

GENETICALLY MODIFIED POTATOES: WHERE DO THINGS CURRENTLY STAND?

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At present “genetically-modified” potatoes are not grown for commercial production anywhere in the world. Monsanto (in the USA) and BASF (in Europe) have previously produced and sold ‘Newleaf’ and ‘Amflora’ potatoes, but they were withdrawn from the marketplace in 2001 and 2012, respectively.

The J.R. Simplot Company has been working for many years to develop genetically modified potatoes of their own. Central to Simplot’s strategy has been the assumption that consumers are more likely to accept GM potatoes if the only genes added come from other potatoes. They use the word ‘Innate’ to describe their genetically engineered potatoes, and have recently petitioned the USDA to deregulate them. They hope to sell limited quantities in 2014. Some of the genes that Simplot has altered include polyphenol oxidase (turning off this gene reduces blackspot bruise symptoms), asparagine synthetase (shutting down this gene reduces acrylamide levels in fries and chips), and starch-associated water dikinase R1, phosphorylase-L, and acid invertase (down-regulating these genes reduces cold-induced sweetening). More information about Simplot’s ‘Innate’ potatoes is available on their website, www.simplot.com/plant_sciences

On a more conventional note, descriptions of five of our most promising candidate varieties follow below. Comments on the performance of these clones or any previously released Cornell varieties, or on desired attributes of future varieties, are always welcome.

NY140 (Y36-4) = NY121 x NY115 (1998). Late season, dual purpose chip and tablestock. High yields of large tubers, lightly textured skin. Resistant to races Ro1 and Ro2 of the golden nematode.

- Marketable yields in Tompkins County over the past eleven years have averaged 115% of Atlantic (27 trials).
- Yields in Steuben and Wyoming County trials averaged 111% of Atlantic in 2006, 119% in 2007, 117% in 2008, 119% in 2009, 102% in 2010, 106% in 2011, 105% in 2012, and 101% of Atlantic in 2013. Eight year average: 111%.
- Yield in Wayne County was 129% of Atlantic in 2008, 123% in 2009, and 112% of Atlantic in 2012.
- Yields on Long Island were 108% of Norwis in 2004. Yields were 103% of Reba in 2005, 116% in 2006, 91% in 2007, 105% in 2008, 128% in 2009, 139% in 2010, 126% in 2011, and 120% of Reba in 2012.

- In PA yields averaged 106% of Atlantic in 2005 (3 trials), 124% in 2007 (4 trials), 119% in 2008 (2 trials), 104% in 2009 (3 trials), 112% in 2010 (3 trials), 107% in 2011 (2 trials), and 129% of Atlantic in 2012 (3 trials).
- Yield in North Carolina averaged 117% of Atlantic in 2009 (3 trials) and 96% of Atlantic in 2010 (2 trials).

A low frequency of pickouts due to knobs, misshapes and growth cracks. Some internal defects, most commonly hollow heart and internal necrosis, have been observed. Tuber size is unmistakably large, averaging 6.2 ounces per tuber (19 trials). Even at 6 inch spacing, tuber size remains large (2009 and 2010 trials). Specific gravity has averaged 0.012 less than Atlantic (37 trials). This will limit the locations where it could be grown for chips. Chip quality has generally been very good: over the past nine years it has averaged 3.5, comparable to Snowden, which also averaged 3.6 in the same trials (lower is better). Susceptible to common scab, comparable to Katahdin. Tubers remain white after boiling, and do not slough significantly. Tuber dormancy is about six weeks longer than Atlantic. Nice vines, white flowers, few fruit. Exhibited moderate resistance to late blight as well as early blight in PA trials in 2007 - 2009. Good resistance to blackspot bruise. Resistant to races Ro1 and Ro2 of the golden nematode.

NY141 (Y41-67) = R6-4 x NY115 (1998). Early to mid season tablestock, attractive tubers.

- Marketable yields in Tompkins County over the past eleven years have averaged 99% of Atlantic (30 trials).
- Yield in Wayne County was 107% of Atlantic in 2008, 106% in 2009, 78% in 2011, and 108% of Atlantic in 2012.
- Yields on Long Island were 82% of Norwis in 2004. Yields were 95% of Reba in 2005, 100% in 2006, 81% in 2007, 111% in 2008, 110% in 2009, 118% in 2010, 110% in 2011, 102% in 2012, and 109% of Reba in 2013.
- Yield in PA in 2005 was 107% of Atlantic in 2005 (1 trial), 92% in 2007 (4 trials), 79% in 2008 (2 trials), 94% in 2009 (3 trials), 115% in 2010 (3 trials), 91% in 2011 (2 trials), and 97% of Atlantic in 2012 (3 trials).

