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NORTH CENTRAL REGIONAL POTATO TRIALS  
1968-1970  
WOOSTER, OHIO

OHIO AGRICULTURAL R & D CENTER

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North Central Regional Potato Trials  
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Nineteen-seventy marked the 20th year for the North Central Regional Potato Trials. Ohio is one of 12 states participating in this potato evaluation program and has been participating since 1954.

These trials have enabled Ohio researchers to determine the adaptability of pre-released breeder lines and newly released potato varieties to the environmental and cultural conditions of the State of Ohio. At the same time these trials have permitted a means of appraisal of tuber characteristics of new lines and varieties as they apply to the fresh and processing market.

Through these trials a pre-release evaluation of Ohio's present commercial varieties has been established. Without Ohio's continuous participation in this program there is the probability that these varieties as well as other genetic material adapted to Ohio's conditions would be discarded as unsuitable in other states.

Methods. Cut or B-size seed pieces ( $1\frac{1}{2}$  - 2 oz. each) were planted each year at the Ohio Agricultural Research and Development Center, Wooster, Ohio in Wooster silt loam (see Table 1 for planting and harvest dates).

TABLE 1.--Planting and harvest dates for the 1968 - 1970 growing seasons.

Year	Planting Date	Harvest Date	Season ** (Days)
1968	June 20*	Oct. 16	118
1969	May 28	Oct. 10	135
1970	June 5*	Oct. 6	123

\* Planted late due to poor weather conditions.

\*\* Average frost-free growing season for the Wooster area ranges from 135 - 145 days.

<sup>1</sup>Deceased.

Seed pieces were spaced 11 inches (12 inches in 1970) within rows 36 inches apart. Plots were 20 feet long and replicated 4 times. Norland, Cobbler, Red Pontiac and Katahdin (except in 1968) were used as varietal checks. Katahdin was not an official NCR entry. See Tables 2, 3 and 4 for a list of entries for 1968, 1969 and 1970, respectively.

TABLE 2.--Entries in the 1968 North Central Regional Potato Trials.

<u>Selection No.</u>	<u>Entered By</u>	<u>Parentage</u>
ND 5761-5	North Dakota	Nordak x W 56
* <sup>4</sup> La 12-157	Louisiana	Katahdin x B 3692-4
B 5042-2	U.S.D.A. - Maine	B 24-58 x Iduna
* Norland	Check	ND 626 x Redkote
Cobbler	Check	Unknown
<sup>3,4</sup> B 4469-7	U.S.D.A. - Maine	47156 x B 3672-3
<sup>1</sup> I 6413	Iowa	I 57324-52 x 57324-37
* Minn 144	Minnesota	Redkote x Minn 69.49-4
<sup>2</sup> Minn 148	Minnesota	Minn 181.53-3 x Minn 15.50-3
Neb 16.55-1	Nebraska	226.49-1 x 25.47-7X
* Neb 48.57-3	Nebraska	83.55-3 x 156.52-2
Neb 185.57-1	Nebraska	
* ND 6948-14R	North Dakota	ND 5219-1R x ND 4524-7R
* ND 6584-6R	North Dakota	F-17-1 x ND 4524-7R
<sup>4</sup> W 643	Wisconsin	W 233 x W 59
* Red Pontiac	Check	Triumph x Katahdin

<sup>1</sup> Released in 1970 by the Iowa Agriculture and Home Economics Experiment Station under the name Iopride.

<sup>2</sup> Released in 1969 by the Nebraska Agricultural Experiment Station as Shurchip.

<sup>3</sup> Released in 1969 by the Research Farm Departments of Frito-Lay, Inc. as Seminole.

<sup>4</sup> Seed not received.

\* Red-skinned entries.

TABLE 3.--Entries in the 1969 North Central Regional Potato Trials

<u>Selection No.</u>	<u>Entered By</u>	<u>Parentage</u>
4,6 ND6948 - 14 R	North Dakota	ND5219 - 1R x ND4524 - 7R
4,6 La 12-157	Louisiana	Katahdin x B3692-4
4 Norland	Check	ND626 x Redkote
Cobbler	Check	Unknown
1,6 I 6413	Iowa	I 57324-52 x I 57324-37
B5400-8	U.S.D.A. - Maine	Houma x B4116-2
9 B5415-6	U.S.D.A. - Maine	X 1276-185 x B4116-2
8 B5960 - 13	U.S.D.A. - Maine	-----
Wisc 664	Wisconsin	W270 x 275
4 Minn 140	Minnesota	-----
Minn 172	Minnesota	-----
2,5,6 Neb16.55-1	Nebraska	226.49-1 x 25.47 - 7X
3,4,6 Neb48.57-3	Nebraska	83.55-3 x 156.52-2
Neb91.57 - 18	Nebraska	-----
6 ND 5761-5	North Dakota	Nordak x W56
5 ND 6993-13 Russ	North Dakota	ND5502-15 x ND5281 - 8
4 Red Pontiac	Check	Triumph x Katahdin
MS 709	Michigan	-----
7 Katahdin	Check	U.S.D.A. 40568 x U.S.D.A. 24642

- 1 Released in 1970 as Iopride by the Iowa Agriculture and Home Economics Experiment Station.
- 2 Released in 1969 as Shurchip by the Nebraska Agricultural Experiment Station.
- 3 Released in 1969 as Sioux by the Nebraska Agricultural Experiment Station.
- 4 Red - Skinned entries.
- 5 Russeted entries.
- 6 Tested in Ohio NCR Trials in 1968
- 7 Not an official NCR entry,
- 8 Seed not received.
- 9 Released in 1970 as Abnaki by U.S.D.A.

