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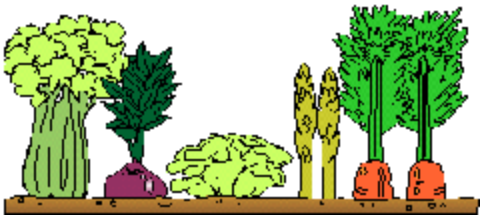

Vegetarian Newsletter

A Vegetable Crops Extension Publication
Vegetarian 01-12
December 2001

University of Florida
Institute of Food and Agricultural Sciences
Cooperative Extension Service

Print Version

EVENTS CALENDER

COMMERCIAL VEGETABLES

- Snack Food Association Potato Variety Trial, 2001
- Copper Toxicity of Vegetable Crops
- Spring 2001 GCREC Cantaloupe Variety Evaluation
- Spring 2001 GCREC Tomato Variety Evaluation
- Sensory Evaluation of Cantaloupe Varieties in North Florida

VEGETABLE GARDENING

- No article this month

List of Extension Vegetable Crops Specialists

Events Calender

2002 Postharvest Horticulture Industry Tour - March 4-7, 2002. Visit postharvest operations from harvest through shipping in central and southwest Florida. Special rates are available for county and statewide faculty. Contact Steve Sargent (sasa@mail.ifas.ufl.edu, 352-392-1928, ext. 215) or Mark Ritenour (mrit@gnv.ifas.ufl.edu, 561-467-3877).

Cucurbitaceae 2002 - December 8-12, 2002 - Naples Beach and Golf Club, Naples, FL. Contact Donald N. Maynard at (941)751-7636 x239 or dnma@mail.ifas.ufl.edu.

Commercial Vegetable Production

Snack Food Association Potato Variety Trial, 2001

Cooperators:

Chad Hutchinson, Hastings REC, University of Florida/IFAS, P.O. Box 728, Hastings, FL. Telephone: 904-692-1792, Email: cmhutch@ufl.edu.
Marion White, Mid-Florida REC, University of Florida/IFAS, 2725 Binion Road, Apopka, FL. Telephone: 407-884-2034.
Pete Weingartner, Hastings REC, University of Florida/IFAS, P.O. Box 728, Hastings, FL. Telephone: 904-692-1792.

General Comments:

Chip potato production is valued at over $100 M annually in Florida. Chip potatoes are grown in many areas of the state although the greatest concentration of chip potato acreage (20 k + acres) is in Hastings. The goal of the Snack Food Association Potato Variety Trial is to find a chip potato with better quality and production characteristics than Atlantic, the standard Florida chip variety. Varieties and clones are submitted for evaluation in the program by unviersity, USDA, and private breeding programs. Clones are evaluated under Florida's short day growing conditions for higher gravity, better production, improved chip color, and improved disease resistance compared to Atlantic. (See Tables 1, 2, 3 and 4.)

Planting Site: Hastings REC, Yelvington Farm
Planting Date/Harvest Date: February 16, 2001; June 4, 2001
Season Length: 108 days
Growing Conditions: A dry season with average temperatures and a low incidence of Late Blight resulted in higher than average tuber yields in North Florida.
Experimental Design: Each variety/clone was planted in a single 200 ft row as dictated by the SFA protocol. Four 20 ft sections of each row were harvested and graded. This was not a replicated experiment. Only means were calculated.
Row Spacing: 8 inches in-row, 40 inches between-row
Fertilizer: preplant, 168-24-144 lb/A; sidedress, 98-14-84 lb/A
Pest Control: Telone II, 6 gpa December 20, 2001
Temik 15G, 20 lb/A, February 16, 2001
Sencor DF, 16 oz/A, at hilling
Fungicides, IPM program
Early Plant Size (Early Vigor): Rated 39 days after planting
Highest Total Yield: Atlantic (410 cwt/acre)
Highest Marketable Yield: W1431 (374 cwt/acre)
Best Overall Tuber Appearance: NY120 (5.7), AF1424-7 (5.7)

Specific Comments:

Atlantic. Total and marketable yields were 410 and 335 cwt/acre, respectively. Potato tuber skin color was tan with a slightly netted texture. Tuber flesh color was white to cream. Tubers were rated as round to oblong with intermediate

to shallow eyes. Overall external tuber appearance was noted as fair. Early plant size was rated between 4 and 6 inches. Plant maturity at harvest was scored as yellow and dying to completely dead. Scab was noted on tubers when harvested. Average specific gravity for Atlantic tubers was 1.078. The Agtron reading was 55 with 4% external defects. Chips were noted as “fairly bright”.

La Chipper. Total and marketable yields were 266 and 244 cwt/acre, respectively. Potato tuber skin color was tan to smooth with a moderately smooth texture. Tuber flesh color was white. Tubers were rated as round to oblong with deep to intermediate eyes. Overall external tuber appearance was noted as fair. Early plant size was rated between 6 and 8 inches. Plant maturity at harvest was rated as completely dead. Mild scab was noted on tubers when harvested. Average specific gravity for La Chipper tubers was 1.070. The Agtron reading was 54 with 1% external defects. Chips were noted as “dark golden”.

Snowden. Total and marketable yields were 315 and 286 cwt/acre, respectively. Potato tuber skin color was tan with a slightly netted texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate eyes. Overall external tuber appearance was scored as fair to good. Early plant size was between 8 and 10 inches. Plant maturity at harvest was scored as moderately mature to yellow and dying. Mild scab and large lenticels were noted on tubers when harvested. Average specific gravity for Snowden tubers was 1.079. The Agtron reading was 57 with 3% external defects.

AF1424-7. Total and marketable yields were 204 and 177 cwt/acre, respectively. Potato tuber skin color was buff to white with a slightly netted texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair to good. Early plant size was rated between 8 and 10 inches. Plant maturity at harvest was scored as completely dead. Scab and large lenticels were noted on tubers when harvested. Average specific gravity for AF1424-7 tubers was 1.077. The Agtron reading was 62 with 7% external defects. Chips were noted as “nice”.

AF1775-2. Total and marketable yields were 373 and 353 cwt/acre, respectively. Potato tuber skin color was tan to buff with a moderately smooth texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair to good. Early plant size was rated as 2 inches or less. Plant maturity at harvest was scored as yellow and dying. Scab was noted on tubers when harvested. Average specific gravity for AF1775-2 tubers was 1.075. The Agtron reading was 58 with 2% external defects.

