

2013 Downy Mildew Muskmelon Trial Report

by Edmund Frost

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Introduction:

2013 was a year of very high Downy Mildew pressure in Central Virginia and at our farm. We had already observed DM on other cucurbit plantings before planting this trial, and rainy weather persisted throughout the summer. Out of 38 seed stocks planted (29 orange muskmelon, 2 honeydews and 7 miscellaneous), only 3 achieved good or moderate production of good-tasting, marketable fruit. 20 produced very poorly or not at all. 10 fell somewhere in between these categories and 2 had insufficient stands.

Seed sources for the trial included Southern Exposure Seed Exchange, Johnny's, Cornell University, USDA Plant Introductions program, Fedco, Heavenly Seeds, Livingston Seeds, Cornucopia Seeds, Orange-Madison Coop, Seeds of Change and Twin Oaks Seed Farm.

We intentionally planted late to expose plants to high DM pressure. Late planting in a high pressure year represents a worst-case scenario for DM damage to melon plants, and this trial successfully evaluated performance under these conditions.

Unlike cucumbers, very few melon varieties are advertised or listed as DM resistant. Exceptions were Edisto 47, Mainstream, Planters Jumbo, and USDA Plant Introductions 292008 and 12411

Methods:

38 varieties of muskmelon were planted on June 18th and 19th, 2013. We selected varieties offered by southern seed companies, popular varieties, and DMR-listed varieties –mostly orange netted muskmelons. Three varieties were hybrids and the rest open pollinated. Seeds were planted 12 inches apart in stations – 10 stations per seed stock; 36 inches between seed stocks. We planted 3 seeds per station, except where seed supply was limited, in which case we planted 2 per station. Seed emergence evaluation was not one of the goals of the trial. Due to several days of heavy rain just after planting, emergence of some varieties was poor. Plants were thinned on 7/18 to 1 per station. Two plants were left in stations next to gaps. See spreadsheet for information about plant stands for each seed stock. There were two rows planted 6 feet apart.

The trial took place in LB1 field at Twin Oaks Seed Farm, which is certified organic. Soil type is Alta Vista Sandy Loam. Fertility was based on a soil test from A&L Eastern Labs. Amendments used were tofu okara (for nitrogen), at a rate of one ton per acre side dressed on August 8th. An over-wintered Crimson Clover cover crop was the main source of nitrogen. Potassium was supplied with an application of Potassium Sulfate at a rate of 400 pounds per acre. Phosphorus levels in the soil are very high, and pH is 6.4. Plants were covered with row cover until 7/5 to prevent plant mortality from cucumber beetles. Weed control was accomplished by hoeing in-row, hand weeding (once around plants), and tractor cultivation.

Downy Mildew pressure on leaves was observed and rated 5 times during the trial, using a 1-9 rating system (9 being the highest DM presence, and 1 indicating no DM presence). Harvest took place on 12 dates between 8/12 and 9/30.

Conclusions:

Only three seed stocks, Hannah's Choice F1 (Cornell/Fedco), Edisto 47 (Twin Oaks Stock) and Edisto 47 (TO non-stock) produced moderate to good yields of mostly sweet, marketable fruit. Five additional varieties had moderate to good production, but with problems that would make the fruit unmarketable or hard to market. 180A (Cornell) and Pride of Wisconsin (Fedco) had moderate yields of sweet fruit, but netting and appearance were poor. Old Time Tennessee Green (Twin Oaks) had good production and appearance, but sweetness was poor/moderate. Athena had moderate production and appearance, but poor fruit quality. Sweet passion had moderate production, good appearance, and very poor fruit quality.

It is likely that variation in stand density between seed stocks (due to poor emergence) contributed somewhat to differences in size of fruits, productivity and possibly sweetness. See spreadsheet and spreadsheet notes for more information.

Downy mildew ratings on foliage generally corresponded to productivity (as well as sweetness and to some extent appearance). The Edisto 47 seed stocks, 180A and Old Time Tennessee Green had four of the five best average DM ratings in the trial (along with PI 12411). Hannah's choice had good to moderate DM ratings early on. Because it is an earlier variety, the applicable DM resistance ratings are 8-28 and before. Pride of Wisconsin had moderate DM ratings throughout, which did not worsen over time like most other varieties. Tam Dew, Green Honeydew, Eel River, Missouri Gold and Old Time Tennessee (regular stock) also had good DM ratings on foliage. The worst performers (see next paragraph) generally had poor DM foliage ratings.

Varieties that produced basically inedible fruit with no sweetness (likely due to Downy Mildew) were: Sweet Passion, Golden Jenny, Hales Best, Halona, Eden Gem, Pike (2 seed stocks), Imperial 45, Minnesota Midget, Emerald Gem, Delicious 51, Old Time Tennessee (Stock), Planters Jumbo, Kansas (2 seed stocks), Honey Rock, Edisto Mystery, Ice Cream, PI 292008, and Improved Rocky Ford (20 in all). These all also produced poorly with the exception of Sweet Passion. Hearts of Gold also produced very poorly (one small melon). PI 12411 (regardless of DM) has very unusual, dry fruit.

