

## HIGH YIELDING POTATO VARIETIES FOR WASHINGTON

by Norris Holstad

### INTRODUCTION:

Extensive potato variety testing in the Columbia Basin began in 1960 as a cooperative effort between WSU, the USDA, the Potato Commission and the State Department of Agriculture. Between 1960 and 1969, 217 named varieties and promising numbered selections were tested for yield, grade, specific gravity, chip color (before and after cold storage), and blackspot.

The potatoes tested came from all parts of the United States and Canada. They varied as to shape, skin color, etc.

When these studies began, most of the potatoes produced in the Columbia Basin were shipped directly from the field to market. Almost no potato processing existed in the Basin. It is possible that some promising processing varieties were discarded simply because only fresh market varieties were considered.

Currently the Russet Burbank accounts for 74%, the Norgold Russet for 22% and all other varieties for about 5% of Washington's potato production (Table 1.). The Russet Burbank is sold fresh and processed while the Norgold is primarily a fresh market variety. In spite of Russet Burbank's faults it is likely to dominate the potato variety picture in Washington for sometime.

Washington's potato industry is changing. In 1964, 28% of the potato crop was processed and in 1968, 68% was processed.

### CLASSIFICATION OF VARIETIES:

Varieties are classified by tuber shape, skin color and as early, midseason or late. Such descriptions are useful but tell little about the quality characteristics of the tuber or the desirability of the variety for various purposes.

A more meaningful classification for central Washington, wherein the harvest season extends from July into November, would be based on utilization.

### FRESH MARKET VARIETIES:

Washington potato producers must receive a premium price on the distant fresh markets to offset the higher freight rates compared to other potato producing areas nearer to the markets. In order to receive this premium Washington potatoes must earn and maintain a reputation for high culinary quality and freedom from internal and external defects. In addition they must have distinguishing characteristics so they can be readily identified.

The Russet Burbank, Norgold Russet and White Rose have distinguishing features. The Russet Burbank has been widely advertized and accepted as a quality potato and has been produced almost exclusively in the Northwest. Other states close to major markets are learning to grow long russets and with time, considerable competition for Northwest russets may develop.

#### PROCESSING VARIETIES:

The processors' requirements can be divided into three groups: potatoes for French frying, chipping or dehydrating (flakes or granules). Varieties which are high yielding, high in dry matter, low in reducing sugar, free from internal blemishes, and of internal uniformity are desirable for all three types of processing. There is also a need for processing varieties for early season harvest and varieties which are capable of maintaining quality during storage.

French fries: The ideal variety would be a long, rectangular tuber with a small pith and without areas of high sugar concentration. Both the Norgold Russet and Russet Burbank at times fit this description. Round varieties tend to have large piths and tend to produce limp fries from the center cuts.

Chips: The potatoes must "fry" - all else is of secondary importance. If the slices fry to a light golden color, the factors of dry matter content, size of tubers, etc. become important. Some varieties accumulate reducing sugars at low temperatures but lose them rapidly when stored at 65-70 F for several weeks. Other varieties accumulate reducing sugars at low temperatures but fail to convert them back to starch when placed at a conditioning temperature. Still other varieties like the Russet Burbank are unsuitable for chipping because often the ends of the same tuber do not "fry" to the same color.

Dehydrated Potatoes: The potatoes can be most any shape, color or size. With the advent of dehydration came the possibility of utilizing round or elongated potatoes for a portion of the potato production - as long as they meet the basic requirements.

#### MULTI-PURPOSE VARIETIES:

The Russet Burbank is the most outstanding example of a variety which is adapted to both the fresh and processing markets. Some people claim that it is necessary to grow a multi-purpose variety so that the producer will have a greater flexibility in marketing and so "creaming" may be practiced. "Creaming" is when the best potatoes are sorted out and sold at a premium price on the fresh market and the remainder is marketed in processed form. With the trend to processing, use of higher yielding

potatoes with superior processing qualities may become a standard practice. Technically there is no such thing as a multi-purpose potato variety because even within a variety there are some potatoes which are best suited for specific purposes. Some are best for baking and mashing and others are best for salads or for frying.

