On-farm evaluation of heirloom potato varieties

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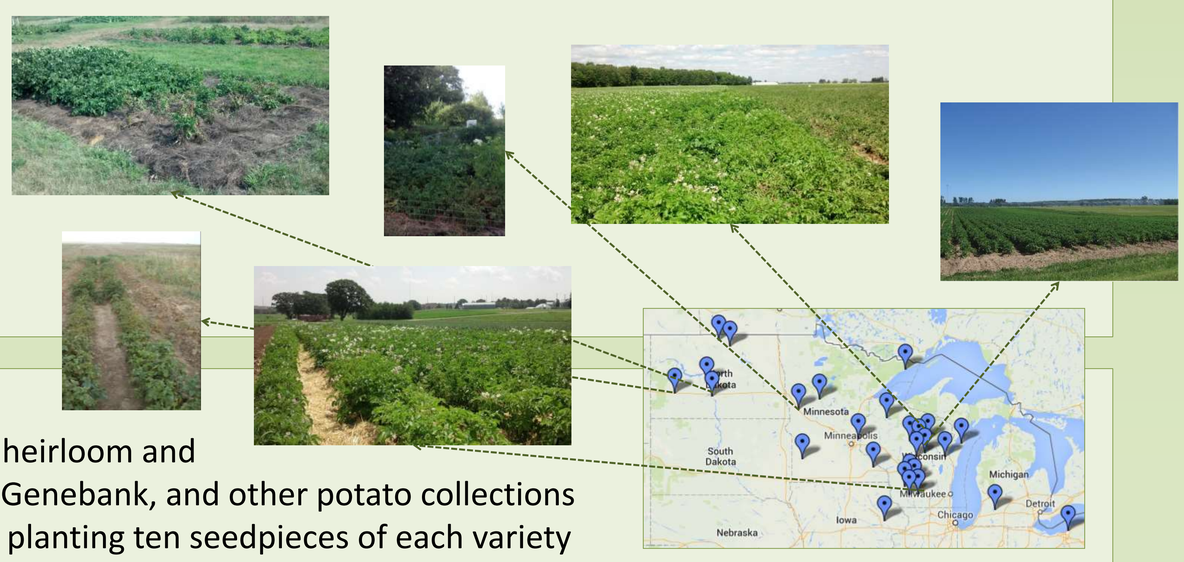
Our research and outreach goals:

- Select potato varieties that thrive under organic management, and evaluate heirloom and specialty varieties
- Use these varieties to initiate a participatory potato breeding program focused on organic production needs

Background: From 2010-2012, we worked with seven Wisconsin organic farms to evaluate commercially available potato varieties for tuber yield, quality and taste. High yielding varieties tended to have vigorous vines, and resistance to insect pests, vine diseases, and tuber defect diseases.

Varieties with consistently high yields of marketable tubers in 2010-12:

- Dark Red Norland, Chieftain, Red Maria (red)
- Keuka Gold, Satina and German Butterball (yellow)
- Red Thumb, Papa Cacho and French Fingerling (red fingerling)
- Adirondack Blue and Purple Majesty (blue-fleshed)
- Caribe and Spartan Splash (multicolor skin)
- Langlade, Kennebec, and Irish Cobbler (white)



Heirloom potato variety trials in 2013:

- With 26 organic farmer and gardener partners (see map), we trialed heirloom and
- specialty potato varieties from Seed Savers Exchange, the US Potato Genebank, and other potato collections
- Each farm grew a subset of the 24 trial varieties plus check varieties, planting ten seedpieces of each variety
- All varieties were grown at the West Madison Agricultural Research Station on organically managed land, and at one of two central Wisconsin organic farms with many years of potato growing expertise (Farm M and Farm I: see charts below). Varieties were evaluated for emergence, vine vigor, pest and disease impacts, and yield and tuber quality, and several farms evaluated taste.

On-farm variety trial observations:

Varieties differed for vine vigor, pest and disease impact, and tuber yield and quality. We saw site-to-site variation, attributable to differences in management and growing conditions, but some varieties were standouts at many locations. Varieties with market or home garden potential are indicated with arrows. Check varieties are shown in italics.

