

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

A project of Twin Oaks Seed Farm.
Organized by Edmund Frost and
funded by a SARE grant for 2014.

Project Elements

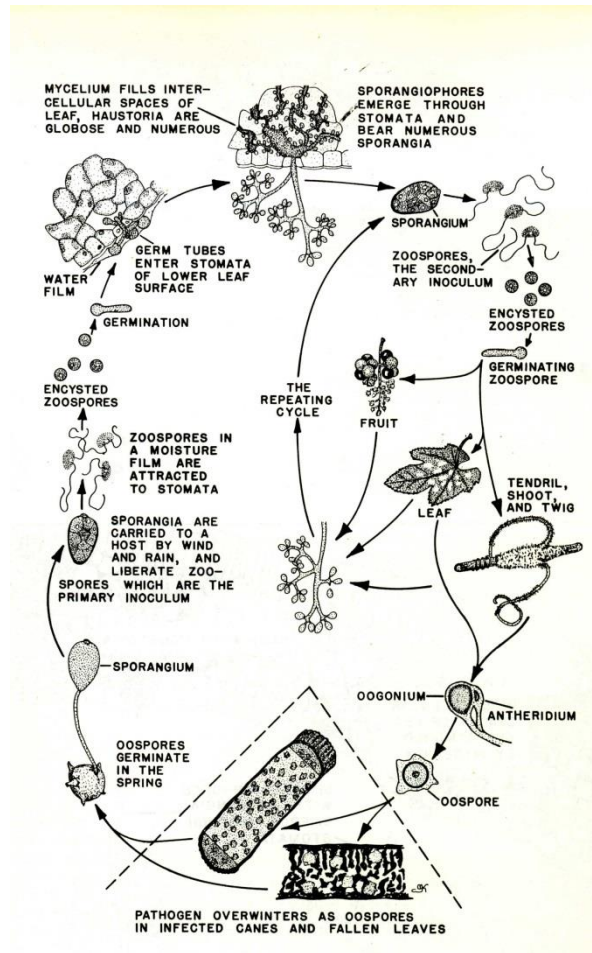
- Winter Squash Trial: 20 replicated entries plus 25 single entries.
- Cucumber Trial: 35 replicated entries plus 23 single entries.
- Melon Trial: 32 replicated entries plus 4 single entries.
- Striped cucumber beetle trial (separate from main trial). Not grown to maturity.
- Grower survey to assess cucurbit seed needs:
tinyurl.com/cucurbitsurvey
- Outreach with trials results and to promote the survey.

Cucurbit Downy Mildew (DM)



- A disease that affects the leaves of cucumber, melon, squash, watermelon and gourd plants by causing highly destructive leaf damage as well as a decline in fruit quality.
- DM may be the biggest problem affecting cucurbit production in the mid-Atlantic and the Southeast. It has increasing importance in the Northeast and upper Midwest as well.

Cucurbit Downy Mildew (DM)



- **Lifecycle:** Downy Mildew cannot survive freezing temperatures. It overwinters in southern Florida, and the spores blow north on the wind each season. Extended periods of dry, hot weather tend to suppress spread of the disease. Many years it does not arrive in Virginia until late August or September. Due to wet conditions, we saw symptoms by mid-June in 2013. Disease development is favored in wet, moderately cool summers.

Cucurbit Downy Mildew (DM)



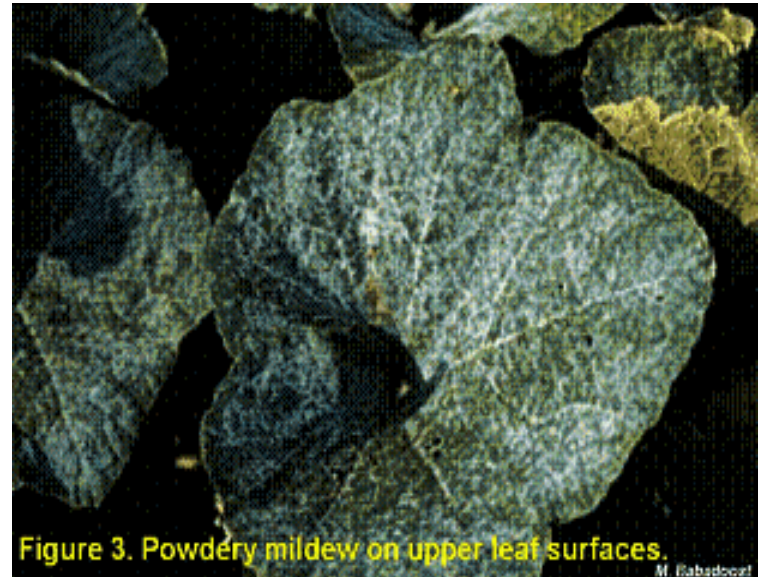
- **Symptoms:** Angular brown spots on leaves that often grow and kill the leaves and sometimes the entire plant (spots on melon leaves are less angular). Fruit is not directly affected, but is often stunted and/or low in sugar content as a result of plant stress.

