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Pumpkin Variety Trial: *Cucurbita moschata*

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Abstract

Tropical varieties of pumpkin, *Cucurbita* sp., vary widely in their production, fruit size and quality, and taste. This variety trial and analysis includes eleven varieties available at the ECHO farm in Florida in 2006. All varieties were evaluated for seed viability, total production, fruit size and quality, and taste. Trinidad Selection and Hardy were determined to be the best tasting as well as the most productive varieties. Tahitian Straightneck and La Primera were the least favored for taste.

Introduction

Temperate *cucurbita* varieties do not grow well in subtropical and tropical climatic zones and are prone to diseases that kill them outright or reduce harvest yields. Tropical and Seminole pumpkins grow well in tropical climates and are important for ECHO and ECHO network members. Seminole pumpkins are *Cucurbita moshata* varieties bred and cultivated by the Seminole Indians of Southwest Florida (zone 9a/10b). Tropical pumpkins, are *Cucurbita* sp. that have been bred and cultivated in tropical climatic zones. Both pumpking groups can be grown throughout the year, although they grow best in lower humidity due to water-borne disease pressure.

Table 1. Varieties of pumpkins in the trial

Variety	Type
Acorn	Seminole pumpkin
Crookneck	Seminole pumpkin
Hardy	Seminole pumpkin
Ingram Billie	Seminole pumpkin
Tropical Brian	Tropical pumpkin
La Primera	Tropical pumpkin
Tahitian Butternut	Tropical pumpkin
Tahitian Straightneck Selection of 2005	Tropical pumpkin
Small Butternut	Tropical pumpkin
Trinidad Selection of 2005	Tropical pumpkin
Lloyd Marsh Selection of 2005	Tropical pumpkin

Fruits store for months due to the hardening of outter shells at maturation. This storage trait is highly practical for areas with no refrigeration.

Pumpkin flesh is high in vitamin A. Male flowers, tender leaves, and seeds can be eaten as well. Pumpkins are pollinated by bees and other insects which can carry pollen long distances and visit many folwers. To keep seeds true to the parent variety, it is necessary to hand-pollinate or plant only one variety at a time. The goal of this variety trial was to compare ECHO's eleven varieties of pumpkins as well as to determine the purity of the genetic lines.

Materials and Methods

Trial Design

Eleven varieties (Table 1) of pumpkins were planted on ECHO's global demonstration farm in North Fort Myers, Florida in three replications. Each plant was spaced 60cm apart.

Trial establishment

All varieties were seeded, with three seeds per planting station on March 9 and 10, 2006.

Replications 1 and 2 were seeded on flat beds, using newspaper and vetiver grass (*Chrysopogon zizanioides*) as mulch. Replication 3 was seeded on raised beds with woodchip mulch (Figure 1). Prior to planting, planting areas were sprayed twice with Glyphosphate Pro II for weed control.

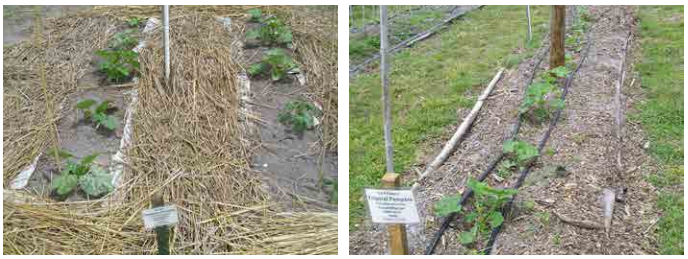

Figure 1. *Replications 1 & 2 design (left) and replication 3 design (right).*

Each plot was fertilized with 1.4 kg 8-2-8 fertilizer (109 g N), when seeds were planted. Side dressings of 7.8 g N/m^2 were put down every three weeks.

All replications were watered three times per week. Replications 1 and 2 were watered with overhead irrigation, while replication 3 was waterd through drip irrigation. Conditions were dry until mid-May. After mid-May, irrigation was no longer used unless ground was very dry.

For disease and pest control, two chemicals were used. Each week, MilStop® was sprayed as a preventative against powdery and downy mildews. DiPel® DF (*Bacillus thoringiensis subsp. kurstaki*) was sprayed as needed for control of melonworms (*Diaphania hyalinata*).

During the trial, Glyphosphate Pro II was sprayed once to control weeds, otherwise weeds were hand pulled.

For seed saving, hand-pollination was performed for Tahitian Staightneck, Trinidad Selection, Lloyd Marsh Selection, and Brian. Hand-pollination of selected vareities may have effected the rate of fruit set and therefore may have skewed varietal production differences.

Data collection

Fruits were harvested when pumpkins turned pale and plants were beginning to senesce. Harvested pumpkins were weighed individually. Hand-pollinated fruits were cut in half to harvest the seed which were then washed and dried on screens.

