

2014 Variety Trials at Twin Oaks Seed Farm

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

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

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.