Watermelon Research on Delmarva

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UNIVERSITY OF DELAWARE
COOPERATIVE EXTENSION
UNIVERSITY OF DELAWARE
College of Agriculture & Natural Resources

Delmarva Peninsula Watermelon Producing Area

Delmarva
5,500-6,000
Acres

Delmarva Watermelon Industry

- 5000-6000 acres
- Planted late April-June
- Harvest July-October
- 95% Black plastic mulch and drip irrigated
- 5% no-till
- Seedless
- Both special and standard seeded as pollenizers


G Johnson

Delmarva Watermelon Industry

- Standard Seedless
  - Fascination was standard
  - Larger mix now
  - In row pollenizers. Wide adoption of CoPlanted Pollenizers
- Less than 5% mini on contract
- Limited grafted use
- Majority broker contracted
- Small # of grower brokers
- Multi state – DE, MD, (SC)
- Compete with south in July,
- Indiana in August

Delmarva Watermelon Growers Questions/Concerns

- Improving pollination, set and carrying capacity
  - Better overall yields
  - Improving crown set, early yields
- Special pollenizers
  - Necessity (cost)
  - Vigor, Health (disease resistance)
  - Effectiveness (yield)
- Best triploid/pollenizer combo
- Co-Planted pollinizer effectiveness
- Pollenizer systems, spacings
- Pollinating insects

Delmarva Watermelon Growers Diseases and other pest concerns

- Phytopthora capsici management
- Fusarium wilt management
- Gummy Stem Blight control
- Anthracnose increase
- Powdery and downy mildew
- Fruit blotch
- Spider mites
- Cucumber beetles
- Other rind feeders
- Aphids
- Weeds – morningglory, Palmer amaranth

Regional Watermelon Research Programs

- University of Delaware
  - Dr. Gordon Johnson - Culture
  - Dr. Emmalea Ernest - Varieties
  - Dr. David Owens - Entomology
  - Dr. Mark VanGessel – Weed Science
- University of Maryland
  - Dr. Jerry Brust – Culture
  - Dr. Kate Everts – Plant Pathology
  - Dr. Kurt Volmer – Weed Science
- Virginia Tech
  - Dr. David Langston – Plant Pathology

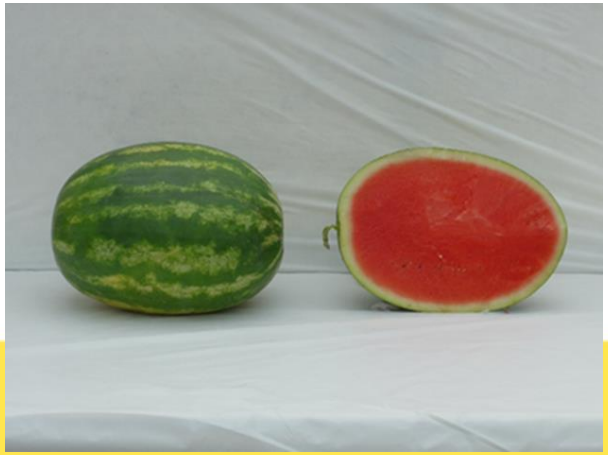
Watermelon Variety Trials and other Watermelon Research

Gordon Johnson
Extension Fruit and Vegetable Specialist
Department of Plant and Soil Sciences
University of Delaware

Delaware Watermelon Yield Trials In Top Group 2016-2019

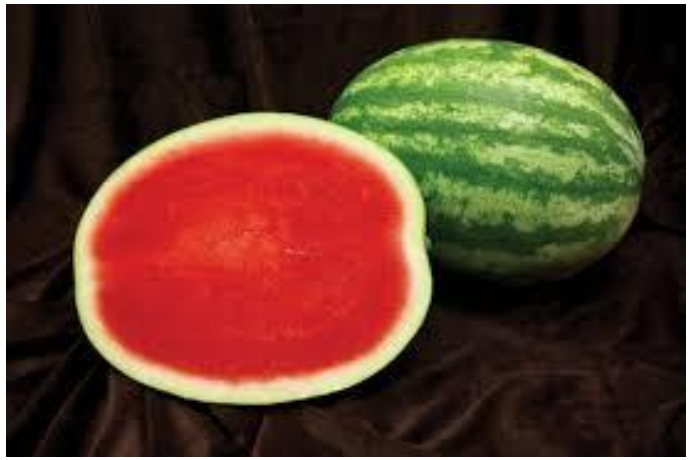
All 4 years

- 7187 (4,17,10, 17)
- Crunchy Red (3, 5, 7, 8)
- Maxima (1,14, 2, 7)
- Fascination (6, 8, 15, 1)



3 of 4 years

- Road Trip (7, 12, 5)
- Bottle Rocket (8, 5,16)



Selecting Varieties

- Yield
- Maturity
- Longevity
- Size Distribution
- Appearance
  - Rind color
  - Shape
- Quality
  - Soluble solids (sugar)
- Flesh density
- Limited defects
  - Hollow heart
- Plant vigor
- Disease resistance
  - Fusarium
  - Anthracnose

Delaware 2018 Variety Trial Information – On Line

- 36 Varieties
- 10 Companies
- 4 Replications
- UD REC
- 9 plant plots, 4 pollenizers (SP7, Accomplice, Pollen Wingman, Ace +)
- Flooded 6/9, delayed harvest 3 weeks
- Planted May 22
- Harvested 3 times
  - 8/8 first harvest
- Individual weights
- Soluble solids
- Hard Seed
- Hollow Heart

Top Yielders 2018

Variety	Lbs./a	No./a
Paradigm	131904	9046
Maxima	128276	7663
9601	126470	9046
ORS 60599	124292	8182
Unbridled	121867	8240
ORS 6181 B	120354	7894
Crunchy Red	116774	8412
Embasy	108324	7375
Charismatic	105481	7087
7187	104405	6914
Summer Breeze	101692	6972
Road Trip	97807	6453
Premont	97645	6972
Secretariat	96624	6972
Fascination	92604	6453
Kingman	92319	6396
Joy Ride	92262	5704

Over 40% 60 Count

- 7187, Summer Breeze, 7197, Cut Above, Premont, 9601, Crunchy Red, Secretariat, 0241 WA, ORS 6151, ORS 6064, Troubadour, and Eclipse.

Troubadour

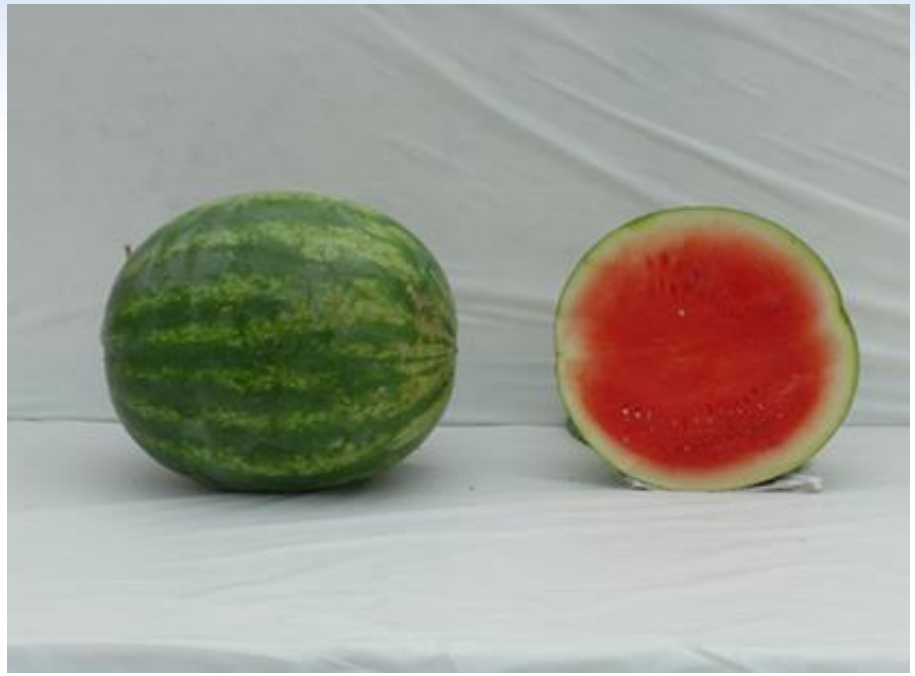
Over 40% 45 Count

- All varieties had greater than 40% of the melons harvested in the 45-count class, except for Troubadour, Eclipse, and Summer Breeze. Fascination had the highest percentage of 45 count melons (66.7 %).

Fascination

36 and 30 Count Watermelons

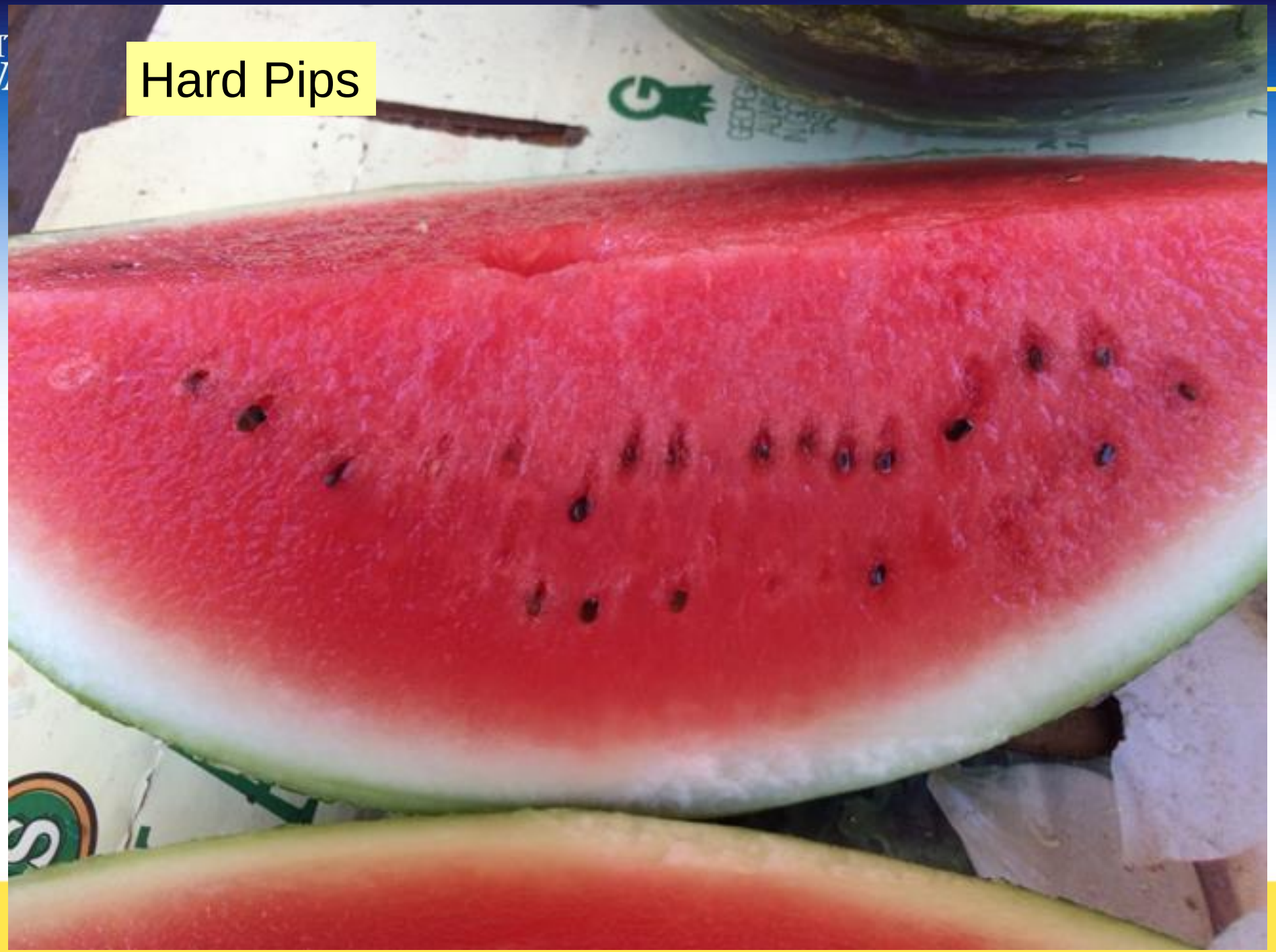
Varieties with more than 30% 30 and 36-count fruit were Maxima, Joy Ride, and Bottle Rocket.



Maxima

Variety	Hollow Heart Severity Rating (mean)		Percent Hollow Heart By Severity Rating			
			2	3	4	5
0241 WA	2.47	a	33	11	22	6
7197	2.31	ab	17	8	33	0
Unbridled	2.19	abc	6	25	13	6
ORS 6151	2.15	abcd	33	20	13	0
ORS 6181 B	2.13	abcd	6	12	12	12
7187	1.99	abcde	0	29	6	6
Charismatic	1.94	abcdef	13	6	6	13
Kingman	1.88	bcdefg	31	6	6	6
9601	1.85	bcdefg	15	0	15	5

Hard Pips



2019 Variety Trial Information

- 30 Varieties
- 8 Companies
- 4 Replications
- UD REC
- 9 plant plots, 4 pollenizers (SP7, Accomplice, Wingman, Ace +)

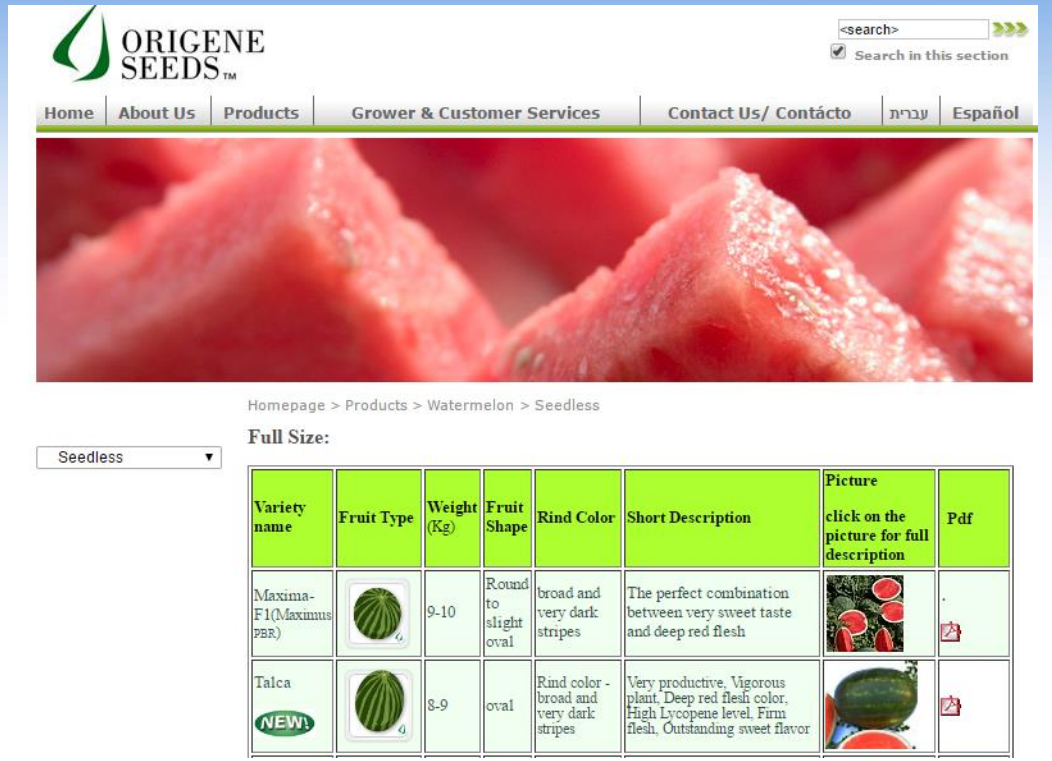
- Planted May 15
- Harvested 3 times
- Individual weights
- Soluble solids
- Hard Seed
- Hollow Heart

Varieties Seminis

- Joy Ride*
- **Road Trip***
- Summer Breeze*
- Bottle Rocket*
- Tailgate*
- SV 0241 WA*
- SV 4741
- SV 0502

Varieties Origene

- **Maxima***
- Boneci
- ORS 6064 B
- ORS 6064 F
- ORS 6203 A
- ORS 6371
- ORS 6375 A



