Performance of 127 POTATO VARIETIES in Alaska 1951 - 1959

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Palmer, Alaska

Bulletin 29
June 1960

CONTENTS

Since 1951, 127 potato varieties have been compared and evaluated for interior Alaska's major agricultural areas, in an effort to find an improved crop for the commercial tablestock industry.

Of these 127 varieties, only the following four white potatoes are generally recommended for commercial production in interior Alaska --

GREEN MOUNTAIN, often called ARCTIC SEEDLING or WHITE BLISS

KENNEBEC ALASKA 114 STATELY

Alaska 114 and Stately originated in Alaska, being fairly recent introductions from the local breeding program.

Where scab causes excessive grade-out losses in the above varieties, ONTARIO offers the advantage of some scab resistance. It is a medium quality potato.

NORLAND (pink-skinned) and RED BEAUTY (red-skinned) are good specialty potatoes showing high consumer appeal. They do not yield as much as white potatoes.

SWEDE and EIGENHEIMER are yellow potatoes liked by many home gardeners who prefer their special qualities to large yields.

More losses are caused by physical defects than by disease. Diseases are now fairly well controlled by a local certified seed program, and by improved production and storage practices.

PERFORMANCE OF 127 POTATO VARIETIES IN ALASKA

Potato varieties familiar to growers in other states behave differently when grown in this northern region. Geologically young soils, low soil temperatures, low moisture and many hours of daylight during the growing season provide an environment different from that in which many potato varieties were originally evaluated.

The purpose of this bulletin is to show how potato varieties respond when grown in Alaska. It also describes and illustrates desirable and undesirable features of those varieties evaluated in Alaska. Of 127 varieties grown in the Matanuska and Tanana* valleys, only six are recommended. Two of these were developed especially for Alaska. Three other special purpose potatoes are also described.

A condition unique to Alaska is its relative freedom from insects and diseases. Because of this nearly pest-free environment, pesticide foliage sprays and dusts have not been used. Abnormalities of potato tops and tubers have been a response to local environmental conditions or to viruses contained in the seed pieces.

Although vine growth habits are important, little mention is made of them. Vines of most imported potatoes conform quite well to descriptions published when a particular potato was originally introduced. The vine characteristics of healthy plants have been very uniform within varieties. Disease response is mentioned only when a variety shows marked resistance or susceptibility.

CHARACTERISTICS OF A GOOD VARIETY

Potato varieties high in total solids are usually preferred by both processors and consumers. Generally, Alaska grown potatoes contain 2 to 5 per cent more solids – sugars, starches, and minerals — than do the same varieties grown in more southerly latitudes. This high sugar content accounts for the distinctive sweet flavor of Alaskan grown potatoes.

A complicating factor in the choice of a variety is after-cooking-darkening, which is basically a varietal peculiarity. It may occur in varieties that normally are high in total solids. Within a po-

*Acknowledgement is given to Dr. Arvo Kallio for his assistance in planting, caring for, and harvesting many potato varieties at the College Experiment Station Farm. Appreciation is also expressed to Virgil Eckert, Glen Woods, Jay Levan, Ray Wilson, Roy Weston, Frank Mullen, Joe Kindler, Waldo Erickson and Edith Flowers for their cooperation in providing land and labor for evaluating potatoes at sites other than the Experiment Stations.

Stately, a tough-skinned, very high dry matter, white potato for home gardeners and growers who will sacrifice some yields for a quality baking potato.

Green Mountain, a high yielding, high dry matter, white potato grown successfully in Alaska for over 60 years. It is often called Arctic Seedling or White Bliss.

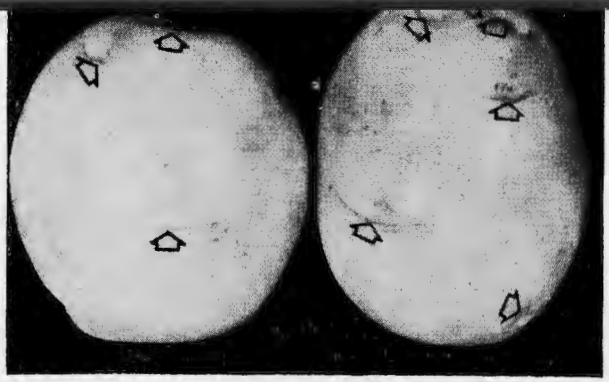
Red Beauty, a medium yielding, medium quality, red-skinned potato unsurpassed in appearance by any other red-skinned potato.

Norland, a high yielding, medium quality, pink-skinned, potato with prominent pink lenticels distinguishing it from all other pink varieties.

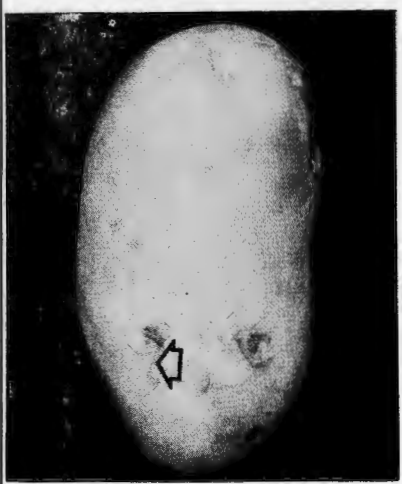
Alaska 114, a tough-skinned, medium dry matter, white potato that yields and stores well.

Kennebec, an all-purpose, high yielding, medium dry matter, white potato.

Second growth tubers are caused by regeneration of axillary buds.



Tubers of the variety Stately, left, have few eyes and seed is difficult to cut compared with Kennebec, right.



Unsightly eye canker produces small rootlet at corners of eyebrow.

Skin feathering is a result of rough handling.

Skin blemish formed on underside of right tuber, where it rested in contact with decaying organic matter.

Below, some varieties develop abnormal depressions in the central area of the primary bud group where scar tissue replaces normal skin. Cause and prevention are unknown.

tato variety, culinary characteristics may vary from season to season, because of fertilizer practices, available soil moisture immediately preceeding harvest, and conditions under which the potato tubers are stored and cooked.

Many characteristics are directly related to genetic composition of a particular variety or clone and these can be modified by breeding and selection for stronger expression of the desired qualities.

Since the grower can neither anticipate nor control many environmental conditions that affect the quality of a variety from year to year, his greatest assurance of quality in the crop is to know how the different varieties behave and plant those with the greatest number of desirable qualities.