Seven varieties gave intermediate results. Tam Dew, Eel River, Top Mark, Sierra Gold, Missouri Gold, Green Honeydew and Mainstream had poor-moderate taste ratings and poor-moderate yields.

Schoon's Hardshell (only 2 plants) had moderate taste, yield and DM ratings, and could hold potential as a DM tolerant variety.

The fact that 20 of 36 seed stocks did very poorly, and that only 7 seed stocks did at least somewhat well demonstrates the severity of the Downy Mildew problem in our region and underscores the importance of identifying existing DM resistant varieties and developing new ones. More trialing is needed to discern differences between the best performers and even between the best and the varieties with intermediate results. In our 2014 trial we will eliminate the least resistant seed stocks, include multiple seed stocks of the best varieties, and include multiple replications.

The differences between the two seed stocks of Old Time Tennessee melon are notable. They were saved from the same 2011 Twin Oaks seed growout. The "green" seed stock came from green offtypes that were also very sweet. In the 2013 trial these were not green, but they had notably better DM resistance in the foliage, and better productivity and taste than the regular stock seed.

Spreadsheet Notes:

#plants: The intention was to have ten plants of each variety, spaced one foot apart. Due to very wet weather just after planting, emergence was poor for some varieties. This column gives the number of surviving plants for each variety. I removed Schoon's Hardshell (2 plants) and 181A (1 plant) from the comparative analysis. They are listed at the bottom of the spreadsheet.

Tot#: Total harvested weight.

dm726-dm910: Downy Mildew ratings for plant foliage on different dates. 1 is most resistant and 9 is least resistant. An average may not be useful because some varieties that appeared to have good resistance early on eventually turned out to have very poor resistance and productivity. There is a tendency for plants to exhibit more disease susceptibility closer to, during and after harvest. Early varieties like Hannah's Choice have poor ratings in the last two DM evaluations that do not pertain well to the performance of the variety. Late varieties like Old Time Tennessee had several very favorable DM ratings, but the plants were mostly dead by the time of harvest.

DMworst: The worst DM rating received by each variety during the trial.

DMavg: The average of the DM ratings for each variety.

Tstavg: The average taste rating for each variety. 1 is best tasting, 9 is worst

Tstbest: Best taste rating from each crop. This is included because some poor taste ratings may relate to harvest timing.

Rating: Overall variety rating, based on yield and taste ratings.

A = Melons that had good or moderate taste, productivity and appearance.

B = Melons that produced well but had somewhat poor taste or poor appearance.

C = Intermediate results. See conclusions section.

D and F = Crop failure, F worse than D.

Yield/acre: Per acre yield, figuring that each variety had 78 square feet.

Lbs/plnt: Pounds produced per plant.

Fruits: Total number of fruits produced.

AvgWt: Average weight of fruits.

Net: Appearance of and/or presence of netting when applicable. Many of the poor ratings reflect Downy Mildew pressure and stress. Some highly DM-impacted varieties had good netting and appearance however. Some varieties (like Edisto 47 and Schoon's Hardshell) naturally have slight or coarse netting.

Additional Notes:

Hannah's Choice: Deep orange inside. Coarse, nice looking netting, scored.

Golden Jenny: Rough/poor netting. Button on blossom end.

Sweet Passion: Some well netted, some not.

Honey Rock: Seeds are germinating in the melon.

PI 124111: Mealy, dry, starchy, some sweetness. Like cooked winter squash. Unique.

180A: Firm flesh, deep orange color. There is a tendency to be overly crunchy if you don't wait plenty long enough to eat it. Not much netting.

Old Time Tennessee Green: Orange inside, despite stock seed coming from green flesh melons.

Old Time Tennessee Stock: Some crescent shapes.

Pike Stock: Netting half way around. Some crescent shapes.

Missouri Gold: Pointy on both ends. Coarse netting.