#### UTILIZATION:

Tables 1 and 2 were compiled from Washington State Potato Committee reports to show how the 1968 potato crop was utilized. Nearly 81% of the Russet Burbanks were processed and 19% were sold fresh. In contrast, 84% of the Norgolds and 96% of the Reds were sold fresh. All of the Haigs and 99% of the Kennebecs were processed. While there are advantages for multi-purpose varieties there is also a place for specific purpose varieties.

#### CHARACTERISTICS OF A PROMISING VARIETY ARE:

High yield, desirable tuber type, high percentage of No. 1 grade tubers, high specific gravity, low reducing sugars, disease resistance, stores well, net necrosis resistant, hollow heart resistant, white flesh, uniform eye distribution and resistance to mechanical damage. The greater the number of desirable characteristics a variety has the greater the likelihood of trade acceptance.

#### GROWING A NEW VARIETY:

An advantage of the Russet Burbank is that many of the cultural requirements are known. Most growers know how to handle the seed, the best planting procedures to use, and the best suited fertilizer and irrigation practices. A new variety may have other requirements and fail because we try to grow it like Russets. For example:

1. Seed - The Russet Burbank has many eyes and even with machine cutting each seed piece will usually have an eye. Some new varieties have few eyes and they are poorly distributed, therefore, when machine cut some seed pieces may have no eyes. Some varieties such as Norgold have a short rest period and sprout, sometimes even in the ground before harvest. Excessive sprouting may give poor results.
2. Spacing - Some varieties require closer spacing than the Russet Burbank to reduce the oversized tubers. Oversized tubers tend to become rough and to hollow heart.
3. Growing time - Some varieties do better over a short growing season than over a long one and vice-versa.
4. Fertilizer - Usually little is known about the fertilizer requirements of new varieties, however, a good fertilizer program for Russet Burbanks will serve as a starting point.

#### 1969 VARIETY TRIAL:

The 1969 yields were phenomenal (Table 3.). The land had never grown potatoes. It was in small grain one year and in alfalfa for six years. Prior to that it was planted to dryland small grain.

$P_2O_5$  and  $K_2O$  at 540 lb/acre each and 10 lb/acre of zinc from ZnMnS were broadcast prior to rotovating the alfalfa stubble. Later the land was plowed 10-12 inches deep. The seed was planted 9.3 inches apart in rows 32 inches apart on April 28. About 440 lb/acre of nitrogen from ammonium nitrate was banded two inches to the side and slightly below the seed piece at planting time.

Weeds were controlled with Dacthal. Furrow irrigation on a 5-day rotation started May 22 and was continued with brief interruptions into September.

Insect and disease control were on a preventative basis. WSU recommended materials were used at about two week intervals for the control of mildew, aphids, mites and early blight. Close attention was given to all factors which we knew might affect yield or quality.

The vines were beaten off October 15 and the tubers were harvested October 16-17.

#### HIGH YIELDS MAKE A DIFFERENCE:

It costs little more to produce high yields than low yields. If the highest yielding selection for the period 1963 to 1969 (Table 4.) were to replace the Russet Burbank a grower averaging 664 cwt/acre of Russet would have averaged 887 cwt/acre of A503-42. This is an average yield increase of 223 cwt. which is 34% higher than the yields of Russet Burbanks during the same six year period.

Selection A503-42 is a round, white skinned potato and would not be a good fresh market variety but it has a specific gravity comparable to the Russet Burbank and should be satisfactory for dehydration and possibly French fries. Seed of this selection is being increased and if found acceptable by the trade, yields of 50 ton/acre would not be just a dream.

Table 2. Total Production and Utilization of Washington's 1968 Potato Crop. Figures are in 1,000 cwt. (Figures from the Washington State Potato Committee Reports.)

Variety	Total		Processed				
	Total	Fresh	Total	Frozen	Dehydrated	Chips Prepeeled	
Russet Burbank	15,861.4	3,044.4	12,817.0	9,446.1	3,272.1	9.5	89.3
Norgold Russet	4,602.7	3,872.0	730.7	300.1	387.6	0.3	41.9
Kennebec	630.3	5.9	604.4	326.8	17.1	74.0	27.7
White Rose	32.8	32.5	0.4	-	-	0.1	-
Round Red	117.3	113.1	0.4	2.7	-	0.4	-
Haig	76.5	-	76.5	0.4	-	22.4	-
Other	77.3	-	17.3	16.3	-	0.2	0.2
Total	21,398.3	7,067.9	14,246.7	10,092.4	3,676.8	106.7	159.1

Table 1. Percentage Distribution by Varieties of Washington's 1968 Potato Crop into Market Outlets. (Figures are derived from the Washington State Potato Committee Reports.)