To be economical for the grower a good variety produces a high yield per acre and the tubers are uniform in size and shape. One and a half to two pounds per three square feet of land or 11 to 15 tons per acre can be expected under average growing conditions.

A tough skin is highly desirable because it does not feather and bruise during the harvesting, storing, packaging and marketing operations.

Good potatoes have resistance enough in skin and tuber to prevent entry and spread of diseases. They are free from bacterial diseases such as blackleg and ringrot, and have a high degree of resistance to fungus infections resulting in scab lesions, skin checks, skin spots, eye cankers and stolon girdle. Freedom from virus disease is important, although a few kinds are easily rogued because the plants develop conspicuous leaf symptoms.

They must also be free from physiological weaknesses that foster growth cracks, shatter cracks, hollow heart, vascular staining in the stolon region, flecking or discoloration of the flesh, secondgrowth, early sprouting in storage, feathering, scald and skin lesions resulting from bruising.

A few varieties have some resistance to ringrot, a very serious bacterial disease of potatoes, but these varieties have not yielded well in Alaska. Teton and Merrimack are examples.

Another feature of a good potato is that it will retain good physical condition when stored for as long as a year, if held between 33°F and 38°F. At this low temperature some starch in potato tubers changes to sugar, resulting in a sweet flavor of the raw or cooked tuber.

Varieties differ markedly in the rapidity of conversion of starch to sugar, and in the degree of sweetness accumulated. In some, this accumulation of sugar during early storage is followed by rapid sprout development if the temperature rises above 40°F. Their food and market value is soon lost under these conditions.

Much of this sweetness can be removed by storing the tubers in darkness at room temperature for ten days. Even with the best varieties, this warming-up period is usually desirable if tubers have been stored for prolonged periods at low temperatures.

Six of the best varieties, well adapted to the Matanuska Valley and widely grown in the

rest of Alaska's interior, are described in some detail in the following pages. None of them possess all of the desirable characteristics sought in a single variety, but they are now accepted by both growers and consumers. They will continue as the major varieties in Alaska's tablestock industry until something better is at hand.

COMMON PHYSICAL FAULTS OF POTATOES

Cracking, either shatter or growth, is a serious fault of high dry matter varieties. Potatoes harvested from cold, wet soils frequently shatter-crack badly, as illustrated on page

Occasionally tubers held several months at storage temperatures below 36°F develop shatter cracks if jarred only moderately in handling.

Shatter cracking at harvest can be minimized during cold weather by delaying digging until the warmth of the day. A delay of a day in harvesting following a rain, frequently reduces shatter crack losses.

Varieties subject to shatter cracking are also susceptible to growth cracking since a growth crack is really an early shatter crack that has healed (see the illustration). During early tuber growth, a fluctuation in water available to the plant results in a high percentage of growth cracking in some varieties. The condition is most aggravated when the lack of water prevents the continued vine growth.

Under these circumstances, sugars and minerals continue to accumulate in the outer part of the tubers and create pressures within the tissues. When water again becomes available, stresses within the tuber exceed the elasticity of the skin and cracking occurs. Proper irrigation that maintains a steady growth of plants and tubers materially reduces the growth cracking.

Shatter cracking may occur at harvest in a tuber that had shattered earlier in the soil, (see illustration). Sixty per cent of the yield of varieties such as Satapa and Columbia Russet may be lost as a result of shatter cracking.

Shown in the illustration is another common defect known as second growth. Russet Burbank is very susceptible to second growth. Variable soil moisture and abnormally high temperatures during late July and early August increase the number of knobby or second growth tubers.

Feathering is a skin condition resulting from bruising or slipping of the skin on immature tubers. These loose pieces of skin that adhere to the tuber are papery on some varieties and not very objectionable. On other varieties the skin feather is dark and detracts from the appearance of the tuber because of its contrast with healthy skin.

After healing of the tuber, the flesh where the skin has been scuffed off may blend with the remainder of the surface. In some varieties the contrast is strong and unsightly. Kennebec, placed in cold storage without a conditioning period for suberization or healing of bruised skin, frequently exhibits this unsightly change of color. Green Mountain is similarly susceptible.

Scald is also often serious. It occurs on immature tubers stored under conditions that favor rapid water loss. Harvesting during dry, windy weather or washing and packaging early harvested tubers and storint them in the dry atmosphere of grocery display counters may cause scald.

Eye cankers detract from the appearance of a variety by causing circular, corky areas on either side of an eye at the basla end of the tuber. In some varieties, roots develop at the corner of the eyes as shown in the illustration. In others the corky area obliterates the eye. Susceptible varieties, such as Stately, develop more eye cankers when grown on newly cleared land than when grown in soils tilled for several years.

Stolon girdle, stem-end-browning and vascular staining are other manifestations of varietal weaknesses. They are also more common in potatoes grown on land recently brought under cultivation.

Physiological weaknesses no doubt will eliminate some varieties now considered satisfactory when irrigation is more widely practiced.

Greening of tubers detracts from their value. It is encouraged in some fields and gardens by improper hilling. Certain varieties are slow in developing chlorophyl in their skin, while others become objectionably green after three days of exposure to light. Heavy vine growth occasionally shades some improperly hilled tubers from the sun's rays. Freshly dug potatoes turn green rapidly in storage if exposed to light. After long periods of storage most varieties become less sensitive to light.

The number of eyes per tuber is important in determining seed costs. Tubers with many eyes can be cut into more good seed pieces and consequently more seed is available for use from this type tuber. Occasionally a good variety has very few eyes. For example, Stately has very few eyes and Kennebec has many eyes (see illustrations). This lack of eyes can make seed expensive unless, as with Stately, greater distance is allowed between planted seed pieces which compensates for the lesser number of seed pieces available per tuber.

Other characteristics not visible in the individual tuber are very important to the grower. The seed pieces of some varieties must be planted as close as seven inches in order to get satisfactory acre yields, because the variety develops only a few tubers in each hill. Other varieties that give 7 to 10 tubers per hill require more soil per plant from which to draw water and nutrients. These must be planted with a wider spacing between seed pieces, for example, 10 to 12 inches.

GOOD VARIETIES FOR ALASKA

It is apparent that a good potato variety must have many attributes to satisfy consumers, storage operators, seed growers, gardeners and commercial producers.

Few potatoes among the 127 listed in the table possess most of these important attributes.

