

# CHAPTER 4. RED AND PURPLE-SKINNED FRESH MARKET POTATO VARIETY TRIAL, 2003

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## *General Comments*

A goal of the red/purple-skinned fresh market variety trial is to identify a red potato that has better quality and production characteristics than Red LaSoda or LaRouge. Identification of “specialty” potatoes that expand the marketable varieties produced in Florida is also a priority. Established varieties were included to provide a baseline for the numbered clones.

## *Planting Information*

Planting Site	PSREU, Yelvington Farm, Hastings, FL
Planting Date	January 28, 2003
Vine Kill Date	May 1, 2003
Harvest Date	May 19, 2003
Season Length	93 days planting to vine kill; 111 days planting to harvest
Fertilizer Program	preplant, 100-43-86 lb/A; sidedress, 50-0-42 lb/A; 80-0-69 lb/A
Irrigation Program	seepage

## *Experimental Design*

Number of Varieties	10 (Standard: Red LaSoda and LaRouge)
Number of Clones	10
Within Row Spacing	8 in (20 cm)
Between Row Spacing	40 in (102 cm)
Replications	4
Plot Size	16 ft (4.9 m)

## *Production Statistics*

Early Vigor Ratings	36 days after planting
Highest Total Yield	B1523-4 (561 cwt/acre or 62.9 MT/ha)
Highest Marketable Yield	Red LaSoda 10 (485 cwt/acre or 54.3MT/ha)
Best Appearance Rating	Super Red Norland and B0811-4 (7.3, good to excellent)

## *Specific Comments*

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**Red LaSoda (MFX).** *Red.* Red LaSoda total and marketable tuber yields were 495 and 419 cwt/acre, respectively. Potato tuber skin color was red to pink with a moderately smooth to smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as 'mostly round' to 'round to oblong' with an eye depth of deep to intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for Red LaSoda tubers was 1.059.

**Chieftain (MFX).** *Red.* Chieftain total and marketable tuber yields were 477 and 436 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white. Tuber shape was rated as 'round to oblong' with an eye depth of deep to intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for Chieftain tubers was 1.062.

**LaRouge (MFX).** *Red.* LaRouge total and marketable tuber yields were 521 and 452 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white. Tuber shape was rated as 'mostly round' to 'round to oblong' with an eye depth of deep to intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for LaRouge tubers was 1.060.

**Michigan Purple (MSU).** *Purple.* Michigan Purple total and marketable tuber yields were 496 and 457 cwt/acre, respectively. Potato tuber skin color was purple with a moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as 'round to oblong' to 'mostly oblong' with an eye depth of deep to intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading to upright with a fair canopy. Plant maturity at vine kill was rated as green and vigorous to starting to senesce. Average specific gravity for Michigan Purple tubers was 1.064.

**Pontiac (MFX).** *Red.* Pontiac total and marketable tuber yields were 510 and 448 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as 'round to oblong' to 'mostly oblong' with an eye depth of intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce. Average specific gravity for Pontiac tubers was 1.056.

**Red LaSoda 10 (Windy Mountain Farms).** *Red.* Red LaSoda 10 total and marketable tuber yields were 540 and 485 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as 'mostly round' to 'round to oblong' with an eye depth of intermediate to deep. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately mature. Average specific gravity for Red LaSoda 10 tubers was 1.061.

**Red LaSoda 13 (MFX).** *Red.* Red LaSoda 13 total and marketable tuber yields were 512 and 430 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as 'round to oblong' with an eye depth of intermediate to deep. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately mature. Average specific gravity for Red LaSoda 13 tubers was 1.060.

**Rideau (MFX).** *Red.* Rideau total and marketable tuber yields were 479 and 421 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as green and vigorous to starting to senesce. Average specific gravity for Rideau tubers was 1.066.

