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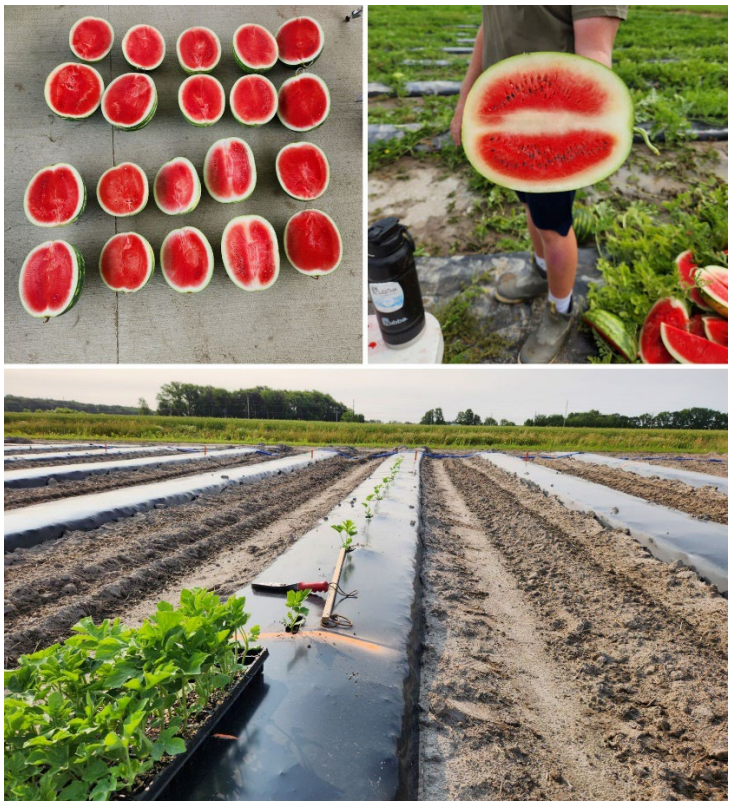

Seedless Watermelon Variety Trial Results 2023

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2023 University of Delaware Seedless Watermelon Variety Trial

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Introduction

The 2023 Seedless Watermelon Variety Trial included 10 varieties from three participating companies. The purpose of this trial was to evaluate seedless watermelon varieties for yield, quality and maturity.

Materials and Methods

Location and Soil Type

Field 12 E, University of Delaware Thurman Adams Research Farm, Carvel Research and Education Center, Georgetown, Delaware. The soil type was a Hurlock Loamy Sand.

Cultural Practices

The field was fertilized and limed according to soil test results. Black plastic mulch and trickle irrigation were laid on 7' centers. A total of 150 lbs/A of nitrogen fertilizer was applied through fertigation. When the vines began to run, 50 lbs/A was applied and a second application of 50 lbs/A was made two weeks later. In mid-July 25 lbs/a was applied and a second application of 25 lbs/A was made after the first harvest on August 8.

Trial entries are listed in Table 1. Entries were seeded in the greenhouse on April 24, 2023. Plants were transplanted to the field on May 24, 2023. Field plots were one row (7 ft) wide and 30 ft long. Plots were arranged in a randomized complete block design with four replications. In-row spacing for seedless plants was 3 ft with 10 plants per plot. Four pollinizer plants, one each of the in-row pollenizer varieties Ace Plus, Wingman, Sidekick and Accomplice, were planted between seedless plants in the following arrangement:

s A+ s s s W s s s S s s s Ac.

"A+" designates Ace Plus, "W" designates Wingman, "S" designates Sidekick, and "Ac" designates Accomplice. The seedless plants are indicated by "s".

The border rows next to the drive rows, which separated the replications, were planted in the triploid variety 'Belmont', with the same the pollenizers, in the same arrangement as the experimental plots.

