



Central VA Organic Cucurbit Variety Trial, Summer 2014

Identifying and Marketing Quality Open-Pollinated and Organic Seedstocks for Virginia

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In 2014 Twin Oaks Seed Farm received a SARE grant for replicated cucumber, melon and winter squash variety trials. The primary goals were to evaluate resistance to Cucurbit Downy Mildew, and to identify resistant seedstocks. We also looked at eating quality and productivity. Downy Mildew has been the number one limiting factor in cucurbit production on our farm, affecting seed crops as well as market crops of cucumber, squash, melon, gourd and watermelon. We want to find varieties that will do better, and to share the results. Some of the varieties we find will be useful as is, and some will be useful in future breeding projects.

It is also our goal to situate these trials in the context of a broader movement to create a vibrant seed system in our region. Such a movement must include regional trialing, breeding and seed production work, as well as networking and information sharing. We want the results from our trials not only to benefit produce growers, but to provide a model for farmers who participate or who might participate in seed growing, research and breeding in the Southeast and mid-Atlantic.

Our project includes a grower survey about cucurbit seed needs. This will be useful in planning future trials and breeding projects. Feedback from produce growers to seed growers, breeders and researchers is needed to keep our work relevant. Please consider taking the survey. tinyurl.com/cucurbitsurvey

Summary of Trial Results

PLEASE SEE PAGES 4-6 FOR DATA TABLES.

Cucumbers: The results from the cucumber trial are dramatic. Straight Eights, a susceptible variety,

yielded on average 2.1 pounds from five plants. Several of the resistant varieties yielded over 35 pounds per 5 plants – that’s 16 times as much! Marketmore 76, a standard with intermediate resistance, yielded an average of 11.2 pounds from each 5 plant entry. Ashley, another standard “resistant” variety yielded an average of 12.7 pounds. We’ve found 17 varieties that have so far yielded twice as much as these standards. Several of these standouts are Chinese trellising cucumbers that we got from the USDA Plant Introductions program (specifically the North Central Regional Plant Introduction Station in Ames, Iowa). Other standouts: Cornell’s DMR-264 (a green slicer) and DMR-261 (a white slicer); Ivory Queen, a white slicer from Cook’s Garden; Shintokiwa Long from Turtle Tree Seeds; White Emerald from Baker Creek (though only some of the plants have white cucumbers).

Melons: Downy Mildew in the melon trial was also severe. We found a good correlation between Downy Mildew foliage ratings and sugar content of the fruit (brix readings). The three sweetest varieties were Seminole, Tai Nang, and Trifecta, with brix averages of 9.8, 11.8 and 10.4 respectively. Keep in mind that this is in a late-planted trial under very heavy Downy Mildew pressure. As a reference point, Hales Best averaged 5.6 brix; Delicious 51 averaged 6.8 brix. Several varieties had moderate sweetness and foliage resistance, including Hannah’s Choice, Edisto 47 and Sivan.

Winter Squash: In the winter squash trial, we saw almost complete dieback of the Waltham butternut plants in late August. Quite a few varieties showed good Downy Mildew resistance, especially the tropical pumpkins. We included tropical pumpkins from Puerto Rico, Cuba, Jamaica, Thailand, China and Panama, and many of these proved to be very DM resistant. There was decent fruit set on the Waltham, and many of the fruits were marketable; however DM significantly lowered quality and yield. An F3 cross between Seminole pumpkin and Waltham did well in the trial, with DM foliage ratings similar to Seminole and yields 60% higher than Waltham. Some of the Caribbean tropical pumpkins showed huge yields. Fruit quality was quite variable in several of the seedstocks, or poor in some cases, but the presence of high quality fruits point to potential for breeding and selection projects. Most but not all of the tropical pumpkins made it to maturity. Tropical pumpkin fruits tend to be very large, which is often not desirable with market growers. Two Thai varieties, Thai Kang Kob and Thai Rai Kaw Tok showed good DM resistance and exceptional eating quality, though were not high yielding (Thai Rai Kaw Tok was slightly higher yielding but slightly lower quality than Thai Kang Kob). A Chinese tropical pumpkin (it came to us without a name) showed very good eating quality, good productivity, good foliage resistance, good keeping quality and attractive medium-sized fruits. It has potential to become a popular market variety in our region. Most of the entries were moschata species; the few that were maxima and pepo species were significantly impacted by vine borer as well as Downy Mildew.