Variety	% Total Production		Per Cent Processed			
	Production	Fresh	Frozen	Dehydrated	Chips	Prepeeled
Russet Burbank	74.1	19.2	59.6	20.6	---	0.6
Norgold Russet	21.5	84.1	6.5	8.4	---	0.9
Kennebec	2.9	0.9	51.8	2.7	40.2	4.3
White Rose	0.1	99.0	---	---	---	---
Round Reds	0.6	96.4	2.3	---	1.3	---
Haig	0.4	---	0.5	---	99.5	---
Other	0.4	---	94.2	---	4.6	1.2

Table 3. Yield, Grade and Tuber Description of Varieties in the 1969 Trials.

<u>Rank</u>	<u>Variety</u>	<u>Yield cwt/A</u>	<u>% No. 1's</u>	<u>Tuber Description</u>
1	A 503-42	1125	88	Round, White
2	A 6203-4	1088	82	Oblong, Red
3	A 6135-4	1056	87	Long, Buff-Russet
4	W 44-3A	1055	87	Long, Buff
5	A 6207-3	990	77	Oblong, Buff
6	B 5011-17	978	80	Round, White
7	A 59325-2	977	86	Long, Russet
8	Kennebec	957	87	Oblong, White
9	Cascade	945	86	Oblong, White
10	A 180-26	921	82	Oblong, White
11	Wc 230-14	910	92	Long, Russet
12	16.55-1	910	80	Oblong, Buff
13	A 6135-4	891	87	Long, Buff
14	Russet Burbank	890	76	Long, Russet
15	Wauseon	874	89	Round, White
16	A 575-7	860	75	Oblong, Russet
17	A 598-3	859	73	Long, Russet
18	A 170-9	851	80	Oblong-Long, Russet
19	A 6126-4	849	83	Oblong, Red
20	Norchief (ND 5778-2R)	844	87	Round, Red
21	396.55-3	839	91	Round, Red
22	A 6176-7	833	72	Oblong-Round, Russet
23	1457-3	819	91	Oblong, Buff
24	Alamo	810	85	Oblong, White
25	B 5089-17	803	81	Oblong, White

Table 3. (Continued)

<u>Rank</u>	<u>Variety</u>	<u>Yield cwt/A</u>	<u>% No. 1's</u>	<u>Tuber Description</u>
26	B 5415-6	803	81	Oblong, White
27	A 59197-5	794	83	Long-Oblong, Russet
28	77.57-1	774	88	Round, White
29	93.55-16	772	90	Round, Buff
30	245-9	770	86	Long, White
31	A 62180-2	768	82	Oblong, Buff
32	309-50-5	747	88	Long, White
33	B 5665-7	739	86	Long, White
34	ND 6584-6R	737	88	Round, Red
35	B 5031-18	735	77	Round, White
36	245-2	734	86	Long, Russet
37	1.57-1	702	89	Round, Buff
38	168-3	689	85	Long, Russet
39	Norchip (ND 5899-1)	688	85	Round, White
40	Lenape	687	87	Round, White
41	B 5613-1	682	84	Round, White
42	Norgold Russet	679	90	Long, Russet
43	B 5132-3	674	82	Round, White
44	Bake King	666	87	Oblong-Long, Buff
45	245-5	665	88	Long, Russet
46	B 5461-4	665	83	Round, White
47	ND 6127-10R	645	89	Round, Red
48	249-1	644	82	Long, Red
49	ND 6327-7Rus	642	88	Oblong, Russet
50	91-57-8	642	82	Oblong, Buff-Russet



Table 4. Total Yield in Hundred Weight of Some of the Highest Yielding Potato Selections Grown as Late Varieties for the Period 1963-1969.

<u>Variety</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1969</u>	<u>Ave.</u>
A 503-42	712	976	923	703	883	1125	887
Kennebec	630	884	---	543	635	956	732
Cascade	660	745	---	570	---	945	730
A 170-9	627	844	730	697	615	806	720
A 576-2	832	880	798	670	591	---	694
Russet Burbank	489	790	701	567	546	890	664
Norgold	445	650	621	---	406	679	560