

*Performance of*

# WHITE POTATO VARIETIES

*Grown in the Red River Valley*

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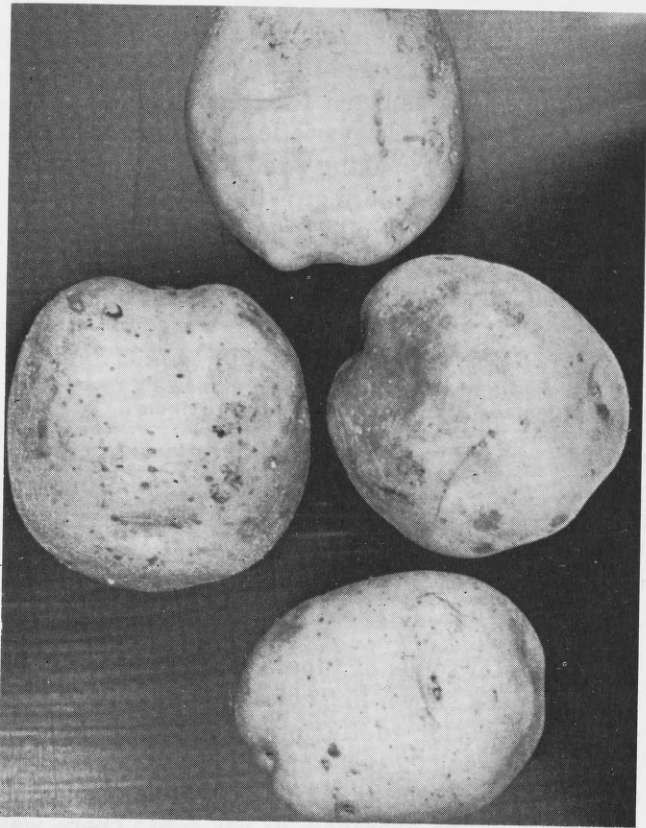
An increasing share of the potatoes grown in the Red River Valley are used by the processing industry. This shift in production has resulted in the increasing importance of certain white varieties of potatoes, especially Kennebec and Norchip. These varieties together with Monona and Irish Cobbler have been tested in cultural and variety trials for several years. In these trials, data has been collected on yields, total solids, tuber defects, chipping and cooking quality. This information along with some observations are summarized in this report. Though Irish Cobbler is no longer of

much importance, it is useful to compare with the other more popular varieties. Varieties are shown in Figure 1.

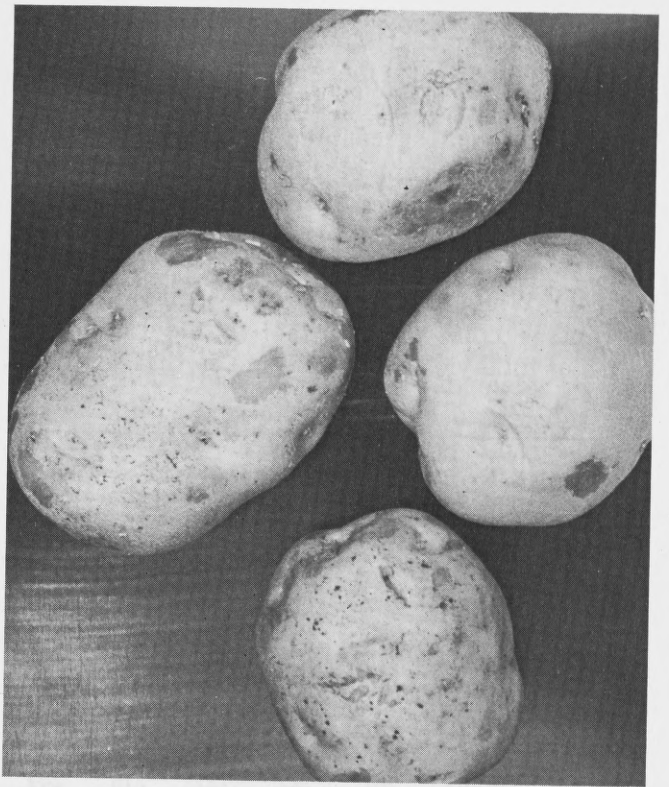
Table 1 shows yields of U. S. No. 1 tubers at Grand Forks and Park River over a five-year period. Variety rankings, based on average yields, were the same at both locations. Marketable yields of Kennebec and Norchip were about equal at Grand Forks; however, Kennebec had a 13 per cent yield increase over Norchip at Park River. The lowest yielding variety was Monona averaging 192 hundredweight for the 10 trials. Monona was the top yielder in only one of the 10 trials. Averages for the 10 trials showed Irish Cobbler yielded 10 hundredweight (5.2 per cent), Norchip 37 hundred-

