

Selecting Potato Varieties for Michigan

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PROPER VARIETY SELECTION is essential to a high quality potato crop for commercial production as well as the home garden. The variety must not only be well adapted to the soil and cultural conditions, but also acceptable for the chosen market outlet. Extensive potato variety performance trials are conducted each year at MSU's Montcalm Research Farm and in mini-commercial trials in several counties on cooperating commercial farms. New varieties and seedlings are obtained from U.S. and Canadian potato breeding programs. These are grown to provide data on their performance, quality characteristics and adaptability for Michigan.

Because of the wide diversity of market utilization of potatoes in Michigan and out-of-state, it is difficult to make specific recommendations. The intended market use for potatoes is becoming more specific, and in many contract agreements the variety to be grown is specified. This bulletin provides information on several potato varieties tested in Michigan to assist commercial producers and home gardeners in variety selection.

Table 1 provides general information on the relationship between specific gravity, dry matter, texture and the best use of potatoes within these parameters. Table 2 provides release dates, agency, tuber type, maturity, specific gravity, strengths and weaknesses on several popular potato varieties.

Yield Performance

Tables 3 and 4 summarize the yield and specific gravities of round and long potato varieties tested in the irrigated and dates-of-harvest studies conducted annually at MSU's Montcalm Research Farm since 1980. Data from red varieties with a single harvest date are presented in Table 5.

In the dates-of-harvest study, each variety was replicated four times at each harvest date. Planting was done between May 5 and

10. Plots were 23 feet long, and seed spacing was 12 inches in rows 34 inches apart. Based on a soil test recommendation, fertilizer at planting and subsequent sidedress was uniformly applied to all plots at approximately 175 lbs N/A, 50 lbs P₂O₅/A and 225 lbs K₂O/A.

Harvests were made in early August, late August and late September (90-95, 110-115 and 130-135 days after planting). After harvest, samples were graded in four categories: Round varieties under 2 inches in diameter; those 2 to 3¼ inches; those over 3¼ inches; and pick outs (tubers with external growth defects such as knobs and growth cracks).

The grade categories for long varieties were: Under 4 ounces; 4-10 ounces; over 10 ounces; and pick outs. Samples were also collected to determine specific gravity (weight in air and weight in water method) and internal defects, particularly hollow heart, internal brown spot, vascular discoloration and black-spot bruising. Chip color assessments were made soon after harvest and following storage.

Growers can determine the optimum time to harvest from the data in Tables 3 and 4. To do this, evaluate the change in yield and specific gravity for a given variety between the harvest dates. Optimum yield is usually not the same as maximum yield, but depends more on the particular use.

Often, factors other than yield must be considered to determine optimum maturity. For example, the Onaway has a 48 cwt/A increase in U.S. No. 1 yield from early to mid-season harvest, but it is classed as an early variety because it sets tubers and size early.

If harvest is delayed, the tubers become excessively large and misshapen and undesirable for fresh pack. Similarly, Russet Burbank did not increase in U.S. No. 1 yield from mid-season to late harvest, but it is still considered late-maturing. Under normal, high fertility commercial management, the vines remain green late into the season and the skin set is better at late harvest.

See the
tables
beginning
on page 3

External and Internal Defects

Information on external and internal defects according to tuber type is provided in Table 6. The black-spot data can help you make relative comparisons among varieties. The absolute values were very dependent on the season, maturity at harvest, harvest and handling equipment, and soil moisture at harvest. The bruised values were obtained under severe conditions of artificially bruising potatoes with a pulp temperature of 40°F. After cooking, darkening (ACD) was evaluated in peeled potatoes that were cut in half longitudinally and steam-cooked.

Some Commonly Grown Michigan Varieties

The most popular varieties currently grown in Michigan are Onaway, Superior, Atlantic, Russet Norkotah and Russet Burbank. In addition to information given in Tables 2 through 6, following are brief characterizations of individual varieties:

Onaway - Early maturing, round-to-oblong tubers with medium deep eyes. Its best use is for fresh market out-of-field. It is not recommended for storage since tubers are susceptible to early blight. It is also susceptible to growth cracks. Tubers have low specific gravity, minimal internal defects and some scab resistance.