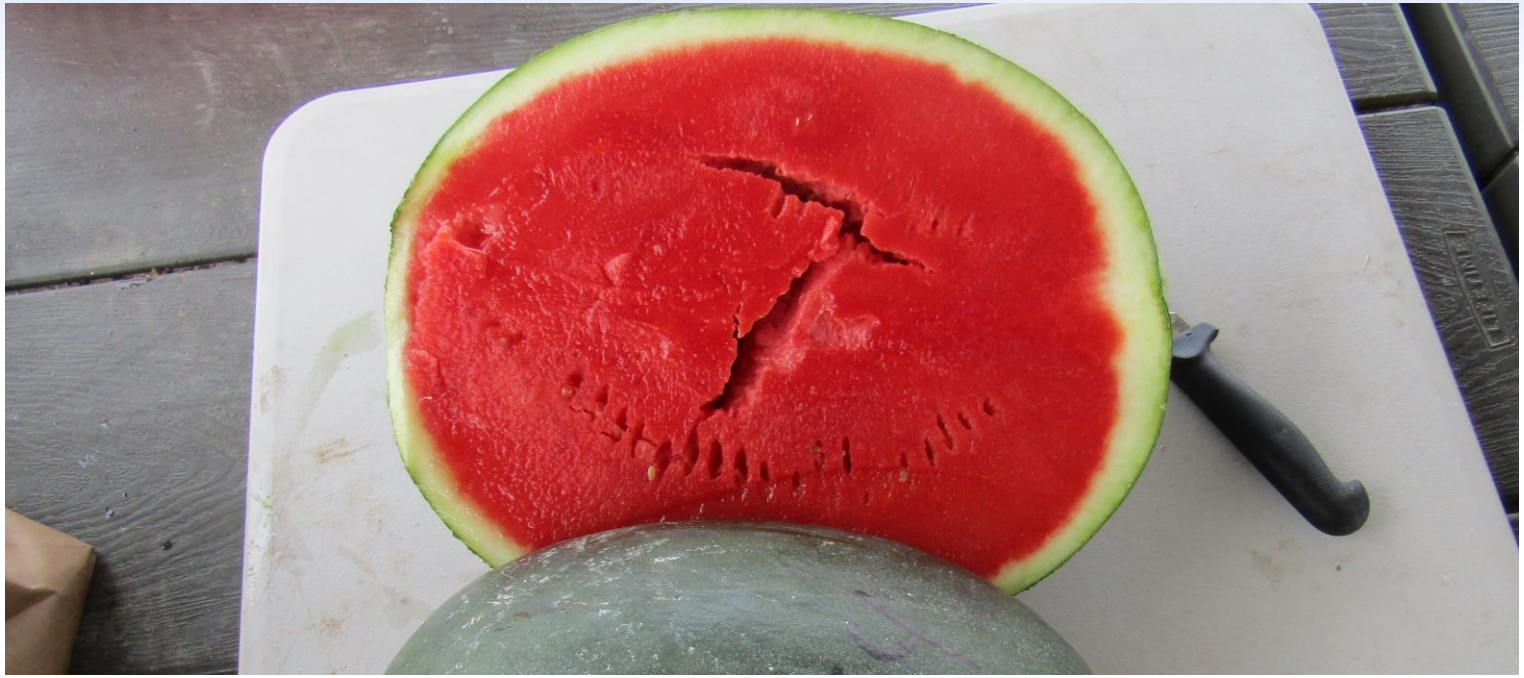
Variety	lbs/a		no./a
Fascination	111055	a	7548
ORS 6375 A	110072	a	7548
SW 2004	107480	ab	7202
SV 0241	102478	ab	7145
Roadtrip	101241	ab	7087
Red Garnet	98223	ab	7202
Maxima	96729	ab	6223
Crunchy Red	96672	ab	6626
Red Amber	92698	abc	6280
ORS 6371	92413	abcd	6165
Charismatic	92036	abcd	6626
Summer Breeze	91538	abcd	6972
Tailgate	90912	abcd	5877

Variety	lbs./a		no./a
Excursion	89484	abcd	5762
SV 4741	89372	abcd	5762
Bottle Rocket	88842	abcd	5474
7187	88241	abcd	5992
SV 0502	88010	abcd	6626
Captivation	86914	abcd	6396
Boneci	86268	abcd	6396
SW 1981	84913	abcd	5647
ORS 6064 B	84202	abcd	5704
Red Opal	82857	abcd	5762
Secretariat	81313	abcd	6453
Troubadour	80817	abcd	6626

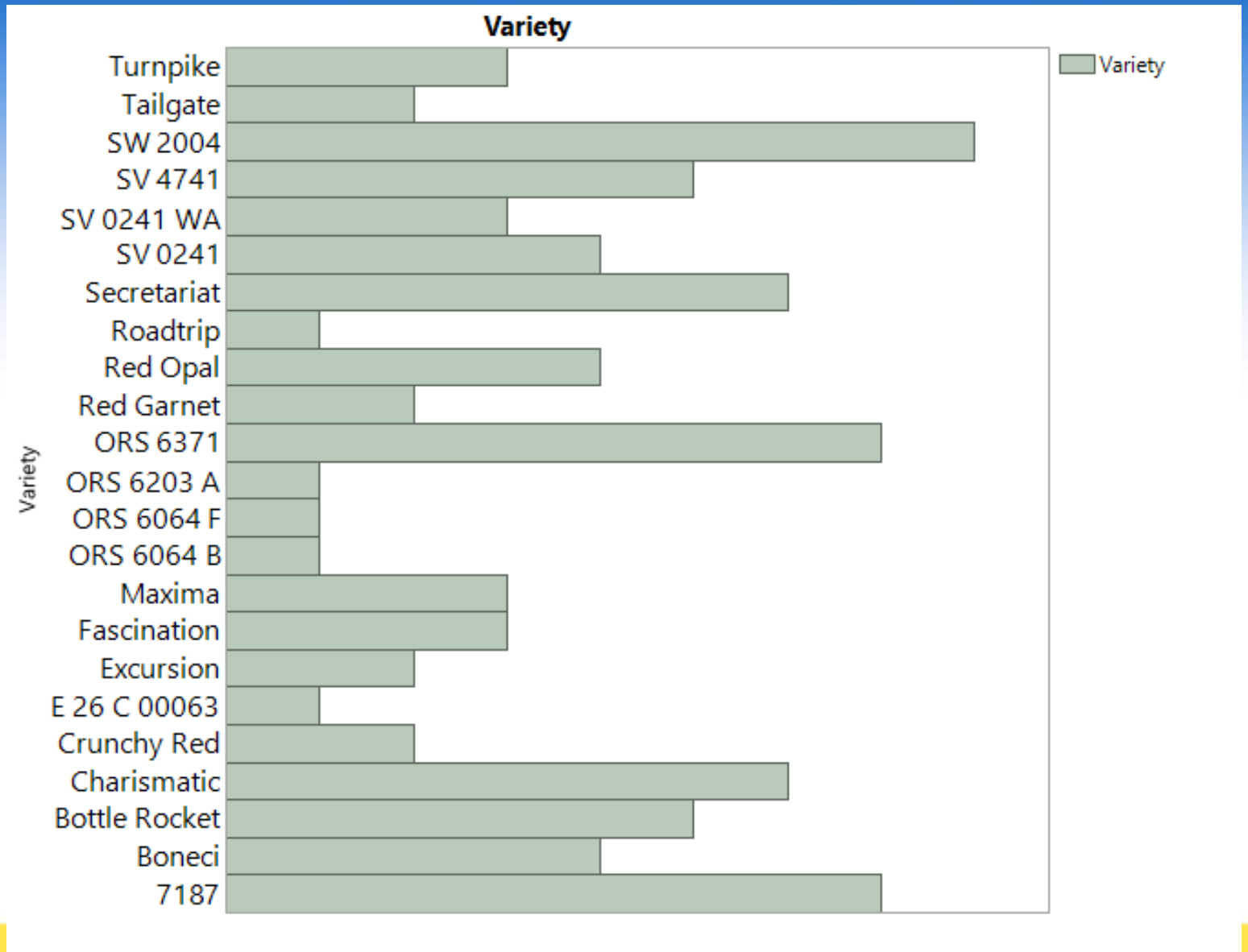
Variety	lbs/a		no./a
Fascination	111055	a	7548
ORS 6375 A	110072	a	7548
SW 2004	107480	ab	7202
SV 0241	102478	ab	7145
Roadtrip	101241	ab	7087
Red Garnet	98223	ab	7202
Maxima	96729	ab	6223
Crunchy Red	96672	ab	6626
Red Amber	92698	abc	6280
ORS 6371	92413	abcd	6165
Charismatic	92036	abcd	6626
Summer Breeze	91538	abcd	6972
Tailgate	90912	abcd	5877

Variety	SS
SV 2004	12.1
Roadtrip	12.0
SW 2004	11.7
Maxima	11.7
SV 0241	11.6
7187	11.6
Boneci	11.4
E 26 C 00063	11.4
Turnpike	11.4
28960 yellow	11.3
SV 0502	11.1
Bottle Rocket	11.1
ORS 6375 A	11.1

