

Specialty Potato Production and Marketing in Southern Idaho

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Introduction

Consumer acceptance of specialty, gourmet, or premium potatoes has been increasing during the last several years. Specialty potatoes tend to be unique and non-traditional cultivars of high quality, various colors, texture, and sizes. These specialty potato cultivars can be red outside and pink inside (Huckleberry and All Red), blue on the inside and out (All Blue), yellow fleshed and skinned (German Butterball and Yukon Gold) and other colorful variations (Fig. 1). Many of the blue or red fleshed cultivars are also high in antioxidants providing an additional nutritional benefit making these types of cultivars even more appealing to consumers. Specialty potatoes comprise only a small percentage (1 versus 70 percent for russets) of the total fresh potatoes consumed and, therefore, lend themselves to small acreage production and direct marketing. Specialty potatoes usually command a higher price, so potato size, quality, and packaging must meet consumer expectations.

What customers want

The United States Potato Board (USPB) has done extensive consumer surveys indicating that the majority of consumers are willing to pay a higher price for quality fresh potatoes. In fact, 57.2 percent of consumers surveyed by USPB specified quality, appearance, and color as the primary considerations when purchasing potatoes. Only 18.2 percent indicated that price was most important in their potato buying decisions. Information collected by AC Nielsen for the USPB shows a very positive trend for specialty potato marketing.



Fig. 1. Examples of internal and external color of specialty potatoes.

For example, data indicates that bagged specialty potatoes have retail prices ranging from \$0.68 to \$1.49 per pound compared to an average price of \$0.39 per pound for russets.

Surveys from the USPB also indicate that consumers typically want more information, such as potato type or cultivar and cooking or usage suggestions, when purchasing potatoes. Consumers are being enlightened through many types of media, such as cooking magazines, restaurant experiences, television cooking shows, and cookbooks, about the numerous unique potato cultivars available. Many of these consumers seek out specific potato cultivars. This interest in new types of potatoes creates a demand for specialty potatoes that are not necessarily commonplace in retail stores. Farmer's markets, specialty stores, and other direct marketing outlets are currently the most common methods for selling these specialized products. A greater market for these potatoes will result as the demand continues to grow. It is important to consider that demand may vary with region and consumer demographics.

This bulletin outlines a series of projects conducted in southcentral Idaho to evaluate production characteristics of specialty potatoes, consumer preference, and the utilization of one method to alter potato size profile. The cultivars evaluated in these trials and surveys were Caribe (lavender purple skin/white flesh), Epicure (buff white skin/white flesh), German Butterball and Yukon Gold (yellow skin/yellow flesh), Huckleberry (red skin/pink flesh), and NorDonna and Viking Red (red skin/white flesh). Russet Norkotah (russet skin/white flesh) was used as a standard. The cultivars selected are just a small sample of potential specialty cultivars available for producers.

For these projects, cultivars were grown under the same conditions, although for optimum performance, each of these cultivars may have different requirements for fertility, irrigation, plant spacing, pest control, and storage.

These trials provide information on the feasibility of growing specialty cultivars in southern Idaho, growth habits and yields to anticipate, and information on consumer preferred cultivars and size ranges.

Specialty cultivar trial at Kimberly

This report provides initial information on production expectations and cultivar characteristics for particular markets and end uses. These results are indicators regarding the growth and yield potential of these cultivars. Since this study was performed for only one year, environmental conditions that vary from this season may produce different results.

A one-year trial observed growth patterns and yield potential of seven specialty potato cultivars (see Table 1) under southern Idaho conditions. Replicated trials planted at Kimberly were managed in fertility and irrigation similar to standard Russet Norkotah production methods. Certified seed was planted on 9-inch spacing. At 86 days after planting (DAP), several plants of each cultivar were harvested to evaluate for early harvest potential. Vines were killed 113 DAP and potatoes were harvested 126 DAP.

Stem number per plant. Stem number per plant is often used as an indicator for the number of tubers a plant may produce. In general, a greater number of stems relates to a higher number of tubers per plant, but the tubers would be of a smaller size. Epicure and German Butterball had the highest stem and tuber number per plant (Table 1). Yukon Gold, Viking Red and Huckleberry tended to produce fewer stems and tubers per plant. Early yields at 86 DAP showed a strong difference in early tuber bulking and potential size for early harvests. Caribe, Viking Red, and Yukon Gold had the highest and German Butterball and Huckleberry had the lowest yield per plant at this early harvest.

Gravity and starch content. Specific gravity of a tuber is an indicator of tuber dry matter and thus starch content. A higher tuber specific gravity equates to higher dry matter content. Knowledge of specific gravity predicts the best culinary uses of the cultivar. For instance, Viking Red had a low specific gravity (1.064), and therefore would be best used as a boiling or salad potato. In contrast, Yukon Gold had a high specific gravity (1.082), and would be more desirable for baking, frying or roasting. Cultivars varied

greatly in dry matter content and this variability should be taken into account when providing consumers with culinary suggestions for the cultivar.