TABLE 4.--Entries in the 1970 North Central Regional Potato Trials.

<u>Selection No.</u>	<u>Entered By</u>	<u>Parentage</u>
Minn 174	Minnesota	-----
Minn 1317	Minnesota	-----
<sup>1</sup> Minn 4086	Minnesota	-----
B5267 - 2	U.S.D.A. - Maine	-----
B6039 - 1	U.S.D.A. - Maine	-----
B6044 - 14	U.S.D.A. - Maine	-----
<sup>2</sup> Wisc 634	Wisconsin	W231 x B3620 - 1
<sup>2</sup> Wisc 664	Wisconsin	W270 x W275
<sup>4</sup> Neb99.56 - 4X	Nebraska	Neb114.51-2 x Neb104.52-1
<sup>1</sup> Neb92.56 - 4	Nebraska	Neb114.51-2 x Neb215-50-2
<sup>2</sup> Neb91.57 - H18	Nebraska	Neb104.52-2 x Neb77.51-2
La 51-2	Louisiana	Early Gem x Katahdin
<sup>1</sup> La 22-111	Louisiana	6894 x LaChipper
<sup>2</sup> Mich S709	Michigan	I902-3 x I872-4
Mich S503	Michigan	B926-9 x 1107-4
<sup>2,5</sup> ND 6993-13 Russ	North Dakota	ND 5502-15 x ND 5281-8
ND 7196-18	North Dakota	B5298-14 x 5455 - 1R
ND 5922 - 12	North Dakota	W56 x Snowflake
<sup>1</sup> Red Pontiac	Check	Triumph x Katahdin
Cobbler	Check	Unknown
<sup>1</sup> Norland	Check	ND 626 x Redkote
<sup>3</sup> Katahdin	Check	U.S.D.A. 40568 x U.S.D.A. 24642

<sup>1</sup> Red-skinned entries.

<sup>2</sup> Tested in Ohio NCR trials in 1969.

<sup>3</sup> Not an official NCR entry.

<sup>4</sup> Seed not received.

<sup>5</sup> Russeted entries.

Fertilizer applications in each of the 3 years were made as follows. In 1968, prior to planting, 100 pounds of ammonium nitrate per acre was drilled on plowed sod and disked in. An additional 800 pounds per acre of 10-20-20 was applied in bands at the time of planting. The same procedure was used in 1969 except that a 5-20-20 analysis was used. In 1970 no ammonium nitrate was used and 1000 pounds per acre of 10-20-20 was applied in bands during planting.

Thimet (3 lbs./A act.) was applied during planting for systemic insect control. Sevin (1 lb./A) and Thiodan (0.5 lb./A) were applied for late season aphid control. Dithane M-22 (3 lbs./A) was applied at 7 - 10 day intervals starting around full bloom. Eptam (4 lbs./A) was applied potato pre-emergence and incorporated for weed control.

No vine killers were used. In 1968 all vines, except Neb 48.57-3, were frost killed before harvest. In 1969, all vines died prematurely by mid-September prior to the first frost. In 1970, all vines were dead prior to harvest.

Specific gravity of tubers was determined by the potato hydrometer method and converted to percent solids using the Maercker-Landwerths conversion chart. Environmental Factors. See Tables 5, 6 and 7 for rainfall and temperature data for 1968, 1969 and 1970, respectively.

TABLE 5.--Rainfall and Temperature Data for the 1968 Growing Season.

<u>Month</u>	Rainfall (inches)			Air Temperature (°F)	
	<u>Total</u>	Dep. from <u>Norm</u>	Evap. <u>(inches)</u>	<u>Mean</u>	Dep. from <u>Norm</u>
June 20 - 30	1.39	-0.61	2.46	67.0	-1.3
July	2.14	-1.83	7.25	70.0	-2.0
August	3.45	-0.16	6.79	70.7	+0.2
September	2.81	-0.03	4.74	63.8	+0.2
October - 16	0.48		1.66	54.7	

In 1968 there was adequate moisture at planting but slightly less than normal the remainder of the growing season.

TABLE 6.--Rainfall and Temperature Data for the 1969 growing season.

Month	Rainfall (inches)			Air Temperature (°F)	
	Total	Dep. from Norm	Evap. (inches)	Mean	Dep. from Norm
May 28 - 31	0.06	-0.27	1.14	64.1	--
June	3.90	-0.01	6.14	63.9	-2.8
July	*12.78	+8.76	5.71	71.5	+0.1
August	3.02	-0.47	6.39	70.8	+0.4
September	2.33	-0.67	3.83	62.9	-1.4
October 1 - 10	1.10	---	0.90	58.6	--

\*Includes 10.36" on July 4 - 5.