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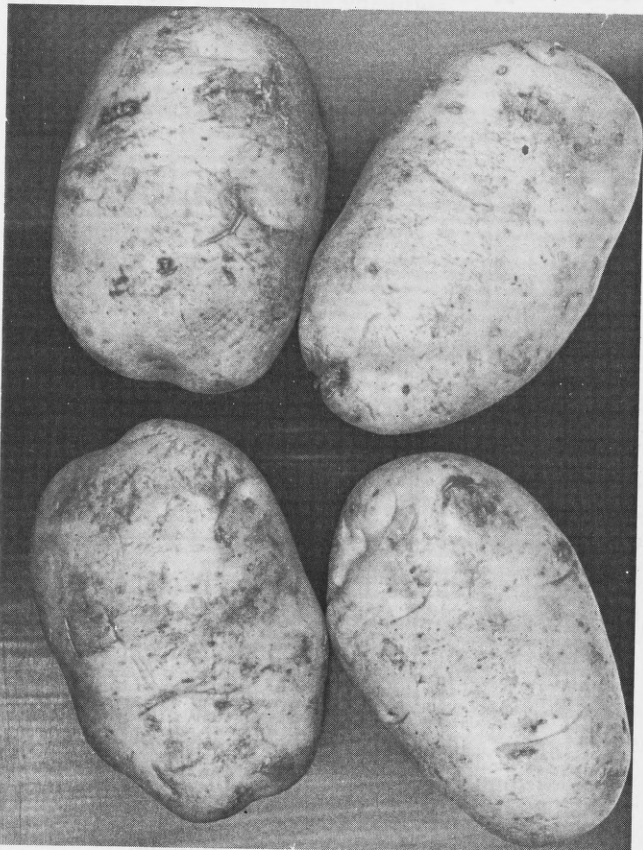
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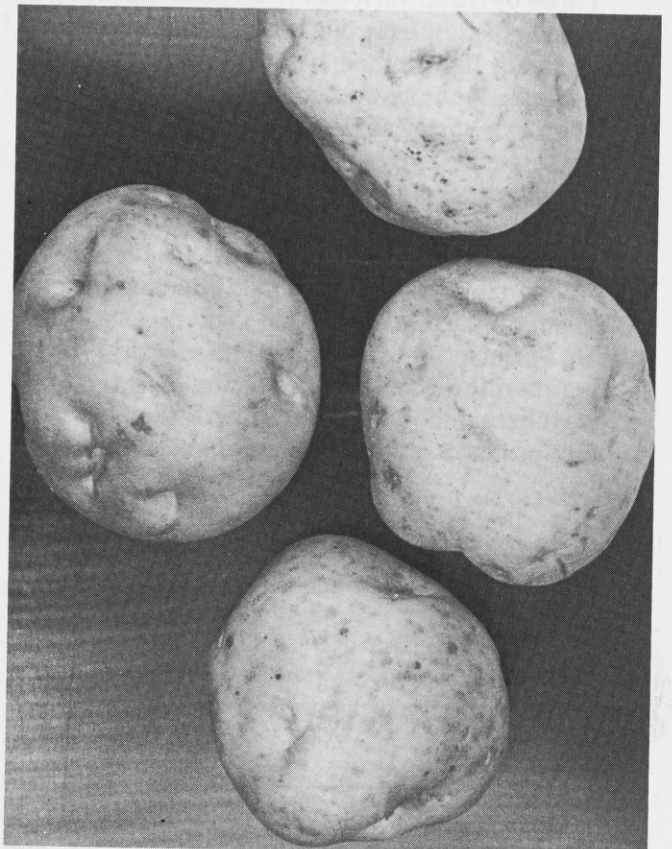
**Norchip**



**Monona**



**Kennebec**



**Irish Cobbler**

**Fig. 1. White potato varieties grown in the Red River Valley,  
July - August, 1972**

weight (19.3 per cent) and Kennebec 53 hundred-weight (27.6 per cent) more per acre than Monona.

Total yields are higher than those shown in Table 1, since culls accounted for part of the yield. The average per cent of culls (undersize and defects) for each variety over the five-year period was as follows: Kennebec 8.2 per cent, Norchip 12.3 per cent, Monona 6.6 per cent, and Irish Cobbler 11.0 per cent. While the difference between varieties in percentage culls was substantial, the ranking in terms of total yield was the same as that shown in Table 1.