Trial Methods:

Cucumber:

- 35 replicated entries and 23 single entries.
- 6 foot row spacing; 1 foot between plants and five feet between entries in-row.
- Provided Nitrogen with early cowpea cover crop, supplemented by tofu okara side dressing at a rate of 1.75 tons per acre. Last year’s crop was sorghum-sudan cover crop.
- Planting date was June 27; transplant dates were July 12 and 13. Late planted for increased

Downy Mildew exposure.

-We obtained many of the seedstocks from the USDA Plant Introduction Station in Ames, Iowa. This is a great resource. Most of the entries were chosen because they showed resistance in a previous test or because we otherwise suspected DM resistance.

-The susceptible control was Straight Eights and the moderately resistant control was Marketmore 76.

-We recorded foliage ratings and yields from mid-August through late September, and also did a variety tasting.

Melon:

-32 replicated entries and 4 single entries

-7 foot row spacing; 1.5 feet between plants; 6 feet between entries in-row

-Provided Nitrogen with early cowpea cover crop, supplemented by tofu okara side dressing at a rate of 1.75 tons per acre. Last year's crop was sorghum-sudan cover crop.

-Planting date was June 13; transplant dates were June 28 and 29. Late planted for increased Downy Mildew exposure.

-Controls were Delicious 51, Hale's Best and Athena.

-Many of the seedstocks for the trial came from the USDA Plant Introduction Station in Ames, Iowa.

-We recorded foliage ratings, brix readings, yields and taste ratings between mid August and mid September.

Winter Squash:

-20 replicated entries, plus 25 single entries.

-12 foot row spacing, 2 feet between plants and 12 feet in-row between entries.

-Fertilized with tofu okara at 4 tons per acre; compost at 2 tons per acre (side dressed); potassium sulfate and magnesium sulfate at 200 pounds per acre each (side dressed); previous crop was grass hay.

-Planting date (direct seeding) was June 10th for most entries, with a May 20th planting date for the Caribbean tropical pumpkins. We planted late to maximize Downy Mildew exposure.

-We had to train the vines every few days all summer!

-Most of the entries are Cucurbita Moschata species. Many are tropical pumpkins, including from Puerto Rico, Cuba, Jamaica, Panama, China, India, Costa Rica and Thailand. Several varieties are from the Southeast US.

-Control is Waltham butternut.

-We recorded foliage ratings starting on August 22nd, through mid October.

-We recorded yields.

-We tested three squash from each entry for dry matter content and brix; and rated flavor, color, sweetness and texture in a taste test.

See WWW.TWINOAKSSEEDFARM.COM for updates and additional information on our trials!

The Carolina Farm Stewardship Association would like to thank Twin Oak Seed Farm for permission to include this data in the [SE Organic Seed and Variety Trials Report](#).