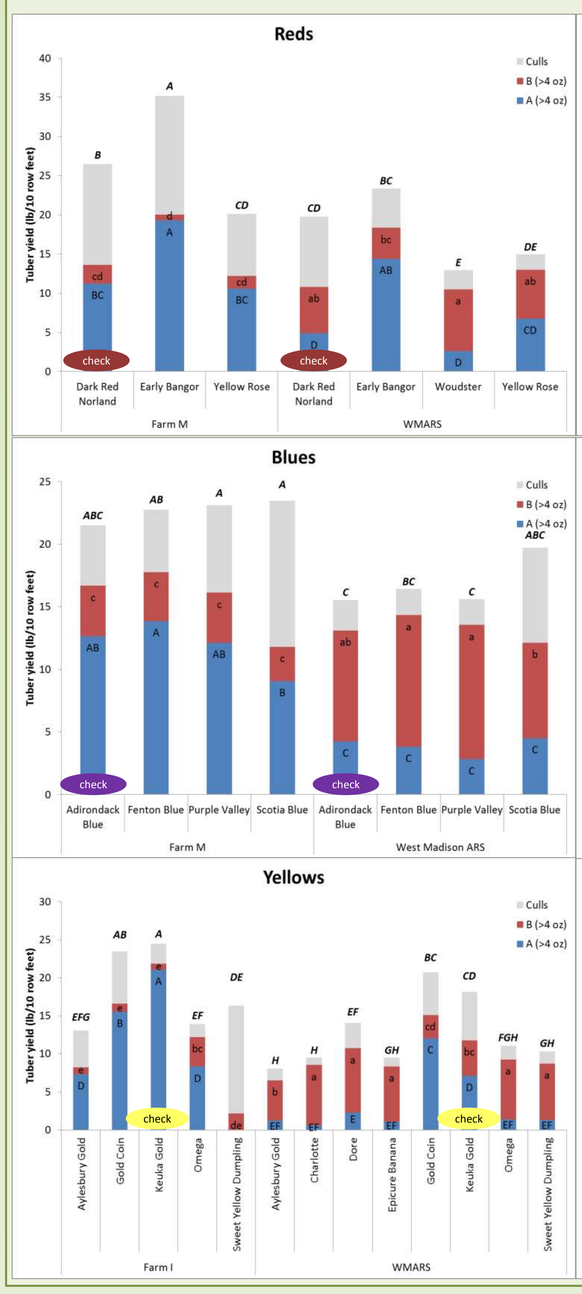

On-farm potato variety trial harvest

Photo credit: Laura Krouse

Market class	Variety	Notable characteristics	Yields	Most common tuber defects
Red	Candy Stripe	Attractive skin; round tubers	Medium	
	Dark Red Norland	Broadly adapted; attractive round tubers	High	
	Early Bangor	Broadly adapted; vigorous vines; large tubers	High	Common scab, Misshapen
	Red Gold	Yellow flesh	Medium	Green ends
	Red La Soda	Broadly adapted; deep eyes	Medium	Green ends
	Woudster	Very pale skin; blocky tubers	Medium	Green ends, Misshapen
	Yellow Rose	Less vigorous; smooth pink skin, oblong tubers	Medium	
Blue	*Adirondack Blue*	Vigorous vines; oblong tubers with blue flesh	Medium-High	
	Fenton Blue	Vigorous vines; oblong tubers with blue/white flesh	Medium-High	Silver scurf
	Purple Valley	Vigorous vines; oblong tubers with blue/white flesh	Medium-High	Common scab
	Scotia Blue	Vigorous vines; elongated tubers, lavender skin and blue/white flesh	Medium-High	Green ends
Yellow	Aylesbury Gold		Low	Green ends, Undersize
	Charlotte	Smooth skin; attractive oblong tubers, medium sized	Low-Medium	Green ends, Undersize
	Dore	Rough skin	Medium	
	Epicure Banana	Smooth skin; attractive oblong tubers, medium sized	Low-Medium	Green ends
	Gold Coin	Vigorous vines; large tubers with rough skin	High	Common scab
	Keuka Gold	Vigorous vines; large tubers with rough skin	High	Black scurf
	Omega		Low-Medium	Undersize
	Sweet Yellow Dumpling	Vigorous vines	Low-Medium	Common scab, Undersize
Fingerling	*Austrian Crescent*	Vigorous vines; attractive elongated tubers	Medium-High	Green ends
	Black Russian	Deep blue skin; blue and white flesh	Medium	
	Corne de Mouton	Smooth pink skin, yellow flesh	Medium	Green ends, Undersize
	French Fingerling	Tall vigorous vines; blocky tubers; white or pink/white skin	Medium	Green ends, Growth Cracks
	Nosebag	Tall vines; probable synonym for French Fingerling	Low	Green ends, Growth Cracks
	Papa Cacho	Tall vigorous vines; insect resistance? Large elongated tubers; red/white flesh; stolons attached	Medium	
	Peanut	Small rough-skinned yellow tubers	Low	
Russet	Bannock Russet		Low-Medium	Black scurf, Undersize
	Butte Russet	Vigorous vines	Medium	Misshapen
	Freedom Russet	Vigorous vines ; insect resistance?	Medium	Misshapen, Undersize
White	Abnaki		Medium	Undersize
	Australian Crawlers	Very vigorous vines; indeterminate growth; insect resistance? White skin splashed with red	Low-Medium	Common scab, Misshapen, Undersize
	Campbell		Low	Green ends
	Early Epicure	white skin splashed with red; deep eyes; blocky	Medium	Common scab, Green ends, Misshapen
	Gui Valley	Vigorous vines; attractive small tubers – specialty?	Low-Medium	
	Houma		Low-Medium	Common scab, Green ends
	Langlade	Vigorous vines; large blocky tubers	High	Common scab, Green ends
	Niska		Medium	Common scab, Green ends, Misshapen

Potato Breeding Project – soft rot of potato: Bacterial soft rot, caused by *Pectobacterium* species, is a major problem in stored vegetables. Varieties with resistance to bacterial soft rot would improve farm profitability of farmers by reducing losses to disease, particularly during storage and shipping. No commercial potato cultivars are resistant to this disease, but several wild species are. By crossing wild (diploid) and cultivated (tetraploid) potatoes, we can map the location of soft rot resistance genes. Diploid lines carrying these resistance genes will be compared to cultivated tetraploid potato lines in organic research plots. Long term goals of this project are to develop soft rot resistant potato lines that can be used in breeding soft rot resistant potato varieties.

Total and marketable yields for replicated trials in central (Farms I, M) and south (WMARS) Wisconsin. Bars with different letters indicate significant yield differences for total ("***A***"), B size ("a") and A size ("A") tubers.



On-going research and field trials: ***JOIN US IN 2014!!***

- Newly available heirloom and specialty varieties for 2014 trials
- New project – on-farm potato breeding and selection
- Trials of mulch in organic potato production for weed, water and soil management

Contact us and stay updated through our website:
http://labs.russell.wisc.edu/organic-seed-potato/

Many thanks to all the farmers who have contributed their expertise, time and resources to set up trials, collect data, and share their stories, pictures, recipes and enthusiasm for potatoes!