In 1969 there was adequate moisture after planting. This period was followed by severe rains (9.37" on July 5) at the time of tuber set and a dry spell in August. Both of these conditions no doubt contributed to the generally low yield of all entries. The heavy rain in July apparently contributed to the abnormally early vine death of all entries by September 10. This same rain also caused hill erosion which resulted in a high percentage of green tubers. Temperatures for the growing season were near normal.

TABLE 7.--Rainfall and Temperature Data for the 1970 Growing Season.

Month	Rainfall (inches)			Air Temperature (°F)	
	Total	Dep. from Norm	Evap. (inches)	Mean	Dep. from Norm
June	4.66	+0.74	6.75	67.5	-0.1
July	3.65	-0.37	6.36	70.5	-1.0
August	1.11	-2.35	6.85	69.6	-0.1
September	4.19	+1.18	5.28	66.5	+3.1



In 1970 a prolonged drouthy period from mid-July through August undoubtedly resulted in reduced yields.

Results - 1968. See Tables 8 and 9 for a summary of the results.

1. Maturity (Table 8). Norland was very early in maturity with cobbler being next in earliness. ND 5761-5, La 12-157, I 6413, Minn 144, Neb. 185.57-1 and ND 6584-6R were medium in maturity. ND 6948-14R was between early and medium. Minn 148 was between medium and late in maturity. Both Neb. 16.55-1 and W 643 were late. Red Pontiac was between late and very late. Neb. 48.57-3 was very late, the vines remaining green until harvest time.

2. Scab (Table 8). Several entries only had a trace of small, superficial scab lesions. These included Cobbler, I 6413, ND 6948-14R, ND 6584-6R and Red Pontiac. ND 5761-5, Norland and W 643 had from 1-20% of the tuber surface covered by small, superficial scab pustules. Two entries, Minn 144 and Neb. 16.55-1, had 21-40% small, superficial pustules. Minn 148 and Neb. 48.57-3 had 40-60% and 61-80%, respectively, small superficial pustules. Two wntries, La 12-157 and Neb. 185.57-1, had 1-20% large, superficial pustules.

3. Yield (Table 8). Red Pontiac (a check entry) had the highest yield of U.S. #1 tubers (461 cwt/A). Two entries yielded over 300 cwt/A of U.S. #1 tubers. They were Neb. 16.55-1 (339 cwt/A) and Neb. 48.57-3 (305 cwt/A). One entry, Minn 144, was extremely low in yield of U.S. #1 tubers with an average of 131 cwt/A.

Percent U.S. #1 tubers averaged 91% for all entries. Entries grading 90% U.S. #1 or above were ND 5761-5, Cobbler, I 6413, Neb. 16.55-1, Neb. 48.57-3, Neb. 185.5-1, ND 6584-6R and Red Pontiac.

4. Total Solids (Table 8). According to the Maercker-Landwerths conversion chart a tuber with a specific gravity of 1.070 has 17.5% total solids. It has generally been considered that potatoes under 1.070 are unsatisfactory for chipping.

TABLE 8.-- Summary of Maturity, Scab, Yield and Total Solids Data for the 1968 Trials.

Entry	Aver. Mat. (1)	Most Representative Area-Type	Scab (2)	Aver. Yield (cwt/A)	Aver. Yield U.S. #1 (cwt/A)	Aver. Percent U.S. #1	Aver. % Total Solids	Total Solids Lbs./A	Gen. Merit Rat. (3)	Tuber Characteristics
<u>Early to Med. Early</u>										
ND 5761-5	3	1	1	259	235	91	20.5	5321	4	Smth white, shal. eyes
La 12-157	3	1	2	197	176	89	18.0	3553		Smth red, shal. eyes
B 5042-2	----- SEED NOT RECEIVED -----									
Norland	1	1	1	206	182	88	16.2	3334		Smth red, med-deep eyes
Cobbler	2	T	1	307	283	92	19.0	5827		Sl rough, high scab
<u>Medium to late</u>										
B 4469-7	----- SEED NOT RECEIVED -----									
I 6413	3	T	1	310	286	93	18.0	5581	2	White, sl russet, few lrg, shal. eyes
Minn 144	3	2	1	151	131	85	19.0	2878		Smth red, shal. eyes
Minn 148	3.5	3	1	205	178	86	17.7	3634		Smth white, med-deep eyes
Neb. 16.55-1	4	2	1	354	339	96	17.3	6121	3	Smth white, mod-deep eyes
Neb. 48.57-3	5	4	1	328	305	98	19.0	6226		Considerable scab
Neb. 185.57-1	3	1	2	238	221	93	18.8	4485		Smth white, mod-shal. eyes
ND 6948-14R	2.5	T	1	258	231	89	16.0	4122	1	Smth red, round shal. eyes
ND 6584-6R	3	T	1	314	291	93	16.9	5304	5	Smth red, shal. eyes
W 643	4	1	1	309	277	89	17.7	5474		Smth white, shal. eyes
Red Pontiac	4.5	T	1	479	461	96	16.7	8009		Lrg. red, sl. rough, deep eyes

(1) Very early = 1, early = 2, medium = 3, late = 4, very late = 5.