Superior - Early maturing, round white variety. Tubers have a netting and are well-shaped and attractive. A high percentage are U.S. No. 1 tubers. Superior potatoes are used primarily for fresh market, though some are used for chips. Tubers have medium-low specific gravity and minimal internal defects. Since Superior is very susceptible to early die disease, fumigation is advised. It has some scab resistance.

Atlantic - Mid-season to late-maturing, round white variety. This is the major chipping variety in Michigan. It has high specific gravity and excellent chip color. Atlantic does not have ideal storage characteristics. Its other limitations are susceptibility to internal brown spot, hollow heart and scab.

Russet Norkotah - Early to mid-season maturing russet variety. Tubers have an excellent appearance and are ideally suited for the count pack market. Its specific gravity is much lower than that of the Rus-

set Burbank. This variety sometimes produces below-average yields because of poor sizing. Tubers have minimal internal defects and excellent resistance to blackspot. Russet Norkotah is susceptible to early die disease and pink eye.

Russet Burbank - Late-maturing russet variety, widely grown in the northern United States. Tubers have high specific gravity. This variety is primarily used for fresh market, count packs, frozen processing and dehydrated products. It requires a uniform supply of soil moisture to avoid knobby and misshapen tubers. Its limitations are low percentage of U.S. No. 1 tubers, late maturity, and susceptibility to virus diseases. Russet Burbank has excellent cooking and storage qualities and some resistance to scab.

Some New Releases and Advanced Seedlings with Potential in Michigan

Snowden (W855) - Late-maturing, round-white variety with high specific gravity and excellent chip color. Snowden has excellent chip potential in Michigan and has less internal defects compared with Atlantic. It produces excellent chip color following 45°F storage. Snowden responds to higher amounts of nitrogen than Atlantic. It is a heavy setter and prefers a wider spacing. It has some tendency to attract Colorado potato beetles.

Somerset (AF236-1) - Mid-season to late-maturing, with oblong shaped tubers. Tubers have medium-to-high specific gravity and excellent chip color. Compared to Atlantic, Somerset's internal defects are minimal. It chips well out of 45°F storage. It sets shallow, and tuber greening can be a problem. This variety is suited for both fresh market and chipping; however, it is susceptible to scab.

Steuben (NY81) - Late-maturing and round-white variety, this variety has a tendency to oversize at 12-inch spacing. It sets and sizes tubers early, producing high tuber yields with medium specific gravity. It has a potential for chipping and fresh market in Michigan, and is resistant to golden nematode.

Kanona (NY71) - Medium- to late-maturing, round-white with chip characteristics similar to Monona. It has fresh market and chipping potential in Michigan, except for a low specific gravity.

Allegany (NY72) - Very late-maturing, round-white variety with golden nematode resistance.

Frontier Russet (A74114-4) - A new release from the USDA-Aberdeen potato breeding program. Late-maturing russet with high yields. Suitable for fresh market and frozen processing because of high specific gravity and shape and has excellent cooking qualities.

Home Gardens

Home gardeners should purchase and use new certified seed each year. Saving tubers from year to year will eventually result in lower yields and small tubers due to seed borne virus diseases. Do not use potatoes sold for table use as seed because they often are treated with a sprout inhibitor.

Varieties to consider for home gardens are Onaway, Norland, Yukon Gold, Michigold, Saginaw Gold, Superior, Sebago, Kennebec and Red Pontiac. Onaway and Norland are early maturing varieties well adapted for home gardens. Yukon Gold, Saginaw Gold and Michigold are yellow-fleshed varieties. Sebago is a late-maturing, round white that is widely adapted and has some drought tolerance. Kennebec is a medium-late, oblong white with above-average yields. It is very susceptible to Verticillium wilt. Red Pontiac is a commonly grown, medium-maturing, round red that produces high yields and has some drought tolerance. It is susceptible to common scab and has deep eyes. Russet Burbank is difficult to grow because of its tendency for knobby and off-type tubers. It requires a well drained soil and must be irrigated to provide adequate and uniform soil moisture.

Table 1. The relationship between specific gravity, dry matter, texture and use of potatoes.

