

Naturize Biosciences Potato Report, 2003



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NATURIZE BIOSCIENCES POTATO REPORT, 2003

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INTRODUCTION

Potato (*Solanum tuberosum* L.) is an important agricultural crop for Florida annually ranking among the top five valued vegetable crops in the state. From 1996 to 2000, the winter and spring potato crop was grown on an average of 39,500 acres and valued at \$117 million. Growers are always interested in finding materials that will enhance production and/or quality of this valuable Florida crop.

The objective of this study was to determine the influence of Equity 4-0-0 manufactured by Naturize Bioscience on potato tuber production and tuber quality.

MATERIALS AND METHODS

General Potato Production Information. The trial was conducted at the Plant Science Research and Education Center's Hastings Farm in Hastings, FL. The PSREC is part of the University of Florida/IFAS network of research farms located around the state to conduct research on important horticultural crops. The soil at the field site is classified as Ellzey fine sand (sandy, siliceous, hyperthermic Arenic Ochraqulf; sand 90-95%, < 2.5% clay, < 5% silt).

Potatoes (*Solanum tuberosum* L.) in the Tri-County Agricultural Area (TCAA) around Hastings, Florida are grown in 60-foot wide beds consisting of sixteen rows. Rows are raised with a between row spacing of 40 inches (center to center). A clay layer underlies the topsoil at a depth of three to five feet in the TCAA. The research plots were irrigated with seepage irrigation. In this system, the perched water table depth is managed by water flow into irrigation canals spaced between beds. Potato beds were irrigated continuously over the season except after a rain event.

Potatoes were planted following a sorghum/sudan grass summer cover crop (*Sorghum bicolor* (L.) Moench x *S. arundinaceum* (Desv.) Stapf var. SX17, Dekalb). Cover crop was incorporated into the potato beds in September, 2002. Potato beds were fumigated with 1,3-dichloropropene (Telone II, 6 g/A) in early-January, 2003. Potato seed pieces were dusted with fungicide (Maxim

MZ) prior to planting. Aldicarb (Temik, 20 lb/A) was applied at planting. Metribuzin (Sencor, 20 oz/A) was broadcast at hilling. Fungicides were applied on a schedule during the season based on IPM practices.

‘Atlantic’ was planted in a randomized complete block design with four replications. Treatments are listed below. Potato seed pieces were hand cut (approx. 2.5 oz) and planted with a carousel planter on a 8-inch within row spacing (4 February, 2003). Plot size was four rows by 20 feet. Fertilizer (14-6-12, 700 lb/acre) was incorporated into the beds prior to planting. A single side dress fertilizer (14-0-12) application was made on 13 March, 2003. The rate for treatments 1-3 was 928 lb/acre. The rate for treatments 4 and 5 was 571 lb/acre. Early vigor was rated 35 days after planting (DAP).

Equity was applied either as a single application at planting (4 quarts product/acre; 4 February, 2003) or as a split application at planting (2 quarts product/acre 4 February, 2003) and at hilling (2 quarts product/acre 20 February, 2003). The application at planting was sprayed in the furrow before the seed pieces were covered. The split application was applied in a band on each side of the row and covered.

Table 1. Treatment list for Naturize Biosciences trial.

Treatment	Fertilizer Rate¹	Equity Application
1	228-42-195	none
2	228-42-195	4 qts/A in furrow at planting
3	228-42-195	2 qts/A in furrow at planting, 2 qts/A banded at hilling
4	178-42-153	none
5	178-42-153	2 qts/A in furrow at planting, 2 qts/A banded at hilling

¹Fertilizer Rate is N; P₂O₅; and K₂O in pounds per acre.

Plots were harvested with a single-row commercial potato harvester on 13 May, 2003 (98 DAP). Vine maturity was rated at harvest. Potatoes were graded using commercial grading equipment. Culls were removed and remaining potatoes were separated into six size classes and weighed. Specific gravity was measured on a random 20-tuber sample from each plot using the weight-in-air/weight-in-water method.

External quality defects classified as growth cracks, misshapes, sunburn, rotten and miscellaneous tubers were weighed and reported as cwt/acre. Internal quality was measured on a sub-set of 20 tubers from each plot. Tubers were cut into eighths and scored for hollow heart, corky ringspot, brown rot, and internal heat necrosis. Internal quality is reported as a percent of total production.

RESULTS

Crop Yield and Quality Impacts: Plants in treatments 1 and 2 had a significantly higher total yield than all other treatments (Table 3). Plants in treatment 1 produced a significantly higher marketable yield than plants in treatments 3 and 4. Tuber yield in the Equity treatments were not significantly different than the no Equity controls at each fertilizer rate. There was no significant difference between treatments for distribution by size class, and size class range. Tubers in treatments 4 and 5 had significantly higher specific gravity than tubers in all other treatments. This was related to the nitrogen rate and not the application of Equity.