Some idea of what can be expected of white-skinned potato varieties in Alaska may be gained by scanning the 73 listed in the table. Only four have enough of the desirable characteristics to justify on a large scale their production. They are Alaska 114, Kennebec, Green Mountain and Stately.

Eighteen red-skinned varieties evaluated in Alaska are also listed in the table. Red Beauty is outstanding in this group.

Norland is the only one of value of the eleven pink-skinned and two blue-skinned varieties listed.

Although consumer interest in yellow potatoes has not been great, eighteen varieties have been evaluated in Alaska, and their performance is summarized in the table. Skin color is variable in this group and ranges from cream through yellow to red.

Seven russet-skinned types are also listed. Russet-skinned varieties have not been outstanding yielders in Alaska.

Throughout the tables better varieties are marked with an asterisk.

ALASKA 114 develops a medium sized vine, free from leaf necrosis associated with low soil potash.

Its flowers are purple with white corolla tips. Numerous seed balls are common in most seasons.

This variety produces 6 to 8 white, tough-skinned, uniform sized tubers per hill. The tubers have a distinctive, pleasant flavor. They contain 21 to 22 per cent total solids and are suitable for general culinary purposes or for making potato chips and French fries. Alaska 114 tubers keep exceptionally well over long periods in common storage and make an attractive pack when displayed in stores in window type bags.

In growing seasons of 105 days with adequate moisture, this variety has produced 300 hundredweight of marketable tubers per acre. In dry seasons many tubers have failed to attain a two-inch diameter.

This variety has been somewhat troubled with hollow heart in seasons of fluctuating soil moisture.

Alaska 114 is susceptible to scab. It occasionally has a small grade out, possibly one per cent, caused by stolon girdle and brown staining of the vascular ring in the vicinity of the stolon. Even with these defects, its tough skin makes it a good variety for Alaska, especially in the Cook Inlet area.

GREEN MOUNTAIN has been widely grown in Alaska during the past half century. Those strains now sold under the name, Arctic Seedling and White Bliss, are considered to be the Green Mountain.

White Bliss as it exists in Canada is described as having splashes of red in its skin. None of the so-called White Bliss clones sold in Alaska during the past 16 years has shown any red in the skin of the tuber.

Green Mountain has a large vine and medium green colored leaves. When grown in soils low in potash supplying capacity the leaves are very dark green in color and the vines are dwarfed. If potash starvation persists, small dark spots

PERFORMANCE OF 127 POTATO VARIETIES IN ALASKA

Variety	Tuber Size	Tuber Shape	Feathering of skin	Cracking Growth	Cracking Shatter	Eye Depth	Eye Number	Yield	Total solids	Other characteristics
WHITE SKINNED POTATOES										
Alaska	Medium	Oblong, thick	None	Severe	Severe	Medium	Few	Medium	Medium	Hollow
Alaska 114*	Medium	Oval, thick	None	Few	None	Medium	Many	High	Medium	Tough skin
American Wonder	Medium	Flat, cylindrical	Medium	None	None	Very deep	Many	Low	Medium	Second growth
Antigo	Medium	Oblong	Severe	None	Severe	Medium	Medium	Low	Medium	Vascular stain
Arnica	Small	Heart shaped	Severe	Severe	None	Deep	Many	Low	Very high	Eyebrows crack
Ashworth	Medium	Round, flattened	Slight	None	Severe	Deep	Medium	High	Low	Rugose leaf
Boone	Large	Oblong, angular	Medium	Mild	Severe	Shallow	Medium	Medium	Low	Hollow
Calrose	Medium	Long, flattened	Medium	Mild	None	Deep	Many	Low	Medium	Rough eyebrow
Canoga	Small	Oval, compressed	Medium	Mild	None	Deep	Medium	Medium	Very high	Scurfy skin
Canso	Medium	Round	Medium	None	Severe	Medium	Medium	High	High	Internal brown spot
Canus	Uneven	Oval	Medium	None	Severe	Medium	Few	High	Low	Clear skin
Cayuga	Medium	Oval, short	Slight	None	None	Shallow	Low	Medium	high	Second growth
Chenango	Medium	Oblong, angular	Severe	None	None	Medium	Medium	High	Low	Deep stem-end
Cherokee	Medium	Oblong, flattened	Medium	Severe	Severe	Deep	Many	High	Medium	Hollow
Chippewa	Large	Oval, flattened	Slight	None	None	Shallow	Medium	High	Very low	Clear skin
Chisago	Medium	Oblong, thick	None	Severe	Severe	Medium	Few	Medium	Medium	Hollow
Cobbler	Medium	Round, oblong	Slight	Slight	Severe	Deep	Many	High	High	Hollow, second growth
Delus	Medium	Round, variable	Severe	None	Slight	Medium	Medium	Medium	Medium	Stolon girdle
Doone Early	Medium	Oval, thick	Severe	None	None	Deep	Many	High	Low	Watery flesh
Earlaine	Medium	Round, oval	Severe	None	Severe	Shallow	Medium	Medium	Very low	Sprouts in storage
Earlaine # 2	Medium	Round	Slight	Slight	Severe	Deep	Medium	High	Low	Vascular stain
Empire	Large	Oval, long	Slight	None	None	Deep	Medium	Low	Medium	Rugose leaf
Essex	Small	Oblong, compressed	Severe	Slight	Severe	Deep	Many	Low	Low	Uniform tuber
Fillmore	Small	Round	Severe	Slight	Slight	Deep	Many	Low	Medium	Pink cast of skin
Green Mountain*	Medium	Oblong	Severe	None	None	Deep	Many	High	High	Rough eye
Haig	Small	Oval, short	Slight	None	Slight	Medium	Medium	Medium	Medium	Uniform tuber size
Hindenburg	Medium	Oblong, tapered	Severe	Slight	None	Deep	Many	Medium	High	Deep stem-end
Houma	Small	Round, flattened	Slight	None	Slight	Deep	Medium	Medium	Medium	Sprouts in storage
Huron	Large	Oval, irregular	Slight	Slight	Slight	Deep	Medium	High	Low	Sprouts in storage
Jubel	Small	Oblong	Slight	Severe	Slight	Deep	Many	High	High	Dark after cooking
Katahdin	Medium	Oval, short	Medium	Slight	Slight	Medium	Medium	Medium	Medium	Irregular shape
Kennebec*	Large	Oval, long	Severe	Slight	Slight	Medium	Medium	High	High	Early, low tuber set
Keswick	Medium	Oval, thick, uniform	Slight	None	Severe	Shallow	Medium	Medium	High	Deep stem-end