(2) Area: T = less than 1%, 1 = 1 - 20%, 2 = 21 - 40%, 3 = 41 - 60%, 4 = 61 - 80%, 5 = 81 - 100%.

Type of pustules: 1 = small superficial, 2 = larger, still superficial, 3 = large, rough pustules, 4 = large pustule, shallow holes, 5 = large pustules, deep holes.

(3) Takes into consideration all factors in tables 8 and 9. A rating of 1 is the highest.

TABLE 9.--Summary of Grade Defects for the 1968 Trials.

Entry	Percent External Defects (1)				Total Tubers Free of External Defects (4)	Percent Internal Defects (2)			
	Scab (3)	Growth Cracks	Second Growth	Sun Green		Hollow Heart	Internal Necrosis	Vascular Discolor	Normal Tubers (5)
<u>Early to med. early</u>									
ND 5761-5	100	4	2	26	-	-	-	56	44
La 12-157	100	2	-	14	-	-	-	20	80
B 5042-2	-----SEED NOT RECEIVED-----								
Norland	100	2	-	6	-	-	-	22	78
Cobbler	80	8	-	28	18	-	-	12	88
<u>Medium to late</u>									
B 4469-7	-----SEED NOT RECEIVED-----								
I 6413	86	-	-	24	32	-	-	22	78
Minn 144	98	-	2	22	2	-	-	50	50
Minn 148	100	2	-	20	-	-	-	28	72
Neb. 16.55-1	100	-	-	30	-	-	-	38	62
Neb. 48.57-3	100	6	-	8	-	2	-	34	64
Neb. 185.57-1	100	-	-	18	-	2	-	26	72
ND 6948-14R	36	2	-	6	62	-	-	16	84
ND 6584-6R	54	8	-	18	32	-	-	32	70
W 643	100	2	-	24	-	-	-	48	52
Red Pontiac	52	2	-	16	42	-	-	22	76

- (1) Based on four 25-tuber samples (one from each replication.) Percentage based on number of tubers.
- (2) Based on four 25-tuber samples (one from each replication.) Percentage based on number of tubers.
- (3) Includes all tubers with scab lesions whether merely surface, pitted or otherwise and regardless of area.
- (4) This total represented tubers free from any external defects of any sort.
- (5) Percentage normal tubers are those showing no internal defects. Some individual tubers will have more than one type of internal defects.

Entries in this category were Norland, Neb. 16.55-1, ND 6948-14R, ND 6584-6R and Red Pontiac. I 6413, La 12-157, Minn 148, and W 643 were borderline. One entry, ND 5761-5, had a high total solids content of 20.5%.

Red Pontiac, because of its high yielding ability, out produced its nearest competitor in total solids per acre by 22% with 8009 pounds per acre. Other entries that were high in total solids per acre were Neb. 48.57-3 (6226 lbs.) and Neb. 16.55-1 (6121 lbs.).

5. External Defects (Table 9).

a. Scab. All tubers in eight entries had scab lesions to some degree. These entries were ND 5761-5, La 12-157, Norland, Minn 148, Neb. 16.55-1, Neb. 48.57-3, Neb. 185.57-1 and W 643. ND 6948-14R only had 36% of the tubers with scab lesions. This was the lowest percent for any entry.

b. Growth Cracks. Occurrence of growth cracks was not too extensive in any of the entries. I 6413, Minn 144, Neb. 16.55-1 and Neb. 185.57-1 were completely devoid of growth cracks.

c. Second Growth. Only two entries exhibited any secondary growth. These were ND 5761-5 and Minn 144.

d. Sun Green. A high percentage of sun greened tubers could be indicative of shallow tuber set. Entries exhibiting a high percentage of green tubers were ND 5761-5, Cobbler, I 6413, Minn 144, Minn 148, Neb. 16.55-1 and W 643. No entry was devoid of sun greened tubers.

e. Tubers free of External Defects. ND 6948-14R had the highest percentage (62) of tubers free of any external defects. Eight entries had no freedom of external defects. These included ND 5761-5, La 12-157, Norland, Minn 148, Neb. 16.55-1, Neb. 48.57-3, Neb. 185.57-1 and W 643.

6. Internal Defects. (Table 9).

a. Hollow heart. Only two entries had some presence (2%) of hollow heart. These were Neb. 48.57-3 and Neb. 185.57-1.

b. Internal Necrosis. None of these entries had any presence of internal necrosis.

c. Vascular Discoloration. All entries had some vascular discoloration at the stem end. Those showing the least amount of discoloration were La 12-157, Cobbler and ND 6948-14R.

d. Tubers Free of Internal Defects. Cobbler, a check entry, had the highest percentage of tubers free of internal defects. Others exhibiting considerable absence of internal defects were La 12-157, Norland, I 6413 and ND 6948-14R.

Results - 1969. See Tables 10 and 11 for a Summary of the Results in 1969.

1. Maturity. No assessment of maturity was possible due to premature vine death of all entries prior to September 10. Excessive rainfall in July possibly contributed to this occurrence.

