

University of Florida Potato Variety Trial Program— 'Elkton' Commercial Evaluation¹

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Overview of the Potato Variety Program in Florida

Approximately 25,000 acres of Florida potato are cultivated during winter and spring. Florida is an integral part of the supply chain for freshly harvested potatoes in the United States. Florida is ranked seventh nationally because of its high-value winter and early spring potato production. The University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) is continuously evaluating new and advanced breeding selections from public and private sectors at its Florida Partnership for Water, Agriculture, and Community Sustainability Research Farm in Hastings, Florida. One objective of the UF Potato Variety Program is to conduct commercial trials of advanced potato breeding lines and newly released potato varieties to facilitate commercial adoption of improved, new genetic material by potato growers and industry members. As new selected clones move through the commercialization process and larger quantities of seed become available, entries that look promising over many years of testing at multiple University of Florida locations are evaluated on a larger scale at local grower farms in variety trial, plant spacing, and fertility plots.



Figure 1. Overview of a commercial evaluation site of 'Elkton' and 'Atlantic' at a grower's field in Hastings, Florida during spring, 2011. The flagged potato rows were planted with 'Elkton'; the other rows were planted with 'Atlantic.'

Credits: UF/IFAS

A Brief History of the Performance of 'Elkton' at the Research Farm

'Elkton' is a white-flesh potato variety suitable for chipping directly from the field. 'Elkton' was evaluated under the pedigree B1992-106 from the USDA-ARS breeding program in Beltsville, MD by Dr. K. G. Haynes in 1997. There have been 19 trials of the selected chipping potato variety 'Elkton' on small plots in Florida since 2003. This clone has shown promising results compared with 'Atlantic,' the standard chipping variety widely used by Florida growers. 'Elkton' has shown resistance to internal heat necrosis (see <https://edis.ifas.ufl.edu/hs395>) and hollow heart (<https://edis.ifas.ufl.edu/hs197>). The average marketable yield for

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‘Elkton’ in the 19 trials was 356 cwt/acre, while ‘Atlantic’ yielded 317 cwt/acre, an average increase in marketable yield of 11 percent for ‘Elkton.’

In the spring of 2011, the University of Florida team recruited two growers in the Hastings area for commercial trials of ‘Elkton’ in their fields. Together, these two growers cultivated approximately 2,000 acres of chipping potatoes. The growers maintained all crop management practices (fertilization, chemical sprays, etc.). The soil is classified as Ellzey fine sand (sandy, siliceous, hyperthermic Arenic Ochraqualf; sand 90%–95%, <2.5% clay, <5% silt).

Potato seeds from the regional ‘Atlantic’ standard chipping and ‘Elkton’ varieties were planted on Jan. 21, 2011, at Farm 1 and on Jan. 24, 2011, at Farm 2. Seed pieces were cut to a target size of 2 oz and planted at an in-row spacing of 8 inches with 42 inches and 40 inches between-row spacing at Farm 1 and Farm 2, respectively. The rows were raised to 16 inches in height. The planted area with ‘Elkton’ was equivalent to 0.41 and 0.51 acres at Farm 1 and Farm 2, respectively. The seepage (subsurface) irrigation system commonly used in the region uses high row beds to plant potatoes and shallow water furrows to supply irrigation water and to remove drainage water. The fertilization rate and application timing were identical to the practice adopted by the growers at each location.

Tubers were harvested at both locations on May 4, 2011, 103 days after planting at Farm 1 and 100 days after planting at Farm 2. A total of 32 plots each of ‘Elkton’ and ‘Atlantic’ were harvested for yield and quality data. Random 20 ft-long plots were flagged off and mechanically harvested with a commercial row potato harvester. Data were collected from the center two rows of each four-row plot at Farm 1 and from the center four rows of each eight-row plot at Farm 2. Potatoes were washed and graded into five size classes as defined by US Department of Agriculture grading standards (USDA 1997). Specific gravity was measured by the weight in air/weight in water method (Edgar 1951). Randomly selected field-run potato samples of ‘Elkton’ were harvested, bagged, and sent directly to Wise Foods, Inc. in Berwick, Pennsylvania, and Utz Quality Foods, Inc. in Hanover, Pennsylvania, for frying tests.

Potato Yield and Internal and External Quality

Yield parameters, tuber size distribution, and specific gravity are presented for ‘Atlantic’ and ‘Elkton’ (Table 1). The total yield obtained at Farm 1 was 308 cwt/ac and 337 cwt/ac for ‘Atlantic’ and ‘Elkton,’ respectively. At Farm 2,

total yield was 371 and 380 cwt/ac, for the same respective varieties. The marketable yield (total yield minus culls) was 262 and 295 cwt/ac for ‘Atlantic’ and ‘Elkton,’ respectively, at Farm 1 and 298 and 324 cwt/ac, respectively, at Farm 2. Conditions were dry from January to May 2011; there were two major rainfall events (February 7 and March 31, with 2.29 and 1.59 inches of rain, respectively). Total cumulative precipitation for the growing season was 7.93 inches, much lower than the long-term average precipitation for the same period. Consequently, there was higher demand for irrigation throughout the entire growing region. The average marketable yield for ‘Elkton’ was 309 cwt/A, 11% higher yield than for ‘Atlantic.’ These comparative results obtained from commercial settings are in agreement with the results of University of Florida variety research trials conducted between 2003 and 2011. The average marketable yield for ‘Elkton’ from the 19 research trials since 2003 was 356 cwt/ac, 13 percent higher than ‘Atlantic’ (Hayes et al. 2013).