B0766-3. Total and marketable yields were 336 and 293 cwt/acre, respectively. Potato tuber skin color was buff with a slightly netted texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair to good. Early plant size was rated between 4 and 6 inches. Plant maturity at harvest was scored as yellow and dying to completely dead. Scab was noted on tubers when harvested. Average specific gravity for B0766-3 tubers was 1.070. The Agtron reading was 58 with no defects.

NDTX4930-5W. Total and marketable yields were 333 and 276 cwt/acre, respectively. Potato tuber skin color was tan to buff with a moderately smooth texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair. Early plant size was rated between 6 to 8 inches. Plant maturity at harvest was scored as completely dead. Large lenticels were noted on tubers when harvested. Average specific gravity for NDTX4930-5W tubers was 1.068. The Agtron reading was 54 with 1% external defects. Chips were noted as “good appearance”.

NY120. Total and marketable yields were 297 and 273 cwt/acre, respectively. Potato tuber skin color was brown to tan with a netted to slightly netted texture. Tuber flesh color was white. Tubers were rated as mostly round to round/oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair to good. Early plant size was rated between 8 and 10 inches. Plant maturity at harvest was rated as yellow and dying to completely

dead. Scab was noted on tubers when harvested. Average specific gravity for NY120 tubers was 1.077. The Agtron reading was 48 with 1% internal defects. Chips were noted as “dark golden”.

MSA091-1. Total and marketable yields were 301 and 263 cwt/acre, respectively. Potato tuber skin color was buff with a moderately smooth texture. Tuber flesh color was white. Tubers were rated as mostly round to round/oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair. Early plant size was rated between 8 and 10 inches. Plant maturity at harvest was scored as completely dead. Tubers were noted as misshaper when harvested. Average specific gravity for MSA091-1 tubers was 1.076. The Agtron reading was 53 with 13% internal defects.

MSG227-2. Total and marketable yields were 295 and 257 cwt/acre, respectively. Potato tuber skin color was brown with a slightly netted to netted texture. Tuber flesh color was white. Tubers were rated as mostly oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair. Early plant size was rated between 4 and 6 inches. Plant maturity at harvest was scored as completely dead. Scab was noted on tubers when harvested. Average specific gravity for MSG227-2 tubers was 1.071. The Agtron reading was 57 with 3% internal and 3% external defects. Chips were noted as having an “oblong appearance”.

W1355-1. Total and marketable yields were 170 and 152 cwt/acre, respectively. Potato tuber skin color was tan to buff with a slightly netted texture. Tuber flesh color was white. Tubers were rated as round to oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as fair. Early plant size was between 6 and 8 inches. Plant maturity at harvest was rated as yellow and dying to completely dead. Average specific gravity for W1355-1 tubers was 1.079. The Agtron reading was 51 with 1% internal defects.

W1431. Total and marketable yields were 374 and 356 cwt/acre, respectively. Potato tuber skin color was buff with a lightly netted to moderately smooth texture. Tuber flesh color was white. Tubers were rated as mostly oblong with intermediate to shallow eyes. Overall external tuber appearance was noted as poor to fair. Early plant size was rated between 4 and 6 inches. Plant maturity at harvest was scored as yellow and dying to completely dead. Tubers were noted as misshapen when harvested. Average specific gravity for W1431 tubers was 1.074. The Agtron reading was 52 with 2% external defects. Chips were noted as "dark golden".

Table 1. Snack Food Association Trial. Total yield, marketable yield, percentage of yield by grade, size distribution, percent culls, and specific gravity of chipping potato clones grown in Hastings, FL – 2001.

Clone	Total Yield (cwt/A)	Marketable Yield[1]		Size					Size			Specific Gravity
		(cwt/A)	percent of standard	Distribution by Class (%)[2]					Distribution (%)			
				1	2	3	4	5	2 to 4	3 to 4	culls	
Season–108 days												
Atlantic	410	335	100	2	29	39	30	0	98	69	16	1.078
LaChipper	266	244	73	4	44	42	10	0	96	52	5	1.070
Snowden	315	286	85	3	39	41	15	2	95	56	4	1.079
AF1424-7	204	177	53	9	54	33	4	0	91	37	5	1.077
AF1775-2	373	353	105	1	23	37	39	0	99	75	4	1.075
B0766-3	336	293	87	4	30	34	32	1	95	66	8	1.070
NDTX4930-5W	333	276	82	5	56	37	2	0	95	39	13	1.068
NY120	297	273	81	4	49	41	6	0	96	47	5	1.077

MSA091-1	301	263	79	4	52	43	1	0	96	44	9	1.076
MSG227-2	295	257	77	9	74	17	0	0	91	17	4	1.071
W1355-1	170	152	45	6	62	31	0	0	94	31	4	1.079
W1431	374	356	106	3	44	45	8	0	97	53	2	1.074
Average	306	272										1.074

Planted on February 16, 2001, fertilizer rate was 168-24-144/A plus 98-14-84/A side dressed, harvested on June 4, 2001.

[1] - Marketable Yield: size classes 2 to 4.

[2] - Size classes: 1 = <1 7/8", 2 = 1 7/8 to 2.5", 3 = 2.5 to 3.25", 4 = 3.25 to 4", 5 = >4"; Size Distribution by Class was calculated with the following formula: Class (wt)/Total Yield (wt) – culls (wt)

Table 2. Snack Food Association Trial. Yield, vine maturity, tuber characteristics, and internal defects of chipping potato clones grown in Hastings, FL - 2001.

