sept. 16	210.0	323	539	2	69	29	1.073
Oct. 7	207.0	319	531	2	63	35	1.072

Table 4. Potato Seed Samples from the Plots Which Were Submitted for the Florida Test

Variety: Russet Burbank and Sebago

Sample R.B.	Nos. Seb.	Treatment	Dates: Vines Killed	Dates: Insecticide Applied	Dates: Harvest
1	37	Double Systemic	---	---	Aug. 20
2	38	Untreated	---	---	Aug. 20
3	39	Double Systemic + Foliar	---	---	Aug. 19
4	40	Single Systemic + Foliar	---	---	Aug. 19
5	41	Double Systemic	Aug. 20	---	Oct. 17
6	42	Untreated	Aug. 20	---	Oct. 17
7	43	Double Systemic + Foliar	Aug. 20	---	Oct. 17
8	44	Single Systemic + Foliar	Aug. 20	---	Oct. 17
9	45	Double Systemic	Aug. 20	Aug. 23	Oct. 17
10	46	Untreated	Aug. 20	Aug. 23	Oct. 17
11	47	Double Systemic + Foliar	Aug. 20	Aug. 23	Oct. 17
12	48	Single Systemic + Foliar	Aug. 20	Aug. 23	Oct. 17
13	49	Double Systemic	---	---	Sept. 5
14	50	Untreated	---	---	Sept. 5
15	51	Double Systemic + Foliar	---	---	Sept. 4
16	52	Single Systemic + Foliar	---	---	Sept. 4
17	53	Double Systemic	Sept. 5	---	Oct. 17
18	54	Untreated	Sept. 5	---	Oct. 17
19	55	Double Systemic + Foliar	Sept. 5	---	Oct. 17
20	56	Single Systemic + Foliar	Sept. 5	---	Oct. 17
21	57	Double Systemic	Sept. 5	Sept. 11	Oct. 17
22	58	Untreated	Sept. 5	Sept. 11	Oct. 17
23	59	Double Systemic + Foliar	Sept. 5	Sept. 11	Oct. 17
24	60	Single Systemic + Foliar	Sept. 5	Sept. 11	Oct. 17
25	61	Double Systemic	---	---	Sept. 17
26	62	Untreated	---	---	Sept. 17
27	63	Double Systemic + Foliar	---	---	Sept. 16
28	64	Single Systemic + Foliar	---	---	Sept. 16
29	65	Double Systemic	Sept. 18	---	Oct. 9
30	66	Untreated	Sept. 18	---	Oct. 9
31	67	Double Systemic + Foliar	Sept. 18	---	Oct. 9
32	68	Single Systemic + Foliar	Sept. 18	---	Oct. 9
33	69	Double Systemic	---	---	Oct. 8
34	70	Untreated	---	---	Oct. 7
35	71	Double Systemic + Foliar	---	---	Oct. 7
36	72	Single Systemic + Foliar	---	---	Oct. 7

B. Evaluation of Soil Systemic and Foliar Insecticides at the Muck Experimental Farm.

Objective and Methods. Plots were established at the Muck Experimental Farm to compare soil applications of systemic insecticides with foliar applications of other materials on foliar feeding insects of potatoes. The potatoes were planted on May 20 using cut Sebago seed in three replications of paired 25 foot plots. The soil systemics were applied as granules in the open furrow after planting and before covering the seed. Flea beetle feeding scars were counted on the systemic plots at the time of hilling, also at which time some of the systemic plots received another application of the granular formulations as a sidedress band.

The other plots as well as certain of the systemic plots were sprayed with a hydraulic sprayer delivering 100 gal/A on July 12, 24, August 9 and 26. The insects were sampled periodically by direct counting infestations per compound leaf or by insect sweep net. The data are presented in Tables 5-8. The potatoes were harvested on October 22 and the yields presented in Table 9. The results of another study to determine the value of seed treatments with Orthene for early season insect control is given in Table 10.

Results. The flea beetle damage counts indicated that most of the systemic materials were in the plants and killing flea beetles soon after the plants emerged. They were still affecting the insects until mid July and certain ones were still effective on aphids into August. There was a wide variation in the results of the foliar materials on certain insects. This is expected since some of the materials are very specific in their insecticidal activity.

The yields indicate that with good fertilization and maintenance, muckgrown potatoes can withstand considerable insect feeding without extensive loss in yield potential. It appears that in-row applications of certain of the systemics slowed down early growth and affected the yield since these appear to be less than in the unheated plot.