Variety	Tuber Size	Tuber Shape	Feathering of skin	Cracking Growth	Cracking Shatter	Eye Depth	Eye Number	Yield	Total solids	Other characteristics
WHITE SKINNED POTATOES continued										
Kitting	Large	Oval, thick	Slight	Slight	Slight	Shallow	Medium	Medium	Medium	Watery texture
Knik	Large	Oval, long	Medium	Slight	Slight	Shallow	Medium	High	Medium	Dark after cooking
LaSalle	Medium	Round, flattened	Medium	Slight	Slight	Deep	Medium	Medium	Low	Very deep stem-end
Manota	Large	Oval, thick	Medium	Slight	Slight	Shallow	Medium	Medium	Medium	Hollow
Menominee	Small	Round, compressed	Medium	Severe	Severe	Deep	Medium	Medium	Medium	Rough tuber
Merrimack	Medium	Oblong	Severe	Few	Severe	Medium	Many	Low	High	Second growth
Mesaba	Medium	Round	Slight	Slight	Severe	Deep	Medium	Low	Low	Rhizoctonia on skin
Mohawk	Large	Oblong	Slight	Few	Few	Medium	Medium	Low	Medium	Hollow, second growth
Nordak	Medium	Oval	Slight	Few	Few	Medium	Medium	Medium	Low	Irregular shape
Norgleam	Medium	Oblong, short	Slight	Few	None	Medium	Medium	Medium	High	Spongy tuber
Norkota	Medium	Oval, flat, long	None	None	Few	Shallow	Medium	Low	Low	Sourfy skin
Ontario*	Medium	Oblong	Medium	Few	None	Medium	Many	High	Medium	Scab resistant
Osage	Large	Oval, tapered	Severe	None	None	Medium	Many	Medium	High	Hollow, scalds badly
Osseo	Large	Round	Severe	Few	Severe	Medium	Medium	High	Low	Hollow, shatters badly
Panther	Small	Cylindrical	Slight	Few	None	Medium	Many	Low	High	Hollow, stolons heavy
Pawnee	Medium	Oval, compressed	Slight	Few	Few	Shallow	Medium	Low	Low	Sprouts in storage
Phulwa	Small	Round, compressed	Slight	None	None	Deep	Many	Low	Medium	Rough tuber shape
Placid	Medium	Oval, thick	Severe	Severe	Few	Medium	Medium	High	Medium	Scalds badly
Plymouth	Medium	Oval, irregular	Medium	Severe	None	Few	Medium	Low	Medium	Second growth
Potomac	Medium	Round	Severe	None	None	Deep	Many	Medium	Low	Rough tuber shape
Pungo	Medium	Oblong, thick	Slight	Few	None	Deep	Many	High	Medium	Mostly hollow
Rukat	Medium	Oval	Severe	Few	Few	Shallow	Medium	High	Medium	Scalds badly
Rural New Yorker	Medium	Oval, variable	Severe	Few	None	Deep	Many	Low	Medium	Rough tuber shape
Saco	Medium	Oval	Severe	Severe	Severe	Medium	Medium	Medium	Medium	Pink cast from cold
Saranac	Small	Round, oval	Slight	None	None	Medium	Medium	Low	Medium	Course skin netting
Sebago	Small	Oblong, short	Severe	Few	Severe	Shallow	Few	Low	Medium	Sprouts in storage
Seneca	Medium	Oblong, short	Slight	None	Few	Medium	Medium	High	Medium	Scab resistant
Sequoia	Large	Oval, compressed	Severe	Few	Few	Medium	Medium	High	Medium	Mostly hollow
Smooth Burbank	Small	Cylindrical	Severe	Few	Few	Deep	Many	Low	High	Second growth
Smooth Rural	Medium	Oblong, flattened	Severe	None	None	Deep	Many	High	Medium	Eyebrows overhang
Snowdrift	Small	Oval, thick	Slight	None	None	Shallow	Medium	Medium	Medium	Eyes on shoulders
Stately*	Small	Round, uniform	None	Few	Few	Shallow	Few	Low	High	High baking quality
Tawa	Medium	Oblong	Medium	Few	Severe	Shallow	Medium	Medium	Medium	Second growth
Teton*	Medium	Oblong, short	Medium	None	None	Medium	Medium	Medium	Medium	Ring rot resistant