Row middles were sprayed using a hooded sprayer on June 26 with the following herbicides (all rates per acre):
Gramoxone 1 qt., Reflex 16 oz., Dual Magnum 1 pt., Strategy 1 qt., Sandea 1 oz., Crop Oil 1% v/v

A comprehensive disease, insect and mite control program was used for the trial as follows (*all rates per acre*):
Jun 24: Approvia Top 13 oz., Tactic 1 pt., Initiate 2 pt.
Jul 7: Initiate 3 pt., Inspire Super 1 pt., copper 1 pt
Jul 14: Initiate 3 pt., Aprovia Top 13 oz., Orondis Ultra 8 oz., Intensity 1 pt., Minecto 10 oz.
Jul 24: Initiate 3 pt., Aprovia Top 13 oz., Ranman 2.75 oz.
Jul 28: Initiate 3 pt., Aprovia Top 13 oz., Orandis Ultra 8 oz., Mastercop 1 pt.
Aug 4: Initiate 3 pt., Previcur Flex 1.2 pt., Inspire Super 1 pt., Mastercop 1 pt., Bifenthrin 6 oz.
Aug 11: Initiate 3 pt., Ranman 3 oz., Mastercop 1 pt., Anarchy 4 oz.
Aug 17: Initiate 3 pt., Aprovia Top 13 oz., Mastercop 1 pt., Orandis Ultra 8 oz.
Aug 25: Initiate 3 pt., Aprovia Top 13 oz., Mastercop 1 pt.

Irrigation was applied regularly as determined by experiment station farm staff. Temperatures during the early growth period were below average, especially at night (see Appendix B). Growth was slow during the first 4 weeks due to low temperatures and possibly low solar radiation caused by wildfire smoke. Rainfall during the trial period totaled 19.55 inches, which was slightly higher than the 10-year (2013-2022) average for this period (17.24 inches).

Harvest
Due to the cool spring, plots were not harvested until August. Fruit were harvested three times. The first harvest was on August 8 at 76 days after transplanting (DAT), the second harvest was August 15 at 83 DAT, and the final harvest was September 15 at 114 DAT. The weight of each watermelon harvested was recorded individually. Fruit that were unmarketable because they were misshapen were removed but not included in yield totals. Fruit that were less that 9 lbs were also considered unmarketable. Five marketable watermelons from each plot were cut and evaluated for presence of hollow heart, hard seeds, fruit dimensions, rind thickness, and soluble solids levels. Watermelons were cut lengthwise and fruit length, fruit width and rind thickness were measured with a ruler. The two halves were then cut crosswise and the number of hard seeds visible on the surface of the four pieces were counted. Soluble solids were measured using a hand-held refractometer. The diameter of any cracks from hollow heart disorder were measured at their widest point with a ruler.

Results
Marketable Yield I, which excludes misshapen culls and fruit less than 9 lbs, is reported in Table 2 and Marketable Yield II, which excludes misshapen culls, fruit less than 9 lbs and fruit over 24 lbs, is reported in Table 3. Yields are expressed in both pounds per acre and fruit per acre for each variety. Yields in the trial ranged from 35,286 to 60,509 lbs/A.

The highest yielding varieties in the trial in terms of Marketable Yield I in lbs/A were: Crunchy Red, Fascination, Eleanor, Hazera 53021, Troubadour, Jet Ski, and Hazera 53022. This high yielding group ranged from 60,509 to 49,604 lbs per acre.

The highest yielding varieties in terms of Marketable Yield II in lbs/A were: Fascination, Eleanor, Crunchy Red, Hazera 53021, Jet Ski, Troubadour, and Hazera 53016. This high yielding group, excluding very large melons, ranged from 56,066 to 45,470 lbs per acre.

Table 4 reports the percent of total harvest for each harvest. All varieties produced more than 40% of their yield on the first harvest except Troubadour. Jet Ski produced 80 percent of its total yield in the first harvest. The following varieties produced more than 50% of their yield on the first harvest: SVWA7844, SVWA7826, Fascination, Eleanor, and Hazera 53022. Those varieties with extended harvest (50% or more harvested in the second and third harvest) were Hazera 53021, Crunchy Red, Hazera 53016 and Troubadour.