Clone	Total Yield (cwt/A)	Marketable Yield (cwt/A)	Vine Maturity[1]	Tuber Characteristics[1]						Internal Defects[2]			
				IFC	SC	ST	TS	ED	APP	HH	BR	CRS	INT
Season–108 days													
Atlantic	410	335	2.0	1.3	6.0	6.0	3.3	6.3	5.0	1	0	0	3
LaChipper	266	244	1.0	1.0	6.7	7.0	3.7	4.7	5.0	0	0	0	0
Snowden	315	286	3.5	1.0	6.0	6.0	3.3	5.0	5.3	0	0	0	1
AF1424-7	204	177	1.0	1.0	7.3	6.7	3.0	6.3	5.7	0	0	0	0
AF1775-2	373	353	3.0	1.0	6.7	7.0	3.3	6.0	5.3	0	0	0	4
B0766-3	336	293	1.5	1.0	7.0	6.0	3.0	6.3	5.3	0	0	0	0
NDTX4930-5W	333	276	1.0	1.0	6.7	7.0	3.3	6.3	5.0	0	0	0	0
NY120	297	273	1.5	1.0	5.3	5.7	2.7	6.3	5.7	0	0	0	0
MSA091-1	301	263	1.0	1.0	7.0	7.0	2.7	6.0	5.0	0	0	0	1
MSG227-2	295	257	1.0	1.0	5.0	5.7	4.0	6.3	5.0	0	0	0	0
W1355-1	170	152	2.0	1.0	6.3	6.0	3.0	6.0	5.0	0	0	1	0
W1431	374	356	1.5	1.0	7.0	6.7	4.0	5.7	4.7	1	0	0	0

[1] See rating system outlined in Florida Rating Code Table (Table 4).

[2] Percent of tubers with defects. HH = hollow heart, BR = brown rot, CRS = corky ring spot, INT = internal browning.

Table 3. Snack Food Association Trial. Chip quality data for chipping potato clones grown in Hastings, FL – 2001.

Clone	Total Yield (cwt/A)	Marketable Yield (cwt/A)	Chip Data[1]				
			Wise Defect Score		Wise Agtron	SG	Comments
			External	Internal			
Season–108 days							
Atlantic	410	335	4	0	55	1.078	fairly bright
LaChipper	266	244	1	0	54	1.070	dark golden
Snowden	315	286	3	0	57	1.079	
AF1424-7	204	177	7	0	62	1.077	nice
AF1775-2	373	353	2	0	58	1.075	
B0766-3	336	293	0	0	58	1.070	
NDTX4930-5W	333	276	1	0	54	1.068	good appearance
NY120	297	273	0	1	48	1.077	dark golden
MSA091-1	301	263	0	13	53	1.076	
MSG227-2	295	257	3	3	57	1.071	oblong appearance
W1355-1	170	152	0	1	51	1.079	
W1431	374	356	2	0	52	1.074	dark golden
Average	306	272			55	1.074	

[1]Color: 58 minimum acceptable; defects: 15 maximum combined internal and external allowed. Defects are defined as any imperfection equal to or greater than 3/16 inch in diameter.

Table 4. Florida Rating Codes for Potato Plant and Potato Tuber Characteristics[1]

Plant Characteristics

Rating Code	Early Vigor	Plant Size	Vine Maturity	Plant Type	Vine Maturity at Harvest/Vinekill	
0	No Emergence					
1	Plants Just Emerged	Very Small	Very Early	Decumbent – Poor	Dead	
2	Leaves in Rosette	--	Early	Decumbent – Fair	--	
3	Emerged Leaves Open	Small	+	Decumbent – Good	Yellow and Dying	

4	Plants < 2"	--	Medium Early	Spreading – Poor	--	
5	Plants 2" to 4"	Medium	Medium	Spreading – Fair	Moderately Mature	
6	Plants 4" to 6"	--	Medium Late	Spreading – Good	--	
7	Plants 6" to 8"	Large	+	Upright – Poor	Starting to Mature	
8	Plants 8" to 10"	--	Late	Upright – Fair	--	
9	Plants > 10"	Very Large	Very Late	Upright - Good	Green and Vigorous	
Tuber Characteristics						
Rating Code	Internal Flesh Color	Skin Color	Skin Texture	Tuber Shape	Eye Depth	Overall Appearance
1	White	Purple	Part. Russet	Round	Very Deep	Very Poor
2	Cream	Red	Heavy Russet	Mostly Round	--	--
3	Light Yellow	Pink	Mod. Russet	Round to Oblong	Deep	Poor
4	Medium Yellow	Dark Brown	Light Russet	Mostly Oblong	--	--
5	Dark Yellow	Brown	Netted	Oblong	Intermediate	Fair
6	Pink	Tan	Slightly Netted	Oblong to Long	--	--
7	Red	Buff	Mod. Smooth	Mostly Long	Shallow	Good
8	Blue	White	Smooth	Long	--	--
9	Purple	Cream	Very Smooth	Cylindrical	Very Shallow	Excellent
[1]Based on the standard NE 184 rating codes for plant and tuber characteristics.						

(Hutchinson - Vegetarian 01-12)

Copper Toxicity of Vegetable Crops

Copper (Cu) is an essential micronutrient for plant growth. It is an important component of proteins found in the enzymes that regulate biochemical reactions in plants. Copper-deficient plants are stunted and have short internodes and necrotic young leaves. Optimal Cu contents in leaves for most vegetable crops are 1-10 ppm. Copper deficiency often occurs in soils with high pH and in organic soils where Cu is complexed to organic substances. In early 50s, Cu fertilizer significantly increased crop production in Belle Glade area. Most mineral soils in Florida contain adequate amounts of Cu for optimum vegetable yields. Actually, high Cu concentrations in some soils cause toxicity to crops.

A recent study reported the background Cu concentrations for Florida surface soils are 0.2-22 ppm. However, some soils have as high as 1500 ppm for total Cu and 200 ppm for plant available Cu. Copper was accumulated in soils through application of fungicides, fertilizers, animal manures, and municipal solid wastes. Copper-formulated fungicides are probably a main source for most high Cu soils.

Copper toxicity to citrus was first reported in Florida as early as 1954. We did not find literatures on Cu toxicity to vegetable crops in Florida. However, for last several years I have seen Cu toxicity symptoms on various vegetable crops in south Florida. Recently, we evaluated effects of Cu on 6 vegetable crops (mustard, Chinese cabbage, tomato pea, sweet corn, snap bean) in the Indian River Research and Education Center at Ft. Pierce. Growth of mustard, tomato and sweet corn were significantly reduced in the solution containing 10 ppm Cu. Chinese cabbage, pea and snap bean relatively resisted to Cu toxicity.

Copper toxicity symptoms include plant stunting, a bluish tint to leaf color, and leaf cupping followed by chlorosis or necrosis. Feeder roots may become darkened. Crops planted in high Cu soils often show iron deficiency symptoms. Some literature suggested that the Cu toxicity concentration in leaves is 150 ppm while other proposed toxicity levels as low as 20-30 ppm. There are large differences in Cu tolerance among crops. Bean is much more tolerant than sweet corn.