Vera	Medium	Round, compressed	None	None	None	Deep	Many	Medium	Low	Very rough tuber
Virgil	Medium	Oval, thick	Medium	None	Few	Deep	Many	Medium	Medium	Very deep eye
White Cloud	Medium	Oval, uniform	Medium	None	Severe	Deep	Many	High	Medium	Very deep eye
White Gold	Medium	Oblong	Slight	Few	Few	Medium	Many	High	Medium	Green Mountain type
White Rose	Large	Oval, long, flat	Severe	Few	None	Deep	Many	High	Low	Very deep eye
Yampa	Medium	Oval, short	Slight	Severe	Few	Shallow	Medium	Medium	Low	Hollow
RED SKINNED POTATOES										
Bliss Triumph	Medium	Round, irregular	Medium	None	Severe	Deep	Many	High	High	Deep stolon end
Dasoc	Medium	Oblong, irregular	Slight	None	Severe	Deep	Many	High	Low	Hollow
Eminencia	Large	Oblong, flat	Severe	None	None	Deep	Many	Low	Low	Second growth
Pontiac	Small	Round	Severe	None	Severe	Deep	Many	Low	Low	Very poor quality
Progress	Small	Round	Slight	Few	Severe	Deep	Many	High	Low	Very severe shatter
Redbake	Medium	Oblong	Severe	Few	Severe	Medium	Many	Medium	Medium	Sprouts in storage
Redburt	Medium	Oblong	Severe	Severe	Severe	Deep	Many	Medium	High	Skin-flesh contrast
Redglo	Medium	Oblong	Severe	Severe	Severe	Deep	Many	High	Medium	Very rough eye group
Redkote	Medium	Oval, short, thick	Severe	Severe	None	Deep	Many	Medium	Medium	Stolon adheres
Red Beauty*	Medium	Oval, uniform	Slight	None	None	Shallow	Medium	Medium	Medium	Early red
Red Eyed Warba	Small	Oblong, compressed	Medium	None	Severe	Deep	Many	High	Medium	Poor tuber shape
Red LaSoda	Large	Oblong	Severe	Few	Severe	Deep	Medium	High	Low	Hollow, deep cavity
Red Pontiac	Medium	Heart shaped, thick	Slight	Severe	Few	Medium	Medium	High	Low	Irregular shape
Red Warba	Small	Round, compressed	Medium	None	Severe	Deep	Many	Medium	Low	Irregular shape
Rode Eersteling	Large	Oval, long, thick	Slight	Slight	None	Shallow	Medium	Medium	Medium	Yellow fleshed
Sheridan	Medium	Oval, short	Slight	None	Severe	Deep	Medium	High	Medium	Many hollow
Spaulding Rose	Small	Oval, flat	Medium	None	None	Medium	Many	Low	Medium	Very poor yield
Victor, Blue	Small	Oval, long	Medium	None	Few	Medium	Many	Low	High	Very poor yield
PINK SKINNED POTATOES										
Beauty of Hebron	Medium	Oval, long, flat	Severe	None	None	Deep	Many	Low	Medium	Rough eye group
Cornea	Small	Oval	Severe	None	None	Shallow	Many	Low	High	Scalds badly
Early Ohio	Small	Oval, short	Slight	Few	Severe	Deep	Many	Low	Medium	Second growth
Excel	Medium	Oval, thick	Slight	None	Few	Shallow	Many	Medium	High	Pink streaks in flesh
Glenmeer	Small	Oblong	Severe	Slight	Severe	Shallow	Many	Low	Medium	Very low yield
Norland*	Large	Oblong, thick	Slight	None	None	Shallow	Many	High	Medium	Conspicuous lenticel
Satapa	Medium	Oval, thick	Medium	Slight	Severe	Shallow	Medium	High	High	Nearly all shatter
Tebon	Small	Oval, thick	Severe	None	Severe	Deep	Medium	High	High	Nearly all shatter
Thijn	Small	Oval, slim	Medium	None	None	Shallow	Many	High	High	Yellow flesh, hollow
Waseca	Large	Heart shaped	Slight	Severe	None	Deep	Medium	Medium	Low	Hollow, stolon girdle
Ysselster	Small	Oval, pointed	Slight	Severe	Few	Medium	Many	Medium	High	Yellow flesh

Variety	Tuber Size	Tuber Shape	Feathering of skin	Cracking Growth	Cracking Shatter	Eye Depth	Eye Number	Yield	Total solids	Other characteristics
YELLOW FLESHED POTATOES										
Aokersegen	Small	Oblong, irregular	Severe	Few	None	Deep	Many	Low	Medium	Scald badly
Belle de Fonteney	Medium	Oval, long, flat	Severe	None	None	Shallow	Medium	Low	Low	Second growth
Bintje*	Medium	Oval, long	Severe	Few	None	Shallow	Medium	High	Medium	Smooth tuber
Eigenheimer*	Small	Oval, long	Medium	None	None	Medium	Many	Low	High	Very high solids
Eersteling	Medium	Oval, long, flat	None	Few	None	Shallow	Medium	Medium	Medium	Poor shape
Fruhbote	Small	Oval, irregular	Slight	None	None	Deep	Many	Low	Low	Tuber ends pointed
Fruhmolle	Small	Cylindrical, irregular	None	None	None	Deep	Medium	Low	Low	Tubers constricted
Fruhpule	Medium	Cylindrical, irregular	Medium	None	None	Shallow	Medium	Low	Low	Second growth
Geelblom	Medium	Cylindrical, long	Slight	Few	None	Deep	Many	Medium	Low	Eyebrows overhang
Jacobi	Medium	Oblong	Medium	Few	None	Deep	Many	Medium	Medium	Very deep eye
Limosa	Small	Oval	Medium	None	Severe	Shallow	Medium	Low	High	Tough skin
Market Redwitzer	Medium	Round, compressed	Medium	Many	None	Deep	Many	Medium	Low	Rough, angular shape
Marygold	Large	Oval, irregular	Severe	Few	Medium	Medium	Medium	High	Low	Light purple eyes
Marta	Small	Oval, long, flat	Severe	None	None	Shallow	Medium	Low	High	Very low yield
Oberanbacher Fruhe	Medium	Oval, long	Medium	None	None	Medium	Many	Medium	Low	Smooth skin
Primula	Medium	Cylindrical, long	Slight	None	None	Medium	Medium	Low	Low	Shoulders heavy
Rhinegold	Small	Oblong, short	Severe	None	None	Deep	Medium	Low	High	Stolon adheres
Swede	Small	Cowhorn	Medium	None	None	Deep	Many	Low	High	Very low yield
RUSSET SKINNED POTATOES										
Columbia Russet	Medium	Eliptical	Slight	Few	Severe	Shallow	Many	High	Medium	Nearly all shatter
Early Gem	Large	Oblong, long	Severe	Severe	Severe	Medium	Medium	Low	Low	Internal brown spots
Jossing	Small	Cylindrical, short	Slight	None	Slight	Shallow	Many	Low	High	Very low yield
Rushmore	Large	Cowhorn, flat	Slight	None	None	Medium	Many	Low	Low	Hollow, second growth
Russet Burbank	Small	Cylindrical, flat	Slight	Severe	Severe	Medium	Many	Low	High	Hollow, second growth
Russet Rural	Large	Oval, flat	Medium	None	Few	Deep	Many	High	Medium	Dull, dirty skin
Russet Sebago	Small	Oblong, round	Slight	Few	Severe	Shallow	Few	Medium	Medium	Low yield

* Outstanding potato variety for Alaska's Matanuska Valley and other similar sites

appear on the leaves midway up the plant. These spots frequently enlarge and unite, resulting in curling and drying out of the affected leaves. Under these conditions yields are reduced 20 to 50 per cent.

Although eyes are numerous and well distributed over the tubers, they are objectionably deep. The flowers are white and they open early, seldom forming seed balls.

Green Mountain produces 6 to 8 white, tender-skinned, oblong tubers per hill (see illustration). Although they lack uniformity of size and shape, some of this disadvantage can be overcome by spacing the seed pieces 7 to 8 in. apart in the row. In heavy soils all tubers are more flattened than in sandy soils.

Yield of marketable tubers is slightly higher than for Alaska 114. Total solids are high, usually from 22 to 24 per cent, although even with this high solids content, Green Mountain does not French fry or chip satisfactorily.