Final yield and size. Final yield and size distribution varied with cultivar (Table 2). Epicure produced the lowest yields and Viking Red produced the highest. German Butterball produced a high yield of smaller sized potatoes. Smaller potatoes are often more desirable when producing specialty potatoes, but can be more difficult to harvest using standard equipment. Harvester modifications may be needed in order to efficiently harvest small tuber-producing cultivars. Huckleberry, Caribe, Viking Red and Yukon Gold tended to produce larger sized potatoes. Some cultivars, such as Viking Red, had a greater tendency for malformed tubers (higher US#2 yield).

This study demonstrates the variability in growth patterns, yield, tuber size distribution and quality between these specialty cultivars. Desired production and quality needs to be maximized for

each cultivar by fine-tuning production practices such as fertility, irrigation, and plant spacing. If there is a market for a particular cultivar, highest total yield may be exchanged for desired tuber size and consumer appearance and taste preferences. Although these trials demonstrated good production potentials for many of these cultivars, the capacity of the local and national markets for specialty potatoes remains unclear.

Southern Idaho Market Analysis -118 opinions

Taste and purchase preferences were evaluated at two southern Idaho farmer's markets (78 people) and one agricultural field day (40 people). Taste test results indicate that Caribe, German Butterball, Yukon Gold, Viking Red, and NorDonna rank high. Taste and purchase preferences differed among individuals, sample preparation method, and locations surveyed. In general, 80 percent of those surveyed would purchase all the cultivars displayed

Table 1. Stem number, tuber set and single plant yield of specialty cultivars following early harvest, and tuber specific gravity following final late harvest.

Early Harvest (86 days after planting)				
Cultivar	Stem # /plant	Tuber # /plant	Tuber weight (lb)/plant	Specific gravity at final harvest
Caribe	2.7	7.8	1.7	1.070
Epicure	4.0	11.3	1.3	1.081
German Butterball	3.3	8.7	0.7	1.073
Huckleberry	2.3	6.2	0.8	1.066
NorDonna	2.7	7.2	1.0	1.070
Russet Norkotah	3.0	6.5	1.2	1.071
Viking Red	2.0	6.3	1.7	1.064
Yukon Gold	2.0	6.9	1.7	1.082

Table 2. Yield (cwt/A) and size profile of tubers harvested 126 days after planting.

Cultivar	US #1 yields (cwt/A)					Yield (cwt/A)	
	< 2 oz	2-4 oz	4-6 oz	6-10 oz	10+ oz	US #2s	Total
Caribe	18	46	55	92	77	36	327
Epicure	47	92	68	71	11	6	296
German Butterball	75	139	80	38	5	6	344
Huckleberry	19	38	46	71	101	38	319
NorDonna	25	62	99	136	57	17	399
Russet Norkotah	16	34	51	112	48	34	302
Viking Red	9	16	30	83	308	76	529
Yukon Gold	6	27	62	165	205	15	481

Table 3. Market survey measuring consumer favorability toward the purchase of the evaluated cultivars. Surveys were completed at an agricultural field day, two farmer's markets, and by Magic Valley produce managers.

Cultivar	Would Purchase (%)			
	Field Day	Farmer's Market 1	Farmer's Market 2	Produce Managers
Caribe	82	93	80	33
Epicure	22	82	89	25
German Butterball	78	100	90	25
Huckleberry	64	73	50	11
NorDonna	82	100	100	63
Russet Norkotah	70	77	100	100
Viking Red	89	89	90	75
Yukon Gold	100	90	100	78

Table 4. Yield and tuber size profile as influenced by three seed storage temperatures for Caribe, NorDonna, and Yukon Gold combined over two years.

Cultivar	US #1 yields (cwt/A)					Yield (cwt/A)	
	2 oz	2-4 oz	4-6 oz	6-10 oz	10+ oz	US #2s	Total
Caribe							
38°F	8	45	54	75	62	59	346
38°F and 45°F	7	39	50	86	93	71	344
38°F and 60°F	7	33	49	87	90	53	321
NorDonna							
38°F	12	41	49	68	54	40	302
38°F and 45°F	14	48	64	98	83	37	343
38°F and 60°F	9	39	66	103	88	38	344
Yukon Gold							
38°F	8	39	50	142	109	12	379
38°F and 45°F	7	35	45	137	115	13	368
38°F and 60°F	6	36	52	154	112	11	389

except Huckleberry (Table 3). The cultivar Huckleberry has a pink/red flesh color that apparently may not appeal to as many consumers. At one location, Epicure did not rate as high for overall acceptability.

Ten grocery stores were also surveyed in the Magic Valley in order to gain a perspective on cultivar suitability for the traditional retail market. Consumers expressed a high likelihood of purchasing specialty potatoes at farmer's markets (direct markets) while produce managers at supermarkets did not (Table 3).

Purchase preferences could change if consumers began to request these types of cultivars from supermarkets. Produce managers indicate a need to educate consumers to the benefits of specialty cultivars in order to encourage

the purchasing of these non-traditional potatoes.