Table 5. Foliar Insect Control on Potatoes

Potato Leafhoppers (Insects/30 sweeps)

	July			August		Sept.	Totals	Nymphs/15 leaves	
Material*	9	19	31	9	22	3	(7/19-9/3)	Aug. 21	Sept. 3
Thimet G	11	39	51	93	106	8	297	3	1
Thimet G + Cyg	10	49	15	90	99	6	259	2	1
Disyst G	17	26	54	122	72	18	292	-	-
Disyst G + F	16	53	38	112	93	10	306	1	-
Disyst G	22	38	30	86	99	13	266	2	-
Disyst G + S + F	18	54	17	71	96	7	245	1	-
Temik G 3	9	29	29	72	84	21	235	3	-
Temik G 2	12	27	47	100	114	26	314	15	-
DS 15647 G 3	8	14	8	40	51	3	116	-	-
DS 15647 GS	5	22	18	30	41	8	119	1	1
Furadan G	9	34	57	80	97	34	302	20	2
Furadan G + Disy G	11	66	44	80	116	34	340	12	-
Bay Hox G + E	40	81	24	49	65	5	224	3	-
SD 8832 + Thio	17	64	23	87	63	7	244	3	-
Orth G + F	43	42	21	57	60	2	182	-	-
Sandoz	49	47	27	82	97	5	258	3	-
Monitor	45	43	12	40	48	-	143	2	-
Bay Hox + Guthion	57	63	68	85	101	4	321	9	-
CGA 18809	49	63	35	84	74	9	265	3	2
CGA 15324	51	53	33	68	78	19	251	3	-
C-8353	47	66	14	37	33	-	150	4	-
Furadan	46	39	3	30	33	1	106	4	-
Pirimor 2	43	101	18	74	89	7	289	5	-
Pirimor 4	48	82	68	77	77	4	308	5	-
Carzol	40	63	36	57	45	6	207	7	-
Dyfonate	58	152	62	130	93	10	447	9	-
Imidan	39	52	12	47	36	1	148	-	-
Dyfonate + Imidan	36	51	23	35	47	2	158	2	-
Sevimol + Cygon	43	52	15	28	55	1	151	1	-
Lannate	52	49	18	74	65	4	210	3	-
Rohm & Haas	42	55	18	51	61	3	188	1	-
Untreated	42	110	53	82	103	12	360	27	3
Untreated	54	126	39	91	129	13	398	14	2

*For rates of application and treatment dates refer to Table 9.

Table 6. Foliar Insect Control on Potatoes

Aster Leafhoppers (Insects/30 sweeps)

	July			August		Sept	Totals
Material*	9	19	31	9	22	3	(7/19-9/3)
Thimet G	6	12	--	6	1	1	20
Thimet G + Cyg	6	14	6	6	2	1	29
Disyst G	4	10	5	7	5	-	27
Disyst G + F	2	4	3	8	7	-	22
Disyst G	2	5	3	8	8	-	24
Disyst G + S + F	5	7	-	5	4	-	16
Temik G 3	2	2	6	5	4	-	17
Temik G 2	3	9	8	6	4	2	29
DS 15647 G 3	1	5	5	3	4	1	18
DS 15647 GS	-	5	5	2	3	1	16
Furadan G	3	2	2	2	3	1	10
Furadan G + Disy G	4	3	5	5	3	1	17
Bay Hox G + E	10	29	9	6	9	1	54
SD 8832 + Thio	7	20	6	6	8	1	41
Orth G + F	8	13	6	10	8	3	40
Sandoz	9	15	5	6	13	3	42
Monitor	14	14	9	9	14	1	47
Bay Hox + Guthion	15	8	2	4	8	3	25
CGA 18809	19	33	5	3	11	-	52
CGA 15324	12	14	5	6	3	1	34
C-8353	8	23	9	8	6	2	48
Furadan	9	9	5	6	3	-	23
Pirimor 2	6	17	3	7	12	-	39
Pirimor 4	16	38	6	11	12	2	69
Carzol	17	19	8	7	11	-	45
Dyfonate	18	13	3	7	6	-	39
Imidan	16	14	9	9	4	-	36
Dyfonate + Imidan	7	24	9	9	3	2	47
Sevimol + Cygon	18	13	8	7	14	-	42
Lannate	11	24	3	9	21	-	47
Rohm & Haas	8	22	6	11	6	-	45
Untreated	19	17	5	8	6	-	36
Untreated	20	27	9	7	6	1	50

*For rates of application and treatment dates refer to Table 9.