After-cooking-darkening is a serious weakness of this variety, especially when it is grown on wet soils high in nitrogen.

Hollow heart does not normally occur in Green Mountain, and this feature, combined with high productivity, keeps the variety in demand. It is susceptible to all of the common potato diseases, but planting certified seed overcomes nearly all of the disease problems except common scab.

KENNEBEC has large vines and leaves, deep green foliage and white flowers. Both flowering and seed ball formation are rarities with this variety.

Kennebec produces 4 to 6 smooth, oval, tender-skinned tubers per hill (see illustration). It equals Green Mountain in yield, grows its tubers more rapidly, but contains about one per cent less dry matter.

Kennebec is good for all culinary purposes including chipping and French frying. Mashed potatoes made from Kennebec have a slight creamy tint.

Hollow heart is a weakness of Kennebec that can be minimized. It is associated with very large tubers. Under most growing conditions, tuber size can be held down and hollow heart reduced by planting the seed pieces only 6 or 7 inches apart in rows three feet apart.

The skin of Kennebec turns green very rapidly, even in light of relatively low intensities. Intense greening that occurs in the field imparts a bitter flavor to the cooked potato, so special care must be exercised in hilling to prevent greening in the field. After digging, tubers must be stored in total darkness to avoid greening. Any greening that occurs while tubers are on the grocery shelf usually does not progress to a stage where flavor is affected, although the color change may be conspicuous and uniform.

STATELY is a medium sized, open vine variety with large, dark green leaves. Its numerous, showy flowers are purple with white tips. Seed balls are abundant and large.

Seven to ten tubers are produced per hill and in seasons of low moisture the tubers remain rather small. Its tubers

are oblong to round, short, smooth, white (see illustration) and have a very tough skin. Uniformity of size and shape make it an attractive packaged potato.

A disadvantage of Stately is its low yield, about a third less than for Green Mountain, Kennebec or Alaska 114. Yet Stately has a place especially for those who like its dry texture and white, fluffy mashed potato quality. Stately contains 24 to 25 per cent total solids. It can be satisfactorily processed into potato chips and French frys, but it is too dry for hash brown or country style preparation.

Sweetness, so objectionable to some persons, is essentially non-existant in Stately. This variety keeps well in storage and retains a high vitamin C content for at least eight months.

From the growers standpoint Stately has some weaknesses. As mentioned above, this variety has not produced high acre yields. Few eyes and poor distribution over the tuber make the variety difficult to cut for planting since each cut piece must have an eye from which a new plant can grow. Eye distribution on most varieties makes it easy to quarter a tuber and have an eye on each piece. Stately seldom yields more than three seed pieces per tuber. This disadvantage is offset by spacing the seed pieces of Stately further apart in the rows. It sets a large number of tubers per hill and yields best at spacing of 11 to 12 inches. In very dry areas, greater distances (13 to 14 inches) between seed pieces is desirable.

If too much space is allowed per plant, some tubers will grow too large and develop hollow heart, so the distance between seed pieces must be determined by trial at each location.

Stately is susceptible to scab and, in some soils, the tubers develop large eye cankers.

RED BEAUTY is a new Wisconsin variety with many desirable features for Alaska. Its vines are small to medium in size and show some tendency to lodge earlier than most varieties. Deep green, slightly crinkled foliage gives the plants a healthy appearance. Solid purple flowers are borne well above the foliage, but seed ball formation is not abundant.

Red Beauty produces 3 to 5 oval, smooth, red-skinned tubers per hill (see illustration.) Eyes are shallow, numerous and well distributed over the tubers. This is the only red-skinned variety among 17 tested which possesses all of these desirable characteristics. It has been compared with such red varieties as Bliss Triumph, Dazoc, Kasota, Progress, Redbake, Redburt, Redglo, Redkote, Red Eersteling, Red LaSoda, Red Pontiac, Red Warba, Sheridan and Ysselster.

Red Beauty yields 10 to 15 per cent per acre less than Green Mountain, but practically all of its tubers come within the U. S. No. 1 grade.

Its flesh color is white, and does not turn objectionably yellow when the red skin is bruised.

It has a total solids content of 20 to 21 per cent and

is of average table quality. In Alaska, potatoes with less than 22 per cent total solids usually have only fair quality when baked.

Tuber defects such as hollow heart, growth cracking, shatter bruising and eye canker have not been troublesome in Red Beauty. No storage problems have been observed in this variety even with tubers held for ten months. It is susceptible to common scab, as are other red-skinned varieties.

NORLAND is a pink-skinned variety released by North Dakota in 1958. Its vines are medium in size, erect, bushy in early growth and open to spreading as they mature. Leaves are medium large, light green and are rather prominently veined.

Norland's flowers are purple and numerous. Seed ball formation is common.

On the basis of two year's observations in Alaska, it produces 4 to 6 tubers per hill and yields only slightly less than Green Mountain.

Norland tubers are pale pink with conspicuous dark pink lenticels that distinctly mark the variety. The eyes are medium, deep, numerous and well distributed over the thick, oblong tubers (see illustration).

It has a thin, tender skin that slips easily, exposing a clear, white flesh. Norland contains 22 to 23 per cent solids and has made better than average chips and exhibited good table quality in the two seasons tested. Its quality and good productivity make it a very desirable potato for Alaska when a pink variety can be substituted for a red.

Norland is claimed to be moderately resistant to common scab, but has not been tested in Alaska sufficiently to verify this claim.

SPECIAL PURPOSE POTATOES

SWEDE*, or peanut potato, as it is frequently called in Alaska is from a Scandinavian clone of unknown parentage.

It is a fine-leaved, strong growing, erect plant with much purple coloring in the stem. Its tubers are cylindrical, curved and tapered toward one end or the other. Flesh color is yellow-orange.

Under good conditions Swede potatoes seldom yield a fifth as much as Stately. Some gardeners are willing to sacrifice yield in order to obtain their distinctive flavor, color and very dry texture.

When cooked the flesh color and texture approach the consistency of yams or good, dry sweet potatoes.

Several strains of Swede exist in Alaska between the Kenai Peninsula and the Yukon River. Persons interested in growing Swede should plant it in a plot separate from other varieties and rogue out odd or diseased plants.

