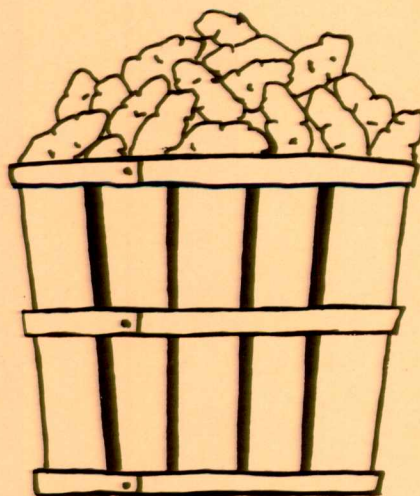




**POTATO VARIETY PERFORMANCE
IN THE MATANUSKA VALLEY
1982, 1983, 1984**

D.E. Carling and P. Rissi



**Agricultural and Forestry Experiment Station
School of Agriculture and Land Resources Management
University of Alaska**

James V. Drew, Dean and Director

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by

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INTRODUCTION

A program of field research relating to the commercial production of potatoes was initiated in 1982 at the University of Alaska Agricultural Experiment Station's research center in Palmer. The experimental fields are located at the Matanuska Research Farm on Trunk Road near Palmer. This program is a modified continuation of a potato research program initiated more than 30 years ago by Dr. C.H. Dearborn. Whereas the major emphasis of Dr. Dearborn's potato program was variety development and testing, the major emphasis here is study of general cultural practices, disease development and control, and the comparative evaluation (yield trials) of potato varieties having commercial potential.

Plans call for the comparative evaluation of thirty to forty named varieties or numbered selections each year. Varieties are selected for testing on the basis of yield potential, general quality characteristics, and disease resistance. An attempt is made to include all varieties grown commercially in the state, newly developed varieties from breeding programs in the U.S., Canada, and elsewhere, as well as established varieties that have yet to be thoroughly tested in this environment. Commercial varieties with locally proven "track records," such as Alaska 114, Bakeking, Green Mountain, and Superior will serve as a comparative base for more recently introduced varieties. New varieties will be tested for 4-5 years before being dropped, kept for further study, or recommended to commercial growers.

Summarized in this circular are the results of three years of variety trials (1982, '83, and '84). Also included are summaries of environmental conditions at or near the experimental test site and some detailed information about several locally grown commercial varieties.

The summaries of yield performances and weather conditions cannot be interpreted as representative of all Matanuska-Susitna Valley growing sites, much less of more distant Alaskan agricultural centers such as Delta Junction, Fairbanks, or the Kenai Peninsula. Widely varying environmental and soil conditions would make it necessary to conduct similar studies at each of these sites, if site-specific data are required. Variety testing at several sites is beyond the capabilities of this

program. With the aid of cooperating agencies and individuals, however, it is hoped that potato variety testing may be carried out on a limited scale at several locations in the future.

WEATHER DATA SUMMARY: 1982

A summary of weather data for the 1982 growing season at the Matanuska Research Farm is presented in Table 1. Monthly average air temperatures, soil temperatures, and precipitation are summarized. Forty-year averages of air temperature and precipitation are presented for comparison. Soil temperatures were recorded at the Palmer Research Center, located approximately 5 miles from the Matanuska Research Farm.

Table 1. Climatic data for Matanuska Farm during the 1982 growing season.

	May	June	July	August	September
Temp. (°F)					
Air					
Daily max.	55.1 (57.7) ¹	63.2 (65.0)	64.6 (67.5)	65.2 (65.0)	56.2 (52.0)
Daily min.	34.8 (35.9)	43.5 (43.9)	47.2 (47.5)	45.6 (45.5)	40.4 (35.6)
Daily mean	45.0 (46.8)	53.4 (54.5)	55.9 (57.5)	55.4 (55.3)	48.3 (43.8)
Soil, 2in. ²	39.1 —	41.9 —	54.0 —	54.7 —	47.5 —
Precip. (in.)	0.61 (0.74)	0.96 (1.61)	3.42 (2.45)	1.21 (2.61)	3.37 (2.18)

¹ Values in parentheses represent a 40-year average.

² Soil temperatures were recorded at the Palmer Research Center on fallow ground.