Table 7. Foliar Insect Control on Potatoes

Potato Fleabeetles (Insects/30 sweeps)

Material*	July 9	July 19	July 31	August 9	August 22	Sept. 3	Totals (7/19-9/3)	Feeding Scars/ leaflet 6/20
Thimet G	15	37	174	212	149	56	528	1.6
Thimet G + Cyg	20	81	179	224	209	55	748	1.8
Disyst G	32	40	159	188	204	60	651	3.4
Disyst G + F	25	58	176	178	177	83	672	4.5
Disyst G	27	33	252	191	187	76	739	4.9
Disyst G + S + F	25	52	204	183	177	47	663	4.8
Temik G 3	7	39	197	155	161	40	592	0.9
Temik G 2	15	49	140	131	158	74	552	1.3
DS 15647 G 3	9	18	164	176	137	43	538	1.2
DS 15647 GS	1	25	101	159	131	40	456	2.0
Furadan G	10	19	197	132	148	33	529	0.9
Furadan G + Disy G	2	50	83	124	120	59	436	0.6
Bay Hox G + E	62	51	201	262	262	73	849	9.6
SD 8832 + Thio	75	57	249	280	293	39	918	5.9
Orth G + F	44	33	240	316	344	40	973	5.5
Sandoz	52	76	287	326	312	53	1054	---
Monitor	60	47	186	280	379	36	927	---
Bay Hox + Guthion	75	40	186	211	307	72	816	---
CGA 18809	41	12	155	249	229	33	678	---
CGA 15324	48	26	240	300	359	62	987	---
C-8353	76	39	264	289	277	36	905	---
Furadan	50	25	77	288	231	4	625	---
Pirimor 2	43	48	126	258	356	25	813	---
Pirimor 4	64	41	284	-39	302	88	954	---
Carzol	52	39	363	264	135	42	843	---
Dyfonate	32	17	159	208	356	31	771	---
Imidan	46	42	216	299	254	26	837	---
Dyfonate + Imidan	37	12	224	266	305	16	823	---
Sevimol + Cygon	31	22	186	294	357	24	883	---
Lannate	46	16	222	312	359	34	943	---
Rohm & Haas	47	38	230	317	273	17	875	---
Untreated	60	18	171	186	308	63	746	9.7
Untreated	35	20	96	196	197	34	543	6.4

*For rates of application and treatment dates refer to Table 9.

Table 8. Foliar Insect Control on Potatoes

Aphids (Insects/30 sweeps)

Material*	July 9	July 19	July 31	August 9	August 22	Sept. 3	Totals (7/19-9/3)	Aphids/15 leaves 8/21	Aphids/15 leaves 9/3
Thimet G	1	-	6	30	187	53	276	30	6
Thimet G + Cyg	1	3	2	7	179	22	213	62	64
Disyst G	-	-	14	14	132	5	165	9	-
Disyst G + F	1	-	-	12	66	12	90	11	10
Disyst G	2	1	2	21	67	8	99	4	3
Disyst G + S + F	3	2	-	6	59	5	72	6	3
Temik G 3	3	1	3	19	173	28	224	11	1
Temik G 2	2	3	5	13	256	50	327	10	4
DS 15647 G 3	1	5	8	26	310	67	416	15	6
DS 15647 GS	1	3	6	17	170	64	260	33	36
Furadan G	-	6	50	124	289	47	516	4	2
Furadan G + Disy G	1	3	17	72	157	32	281	8	6
Bay Hox G + E	2	1	3	20	67	26	117	19	8
SD 8832 + Thio	4	-	5	33	231	26	295	16	9
Orth G + F	6	1	8	52	121	19	201	22	5
Sandoz	1	1	3	36	59	7	106	4	2
Monitor	3	1	3	6	61	17	87	10	11
Gay Hox + Guthion	4	2	3	34	105	39	183	14	4
CGA 18809	7	1	8	71	646	221	947	123	59
CGA 15324	2	-	2	43	321	84	450	32	20
C-8353	3	4	9	106	1076	82	1277	139	87
Furadan	4	2	5	68	901	303	1279	44	26
Pirimor 2	6	-	11	62	151	79	303	72	35
Pirimor 4	3	2	9	55	464	69	599	241	49
Carzol	3	1	14	104	578	383	1080	24	30
Dyfonate	2	10	57	156	551	267	1041	54	25
Imidan	5	3	26	124	843	221	1217	283	68
Dyfonate + Imidan	2	2	17	121	841	135	1116	30	7
Sevimol + Cygon	3	-	2	22	364	58	446	116	58
Lannate	2	10	54	285	361	43	753	39	15
Rohm & Haas	4	2	12	57	357	137	565	57	22
Untreated	1	8	47	137	556	274	1022	13	22
Untreated	8	7	84	287	519	113	1010	28	13

*For rates of application and treatment dates refer to Table 9.