EIGENHEIMER* is another yellow fleshed variety with distinctive flavor and very high total solids. Its high solids content gives it an exceptionally dry texture. Eigenheimer produces a low yield of medium

* Eigenheimer and Swede are available from the Alaska Experiment Station in samples not to exceed five tubers.

long, oval tubers with very deep eyes. Its vine growth exceeds that of Green Mountain and it is therefore not suited to gardens where space is limited.

ONTARIO is a highly scab resistant potato. It produces fairly clean tubers on land so heavily infested with common scab that other varieties are completely infested as shown in the illustration.

Ontario develops a large, open vine, has pale lilac colored flowers and occasionally sets seed balls. It is subject to bronzing and to leaf scorch like Green Mountain if grown on soils low in potash.

Ontario produces 5 to 7 oblong, white-skinned, attractive tubers per hill and gives yields equivalent to Green Mountain. Hollow heart can be controlled fairly well by close spacing in the row.

Other special purpose potatoes are presently being sifted from among thousands of seedlings grown and selected during the past 10 years.

Several other selections bred for frost resistance and a seedling with a russet skin show promise of being useful for Alaskan growers.

POOR VARIETIES FOR ALASKA

Most varieties, as indicated in the table, are not satisfactory in Alaska. Of 127 named varieties evaluated in the Matanuska Valley only 4 or 5, as described above, are worth recommending. Many newcomers usually asked about three favorites -- Netted Gem, Cobbler and Bliss -- that are popular in other States.

Netted Gem, Russet Burbank, Idaho Russet or California Russet, as it is sometimes called, is not satisfactory in Alaska. Probably the reason for growing it is to satisfy a demand for a russet-skinned potato. In addition to its deep eyes, the tubers develop hollow heart, second growth knobs and growth cracks. It yields approximately one half as much as Stately and has no better eating qualities. For those persons accustomed to the quality of Netted Gem, a recommended replacement is Stately.

Cobbler, an old standard variety in other states, produces tubers with eyes so deep that it is not marketable in Alaska. A good replacement for it is Alaska 114 which has a much better skin. Cobbler is, however, an earlier potato under Alaskan growing conditions.

Triumph, Bliss or Bliss Triumph, a standard red potato in other states, has very deep eyes when grown in Alaska. Shatter cracking causes losses of 50 per cent of the crop in most seasons.

SOURCES OF GOOD SEED

The safest source of good seed is that grown under a crop certification program where rigid standards of cleanliness are practiced to keep potato tubers disease free. Certified or foundation grade seed, carrying the symbol of a state certifying agency and a lot number, has advantage frequent-

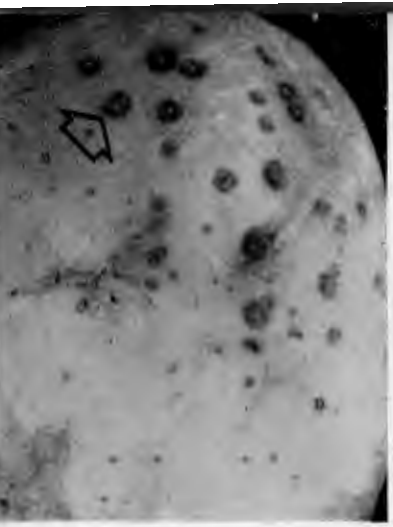
Cross-section of hollow-heart tuber. Inner layer of cells dies early in the life of the tuber. As the tuber expands, the dead tissue separates to form a hollow area.

Deformed stolon end of top tuber is caused by stolon girdle. Skin is often discolored. Internal discoloration due to stolon girdle in bottom tuber seldom leads to further decay.

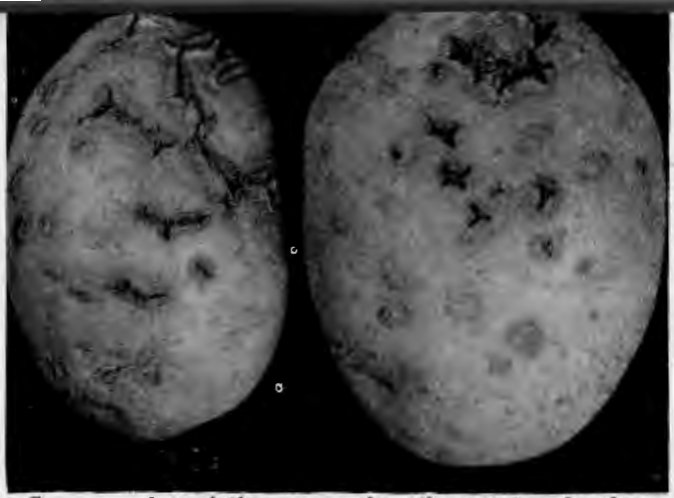
Growth crack through apical bud group caused by rapid early growth. By harvest time surfaces of the crack had healed.

Below, arrow points to shatter crack intersecting a healed growth crack, indicating that this tuber went through two periods of excessive internal growth stresses.

Below extensive decay sometimes invades tubers weakened by stolon girdle.



Tuber lenticels of some varieties permit disease organism to enter and attack underlying tissue, causing brown spots under the skin.

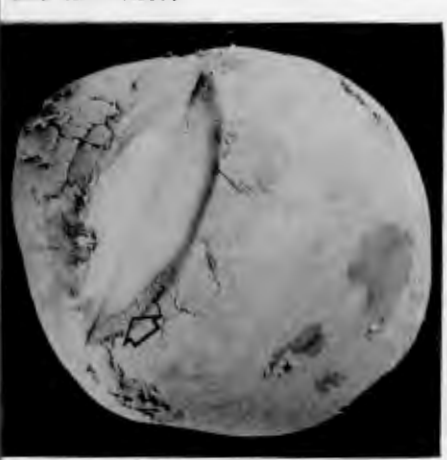


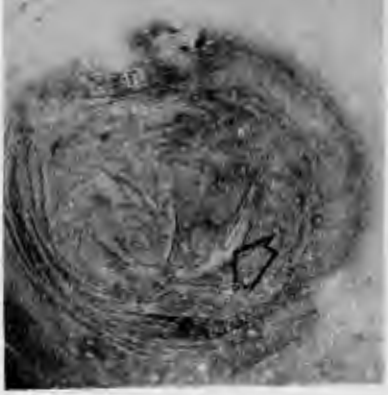
Some good varieties grown in other states develop Y-checks in Alaska, as seen in the above tubers.