2. Scab. (Table 10). All entries had some degree of scab lesions. ND 6948-14R, Norland, Cobbler, B 5400-8, B 5415-6, Minn 172, ND 5761-5, Red Pontiac, MS 709 and Katahdin had 1 - 20% of the tuber surface covered with small, superficial scab pustules. Three entries, I 6413, Neb. 91.57-18 and ND 6993-13, had 1 - 20% large, superficial pustules. Wisc 664 had 21 - 40% large, superficial pustules. The remaining entries were badly infected with scab. These included La 12-157, Minn 140, Neb. 16.55-1 and Neb. 48.57-3.

3. Yield (Table 10). Yield was generally low as compared to previous years. This could have been due to the heavy rain on July 4 - 5 which was approximately at the time of tuber set (re: Table 2). The highest yield was achieved by B 5415-6 (13.5% higher than the next highest entry). The two Minnesota entries, Minn 140 and Minn 172, were extremely low in yield.

B 5415-6 and Neb. 16.55-1 graded out the highest in U.S. #1 tubers with 96%.

Minn 140 graded only 70% U.S. # 1 due to a high proportion of small tubers.

4. Total Solids (Table 10). According to the Maercker-Landwerths conversion chart a tuber with a specific gravity of 1.070 has 17.5% total solids. It has generally been considered that potatoes under 1.070 are unsatisfactory for chipping. All but one entry, Minn 140, were in this category. Minn 140, however, was still on the borderline of acceptability for chipping.

B 5415-6, because of its high yield produced the most total solids per acre of any entry. Norland, ND 6948-14R and Minn 172 were extremely low in total solids produced per acre.

5. External Defects (Table 11).

a. Scab. All tubers in La 12-157, Neb 16.55-1, Neb 91.57-18 and ND 6993-13 had scab pustules of some sort. All other entries were also high in the percent of tubers infected with the lowest degree of infestation being 74% in ND 5761-5.

b. Growth Cracks. Growth cracks occurred in all entries. ND 6993-13 was extremely high in incidence of growth cracks with 34%. Entries having 10% or more of the tubers with growth cracks were ND 6948-14R, La 12-157, Wisc 664, Minn 140, Neb 16.55-1, Neb 48.57-3 and Red Pontiac.

c. Second Growth. Cobbler and ND 6993-13 were excessively high in the occurrence of secondary growth. No secondary growth was observed in ND 6948-14R, Minn 140, Minn 172, Neb 48.57-3, ND 5761-5 and Katahdin.

d. Sun Green. The occurrence of sun greened tubers was high to extremely high in all entries. This undoubtedly was a result of hill deterioration caused by the heavy rain in July.

e. Tubers Free of External Defects. None of the entries exhibited any real degree of freedom from external defects. The highest degree of freedom was in ND 5761-5 where 13% of the tubers were free from any external defect.

TABLE 10.--Summary of Scab, Yield and Total Solids Data for the 1969 Trials.

Entry	Most Representative Scab <sup>(2)</sup>		Aver. Yield cwt/A	Aver. Yield U.S.#1 cwt/A	Aver. Percent U.S.#1	Aver. % Total Solids	Total Solids Lbs./A	Gen. Merit Rat.	Tuber Characteristics
	Aver. (1) Mat.	Area-Type							
<u>Early to med. early</u>									
ND 6948-14R	1	1	172	156	91	14.3	2460		Smooth, shal eyes
La 12-157	3	2	187	171	91	17.5	3273	2	Round, flush-shal. eyes
Norland	1	1	181	166	92	14.8	2679	3	Smooth, shal. eyes
Cobbler	1	1	188	169	90	16.2	3046		Knobby, flush-deep eyes
<u>Medium to late</u>									
I 6413	1	2	198	184	93	16.0	3168	5	Round, shal. eyes
B 5400-8	1	1	182	165	91	16.7	3039		Round, shal. eyes
B 5415-6	1	1	285	274	96	16.7	4759	1	Smooth, shal. eyes
B 5960-13	-----SEED NOT RECEIVED-----								
Wisc 664	2	2	183	161	88	17.5	3203	4	Round, flush-shal. eyes
Minn 140	2	4	161	113	70	18.4	2962	6	Small tubers
Minn 172	1	1	138	118	85	15.6	2153		Good appearance, 27% sprouts
Neb 16.55-1	1	4	204	195	96	15.6	3182		Shal. eyes, short dormancy
Neb 48.57-3	3	2	227	205	90	16.7	3791		Round, flush-shal. eyes
Neb 91.57-18	1	2	183	169	92	16.0	2925		Smooth, oblong, shal. eyes
ND 5761-5	1	1	174	164	94	17.3	3010		Smooth, term. eyes v. deep
ND 6993-13	1	2	243	219	90	16.5	4009		Oblong, Russ., poor appear.
Red Pontiac	1	1	257	237	92	14.1	3624		Oblong, med. eyes
MS 709	1	1	183	162	89	16.2	2965		Smooth, shal. eyes
Katahdin	1	1	201	187	93	15.8	3176		

(1) Maturity designations were not possible for reasons as mentioned in the text.

(2) Area: T = less than 1%, 1 = 1-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%.  
Type of pustule: 1 = small superficial, 2 = larger, still superficial, 3 = large, rough pustules, 4 = large pustules, shallow holes, 5 = large pustules, deep holes.