In 1982 the yield trial was planted on May 18. This was somewhat later than average, but occurred about midway in the 1982 commercial planting season. Soil temperatures were lower than normal in May and June resulting in delayed emergence. Some varieties required more than 5 weeks to emerge. The 1984 spring was not dry, as snow melt and early spring rain left standing water in many fields. However, rainfall for May and June was below average. August rainfall was well below average, but residual soil moisture from above-average rains in July minimized any negative effect this August deficit may have had on yield. Air temperatures were slightly below the 40-year average from May through August, but were more than 4°F above average for the month of September. Experimental plots were dug on September 15, more than a week before the first killing frost. Commercial harvests went relatively well through most of September, aided by temperatures that were warmer than normal. Some growers were still harvesting in mid-October and were caught in heavy snow. The heavy snowfall abruptly ended the harvest season.

Table 2. Yield trial summary (1982).

Variety ¹	Per-acre yields in tons				Per cent US #1	Tuber Weight ⁵	Specific Gravity
	US #1 ²	Small ³	Other ⁴	Total			
Green Mountain	20.0	2.9	2.7	25.6	78.1	8.0	1.095
18-6	19.9	2.5	1.5	23.9	83.3	7.7	1.081
Kennebec	19.2	1.8	3.3	24.3	78.8	8.3	1.087
NY-61	17.1	3.6	1.1	21.8	78.5	7.5	1.076
B8883-13	16.8	3.4	0.8	21.0	80.0	6.4	1.087
Bakeking	16.5	1.8	1.0	19.3	85.4	7.6	1.096
3-79-209-81	14.6	4.6	0.7	20.0	73.0	8.0	1.084
Butte	14.6	2.7	2.0	19.3	74.9	8.9	1.085
6-76-15-79	14.3	5.2	0.9	20.4	69.8	6.8	1.072
1-77-14-79	14.3	3.4	1.3	19.0	74.9	7.2	1.095
1-76-32-79	14.1	2.6	1.0	17.7	79.6	7.3	1.088
37-68-8-70	14.1	2.0	2.7	18.8	74.8	8.1	1.100
1-77-13-79	13.9	5.7	1.3	20.9	66.8	6.3	1.098
Lemhi	13.9	3.6	4.5	22.0	63.3	7.5	1.094
Superior	13.9	2.0	3.3	19.2	72.2	7.7	1.087
Alasclear	13.6	1.7	4.3	19.6	69.4	6.8	1.096
Alaska Frost.	13.6	3.1	2.5	19.2	75.6	5.4	1.093
5-76-168-79	13.5	7.0	0.2	20.7	65.0	6.6	1.098
56-2-277-79	13.4	4.1	3.3	20.8	64.5	6.8	1.093
6-76-141-79	13.4	5.6	0.0	19.0	61.8	6.6	1.080
Alaska Red	12.9	3.4	4.4	20.7	71.9	6.9	1.084
Highlat Russet	12.6	3.1	5.0	20.7	73.8	7.2	1.088
Denali	12.6	2.6	2.9	18.1	69.4	7.4	1.098
Alaska 114	12.0	3.5	2.8	18.3	65.4	6.6	1.081
6-78-137-80	11.4	7.0	0.6	19.0	59.8	6.3	1.084
1-76-10-79	10.4	5.0	1.1	16.5	63.0	5.7	1.093
7-78-38-80	10.2	2.7	3.3	16.2	63.1	7.7	1.099
Russet Burbank	9.9	3.9	6.1	19.9	48.9	5.7	1.097
3-79-168-81	9.8	7.2	0.9	17.9	54.5	6.0	1.094
3-79-406-81	8.1	4.3	4.9	17.3	46.1	6.3	1.087
3-76-23-79	7.9	9.8	1.1	18.8	42.0	5.6	1.079
2-78-27-80	7.7	2.1	3.3	13.1	56.7	8.9	1.097
6-78-135-80	5.9	10.2	0.3	16.4	36.0	5.3	1.091
LSD 5% ⁶	2.5	—	—	2.4	8.3	.9	0.003

¹ Numbered varieties originated in the breeding program of C.H. Dearborn.² #1 market grade as defined by the US Department of Agriculture.³ Tubers less than 1.75 inches in diameter.⁴ Includes oversize, shatter or growth crack, second growth, green, etc.⁵ Average weight of #1 tubers in ounces.⁶ LSD: Least significant difference.