Table 9. Yields and Size of Tubers from Potato Foliar Plots

Type of Foliar Applications: Hydraulic sprayer delivering 100 gal/A.
Dates of Application: July 12, 24, Aug. 9 & 26, 1974

Materials	Rate/A. (Tox.)	Placement	Yield/Acre CWT	Yield/Acre Bu.	% Size Distribution Less than 1-7/8"	% Size Distribution 1-7/8" and over
Thimet 15G	3 lb	In-row	255	425	5%	95%
Thimet 15G	3 lb	In-row				
+ Cygon 267	1/2 lb	Foliar	220	367	4	96
Disyston 15G	3 lb	In-row	253	422	6	94
Disyston 15G	3 lb	In-row				
+Disyston 6SC*	1 lb	Foliar	255	425	5	95
Disyston 15G	3 lb	In-row	242	403	6	94
Disyston 15G	3 lb	In-row				
+ Disyston 15G	3 lb	Side-dress				
+ Monitor 4WDL	1 lb	Foliar	225	375	6	94
Temik 15G	3 lb	In-row	362	603	4	96
Temik 15G	2 lb	In-row	324	540	3	97
Diam. Sham. 15647 10G	3 lb	In-row	363	605	4	96
Diam. Sham. 15647 10G	2 lb	In-row				
+ Diam. Sham. 15647 10G	1 lb	Side-dress	333	555	3	97
Furadan 10G	3 lb	In-row	374	623	5	95
Furadan 10G	3 lb	In-row				
+ Disyston 15G	3 lb	Side-dress	356	593	5	95
Bay Hox 1901 10G	3 lb	In-row				
+ Bay Hox 1901 4E	1/2 lb	Foliar	316	527	7	93
SD-8832 10G	3 lb	In-row				
+Thiodan 3E	3/4 lb	Foliar	315	525	7	93
Orthene 5% G	3 lb	In-row				
+ Orthene 75 S	1 lb	Foliar	346	577	4	96
Sandoz 201 4E	3/4 lb	Foliar	304	507	7	93
Monitor 4WDL**	1 lb	Foliar	308	513	5	95
Bay Hox 1901 4E	1/2 lb					
+ Guthion 2SC	1/2 lb	Foliar	293	488	8	92
CGA 18809 50 WP	3/4 lb	Foliar	276	460	7	93
CGA 15324 4E	3/4 lb	Foliar	309	515	6	94
C-8353 2EC	3/4 lb	Foliar	307	512	6	94
Furadan 4F**	1 lb	Foliar	291	485	5	95
Pirimor 50 WP	2 oz					
+ Bio Film**	6 oz	Foliar	311	518	7	93
Pirimor 50 WP	4 oz					
+ Bio Film**	6 oz	Foliar	309	515	5	95
Carzol 97%	1/2 lb	Foliar	345	575	5	95
Dyfonate 4F	1 lb	Foliar	266	443	8	92
Imidan 70W	1 lb	Foliar	293	488	4	96
Dyfonate 4F	3/4 lb					
+ Imidan 70W	3/4 lb	Foliar	326	543	5	95
Serimol 4	1 lb					
+ Cygon 267	1/2 lb	Foliar	322	537	6	94
Lannate 1.8L	.9 lb	Foliar	340	567	5	95
Rohm & Haas 218 5EC	1 lb	Foliar	314	523	4	96
Untreated	--	--	359	598	6	94
Untreated	--	--	356	593	5	95

*Not applied on Aug. 26.
**Additional application on Sept. 10 for residue study.