(3) Takes into consideration all factors in tables 10 and 11.A rating of 1 is the highest.

TABLE 11.--Summary of Grade Defects for the 1969 Trials.

Entry	Percent External Defects <sup>(1)</sup>				Total Tubers Free of External Defects <sup>(4)</sup>	Percent Internal Defects <sup>(2)</sup>			
	Scab <sup>(3)</sup>	Growth Cracks	Second Growth	Sun Green		Hollow Heart	Internal Necrosis	Vascular Discolor	Normal Tubers <sup>(5)</sup>
<u>Early to med. early</u>									
ND 6948-14R	90	14	0	16	8	0	5	24	72
La 12-157	100	11	3	23	0	0	0	34	66
Norland	89	5	1	21	9	0	3	26	73
Cobbler	96	9	21	42	1	0	15	41	58
<u>Medium to late</u>									
I 6413	94	5	2	37	3	1	7	38	62
B 5400-8	99	1	1	43	1	0	16	28	63
B 5415-6	90	7	2	44	2	1	3	48	52
B 5960-13	-----SEED NOT RECEIVED-----								
Wisc 664	93	22	1	54	1	0	0	15	85
Minn 140	86	10	0	27	10	2	0	11	88
Minn 172	81	4	0	36	9	1	8	14	82
Neb 16.55-1	100	11	5	43	0	0	3	36	64
Neb 48.57-3	95	17	0	29	2	1	12	44	56
Neb 91.57-18	100	3	4	50	0	1	20	40	53
ND 5761-5	74	8	0	48	13	0	1	49	50
ND 6993-13	100	34	18	22	0	1	9	50	47
Red Pontiac	90	12	6	25	7	0	2	44	56
MS 709	96	4	3	65	1	0	1	44	56
Katahdin	89	3	0	52	2	0	0	10	90

- (1) Based on four 25-tuber samples (one from each replication). Percentage based on number of tubers.
- (2) Based on four 25-tuber samples (one from each replication). Percentage based on number of tubers.
- (3) Includes all tubers with scab lesions whether merely surface, pitted or otherwise and regardless of area.
- (4) This total represents tubers free from any external defect of any sort.
- (5) Percentage normal tubers are those showing no internal defects. Some individual tubers will have more than one type of internal defects.



6. Internal Defects (Table 11).

a. Hollow Heart. Seven entries had 1 - 2% of the tubers with hollow heart. These included I 6413, B 5415-6, Minn 140, Minn 172, Neb. 48.57-3 and Neb. 91.57-18, and ND 6993-13.

b. Internal Necrosis. Four entries, Cobbler, B 5400-8, Neb. 48.57-3 and Neb. 91.57-18, had a relatively high incidence of internal necrosis. La 12-157, Wisc 664, Minn 140 and Katahdin had no occurrence of internal necrosis.

c. Vascular Discoloration. All entries had some vascular discoloration at the stem end. Those with the lowest frequency of occurrence were Wisc 664, Minn 140, Minn 172 and Katahdin.

d. Tubers Free of Internal Defects. Katahdin, an unofficial check entry, had the highest percentage of tubers free from internal defects. Wisc 664 and Minn 140 were also fairly free of internal defects.

Results - 1970. For the results of 1970 see Tables 12 and 13.

1. Maturity (Table 12). Norland, Cobbler, and a new entry, B 5267-2, were very early in vine maturity. Early vine maturity was observed in Red Pontiac, ND 7196-18, Minn 174, B 6039-1, La 51-2 and ND 6993-13 Russ. Entries, La 22-111, Neb. 91.57-H18, Minn 1317, Minn 4086, B 6044-14, Neb. 92.56-4 and ND 5922-12 were medium in maturity as was Katahdin. Wisc 664, Mich S 709 and Mich S 503 were late, while Wisc 634 was very late in maturity.

2. Scab (Table 12). All entries had some scab lesions. Katahdin, ND 7196-18, Norland, Minn 174, Minn 1317, B 5267-2, Wisc 634, Wisc 664, ND 6993-13 Russ and Red Pontiac had a trace of small, superficial scab lesions. Minn 4086 had the worst infestation, exhibiting 1-20% of the tuber surface with large, rough scab pustules.

3. Yield (Table 12). Yields of all entries were below expectations due to poor plant stands and a prolonged drouthy period from mid-July through August. Only

Katahdin and Red Pontiac had a total yield above 200 cwt. per acre. Most entries had a total yield of less than 150 cwt. per acre. ND 7196-18, Norland, Minn 4086, Wisc 664, B 6044-14 and ND 5922-12 had 75% or less stand. Norland and ND 7196-18 had less than 80 cwt. per acre in total yield.

Most entries graded 85% or above U.S. # 1 tubers. Norland, ND 7196-18 and Minn 1317 graded less than 85% U.S. # 1.

4. Total Solids (Table 12). According to the Maercker-Landwerths conversion chart a tuber with a specific gravity of 1.070 has 17.5% total solids. All entries in the 1970 trials, on this basis, and when compared to the 1968 and 1969 trials, were extremely low in percent total solids. Katahdin, which usually has from 17.5 to 19.2% total solids, only had 15.6% total solids in the 1970 trials. Therefore, the low total solids in the 1970 trials was not due entirely to the genetic makeup of the entry but rather due to some factor or factors in connection with the growing season.