Additional surveys were made of potential consumers (29 people) at two other southern Idaho farmer's markets in order to assess consumer preference in size and appearance of Caribe, NorDonna, and Yukon Gold. Although preferences varied slightly with location, consumers did not find the lavender skinned and deep eyed potato Caribe as appealing as the other two cultivars.

Size preference. Overall preferred size range appeared to be 4 to 6 oz for all three cultivars, with some consumers preferring smaller sizes (2 to 4 oz) of NorDonna and larger sizes (6 to 10 oz) of Yukon Gold potatoes. This information stresses the importance of identifying, producing, and packaging the

preferred cultivars into size ranges for consumers. As seen with these examples, consumer preference will vary with cultivar, and therefore individual markets may need to be assessed.

Altering potato size profile: two-year seed storage and physiological aging trial

Several practices are used to decrease tuber size. Some of those methods include planting at closer spacing, increasing seed piece size, harvesting earlier, and physiologically aging the seed tubers by storing seed at warmer temperatures.

As a seed tuber physiologically ages, it tends to have a shorter dormancy period, emerges earlier, produces a higher number of stems, initiates tubers earlier, produces less vine growth, senesces earlier, and produces more tubers of smaller size. Yields may or may not be compromised, depending on growing-season length and the intended use of the harvested crop. Typically, the greater the heat unit accumulation, such as warmer growing or storage conditions, the older the seed will be physiologically. The ideal seed age range will vary with each variety and end-use.

This two-year study attempted to alter yield and size profile by physiologically aging seed in elevated storage temperatures. Seed tubers of Caribe, NorDonna, and Yukon Gold were stored at

- 38°F until planting (no aging),
- 38°F and 30 days at 45°F prior to planting,
- 38°F and 15 days at 60°F prior to planting.

Seed pieces (2-2.5 oz) were planted in field trials, grown for 110 days, and evaluated each year for performance over two production years.

Cultivar response to storage treatments varied between the two years. Seed aged at elevated storage temperatures emerged earlier than seed that was not aged. For Caribe, average stem number per plant, yield and tuber size distribution were not affected by aging seed (Table 4). It may be desirable to age NorDonna seed, since stem numbers, total and US1 yields, and yields in the 6-10 oz. size range were

higher when seed was aged. Although seed aging significantly increased stem numbers for Yukon Gold, there was no impact on total yield or tuber size distribution. In general, seed aging using these elevated storage temperatures did not substantially impact size distribution for these cultivars. More extreme seed storage temperatures may be needed in order to make substantial changes in tuber size distribution. Other means to alter size such as seedpiece size, plant spacing and earlier harvests may need to be utilized in conjunction with seed aging.

Summary

Information in this bulletin may be used as a reference for producing and marketing specialty potatoes. Specific production programs and marketing plans are needed on an individual basis. Current markets for these specialty potatoes are available, but on a limited scale. Therefore, caution should be used in initial production volume. Whether direct marketing or wholesaling the potatoes, it is important to have markets and plans established prior to planting.

Sources and considerations for obtaining seed of specialty cultivars

Since specialty potato production is relatively new and rather limited, finding certified and high quality seed can be difficult. The specialty potato market depends greatly on providing premium quality potatoes to the consumers, so it is important to start with high quality seed at planting. If a purchased seed lot has high levels of *Fusarium* dry rot and/or wet rot, once the seed is planted, seed decay and stand establishment can become major issues.

Other concerns include the reduction in yield and tuber quality due to potato leaf roll and mosaic virus infections. These losses can be severe depending upon the situation. Purchase only certified seed and obtain certification reports. If winter tests were performed, obtain results prior to purchasing the seed. Planting high quality certified seed is one of the most important considerations when producing specialty potatoes. Reputable specialty seed potato growers can be found in Idaho, Colorado, and other states, so check with your state's certification agency for a listing of certified growers.

Additional resources
Re-inventing the Potato Retail Marketing Toolkit. 2001. United States Potato Board (<http://www.uspotatoes.com>).

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A few important points to consider from these studies:

- All cultivars performed well in southern Idaho, although some produced higher yields and better quality than others.
- Growth habit and rate of tuber bulking of each cultivar will impact production and harvest timing.
- Culinary uses for particular cultivars will differ and knowledge of best use is important.
- Potatoes with unusual flesh colors (e.g. pink or blue) may have less appeal to consumers than yellow or white fleshed cultivars.
- Yield and size vary with each cultivar; cultural practices can be used to modify size distribution, although seed aging did not substantially impact size in the cultivars in this study.
- Size and appearance are important consumer criteria and need to be maximized for each cultivar.
- At the present time, in southern Idaho, direct marketing of specialty potatoes to consumers may be more effective than marketing through commercial retail avenues. Marketing potential in large cities (New York, Chicago) should be investigated.
- Having a solid understanding of your consumers and the end-uses of the potatoes purchased will help increase consumer acceptance and demand.

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