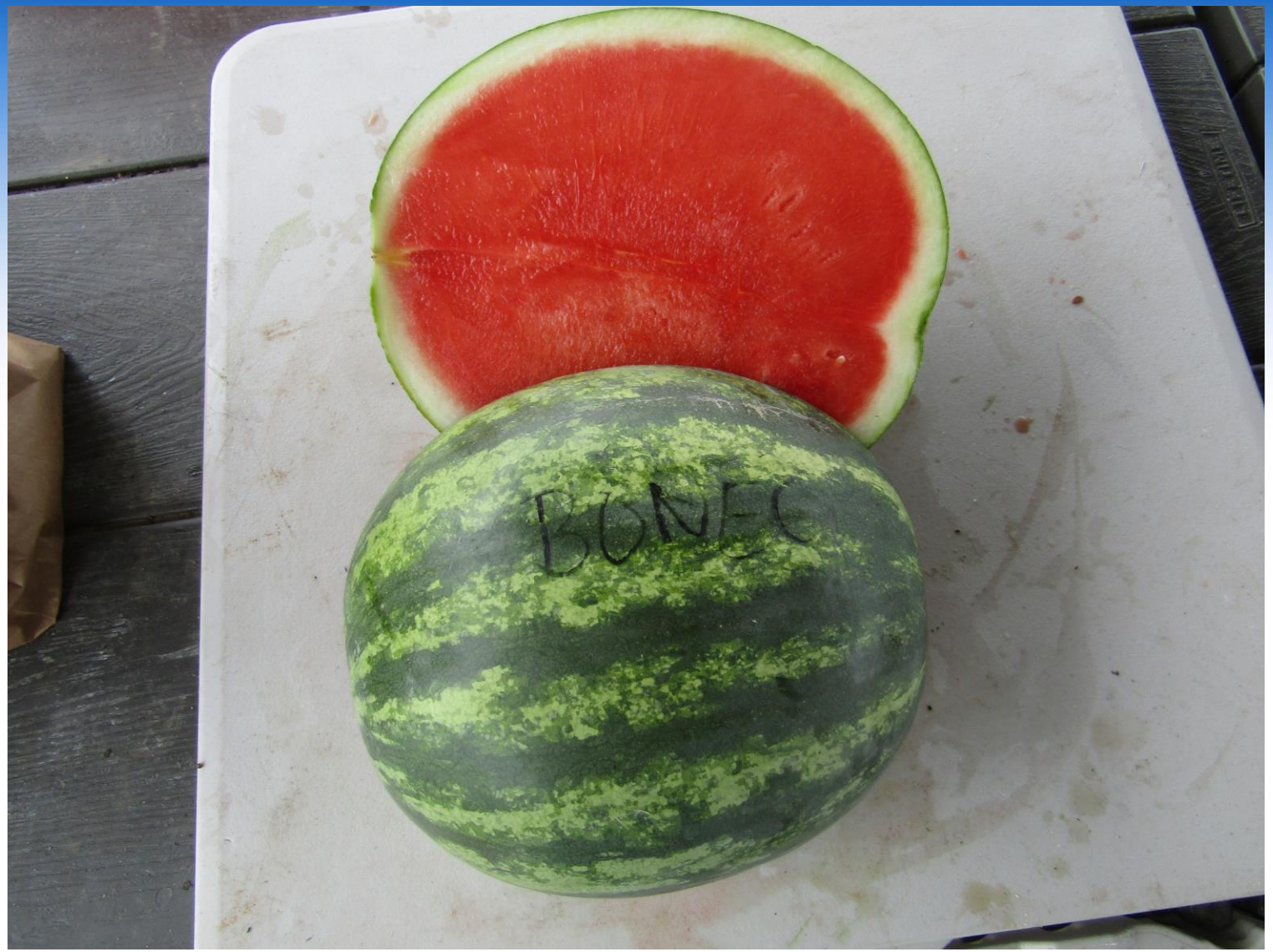
Hollow Heart

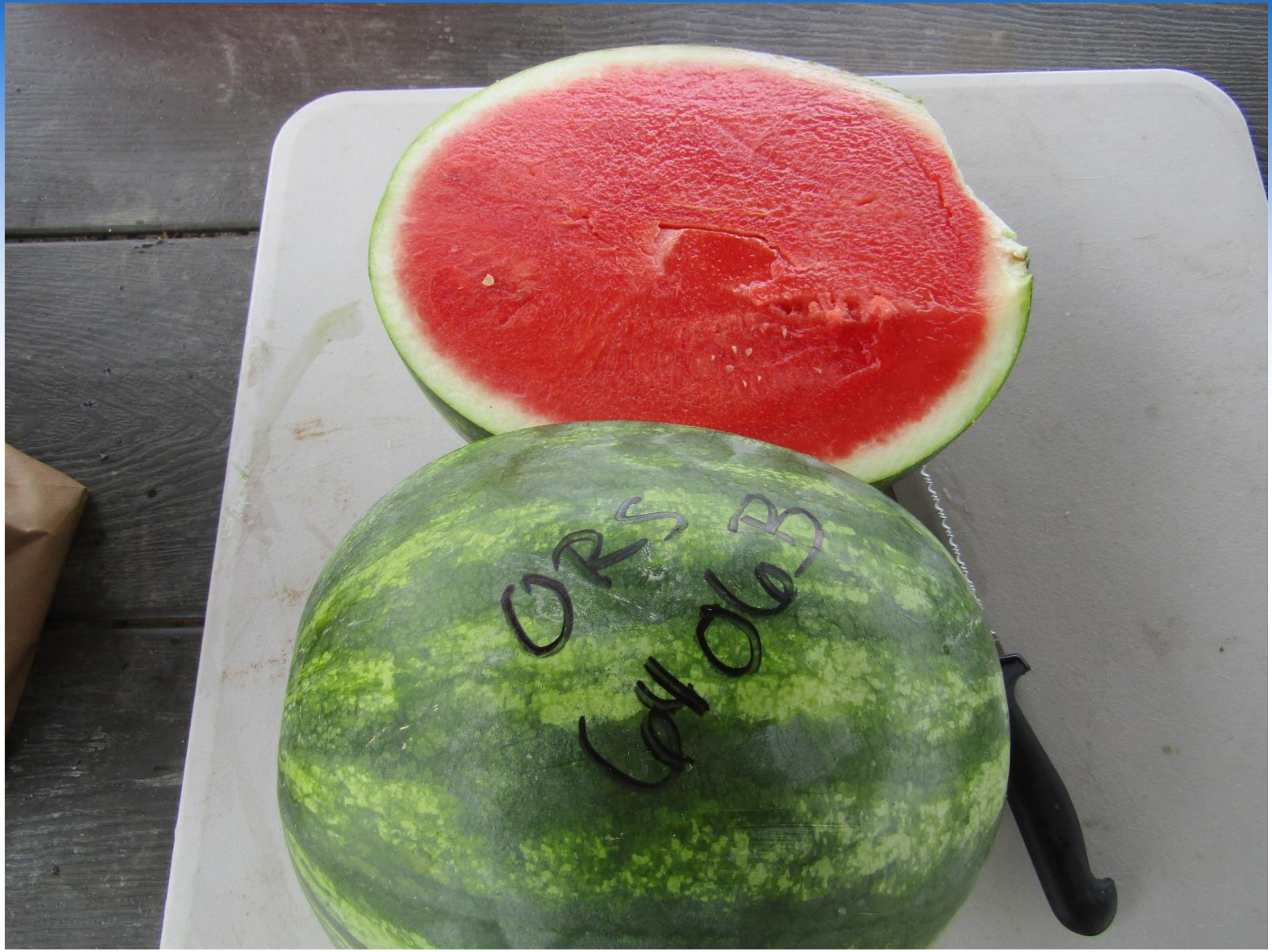


Hollow Heart

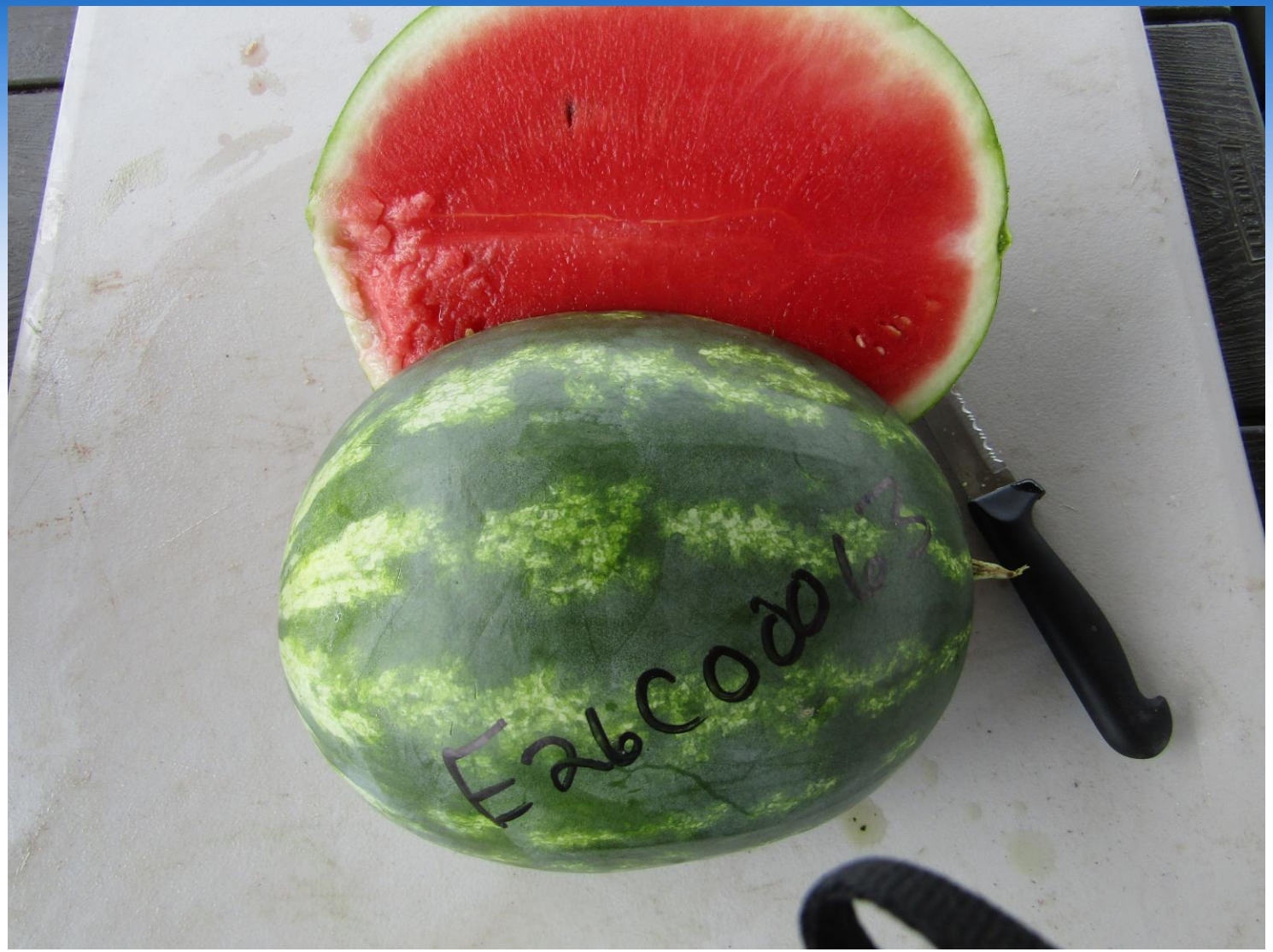


SV0502


BONEC


ORS
6406B


ORS
6064

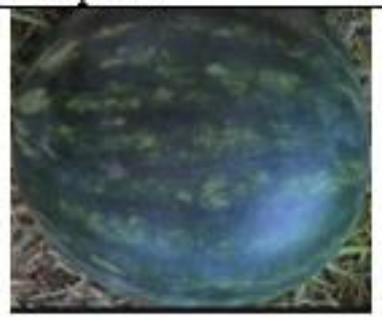

E26Cooler

W 28960 Yellow

2018 Mini Variety Trial Information

- Late summer/fall
- 12 Varieties
- 5 Companies
- 3 Replications
- UD REC
- 15 plant plots, 2 pollenizers (110 WC and Minipol)

- Planted June 22
- Harvested 3 times
  - 9/6 first harvest
- Individual weights
- Soluble solids
- Hard Seed
- Hollow Heart

			
Extazy	Leopard	Ocelot	Serval
			
Sorbet	Ana	ORS 7033 b	Promesa
			Photo not available
Mini Bee	Early Riser	Paragon	Titan

Variety	Yields and Harvest Distribution				
			Fruits per harvest (No/a)		
	Marketable lbs/a	Marketable Fruits/a	Harvest 1 77 DAT	Harvest 2 88 DAT	Harvest 3 104 DAT
Extazy	104484 a	15548 a	5739	8781	1037
Promesa	78976 b	13543 ab	5030	4823	726
Ana	77603 b	11814 bc	4218	5186	691
Titan	77348 bc	10984 bcd	2489	9611	1452
Sorbet	73883 bcd	10777 bcd	4149	3872	1175
Mini Bee	72086 bcd	10777 bcd	2627	6845	2351
Paragon	63018 bcde	10736 bcd	3181	7053	761
Leopard	62744 bcde	10155 cd	2489	6569	1106
ORS 7033 B	62530 bcde	10086 cd	2282	5186	415
Serval	57400 cde	9187 cd	2420	6914	1452
Early Riser	54254 de	8841 cd	3872	3941	1037
Ocelot	51527 e	7706 d	2835	7191	761
p-value	***0.0013***	***0.012***			
$LSD_{0.05}$	**40705**	**3357**			

2019 Mini Variety Trial Information

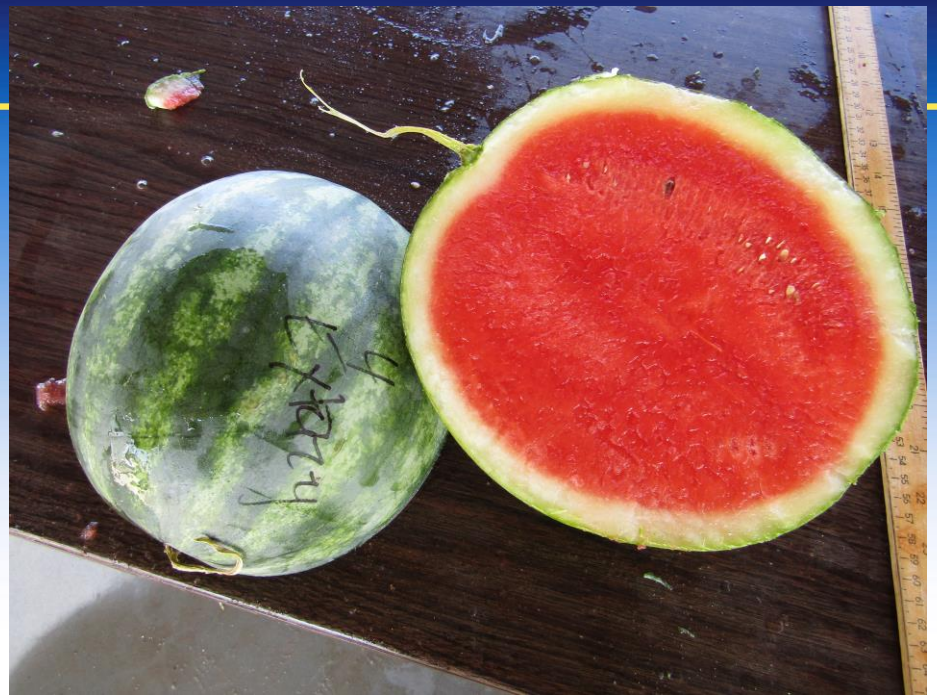
- Summer Planting
- 16 Varieties
- 6 Companies
  - Hazera
  - Origene
  - Siegers
  - Hollar
  - Seedway
  - Seminis
- 4 Replications
- UD REC

- 15 plant plots, 2 pollenizers (110 WC and Minipol)
- Planted June 9
- Harvested 2 times
- Individual weights
- Soluble solids
- Hard Seed
- Hollow Heart

Variety	lbs/a	
ORS 7204 C	95171	a
Extazy	94723	a
31502	90454	ab
ORS 7204 G	83851	abc
ORS 70258	80242	abcd
ORS 7241	79710	abcd
Anna	78945	abcde
Beach Ball	76733	bcde
Mini Bee	75583	bcde
ORS 12748	75477	bcde
Sirus	71202	cde
Paragon	67489	cde
Early Riser	67488	cde
ORS 7163	66148	de
Ocelot	65410	de
Nectaro	62571	e

Variety	no/a
Beach Ball	12377
Mini Bee	12377
31502	12031
Extazy	11685
Ocelot	11685
ORS 7204 C	11270
ORS 7241	11063
Paragon	10925
ORS 12748	10302
ORS 70258	10302
Anna	10233
ORS 7204 G	10026
Sirus	9887
Nectaro	9542
Early Riser	9473
ORS 7163	8989

Variety	lb/melon
ORS 7204 C	8.5
ORS 7204 G	8.4
Extazy	8.1
ORS 70258	7.8
Anna	7.8
31502	7.5
ORS 12748	7.3
ORS 7163	7.3
Sirus	7.2
ORS 7241	7.2
Early Riser	7.1
Nectaro	6.6
Beach Ball	6.2
Paragon	6.2
Mini Bee	6.1
Ocelot	5.6




4
3KB02


4
ORS
7204

Beach Ball had serious interior quality issues

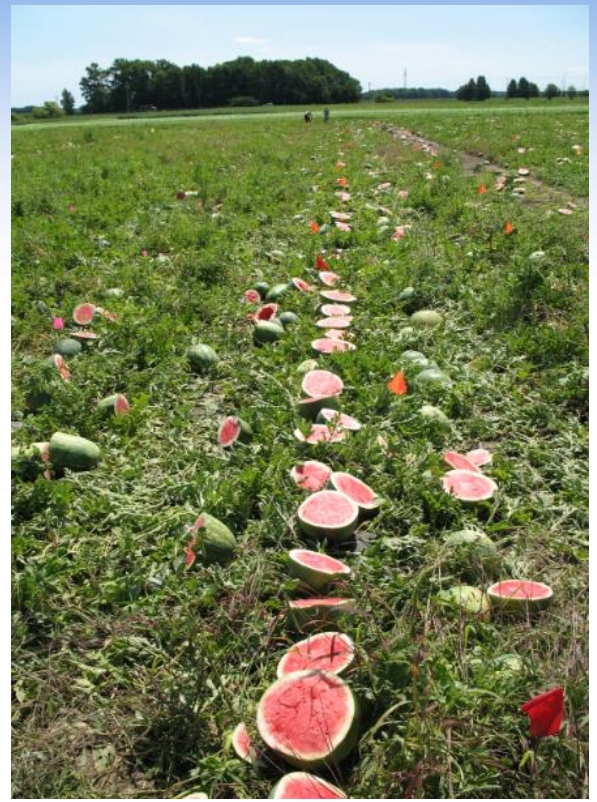
2017 Fruit Set and Hollow Heart Trial

Varieties tested

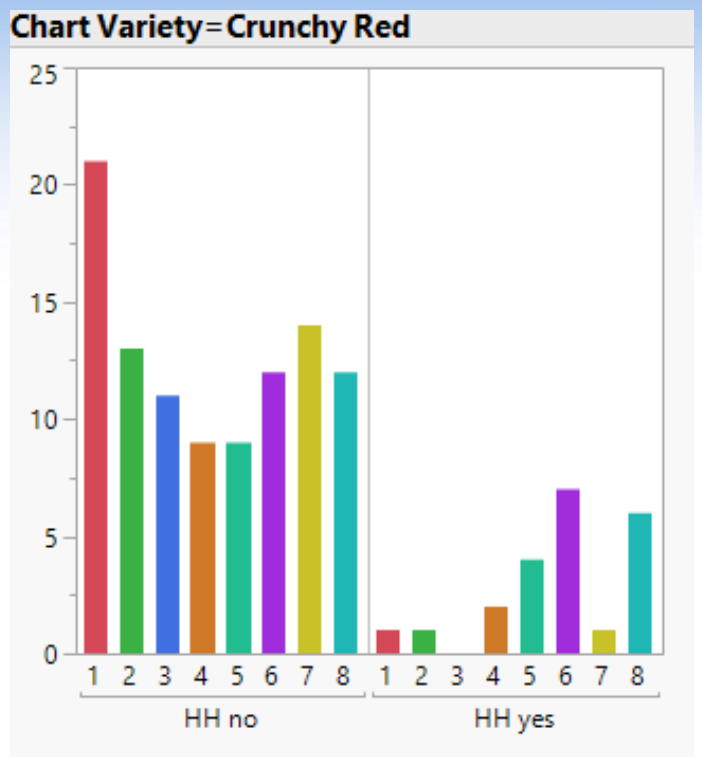
Liberty (Lower density)
9651 (Dense)
Revolution (Long)
Wayfarer (Smaller Icebox)
Crunchy Red (Dense)
7187 (Lower Density)

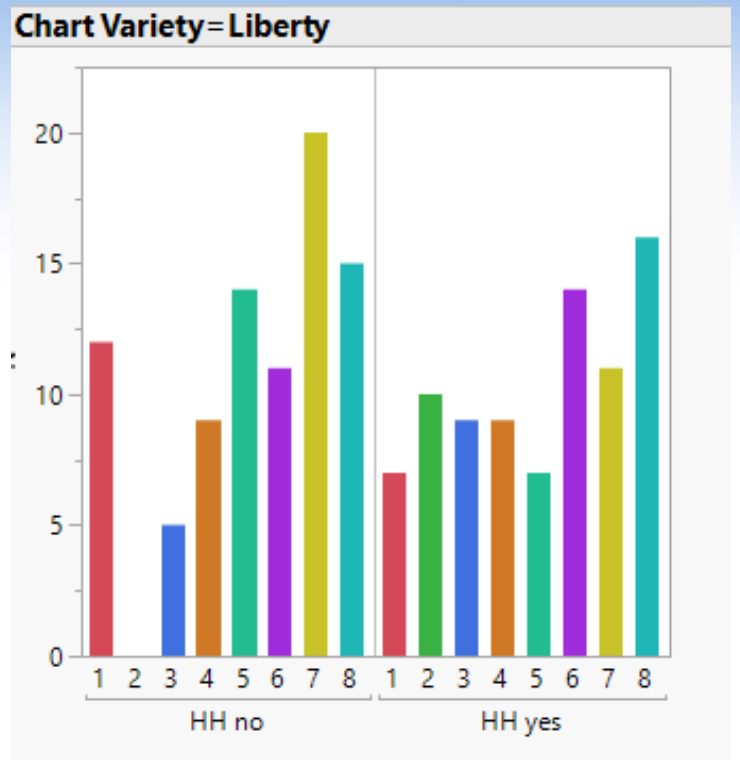
Pollen Pro pollenizer

1:16 pollinizer to seedless ratio
SSSSSSSSPSSSSSSSS



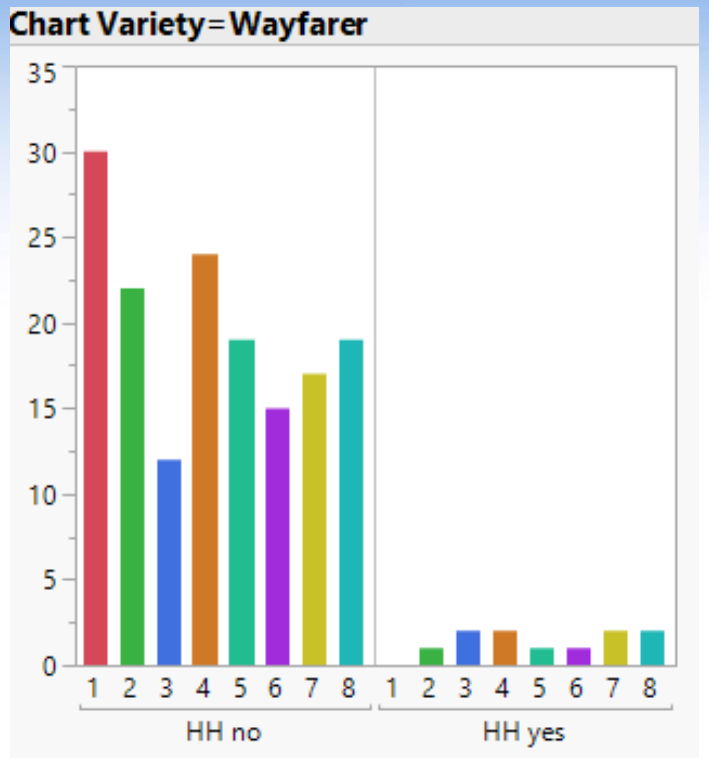
Hollow Heart in Dense vs Non-Dense Varieties By Position 1-8 (3 to 24' from pollinizer)