5. External Defects. (Table 13).

a. Scab. Scab infestation ranged from 14 to 90%. Katahdin and ND 7196-18 had only 14% infestation. Most entries had 40% or greater incidence of infection. Norland had 29% while Minn 4086 and Neb. 92.56-4 had 84 and 90%, respectively.

b. Growth Cracks. Eight entries had no growth cracks. B 6044-14 and ND 6993-13 Russ had the highest percentage of growth cracks with 13 and 9%, respectively.

c. Harvest Cracks. All entries were not screened for harvest crack damage. Of those observed, La 22-111, B 6044-14, Wisc 634, Wisc 664, Mich S 709 and Mich S503 were very high in the incidence of harvest cracks.

d. Second Growth. All entries had little or no incidence of second growth. Entries having greater than 5% were B 5267-2, B 6044-14 and Wisc 634.

e. Sun Green. The incidence of sun greening was not as severe as in 1968 and 1969. This was most likely due to absence of heavy rains which cause hill erosion. Entries having greater than a 10% incidence of greening were Katahdin, B 6039-1, B 6044-14 and Mich S 709.

TABLE 12.--Summary of Maturity, Scab, Yield, Total Solids and Stand Data for the 1970 Trials.

Entry	Aver. Mat. (1)	Most Representative Scab Area-Type (2)		Aver. Yield (cwt/A)	Aver. Yield U.S. #1 (cwt/A)	Aver. Percent U.S. #1	Aver. % Total Solids	Total Solids Lbs./A	Gen. Merit Rat. (3)	Tuber Characteristics (4)	% Stand (5)
<u>Early to Med. Early</u>											
Neb. 91.57-H18	3	1	1	139	130	93	15.4	2144	3	M.-L., 1-Ro, 2de	80
La 22-111	3	1	2	129	121	94	14.8	1909		M., 1-R, 2-cd	90
ND 7196-18	2	T	1	51	41	79	15.6	799		S., 1-R, 2-cd	38
Norland	1	T	1	79	65	82	14.1	1120		M., 1-Ro, 2-c	65
Cobbler	1	1	2	131	115	89	15.6	2036		M., 1-R, 2-c	91
<u>Medium to late</u>											
Katahdin	3	T	1	212	204	97	15.6	3301		M.-L., 1Ro, 2d	97
Minn. 174	2	T	1	115	103	90	16.0	1832		S., 1-R, 2-d	90
Minn. 1317	3	T	1	135	104	77	15.0	2025		S., 1-R, 2-c	86
Minn. 4086	3	1	3	112	99	89	15.6	1749		M., 1-O, 2-d	75
B 5267-2	1	T	1	136	129	95	15.6	2125		M., 1-Ro, 2-d	95
B 6039-1	2	1	1	147	127	86	15.6	2295		S., 1-O, 2-d, #5	85
B 6044-14	3	1	1	143	134	94	16.9	2410		M., 1-Ro, 2-de, #5	74
Wisc. 634	5	T	1	157	147	93	15.2	2391	4	M., 1-R, 2-c	76
Wisc. 664	4	T	1	151	138	91	15.6	2357	2	M., 1-R, 2bc, #8	67
Neb. 99.56-4x	-----SEED NOT RECEIVED-----										
Neb. 92.56-4	3	1	2	130	125	96	15.4	1999		M.-L., 1Ro, 2-b, #10	89
La 51-2	2	T	2	121	103	85	15.8	1912		S., 1-R, 2-c	94
Mich S709	4	1	1	155	142	91	14.1	2187		L., 1-R, 2c, #14	84
Mich S503	4	1	1	172	162	94	15.6	2683	5	L., 1-R, 2e	81
ND 6993-13 Russ	2	T	1	117	100	85	16.5	1937		M., 1-Ro, 2-e	82
ND 5922-12	3	T	2	108	92	85	16.2	1753		M., 1-R, 2-d	64
Red Pontiac	2	T	1	218	205	94	13.3	2895	1	L., 1-Ro, 2-bc	82

(1) Very early =1, early =2, medium = 3, late = 4, very late = 5.

(2) Area: T = less than 1%, 1 = 1 - 20%, 2 = 21 - 40%, 3 = 41 - 60%, 4 = 61 - 80%, 5 = 81 - 100%.  
 Type of pustules: 1 = small, superficial, 2 = larger, still superficial, 3 = large, rough pustules,  
 4 = large pustule, shallow holes, 5 = large pustules, deep holes.

(3) Takes into consideration all factors in 12 & 13. A rating of 1 is the highest.

(4) Tuber Characteristics: a) percent tubers with sprouts at harvest--#5&6.6%: #8, 2%: #10, 1%. b) #14 had spindle tuber characteristics. c) Tuber size, S=small, M=medium, L=Large. (5) Not used in merit rating.

TABLE 13.--Summary of Grade Defects for the 1970 Trials.