Cucumber Variety Trial - 2014 - Twin Oaks Seed Farm

Entry	Name	Number of Replications	Average Total Weight (lbs)	Average Downy Mildew Rating 8-18 (1 is best, 9 is worst)	Average Downy Mildew Rating 8-27 (1 is best, 9 is worst)	% Marketable
1	PI 618907 Jin Yang No 2 Shaanxi China 1994	3	34.5	4.3	4.5	81
2	PI 432878 San Dong Si Gua 127 Shandong China 1979	3	41.2	3.5	3.3	86
3	PI 432885 San Dong Si Gua 1210 Shandong China 1979	3	41.1	3.0	3.8	86
4	PI 618912 Jin Yang #1 Shaanxi China 1994	3	25.8	5.7	5.0	81
5	PI 618902 Jin Yang #4 Shaanxi China 1994	3	21.6	4.7	5.2	83
6	PI 618895 Jin Yang #4 Henan China 1994	3	8.1	7.0	5.7	69
7	PI 618894 Jin Za #2 Henan China 1994	3	35.4	4.0	4.0	86
8	PI 618893 Henan China 1992	3	30.3	4.7	4.2	81
9	PI 432868 (straight, green) Beijing China 1994	3	28.6	4.0	4.0	72
10	PI 114339 Manchuko Wonder Japan 1936	2	24.7	5.5	4.0	67
11	PI 227209 Sagami-hangiro Honshu Japan 1955	2	6.5	5.5	5.3	80
12	PI 390260 Satiama Ochiai 4 Japan 1974	3	9.3	6.0	5.3	90
13	PI 358813 Kuala Lumpur Malaysia	3	17.0	5.3	4.7	85
14	PI 249562 Teang-rhan Thailand 1958	3	12.5	5.7	4.3	79
15	PI 426170 (pickler, color variable) Luzon Phillipines 1978	3	27.1	4.0	5.2	80
16	PI 426169 (pickler green/brown) Luzon Phillipines 1978	3	16.9	5.3	6.3	85
17	PI 419214 Hong Kong 1977	3	14.3	4.3	5.0	79
18	PI 321008 Nanchi Black Spine Taiwan 1967	3	12.1	4.0	3.2	64
19	PI 197088 Assam India 1951	3	23.7	1.7	3.0	0
20	PI 197087 Assam India 1951	3	7.9	7.0	6.0	80
21	PI 197086 Assam India 1951	3	28.0	2.3	3.2	0
22	Suyo Long (Twin Oaks 2013 stock)	3	26.0	5.5	4.8	72
23	Suyo Long (High Mowing)	3	14.4	6.3	6.0	76
24	DMR 264 (Cornell)	3	32.3	2.0	2.2	79
25	Straight 8s (SESE)	3	2.1	7.3	7.3	93
26	Marketmore 76 (Johnny's)	3	11.7	5.8	7.0	78
27	SV4719CS (Seminis – from Johnny's)	3	13.3	4.8	6.8	86
28	Ashley (Twin Oaks)	3	12.7	5.3	6.0	83
29	White Emerald (Baker Creek)	3	28.8	4.0	3.8	81
30	Yok Kao (Baker Creek)	3	25.8	4.3	3.7	78
31	DMR 261 (Cornell)	3	39.1	3.0	3.3	87
32	Ivory Queen (Cook's Garden)	3	43.9	3.7	4.5	68
33	WI 2238 (Cornell)	3	12.2	5.0	7.2	80
34	Wautoma BWR (SSE)	1	12.0	4.0	6.5	95
35	PI 234517 SC50 South Carolina US 1956	3	14.3	4.0	5.3	77
36	DMR 262 Cornell	1	19.5	3.0	2.0	70
37	Shintokiwa Turtle Tree Seeds	1	45.0	5.0	4.0	84
38	Shantung Shuyo Fedco	1	33.7	6.0	5.0	75
39	Thai Petch Tsai Baker Creek	1	18.0	5.0	5.0	99
40	Hmong Red Baker Creek	1	1.8	6.0	6.5	39
41	PI 390251 Japan 1974	1	3.3	8.0	7.0	13
42	PI 390249 Japan 1974	1	4.9	8.0	6.5	50
43	PI 385967 Kenya 1974	1	12.1	5.0	5.5	92
44	PI 358814 Malaysia 1971	1	16.7	5.0	4.0	77
45	PI 209069 Ohio U.S. 1953	1	2.9	8.0	8.0	58
46	PI 321009 Nanchi White Spine Taiwan 1967	1	22.6	3.0	4.0	81
47	PI 197085 Assam India 1951	1	9.7	3.0	2.0	100
48	PI 165509 Uttar Pradesh India 1948	1	8.8	7.0	7.5	93
49	PI 164173 Maharashtra India 1948	1	2.4	6.0	7.0	66
50	PI 105340 China 1934	1	1.9	7.0	8.0	55
51	PI 432852 Japan 1979	1	7.0	8.0	7.5	73
52	PI 418964 Shaanxi China 1977	1	25.9	5.0	5.0	86
53	PI 391570 Shaanxi China 1974	1	15.2	4.0	6.0	85
54	PI 391568 Shaanxi China 1974	1	17.8	6.0	5.5	92
55	PI 390253 Japan 1974	1	9.3	7.0	7.0	85
56	PI 605996 Madhya Pradesh India 1992	1	40.7	4.0	3.0	68
57	PI 426629 Pakistan 1978 (Cucumis Melo)	1	14.3	6.0	6.0	63
58	SESE Homemade Pickles lot AA957	3	13.8	6.3	7.3	81