Copper is tightly adsorbed by most soils and will not easily leach. Therefore, once Cu accumulates in a soil and toxicity problem develops, it is very difficult to alleviate it. Several approaches may prevent or reduce Cu toxicity to vegetable crops: 1) testing soils before planting vegetables, especially for old citrus or avocado lands; 2) planting Cu-tolerant crops or varieties; 2) liming acid soil to pH 6.5; 3) using soil organic amendments; and 4) apply iron and other fertilizers to stimulate root growth.

(Yuncong Li and Zhenli He- Vegetarian 01-12)

Spring 2001 GCREC Cantaloupe Variety Evaluation

Cantaloupe is included in the melon group *Cucumis melo cantalupensis* in the Cucurbitaceae family. Cantaloupes are a relatively minor crop in Florida so there are no data available on commercial acreage, yield, production or value. However, there has been a great increase in production in west-central Florida and throughout the state in recent years indicating the potential for a strong commercial cantaloupe industry in Florida.

The ideal shipping variety for Florida should combine the following traits: (1) capacity to produce high yields; (2) fruit that is sutureless or nearly so, round to slightly oval, fully netted, a minimum 3 lb weight with a thick, deep salmon interior, a small, tight seed cavity, and high soluble solids; (3) a pleasant aroma and taste; and (4) resistance to fruit rots and foliar diseases, especially downy and powdery mildew. ‘Athena’, introduced several years ago, has become

the industry standard and is largely responsible for the increased acreage. The object of this trial was to further evaluate outstanding varieties from the 2000 trial to identify slightly sutured, heavily netted cantaloupe varieties for potential production in west-central Florida.

Ten cantaloupe hybrids were direct seeded on 15 March in holes that were punched 2 ft apart in the black polyethylene mulch. The 20-ft long plots contained 10 plants each and were replicated four times in a randomized, complete block design. Weed control in row middles was by cultivation and application of paraquat. Pesticides were applied as needed for control of silverleaf whitefly (endosulfan), downy mildew (chlorothalonil, fosetyl-aluminum, azoxystrobin, thiophanate-methyl, and maneb), powdery mildew (trifoxystrobin), and lepidopterous larvae (*Bacillus thuringiensis*, spinosad, esfenvalerate, and methomyl).

Cantaloupes were harvested eight times beginning on 28 May and ending on 13 June. Marketable fruit were separated from culls that included fruit weighing less than 2.0 lb or that were cracked, rotted, or poorly shaped. Observations were made on fruit shape, sutures, and netting. Soluble solids were determined with a hand-held digital refractometer on several fruit from each entry on several harvest dates.

Early yields, as represented by the first two of eight harvests, ranged from 21 cwt/acre for 'Odyssey' to 483 cwt/acre for RML 8726-VP (Table 1). Average fruit weight of early-harvested cantaloupes varied from 4.8 lb for 'Athena' to 8.8 lb for 'Minerva'.

Total marketable yields for the entire season varied from 514 cwt/acre for RML 9602-VP to 773 cwt/acre for RML 8793-VP (Table 1). Seven other entries had yields similar to those of RML 8793-VP. Average fruit weight ranged from 5.0 lb for 'Athena' and PXC 221 to 8.6 lb for RML 9601-VP which was statistically superior to all but one other entry. Soluble solids varied from 10.7% for RML 9602-VP to 13.2% for RML 8793-VP. Very good internal quality is used to describe cantaloupes containing not less than 11% soluble solids. Using this criterion, all but three entries qualify for the very good internal quality designation. Cull fruit was between 64 cwt/acre for RML 8793-VP and 298 cwt/acre for RML 8797-VP. The principal causes of cull fruit were stem-end cracks, fruit rots and misshapen fruit. Marketable fruit per plant varied from 1.7 for RML 8797-VP to 3.3 for 'Athena'.

Previous cantaloupe variety evaluation trials were conducted at this location in the spring 1988, 1990, 1991, 1999 and 2000 seasons. Total marketable yields from cantaloupe hybrids in 2001 ranged from 514 cwt/acre to 773 cwt/acre, in 2000 yields varied from 265 cwt/acre to 681 cwt/acre; in 1999 they ranged from 382 cwt/acre to 660 cwt/acre; in 1991 yields varied from 327 cwt/acre to 547 cwt/acre and in 1990 yields ranged from 300 to 566 cwt/acre. Accordingly, yields in recent years are about 100 cwt/acre greater than those obtained a decade ago. In 2001, yields were still higher with the yields being related largely to large fruit size. Also, some of the more recently introduced hybrids are more dependable producers and have better shipping qualities than those previously available. 'Athena' remains the leading variety. However, growers may want to make trial plantings of 'PXC 221', 'Odyssey', 'Eclipse', or 'Vienna' to evaluate their performance on their own farms.

A complete report of this trial can be obtained from the author at dnma@mail.ifas.ufl.edu

Table 1. Early and total marketable yields, average fruit weight, soluble solids, cull weight, fruit per plant, and plant stands for cantaloupe. Gulf Coast Research and Education Center, Bradenton. Spring 2001.

	Early Harvest[1]			Total Harvest					
Entry	Source	Marketable (cwt/A)[2]	Avg fruit wt (lb)	Marketable (cwt/A)[2]	Avg fruit wt (lb)	Soluble solids (%)	Cull fruit (cwt/A)[2]	Fruit per plant	Plant Stand (%)

RML 8793-VP	Syngenta	337 ab[3]	6.3 bc	773 a	6.0 d	13.2 a	64 c	3.0 ab	100 a
RML 8726-VP	Syngenta	483 a	8.0 ab	766 a	8.0 ab	11.9 a-c	135 bc	2.3 bc	98 a
Minerva	Syngenta	29 d	8.8 a	746 ab	7.7 bc	12.2 a-c	128 bc	2.3 bc	98 a
Athena	Syngenta	124 cd	4.8 c	718 a-c	5.0 e	12.7 ab	86 c	3.3 a	100 a
RML 9601-VP	Syngenta	222 b-d	8.4 a	713 a-c	8.6 a	11.5 a-c	179 a-c	2.2 bc	88 a
PXC 221	Siegers	71 d	5.0 c	681 a-c	5.0 e	12.1 a-c	128 bc	3.1 a	100 a
Odyssey	Sunseeds	21 d	6.3 bc	591 a-c	6.1 d	10.8 bc	229 ab	2.3 bc	95 a
RML 9603-VP	Syngenta	322 a-c	7.3 ab	581 a-c	7.7 bc	10.8 bc	197 a-c	2.1 c	85 a
RML 8797-VP	Syngenta	34 d	8.2 a	545 bc	7.4 bc	11.7 a-c	298 a	1.7 c	98 a
RML 9602-VP	Syngenta	124 cd	7.0 ab	514 c	6.9 c	10.7 c	224 ab	1.8 c	98 a

[1]First two of eight harvests.
[2]Acre = 8712 linear bed feet.
[3]Mean separation in columns by Duncan's multiple range test, 5% level.
[4]Not determined.