Table 10. Seed and Soil Treatments for Potato Insect Control

Variety of Seed: Norchip (cut seed)
Date Planted: May 20, 1974; Phytotoxicity ratings and flea beetle data taken June 25, 1974

Material and Formulation	Rate (oz/cwt) Tox	Form	Phyto rating*	Flea beetle scars/leaf**	Yield/A CWT	Bu	% Grade by Size (B's)	(A's)
Orthene 12.5% ST	0.5 oz	4 oz	3.8	1.3	302	503	6%	94%
Orthene 12.5% ST	1.0 oz	8 oz	3.3	1.7	307	512	7%	93%
Orthene 12.5% ST	2.0 oz	16 oz	4.0	1.8	257	488	6%	94%
Orthene 12.5%--Ortho 15% ST	0.5 oz	4 oz	2.5	4.1	287	478	8%	92%
Orthene 12.5%--Ortho 15% ST	1.0 oz	8 oz	2.5	0.5	338	563	5%	95%
Orthene 12.5%--Ortho 15% ST	2.0 oz	16 oz	3.0	0.3	381	635	6%	94%
Orthocide (Captan 80)	1.0 oz	1.3 oz	1.0	9.8	333	555	11%	89%
Orthene 5% Gran***	3 lb	60 lb	1.0	5.2	328	547	14%	86%
Furadan 10% Gran***	2 lb	20 lb	1.0	1.6	360	600	11%	89%
Untreated	--		1.0	10.0	302	503	16%	84%

*Phytotoxicity ratings: 1--No apparent retardation -- 5--Severe retardation
**Mean of five leaflets/replication
***Applied in seed furrow at time of planting

CORN HYBRIDS, PLANT POPULATION AND IRRIGATION

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Table 1 presents performance data for 76 commercial corn hybrids evaluated in 1974 with irrigation and without irrigation. Eight inches of water were applied in 6 applications on July 16, 22, 27, 31, August 2, September 7. Bouyoucous soil moisture blocks were placed at 6, 12, 18 and 24-inch depths in both irrigated and unirrigated plot areas.

Irrigated yields averaged 112.1 bushels per acre and 102.7 unirrigated. The average difference in favor of irrigation was only 9.4 bushels (9.1%). Difficulties with and inadequate soil moisture monitoring using Bouyoucous blocks and meter may have led to inadequate irrigation during August.

This was the second year in which less than expected response to irrigation occurred. In 1973, irrigation averaged 113.6 bushels versus 101.0 unirrigated -- a difference of only 12.6 bushels (12.5%). Wet soil conditions at and following planting hindered early growth and development. Extreme hot and dry weather in late August and early September after irrigation had ceased probably contributed to a low response from irrigation.

Hybrids ranged from 65.3 to 133.7 irrigated and 57.8 to 121.9 bushels per acre without irrigation. Hybrids signficantly better than the average yield (arranged in order of increasing grain moisture content at harvest) are listed below. Fourteen of these 19 hybrids were in the highest yielding group for both irrigated and unirrigated plots.

Irrigated	Unirrigated
Michigan 2853 (3X)	Michigan 333-3X (3X)
Michigan 333-3X (3X)	Super Crost 1692 (2X)
Asgrow RX53 (2X)	Asgrow RX53 (2X)
Michigan 3102 (2X)	Michigan 3102 (2X)
Funk Exp. 26190 (3X)	Funk Exp. 26190 (3X)
Michigan 396-3X (3X)	Michigan 396-3X (3X)
Michigan 407-2X (2X)	Michigan 407-2X (2X)
Michigan 410-2X (2X)	Michigan 410-2X (2X)
Pride R290 (2X)	Pride R290 (2X)
Cowbell SX7440 (2X)	Cowbell SX7440 (2X)
Funk G4444 (2X)	Funk G4444 (2X)
Funk G4321 (2X)	Funk G4321 (2X)
Funk G4404 (2X)	Asgrow RX64 (2X)
Super Crost 1901 (2X)	Funk G4404 (2X)
Migro M-1130 (2X)	Super Crost 1901 (2X)
Michigan 575-2X (2X)	Michigan 572-3X (3X)
	Michigan 575-2X (2X)
	Cowbell SX7480 (2X)

Table 1

NORTH CENTRAL MICHIGAN

Montcalm County - Irrigated vs. Not Irrigated
One, Two, Three Year Averages - 1974, 1973, 1972