Table 5 lists the varieties according to average fruit weight and gives the percentage of fruit in each of four weight classes: 60-count (9.0-13.5 lbs), 45-count (13.6-17.5 lbs), 36-count (17.6-21.4 lbs) and 30-count (>21.5 lbs). In general, fruit sizes were average to small in 2023, but there were very few undersize culls (less than 3% of all the fruit harvested). No variety had an average weight exceeding 17 lbs. The varieties with the largest fruit size were Hazera 53021, Crunchy Red, Eleanor, Fascination and Hazera 53016.

Those varieties with more that 50% of the melons harvested in the 45-count class were Hazera 53021, Fascination and Hazera 53022.

Varieties with more than 40% small-fruited melons (60-count) were Troubadour, Jet Ski, SVWA7844, and SVWA7826.

Varieties with the highest percent of 36-count fruit were Hazera 53021 and Eleanor.

Table 6 reports the fruit dimensions and rind thickness. Figure 1 is a graphical representation of this same data. There were statistically significant differences between varieties in fruit length, fruit width and rind thickness. Varieties with similar average lengths and widths (i.e. Hazera 53016 and Hazera 53022) had round shapes. Hazera 53021, Eleanor and Crunchy Red had the thickest rinds. Jet Ski had significantly thinner rinds that all of the other varieties.

Table 7 lists the varieties according to their soluble solid measurements. Soluble solids averages are based on a 20-fruit sample (5 fruit per replication). There were significant differences in soluble solids among the varieties. Eleanor, SVWA7844 and Jet Ski had the highest soluble solids levels. All varieties had average soluble solids of over 10%.

Table 8 lists the varieties according to the percent of fruit with of hollow heart. This percentage is based on a 20-fruit sample (5 fruit per replication). No severe hollow heart that rendered fruit unmarketable was observed in the trial this year. Jet Ski, Fascination and Hazera 53021 had the lowest levels of hollow heart.

Table 9 lists the varieties according to the percent of fruit with enough hard seeds to render them unmarketable. Eleanor, Crunchy Red and Fascination all had significant numbers of fruit over standard for hard seed. No hard seeds were observed in SVWA7844 or Jet Ski. If the proportion of fruit with unmarketable levels of hard seeds is considered along with yield, the highest yields of marketable fruit were produced by Jet Ski, Troubadour, Hazera 53021, Hazera 53016, and SVWA7844.

Photographs of the varieties included in the trial are in Appendix A.

Acknowledgements

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Brian Hearn and Ward Harris for pesticide, fertilizer, and irrigation applications. Research farm staff that tilled the plots and laid and removed plastic mulch.

Participating seed companies Seminis, Hazera USA, and HM Clause.

Table 1. Entries in the 2023 Watermelon Variety Trial

Variety	Entering Company
SVWA7826	Seminis
SVWA7844	Seminis
Jet Ski	Seminis
Hazera 53021	Hazera USA
Hazera 53022	Hazera USA
Hazera 53016	Hazera USA
Eleanor	HM Clause
Crunchy Red	HM Clause
Troubadour	HM Clause
Fascination	check variety

Table 2. 2023 Seedless Watermelon Variety Trial: Varieties by Marketable I Yield (all marketable fruit over 9 lbs[1]) in Lbs/a and Fruits/a and Fruits per Harvest