Specific gravity	Percent total solids	Texture	Best use
Below 1.060 (very low)	less than 15.9	Very soggy	Good pan friers, salads, good for canned processing.
1.061 - 1.070 (low)	16.0-18.1	Soggy	Good pan friers, salads, boilers, good for canned processing.
1.071 - 1.080 (medium)	18.1-20.2	Waxy	Good boilers, mashers, fair-to-good for chip processing, fair for canned processing.
1.081 - 1.090 (high)	20.2-22.3	Mealy, dry	Good bakers, chippers, french fries. Some varieties tend to slough when boiled.
Above 1.090 (very high)	over 22.3	Very mealy or dry	Good bakers, french fries, chips. Greater tendency for brittle chips and sloughing when boiled.

Table 2. Characteristics of several types of potato varieties.

Variety	Year released	Agency/state	Tuber type ¹	Primary use	Maturity	Specific gravity	Strengths ²	Weaknesses ²
ROUND WHITES								
Allegany	1988	New York	rd-wh	chips	v. late	med	Res. to GN; tol. to CS, VW, EB and LB	Very long dormancy.
Atlantic	1976	USDA-Beltsville	rd-wh	chips	med-late	high	Ex. chip color, some tol. to VW.	Sus. to CS, HH and heat necrosis; poor storability
Eramosa	1987	Ag. Canada-Ontario	blocky-wh	fresh	early	low	Early maturity; good general appearance.	Sus. to PV-Y, silver scurf in storage. Mod. sus. to CS.
Gemchip	1989	USDA-Aberdeen	ob-wh	chips	med-late	med	Res. to VW; high yields	Mod. sus. to CS; tendency to HH in oversized tubers
Kanona	1988	New York	rd-wh	chips, fresh	med-late	low	Res. to GN; few internal defects; good chip color.	Sus to CS.
LaBelle	1990	Louisiana	rd-wh	chips, fresh	late	med-low	High yield, smooth and shallow eyes.	Sus. to CS and blackspot. Early blight in storage. Oversize at wider spacing.
Monona	1964	Frito-Lay	rd-wh	chips, fresh	med-late	low	Ex. chip color; res. to PV-A; tol. to PV-Y and VW.	Sus to blackleg. Low dry matter for chips. Medium deep eyes.
Norchip	1968	North Dakota	rd-wh	chips	med-late	med-high	Ex. chip quality; tol. to CS, Fusarium dry rot and VW	Below average yields; irregular tuber shape

Table 2. Characteristics of several types of potato varieties.

