Wisconsin Variety and Advanced Selection Trial (WVT)

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Introduction

The Wisconsin Variety and Advanced Selection trialing is an initial screening effort to identify new genetic lines that perform well in Wisconsin environments. Sites represented are: 1) irrigated loamy sand soil, Central WI, 2) silt loam soil, Langlade county, 3) organic soil, Marquette county. These locations are typical of the soils where the majority of potatoes are grown in Wisconsin.

The source of entries has traditionally been US-Public breeding programs although the trial has received material from private companies when there is interest. In 2012 seven public programs submitted entries in the categories Russet, Chip/Yellow and Red skin. The total entries for each category respectively were 34, 28 and 17 for a total of 79 entries tested.

Locations:

Hancock -- Hancock Agricultural Research Station, Hancock, WI

- Irrigated sands of central Wisconsin
- Production is primarily for fresh packing and processing
- *Russet, white, yellow and red skin*
- Replicated (3x) and single rep (1x) observation plots

Antigo -- Langlade County Potato Research Facility, Antigo, WI

- Irrigated silt loam soil of northeastern Wisconsin
- Production is primarily for certified seed, fresh packing and limited processing
- *Russet, white, yellow and red skin*
- Single rep (1x) observation plots

Endeavor -- Gumz Muck Farms, LLC, Endeavor, WI

- Represents organic soils of Wisconsin
- Production is primarily for fresh packing of red skin potatoes
- *Red skin entries only*
- Replicated (3x) and single rep (1x) observation plots

Experimental Design:

All entries were planted at Hancock and Antigo as either single or three replication plots depending on years in trial. **First-year,** *numbered entries,* are tested as a single-rep (1x) observation plot in multiple locations. **Standards, Named varieties** and **multi-year** entries are tested on a three-rep (3x), multiple location approach. Based on performance, first year entries are dropped or continued as 3x-replicated entries in future years. Named varieties and repeat numbered lines were replicated at Hancock and Endeavor (reds only). Antigo was used as a 1x-replication site.

All plots were 20' in length, using 36" row centers and 12" in-row spacing. Sites were visited during the growing season to observe plant development, and score vegetative characters. Days after planting (DAP) to vine kill, for the respective sites, are as follows: Hancock (137 DAP), Antigo (110 DAP) and Endeavor (92 DAP). Yield, size grade, tuber appearance, specific gravity and internal qualities were measured at harvest.

Location	Plant	1st Vine Kill	Days, plant to 1st vine kill
Hancock	25-April	22-Aug	120
Antigo	14-May	31-Aug	100
Endeavor	22-May	1-Sep	117

Table 1 provides a complete description of scales used for evaluation purposes and applies to all subsequent tables in this report.

Storage Processing

Sample Collection: Samples of all white, yellow and russet entries were collected for processing evaluation from the Hancock location at grading. Up to 30 lbs. of 4-13 oz. tubers were collected by entry. Replicates were combined for a single sample per entry.

Storage: Samples of each variety were stored at 55°F and 95% relative humidity for several weeks to allow for wound healing. The lockers were set to ramp to 38°F (Fresh) and 48°F (for long-term process storage) at the rate of 0.1°F every twelve hours.

Chip Processing: Tubers of round, white varieties were selected randomly from each sample held at each storage temperature (45°F and 48°F) for each processing interval. Tubers were cut in half lengthwise (along stem end to bud end axis) using a potato splitter designed and built by the author. One half of the tuber was discarded. Three slices were taken from the remaining half of each tuber. Slices were approximately one millimeter thick. The first slice from each tuber half was discarded and the second was used for the processing evaluation. Each slice was rinsed twice in cold water to remove free starch granules and then drained on a terry-cloth towel. The slices were placed in a specially designed wire basket to hold them in a vertical position while frying. The slices were fried in cottonseed oil at 360°F for two minutes and ten seconds. Slices were drained in the frying basket for a short period of time and then placed on paper towels for further draining. Processed chip samples were evaluated using a Hunter Lab D25LT and presented as an average of 18 chips. Hunter Lab L values of 55 or greater are generally considered acceptable color.