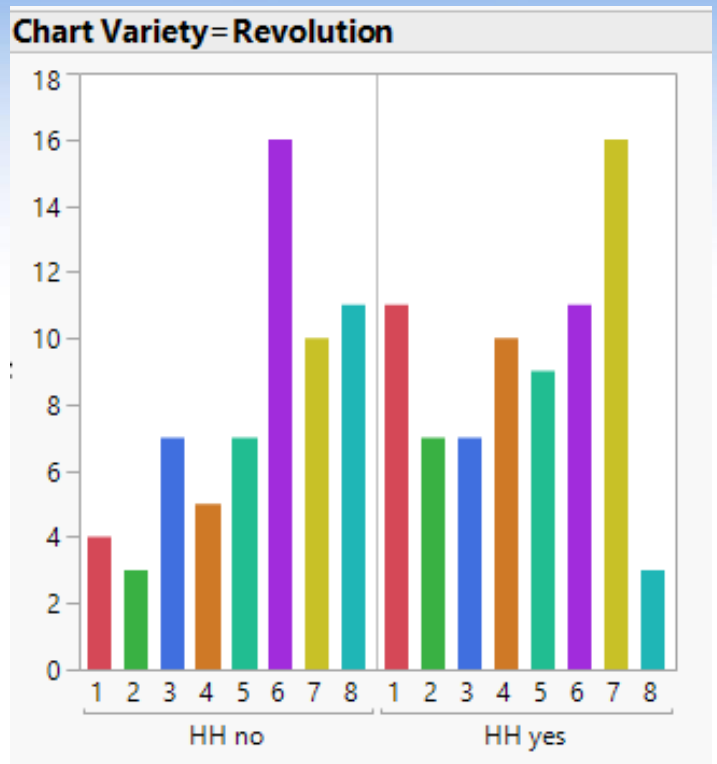




The dense variety (Crunchy Red) had much less hollow heart that the less dense variety (Liberty) Limiting pollen had a greater effect on Liberty

Hollow Heart in Small Round vs Large Long Varieties By Position 1-8 (3 to 24’ from pollinizer)

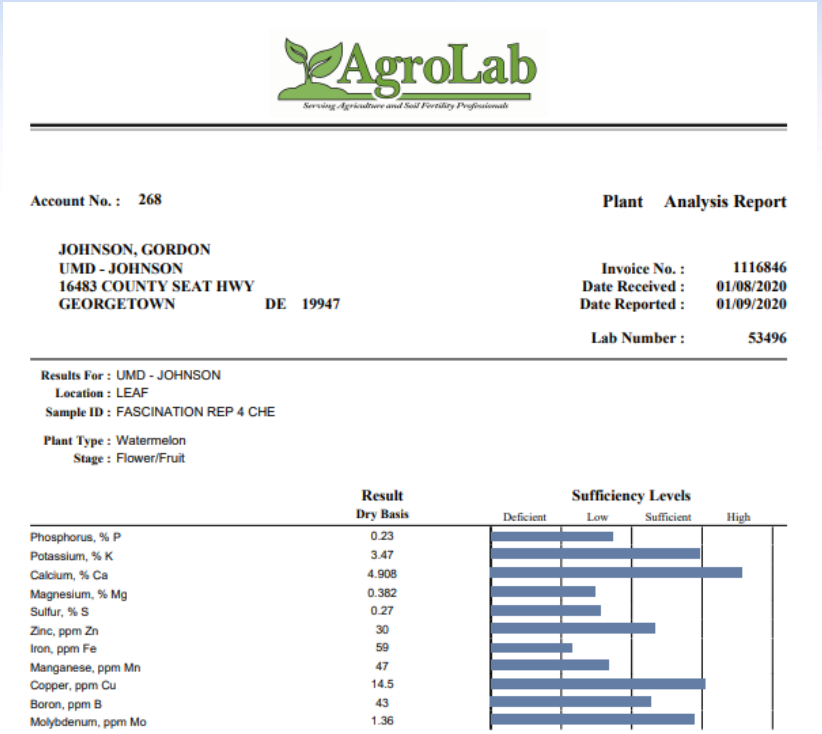




The dense small round variety (Wayfarer) had much less hollow heart than the large long variety (Revolution) Limiting pollen had a greater effect on Revolution

Calcium Nutrition Studies

- **Watermelon, Tomato, Pepper, Eggplant**
- **3 Calcium treatments**
  - **Control**
  - **Calcium Nitrate**
  - **Calcium Chelate**
- **Applied 3x through drip irrigation**
- **N rate adjusted**



AgroLab
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Account No. : 268

Plant Analysis Report

JOHNSON, GORDON
UMD - JOHNSON
16483 COUNTY SEAT HWY
GEORGETOWN DE 19947

Invoice No. : 1116846
Date Received : 01/08/2020
Date Reported : 01/09/2020

Lab Number : 53496

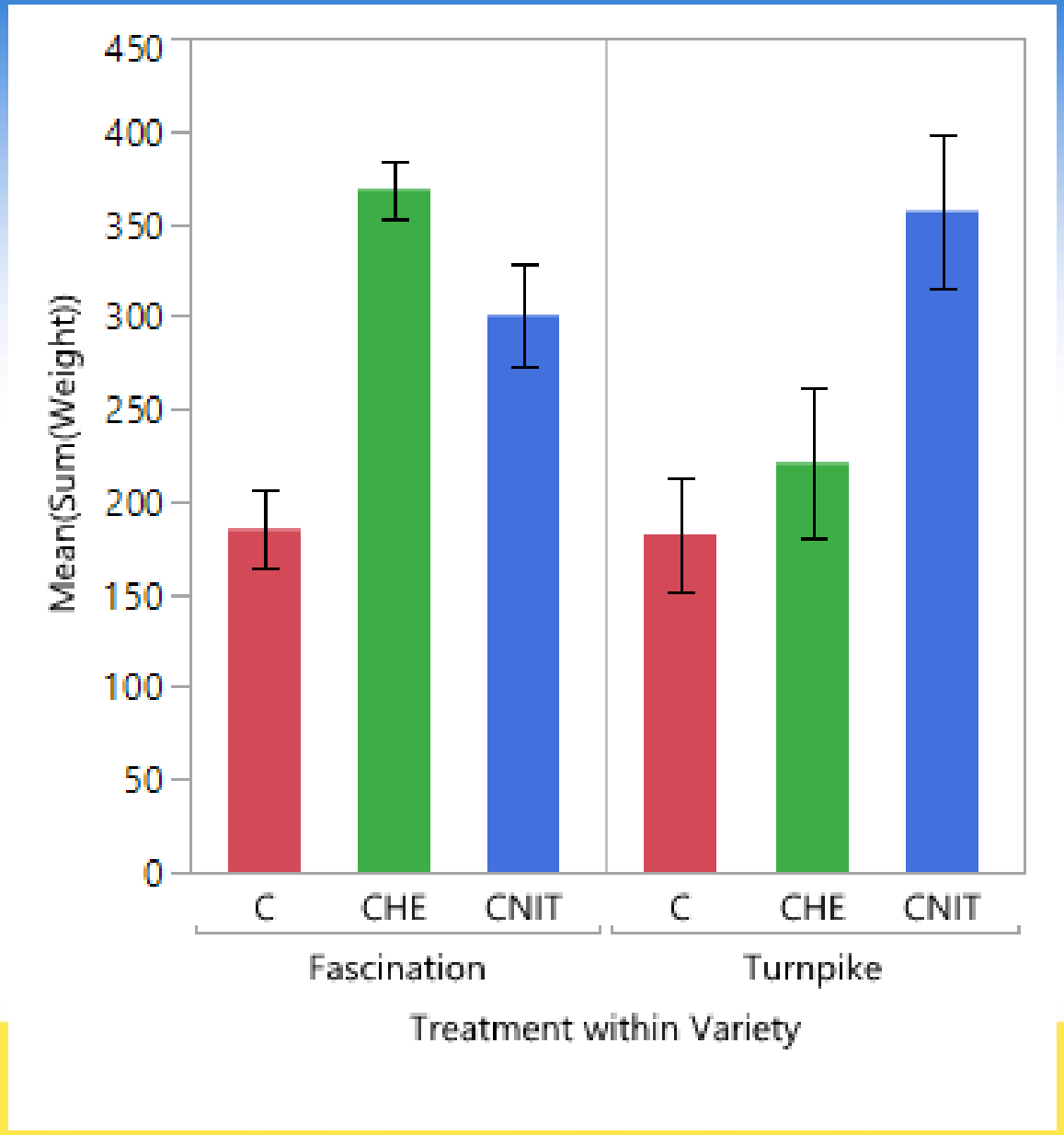
Results For : UMD - JOHNSON
Location : LEAF
Sample ID : FASCINATION REP 4 CHE

Plant Type : Watermelon
Stage : Flower/Fruit

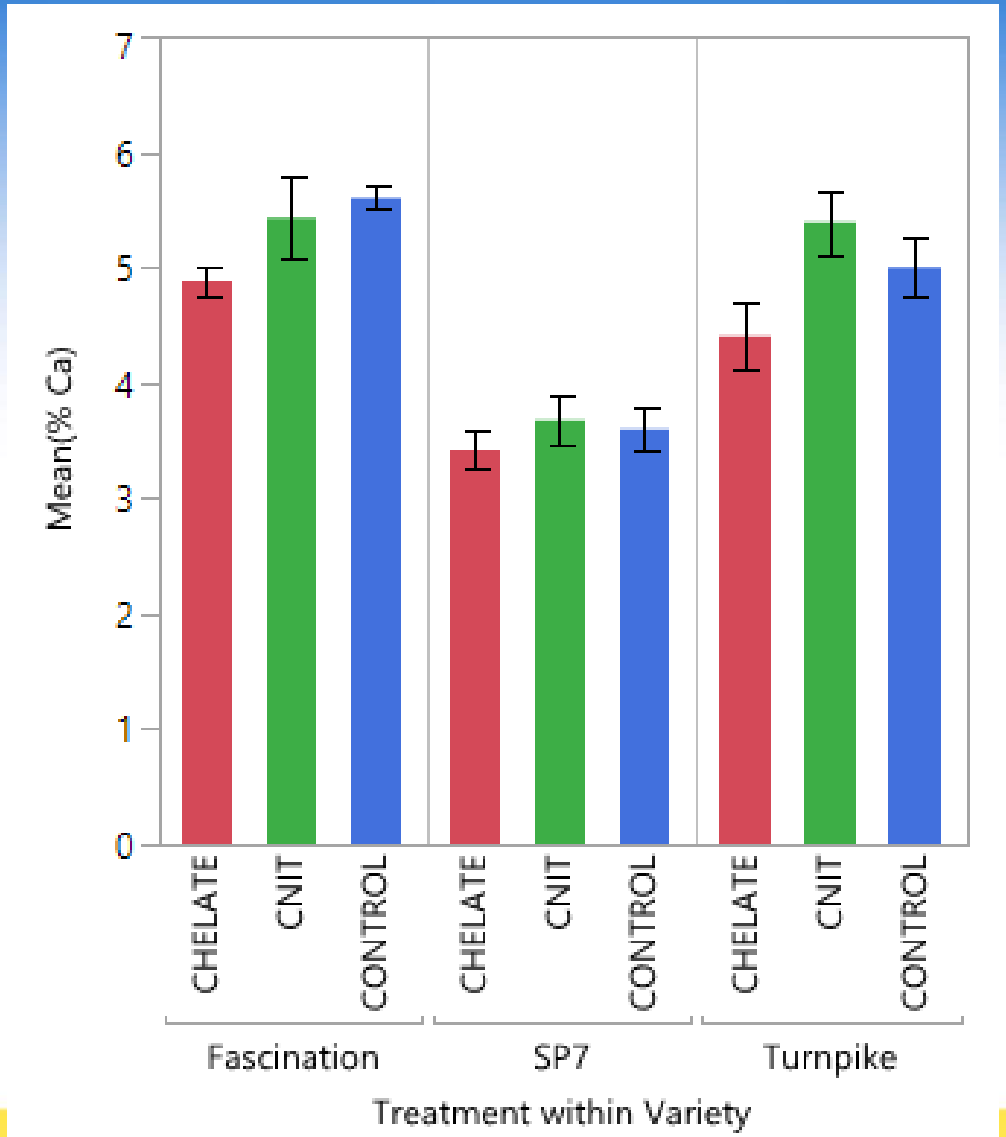
	Result Dry Basis
Phosphorus, % P	0.23
Potassium, % K	3.47
Calcium, % Ca	4.908
Magnesium, % Mg	0.382
Sulfur, % S	0.27
Zinc, ppm Zn	30
Iron, ppm Fe	59
Manganese, ppm Mn	47
Copper, ppm Cu	14.5
Boron, ppm B	43
Molybdenum, ppm Mo	1.36

Sufficiency Levels: Deficient, Low, Sufficient, High

Watermelon Yields Improved with Added Calcium

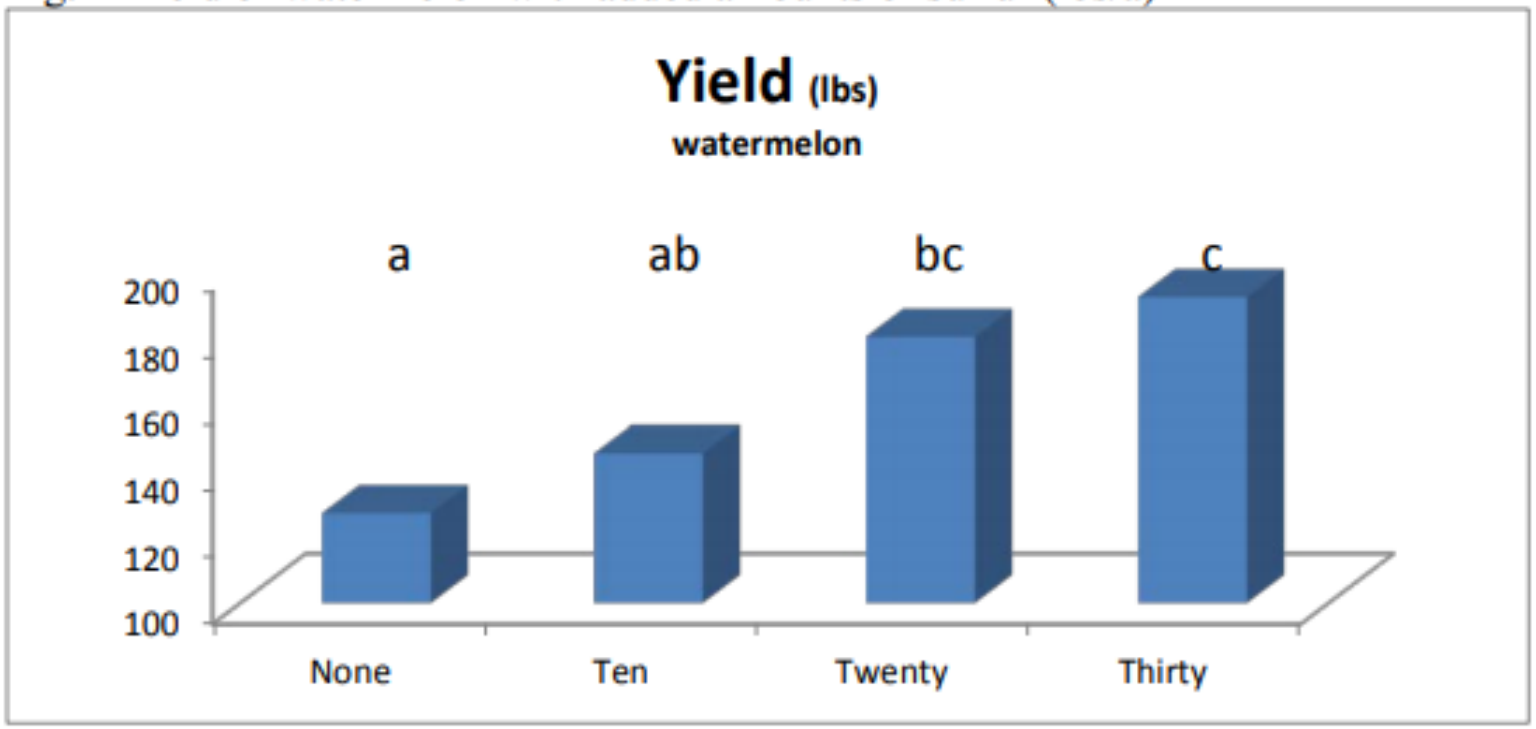


Watermelon Calcium Leaf Content not Affected



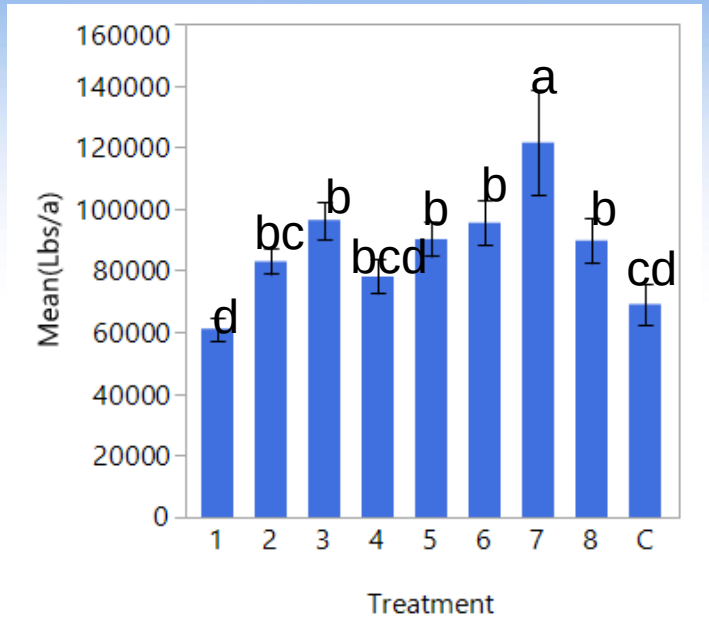
Sulfur and Watermelons – Deficiencies common on Delmarva