Spring 2001 GCREC Tomato Variety Evaluation

In 1999-2000, 43,200 acres of tomatoes were harvested in Florida, yielding 62.2 million 25-pound cartons worth over $418 million. Tomatoes accounted for almost 30% of the total value for all vegetables grown during 1999-2000, making it the most important vegetable produced in the state. The Palmetto-Ruskin area (west-central Florida) accounted for over 36% of the state's total fresh market tomato production in 1999-2000.

A tomato variety trial was conducted in spring 2001 at the Gulf Coast Research and Education Center - Bradenton located in west-central Florida to evaluate fresh market tomato varieties and breeding lines. Twenty-nine entries were evaluated in a replicated yield trial.

Seeds were sown on 9 January into planter flats (1.5 x 1.5 x 2.5-inch cells) containing a commercial mix (60% sphagnum peat moss and 40% vermiculite with 3 pounds dolomite, 1 pound Micromax [microelements] and 1 pound gypsum per yd^3). Transplants were fertilized periodically with a liquid 20-20-20 (N-P_2O_5-K_2O) to sustain growth during production. Plants were conditioned before transplanting by limiting water and nutrients in the final phase of

production.

The Eau Gallie fine sand in the experimental area was sampled before fertilization and analyzed by the University of Florida Extension Soil Testing Laboratory (Hanlon and DeVore, 1989): pH = 7.3 (target pH is 6.5) and Mehlich I extractable P = 147 (very high), K = 48 (medium), Mg = 114 (high), Ca = 1058 (adequate), Zn = 10.2 (adequate), Cu = 6.3 (adequate), and Mn = 8.8 (response possible) ppm. The land was prepared in early February. Beds were formed and fumigated with methylbromide:chloropicrin, 67:33 at 2.3 lb/100 lbf. Banded fertilizer was applied in shallow groove on the bed shoulders at 2.52-0-3.50 lb N-P_2O_5-K_2O/100 lbf after the beds were pressed and before the black polyethylene mulch was applied. The total fertilizer applied was equivalent to 220-0-305 lb N-P_2O_5-K_2O/A. The final beds were 32-in. wide and 8-in. high, and were spaced on 5-ft centers with six beds between seepage irrigation/drainage ditches, which were on 41-ft centers.

Transplants were set in the field on 25 February and spaced 24 in. apart in single rows down the center of each bed. Transplants were immediately drenched with water containing 16 fl. oz/acre of imidacloprid for silverleaf whitefly control. Four replications of 10 plants per entry were arranged in a randomized complete block design in the replicated trial and single 10-plant plots were used in the observational trial. Plants were lightly pruned, staked, and tied.

Plants were scouted for pests throughout the season. Lepidopterous larvae, silverleaf whitefly, and russet mites were the primary insects found. *Bacillus thuringiensis*, abamectin, indoxacarb, spinosad, endosulfan and tebufenozide were used according to label instructions to manage insect pest populations during the season. A preventative spray program using maneb, copper hydroxide, azoxystrobin and chlorothalonil was followed for management of plant pathogens. Tomato yellow leaf curl virus plants were removed and disposed of early in the season, but were allowed to remain after the second tie.

Fruit were harvested at or beyond the mature-green stage on 17 and 31 May. Tomatoes were graded as cull or marketable by U.S. standards for grades and marketable fruit were sized by machine (see footnotes Tables 2, 3 for specifications). Marketable fruit were counted and weighed, cull fruit was weighed.

Early marketable yields ranged from 209 25-lb cartons for ‘Sanibel’ to 905 cartons/acre for BHN 543 (Table 1). Eighteen other entries had yields similar to BHN 543. Extra large fruit yield varied from 151 cartons/acre for ‘Sanibel’ to 765 cartons/acre for BHN 543. Fifteen other entries had early extra large fruit yields similar to those of BHN 543. Large fruit yields varied from 30 cartons/acre for BHN 442 to 182 cartons/acre for ASX 013. Average fruit weight for the early harvest ranged from 5.7 oz for ‘Solar Set’ to 8.0 oz for HA 3028. Plant stand was statistically similar for all the entries. Cull fruit by weight for the early harvests varied from 6% for PS 150535 to 61% for ‘Sanibel’. There was a high incidence of blossom-end rot throughout the trial. Other principal defects were large blossom scars, persistent green shoulders and rough shoulders.

Seasonal marketable yields from two harvests ranged from 1737 cartons/acre for SVR 1440598 to 2821 cartons/acre for ASX 013 (Table 2). Twenty-one entries had yields similar to those of ASX 013. All entries produced yields greater than the state average yield for spring 1999-2000 of 1693 cartons/acre (Witzig and Pugh, 2000).

Yields of extra large fruit varied from 1244 cartons/acre for ‘Sanibel’ to 2392 cartons/acre for BHN 543. Twenty-two other entries had extra large fruit yields similar to those of BHN 543. Large fruit yields ranged from 147 cartons/acre for SVR 1405037 to 771 cartons/acre for ASX 013. Cull fruit for the entire season varied from 12% for Fla. 7973, PS 150535, and ‘Florida 47’ to 32% for HA 3028. Blossom-end rot and persistent green shoulder affected fruit were the principal defects. Average fruit weight was from 5.8 oz for ‘Solar Set’ to 7.8 oz for ‘Florida 47’. The incidence of tomato yellow leaf curl virus infection was low and varied form none for PS 150535, BHN 442, Fla. 7816, HA 3057, HA 3028, and ‘Sanibel’ to 10% for BHN 575, but there was no significant difference among the entries.