Variety	Year released	Agency/state	Tuber type ¹	Primary use	Maturity	Specific gravity	Strengths ²	Weaknesses ²
Norwis	1989	Frito-Lay	rd-wh (pale yellow flesh)	fresh	late	low	High yields; good chip color.	Low SG; sus. to CS.
Onaway	1956	Michigan	rd-wh	fresh	early	low	Res. to CS; few internal defects; above average yields.	Early blight on tubers; oversized tubers; poor type and rough.
Snowden	1990	Wisconsin	rd-wh	chips	late	high	Ex. chip color; high SG; chips out of 45 degrees F.	Sets heavy; CPB attracted to foliage; tubers undersized at closer spacing.
Somerset	1988	Maine	ob-wh	chips, fresh	med-late	med	Ex. chip color; chip out of 45 degrees F.	Sus. to CS, HH and tuber greening; slow early growth.
Spartan Pearl	1990	Michigan	rd-wh	fresh, chips	med-late	med	Good yield; uniform size.	Sus. to CS; growth crack; some ACD; medium SG.
Steuben	1988	New York	rd-wh	chips, fresh	late	med	Res. to GN; sizes tubers early; high yields.	Russet scab on tubers; tendency to oversize at wider spacings.
Sunrise	1985	Maine	ob-wh	fresh	early	med	Res. to GN.	PV-X and NN.
Superior	1961	Wisconsin	rd-wh	fresh	early	med	Ex. general appearance; res. to CS.	Sus. to VW and pressure bruise in long-term storage.
YELLOW FLESH								
Michigold	1989	Michigan	rd-wh (yellow flesh)	fresh	med-late	high	Attractive yellow flesh; uniform size.	Sus. to CS and shatter bruise; netted skin gives darker appearance.
Red Gold	1987	Ag. Canada-Ontario	rd-red (yellow flesh)	fresh	med	med	Tol. to PV-Y and PVL.R.	Skin pinkish-red; below average yields.
Rose Gold	1988	Ag. Canada-Ontario	rd-red (yellow flesh)	fresh	late	med	Vigorous early growth.	Sus. to CS; skin pinkish-red.
Saginaw Gold	1988	Ag. Canada-Michigan	ov-golden (yellow flesh)	chips, fresh	med-late	med	Res. to mosaics; ex. chip color; shallow eyes.	Sus. to CS, some variation in tuber shape. Early blight in field and storage.
Yukon Gold	1980	Ag. Canada-Ontario	rd-golden (yellow flesh)	fresh	med-early	med	Good general appearance; res. to mild mosaic.	Sus. to CS, PV-Y and leaf roll. Sus. to HH. Slow early growth.
REDS								
Norland	1957	North Dakota	rd-red	fresh	early	low	Smooth appearance; res. to PV-A.	Average yields; poor intensity of red color; sus. to PV-Y.
Rideau	1979	Ag. Canada-Ontario	rd-red	fresh	late	med	Good red color; tol. to CS; res. to VW.	Slow early growth.
Sangre	1982	Colorado-USDA	ov-red	fresh	med	low	Res. to NN.	Sus. to EB, LB and VW; very slow early growth and establishment.
Viking	1963	North Dakota	ob-rd red	fresh	med	low	Res. to CS; some drought tolerance.	Sus. to blackleg, Fusarium dry rot and VW.
LONG TYPES								
Frontier Russet	1990	USDA-Aberdeen	lg-rus	fresh, frozen processing	med-late	high	Res. to blackspot, shatter bruise and CS.	Sus. to VW.
HiLite Russet	1987	Northwest Potato Sales, Inc.	lg-rus	fresh	med-early	low	Good general appearance and cooking qualities; res. to blackspot.	Avg. to below avg. yields with poor sizing in some years.
Krantz	1985	Minnesota-Texas	ob-rus	fresh, processing	med-late	med	Res. to CS, LB and HH; smooth type.	Sus. to growth crack and EB; slow early growth and establishment.
Norking Russet	1985	North Dakota	lg-rus	fresh, frozen processing	med-late	med-high	High percent U.S. No. 1; smooth skin.	Sus. to HH; tendency to undersize.
Russet Burbank	1920	Selected by Sweet from Burbank	lg-rus	fresh, frozen processing	late	high	Ex. French fries; good long-term storage; res. to CS.	Sus. to most diseases; needs irrigation to minimize off-type tubers.

Table 2. Characteristics of several types of potato varieties.

Variety	Year released	Agency/state	Tuber type ¹	Primary use	Maturity	Specific gravity	Strengths ²	Weaknesses ²
Russet Norkotah	1987	North Dakota	lg-rus	fresh	med-early	low	Ex. type, high % count pack; smooth russet with shallow eyes.	V. sus to VW; sus. to EB, LB and most viruses.
Russet Nugget	1988	Colorado-Texas	lg-rus	fresh, processing	very late	high	Res. to CS; very good general appearance, high SG and shallow eyes.	Sizes tubers late, sus. to HH and poor yield.
Shepody	1980	Ag. Canada-New Brunswick	lg-wh	frozen processing	med-late	high	Mod. res. to rhizoctonia; earlier maturity than Russet Burbank.	Sus. to CS, virus mosaics and pink eye; slow early growth.

¹rd = round; wh = white; ob = oblong; ov = oval; lg = long; rus = russet.

²GN = golden nematode; CS = common scab; VW = Verticillium wilt; EB = early blight; LB = late blight; SG = specific gravity; HH = hollow heart; PV = potato virus; PVLRL = potato virus leaf roll; NN = net necrosis; ACD = after cooking darkening; CPB = Colorado potato beetle; Ex. = excellent; Res. = resistant; Tol. = tolerance; Sus. = susceptible; Mod. = moderate.

Table 3. Tuber yield and specific gravity of round varieties in dates-of-harvest study at Montcalm Research Farm.