Don't get DM confused with Powdery Mildew!

Downy Mildew



Powdery Mildew



We have experienced very little Powdery Mildew at our farm in Louisa County, Virginia. Most northern seed companies and cucurbit breeders have focused on Powdery Mildew resistance rather than Downy Mildew resistance.

DM has Mutated

- DM has mutated significantly in the last 10 years, becoming more virulent. Many varieties listed as DM resistant are now vulnerable. We had heard of this phenomenon and actively observed it during our 2013 trials and grow-outs in 2012 & 2013.
- Examples of previously listed DMR cucumber varieties that are now vulnerable:
Spacemaker 80 and Arkansas Little Leaf H-19

What strategies are available for dealing with DM?

- **Early Planting:** Some years it is possible to get good cucurbit crops before the disease arrives, or before it has a chance to do a lot of damage. However, this does not provide a supply of these crops later in the season and is not effective in high pressure years like 2013.
- **Wide Plant Spacing:** this method increases air circulation and decreases plant touching which theoretically helps stop/slow down disease spread.
- **Hoophouse Growing:** By keeping rain off the leaves it is possible to avoid bad DM infestations, even later in the season.
- **Disease Forecasting:** This allows farms to do preventative sprays when disease presence is likely. cdm.ipmpipe.org
- **Fungicide Sprays:** Organic options are limited. We used Cueva copper and Double Nickel biofungicide in 2013. Sprays are time consuming and expensive, and may not be very effective. Even with chemical spray programs yields and quality can be significantly reduced.
- **Resistant Varieties:** The most promising approach for organic farms, but information and options for resistant varieties are currently poor. For instance, there are no DM resistant butternut squash varieties available. Most of the cucumber varieties listed as DM-resistant that we trialed in 2013 had poor DM resistance.

How can we improve the availability of DM resistant varieties?

- Variety Trials to identify resistant varieties and seed stocks.
- Breeding Work to develop new resistant varieties.
- Make better and more up-to-date information on DM resistance available to growers.
- Regional Approach: Trialing, breeding and selection are most effective for our region when done in our region.



Farm tour from 2010, with a cucumber seed crop. This may be the moment I realized DM was the central problem for cucurbit production on our farm.



Debbie evaluating our 2013
cucumber DM trial.



Winter Squash Trial June 28th 2014.



August 6th Winter Squash Trial.



August 6th Cucumber and Melon Trial.



Cucumber Trial August 12th.



Melon Trial August 28th.



DMR 264 August 28th.



Straight Eights August 28th.



Marketmore 76 August 28th.



SV4719CS (Seminis) August 28th.



Ashley August 28th.



White Emerald (Baker Creek – from Thailand) August 28th.



DMR 261 (Cornell) August 28th.



Homemade Pickles August 28th.



Shintokiwa Long (Turtle Tree) August 28th.



PI 197088 (India) August 28th.



PI 605996 (India) August 28th.



San Dong Si Gua 1210 (China) August 28th.



'San Dong Si Gua' (China) PI 432885



DMR 264 (Cornell)



Ivory Queen (Cook's Garden)



DMR-264 (Cornell)



PI 197086 (India)



Jin Yang No. 2 - PI 618907 (China)



Shintokiwa Long (Turtle Tree)



PI 605996 (India)



DMR-261 (Cornell)



Taste testing cucumbers.



DMR 264 (Cornell)



Hales Best August 28th.



Delicious 51 August 28th.



Edisto 47 August 28th.



Seminole August 28th.



**PI 436531 (Tai Nang No. 2) from Taiwan by way of Senegal
August 28th.**



Trifecta (Cornell) August 28th.



Trifecta



Seminole



Edisto 47



Seminole



Hannah's Choice



Tai Nang No. 2



Brix testing.



Trifecta



DMR 264 Seed Growout.



Winter Squash Trial August 28th. Border squash is Waltham, and very heavily impacted by DM.



Waltham foreground, Thai Kang Kob behind - August 28th.



Waltham foreground, Seminole behind - August 28th.



Waltham foreground, Seminole x Waltham F3 behind – September 3rd.



Waltham foreground, Pequenita Asar (Spain) behind - August 28th. Pequenita Asar foliage declined quickly in early September.



Variety Trials Field Day, September 15th.



Assorted cucumbers at variety trials field day.



Seminole x Waltham F3



Some of the Winter Squash Harvest



Cuban Necked Pumpkin



Cuban Necked Pumpkin



Thai Kang Kob



Jamaican Long Necked Pumpkin



Soler (Puerto Rico)



Brix testing winter squash in late December.



Chinese Tropical Pumpkin



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