Overall, total marketable yields surpassed those obtained at this location in recent spring seasons. In spring 2001, yields ranged from 1737 cartons/acre to more than 2800 cartons/acre.

The proportion of extra-large fruit was very high, e.g. about 86% of the BHN 543 and 'Florida 91' fruit were in this size category. Exceptional experimental hybrid performers in spring 2001 were ASX 013, Fla. 7973, ASX 911, PS 150535, HA 3026, Fla.7943, Fla. 7816, Fla. 7964, and ASX 174.

A complete report of this trial can be obtained from the author at dnma@mail.ifas.ufl.edu

Table 1. Seed source, early marketable yields, average marketable fruit weight, cull percentages, and plant stands for fresh market tomato entries in the first harvest, 17 May 2001. Gulf Coast Research and Education Center, Bradenton. Spring 2001.

Entry	Source	Total	X-Large	Large	Medium	Culls (%)[2]	Avg Fruit Wt (oz)	Plant Stand (%)
		----------(cartons/A)[1]----------						
BHN 543	BHN Research	905 a[3]	765 a	131 ab	9 c	12 bc	7.8 a	98 a
ASX 013	Agrisales	841 ab	620 ab	182 a	39 ab	16 bc	6.7 a-d	98 a
PS 150535	Seminis	749 a-c	621 ab	118 ab	10 c	6 c	7.7 ab	100 a
ASX 911	Agrisales	694 a-d	590 a-c	94 ab	10 c	17 bc	7.3 a-c	100 a
HA 3057	Hazera	666 a-e	510 a-e	111 ab	45 a	20 bc	6.9 a-d	88 a
Flavormore 223	Harris Moran	651 a-e	494 a-e	141 ab	17 bc	23 bc	6.6 a-d	100 a
Florida 47	Seminis	643 a-e	569 a-d	59 b	14 bc	22 bc	7.4 a-c	98 a
RFT 0252	Syngenta	638 a-e	536 a-e	83 ab	18 bc	25 bc	7.9 a	98 a
HA 3028	Hazera	573 a-e	505 a-e	61 b	7 c	28 bc	8.0 a	98 a
RFT 6153	Syngenta	563 a-e	428 a-e	123 ab	11 c	17 bc	7.6 a-c	90 a
Florida 91	Seminis	551 a-e	457 a-e	74 ab	20 bc	21 bc	7.2 a-c	98 a
BHN 575	BHN Research	529 a-e	420 a-e	102 ab	7 c	14 bc	6.7 a-d	100 a
SVR 1405037	Seminis	494 a-e	433 a-e	45 b	16 bc	21 bc	7.2 a-d	100 a
Fla. 7964	GCREC-UF	485 a-e	407 a-e	72 ab	6 c	35 b	6.9 a-d	100 a

Agriset 761	Agrisales	475 a-e	408 a-e	58 b	9 c	37 b	7.6 a-c	93 a
RFT 0417	Syngenta	460 a-e	389 a-e	63 b	8 c	29 bc	7.2 a-d	98 a
Floralina	Petoseed	452 a-e	352 b-e	84 ab	17 bc	33 b	7.0 a-d	100 a
Fla. 7816	GCREC-UF	449 a-e	370 b-e	59 b	21 bc	25 bc	6.6 a-d	90 a
HA 3026	Hazera	446 a-e	370 b-e	64 b	13 c	24 bc	7.0 a-d	100 a
Fla. 7973	GCREC-UF	423 b-e	348 b-e	68 ab	7 c	14 bc	6.7 a-d	98 a
ASX 174	Agrisales	388 b-e	334 b-e	47 b	7 c	26 bc	7.2 a-c	98 a
Sunguard	Seminis	383 b-e	278 b-e	94 ab	10 c	25 bc	6.6 a-d	100 a
Fla. 7943	GCREC-UF	340 c-e	257 b-e	74 ab	9 c	34 b	6.1 b-d	98 a
SVR 1440598	Seminis	336 c-e	240 b-e	86 ab	10 c	32 b	6.2 b-d	90 a
Solar Set	Seminis	303 c-e	187 de	101 ab	15 bc	37 b	5.7 d	100 a
BHN 442	BHN Research	255 de	223 c-e	30 b	3 c	22 bc	7.4 a-c	98 a
Sanibel	Seminis	209 e	151 e	50 b	8 c	61 a	6.2 b-d	100 a

[1]Carton = 25 lbs. Acre = 8712 lbf. Grading belt hole sizes: X-Large = no belt, > 2.75"; Large = 2.75" - 2.51"; Medium = 2.50" - 2.26"; and Cull < 2.25".
[2]By weight.
[3]Mean separation in columns by Duncan's multiple range test, 5% level.

Table 2. Total marketable yields, average marketable fruit weight, and cull percentages for fresh market tomato entries. Gulf Coast Research and Education Center, Bradenton. Spring 2001. (Harvest Dates: 17 May and 31 May 2001).

Entry	Total	X-Large	Large	Medium	Culls (%)[2]	Avg Fruit Wt (oz)	TYLCV[3] (%)
	----------(cartons/A)[1]----------						
ASX 013	2821 a[4]	1850 ab	771 a	201 ab	22 a-d	6.2 cd	5 a