Taste tests were performed for each variety of pumpkin. Pumpkin flesh was diced into pieces about 1"x1" and microwaved in a glass bowl for ten minutes with 350ml of water. Each variety was assigned a letter so as not to sway decisions due to a variety name. Participants tasting the fruit were asked to make comments about sweetness, bitterness, and texture. They were also asked to number their three favorite and three least favorite varieties. Each top favorite was given a score of 3 points, second favorite 2 points, and third favorite 1 point to determine which variety received the overall highest rating. The same was done for the worst tasting varieties. The worst variety received 3 points, second worst 2 points, and third 1 point, to determine the varieties with the worst ratings. Participant comments were read about each variety. It should also be noted that different people representing different countries will be biased toward one taste over another. A thick texture may be highly valued in one culture and looked down upon in another. There were three non-Americans present, but this is not enough to make it unbiased.

Table 2. Percent Germination for each variety

Variety	% Germ.
Lloyd Marsh	93%
Acorn	88%
Crookneck	87%
La Primera	82%
Hardy	81%
Tahitian Butternut	54%
Ingram Billie	51%
Trinidad Selection	25%
Tahitian Straightneck	11%
Tropical Brian	0%
Small Butternut	0%

Results and Discussion

Small Butternut was removed from the trial because of poor germination.

Tropical Brian was initially thought to also have nonviable seed. There was 0% germination from direct seeding as well as the pots for transplanting (Table 2). Because it had to be reseeded, Tropical Brian was behind the other varieties in flowering, fruiting, and maturing. Seasonal rains caused all varieties to deteriorate from mildew and caterpillar damage.

Tropical Brian was behind the others and therefore experienced higher pest and disease prevalent later in the growing season. This may have been a factor that decreased yields to lower-than normal numbers (Table 3). It was also observed to be more difficult to obtain Tropical Brian pumpkins through hand-pollination than other hand-pollinated varieties.

Tahitian Straightneck had low germination (11%) (Table 2), reducing the number of full plots. Rather than eliminating one entire replication, five to six plants were placed in each plot and spaced wider than orginally planned. This affected the total number of fruits produced (Table 3) for this variety.

Table 3. Average means of varietal production.

Variety	Number of fruit	Mass per fruit (kg)	Yield (kg)
Acorn	22 a	1 d	31 ab
Tropical Brian	6 bc	2 cd	16 b
Crookneck	21 a	2 cd	56 ab
Hardy	16 a-c	2 cd	27 b
Ingram Billie	15 a-c	2 cd	39 ab
Lloyd Marsh	18 ab	3 bc	67 ab
La Primera	15 a-c	5 ab	80 a
Tahitian Butternut	9 a-c	3 cd	17 b
Tahitian Straightneck	4 c	6 a	20 b
Trinidad Selection	15 a-c	3 cd	46 ab
P-Value[Y]	**0.0537**	**0.0012**	**0.0609**

[Y] Within each column, means separation letters (obtained via Duncan's Multiple Range Test) are shown if the corresponding P value is ≤ 0.05. Any two means in a column are statistically similar if followed by one or more letters in common. Any two means in a column sharing no letters in common are statistically different.

Figure 2. *Crookneck (left) and Hardy (right) varieties with varying shape and size of fruit.*

The Lloyd Marsh variety was both a high producer and produced large fruits. The Tahitian Staightneck grew large fruits, but few were produced.

The Acorn variety stood out as one of the highest number of fruit procers with one of the lowest fruit masses.

Table 4. Tast Test Results

Variety	Color from lightest (1) to darkest (10)	Flesh Thickness (from thinnest (1) to thickest (10))	Taste remarks
Acorn	7	4-5	Not much agreement, but mostly neutral remarks
Tropical Brian	2-3	6-7	Tender, with mildly sweet flavor
Crookneck	1	1-3	Rather bland
Hardy	4	1-3	Firm texture and slightly sweet flavor
Ingram Billie	9	4-5	Sweet flavor
La Primera	6	9-10	Smooth texture and slightly bitter flavor
Lloyd Marsh	8	8	Thick, smooth consistency with fairly strong flavor
Tahitian Butternut	5	1-3	Thick texture with strong flavor
Tahitian Straightneck	2-3	6-7	Stringy texture with bitter to bland flavor
Trinidad Selection	10	9-10	Thick consistency with sweet flavor

Some varieties, including Crookneck and Hardy, had inconsistent shape and size of fruit (Figure 2). This indicates the genetic line is no longer pure. Acorn, Ingram Billie, and Tahitian Butternut had some variation in size, but did not display drastic differences in shape.

Consumption value

Although it is not totally accurate, as different cultures enjoy different tastes and textures, participants found Trinidad Selection and Hardy to be the preferred varieties. Both are firm fleshed with a sweet flavor. Least preferred were the Tahitian Straightneck and La Primera. Both were described as bitter flavored and the Tahitian Staightneck was also noted to have a stringy texture (Table 4).

Conclusion

La Primera, Lloyd Marsh Selection, Trinidad and Tahitian Straightneck varieties are appropriate for regions preferring large fruit while Acorn would be appropriate for regions preferring small fruit.

For varieties with inconsistent fruit shape (e.g. Crookneck and Hardy in this trial), it may be necessary to refresh seed lots.

For those doing similar trials in the future, transplants might be better than seeds.

Uniform hand-pollination or lack of hand-pollination for varieties trialed should also be encouraged to ensure better consistency.