Melon Trial Data

Variety	Source	var #	# of reps	Median Total Weight (lbs)	Median Brix	DM 821 (9 is worst)	DM 827 (9 is worst)	Average Weight (lbs)
Tai Nang 2(PI 436531)	NCRPIS	15	3	14.6	11.8	3	4	1.6
Trifecta	Cornell	28	3	25.8	10.4	4	4.5	2.3
Seminole	Cornell	23	3	32.0	9.8	2	3	2.6
Sivan	High Mowing	27	3	19.6	8.7	5	5.5	2.1
Hannah's Choice	Fedco(Cornell)	19	3	40.7	8.6	4	4.5	3.7
Edisto 47 (NSL34600)	NCRPIS	1	3	31.4	8.3	3	4	2.9
Edisto 47	Twin Oaks	18	3	25.8	8.3	4	4.5	2.5
Amish Melon	Dixie Salvation	36	1	18.6	8.3	6	6.5	1.9
Sel of Edisto 47	Twin Oaks	37	2	34.3	8.1	3.5	4	3.3
Wrangler	Johnnys	32	3	27.4	7.5	4	4.5	3.3
Athena	Johnnys	22	3	25.3	7.4	4	5	3.6
Golden Gopher	Turtle Tree	29	3	24.5	7.3	7	8	2.5
Missouri Gold	Twin Oaks	30	3	25.7	6.9	5	6	2
Aurora(PI 601164)	NCRPIS	3	3	28.4	6.8	4	6	3.1
Delicious 51	Turtle Tree	21	3	26.4	6.8	5	8	3
Pride of Wisconsin	Fedco	25	3	34.8	6.5	5	5	3.5
Gulf Stream (NSL60241)	NCRPIS	2	3	28.1	6.4	5	7	2.1
Earlichamp	Johnnys	26	3	28.6	6.3	7	8.5	3.6
Old Time TN Green	Twin Oaks	20	3	20.0	6.1	5	6	5
Schoons Hardshell	Baker Creek	24	3	27.0	5.6	5	5	3.4
Hales Best	SESE	38	2	29.0	5.6	5.3	6.3	2.6