Variety	Yields and Harvest Distribution				
			Fruits per Harvest		
	Marketable I lbs/a	Marketable I Fruits/a	Harvest 1 76 DAT	Harvest 2 83 DAT	Harvest 3 114 DAT
Crunchy Red	60,509 a	3,786 a	1,763	726	1,296
Fascination	57,388 ab	3,682 a	1,867	1,245	570
Eleanor	57,256 ab	3,630 a	1,815	1,141	674
Hazera 53021	53,931 ab	3,267 abc	1,504	1,037	726
Troubadour	53,071 ab	3,630 a	1,296	1,763	570
Jet Ski	51,484 abc	3,619 ab	2,766	553	277
Hazera 53016	49,604 abc	3,215 abc	1,348	933	933
Hazera 53022	42,016 bc	2,801 bc	1,348	778	674
SVWA7844	36,887 c	2,645 c	1,452	778	415
SVWA7826	35,286 c	2,593 c	1,400	882	311
p-value	***0.0239***	***0.0258***			
CV	***16.93***	***21.81***			

Means followed by the same letter are not significantly different from one another at α=0.05.

Table 3. 2023 Seedless Watermelon Variety Trial: Varieties by Marketable II Yield (excluding fruit less than 9 lbs and over 24 lbs[1]) in Lbs/a and Fruits/a and Fruits per Harvest

Variety	Yields and Harvest Distribution				
			Fruits per Harvest		
	Marketable II lbs/a	Marketable II Fruits/a	Harvest 1 76 DAT	Harvest 2 83 DAT	Harvest 3 114 DAT
Fascination	56,066 a	3,630 a	1,815	1,245	570
Eleanor	54,698 ab	3,526 ab	1,763	1,141	622
Crunchy Red	53,857 ab	3,526 ab	1,763	726	1,037
Hazera 53021	52,662 ab	3,215 abc	1,504	1,037	674
Jet Ski	51,366 ab	3,615 ab	2,766	553	277
Troubadour	50,445 ab	3,526 ab	1,296	1,763	467
Hazera 53016	45,470 abc	3,060 abc	1,348	933	778
Hazera 53022	42,016 bc	2,801 bc	1,348	778	674
SVWA7844	36,887 c	2,645 c	1,452	778	415
SVWA7826	35,286 c	2,593 c	1,400	882	311
p-value	***0.0174***	***0.0429***			
CV	***18.59***	***16.56***			

Means followed by the same letter are not significantly different from one another at α=0.05.

Table 4. 2023 Seedless Watermelon Variety Trial: Percent of Total Harvested at Each Harvest by Weight

Variety	Percent of Total Harvested at Each Harvest by Weight		
	Harvest 1 76 DAT	Harvest 2 83 DAT	Harvest 3 114 DAT
Jet Ski	80	12	7
SVWA7844	57	28	15
SVWA7826	56	31	12
Fascination	53	29	18
Eleanor	52	29	19
Hazera 53022	51	25	24
Hazera 53021	45	30	25
Crunchy Red	43	16	41
Hazera 53016	40	25	35
Troubadour	34	46	20

Table 5. 2023 Seedless Watermelon Variety Trial: Varieties by Average Fruit Weight and Percent of Marketable I Fruit in Each Size Class

Variety	Mean Marketable I Weight (lbs)	Percent of Fruit in Each Size Class			
		30 Count 21.5 lbs plus	36 Count 17.6-21.4 lbs	45 Count 13.6-17.5 lbs	60 Count 9.0-13.5 lbs
Hazera 53021	16.55 a	8	25	51	16
Crunchy Red	15.92 ab	11	16	45	27
Eleanor	15.75 ab	7	23	40	30
Fascination	15.63 abc	8	18	52	21
Hazera 53016	15.45 abcd	6	16	44	34
Hazera 53022	15.04 bcde	4	13	57	26
Troubadour	14.61 cdef	7	6	43	44
Jet Ski	14.30 def	0	12	40	48
SVWA7844	14.00 ef	0	10	37	53
SVWA7826	13.55 f	0	6	46	48
p-value	***<0.0001***				
CV	***20.97***				

Means followed by the same letter are not significantly different from one another at α=0.05.