Right, some red-skinned varieties popular in other states develop extreme vascular staining when grown in Alaska.

The dark area, a discoloration of the outer cortical tissue, is called "scald". Badly feathered tubers scald after a few hours of exposure to a relatively dry air.

Below, immature tuber dug from very dry soil. Its skin wilted while cortical tissue (arrow) discolored and shrivelled.





Break in skin (arrow) shows where dry rot organisms entered tuber causing progressive decay. Crosses from Cherokee show a high incidence of this kind of storage rot.

Right, regrowth from eyes of tubers on this young plant was caused by virus infection.

Below, corky tissue in vascular ring of Rushmore tuber. Cause and prevention are unknown.

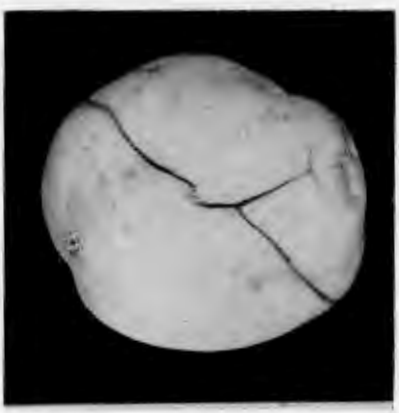
Below, brown staining of vascular tissue in this tuber is usually associated with stolon girdle. Top killing practices may aggravate vascular staining in some varieties.

Arrow above indicates curled leaves on potash deficient Green Mountain plant. At left, arrow points to brown depressed skin lesion on tuber from a potash deficient plant. Cross-section through tuber lesion at right reveals dessicated corky tissue.

Some varieties are more susceptible to potash deficiency than others. Green Mountain seems especially sensitive to lack of potash.

Scabby tuber of a susceptible variety compared with a clean tuber of the resistant variety Ontario, right.

Fresh shatter cracks degrade many tubers during harvest. Tubers crack because of excessive internal pressures.



ly overlooked by the purchaser. The symbol is a guarantee or trade mark signifying a standard of quality backed up by the grower. Since each 100 pound container of certified seed bears a lot number, registered in the books of the certifying agency, itis a relatively simple matter for a prospective purchaser of seed to inquire as to the past history of any lot number inspected by the agency. In this way buyers and growers alike can have a common understanding of the meaning of certified or foundation grade potato tubers.

Good seed is grown in Alaska by independent farmers who maintain high standards of cleanliness and certify their crops through the Alaska Crop Improvement Association. This organization inspects seed potatoes on the farm and in the storage of the grower, but does not handle or sell seed potatoes.

Many certified potato varieties are available to the home gardener and commercial potato grower but only those that are adapted to Alaska are available in the State. Individuals interested in satisfying their own curiosity about other varieties need only to address a postcard to "Officer in Charge of Seed Certification" in each of the fifty states. At least thirty-two states are actively engaged in potato certification programs and will be delighted to send a copy of their varieties being certified. The cost of importing certified seed potatoes is prohibitive however, except on a small trial planting basis. Certified seed is good assurance that a crop grown from such seed will keep for at least eight months in a well managed common storage.

The cash outlay for local certified seed is generally a cent or two per pound more than what the commercial grower gets for his potatoes. For a grower that plants at the rate of 1600 pounds of cut seed per acre, the additional cost of good seed can amount to $32 per acre over the value of common potato seed. If the crop sells for 4 cents per pound, certified seed needs to increase the yield only 800 pounds per acre to compensate for the additional cost of $32 per acre for certified seed. Usually the gain in marketable tubers per acre from good seed over common seed is five times greater than the 800 pounds referred to above.

Good seed sources can be maintained effectively only where commercial growers renew their seed each year thus providing assurance to the grower of certified seed that there will be a market for his crop. Too frequently commercial growers overlook this situation and have inadequate sources of good seed when their stocks become diseased. None are as aware of this than growers who have planted their crop from their own ring rot infected seed. Although ring rot causes some losses in the field during the growth of the crop, the real loss comes after the crop is in storage. Secondary bacterial disease organisms often invade the tissue of ring rot infected tubers. Even in well managed storages decay due to soft rot generates considerable heat that further hastens the sprouting or rotting of the

stored crop.

Good seed sources may be great distances from a commercial grower in terms of shipping costs since many areas receive their seed via air. To reduce shipping charges "potato eyes" or "seed eyes" can be cut from tubers. This is done by scooping an eye or group of eyes from a tuber with a device such as a small ice cream or melon scoop. Approximately two-thirds of the tuber is discarded in this method of preparation and consequently shipping charges figured on an acre basis are likewise materially reduced.

Plastic or paper shipping containers are excellent for "seed eyes" providing they have some perforations that permit aeration within the container. Cut seed sweats in closed containers. This moisture readily supports undesirable mold growth on the cut surfaces. Dusting of freshly cut seed with talc or lime prior to packaging helps to reduce condensation inside the package.

From the growers standpoint it is a good practice to plant seed eyes shallow and allow at least 12 inches between hills. Some varieties may develop large tubers that show hollow heart, but this does not detract from their value as potential seed for the next season. When seed eyes are used for producing a commercial crop, closer spacing should be practiced to overcome the hollow heart condition.

DEVELOPING BETTER VARIETIES

It is not by chance alone that better potato varieties are developed to meet new quality requirements or to resist pest hazards. Early maturing varieties are needed that will withstand moderate frosts, and that will recondition for chipping, French frying, boiling or baking after being held for long periods at low storage temperatures.

To combine the desirable characteristics of poor yielding, frost hardy varieties with good quality, high yielding commercial varieties, it is necessary to cross the flowers of the two types. Seedballs, one half to one inch in diameter, develop from the crossed flowers. Generally the seedballs are borne in clusters, one for each flower of the flower cluster.

These "true seeds", in contrast to tubers which are frequently referred to as potato seed, are removed from the pulp of the seedballs and planted. When these true seeds germinate many new plant and tuber types are produced. If sufficient seed of a cross is available, the desired combination of plant and tuber characteristics will be present in one seedling among approximately 100,000 of a cross.

Very few breeders have the opportunity to search for this one plant because it is so expensive to grow so many plants at one time. The alternative is to back-cross the most desirable seedling of a cross to the parent that will strengthen the characteristic desired. New varieties such as Alaska 114, Stately, Kennebec and many others, have been developed in recent years through this procedure of crossing, selecting and varietal testing.