High tuber specific gravity (SG) is an indication of better tuber quality in chipping potatoes due to the increase in chipping yield. Similar SG was observed for ‘Elkton’ and the industry standard ‘Atlantic’ varieties. In addition, similar tuber size distribution and external quality were observed for both tested varieties (Table 1).

Among the several internal quality parameters evaluated, ‘Elkton’ showed no incidence of hollow heart or brown center, which are viewed as two different phases of the same internal disorder. The exact causes of hollow heart are unknown, but some important factors such as air and soil temperature, soil moisture, tuber size, and inconsistent growth rate are associated with the disorder. A lower incidence of internal heat necrosis was also observed for ‘Elkton’ than for ‘Atlantic’ (Table 2).

Frying Tests

At Wise Foods, frying test results of ‘Elkton’ from Farm 2 showed a specific gravity of 1.076, 19.1 percent dry matter, an Agtron fry test color score of 65, and no external or internal defects. Agtron values represent the spectral reflectance of the sample; values of 55 or higher denote potato chips with an acceptable color. Tests performed at Utz Quality Foods showed specific gravity of 1.093 and 1 percent of internal discoloration as total chip defect. Test results of ‘Elkton’ from Farm 1 performed by Wise Foods showed a specific gravity of 1.083, 20.6 percent dry matter, and an Agtron fry test color score of 65. External and internal defects were 1.3 and 3.0 percent, respectively. Tests performed at Utz Quality Foods showed specific gravity of 1.084 and 1 percent stem-end brown as total chip defect.

Conclusions

The ‘Elkton’ chipping potato variety was tested on a commercial scale at two growers’ farms in Florida during the 2011 season. The average yield of ‘Elkton’ in the commercial trials ranged between 295–324 cwt/ac, an average of 11 percent higher than that of the standard ‘Atlantic,’ and comparable to the yield range obtained in 19 trials conducted over a nine-year period by the University of Florida.

The lower incidence of hollow heart, brown center, and internal heat necrosis in ‘Elkton,’ higher total and marketable yields compared with the ‘Atlantic’ variety, and its excellent frying quality are indicators of the good adaptability of ‘Elkton’ to the harsh weather and growing conditions of Florida.

References

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Table 1. Total and marketable tuber yield, size class distribution, and specific gravity for 'Atlantic' and 'Elkton' potatoes grown at Farm 1 and 2 in 2011.

	Total Yield (cwt/A)	Marketable Yield ¹ % of		Size Distribution by Class (%) ²						Size Class Range (%)		Specific Gravity
		(cwt/A)	standard	C	B	A1	A2	A3	A4	A1 to A3	A2 to A3	
Farm 1												
‘Atlantic’	308	262	100	2	11	77	8	1	0	87	10	1.068
‘Elkton’	337	295	113	2	9	63	22	4	0	90	27	1.072
Farm 2												
‘Atlantic’	371	298	100	3	13	68	15	1	0	84	17	1.085
‘Elkton’	380	324	109	2	10	55	21	11	0	88	33	1.081

¹ Marketable Yield: size classes A1 to A3.

² Size classes: C = 0.5 to 1.5", B = 1.5 to 1.88", A1 = 1.88 to 2.5", A2 = 2.5 to 3.25", A3 = 3.25 to 4", A4 = >4"

Table 2. External and internal defects of 'Atlantic' and 'Elkton' potato selections grown at Farm 1 and 2 in 2011.

	% External Tuber Defects ¹					% Internal Defects ²					Brown Center	
	Growth Cracks	Misshapen	Sunburned	Rotten & misc.	Culls ¹	HH	BR	CRS	IHN	L	M	H
Farm 1												
'Atlantic'	0.2	0.3	1.1	0.7	2.3	0.2	0.0	0.0	1.6	1.7	0.5	0.0
'Elkton'	0.2	0.2	0.7	1.2	2.3	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Farm 2												
'Atlantic'	0.4	1.0	2.4	0.8	5	6.1	0.0	0.0	0.9	5.8	2.7	0.5
'Elkton'	0.2	0.2	1.8	0.8	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

¹ Percent of Total Yield. Total culls include the sum of growth cracks, misshapen, sunburned, and rotten/misc.
² Percent tubers: HH, hollow heart; BR, brown rot; CRS, corky ring spot; IHN, internal heat necrosis.