BHN 543	2796 ab	2392 a	348 f-k	57 e-h	16 cd	7.3 a-c	5 a
Fla. 7973	2681 a-c	1876 ab	622 a-d	183 a-c	12 d	6.9 a-d	5 a
Sunguard	2619 a-d	2125 ab	420 c-i	73 d-h	17 cd	6.7 a-d	5 a
ASX 911	2558 a-d	2038 ab	422 c-i	98 c-h	19 a-d	6.7 a-d	5 a
Flavormore 223	2540 a-d	1781 ab	639 a-c	120 b-h	24 a-d	6.3 cd	5 a
PS 150535	2540 a-d	2148 ab	338 f-k	54 e-h	12 d	7.2 a-c	0 a
Florida 47	2496 a-d	1955 ab	451 c-h	90 c-h	12 d	7.8 a	5 a
HA 3026	2356 a-d	1982 ab	310 g-k	64 d-h	20 a-d	6.5 b-d	5 a
BHN 442	2347 a-d	1814 ab	454 c-h	79 d-h	19 a-d	6.6 b-d	0 a
Florida 91	2338 a-d	2045 ab	258 h-k	35 gh	16 cd	7.1 a-c	3 a
Fla. 7943	2320 a-d	1354 b	705 ab	261 a	14 d	6.3 cd	3 a
Fla. 7816	2256 a-d	1464 ab	609 a-e	183 a-c	21 a-d	6.7 a-d	0 a
Fla. 7964	2254 a-d	1588 ab	524 b-g	142 b-f	22 a-d	6.9 a-d	5 a
ASX 174	2250 a-d	1728 ab	404 d-i	118 b-h	25 a-d	6.4 cd	3 a
BHN 575	2236 a-d	1749 ab	403 d-i	83 d-h	17 b-d	6.5 b-d	10 a
Floralina	2221 a-d	1762 ab	381 e-j	78 d-h	21 a-d	6.8 a-d	3 a
HA 3057	2186 a-d	1509 ab	523 b-g	153 b-e	24 a-d	6.6 b-d	0 a
RFT 0417	2130 a-d	1803 ab	288 g-k	39 gh	19 a-d	7.0 a-d	5 a
Solar Set	2110 a-d	1343 b	569 a-f	197 ab	28 a-c	5.8 d	5 a
RFT 6153	2036 a-d	1688 ab	304 g-k	44 f-h	21 a-d	7.0 a-c	5 a
Agriset 761	2006 a-d	1408 b	436 c-h	162 b-d	30 ab	6.7 a-d	8 a
HA 3028	1907 b-d	1481 ab	296 g-k	130 b-g	32 a	6.6 b-d	0 a

RFT 0252	1867 cd	1661 ab	174 jk	31 gh	24 a-d	7.6 ab	3 a
SVR 1405037	1862 cd	1688 ab	147 k	27 h	25 a-d	7.1 a-c	3 a
Sanibel	1788 cd	1244 b	457 c-h	87 c-h	31 ab	6.8 a-d	0 a
SVR 1440598	1737 d	1505 ab	199 i-k	33 gh	22 a-d	7.1 a-c	3 a

[1]Carton = 25 lbs. Acre = 8712 lbf. Grading belt hole sizes: X-Large = no belt, > 2.75"; Large = 2.75" - 2.51"; Medium = 2.5" - 2.26"; and Cull < 2.25".
[2]By weight.
[3]Tomato yellow leaf curl virus.
[4]Mean separation in columns by Duncan's multiple range test, 5% level.

(Maynard - Vegetarian 01-12)

Sensory Evaluation of Cantaloupe Varieties in North Florida

Melon is a generic term that refers to the fruits of *Cucumis melo L.* plants, including muskmelons (often incorrectly referred to as cantaloupe) and Galia melons (Simonne et al, 1998). Muskmelons have orange flesh and are categorized as eastern or western type, based on the fruit netting and sutures. The netting is the network of cork-like marks that cover the rind. Sutures are the meridian lines that divide the rind into several sections. Fruits of eastern-type varieties are round, have a large seed cavity, and weigh five to seven pounds each. Their rind show distinctive sutures, with variable levels of netting. In contrast, western-type varieties have oval-shaped fruits weighing three to four pounds each. Their sutureless rind is covered with a coarse netting. Galia melons, at maturity, have yellow rind covered with a light net, green flesh with banana-like aroma.

Currently, eastern-type muskmelons are mainly produced in Georgia, South Carolina and the mid-west, while western-type muskmelons are grown in California, Arizona, and Texas (NASS, 2001). The U.S. field production of Galia melons is extremely small. Despite favorable growing conditions, current cantaloupe acreage in North Florida does not exceed 1,500 acres, and state-wide acreage is estimated at 3,000 acres. While recommendations for cultural practices and variety selection of melons are available, limited information is available on how differently these types taste, and how consumer would rate them one compared to the other. Therefore, the objectives of this study was to determine and compare consumer preference of eastern-type and western-type cantaloupes, and Galia melons grown in North Florida.

In the Spring of 2001, six melons varieties were grown at the North Florida Research and Education Center - Suwannee Valley following recommended practices (Table 1). Melons were harvested at the full-slip stage the day before the taste test, cut into bite-size pieces, and refrigerated overnight. Soluble solids level was measured using a hand-held refractometer on six melon pieces selected randomly from each variety.

The sensory evaluation was conducted following recommendations of the American Society for Testing Materials [ASTM] (1981) on June 4. Twilight field day participants (commercial vegetable growers, gardeners, and Extension personnel) voluntarily participated in the test. In a quiet seated area, panelists were provided with a plate containing

six melon samples coded with random three-digit numbers, a glass of water, a data collection form, and a pen. Panelists were first asked to provide age group and gender. The first question instructed panelists to provide the names of melon varieties they are familiar with. They were then asked to taste and evaluate the samples for crunchiness, sweetness, flavor, and overall preference. Panelists recorded their scores on a 90 mm long, unstructured line for each attribute. Descriptors were written on both ends to give directions of the scale (Fig. 1). On the left side of the lines, terms were associated with unsatisfactory scores such as 'extremely dislike' or 'bland', whereas on the right side of the lines, terms given were associated with favorable scores (full scale) such as 'extremely like' or 'musky'. Numeric scores were taken by measuring with a ruler the distance between the left side of the line and the panelist mark on the line.

Demographic and sensory data were analyzed using analyses of variance and Duncan' multiple range test (SAS 2000). Sensory scores were also compared for melon types using orthogonal contrasts 'eastern-type vs. western-type' and 'muskmelons vs. Galia melons'.

Means scores for each attribute and each sample were calculated by adding all the panelists' response and divided by the total number of panelists. Then melons varieties were ranked from the first to the last one for each sensory attribute, where the higher mean score represented the better rating and the lower mean score represented the less favorable rating. In case of two-way tie at rank n, both samples were ranked as n+(1/2). Next rank was n+2 (Simonne et al., 1999). The variety having the lowest score received the highest rank. The overall rating was evaluated by adding for each variety, the ranks of all four attributes. The sum of ranks was called the Overall Rank Sum Index (ORSI).

Panel makeup. A total of 50 data collection forms was correctly filled and was used in the statistical analysis. The panel was comprised of 22 males, 13 females, and 15 forms did not report gender. Age distribution was 1 panelist in the 0-9 years-old group, 0 in the 10-19 group, 6 in the 20-29 group, 10 in the 30-39 group, 9 in the 40-49 group, 8 in the 50-59 group, and 6 in the 60-69 group. Age group was not reported on 10 forms.