**Super Red Norland (MFX).** *Red.* Super Red Norland total and marketable tuber yields were 362 and 275 cwt/acre, respectively. Potato tuber skin color was red with a slightly netted texture. Tuber flesh color was cream. Tuber shape was rated as ‘round’ to ‘mostly round’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as good to excellent. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading with a good canopy. Plant maturity at vine kill was rated as yellow and dying to completely dead. Average specific gravity for Super Red Norland tubers was 1.054. Nine percent of tubers at harvest had both hollow heart and internal heat necrosis.

**All Blue (MFX).** *Purple.* All Blue total and marketable tuber yields were 441 and 170 cwt/acre, respectively. Potato tuber skin color was purple with a slightly netted texture. Tuber flesh color was purple. Tuber shape was rated as ‘oblong to long’ to ‘mostly long’ with an eye depth of deep to intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for All Blue tubers was 1.066.

**B0811-4 (USDA).** *Red.* B0811-4 total and marketable tuber yields were 331 and 259 cwt/acre, respectively. Potato tuber skin color was red to pink with a slightly netted to moderately smooth texture. Tuber flesh color was light to medium yellow. Tuber shape was rated as ‘round’ to ‘mostly round’ with an eye depth of intermediate. Overall external tuber appearance was noted as good to excellent. Early plant vigor (size) was rated as plants less than 2 inches. Vine type at full flower was rated as upright with a fair canopy. Plant maturity at vine kill was rated as starting to senesce. Average specific gravity for B0811-4 tubers was 1.080.

**B0984-1 (USDA).** *Red.* B0984-1 total and marketable tuber yields were 488 and 409 cwt/acre, respectively. Potato tuber skin color was red to pink with a netted to slightly netted texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘mostly round’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a fair canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for B0984-1 tubers was 1.067.

**B1145-2 (USDA).** *Red.* B1145-2 total and marketable tuber yields were 372 and 303 cwt/acre, respectively. Potato tuber skin color was red with a slightly netted to moderately smooth texture. Tuber flesh color was white. Tuber shape was rated as ‘round’ to ‘mostly round’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading to upright with a fair canopy. Plant maturity at vine kill was rated as yellow and dying. Average specific gravity for B1145-2 tubers was 1.060.

**B1523-4 (USDA).** *Red.* B1523-4 total and marketable tuber yields were 561 and 454 cwt/acre, respectively. Potato tuber skin color was red with a netted to slightly netted texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘mostly round’ to ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 8 to 10 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for B1523-4 tubers was 1.066. Tubers at harvest were noted as “flat”.

**B1758-3 (USDA).** *Red.* B1758-3 total and marketable tuber yields were 479 and 405 cwt/acre, respectively. Potato tuber skin color was purple to red with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘mostly round’ to ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as upright with a fair canopy. Plant maturity at

vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for B1758-3 tubers was 1.064.

**B1758-4 (USDA).** *Red.* B1758-4 total and marketable tuber yields were 478 and 375 cwt/acre, respectively. Potato tuber skin color was purple to red with a slightly netted to moderately smooth texture. Tuber flesh color was cream. Tuber shape was rated as ‘mostly round’ to ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as good to excellent. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as upright with a fair canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for B1758-4 tubers was 1.063. Five percent of tubers at harvest had hollow heart.

**B1763-4 (USDA).** *Purple.* B1763-4 total and marketable tuber yields were 466 and 427 cwt/acre, respectively. Potato tuber skin color was purple with a netted to slightly netted texture. Tuber flesh color was white. Tuber shape was rated as ‘round to oblong’ to ‘mostly oblong’ with an eye depth of intermediate. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce. Average specific gravity for B1763-4 tubers was 1.073. Tuber skin color was noted at harvest as “dark purple”.

**B1816-5 (USDA).** *Purple.* B1816-5 total and marketable tuber yields were 461 and 400 cwt/acre, respectively. Potato tuber skin color was purple with a netted to slightly netted texture. Tuber flesh color was medium to dark yellow. Tuber shape was rated as ‘round to oblong’ to ‘mostly oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 2 to 4 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as green and vigorous to starting to senesce. Average specific gravity for B1816-5 tubers was 1.062.

