



2010 Organic Squash Variety Trial Results

The following tables present the results of organic squash variety trials that took place on research stations and cooperating farms in Oregon, Wisconsin, Minnesota, and New York in 2010. These trials were part of the USDA-OREI funded project "Northern Organic Variety Improvement Collaborative". Trials will continue in 2011, 2012, and 2013.

Detailed descriptions of the trial methods and rating systems are listed after the results tables.



Table 1: NOVIC 2010 Oregon Squash Data

Variety Name	Fruit Number	Marketable Fruit Number	Marketable Weight (kg)	Weight (kg)	Appearance (1-5)	Flesh Color (1-5)	Rind Thickness (1-5)	Cavity Size (cm)
Bugle	51.00 abc	30.33 abc	66.78 a	1.12 bc	2.25 b	1.25 d	3.08 a	6.06 c
Early Butternut	45.00 bc	30.33 abc	98.87 a	1.63 b	3.58 ab	3.33 abc	2.71 a	7.62 b
Honeynut	77.67 a	46.83 a	60.89 a	0.62 c	2.50 b	4.00 ab	2.68 a	6.03 c
Hunter	52.83 ab	33.67 ab	63.77 a	1.15 bc	2.17 b	4.00 ab	2.71 a	5.91 c
JSW 6823 Butternut	42.50 bc	33.33 abc	90.14 a	1.12 bc	4.83 a	3.25 abc	2.79 a	6.70 bc
Long Island Cheese	20.17 c	10.67 c	109.28 a	4.17 a	4.00 ab	4.60 a	3.36 a	17.65 a
Metro	40.67 bc	23.00 bc	81.18 a	1.24 bc	3.67 ab	2.67 bcd	3.04 a	6.77 bc
Pilgrim	32.33 bc	26.50 abc	84.11 a	1.68 b	3.00 ab	4.40 a	2.65 a	7.50 b
Waltham	35.50 bc	24.83 abc	101.22 a	1.53 b	2.33 b	2.00 cd	3.21 a	7.41 b

Trait scores are colored on a spectrum with green being best and red being worst. Letters after the scores represent groups of varieties whose means are not significantly different for that trait. In other words, all the varieties which have a score with an "a" after the number have essentially the same score for that trait. For more information about what the scores mean and how they were measured, please see the protocols at the end of this document.

Table 2: NOVIC 2010 Wisconsin Squash Data

Variety Name	Fruit Number	Marketable Fruit Number	Marketable Weight (kg)	Weight (kg)	Powdery Mildew Resistance (1-5)	Virus Resistance (1-5)	Fruit Habit (1-5)
Bugle	49.33 b	28.20 ab	25.57 a	0.90 b	4.33 a	2.33 a	1.33 bc
Early Butternut	37.33 bc	42.14 ab	53.39 a	1.27 b	2.50 b	3.33 a	3.00 abc
Honeynut	90.00 a	65.43 a	41.22 a	1.34 b	2.60 ab	4.00 a	4.00 ab
Hunter	58.33 b	44.38 ab	36.78 a	0.77 b	3.50 ab	3.50 a	4.33 a
JSW 6823 Butternut	47.00 b	39.57 ab	45.76 a	1.08 b	4.00 ab	4.25 a	1.00 c
Long Island Cheese	19.00 c	13.43 b	48.48 a	3.80 a	3.25 ab	2.00 a	3.33 abc
Metro	44.00 bc	46.25 ab	48.21 a	1.05 b	3.80 ab	3.25 a	3.67 abc
Pilgrim	41.33 bc	37.86 ab	49.70 a	1.35 b	3.25 ab	3.00 a	5.00 a
Waltham	43.33 bc	40.25 ab	55.25 a	1.44 b	3.40 ab	3.75 a	4.00 ab

Trait scores are colored on a spectrum with green being best and red being worst. Letters after the scores represent groups of varieties whose means are not significantly different for that trait. In other words, all the varieties which have a score with an "a" after the number have essentially the same score for that trait. For more information about what the scores mean and how they were measured, please see the protocols at the end of this document.