Hybrid (Brand - Variety)	% Moisture			Bushels per acre						% Stalk lodging					
				1974		2 years		3 years		1974		2 years		3 years	
	1974	2 Yrs	3 Yrs	Irrig	Not Irrig	Irrig	Not Irrig	Irrig	Not Irrig	Irrig	Not Irrig	Irrig	Not Irrig	Irrig	Not Irrig
Pioneer 3965 (3X)	27.4	--	--	105.0	101.5	--	--	--	--	0.0	0.0	--	--	--	--
Super Crost 1610 (2X)	27.5	--	--	108.2	104.3	--	--	--	--	0.0	1.6	--	--	--	--
Michigan 2833 (3X)	27.5	24	--	111.9	103.8	113	103	--	--	0.9	0.0	3	4	--	--
Wolverine W128 (2X)	27.7	26	--	104.8	99.3	105	93	--	--	5.1	4.2	3	4	--	--
1 Michigan 2853 (3X)	27.9	--	--	122.7	108.2	--	--	--	--	1.3	1.4	--	--	--	--
Blaney B100 (2X)	28.1	--	--	95.3	83.0	--	--	--	--	1.7	0.8	--	--	--	--
Michigan 275-2X (2X)	28.1	24	25	110.2	106.2	107	101	113	101	0.9	0.0	3	4	7	3
Michigan 280 (4X)	28.2	24	25	115.9	107.7	108	100	117	108	2.0	4.3	3	4	6	7
Super Crost 1103 (2X)	28.6	--	--	65.3	57.8	--	--	--	--	5.1	5.6	--	--	--	--
Northrup King PX20 (2X)	29.1	--	--	108.3	100.7	--	--	--	--	0.0	0.0	--	--	--	--
1,2 Michigan 333-3X (3X)	29.7	26	27	123.5	115.4	120	106	129	--	0.9	0.0	3	1	--	--
DeKalb XL311 (3X)	29.8	26	--	101.5	86.5	102	87	--	--	0.0	0.0	2	2	--	--
Migro M-0101 (2X)	29.8	--	--	110.8	98.1	--	--	--	--	0.0	1.6	--	--	--	--
Blaney B302 (2X)	30.2	--	--	120.5	111.0	--	--	--	--	0.0	3.2	--	--	--	--
Asgrow RX42 (2X)	31.0	27	--	118.9	105.6	118	106	--	--	0.0	0.0	1	1	--	--
2 Super Crost 1692 (2X)	31.2	27	--	119.2	111.9	113	101	--	--	0.0	1.7	2	2	--	--
1,2 Asgrow RX53 (2X)	31.8	29	--	122.8	114.4	127	117	--	--	0.0	0.0	0	2	--	--
Cardinal SX100 (2X)	31.8	--	--	96.8	89.4	--	--	--	--	1.6	0.8	--	--	--	--
Pioneer 3958 (2X)	32.6	29	--	111.1	98.3	104	95	--	--	0.0	0.0	1	1	--	--
Wolverine W127 (2X)	32.9	--	--	111.9	108.4	--	--	--	--	0.0	0.0	--	--	--	--
1,2 Michigan 3102 (2X)	32.9	--	--	125.1	116.0	--	--	--	--	0.0	0.0	--	--	--	--
1,2 Funk Exp. 26190 (3X)	33.6	--	--	130.8	116.2	--	--	--	--	0.0	0.0	--	--	--	--
Blaney 7305 (2X)	34.0	--	--	106.7	103.8	--	--	--	--	0.0	0.8	--	--	--	--
Migro M-1020 (Sp.)	34.1	--	--	115.7	103.1	--	--	--	--	0.0	1.6	--	--	--	--

Table 1 (Continued)