Fig. 1 Yield of watermelon with added amounts of sulfur (lbs/a)



Foliar Fertilizer on Watermelon

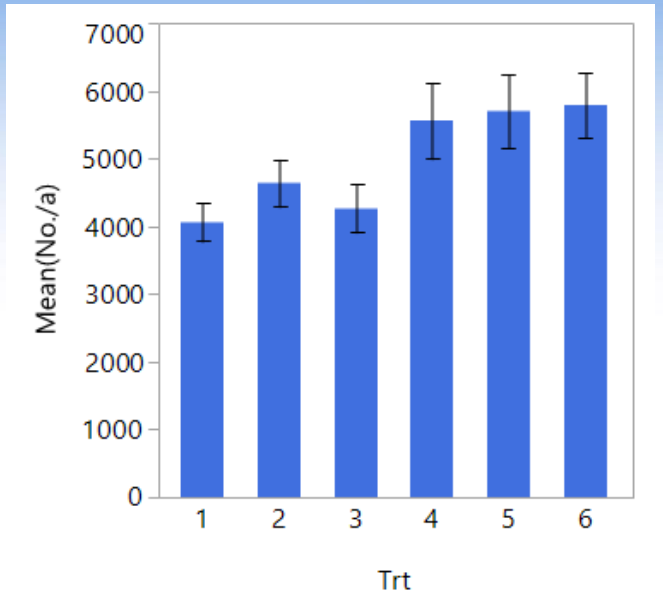
- Fascination and 7187
- 9 foliar treatments
  1. 23-0-0-7
  2. 16-3-0-4
  3. 22-6-22-2
  4. 11-8-5
  5. 34-4-4-4
  6. 28-16-7
  7. N-SUL
  8. UAN
  9. Control



Foliar fertilization had significant impacts on yield. 7187 was more responsive than Fascination. S may be a factor. More research necessary.

Soil applied N on Watermelon

- Fascination and 7187
- 6 N Levels
  1. Treatment 1: 100 lbs of N, 3 applications
  2. Treatment 2: 120 lbs of N, 4 applications
  3. Treatment 3: 120 lbs of N, 3 applications
  4. Treatment 4: 140 lbs of N, 4 applications
  5. Treatment 5: 140 lbs of N, 3 applications
  6. Treatment 6: 160 lbs of N, 4 applications



Numbers were increased at 140 lbs of N; fruit weights did not change (average fruit weight 16 lbs)

Radiation blocks, Reflective materials, and Anti-transpirants

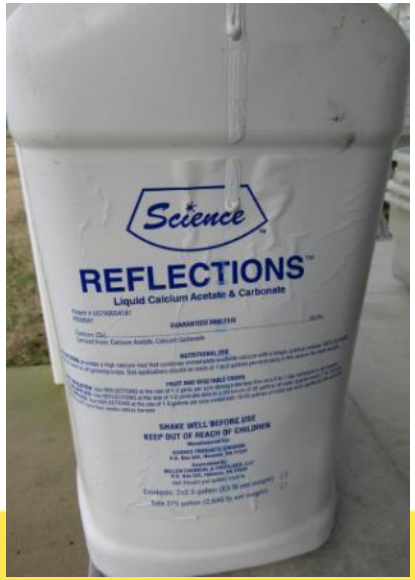
- Radiation Blocks or Reflective Materials
  - **Particle films**
    - **Kaolin based**
    - **Calcium carbonate based**
  - Wax based
- Antitranspirants
  - Stomatal controllers
    - ABA
    - PMA, DSA
  - Coatings

SCREEN™ Duo

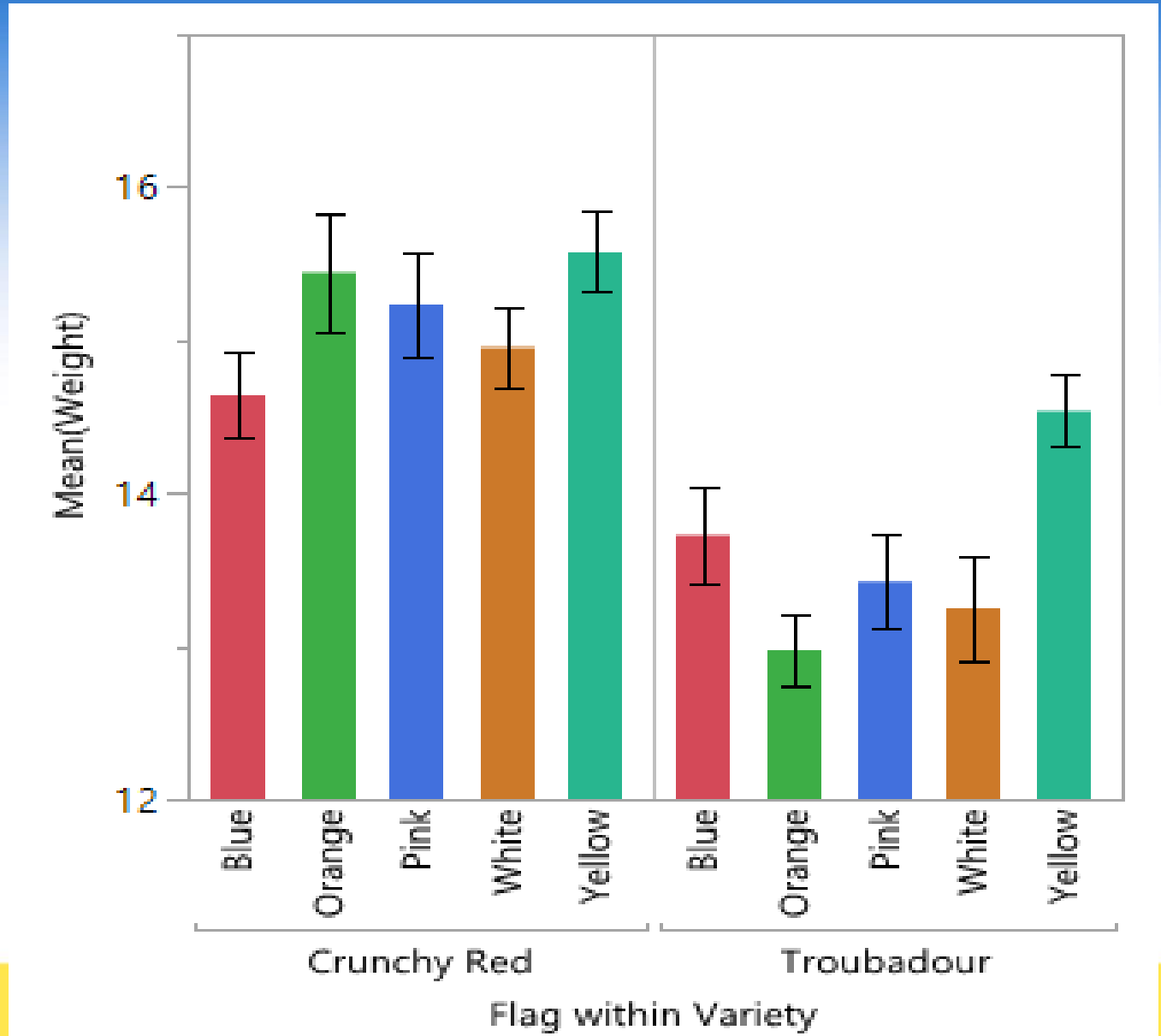
purshade
Solar Protectant

Melons

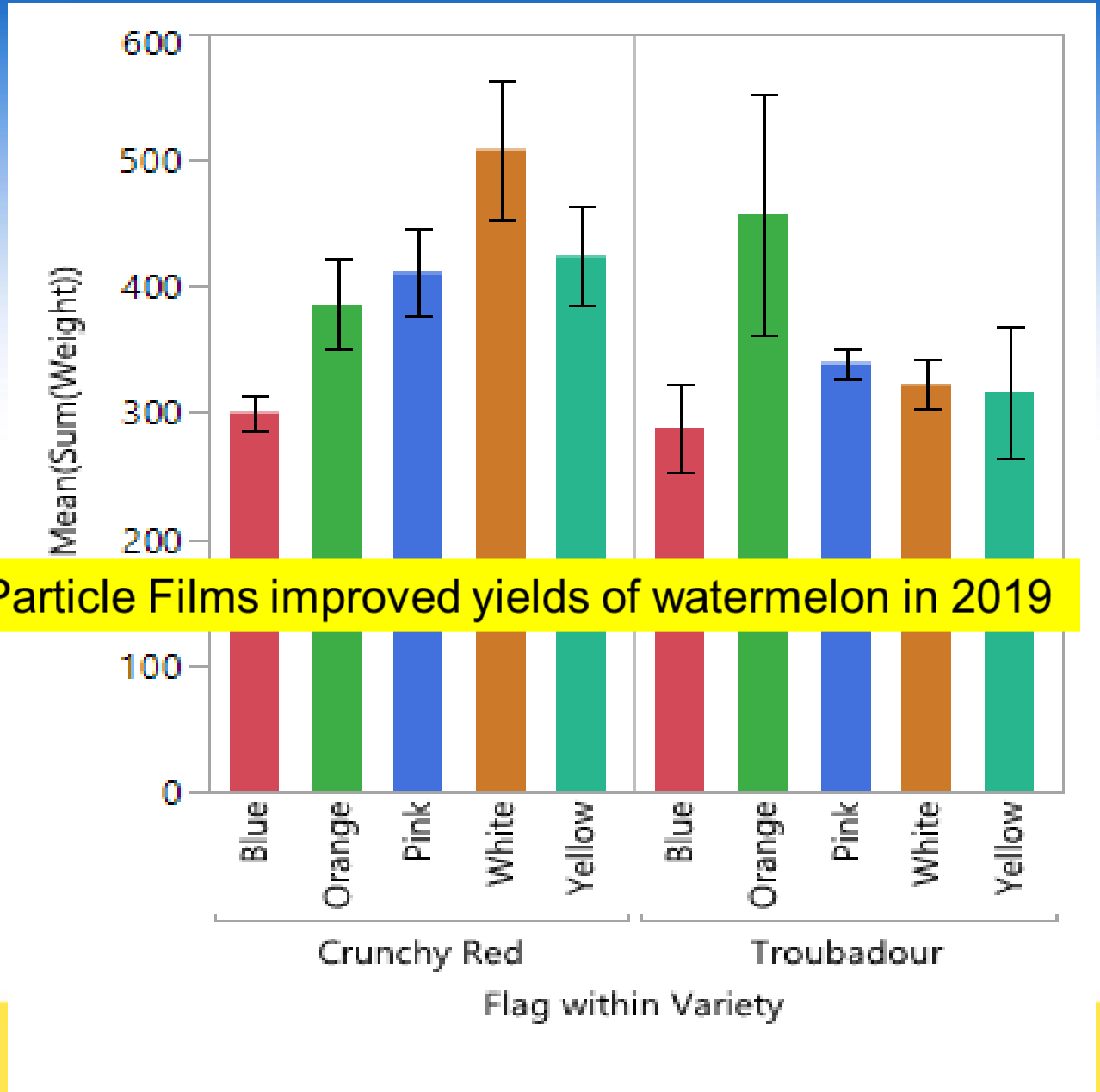
Purshade® directly protects fruit from sunburn and can assist in the establishment of newly transplanted fields.



Particle Films increased weights of watermelons in 2019



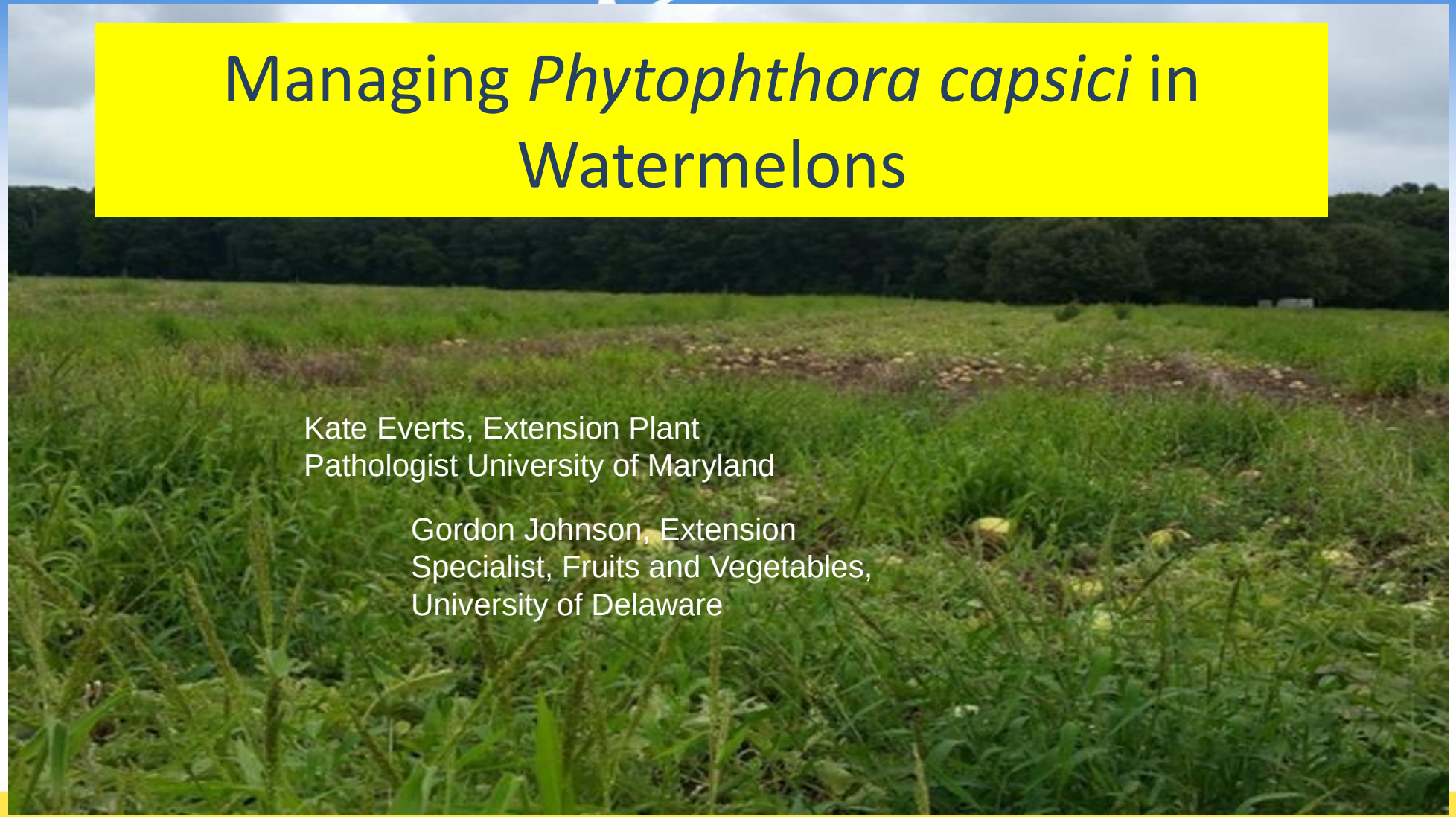
Orange = Surround
Pink = Screen Duo
Yellow = Reflections
White = Purshade



Particle Films improved yields of watermelon in 2019

Orange = Surround
Pink = Screen Duo
Yellow = Reflections
White = Purshade

Managing *Phytophthora capsici* in Watermelons



Kate Everts, Extension Plant Pathologist University of Maryland

Gordon Johnson, Extension Specialist, Fruits and Vegetables, University of Delaware

Research Questions

1. Do different watermelon cultivars vary in their susceptibility to *Phytophthora* fruit rot?

2. Is there a way to improve delivery of "fungicides" through drip irrigation vs. foliar application to improve efficacy?