**B1952-2 (USDA).** *Purple.* B1952-2 total and marketable tuber yields were 412 and 375 cwt/acre, respectively. Potato tuber skin color was purple with a slightly netted to moderately smooth texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘round to oblong’ to ‘mostly oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as upright with a fair to good canopy. Plant maturity at vine kill was rated as green and vigorous to starting to senesce. Average specific gravity for B1952-2 tubers was 1.078.

**NY129 (Cornell).** *Red.* NY129 total and marketable tuber yields were 437 and 394 cwt/acre, respectively. Potato tuber skin color was red with a slightly netted texture. Tuber flesh color was white. Tuber shape was rated as ‘mostly round’ to ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as upright with a fair to good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for NY129 tubers was 1.060.

**S45-5 (Cornell).** *Purple.* S45-5 total and marketable tuber yields were 310 and 195 cwt/acre, respectively. Potato tuber skin color was purple with a netted to slightly netted texture. Tuber flesh color was purple. Tuber shape was rated as ‘oblong’ to ‘oblong to long’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading with a fair canopy. Plant maturity at vine kill was rated as moderately senesced to yellow and dying. Average specific gravity for S45-5 tubers was 1.067.

**W2275-3R (UW).** *Red.* W2275-3R total and marketable tuber yields were 400 and 308 cwt/acre, respectively. Potato tuber skin color was red with a slightly netted texture. Tuber flesh color was white to cream. Tuber shape was rated as ‘mostly round’ to ‘round to oblong’ with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 6 to 8 inches. Vine type at full flower was rated as spreading with a fair canopy. Plant maturity at vine kill was rated as moderately senesced to yellow and dying. Average specific gravity for W2275-3R tubers was 1.059.

**W2275-9R (UW).** *Red.* W2275-9R total and marketable tuber yields were 505 and 438 cwt/acre, respectively. Potato tuber skin color was purple to red with a slightly netted to moderately smooth texture. Tuber flesh color was white. Tuber shape was rated as 'round to oblong' with an eye depth of intermediate to shallow. Overall external tuber appearance was noted as fair to good. Early plant vigor (size) was rated as 4 to 6 inches. Vine type at full flower was rated as spreading to upright with a good canopy. Plant maturity at vine kill was rated as starting to senesce to moderately senesced. Average specific gravity for W2275-9R tubers was 1.067.

Table 9. Production statistics for Red and Purple Fresh Market potato selections.

Clone	Total	Marketable Yield <sup>1</sup>		Size						Size Class		Specific Gravity
	Yield (cwt/A)	(cwt/A)	% of standard	Distribution by Class (%) <sup>2</sup>						Range (%)		
				C	B	A1	A2	A3	A4	A1 to A3	A2 to A3	
Red LaSoda	495	419	100	5	3	37	34	20	1	92	54	1.059
All Blue	441	170	41	26	35	39	0	0	0	39	0	1.066
Chieftain	477	436	104	3	4	49	40	5	0	93	44	1.062
LaRouge	521	452	108	3	4	40	35	19	0	93	54	1.060
Michigan Purple	496	457	109	2	2	33	40	22	0	95	62	1.064
Pontiac	510	448	107	5	4	41	34	16	0	91	50	1.056
Red LaSoda 10	540	485	116	3	2	24	33	36	1	94	70	1.061
Red LaSoda 13	512	430	103	6	3	41	36	13	0	91	50	1.060
Rideau	479	421	100	5	4	40	37	15	0	91	52	1.066
Super Red Norland	362	275	65	10	10	61	14	5	0	80	19	1.054
B0811-4	331	259	62	11	10	64	13	2	0	79	15	1.080
B0984-1	488	409	97	6	4	36	30	24	0	89	54	1.067
B1145-2	372	303	72	8	6	59	22	5	0	86	27	1.060
B1145-2	350	280	67	9	8	60	19	4	0	83	23	1.060
B1523-4	561	454	108	5	4	33	32	23	3	89	55	1.066
B1758-3	479	405	97	6	6	53	25	10	0	88	35	1.064
B1758-4	478	375	90	10	7	53	21	8	0	82	29	1.063
B1763-4	466	427	102	2	3	39	40	15	1	94	54	1.073
B1816-5	461	400	95	5	5	51	33	6	0	90	39	1.062
B1952-2	412	375	89	3	3	41	42	10	0	94	53	1.078