	Acco UC2301 (2X)	34.1	30	30	118.2	104.7	120	106	134	119	0.0	0.0	3	1	7	2
	Wolverine 46A (4X)	34.2	--	--	92.7	87.5	--	--	--	--	0.0	0.0	---	--	--	--
	Acco UC1901 (2X)	34.3	29	--	103.4	88.1	107	96	--	--	0.8	0.8	3	3	--	--
1,2	Michigan 396-3X (3X)	34.4	29	29	126.9	115.2	128	113	136	124	0.0	0.0	2	1	3	2
	Northrup King PX32 (2X)	34.4	--	--	118.7	106.5	--	--	--	--	0.0	0.8	--	--	--	--
1,2	Michigan 407-2X (2X)	34.5	30	30	133.6	121.9	134	120	157	136	0.0	2.0	3	3	4	3
	Cowbell SX4095 (2X)	34.6	--	--	80.7	69.8	--	--	--	--	0.0	3.5	--	--	--	--
	Northrup King PX25 (2X)	34.6	--	--	109.5	97.7	--	--	--	--	0.0	0.8	--	--	--	--
	Funk G4195 (3X)	34.7	28	--	111.7	106.8	106	96	--	--	0.0	0.0	2	4	--	--
	Pioneer 3797 (3X)	34.7	--	--	90.6	77.4	--	--	--	--	0.0	1.7	--	--	--	--
	Funk G4252 (3X)	34.8	30	30	121.0	102.4	104	94	121	106	0.0	0.0	2	2	5	2
	Cardinal SX105 (2X)	35.2	--	--	121.9	106.5	--	--	--	--	2.4	0.0	--	--	--	--
	Migro M-1101 (2X)	35.3	30	30	94.1	87.2	115	100	127	113	0.0	0.8	2	1	2	1
	Wolverine 59 (4X)	36.1	--	--	90.4	86.8	--	--	--	--	0.0	0.0	--	--	--	--
	DeKalb 15A (2X)	36.2	31	30	103.4	100.1	103	97	114	106	0.9	0.0	2	1	8	5
	DeKalb XL12 (2X)	36.3	30	--	115.9	104.3	110	99	--	--	0.0	0.0	2	1	--	--
1,2	Michigan 410-2X (2X)	36.3	30	30	133.1	114.0	133	112	140	123	0.0	1.7	2	4	4	4
	Funk G4343 (2X)	36.3	31	31	101.5	83.2	107	94	130	110	0.0	0.8	1	1	3	1
	Cowbell SX7300 (2X)	36.4	32	--	101.4	90.3	108	94	--	--	0.0	0.8	3	2	--	--
1,2	Pride R290 (2X)	36.8	31	31	133.5	115.1	121	104	140	124	0.0	1.5	3	2	5	4
	Pioneer 3785 (2X)	37.1	--	--	112.9	102.0	--	--	--	--	0.0	0.0	--	--	--	--
	Acco UC231 (4X)	37.1	31	--	92.1	88.5	90	88	--	--	0.0	1.6	4	3	--	--
	Super Crost S25 (2X)	37.2	31	33	113.4	106.3	116	104	139	120	0.0	0.0	0	0	3	3
	Blaney BX-AA (2X)	37.5	32	32	111.2	100.2	118	108	138	123	0.0	0.0	1	1	2	3
	Super Crost S27 (2X)	37.6	33	33	105.5	85.2	120	102	138	121	0.0	0.0	3	2	4	2
	Funk G4288 (3X)	37.7	32	--	115.7	109.4	123	110	--	--	0.0	0.0	3	0	--	--
1,2	Cowbell SX7440 (2X)	37.7	--	--	129.3	117.6	--	--	--	--	1.6	1.5	--	--	--	--
1,2	Funk G4444 (2X)	37.7	33	33	129.1	120.7	132	119	157	134	0.0	1.5	2	2	4	3
1,2	Funk G4321 (2X)	37.7	33	--	132.2	114.6	128	114	--	--	0.0	0.0	3	1	--	--
	DeKalb XL21 (2X)	37.7	33	--	105.4	98.7	111	103	--	--	0.0	2.8	2	4	--	--
	Cowbell SX4100 (2X)	37.8	--	--	111.7	100.2	--	--	--	--	0.0	0.0	--	--	--	--
2	Asgrow RX64 (2X)	37.8	--	--	118.6	113.5	--	--	--	--	0.0	0.0	--	--	--	--

Table 1 (Continued)