Entry	Percent External Defects <sup>(1)</sup>					Total Tubers Free of External Defects <sup>(4)</sup>	Percent Internal Defects <sup>(2)</sup>			
	Scab <sup>(3)</sup>	Growth Cracks	H. CR <sup>(6)</sup>	Second Growth	Sun Green		Hollow Heart	Internal Necrosis	Vascular Discolor	Normal Tubers <sup>(5)</sup>
<u>Early to Med. early</u>										
Neb. 91.57-H18	63	1	12	0	8	33	0	4	26	72
La 22-111	55	5	49	0	2	44	1	1	44	56
ND 7196-18	14	0	15	0	0	81	0	1	38	65
Norland	29	4	0	0	1	68	0	0	46	54
Cobbler	67	1	7	1	4	38	1	1	51	49
<u>Medium to late</u>										
Katahdin	14	0	8	1	11	78	0	0	34	62
Minn 174	59	0		2	3	39	0	8	26	72
Minn 1317	46	0		0	3	52	0	48	32	37
Minn 4086	84	3		1	3	16	0	3	49	49
B 5267-2	65	1		7	4	32	3	11	26	61
B 6039-1	82	5		0	11	18	0	3	37	61
B 6044-14	55	13	60	6	13	35	1	4	45	53
Wisc 634	61	0	47	6	5	32	0	11	33	61
Wisc 664	64	0	60	1	8	32	0	0	29	71
Neb. 99.56-4x	-----SEED NOT RECEIVED-----									
Neb. 92.56-4	90	4	Pres.	5	4	8	0	5	25	72
La 51-2	40	0	6	0	4	58	3	2	46	54
Mich S709	58	2	45	1	18	32	3	5	54	46
Mich S503	56	2	42	3	7	43	0	3	62	38
ND 6993-13 Russ	45	9	4	5	9	46	1	0	57	43
ND 5922-12	43	0	2	0	4	53	1	15	49	51
Red Pontiac	50	1	14	3	5	44	0	3	46	54

- (1) Based on four 25-tuber samples (one from each replication). Percentage based on number of tubers.  
 (2) Based on four 25-tuber samples (one from each replication). Percentage based on number of tubers.  
 (3) Includes all tubers with scab lesions whether merely surface, pitted or otherwise and regardless of area.

TABLE 13. -- Continued.

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- (4) This total = tubers free from any external defects of any sort.
- (5) Percentage normal tubers are those showing no internal defects. Some individual tubers will have more than one type of internal defects.
- (6) Harvest cracks (%). Not used in merit rating. Entries with no number in that column were not observed for this injury.

f. Tubers Free of External Defects. Only two entries had a high percentage of tubers free of external defects. They were ND 7196-18 and Katahdin with 81 and 78% freedom from external defects, respectively.

6. Internal Defects (Table 13).

a. Hollow Heart. Most entries were free of hollow heart. Entries having greater than 1% hollow heart were B 5267-2, La 51-2 and Mich S709, each having 3%.

b. Internal Necrosis. The incidence of internal necrosis was extremely high in Minn 1317 (48%). No internal necrosis occurred in Katahdin, Norland, Wisc 664 and ND 6993-13 Russ.

c. Vascular Discoloration. All entries had an incidence of vascular discoloration at the stem end of 25% or greater.

d. Tubers Free of Internal Defects. Only four entries, Neb. 91.57-H18, Minn 174, Wisc 664 and Neb. 92.56-4 had greater than 70% freedom from internal defects.

Summary - 1968. Taking into consideration all the factors observed and discussed the following ranking of entries was established in 1968. ND 6948-14R, while too low in specific gravity for chipping, was accorded the highest merit rating of 1. I 6413 (now named Iopride) was second in merit. This variety because of its high solids and yielding ability will be tested extensively in the Ohio Grower Cooperative Potato Trials. Neb. 16.55-1 was rated 3rd. in overall worth. This entry has now been named Shurchip and has shown extremely high yielding ability in the OGC Trials. ND 5761-5 was rated 4th, and ND 6584-6R, 5th in overall worth as a potential variety for commercial use.

Summary - 1969. Taking into consideration all the factors discussed and observed in 1969 the following merit ranking was established. Although Katahdin was not an

official entry in the NCR Trials it would have to be rated number 1 or 2 in overall worth even though it was low in total solids, and high in sun green tubers. Of the official entries B 5415-6 was rated number 1, La 12-157 number 2, Norland number 3, Wisc 664 number 4 and I 6413 number 5.

B 5415-6 was the highest yielding entry and produced the highest yield of total solids per acre. None of these entries had a high specific gravity. All entries were susceptible to scab infection.

Although Neb. 16.55-1 (Shurchip) did not respond well in the 1969 NCR Trials it has produced extremely high yields in the Ohio Grower Cooperative Potato Trials in 1969. This variety will again be tested in OGC Trials in 1970. I 6413 (Iopride) and Neb. 48.57-3 (Sioux) will also be tested in the 1970 OGC Trials.

Summary - 1970. On the basis of all the factors studied, Katahdin, an unofficial entry would have received the highest merit rating (1). Of the official NCR entries, Red Pontiac, Wisc 664, Neb. 91.57-H18, Wisc 634 and Mich S503 were given merit ratings of 1, 2, 3, 4 and 5, respectively.

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