Variety Name	Source	Lot #	#plnts	Tot#	dm	dm	dm	dm	dm	dm	dm	tst	tst	Rating	yield/acre	lbs per plant	fruits	avg wt	net
					726	802	813	828	910	Worst	Avg.	avg.	best						
Tam Dew	Heavenly		10	11.6	3	2	4	4.5	8	8	4.3	6	5	C	6403	1.2	5	2.3	na
Eel River	Sds of Change	03ER	8	11.0	3	5	4	5	7	7	4.8	6.5	5	C	6039	1.4	4	2.7	na
Hannah's Choice	Fedco	351	6	27.8	1	3	4	6	7.5	7.5	4.3	3	1	A	15318	4.6	8	3.5	1
Sweet Passion	SESE	7827	10	21.7	5	5	6	8	9	9	6.6	9	9	C	11957	2.2	15	1.4	3
Hearts of Gold	Heavenly		10	0.9	6	5	7.5	7	7	7.5	6.5	6	6	F	496	0.1	1	0.9	6
Golden Jenny	SESE	AA750	8	10.5	4	5	8	9	9	9	7.0	9	9	D	5786	1.3	13	0.8	7
Hales Best	SESE	AA310	10	3.9	5	6	7.5	8	7	8	6.7	9	9	F	2149	0.4	2	2.0	5
Halona F1	Johnnys	40400	5	8.7	6	7	9	8	8	9	7.6	9	9	D	4794	1.7	7	1.2	
Eden Gem	SESE	9728	8	4.9	6	7	6	7	8	8	6.8	9	9	F	2678	0.6	5	1.0	3
Top Mark	TwinOaks	2010 Stock	10	6.8	5	7	6	7	7	7	6.4	5.3	3	D	3769	0.7	4	1.7	3
Pike	SESE	AA515	10	7.6	5	5	5	7	8	8	6.0	8.5	8	D	4188	0.8	4	1.9	9
Imperial 45	Cornucopia		9	6.1	4	5	7	8	8	8	6.4	9	9	F	3383	0.7	4	1.5	1
Minnesota Midget	Seed Savers		8	6.5	3	5	8	8	8	8	6.4	9	9	F	3559	0.8	7	0.9	8
Emerald Gem	Baker Creek	861-140	10	3.4	4	4	5	6	7	7	5.2			F	1873	0.3	2	1.7	7
Pike	Twin Oaks	2012 Stock	10	4.3	4	5	5	7	8	8	5.8			F	2369	0.4	2	2.2	8
Sierra Gold	Livingston	12.10.13	10	12.0	4	5	6	8	8	8	6.2	6.3	5	C	6612	1.2	8	1.5	1
Kansas	Twin Oaks	2010 Stock	10	7.2	4	7	7	8	8	8	6.8	8.5	8	D	3989	0.7	4	1.8	9
Old Time TN	Twin Oaks	2011 Stock	10	10.8	3	3	3	4	7	7	4.0	9	9	D	5940	1.1	4	2.7	na
Green Honeydew	Heavenly		7	9.4	1	3	5	5	7	7	4.2	4.5	4	C	5201	1.3	5	1.9	na
Athena	Fedco	341	9	26.4	3	4	5	7	8	8	5.4	7.7	5	B	14568	2.9	7	3.8	5
Mainstream	Heavenly		9	13.4	3	4	6.5	7	6	7	5.3	6.7	3	C	7405	1.5	11	1.2	1
Delicious 51	SESE	AA685	10	10.6	8	7	6.5	7	9	9	7.5	9	9	D	5841	1.1	7	1.5	9
Planters Jumbo	Heavenly		10	4.1	3	6	6.5	8	6	8	5.9	8	7	D	2259	0.4	4	1.0	6
Missouri Gold	Twin Oaks	2011 Stock	10	13.2	5	4	3.5	4	5	5	4.3	4.5	4.5	C	7273	1.3	8	1.7	5
Kansas	SESE		9	3.9	6	8	6	6	6	8	6.4	9	9	F	2171	0.4	2	2.0	9
Honey Rock	Heavenly		9	9.8	5	6.5	7	9	8	9	7.1	9	9	D	5422	1.1	8	1.2	8
Edisto Mystery	Twin Oaks	2011 Stock	10	3.1	8	9	7	8	8	9	8.0	9	9	F	1708	0.3	3	1.0	9
Pride of Wisconsin	Fedco	351	8	18.5	5	6	6	6	6	6	5.8	4.5	4	B	10194	2.3	6	3.1	6
Edisto 47	Twin Oaks	2011NS	5	26.8	3	4	4.5	4	2	4.5	3.5	2.3	1	A	14789	5.4	8	3.4	4
PI 292008	USDA	11.368.4	7	1.4	3	6	7	7	7	7	6.0	9	9	F	749	0.2	1	1.4	na
PI 12411	USDA	11.364.7	7	9.1	1	2	2	3	7	7	3.0	8.5	8	C	5025	1.3	7	1.3	na
NY09-180A	Cornell	Sel. 2	6	25.3	1	3	4	4	4.5	4.5	3.3	2.3	1	B	13929	4.2	12	2.1	7
Ice Cream	Twin Oaks	2009	10	0.0	7	8	6.5	6	6	8	6.7			F	0	0.0			
Impr Rocky Ford	S. States	160-B1	10	2.5	6	6	7.5	8	8	8	7.1	9	9	F	1378	0.3	2	1.3	4
Edisto 47	Twin Oaks	2011 Stock	9	31.4	1	3	3	3	3	3	2.6	4.7	2	A	17323	3.5	14	2.2	4
Old Time TN Grn	Twin Oaks	2011	9	29.7	3	3	3	2	2	3	2.6	6	6	B	16365	3.3	7	4.2	na
NY09-181A	Cornell	Sel. 1	1	0.0	3	5	4.5	8	9	9	5.9					0.0			
Schoon's Hardshell	Baker Creek	DVB16	2	6.6	5	7	5	4	4	7	5.0	4.5	4			3.3	2	3.3	6