**Table 1. U. S. No. 1 yield (cwt/acre) of processing varieties grown at Grand Forks and Park River, North Dakota.**

Grand Forks	1966	1968	1969	1970	1971	average
Kennebec	184	239	223	200	310	231
Norchip	175	257	178	243	287	228
Monona	143	238	164	136	218	180
Irish Cobbler	212	246	123	201	182	193
<b>Park River</b>						
Kennebec	234	272	156	160	340	259
Norchip	272	240	131	189	317	230
Monona	202	291	122	131	276	204
Irish Cobbler	257	234	142	187	241	212

Three of these varieties have been included in advanced selection tests as check varieties. In these tests Norchip has yielded best followed by Kennebec (Table 2). Monona was much lower in yield than the other two varieties. In these tests the varieties were planted at four spacings. Stands of Norchip and Kennebec averaged 86 per cent and Monona averaged 69 per cent. However, this could account for no more than a small part of the lower yield from Monona. There was a general decline in yield with wider spacing; however, Norchip, a heavy setting variety, yielded better under the widest spacing than the poorer setting Kennebec and Monona varieties.

**Table 2. U.S. No. 1 yield (cwt/acre) of processing varieties grown at different spacings<sup>1</sup>.**

Variety	In-row spacings (inches)				average
	8	12	16	21	
Kennebec	224	218	210	172	206
Norchip	246	244	230	224	236
Monona	173	148	125	110	139
Average	214	203	188	169	

<sup>1</sup>Average of two years (1970-71), two fertility levels and four replications at Grand Forks, North Dakota.

Table 3 shows the types of external defects most commonly found in Kennebec, Norchip and Monona. Of the three types of defects, poor shape was the major defect with all varieties. This includ-

ed both misshapen tubers and tubers with second growth. There was a slightly higher percentage of Kennebec tubers rejected for this defect than tubers of the other two varieties. Monona had the fewest tubers not making grade because of poor shape. Norchip had more growth cracking than the other two varieties, while Kennebec had the most green tubers. Monona had the fewest external defects in all classes of the three varieties.

**Table 3. Per cent of tubers by weight showing damage or serious damage due to external tuber defects<sup>1</sup>.**

variety	greening	growth cracking	shape
Kennebec	1.39	0.22	3.74
Norchip	1.19	0.53	2.92
Monona	0.39	0.06	1.72

<sup>1</sup>Average of four replications, four spacings, two fertility levels and two years (1970-71) at Grand Forks, North Dakota.

The total solids of tubers taken from the variety trials are shown in Table 4. Norchip was consistently superior to the other varieties in total solids, averaging 22 per cent for the 10 trials. Irish Cobbler was second with 21 per cent, while Kennebec and Monona averaged 20 per cent. There was little, if any, difference in performance of the varieties or in percentage of solids at the two locations.

**Table 4. Per cent total solids of processing varieties grown at Grand Forks and Park River, North Dakota.**

Grand Forks	1966	1968	1969	1970	1971	Average
Kennebec	19.4	19.7	19.4	19.2	21.8	19.9
Norchip	20.3	22.4	22.2	21.8	23.5	22.4
Monona	18.2	20.9	19.2	19.9	21.2	19.9
Irish Cobbler	20.1	22.0	21.6	21.4	20.7	21.2
<b>Park River</b>						
Kennebec	20.9	19.0	19.4	18.6	20.9	19.8
Norchip	22.4	21.8	21.4	21.4	21.6	21.7
Monona	20.1	19.7	20.1	19.0	20.1	19.8
Irish Cobbler	22.0	21.8	21.6	21.6	20.3	21.5

Table 5 shows total solids declined slightly with increasing spacing in the advanced test. This was probably due to less competition for water between plants as the distance between plants increased, resulting in a longer growing period and additional water uptake not completely balanced by additional carbohydrate production. As in the variety tests, Norchip was consistently higher in total solids than Kennebec and Monona.