Sugar
Baby

Cultivar	Company	Lesion Diameter (cm)	Pathogen Growth Diameter (cm)		Sporulation Intensity
ORS6064	Origene Seeds	17.2	14.7	a[y]	3.8 ab
0241WA	Seminis	17.7	14.4	ab	2.3 def
Warrior	Nunhems	17.3	14.3	ab	3.3 bcd
Sugar Baby	Johnny's	18.1	14.2	abc	4.5 a
Captivation	Syngenta	17.9	14.1	abcd	2.8 cde
9601	Nunhems	17.0	14.0	abcde	2.5 def
Red Amber	Enza Zaden	17.2	13.9	abcdef	2.5 def
7197	Nunhems	17.1	13.8	abcdef	3.5 bc
Unbridled	Sakata	17.1	13.8	abcdef	3.8 ab
Wolverine	Highmark	16.8	13.4	abcdefg	2.8 cde
Bottle Rocket	Seminis	16.3	13.4	abcdefg	2.8 cde
ORS6151	Origene Seeds	16.7	13.3	abcdefgh	2.8 cde
Excursion	Syngenta	16.5	13.1	abcdefgh	3.5 bc
Premont	Clifton Seed Co.	15.6	13.0	abcdefgh	3.0 bcde
Kingman	Sakata	16.4	12.9	bcdefgh	2.8 cde
Summer Breeze	Seminis	15.4	12.6	bcdefgh	1.8 f
ORS6181	Origene Seeds	15.9	12.6	bcdefgh	2.3 ef
ORS60599	Origene Seeds	15.7	12.6	bcdefgh	2.5 ef
Cut Above	Clifton Seed Co.	15.9	12.5	cdefgh	1.8 f
Road Trip	Seminis	16.3	12.4	defgh	3.0 bcde
Secretariat	Sakata	15.6	12.1	fgh	2.8 cde
Red Garnet	Enza Zaden	15.7	11.9	gh	2.3 ef
ORS6203	Origene Seeds	14.8	11.5	h	2.3 ef
Tailgate	Seminis	14.2	11.3	efgh	3.0 bcdef
P value[x]		0.0797	0.0235		0.0001

Table 3. Second set of watermelons tested.

Table 2.

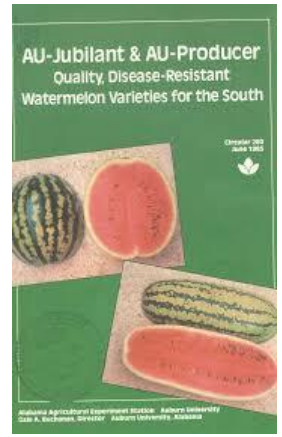
Cultivar	Company	Lesion Diameter (cm)	Pathogen Growth Diameter (cm)	Sporulation Intensity
7187	Nunhems	16.9	13.2	3.8
Charisma	Sakata	16.9	13.2	4.0
Crunchy Red	Harris Moran	16.0	12.1	3.5
Eclipse	Sakata	16.9	12.6	3.0
Exclamation	Syngenta	17.6	12.0	3.5
Fascination	Syngenta	16.9	13.6	3.3
Joyride	Seminis	13.6	11.2	2.8
Maxima	Origene Seeds	16.6	12.3	2.3
ORS6260	Origene Seeds	16.8	13.3	3.0
Paradigm	Sostena	15.6	11.7	3.3
Tailgate	Seminis	15.3	11.7	3.8
Troubadour	Harris Moran	17.6	13.6	3.5
Turnpike	Harris Moran	16.5	11.8	3.5
P value[x]		0.4571	0.5085	0.3134

[x]*P* value ≤ 0.05 indicate significant differences among treatments.

Conclusions

Focus management efforts on other factors (fungicides, cover crops, cultural practices, etc.)

USDA and Seed companies breeding efforts with lines such as USVL531-MDR (derived from PI 494531), USVL003-MDR, Au Jubilant and K-4976, which are not horticulturally acceptable but have resistance.



Is there a way to improve delivery of “fungicides” for P. cap. through drip irrigation vs. foliar application to improve efficacy?

- Six treatments and a non-treated control
- Raised bed, 60-ft long, 7-ft centers
- Five weeks old transplants used, pollenizers SP7
- Field inoculation using backpack sprayer
- Mature and marketable fruits harvested, counted weighed, rotten fruits counted and removed

No.	Name	Conc	Unit	Rate	Unit	Timing	Description
1	Untreated Check						
2	Presidio	4	LB/GAL	4	fl oz/a	AC	Drip
3	Orondis A	0.83	LB/GAL	4.8	fl oz/a	AC	Drip
4	Zampro	4.38	LB/GAL	14	fl oz/a	ACE	Foliar Spray
	Orondis Ultra	2.33	LB/GAL	8	fl oz/a	BDF	Foliar Spray
5	Revus	2.08	LB/GAL	8	fl oz/a	ACE	Foliar Spray
	Presidio	4	LB/GAL	4	fl oz/a	BDF	Foliar Spray
6	Presidio	4	LB/GAL	4	fl oz/a	AC	Drip
	Zampro	4.38	LB/GAL	14	fl oz/a	BE	Foliar Spray
	Orondis Ultra	2.33	LB/GAL	8	fl oz/a	DF	Foliar Spray
7	Orondis A	0.83	LB/GAL	4.8	fl oz/a	AC	Drip
	Revus	2.08	LB/GAL	8	fl oz/a	BE	Foliar Spray
	Presidio	4	LB/GAL	4	fl oz/a	DF	Foliar Spray

K. Everts

Application dates were A=18 Jul; B=25 Jul; C=6 Aug; D=14 Aug; E=20 Aug; F=29 Aug

Results

Treatment and rate/A	Application type and date[z]		Rotted fruit no./plot	Marketable fruit no./plot	Yield lb/plot
Zampro 4.38 SC 14 fl oz	Foliar	(ACE)			
Orondis Ultra 2.33 SC 8 fl oz	Foliar	(BDF)	20.7	28.4 a	290.8 a
Revus 2.08 S 8 fl oz	Foliar	(ACE)			
Presidio 4 SC 4 fl oz	Foliar	(BDF)	23.3	26.0 ab	280.1 a
Orondis Gold 200 1.67 SC 9.6 fl oz	Drip	(AC)			
Revus 8 2.08 S fl oz	Foliar	(BE)			
Presidio 4 SC 4 fl oz	Foliar	(DF)	18.3	23.1 b	255.3 ab
Presidio 4 SC 4 fl oz	Drip	(AC)			
Zampro 4.38 SC 14 fl oz	Foliar	(BE)			
Orondis Ultra 2.33 SC 4 fl oz	Foliar	(DF)	20.3	22.8 b	233.7 b
Orondis Gold 200 1.67 SC 9.6 fl oz	Drip	(AC)	33.3	10.3 c	105.0 c
Presidio 4 SC 4 fl oz	Drip	(AC)	32.8	9.0 c	97.1 c
Non-treated			33.7	11.4 c	116.8 c
P value[x]	0.0001		0.1433	0.0001	0.0001

- No statistical differences in number of rotted fruit/plot
- Foliar only and Drip + Foliar had numerically fewer rotted fruit
- Marketable fruit # significantly greater in foliar Zampro – Orondis Ultra than only 2 drips and 4 foliar
- Total yield greater in six foliar sprays of either Zampro - Orondis Ultra or with Revus – Presidio than non – treated or drip only.
- Intermediate yields in two drip apps and four foliar apps.

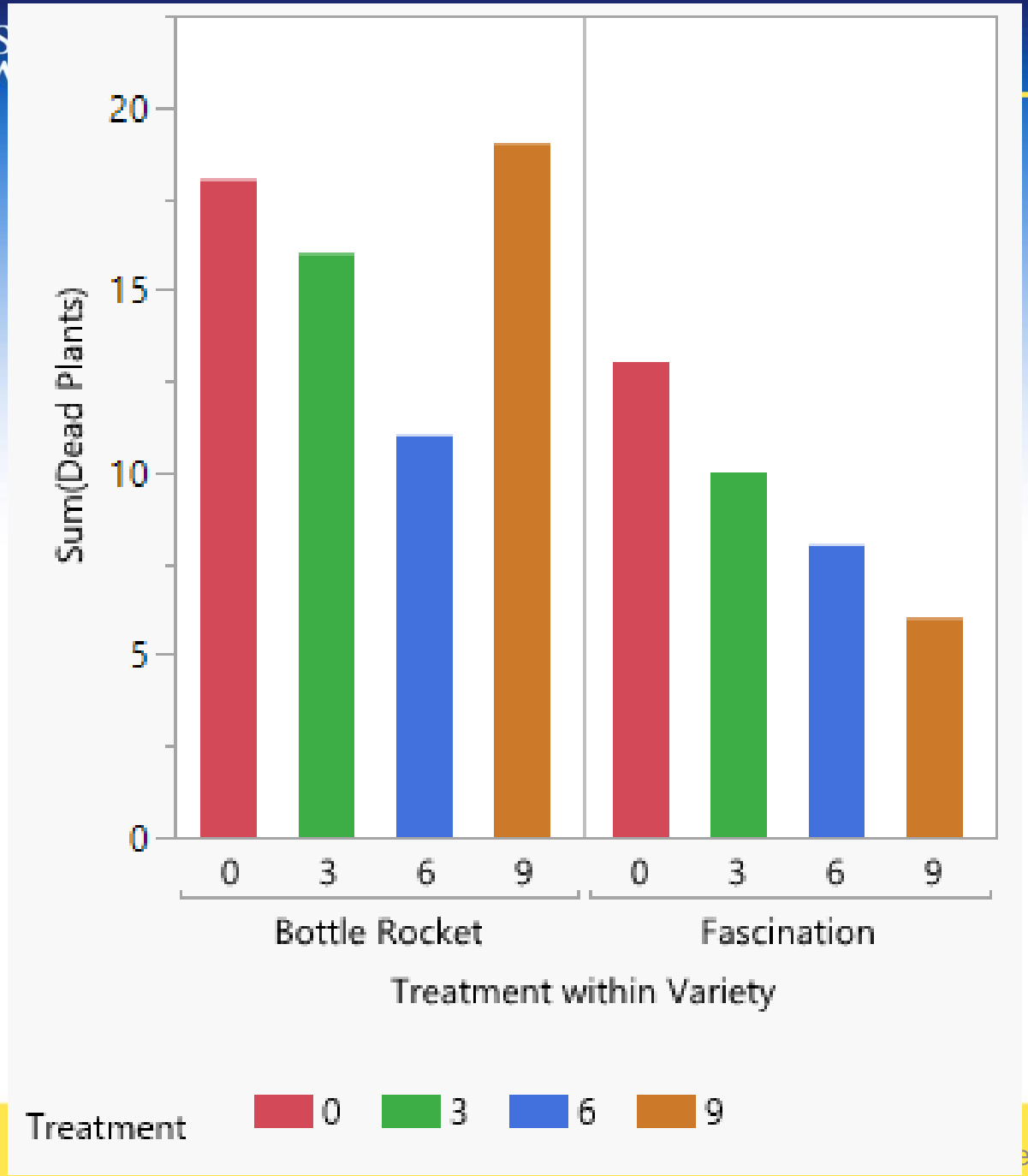
2018 -2019 Trials
Row Middle Plantings
For Phytophthora control

Treatments

- “Caliente” mustard
- “Image” radish
- ”Wheeler” rye
- “Trudan” sudangrass
- Ryegrass
- Oats
- Bare soil control
- Inoculated
- Low infection
- No differences

Compost Studies

- Watermelon, Tomato, Pepper, Strawberries
- Perdue compost
- 0, 3, 6, 9 T/a rates
- N and K rates adjusted
- Yield and health measures
- Heavy disease pressure field



More watermelon plants survived with higher rates of compost in Fascination but not Bottle Rocket

Grafted N and Density Trial

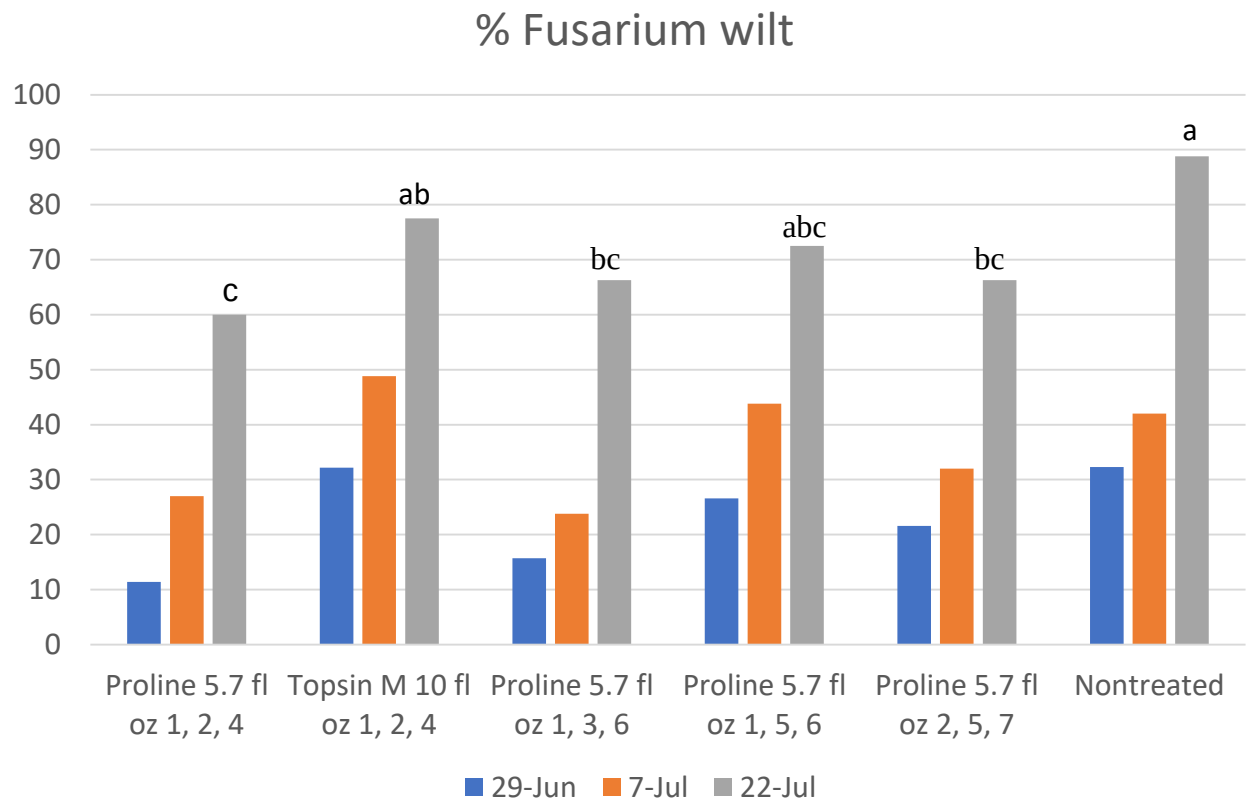
- Grafted Fascination and 7187 onto Interspecific Cucurbita Hybrid (HM TZ148)
- Tri Hishtil (NC)
- 80 and 120 lbs N
- 9 and 6 plants per plot
- No Differences between Populations
- N x Variety interaction
- Low N and Low Populations possible depending on variety

Variety	Lbs N/a	In-Row (ft.)	Yield Lbs/a
7187	80	3	105181 a
7187	80	4.5	101956 a
7187	120	3	54680 c
7187	120	4.5	55602 c
Fascination	80	3	78803 b
Fascination	80	4.5	79917 b
Fascination	120	3	93861 ab
Fascination	120	4.5	111550 a

Fusarium wilt management, recommendation updates, ‘fungicide’ resistance in the region

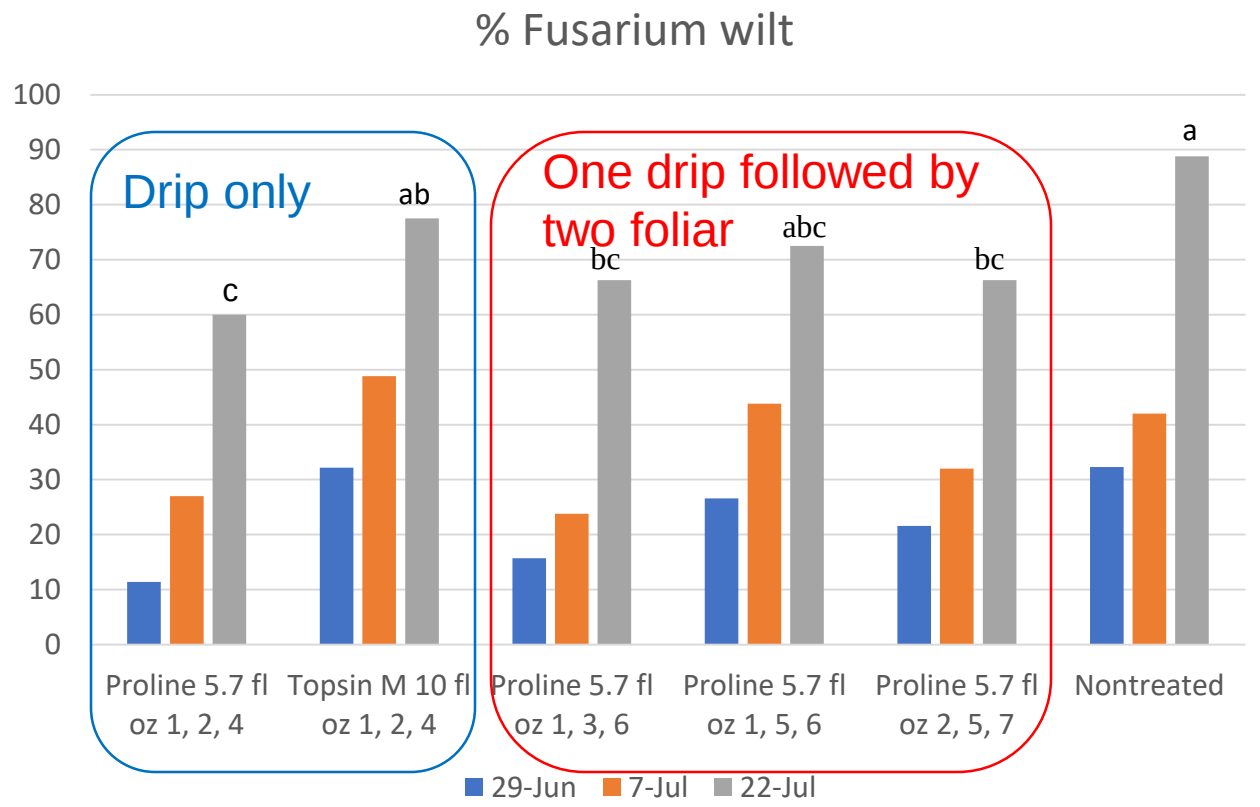
Kate Everts
Extension Plant Pathologist University of Maryland

Fungicides applied through the drip 2015



Drip applications: 1=2 Jun; 2=17 Jun; 4=1 Jul;
Foliar applications: 3=24 Jun; 5=2 Jul; 6=15 Jul; 7=22 Jul.