Typically 2 to 3% of tubers have knobs. A low frequency of internal defects, mostly brown center, have also been observed. Has set an average of 7.0 tubers per foot, with an average weight of 6.1 ounces (14 trials). Early yield, assessed at the end of July in Ithaca, has been good: 112% of Superior in 2010, 110% of Atlantic in 2009, 101% of Superior in 2006, and 122% of Superior in 2005. Specific gravity has averaged 0.011 less than Atlantic (31 trials). Does not chip. Good resistance to common scab. Tubers remain white after boiling, and do not slough significantly. Tuber dormancy is about two weeks longer than Atlantic. Nice vines, white flowers, some fruit. Very good resistance to blackspot bruise. Resistant to race Ro1 of the golden nematode.

NY148 (E106-4) = NY128 x Marcy (2003). Late season, high gravity chipstock.

- In 14 Tompkins County trials over the past six years, marketable yields averaged 112% of Atlantic.
- In trials in Wyoming and Steuben Counties, yield averaged 112% of Atlantic in 2009, 81% in 2010, 108% in 2011, 90% in 2012, and 90% of Atlantic in 2013. Five year average: 96%

- Yield on Long Island was 98% of Reba in 2010, 106% in 2011, 113% in 2012, and 108% of Reba in 2013.
- Yield in PA was 113% of Atlantic in 2011 (1 trial) and 132% in 2012 (4 trials).

In general, few pickouts or internal defects have been observed – but in 2010, two-thirds of tubers exhibited internal necrosis in one yield trial (Harford). Heat necrosis has also been observed on Long Island in 2013 and in small-scale NCPT trials in southern states. Tuber size is similar to Snowden. Scurfy tuber skin. Specific gravity is high and has averaged equal to Atlantic (26 trials). Chip color from 44F storage is reasonable, but not as good as Snowden. In 2008, chip color from December, January and February averaged 3.5, not as good as Snowden at 2.3 in the same trials. In 2009, chip color averaged 3.8, better than Snowden at 4.5. In 2010 chip color averaged 3.3 compared to Snowden at 2.5. In 2011 chip color averaged 3.8 versus 3.7 for Snowden. In 2012 chip color averaged 4.3 compared to Snowden at 3.7. Tubers darken slightly after boiling, and slough moderately. Tuber dormancy is comparable to Atlantic. Many white flowers. Has exhibited good resistance to common scab to date. Resistant to potato virus Y. Tests in PA in 2012 uncovered some resistance to both early and late blight as well. Resistant to race Ro1 of the golden nematode.

NY150 (F52-1) = NY121 x Jacqueline Lee (2004). Niche-market, early season tablestock. Produces many small tubers with bright white skin.

- In eleven Tompkins County trials over the past five years, yields of tubers between 1 and 1.875 inches averaged 174 cwt/acre, while yields of tubers between 1.875 and 2.5 inches in diameter averaged 146 cwt. acre. In the same trials yield of tubers greater than 2.5 inches averaged only 13 cwt/acre. For comparison, marketable yield of Atlantic (>1.875 inches) in the same trials averaged 390 cwt/acre.

Few pickouts (mostly misshapes) or internal defects have been observed. Specific gravity has averaged 0.010 less than Atlantic (9 trials). Tubers do not darken or slough appreciably after boiling, and retain attractive appearance after long term storage. Tuber dormancy is about 2 weeks longer than Atlantic. Intermediate reaction to common scab. Resistant to potato virus Y. Exhibited some resistance to late blight in PA in 2012. Resistant to race Ro1 of the golden nematode.

NY151 (G73-1) = NY121 x Salem (2005). Late season, white tablestock with relatively smooth skin.

- In seven Tompkins County trials over the past four years, marketable yields averaged 105% of Atlantic.
- Yield on Long Island was 116% of Reba in 2011 and 118% of Reba in 2012.
- Yield in PA was 117% of Atlantic in 2011 (1 trial) and 114% of Atlantic in 2012 (3 trials).

Low levels of pickouts (mostly growth cracks) or internal defects (brown center) have been observed. Specific gravity is low and has averaged 0.023 less than Atlantic (7 trials). Moderate resistance to common scab. Tubers do not darken or slough appreciably after boiling. Tuber dormancy is comparable to Atlantic. Resistant to race Ro1 of the golden nematode.