1,2	Funk G4404 (2X)	37.8	33	--	125.5	117.7	132	--	--	--	0.0	0.8	2	--	--	--
	Pioneer 3780 (2X)	37.9	33	32	117.5	109.6	122	110	142	126	0.0	0.0	2	2	6	2
1,2	Super Crost 1901 (2X)	38.0	--	--	133.7	120.0	--	--	--	--	0.0	0.0	--	--	--	--
2	Michigan 572-3X (3X)	38.2	33	32	122.0	115.4	128	116	147	130	0.0	0.0	1	2	4	3
	Pioneer 3773 (2X)	38.5	33	--	103.6	99.3	115	103	--	--	2.5	1.6	2	2	--	--
	P.A.G. SX69 (2X)	38.6	33	34	107.0	102.6	121	110	148	127	0.0	0.9	1	3	2	2
	Acco UC3301 (2X)	38.8	34	33	120.4	105.9	129	112	147	125	0.9	0.0	4	5	4	4
	Migro M-1212 (2X)	38.8	33	--	110.2	105.2	118	112	--	--	1.7	0.8	2	0	--	--
	Michigan 500-2X (2X)	38.8	33	33	110.5	101.4	120	105	139	123	0.0	0.0	2	1	3	1
	Northrup King PX48 (2X)	38.9	--	--	110.0	103.5	--	--	--	--	0.0	0.0	--	--	--	--
	Acco UC3201 (2X)	39.1	34	34	95.7	93.1	117	105	135	118	1.7	0.8	2	1	2	2
	Funk G4366 (3X)	39.1	33	--	105.3	97.5	120	109	--	--	0.0	0.0	2	1	--	--
1	Migro M-1130 (2X)	39.2	34	--	126.7	107.4	127	111	--	--	0.0	0.0	1	1	--	--
1,2	Michigan 575-2X (2X)	39.3	--	--	129.5	116.8	--	--	--	--	0.0	0.0	--	--	--	--
	Funk G-L2384 (Sp.) HL	39.4	38.5	--	114.3	111.0	--	--	--	--	0.0	0.0	--	--	--	--
	Northrup King PX529 (3X)	39.4	--	--	106.7	109.3	--	--	--	--	0.0	0.8	--	--	--	--
	Blaney B606 (2X)	39.4	--	--	110.1	101.8	--	--	--	--	0.0	0.0	--	--	--	--
	Migro M-1010A (2X)	39.7	--	--	96.6	93.0	--	--	--	--	0.0	0.0	--	--	--	--
	Funk GWX302 (Sp.) WX	39.8	--	--	113.1	107.4	--	--	--	--	1.6	0.0	--	--	--	--
2	Cowbell SX7480 (2X)	40.4	--	--	117.0	113.8	--	--	--	--	0.9	0.0	--	--	--	--
	Average	35.0	30	31	112.1	102.7	116	104	136	120	0.4	0.7	2	2	4	3
	Range	27.4 to 40.4	24 to 34	25 to 34	65.3 to 133.7	57.8 to 121.9	90 to 134	87 to 120	113 to 156	100 to 136	0.0 to 5.1	0.0 to 5.6	0 to 4	0 to 5	2 to 8	1 to 7
	Least significant difference	1.7	.8	.6	10.9	9.6	.7	6	5	5						

1 Significantly better than average yield, irrigated 1974.
2 Significantly better than average yield, not irrigated 1974.

	1974	1973	1972
Planted	May 4	May 8	May 5
Harvested	Oct. 26	Oct. 17	Oct. 25
Soil type	Montcalm sandy loam	Montcalm sandy loam	Montcalm sandy loam
Previous crop	Sorghum-sudan seeded to rye in fall	Sorghum-sudan seeded to rye in fall	Sorghum-sudan seeded to rye in fall
Population	20,500	18,700	20,100
Rows	30"	30"	30"
Fertilizer	150-120-170	277-130-130	258-145-145
Soil test: pH	6.1	5.6	5.5
P	340 (very high)	297 (very high)	420 (very high)
K	198 (high)	175 (medium)	178 (medium)
Irrigation:	8 inches	5 inches	6 inches

Farm Cooperator: Theron Comden, Lakeview

County Extension Director: James Crosby, Stanton

Table 2 gives the average, highest, and lowest yields for corn hybrids irrigated and not irrigated for a 7-year period, 1968-1974. The average yielding hybrid has given a response of 46 bushels to irrigation, the highest yielding hybrids have responded with 61 bushels added yield, while the lowest yielding hybrids have given only 27 bushels added yield with irrigation over the seven-year period. These results demonstrate the importance of choosing high yielding hybrids to maximize returns from irrigation with little if any additional cost.

Plant population x irrigation

Five hybrids at 4 plant populations irrigated and not irrigated were grown in each of 7 years, 1968-1974, Table 3. Over the seven-year period, a population of 23,300 has given the highest yield (167 bushels) when irrigated while 19,300 has given the highest yield (110 bushels) without irrigation. The 23,300 population irrigated gave the highest yield in six out of the seven years.

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

Table 2. Average, highest and lowest yields for corn hybrids irrigated and not irrigated for 7 years, 1968-1974.

Year	No. of hybrids tested	Average		Highest		Lowest	
		Irrigated	Not Irrigated	Irrigated	Not Irrigated	Irrigated	Not Irrigated
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
Averages		139	93	179	110	88	61

Table 3. Average yield at 4 plant populations irrigated and not irrigated for 7 years, 1968-1974.

Year	15,200		19,300		23,300		27,600	
	Irri-gated	Not Irri-gated	Irri-gated	Not Irri-gated	Irri-gated	Not Irri-gated	Irri-gated	Not Irri-gated
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	135	95	159	110	167	96	149	87