French Fry Processing: Tubers of long, russet varieties were selected randomly from each sample held at 48°F for each processing interval. Slabs 1¼" wide x 3/8" thick were cut longitudinally from the center of each tuber using a Nemco Model N55450 restaurant-style hand-operated French fry cutter with a modified cutting head. Slabs were placed in a specially designed wire basket to hold them flat while frying. Slabs were oriented stem end down and maintained in this orientation throughout the processing and scoring process. Slabs were fried in cottonseed oil at 375°F for three minutes and thirty seconds. Slabs were drained in the frying basket for a short period of time and then placed on paper towels for further draining. Processed slabs were scored using a Photovolt Model 577 Digital Reflectance Meter within five minutes

after frying. Photovolt readings were taken on the stem end and center of each slab. Photovolt readings of 20 or greater are considered acceptable color.

Summary by Market Category

Russet process: Russet Burbank was characterized by medium sized tubers of variable shape and relatively narrow profile, sp.gr of 1.071 and poor fry color in October. Good performing lines with equal or better dry matter were: **AF3001-6, AF4281-3, MN02419 and W6234-4rus. Alpine, Canela, Pallisade and Premier** continue to develop improved dry matter over Burbank. Mesa Russet had similar gravity to Burbank but higher yield and tuber size. Pallisade Russet generates high gravity in WI conditions but again has a very late vine and tuber size and appearance was not impressive in 2012. The best fry score in October was found with W6234-4rus for both stem and center portions of tubers. While good agronomic performance can be identified in numerous Advanced Lines and Varieties, achieving Quick Serve Restaurant (QSR) standards for retail French Fry sale is the barrier for most candidates.

Russet fresh: Russet Norkotah Sel-8 (or Colorado-8) continues to out-perform standard Norkotah at Hancock and Antigo in yield, grade-out and appearance. Other lines with outstanding tuber appearance for fresh at both locations were **AOTX02136-1RU, Mesa Russet, Premier and W9133-1rus**. At Antigo A03158-2TE had an excellent visual score, particularly full-blocky shape and high yield. The same line was noted to have deep eyes in Hancock.

Chipstock: Snowden yields outpaced all entries at Hancock and Antigo with the exception of Accumulator. **Accumulator** was 119% of Snowden at Hancock and 129% at Antigo, a testament to its continued vigor in the WI environment. External tuber appearance continues to be less than desireable. **Lamoka** yields and dry matter lagged somewhat in 2012 but the variety fried amongst the best in the trial along with **Lelah and W6483-5**. Tundra had the highest specific gravity at Hancock. NY148 was a strong performer in yield and gravity however posted a disappointing fry score and was found to have very deep eyes and poor tuber appearance.

Yellow flesh: Of lines tested many out yielded the Yukon Gold standard for both total and A-size grade out. Numerous entries are of an oval nature reflecting European germplasm source – a trait that is understood to be more acceptable in the market with the passage of time. **Alegria and W6703-1Y** were evaluated to be the best Yukon Gold replacements relative to larger A-size tubers. MN04844-07Y had the best visual and uniformity scores at two locations but was much smaller in size profile. Yukon Gem, a recent release from Idaho (original cross in ND, NDA5507-3) has a similar appearance to Yukon Gold in that it carries red highlights over the eyes, fair tuber skin finish but is clearly more oval in shape and somewhat more flat in profile.

Red skin: Dark Red Norland yielded well in 2012 at two of three locations with Hancock being highest at 584cwt/ac for A-size. Endeavor was impacted by dry weather posting lower than normal yields. Three advanced lines stood out in this year's trial for general good appearance, **CO04159-1R, W6002-1R and W8886-3R**. CO04159-1R had excellent dark red color, shallow eyes and good skin finish and uniform tuber size. W6002-1R has similar characteristics with a medium red color and was the highest yielding entry at Hancock. W8886-3R is slightly oval in shape, excellent skin finish and has the early maturity of Norland types. A tendency for growth cracks was observed in this year's trial. It should be noted the only Fingerling type, CO00405-

1RF carried excellent skin finish and color. Under trial conditions tuber size was larger with many tubers longer than 4". This characteristic can likely be managed depending on target size.

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PLEASE NOTE
This report is a summary of yield data for crop year 2012.
A complete report of variety performance, tuber characteristics and processing study results are available online at:

http://www.ars.wisc.edu/hancock
and
http://www.ars.wisc.edu/rhinelander