Table 9 (con't). Production statistics for Red and Purple Fresh Market potato selections.

Clone	Total	Marketable Yield <sup>1</sup>		Size						Size Class		Specific Gravity
	Yield (cwt/A)	(cwt/A)	% of standard	Distribution by Class (%) <sup>2</sup>						Range (%)		
				C	B	A1	A2	A3	A4	A1 to A3	A2 to A3	
NY129	437	394	94	4	4	50	34	8	0	92	42	1.060
S45-5	310	195	47	13	18	65	4	0	0	69	4	1.067
W2275-3R	400	308	73	11	10	64	14	1	0	79	15	1.059
W2275-9R	505	438	104	6	5	51	34	5	0	89	39	1.067
<i>LSD</i> <sup>3</sup>	50	56		3	3	11	9	8	1	6	12	0.003
<i>P Value</i>	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001	0.0020	0.0001	0.0001	0.0001

<sup>1</sup>Marketable Yield: size classes A1 to A3.

<sup>2</sup>Size 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"

<sup>3</sup>Means separated within columns by the LSD means separation test.

Table 10. Plant growth and tuber characteristics of Red and Purple Fresh Market potato selections.

Clone	Plant Growth Characteristics				Tuber Characteristics <sup>1</sup>					
	% Stand	Early Vigor	Vine Type	Vine Maturity	IFC	SC	ST	TS	ED	APP
Red LaSoda	100	5.5	6-9	6.0	1.7	2.7	7.3	2.7	3.7	5.7
All Blue	98	4.8	6-9	6.3	9.0	1.0	6.0	6.7	4.3	5.3
Chieftain	98	5.3	9	6.5	1.0	2.3	6.3	3.0	4.3	5.3
LaRouge	98	6.0	9-6	6.8	1.0	2.7	6.7	2.7	4.3	6.0
Michigan Purple	97	5.8	5-8	7.3	1.3	1.0	7.0	3.7	4.3	6.7
Pontiac	98	6.0	9	7.0	1.3	2.7	6.3	3.3	5.0	5.3
Red LaSoda 10	99	4.8	9-6	6.3	1.7	2.3	6.7	2.7	4.7	5.3
Red LaSoda 13	96	5.0	9-6	6.8	1.7	2.7	6.7	3.0	4.7	5.3
Rideau	98	4.8	9-6	7.5	1.7	2.7	6.7	3.0	5.3	5.3
Super Red Norland	99	6.3	6	2.8	2.0	2.0	6.0	1.7	5.3	7.3
B0811-4	88	3.0	8	7.0	3.7	2.3	6.3	1.7	5.0	7.3
B0984-1	100	4.8	8-5	6.0	1.3	2.3	5.7	2.0	6.0	6.3
B1145-2	97	5.5	5-8	3.0	1.0	2.0	6.3	1.7	6.3	7.0
B1145-2	96	6.0	8-5	3.0	1.0	2.0	6.7	2.0	6.0	6.3
B1523-4	100	7.3	6-9	5.5	1.3	2.0	5.7	2.7	5.3	5.3
B1758-3	97	5.5	8	5.5	1.3	1.8	6.3	2.3	5.3	6.0
B1758-4	99	5.8	8	5.3	2.0	1.8	6.7	2.3	5.7	7.3
B1763-4	99	5.3	6-9	7.0	1.0	1.0	5.7	3.3	5.0	5.3
B1816-5	98	4.3	9-6	8.3	4.7	1.0	5.3	3.3	5.7	5.7
B1952-2	97	5.8	8-9	8.0	1.7	1.0	6.3	3.3	5.3	5.7

Table 10 (con't). Plant growth and tuber characteristics of Red and Purple Fresh Market potato selections.