Cooking tests were performed on these varieties in 1968, 1969 and 1970. These consisted of bak-

**Table 5. Per cent total solids of processing varieties grown at different spacings<sup>1</sup>.**

Variety	In-row spacings (inches)				Average
	8	12	16	21	
Kennebec	19.9	19.6	19.5	18.5	19.4
Norchip	21.6	21.6	21.4	21.3	21.5
Monona	19.9	19.2	19.1	18.9	19.3
average	20.5	20.1	20.0	19.6	

<sup>1</sup>Average of two years (1970-71), two fertility levels, and four replications at Grand Forks, North Dakota.

ing and boiling tubers of each variety from each location (Grand Forks and Park River). After cooking, tubers were scored on sloughing, mealiness and color. Scores for sloughing, mealiness and color after boiling are shown in Table 6. These scores are averages for three years of tests averaged over the two locations. Sloughing was greatest in tubers of Irish Cobbler. Norchip and Irish Cobbler were mealier than Kennebec and Monona, and Norchip and Monona had the whitest color after boiling. From the same trials, scores for mealiness, color and flavor on baked potatoes (not shown in Table 3) again showed Norchip and Irish Cobbler to be the mealier and Norchip to have the whitest color immediately after baking. There was little difference in flavor between varieties. However, Norchip scored highest of the four varieties.

**Table 6. Effect of cooking (boiling) on sloughing, mealiness and color of tubers.<sup>1</sup>**

Variety	sloughing <sup>2</sup>	mealiness <sup>3</sup>	color after cooking	
			immediately	4 hours after
Kennebec	8.0	7.8	7.4	7.1
Norchip	8.2	8.8	8.6	7.5
Monona	7.7	8.0	8.3	8.1
Irish Cobbler	5.3	8.7	6.9	6.5

<sup>1</sup>Average of two replications at each of two locations (Grand Forks and Park River, in each of three years 1968-1970).

<sup>2</sup>1 equals severe sloughing, 10 equals no sloughing.

<sup>3</sup>1 equals very pasty, 10 equals very dry and mealy.

<sup>4</sup>1 equals very dark, 10 equals very white.

Chipping tests have been conducted on tubers grown in variety trials. These tests have been conducted for six years with Kennebec, Norchip and Irish Cobbler and three years with Monona. The varieties were stored at 40° F from harvest until January or early February and then removed for chipping. Chipping tests were made immediately after removing tubers from 40° F and after various periods of reconditioning at 70° F ranging from one to six weeks. Monona has been slightly but consistently better than the other varieties in these tests. Of the other three varieties, Norchip has generally been the best at the time tubers were taken out of 40° F storage, followed by Irish Cobbler. Kennebec

was the poorest variety. After one week or more of reconditioning, Norchip was still the best followed by Kennebec. Therefore, while Irish Cobbler looked better than Kennebec immediately out of 40° F storage, the reverse was true after reconditioning.

Other observations made during the course of these tests indicated that Monona would more likely be affected by poor plant stands and by hollow heart than Kennebec or Norchip. The heaviest setting variety was Norchip followed by Kennebec and finally Monona, averaging 4.3, 3.4, and 2.4 tubers per hill more than two inches in diameter respectively. Tubers per hill more than two inches also increased with spacing, going from 2.1 tubers for the 8-inch spacing to 4.4 at the 21-inch spacing.

### Summary

Tests conducted over five years with Kennebec, Norchip, Monona and Irish Cobbler have given the following results and observations. Kennebec along with Norchip have given the highest yields. Kennebec has been lower in total solids, average in cooking quality and has produced slightly darker chips on average than Monona and Norchip. Also, Kennebec has produced more misshapen and green tubers than Monona and Norchip, but has some late blight resistance.

Norchip has been high yielding, highest in total solids and has scored the highest in cooking tests of the four varieties. It sets more tubers than either Monona or Kennebec and was resistant to scab. It was more subject to growth cracking than Monona and Kennebec. It also was susceptible to greening and produced more misshapen tubers.

Monona was the lowest yielding of the four varieties with total solids equal to that of Kennebec. It had slightly but consistently better color after chipping than the other varieties. It had fewer shape and growth crack defects and less greening than Kennebec and Norchip. Monona was average in sloughing and mealiness after cooking (boiling) but had superior color (whiteness). Monona produced only about half as many tubers per hill as Norchip so the tubers tended to be large. Stands were also poorer and the variety was susceptible to hollow heart and blackleg.

Irish Cobbler was not included in all of the comparative tests. However, it was lower in yield than Norchip and Kennebec but higher than Monona. It was nearly as high in total solids as Norchip. Color of potato chips was generally darker than those from Monona and Norchip. Irish Cobbler had more sloughing and darker color after cooking than the other varieties. Irish Cobbler was also subject to greening, hollow heart, shape defects and scab.