Table 3: NOVIC 2010 New York Squash Data

Variety Name	Fruit Number	Marketable Fruit Number	Marketable Weight (kg)	Weight (kg)	Powdery Mildew Resistance (1-5)	Downy Mildew Resistance (1-5)	Fruit Habit (1-5)
Bugle	55.33 ab	28.67 ab	31.10 a	0.95 b	1.67 a	1.50 a	1.00 b
Early Butternut	52.67 b	32.00 ab	40.23 a	1.20 b	2.00 a	2.00 a	2.00 a
Honeynut	86.00 a	37.67 ab	20.48 a	0.49 b	1.33 a	2.00 a	2.00 a
Honeynut-2nd	77.00 ab	30.00 ab	19.91 a	0.51 b	1.00 a	1.00 a	1.00 b
Hunter	77.33 ab	38.67 ab	25.55 a	0.64 b	1.33 a	1.00 a	1.00 b
JSW 6823 Butternut	70.00 ab	51.00 a	51.64 a	0.98 b	1.33 a	1.00 a	1.00 b
Long Island Cheese	19.67 c	10.67 b	64.04 a	5.19 a	1.67 a	1.50 a	1.00 b
Metro	59.33 ab	35.33 ab	42.82 a	1.09 b	1.00 a	1.00 a	1.00 b
Pilgrim	56.67 ab	30.67 ab	45.53 a	1.37 b	1.33 a	2.00 a	2.00 a
Waltham	50.00 bc	29.33 ab	34.61 a	1.13 b	1.00 a	1.00 a	1.00 b

Trait scores are colored on a spectrum with green being best and red being worst. Letters after the scores represent groups of varieties whose means are not significantly different for that trait. In other words, all the varieties which have a score with an "a" after the number have essentially the same score for that trait. For more information about what the scores mean and how they were measured, please see the protocols at the end of this document.

Winter Squash Trials

From the trials we seek to determine which crop varieties do well in organic systems. By having regional trials across the Northern US we will get a greater understanding of the regional adaptation versus broad adaptation of a cross-section of organically produced vegetables that will serve to guide vegetable production and improvement in this tier. We also wish to evaluate the post-harvest quality and longevity of butternut squash and thus help with breeding occurring to meet those ends.

Trials will be completed at all four hub sites and participating on-farm sites. Each hub will have a replicated trial on their research farm (3 replicates) and additionally single replicates will occur on three local farms.

Variety Selection

The list of trial cultivars will include germplasm ready for evaluation from the project breeders, varieties currently commercially available as organic seed, varieties identified by regional growers as “check” varieties, control varieties that will be held constant across all locations all years and recently released varieties recommended for organic producers by seed companies who sell organic seed. From these criteria nine cultivars will be selected including at least 5 commercially available varieties. At least five of the varieties will be trialed in all four regions including the breeding germplasm. Four cultivars may vary by region according to regional grower’s interests and regionally identified check varieties. Breeding material will be included as it becomes available in subsequent years of the trials. Growers are welcome to add additional varieties of their own to their on-farm replicates to make the trial even more helpful to their specific farm.

Trial Specifications:

Growers and Researchers are asked to consult the OSA publication “On-farm Variety Trials: A guide for organic vegetable, herb and flower producers” (Colley and Myers, 2007) to aid in having a successful trial.

Planting Specifications

The following specifications should try to be followed as closely as possible but it is understood that each farm should choose specific spacing that fit the methods that they use on their farms. Seed will be provided by the project and growers are asked to start twice as much as they need so that there is plenty for the trial. The use of transplants is recommended because of severe beetle pressure in some regions. Winter squash will be planted in single rows spaced 9 feet apart between rows and 2 feet in row. There should be 12 plants of each variety per rep so that 10 plants can be evaluated and harvested from. Research farms will have 3 replicates while each farm will have only one each. All nine varieties should be planted in a block to minimize edge effects and field variability. Squash should be transplanted the first week of June so that squash matures by late September and be harvested before frost/freezing of some areas.

Data Collection

Dates should be recorded for anything related to the trials including but not limited to: seeding, transplanting, plowing and fitting, spreading of compost/manure/ fertilizer, cultivation, all data collection, and harvest. Pictures taken during all data collection events are very useful.