Clone	Plant Growth Characteristics				Tuber Characteristics <sup>1</sup>					
	% Stand	Early Vigor	Vine Type	Vine Maturity	IFC	SC	ST	TS	ED	APP
NY129	97	4.8	8-9	6.0	1.0	2.0	6.0	2.3	5.7	5.7
S45-5	99	6.0	5	4.8	9.0	1.0	5.3	5.3	5.3	6.3
W2275-3R	99	6.3	5	4.8	1.7	2.0	6.0	2.3	5.7	6.7
W2275-9R	99	5.3	6-9	6.3	1.0	1.8	6.7	3.0	5.3	5.3

<sup>1</sup> - See rating system outlined Tables 1 and 2 (pages 8 and 9).

Table 11. External and internal tuber defects of Red and Purple Fresh Market potato selections.

Clone	% External Tuber Defects					% Internal Defects <sup>2</sup>			
	Growth Cracks	Mis- shapen	Sun- burned	Rotten & misc.	Total Culls <sup>1</sup>	HH	BR	CRS	IHN
Red LaSoda	1	4	1	1	7	1	0	0	4
All Blue	0	2	0	0	3	0	0	0	0
Chieftain	0	0	1	1	2	0	0	0	0
LaRouge	0	4	2	1	7	0	0	0	1
Michigan Purple	0	2	1	0	3	0	0	0	0
Pontiac	0	0	2	1	3	1	0	0	0
Red LaSoda 10	0	2	1	1	5	1	0	0	0
Red LaSoda 13	0	5	1	2	8	0	0	0	1
Rideau	0	2	1	1	4	0	0	0	0
Super Red Norland	0	1	2	2	6	9	0	0	9
B0811-4	0	0	0	0	1	0	0	0	0
B0984-1	0	0	0	6	6	0	0	0	0
B1145-2	0	1	1	4	5	0	0	0	0
B1145-2	0	0	2	2	4	0	0	0	0
B1523-4	0	2	2	5	8	0	0	0	0
B1758-3	1	1	2	1	4	3	0	0	0
B1758-4	0	2	1	2	5	5	0	0	0
B1763-4	0	0	0	2	2	1	0	0	4
B1816-5	0	3	0	1	4	3	0	0	0
B1952-2	0	0	1	2	3	3	0	0	0

Table 11 (con't). External and internal tuber defects of Red and Purple Fresh Market potato selections.

Clone	% External Tuber Defects					% Internal Defects <sup>2</sup>			
	Growth Cracks	Mis-shapen	Sun-burned	Rotten & misc.	Total Culls <sup>1</sup>	HH	BR	CRS	IHN
NY129	0	0	1	1	2	0	0	0	0
S45-5	0	6	0	3	9	0	0	0	0
W2275-3R	0	0	0	2	3	0	0	0	0
W2275-9R	0	0	0	2	3	0	0	0	0
<i>LSD</i> <sup>3</sup>	ns	3	1	2	3	3	ns	ns	4
<i>P Value</i>	0.2771	0.0001	0.0086	0.0001	0.0001	0.0004	-	-	0.0038

<sup>1</sup>Percent of Total Yield. Total culls include the sum of growth cracks, mishapen, sunburned and rotten/misc.

<sup>2</sup>Percent tubers; HH, hollow heart; BR, brown rot; CRS, corky ring spot; IHN, internal heat necrosis.

<sup>3</sup>Means separated within columns by the LSD means separation test.