Fungicides applied through the drip 2015



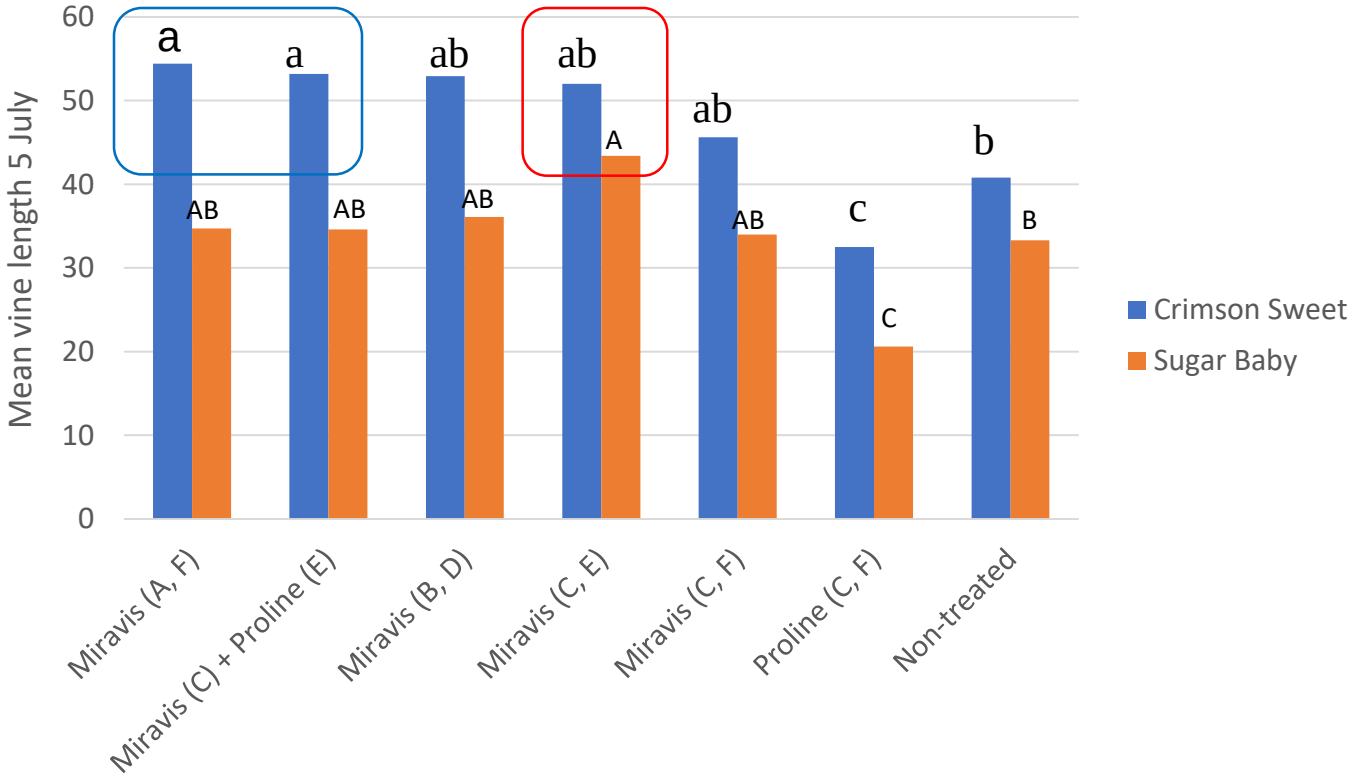
Drip applications: 1=2 Jun; 2=17 Jun; 4=1 Jul;
Foliar applications: 3=24 Jun; 5=2 Jul; 6=15 Jul; 7=22 Jul.

Are there new fungicides that could also be applied through the drip?

In-vitro tests indicate that Adepidyn also inhibited *F. o. niveum*

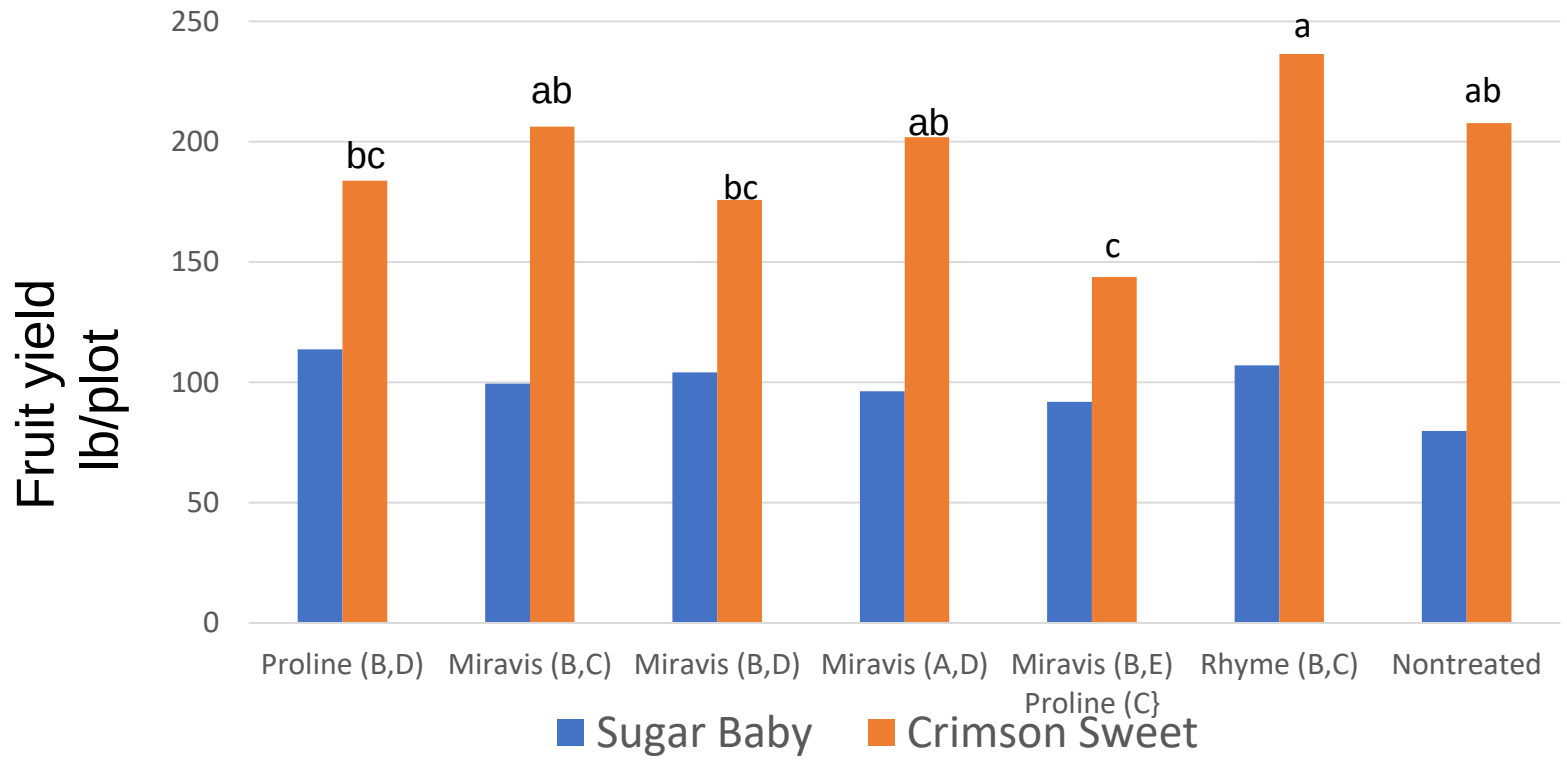
Adepidyn is FRAC Group 7 vs. Proline FRAC code 3

Adepidyn (Miravis) and Proline application methods



A = 6 in. band over soil on 2 Jun at 50 gpa;
B = 3.4 fl oz (100 ml) poured at base of each plant on 7 Jun;
C = through drip on 6 and 7 Jun;
D = 3.4 fl oz poured at base of each plant on 19 Jun;
E = through drip on 19 Jun;
F = 6 in. directed spray over holes in plastic 23 Jun at 100 gpa.

Rhyme also registered FIFRA 2(ee) for Fusarium wilt in Maryland



No significant differences in yield in Sugar Baby.
Although Rhyme treatments yielded more than some other treatments, they were not significantly better than the nontreated controls.

Additions to the Vegetable Recommendations

Cucurbits:

Downy mildew
- Orondis Opti
  - M5 + U15
  - Very good
- Elumin
  - Use in rotation

Gummy stem blight
- Miravis Prime
  - FRAC 7 + 12

Phytopthora crown and fruit rot
- Orondis Opti
  - M5 + U15
- Elumin
  - FRAC 22
- Zing!

Watermelon – Spider mites

Rye strip sampling

Mite surveys

Mite thresholds

Biological control – 2020

Miticide testing – bioassays in 2020

Watermelon Mites – Where Do They Come From?

Sampled 10 fields, 1’ft in 6-10 locations

No mites

Surveyed 10 fields throughout the growing season

Mites first detected in 1 field during 1st week of June, 1 field 2nd week of June, 3 fields 3rd week of June, 3 fields 4th week of June, 1 field 2nd week of July. In general, most first appearances were by weedy ditchbanks and woodlines.

Highest mite population in a watermelon field came from a field that had an interior population first, 17 June

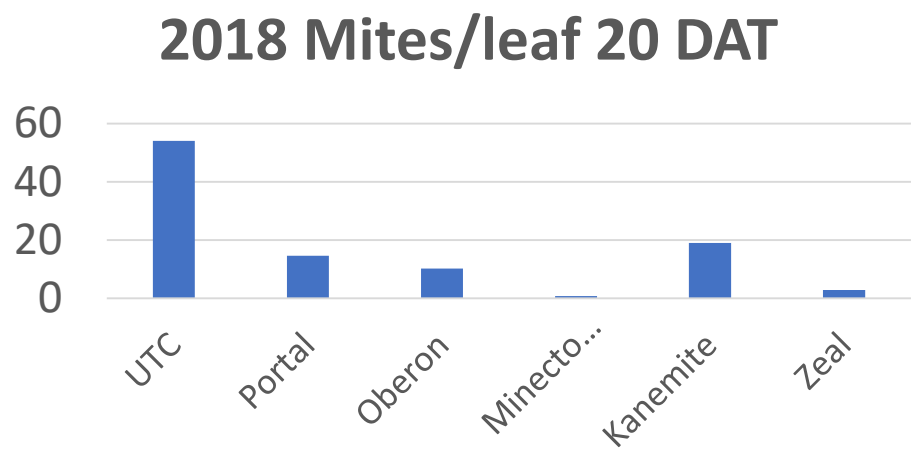
Where Do Mites Come From?

Watermelon Mites

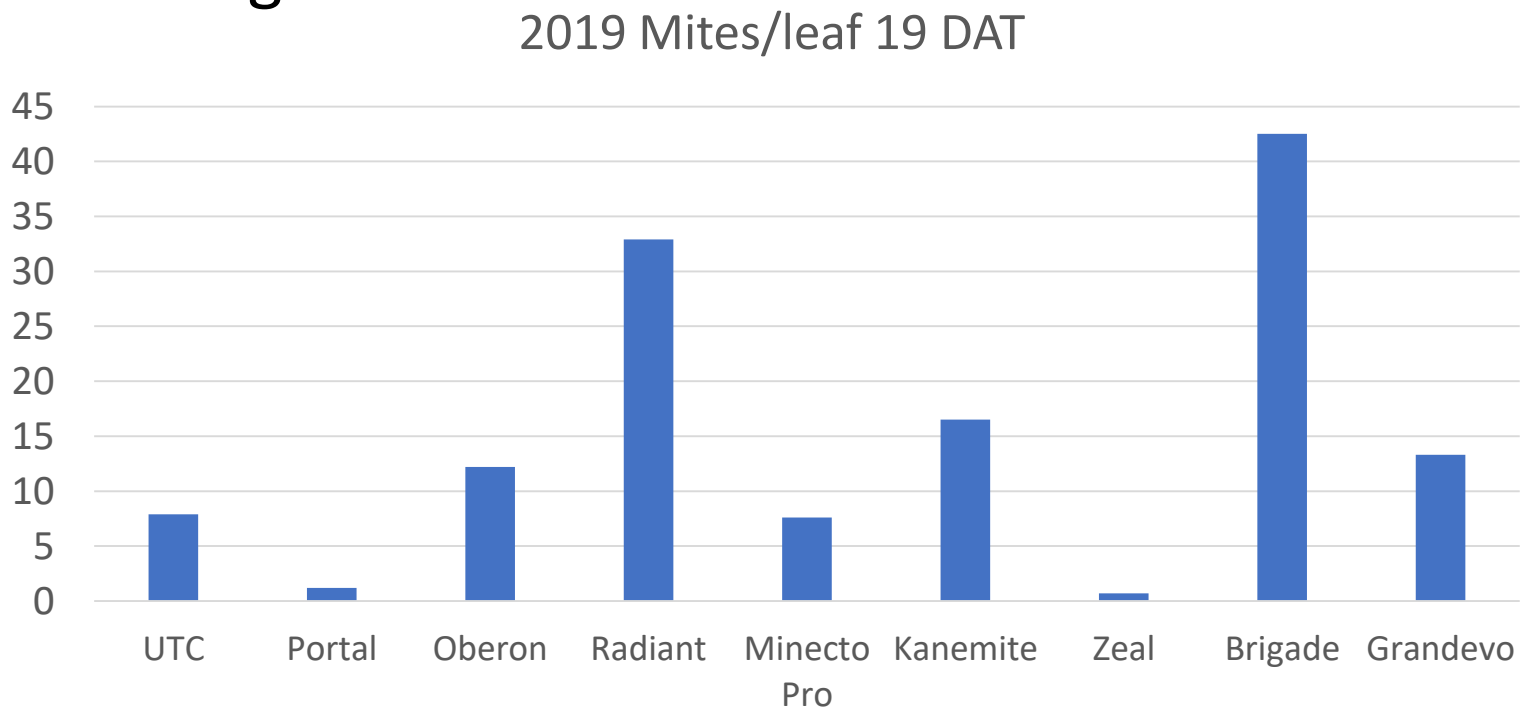
- 2018 and 2019 mite Survey – 9 fields weekly looking for spider mites and predatory mites

- Neoseiulus fallacis – follows mites, abundance in fields is VERY low and doesn’t seem to catch up