Table 6. 2023 Seedless Watermelon Variety Trial: Fruit Length, Fruit Width and Rind Thickness

Variety	Fruit Length (cm)	Fruit Width (cm)	Rind Thickness (cm)
Crunchy Red	26.8 a	21.7 b	2.0 abc
SVWA7844	26.7 a	21.5 b	1.8 c
Eleanor	26.5 a	22.7 a	2.1 ab
Jet Ski	26.4 a	21.1 b	1.5 d
Fascination	26.3 a	22.9 a	1.8 c
SVWA7826	25.9 ab	21.0 b	1.8 c
Troubadour	25.2 bc	21.5 b	1.9 bc
Hazera 53021	25.0 bc	23.1 a	2.2 a
Hazera 53016	24.4 c	23.0 a	1.9 bc
Hazera 53022	24.3 c	22.9 a	1.9 bc
p-value	***<0.0001***	***<0.0001***	***<0.0001***
CV	***5.96***	***4.83***	***19.5***

Means followed by the same letter are not significantly different from one another at α=0.05.

Figure 1. 2023 Seedless Watermelon Variety Trial: Average Fruit Dimensions and Rind Thickness

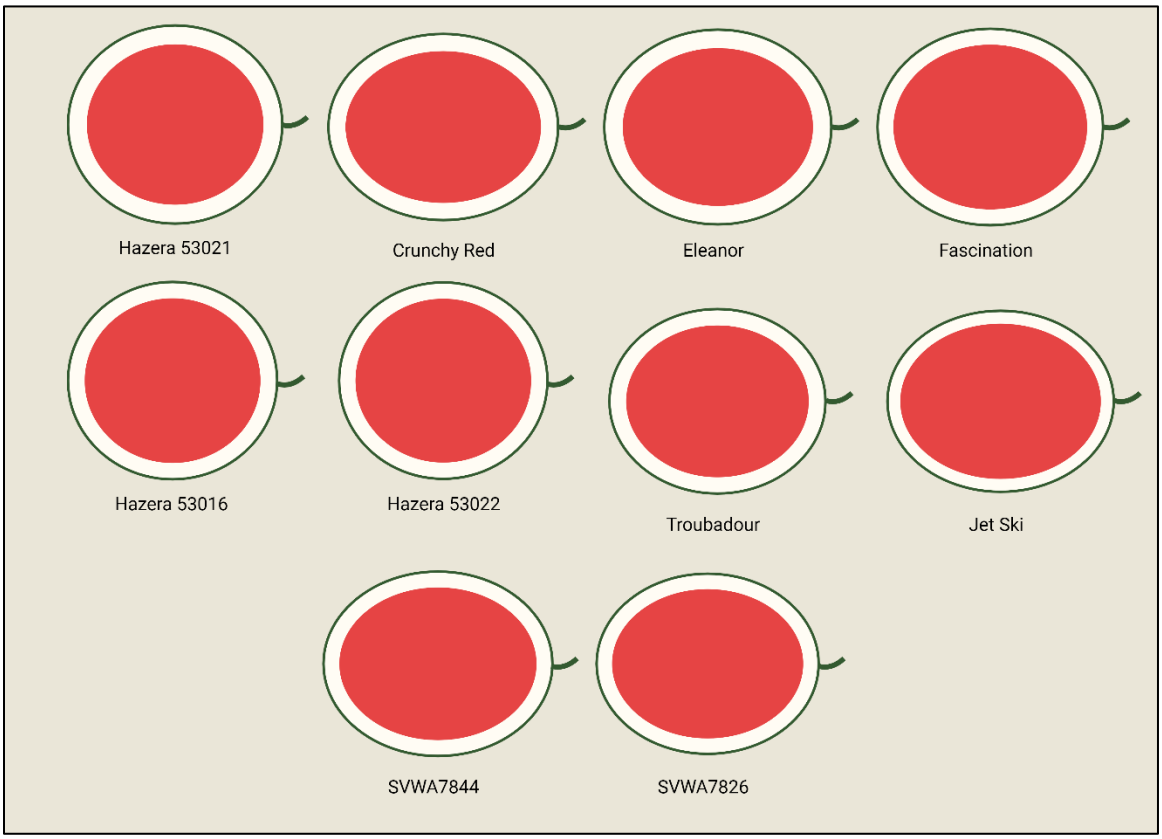

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Table 7. 2023 Seedless Watermelon Variety Trial: Varieties by Soluble Solid Content