WEATHER DATA SUMMARY: 1983

A summary of weather data for the 1983 growing season at the Matanuska Research Farm is presented in Table 3. Monthly average air temperatures, soil temperatures, and precipitation are summarized. Forty-year averages of air temperatures, and precipitation are presented for comparison. Soil temperatures were recorded at the Palmer Research Center, located approximately 5 miles from the Matanuska Research Farm.

Table 3. Climatic data for Matanuska Farm during the 1983 growing season.

	May	June	July	August	September
Temp. (°F)					
Air					
Daily max.	58.7 (57.7) ¹	66.1 (65.0)	66.5 (67.5)	63.4 (65.0)	52.7 (52.0)
Daily min.	37.3 (35.9)	44.0 (43.8)	47.7 (47.5)	45.3 (45.4)	35.9 (35.5)
Daily mean	48.0 (46.8)	55.1 (54.4)	57.1 (57.5)	54.3 (55.2)	44.3 (43.8)
Soil, 2in. ²	45.7 —	57.4 —	62.1 —	54.6 —	44.4 —
Precip. (in.)	0.12 (0.73)	1.19 (1.59)	1.40 (2.44)	4.65 (2.61)	2.04 (2.16)

¹ Values in parentheses represent a 40-year average.

² Soil temperatures were recorded at the Palmer Research Center on fallow ground.

Early-season soil temperatures were well above average, resulting in rapid emergence by most varieties. Planting occurred on May 12, 1983, and plants of several varieties began to emerge within 3 weeks of that date. This compares with the 4-5 weeks required for emergence in 1982. The early months of the growing season were comparatively dry, and on several occasions moisture stress was clearly evident in some of the test varieties. Harvest occurred on September 9, and at that time vines were free of frost damage. Yields were generally lower than in 1982, and this is attributed to moisture stress. The first killing frost occurred after harvest and thus did not affect yield.

The 1983 harvest went comparatively well, although harvesting was interrupted by intermittent rain. The occurrence of wet rot and soft breakdown were below average in the 1983 commercial crop.

Table 4. Yield trial summary (1983).

Variety ¹	Per-acre yields in tons				Per cent US #1	Tuber Weight ⁵	Specific Gravity
	US #1 ²	Small ³	Other ⁴	Total			
Kennebec	18.4	0.4	0.3	19.0	96.7	7.2	1.093
18-6	18.0	0.8	2.0	20.9	86.4	6.2	1.081
13-68-5-72	16.9	0.6	0.5	18.0	93.9	6.1	1.092
6-78-139-80	16.9	1.5	0.4	18.7	90.0	4.9	1.086
3-79-270-81	16.9	0.6	0.7	18.1	93.2	5.6	1.087
Green Mountain	16.7	0.6	0.3	17.6	95.0	5.9	1.092
Alaska 114	16.7	1.0	0.0	17.7	94.1	5.2	1.092
10-71-1-74	16.2	0.5	0.5	17.1	94.3	7.3	1.086
3-79-280-81	15.3	0.8	0.7	16.8	90.9	5.2	1.087
Alaska Red	15.3	2.2	0.3	17.8	86.0	4.3	1.091
Russet Burbank	15.2	1.0	0.6	16.8	90.5	5.0	1.098
3-79-366-81	15.2	1.1	0.3	16.6	91.5	4.8	1.090
26-68-2-71	15.1	1.1	0.3	16.5	91.5	5.6	1.091
B7631-3	14.8	0.5	0.7	15.9	92.8	6.0	1.089
Red Pontiac	14.8	0.7	3.1	18.5	79.6	6.5	1.080
3-79-61-81	14.7	1.2	0.1	15.9	92.2	4.3	1.088
B8887-8	14.7	1.2	0.5	16.4	89.7	5.0	1.088
Snowchip	14.7	1.0	0.0	15.8	93.4	5.5	1.098
3-79-168-81	14.7	1.0	0.1	15.8	92.9	4.9	1.098
Highlat Russet	14.5	0.7	0.9	16.0	90.3	6.1	1.084
Butte	14.1	1.5	0.4	16.1	88.1	5.3	1.087
Lemhi	14.1	1.5	0.2	15.8	89.1	5.3	1.101
B8883-13	13.8	0.6	0.1	14.5	94.9	5.0	1.089
B8926-3	13.2	0.5	0.9	14.6	90.5	5.9	1.080
Denali	13.1	0.7	0.7	14.6	90.2	5.6	1.104
6-78-130-80	12.9	1.3	0.1	14.4	90.1	4.3	1.085
Bakeking	12.4	0.6	0.5	13.5	91.7	6.5	1.095
Alasclear	12.2	0.6	1.0	13.9	87.9	6.2	1.095
Ak Frostless	11.7	1.4	0.0	13.1	89.3	3.7	1.096
4-58-2-60-0P 1-77	11.6	0.4	1.6	13.6	85.2	6.8	1.069
13-5-345-81	11.5	0.4	0.5	12.4	93.1	5.7	1.092
Norgold Russet	11.3	1.3	1.5	14.1	80.3	5.0	1.084
Norchip	11.2	0.8	1.4	13.3	83.6	5.4	1.087
Red Norland	10.4	0.5	3.9	14.8	70.1	5.9	1.078
Superior	9.8	0.7	4.2	14.7	66.3	5.5	1.091
Onaway	7.1	0.5	0.6	8.2	86.6	5.2	1.075
LSD 5% ⁶	1.5	—	—	1.4	5.1	0.4	0.004