	Number of years tested	90-100 Days				110-120 Days				130-140 Days			
		No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity
		cwt / A				cwt / A				cwt / A			
Allegany (NY72)	2	281	313	90	1.074	-	-	-	-	512	540	95	1.078
Atlantic	10	338	390	86	1.085	430	476	90	1.086	432	474	91	1.088
Eramosa	3	278	322	86	1.060	319	368	86	1.058	321	370	87	1.059
Kanona (NY71)	2	374	405	92	1.073	-	-	-	-	476	504	94	1.074
LaBelle (LA01-38)	3	419	444	94	1.075	557	572	97	1.076	491	524	94	1.073
Michigold (y)	6	323	389	82	1.083	397	460	86	1.083	383	440	87	1.081
Monona	4	281	322	87	1.070	339	368	91	1.070	358	390	92	1.070
Norchip	2	296	372	80	1.075	-	-	-	-	324	414	78	1.074
Norwis (FL657)	2	402	428	93	1.065	-	-	-	-	512	560	92	1.065
Saginaw Gold (y)	3	350	428	82	1.075	380	435	87	1.073	373	443	84	1.074
Onaway	10	410	453	90	1.067	458	504	91	1.066	460	502	91	1.067
Snowden (W855)	2	296	370	80	1.080	-	-	-	-	424	494	86	1.082
Somerset (AF236-1)	2	358	395	90	1.075	-	-	-	-	412	455	91	1.077
Spartan Pearl (MS700-83)	7	357	414	85	1.075	447	506	88	1.077	445	502	89	1.075
Steuben (NY81)	2	392	416	94	1.075	-	-	-	-	540	565	95	1.075
Sunrise	2	308	363	85	1.070	334	404	83	1.067	320	378	84	1.071
Superior	4	307	338	91	1.071	303	329	92	1.071	304	343	88	1.073
Yukon Gold (y)	5	303	339	89	1.079	355	383	92	1.079	364	396	92	1.078
MS716-15	7	289	341	84	1.085	355	403	88	1.088	393	443	89	1.086
MS700-70	4	342	393	87	1.080	540	588	92	1.085	525	566	93	1.083

Table 3. Tuber yield and specific gravity of round varieties in dates-of-harvest study at Montcalm Research Farm.

		90-100 Days				110-120 Days				130-140 Days			
		No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity
MS401-1 (y)	3	318	379	84	1.082	390	466	84	1.082	381	450	85	1.080
MS401-2 (y)	4	307	389	80	1.081	327	425	77	1.083	426	456	93	1.082
MS402-7	3	281	320	88	1.069	372	416	89	1.073	401	432	93	1.072

(y) = yellow flesh

Table 4. Tuber yield and specific gravity of long varieties in date-of-harvest study at Montcalm Research Farm.

	Number of years tested	90-100 Days				110-120 Days				130-140 Days			
		No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity	No. 1	Total	% No. 1	Specific gravity
		cwt / A				cwt / A				cwt / A			
Frontier Russet (A74114-4)	3	226	311	73	1.070	310	412	74	1.079	296	391	76	1.078
HiLite Russet	3	208	310	67	1.065	278	390	71	1.067	229	344	66	1.067
Krantz	3	232	317	72	1.067	252	343	72	1.071	234	319	72	1.072
Lemhi Russet	3	349	402	87	1.082	453	520	86	1.085	495	561	88	1.083
Norgold Russet	2	170	280	60	1.062	184	294	63	1.070	170	280	60	1.067
Norking Russet	2	189	327	58	1.078	245	367	66	1.078	238	352	68	1.075
Russet Norkotah	3	203	308	66	1.068	286	370	78	1.069	231	334	69	1.069
Russet Burbank	7	221	341	64	1.077	287	433	66	1.081	277	456	60	1.080
Shepody	6	223	286	72	1.078	383	472	80	1.083	347	465	74	1.082
A76147-2	4	379	488	81	1.068	501	617	81	1.075	495	646	77	1.075
A78242-5	3	292	418	70	1.072	380	473	80	1.075	415	531	78	1.074
A7411-2	2	-	-	-	-	306	414	74	1.090	301	412	73	1.089

Table 5. Tuber yield and specific gravity of red varieties at Montcalm Research Farm.