External and tuber quality was similar among treatments. Hollow heart was significantly higher in the high nitrogen, no Equity treatments than all other treatments (Table 3).

Emergence and Early Vigor. There were no differences between treatments for stand establishment, early vigor, or vine maturity at harvest (Table 3). By 35 days after planting, plants in all plots had an early vigor rating between six and seven. All plants were between 6 and 10 inches in height.

Conclusion. In 2003, the application of Equity at the PSREU Hastings Farm on 'Atlantic' potato did not enhance tuber yield, overall tuber quality, or early plant vigor.

Table 2. Production statistics for potato selections grown at the PSREU in Hastings, FL in 2003.

TRT no.	Fertilizer Rate (N-P ₂ O ₅ -K ₂ O; lb/Acre)	Equity Rate & Timing ¹	Total Yield (cwt/A)	Marketable Yield ²		Size Distribution by Class (%) ³						Size Class Range (%)		Specific Gravity
				(cwt/A)	% of standard	C	B	A1	A2	A3	A4	A1 to A3	A2 to A3	
1	Full Rate, 228-42-195	none	390	337	100	5	4	38	35	19	0	92	53	1.073
2	Full Rate, 228-42-195	A	382	331	98	4	4	36	35	21	0	92	56	1.074
3	Full Rate, 228-42-195	B	351	290	86	5	5	37	35	18	0	90	53	1.074
4	75% Rate, 178-42-153	none	343	301	89	5	4	42	34	16	0	92	50	1.080
5	75% Rate, 178-42-153	B	351	305	90	5	4	41	37	13	0	91	50	1.079
<i>LSD</i> ⁴			26	34	--	ns	ns	ns	ns	ns	ns	ns	ns	0.003
<i>P Value</i>			0.0058	0.0419	--	0.6206	0.8029	0.4338	0.9063	0.2237	0.6081	0.7643	0.6954	0.0003

¹A, 4 qts/A in furrow at planting; B, 2 qts/A in furrow at planting, 2 qts/A banded at hilling.

²Marketable Yield: size classes A1 to A3.

³Size classes: C = .5 to 1.5" , B = 1.5 to 1 7/8", A1 = 1 7/8 to 2.5", A2 = 2.5 to 3.25", A3 = 3.25 to 4", A4 = >4"

⁴Means separated within columns by Tukey's Studentized Range (HSD) Test.

Table 3. Plant growth characteristics, external, and internal defects of potato selections grown at the PSREU in Hastings, FL in 2003.

TRT no.	Fertilizer Rate (N-P ₂ O ₅ -K ₂ O; lb/Acre)	Equity Rate & Timing ¹	Plant Growth Characteristics			External Tuber Defects (cwt/A)					% Internal Defects ⁵			
			% Stand	Early Vigor ²	Vine Maturity ³	Growth Cracks	Mis-shapen	Sun-burned	Rotten & misc.	Total Culls ⁴	HH	BR	CRS	IHN
1	Full Rate, 228-42-195	none	98	6.5	1.8	3	1	9	9	22	0	0	0	1
2	Full Rate, 228-42-195	A	97	6.6	1.8	1	3	9	8	22	1	0	0	0
3	Full Rate, 228-42-195	B	98	6.5	1.5	0	1	5	22	28	0	0	0	0
4	75% Rate, 178-42-153	none	98	6.3	2.8	0	2	7	7	15	1	0	0	0
5	75% Rate, 178-42-153	B	97	6.8	2.5	0	2	7	8	17	1	0	0	1
<i>LSD</i> ⁶			--	--	--	2	ns	ns	ns	ns	ns	--	--	ns
<i>P Value</i>			--	--	--	0.0449	0.3818	0.2766	0.0530	0.1718	0.3901	--	--	0.5767

¹A, 4 qts/A in furrow at planting; B, 2 qts/A in furrow at planting, 2 qts/A banded at hilling.

²Early Vigor was rated on a 1 to 9 scale 35 DAP. A "6" rating is "plants 6 to 8 inches in height". A "7" rating is "plants 8 to 10 inches in height".

³Vine Maturity was rated on a 1 to 9 scale at harvest. A "3" rating is "plants yellow and dying". A "1" rating is "plants dead".

⁴Total culls include the sum of growth cracks, mishapen, sunburned and rotten/misc.

⁵Percent tubers; HH, hollow heart; BR, brown rot; CRS, corky ring spot; IHN, internal heat necrosis

⁶Means separated within columns by Tukey's Studentized Range (HSD) Test.