Effect of demographic data on sensory scores. Panelist age did not significantly affect crunchiness (p-value = 0.33), flavor (p-value = 0.07), sweetness (p-value = 0.18), and overall preference (p-value = 0.24). Gender effect was not significant for flavor (p-value = 0.07), sweetness (p-value = 0.10), and overall preference (p-value = 0.15), but was significant for crunchiness (p-value = 0.01). Crunchiness ratings (mm) were 44a, 38b, and 30c for unreported gender, male, and female, respectively.

Effect of variety and type on sensory scores. Because of the orientation of the unstructured lines, low ratings represent undesirable or low ratings, while high ratings represent desirable, attractive ratings. The lowest and highest possible ratings were 0 and 90 mm, respectively. The median value for all ratings was 45 mm.

Variety significantly affected crunchiness, flavor, sweetness, and overall preference (all p-values = 0.01). 'Hi-Mark' and 'Mission' had significantly higher crunchiness scores than all the other entries except 'Odyssey''. Crunchiness scores for 'Athena' (29 mm), 'Inbar' (38 mm), and 'Passport' (18 mm) were well below the 45 mm median value. 'Athena', 'Inbar' and 'Odyssey' tended to have higher flavor ratings than 'Mission' and 'Passport'. The lowest flavor rating ('Passport', 42 mm) was close to the median 45 mm value, suggesting that panelists perceived favorably the flavor of all varieties. 'Inbar', 'Odyssey', and 'Athena' had significantly higher sweetness ratings than the other entries. The lowest sweetness rating ('Passport', 44 mm) was close to the median 45 mm value, suggesting that panelists perceived favorably the sweetness of all varieties. 'Athena' and 'Odyssey' tended to have the highest overall preference rating (63 mm and 58 mm, respectively), while 'Hi-Mark' and 'Passport' had significantly lower ones (43 mm, and 36 mm, respectively). This analysis made separately for each variety shows that no one single variety was perceived as the best for all the attributes.

The ORSI ranged between 9 for 'Odyssey' to 24 for 'Passport'. Because of the orientation of the rankings, low ORSI values were desirable, while high ones were not. ORSI values for 'Odyssey', 'Athena', and 'Inbar' were numerically close (9, 10 and 11, respectively). These three varieties were the overall best rated ones.

Effect of types on sensory scores. All the p-values associated with both contrasts ('eastern-type vs western type' and 'muskmelon vs Galia melon') were significant, except that of the contrast 'muskmelon vs Galia melon' for sweetness. Mean flavor, sweetness and overall preference were higher for the eastern type, while mean crunchiness was higher for the western type. The Galia type rated lowest for all attributes, because of the low ratings received by 'Passport'. These results are rather surprising as Galia melons are known for their attractive, typical flavor.

In conclusion, this panel of 50 members found significant differences among the four major sensory components of small melons (crunchiness, sweetness, flavor, and overall preference). Different varieties were best rated for different attributes. When all sensory scores were pooled together using ranking procedures, 'Athena' and 'Odyssey' were the most preferred varieties, while 'Passport' was the least preferred. When varieties of the same types were analyzed together, panelists preferred eastern melons over western and Galia melons. These results suggest that growers should consider planting a small acreage of specialty melons such as the Galia-type along with the more traditional eastern-type.

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Table 1. Type, flesh color, and seed source of selected melon varieties.

Variety	Type	Flesh color	Seed Source
Odyssey (Sun-7119)	Eastern	Orange	Sunseeds
Athena	Eastern	Orange	Novartis
Passport	Galia	Green	Johnny's
Inbar	Galia	Green	D. Palmer Seed
Hi-Mark	Western	Orange	Seminis
Mission	Western	Orange	Seminis

Table 2. Sensory scores and raking of melons varieties grown in Florida (2001).

	Crunchiness	Flavor	Sweetness	Overall Preference	ORSI	Final

Variety	Score (mm)	Rank	Score (mm)	Rank	Score (mm)	Rank	Score (mm)	Rank	Total	Rank
Eastern type										
Athena	29c	5	62a	1	60a	3	63a	1	10	2nd
Sun-7119	41ab	3	58ab	2	61a	2	58ab	2	9	1st
Mean	35B		60A		61A		61A			
Western type										
Hi-Mark	49a	1	47cd	5	47b	5	43d	5	16	5th
Mission	48a	2	52bc	4	50b	4	48cd	4	14	4th
Mean	48A		49B		49B		46B			
Galia type										
Inbar	38b	4	57ab	3	62a	1	55bc	3	11	3rd
Passport	18d	6	42d	6	44b	6	36e	6	24	6th
Mean	28C		49B		53B		46B			
Contrasts:										
Eastern vs. Western	0.01		0.01		0.01		0.01			
Galia vs muskmelon	0.01		0.03		0.54		0.01			

Fig 1. Data collection form used to record sensory scores of cantaloupe varieties

Sensory Data Evaluation for Cantaloupe

NO NAME PLEASE Gender (Circle One) M F

Circle your age: 1-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89

What varieties of Cantaloupe do you now? (Please list)

Sample # _____

Sweetness: ----------

not sweet very sweet

Crunchiness: ----------

not crunchy very crunchy

Flavor: ---------- bland flavorful (musky)
Overall Preference:---------- extremely dislike extremely like
Sample#_____
Sweetness:---------- not sweet very sweet
Crunchiness:---------- not crunchy very crunchy
Flavor:---------- bland flavorful (musky)
Overall Preference---------- extremely dislike extremely like

Amy Simonne, Sandrine Cazaux, Bob Hochmuth, Suzanne Stapleton, Eric Simonne, Wayne Davis, David Studstill, and Merry Taylor

A. Simonne and Cazaux are assistant professor and exchange student, respectively, Department of Family, Youth and Community Sciences; Hochmuth, Stapleton and Davis are multi-county agents and senior ag assistant, respectively, North Florida Research and Education Center -Suwannee Valley; E. Simonne and Studstill are assistant professor and biological scientist, respectively, Horticultural Sciences Department; Taylor is a County Extension Director and FCS Extension Agent, Suwannee County.

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(Simonne - Vegetarian 01-12)

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