Watermelon Mites 2019

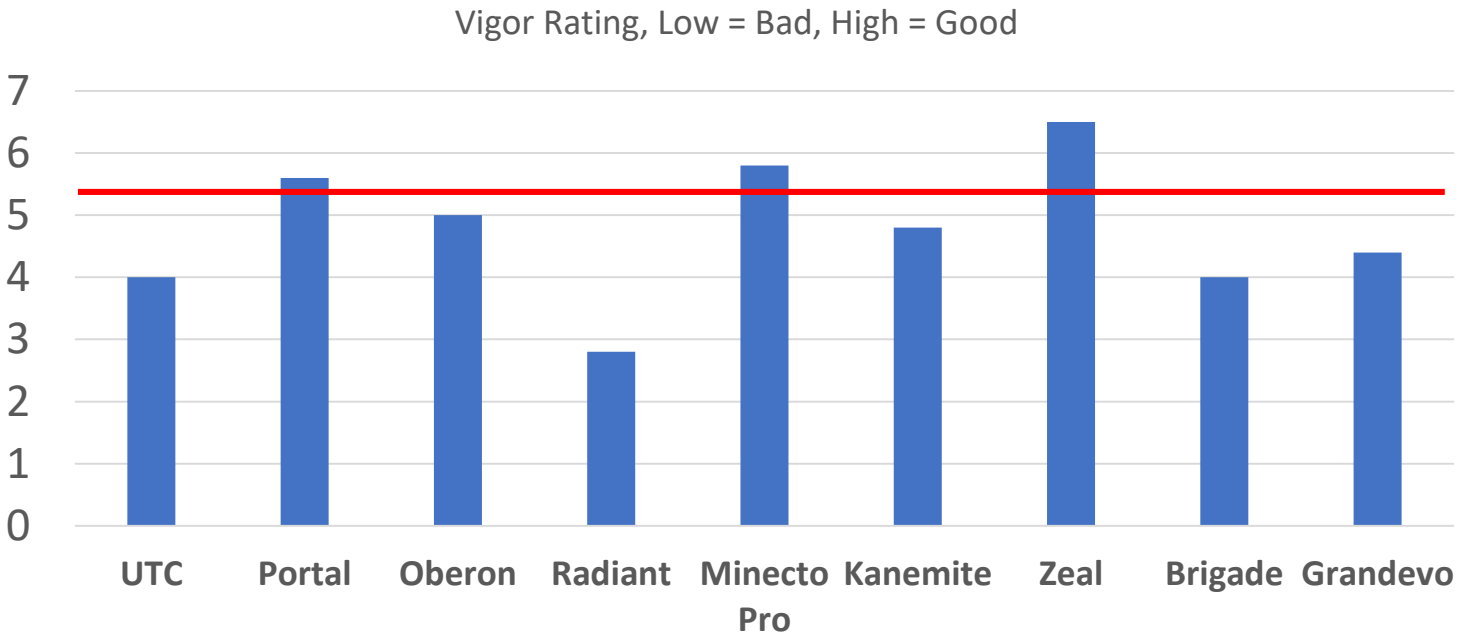


- In 2018 – Minecto and Zeal looked the best
- Mite populations stayed low in UTC, Portal and Zeal looked good, Radiant and Brigade did nothing



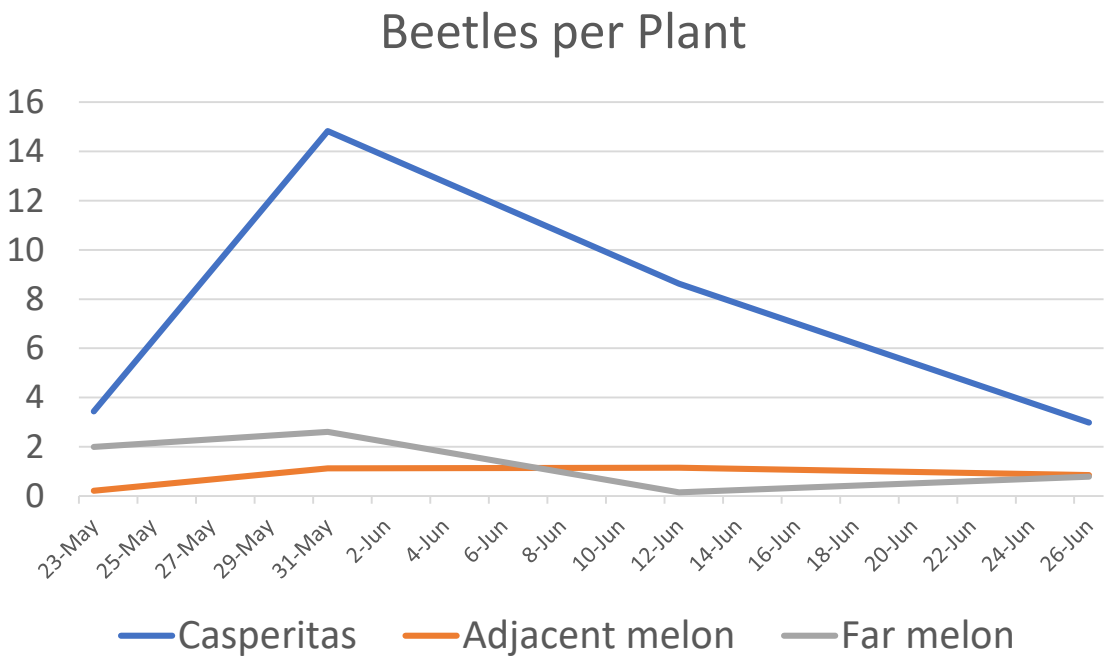
Watermelon Mites 2019

- Portal and Zeal looked good; Minecto plots looked decent in August
- Radiant, Brigade did nothing; Oberon looking weak in both ‘18 and ’19 trial



Watermelon Cucumber Beetles

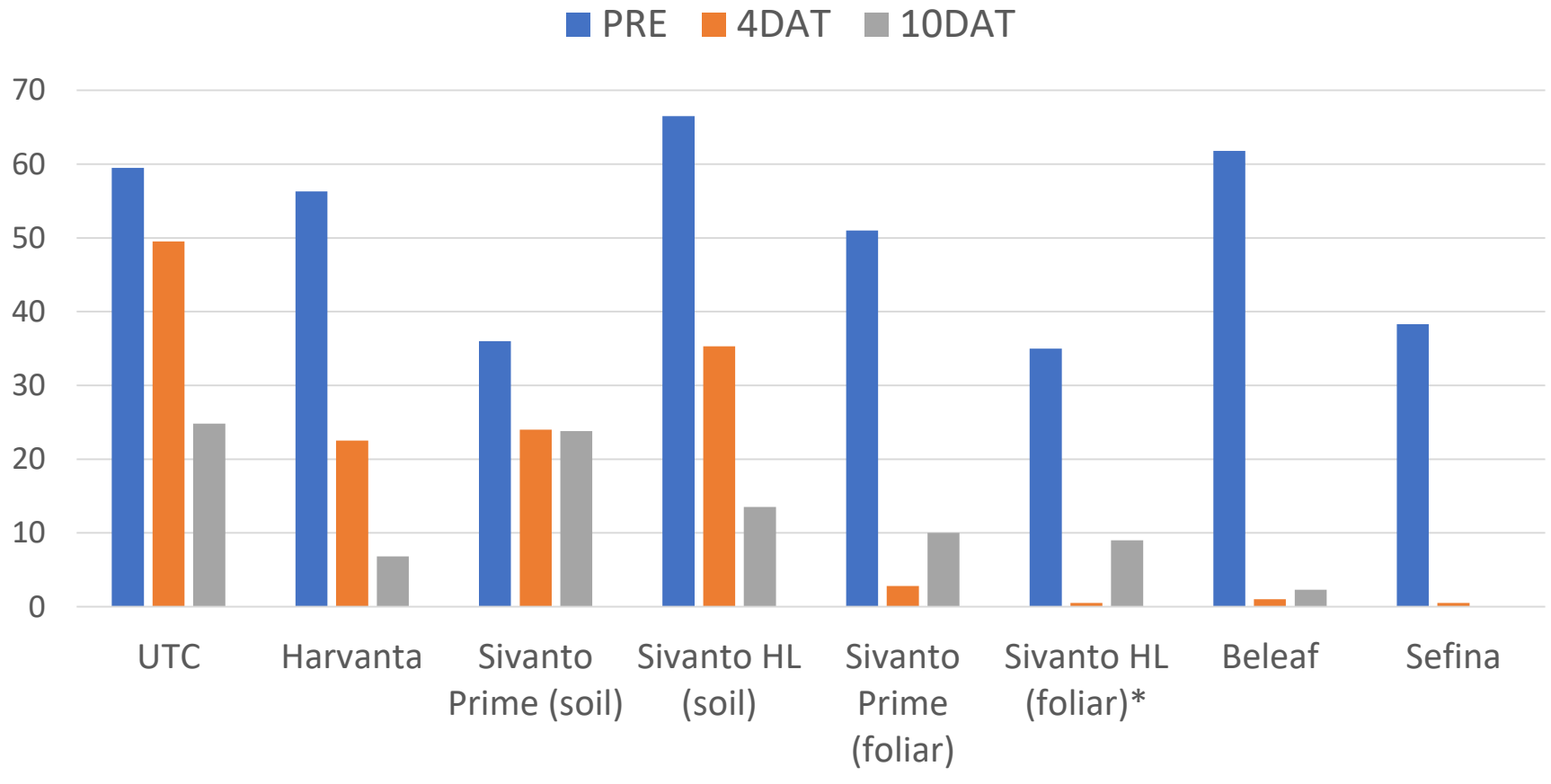
- First appearance: 14 May Laurel
- Traps and lures caught VERY FEW beetles
- Early season beetles really seemed to like the squash; any effect seemed to disappear when melons flowered



Planted May 9, beetles June 6

Aphids in (Cucurbits)

- Tend to be flared up by pyrethroid use
- Populations tend to peak in August – but watch your transplants!
- 2019 populations taken down by natural enemies and aphid disease



Anthracnose

- Temperatures between 64 and 81° F. are ideal for anthracnose infection.
- Once the fungus gets into the leaves, it keeps growing as long as temperatures are 90° F. or lower.
- Anthracnose also needs moisture (rainfall, heavy long dews).
- Anthracnose can develop any time leaves are wet for 2 hours.
- When leaves stay wet for 12–24 hours, the risk of disease is much greater.

Cultural Controls & Prevention:

- Plant only certified disease-free seed.
- Monitor transplant production, do not transplant infected plants
- Rotate out of cucurbits for at least two years.
- Control all weeds, especially volunteer cucurbits.
- Remove or plow down deeply all infected crop debris after harvest.
- Grow cultivars with resistance to the common races of anthracnose.

Anthracnose Excellent resistance is available in some varieties and those should be used when possible. Begin fungicide applications when vines run or earlier if symptoms are detected. **If resistance to FRAC code 11 (strobilurin) fungicides has been detected in the area, do not use Quadris, Quadris Top, Tanos or Cabrio.**

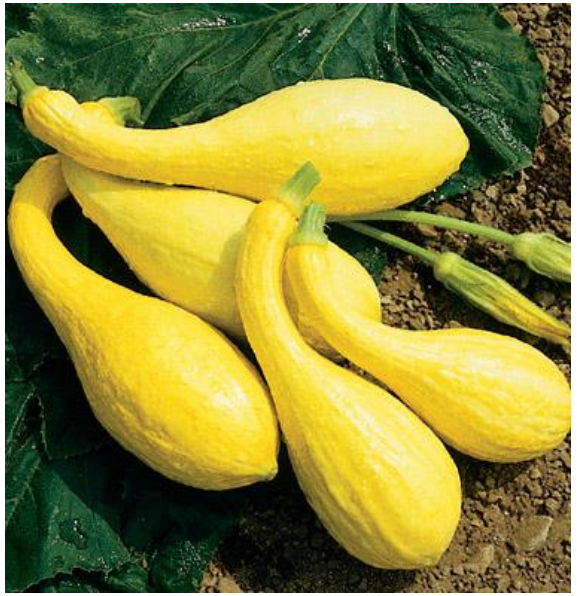
Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Under LIGHT or MODERATE disease pressure, ALTERNATE:						
M5	chlorothalonil 6F	2.0 to 3.0 pt/A (low rate early in the season)	chlorothalonil	0	12	N
WITH a TANK MIX the following fungicide PLUS mancozeb 80 DF 2.0 to 3.0 lb/A OR chlorothalonil 6F 2.0 to 3.0 pt/A:						
1	thiophanate-methyl 70WP	0.5 lb/A	thiophanate-methyl	1	12	N
Under HIGH disease pressure, TANK-MIX one of the following fungicides WITH chlorothalonil 6F 2.0 to 3.0 pt/A:						
3 + 11	Quadris Top 1.67SC	12.0 to 14.0 fl oz/A	difenoconazole + azoxystrobin	0	12	--
3 + 11	Topguard EQ	10.0 to 14.0 fl oz/A	flutriafol + azoxystrobin	1	12	--
7 + 11	Merivon 2.09SC	5.5 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N
7 + 11	Pristine 38WG	18.5 oz/A	boscalid + pyraclostrobin	0	12	--
11	azoxystrobin 2.08F	11.0 to 15.5 fl oz/A	azoxystrobin	0	4	N
11	Cabrio 20EG	12.0 to 16.0 fl oz/A	pyraclostrobin	0	12	N
AND ROTATE with a TANK MIX of the following fungicde PLUS mancozeb 75DF 2.0 to 3.0 lb/A OR chlorothalonil 6F 2.0 to 3.0 pt/A every 7 days:						
1	thiophanate-methyl 70WP	0.5 lb/A	thiophanate-methyl	1	12	N

Recommended Varieties

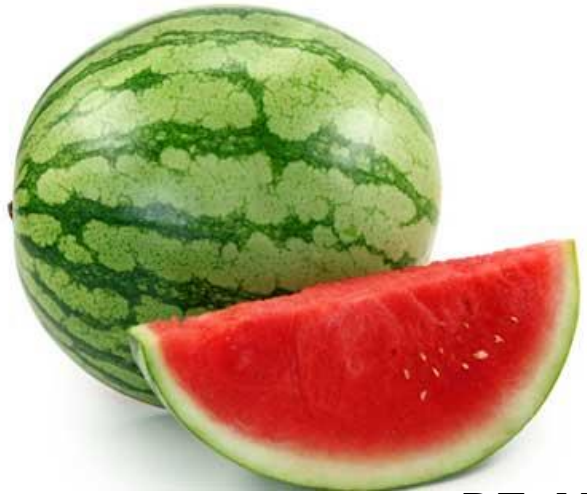
Type	Reported Disease Resistance[2]					
	Fon[3] Gen	Fon 0	Fon 1	Fon 2	Co[4]	
Seeded (also see seeded pollenizers)						
Crimson Sweet	R				R	
Jamboree			I		I	
Sangria	I				I	
Starbrite					R	
Top Gun			I		I	
Vista		I	I		R	
Seedless Early						
Amarillo						
Melody					I	
Secretariat						
Sweet Eat'n	I				I	
Sweet Gem						

Seedless Mid Season					
Bottle Rocket			I		
Butterball			I		
Charismatic					
Cut Above	I				
Fascination			I		I
Gypsy					I
Joy Ride	R				
Kingman					
Red Amber					
Road Trip	R				R
SV0258WA					
SV0241WA			I		R
Traveler					
Turnpike					
Unbridled					
Warrior					
Wayfarer					R
#7167					

Reflex 24c Labels



Yellow squash
Zucchini-type
DE, MD



DE, MD, VA

NJ, VA

DE, MD, VA

Reflex® Herbicide

Use Patterns and Rates

	Bare ground*			Plastic	
Crop	Direct seeded	Transplant	Under Plastic	Broadcast over plastic	POST row middles (shielded)
Watermelon DE,MD,VA	10 - 12 oz	10 - 12 oz	10 - 12 oz	10 - 16 oz	16 - 24 oz
Summer squash DE,MD	8 oz	8 oz	8 oz	8 oz	8 - 12 oz
Pumpkins DE,MD,VA	8 - 10 oz	8 - 10 oz			

*directed seeded: apply within 24 hrs of planting fb 0.2 to 0.5 inches of irrigation or rainfall (36 hrs before soil cracking)

* transplant: wait at least 36 hrs after irrigation to punch transplant holes

Precautions

- Rates vary depending on crop, timing of application, and states
- Reflex can only be used once in two years on any particular field, need to plan accordingly
- Reflex is group 14, mechanism of action that is increasing in use **RESISTANCE**
  - Authority, Valor, Sharpen, Aim, Cadet

Acknowledgements

- MarDel Watermelon Association
- Delaware Department of Agriculture – Specialty Crop Block Grant
- Emmalea Ernest – Research Scientist in our Program
- Donald Seifrit – Master's Student
- Many student and summer workers
- National Watermelon Association
- Participating Companies