¹ Numbered varieties originated in the breeding program of C.H. Dearborn.

² #1 market grade as defined by the US Department of Agriculture.

³ Tubers less than 1.75 inches in diameter.

⁴ Includes oversize, shatter or growth crack, second growth, green, etc.

⁵ Average weight of #1 tubers in ounces.

⁶ LSD: Least significant difference.

WEATHER DATA SUMMARY: 1984

A summary of weather data for the 1984 growing season at the Matanuska Research Farm is presented in Table 5. Monthly average air temperature, soil temperature, and precipitation are summarized. Forty-year averages of air temperature, and precipitation are presented for comparison. Soil temperatures were recorded at the Palmer Research Center.

Table 5. Climatic data for Matanuska Farm during the 1984 growing season.

	May	June	July	August	September
Temp. (°F)					
Air					
Daily max.	58.3 (57.7) ¹	64.9 (65.0)	64.6 (67.5)	64.5 (65.0)	59.0 (52.1)
Daily min.	33.8 (35.8)	43.8 (43.8)	48.7 (47.5)	45.9 (45.4)	37.1 (35.4)
Daily mean	46.0 (46.8)	54.4 (54.4)	56.7 (57.5)	55.2 (55.2)	48.1 (43.8)
Soil, 2 in. ²	41.1 —	54.7 —	59.1 —	56.5 —	47.9 —
Precip. (in.)	0.84 (0.75)	1.78 (1.60)	2.76 (2.45)	2.46 (2.52)	1.83 (2.12)

¹ Values in parentheses represent a 40-year average.

² Soil temperatures were recorded at the Palmer Research Center on fallow ground.

The 1984 growing season may be categorized as average in terms of temperature and precipitation. Experimental plots were planted on May 16, and commercial planting was well underway by that date. A careful comparison of 1984 numbers with the 40-year averages, however, reveals that 1984 air temperatures were slightly below the 40-year average during the critical growing months, and this factor accounted in part for 1984 yields being lower than yields from the two previous years. Another factor contributing to generally lower yields was freezing temperatures (26-28 °F) that occurred August 26-28. The vines of several varieties, most notably Superior, were killed to the ground by these temperatures. Several varieties were only moderately damaged, and Alaska Frostless vines suffered virtually no visible damage. This early frost resulted in the loss of perhaps 7 to 10 growing days, and it is estimated that yields were reduced by 10-15 per cent.

The early frost was followed by ideal harvesting weather — warm, sunny, and dry. Experimental plots were harvested on September 10. Nearly the entire commercial potato acreage was dug in perfect harvesting weather, and therefore the harvested crop reached storage in excellent condition. As a result, it is expected that few storage problems (wet rot, etc.) are expected to be seen in the 1984 crop.