Winter Squash Trial Data

Name	Source	Origin	Species	Entry#	#OfReps	Median	Brix	Median	Dry Matter	Median	Median	Med Imm	DM 907
						Brix	Max	Dry Matter	Max	Weight	%Mkt	Weight	(9 is the worst)
Seminole	Living Energy Farm	Florida/Virginia	mos	1	3	8.2	14.1	11.2	18.4	115.5	93	12.5	4.5
Choctaw Sweet Potato	Charlotte Hagood	Mississippi	mos	2	3	7	7.5	7.8	9.2	183.5	100	67.5	4.5
Thai Kang Kob	Baker Creek	Thailand	mos	3	3	11.8	13.8	16.9	17.5	75	87	21.5	3.5
Thai Rai Kaw Tok	Baker Creek	Thailand	mos	4	3	11.3	13.1	14.2	17.8	97.5	90	15	4
Candy Roaster	Fedco	North Carolina	max	5	3	6.5	7.6	8.8	10.4	139.5	83	4	5.5
Seminole x Waltham F3	Edmund Frost	Virginia	mos	6	3	10	11.6	12.2	19.8	137	96	14	5.5
Waltham	Johnnys	Massachusetts	mos	8	3	9.9	11.2	12.3	14.7	84	81	4	7
6823 PMR	Johnnys		mos	9	3	12	13.1	15.6	16.8	64.5	100	7	6
Buttercup	Johnnys		max	10	3	9.6	13.1	13.6	17.1	63	97	2.5	5
Soler	U. Puerto Rico	Puerto Rico	mos	12	3	5	8.3	6.6	11.2	402.5	91	35.5	3.5
Jamaican Longneck	Caribbean Garden	Jamaica	mos	14	3	8.3	11.6	10.7	20.1	232	77	50.5	4
Jamaican Shortneck	Caribbean Garden	Jamaica	mos	15	3	8	11.3	10.6	15.7	263.5	96	47	3.5
Butterbush Offtype	Twin Oaks		mos	16	3	8.2	10.2	10.4	13.9	90	87	3.5	6
Cuban Necked Pumpkin	Bill Tost	Cuba	mos	17	3	11	13.2	13.9	19.7	248.5	52	41	3.5
Greek Sweet Red	Baker Creek		mos	20	3	9.3	11.9	12.6	14.9	114	94	17.5	3.5
NC Candy Roaster	Seed Savers Ex	North Carolina	max	23	1	6.9	8	9	10	85	91	11	5
Cuban Oblong Large	Bill Tost	Cuba	mos	25	1	7.7	8.8	9.4	10.6	321.4	64	59	3.5
Caribbean Maxima	Evelyn Klumb		max	26	1	15.1	16.4	24.4	26.8	66.3	71	4.5	6.5
Chinese Pumpkin	Glenn Teves	China/Hawaii	mos	28	1	11.3	12.8	15.2	17.3	142	100	3.5	3.5
Arka Suryemukhi	Baker Creek	India	max	29	1	4.6	6	7.8	8.6	210	94	19.5	2.5
Corazon De Panama	Baker Creek	Panama	mos	32	1	8.1	10.5	11.4	14.3	28.5	100	81.5	3
Pequenía Asar	Keith Nicholson	Spain	mos	38	1	9.4	10.8	12.4	14.6	104.5	89	0	6
Jamaican Round	Caribbean Garden	Jamaica	mos	42	1	6.4	6.8	8.1	9.5	265.5	83	46	5
Old Fash AL Pumpkin	Charlotte Hagood	Alabama	mos	44	1	7	10.2	8.8	12.1	202	100	60	5.5
Thai Pumpkin	Andrew Still	Thailand	mos	45	1	10.3	10.8	13.7	15.2	127.5	60	60.5	3
Rio Maya Segualca	Native Seed Search	Sonora, MX	mos	47	1	10	11.6	12.9	15.2	135.5	75	46	6
Striped Green Cushaw	Twin Oaks	Southeast US	arg	7	3	4.7	6	6.8	8.2			0	7.5
Choctaw Round	Charoltte Hagood	Mississippi	mos	39	1					214.5	100	15.5	5.5
Table Queen Vining	High Mowing		pep	11	3					74			8
Taina Dorado	U. Puerto Rico	Puerto Rico	mos	13	3					0	0	127	4
Cuban Round	Bill Tost	Cuba	mos	18	3					279	0	30	4
Gold Striped Cushaw	SSE: GA IN C	Georgia	arg	21	1					94.5	21	32.5	5
Cherokee Candy Roaster	Seed Savers Ex		max	22	3					56	93	3	5
Candystick Delicata	Carol Deppe	Oregon	pep	24	1					13.5	81	0	9
Puerto Rican Pumpkin	Proganics	Puerto Rico	mos	27	1					166	70	41.5	3
San Jose Mountain Club	Baker Creek	Costa Rico	mos	30	1					172	50	56	3.5
Zapollo de Tula	Baker Creek	Panama	mos	31	1					280.5	41	0	4.5
Michigan Butternut	SSE	Michigan	mos	33	1					82.5	80	2.5	8
Green Cushaw	Dixie Salvation	Pennsylvania	arg	35	1					170.5	76	0	8
Butternut	Dixie Salvation	Pennsylvania	mos	37	1					87.5	72	7	9
Tahitian Sweet Potato	George Brewton		mos	43	1					126	87	12	6.5
Carizo	Native Seed Search	Sonora, MX	mos	46	1					133.5	91	10.5	7
Magdalena Big Cheeze	Native Seed Search	Sonora, MX	mos	49	1					106.5	69	48	4