Traits measured in the field

All traits will be rated based on a scale of 1 to 5 scale. For each trait the rating should be based on all plants for each variety for each rep.

Beetle Damage- Beetle damage should be assessed for the first six weeks (after emergence or after transplanting) of the trial. Fruit damage should be noted at harvest.

- 1- All plants dead from feeding damage
- 2 -Plants are set back for few are dead
- 3- Feeding damage affects most leaves
- 4- Damage on plants but not severe
- 5-No visible damage on any of the plants

Weed Pressure- Weed pressure should be evaluated at fruit set and at harvest

- 1 Crop is barely visible because of such severe weed pressure
- 2 Weeds cover the soil and crop is clearly affected
- 3 Weeds cover the soil but crop is still able to grow
- 4 Weeds are visible but don't appear to be effecting crop growth
- 5- No weeds visible

Virus Resistance Ratings

Virus resistance is rated on a scale of 1-5 with 1 being susceptible and 5 being resistant. The breakdown of these ratings are

- 1= Strong systemic symptoms, stunting and little or no fruit set.
- 2= Milder systemic symptoms, slight stunting and fruit set with color break or distortion.
- 3= Very mild foliar symptoms, no stunting and slight color break or distortion.
- 4= Mild symptoms on leaves, growing points do not show virus and no fruit symptoms.
- 5= No visible virus symptoms.

Powdery Mildew ratings

The date that Powdery mildew arrives will vary considerably from year to year and site to site. While scouting the plots on a weekly basis the date the PM is first noticed for be noted. Subsequently each week each variety in each rep should be evaluated for PM. Every week the trials should be scouted for the severity of Powdery mildew. Mildew resistance is rated on a scale of 1-5 with 1 being susceptible and 5 resistant. The breakdown of these ratings are

- 1= mildew colonies on both leaf surfaces, stems and petioles with sporulation.
- 2= mildew colonies on both leaf surfaces, stems or petioles with less sporulation.
- 3= mildew colonies on both leaf surfaces with little sporulation.

4= small mildew colonies on one leaf surface with little or no sporulation.
5= no visible mildew.

Downey Mildew- Start scouting for the presence of Downy Mildew based on DM forecasts for your area. In the NE August 1st is a commonly the start of DM. . Mildew resistance is rated on a scale of 1-5 with 1 being susceptible and 5 resistant. The breakdown of these ratings are:

1= mildew colonies on both leaf surfaces, stems and petioles with sporulation.
2= mildew colonies on both leaf surfaces, stems or petioles with less sporulation.
3= mildew colonies on both leaf surfaces with little sporulation.
4= small mildew colonies on one leaf surface with little or no sporulation.
5= no visible mildew.

Fruit Habit- Fruit habit can be evaluated near fruit maturity but before plant dieback.

- 1- multiple vines from each plants that cover the rows
- 2-
- 3- Single vine
- 4-
- 5- Compact bush that leaves bare space between rows

Harvest

Squash should be harvested at Maturity. This is normally very close to last frost dates and coincides with foliage die back. In most cases all squash harvest can be done on the same day. Data to collect include total fruit harvested, total weight, marketable number and marketable weight. Notes should be taken on why some fruit is not marketable.

Growers should cure (or not cure) their squash as they normally do. In the absence of established methods it is recommended that fruits be cured at 80-85°F and 80-85 percent relative humidity for 10 days. Some growers use empty greenhouses for this purpose. After curing a subset of fruit (3 per variety per replicate) should be evaluated. Fruit should be evaluated for weight, size (length by width), general appearance, flesh color, rind thickness, and seed cavity size. A flesh sample should be cut and frozen so that it can latter be thawed out to test for soluble sugars with a handheld refractometer.

Cooked fruit should be tasted and rated for flavor, color, texture and sweetness.

A subset of fruit (6 per variety per rep) should be stored in the grower's normal storage conditions. In the absence of an established protocol it is recommended to keep the squash at 50°F/50%RH.

Fruit will be monitored monthly for deterioration over 4 months or the time period for which growers usually market their squash. Remaining fruit will be assessed for hollow necks and cooked for tasting.