Table 6. Yield trial summary (1984).

Variety ¹	Per-acre yields in tons				Per cent US #1	Tuber Weight ⁵	Specific Gravity
	US #1 ²	Small ³	Other ⁴	Total			
Kennebec	16.5	1.4	0.7	18.6	88.6	5.8	1.085
18-6	16.4	2.6	0.8	19.8	82.5	6.0	1.076
10-71-1-74	15.4	1.4	0.9	17.7	87.1	5.8	1.080
B7631-3	15.1	1.1	0.7	16.9	89.4	5.4	1.079
Red Pontiac	15.0	1.7	2.3	19.0	79.1	5.2	1.076
Green Mountain	15.0	1.6	2.3	18.9	79.3	5.1	1.090
Shepody	14.4	0.9	0.8	16.1	89.4	7.2	1.088
Alaska 114	14.2	1.8	0.4	16.4	86.5	4.4	1.082
Onaway	13.7	1.9	0.9	16.5	83.0	4.9	1.073
6-5	13.5	2.2	0.8	16.5	81.8	5.5	1.085
Allagash	13.3	1.4	0.3	15.0	89.1	5.0	1.082
Red Norland	13.2	1.5	1.2	15.9	83.0	5.1	1.079
3-79-270-81	13.1	2.4	0.4	16.0	82.3	5.2	1.087
26-68-2-71	13.1	2.8	1.2	17.1	76.6	4.8	1.089
B8883-13	13.0	2.8	0.3	16.1	80.8	5.0	1.088
3-79-280-81	13.0	1.9	0.9	15.9	82.0	4.9	1.091
Highlat Russet	13.0	2.1	0.6	15.7	82.6	5.3	1.086
6-78-139-80	12.8	3.9	0.2	17.0	75.5	4.3	1.085
13-68-5-72	12.6	2.4	0.7	15.7	80.3	5.1	1.090
Denali	12.6	1.5	0.3	14.3	87.9	4.9	1.099
Bakeking	12.4	1.1	1.3	14.8	84.2	5.4	1.093
Alaska Russet	12.4	1.9	1.4	15.7	79.0	5.3	1.085
Superior	12.4	1.7	1.9	15.9	77.7	5.4	1.083
Epicure	12.2	2.0	1.7	15.9	76.7	4.6	1.084
Alasclear	11.9	1.2	1.3	14.5	82.4	4.9	1.092
Lemhi	11.6	2.6	0.9	15.2	76.4	5.0	1.094
Snowchip	11.6	3.0	0.8	15.4	75.4	4.6	1.090
Minn. Russet	11.6	1.4	1.7	14.7	79.1	5.8	1.075
Ak. Frostless	11.0	1.3	0.4	12.7	86.8	3.9	1.094
Belrus	10.8	1.8	0.4	13.0	83.5	4.7	1.092
Norchip	10.7	2.5	1.7	15.0	71.5	4.7	1.083
Norgold Russet	10.7	2.4	1.1	14.2	75.2	4.9	1.079
Alaska Red	10.7	3.2	0.4	14.3	74.9	3.6	1.085
Rus. Burbank	9.2	2.7	1.9	13.8	66.6	4.3	1.092
Butte	8.5	0.7	0.9	10.1	84.4	6.8	1.085
Nooksack	8.4	1.3	2.0	11.7	71.8	5.1	1.099
LSD 5% ⁶	1.9	—	—	2.0	7.6	0.6	0.003

¹ Numbered varieties originated in the breeding program of C.H. Dearborn.

² #1 market grade as defined by the US Department of Agriculture.

³ Tubers less than 1.75 inches in diameter.

⁴ Includes oversize, shatter or growth crack, second growth, green, etc.

⁵ Average weight of #1 tubers in ounces.

⁶ LSD: Least significant difference.

YIELD DATA SUMMARY

1. For the three years included in this report, yields were generally highest in 1982 and lowest in 1984.
2. In spite of very low soil temperatures in early 1982, yields were generally very good. This demonstrates that seed capable of producing a hardy plant, regardless of emergence delays, will very likely produce a successful crop.
3. The early killing frost in 1984 had a dramatic effect on yield. In spite of generally good growing conditions throughout the summer, yields were comparatively lower than for either of the previous years. The early frost was the major negative environmental factor at the experimental plots.