	Number of years tested	cwt/A		% U.S. No. 1	Specific gravity
		U.S. No. 1	Total		
Norland	3	378	415	91	1.065
Red LaSoda	2	495	557	89	1.062
Rideau	4	418	445	94	1.072
Sangre	2	414	464	90	1.062
Red Gold (y)	2	301	410	73	1.071
Reddale	2	433	484	89	1.058
Rose Gold (y)	2	401	472	85	1.073
ND2224-4R	2	380	445	85	1.058
NDT9-1068-11R	2	505	551	92	1.059

(y) = yellow flesh.

Table 6. External and internal defects of potato varieties tested in Michigan.

Variety	Blackspot ^a		After cooking ^b darkening	Hollow ^c heart	Scab ^d susceptibility index
	Check	Bruised			
ROUND TYPES					
Allegany	-	-	2.0	1	4
Atlantic	10	45	1.0	3	3
Eramosa	5	18	1.3	0	4
Kanona	22	70	1.2	1	5
LaBelle	12	65	1.8	0	4
Michigold (y)	6	28	1.0	1	4
Monona	-	-	1.0	0	4
Norchip	15	32	1.2	0	2
Norwis	7	20	1.0	0	3
Saginaw Gold (y)	5	28	1.2	0	5
Onaway	10	22	1.5	0	2
Snowden	10	73	1.2	1	3
Somerset	10	70	1.2	2	4
Spartan Pearl	0	24	2.0	0	4
Steuben	10	45	2.0	4	5
Sunrise	8	18	1.5	0	4
Superior	-	-	1.0	0	1
Yukon Gold (y)	-	-	1.3	0	4
MS716-15	2	25	1.0	0	4
MS700-70	2	35	1.1	1	3
MS401-1 (y)	0	15	1.0	0	5
MS401-2 (y)	3	22	2.0	0	4
MS402-7	3	50	1.0	0	4

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Table 6. External and internal defects of potato varieties tested in Michigan.

Variety	Blackspot ^a		After cooking ^b darkening	Hollow ^c heart	Scab ^d susceptibility index
	Check	Bruised			
LONG TYPES					
Frontier Russet	8	45	1.3	2	3
HiLite Russet	0	22	1.0	0	1
Krantz	0	25	1.3	0	1
Lemhi Russet	-	-	1.0	1	1
Norgold Russet	0	2	1.0	0	2
Norking Russet	0	7	1.5	1	2
Russet Norkotah	5	10	1.7	0	2
Russet Burbank	4	28	1.2	2	2
Shepody	0	24	1.1	0	5
A76147-2	11	44	1.5	2	4
A78242-5	10	35	1.0	2	3
A7411-2	12	60	1.0	1	3
REDS					
Norland	0	0	1.5	1	2
Red LaSoda	0	10	1.5	3	3
Rideau	10	15	2.0	1	2
Sangre	0	15	1.3	2	3
Red Gold (y)	2	58	2.0	0	3
Rose Gold (y)	5	10	1.0	0	3
Reddale	2	27	2.0	4	3
ND2224-4R	8	33	2.5	0	1
NDT9-1068-11R	3	22	1.3	0	2

^aPercent of tubers with blackspot. In the bruised treatment tubers from 40°F were artificially bruised in a wooden drum and peeled 48 hours later. Check samples were potatoes harvested with a research plot harvester.

^bValues based on a 1-5 scale; 1 = no color; 5 = black overall, 1 hour after boiling.

^cNumber of tubers with hollow heart in 20 oversized tubers cut.

^dIndex on a 1-5 scale; 1 = most resistant; 5 = most susceptible. Values based on greenhouse screening tests and field trials performed under extremely high inoculation levels at the MSU Soils Farm.

(y) = yellow flesh.

NOTE: This bulletin replaces E-935, "Selecting Potato Varieties in Michigan."

This is one of a series of **Best Management Practices for Potatoes** bulletins designed to assist Michigan potato growers. These bulletins, a joint effort of the MSU Cooperative Extension Service and the Michigan Agricultural Experiment Station, are based on information and recommendations made possible through research supported wholly or in part by the Michigan Potato Industry Commission.

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