VARIETY DESCRIPTIONS

Below are brief descriptions of some varieties that are or have been grown in Alaska.

Alaska 114: Selected and tested by Dr. Dearborn at Palmer and released in 1954, Alaska 114 produces a white-skinned, round to oblong tuber with shallow to medium-deep eyes. It has a relatively tough skin and therefore is damaged less by mechanical harvesting. It yields competitively, but does not rank as highly as either Green Mountain or Kennebec. Alaska 114 is described as having good boiling, baking, and processing characteristics. Approximately 10 to 20 per cent of the commercial acreage in recent years has been planted to Alaska 114.

Bakeking: Developed in New York and released in 1957, this variety has been grown commercially in the Matanuska Valley for many years. It produces an oblong to oval tuber with a buff to nearly russet skin. Eyes are shallow to medium deep and its skin is relatively tough. Harvest damage is minimal and gradeout due to mechanical damage is relatively low. Bakeking has yielded moderately well in our experiment station trials but is reported to yield competitively when irrigated. Bakeking has good baking, boiling, and processing characteristics. Approximately 25 to 40 per cent of the commercial acreage in recent years has been planted to Bakeking. Indications are that more Bakeking would be planted if sufficient seed were available.

Green Mountain: Developed in 1878 in Vermont and very likely grown in Alaska since early in this century, Green Mountain has a long history as a commercial variety in Alaska. Arctic Seedling and White Bliss are thought to be line selections from Green Mountain. Green Mountain has been included in Alaska Agricultural Experiment Station yield trials for many years and was used as a parent variety by Dr. C.H. Dearborn in some of his variety development work. Green Mountain has ranked at or near the top of yield trials for the last 3 years. It produces a white-skinned, broad-oblong tuber with medium to deep eyes. It is a good boiling potato, but it is not among the better bakers and does not possess good

processing characteristics. Green Mountain has been planted in approximately 10 to 20 per cent of the commercial acreage in recent years.

Kennebec: This variety was developed by the USDA and was released in 1948. It produces white-skinned, round to elliptical tubers with shallow eyes. It has good boiling and excellent processing characteristics but generally is not thought of as a baking potato. Kennebec consistently yields among the best varieties here, but requires some special handling by the grower. It has a tendency to produce fewer tubers than most varieties, and if plants are not spaced close together in the row (7-9 inches) the tubers tend to get very large and develop hollow heart. Kennebec has accounted for less than 10 per cent of recent commercial production.

Russet Burbank: This variety has been grown for nearly 100 years, although the exact date of its selection is not known. Russet Burbank does not rate well among Alaska's commercial growers, but it is a very popular commercial variety in other parts of the United States. In fact, based on acreage and total yield, Russet Burbank is by far the most popular potato variety in the U.S. today. It is a multiple-use potato that can be baked, boiled, or processed, and in many potato-growing regions in the lower 48, high yields of top-quality tubers are harvested regularly. In Alaska, however, Russet Burbank does not yield particularly well, and its moderate total yield is further reduced by high gradeout due to second growth and growth cracks. Russet Burbank has not been planted by Alaska's commercial growers in recent years.

Superior: Developed in Wisconsin and released in 1962, Superior produces a tuber with smooth, white skin and an oval to oblong shape. Eyes are medium in depth. Superior may be used as a processing, boiling, or baking potato. Superior has been grown commercially for several years in the Matanuska Valley, and high yields have been reported by growers. However, it has not yielded well in our experiment station trials. Superior does have a tendency to produce some very large tubers, although hollow heart has not been reported to be a problem. Close observation of the maturing crop and a slightly early harvest may eliminate the oversize problem. In the last 3 production years, 25 to 40 per cent of the commercial acreage has been planted to Superior.

SEED

All potato growers, commercial as well as home gardeners, are advised to plant the best quality seed of regionally proven varieties. This generally implies the use of certified seed. Commercial growers are encouraged to purchase or produce their own certified seed. Home gardeners are encouraged to purchase appropriately labeled certified seed. Lists of local potato-seed growers may be acquired from the Alaska Seed Growers, Inc., Box 895, Palmer, Alaska 99645.

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