Variety	% Soluble Solids	
Eleanor	12.8	a
SVWA7844	12.5	ab
Jet Ski	12.5	ab
Fascination	12.1	bc
Hazera 53016	12.1	bc
Hazera 53022	12.1	bc
SVWA7826	11.8	c
Troubadour	11.6	cd
Hazera 53021	11.2	de
Crunchy Red	10.9	e
p-value	***<0.0001***	
CV	***7.32***	

Means followed by the same letter are not significantly different from one another at α=0.05.

Table 8. 2023 Seedless Watermelon Variety Trial: Percent of Sampled Fruit with Hollow Heart and Percent with Hollow Heart Rendering Them Unmarketable

Variety	% Fruit with Hollow Heart	% Fruit with Unmarketable Hollow Heart
Hazera 53016	19	0
Troubadour	16	0
SVWA7844	15	0
Eleanor	15	0
SVWA7826	11	0
Hazera 53022	11	0
Crunchy Red	10	0
Jet Ski	7	0
Fascination	5	0
Hazera 53021	5	0

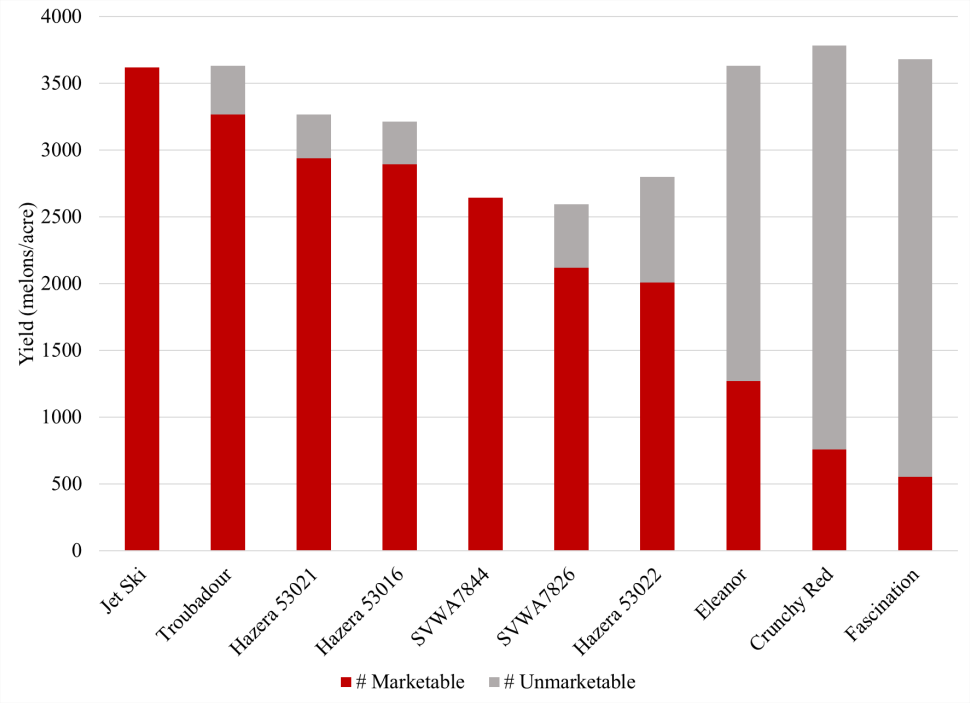
Table 9. 2023 Seedless Watermelon Variety Trial: Percent of Sampled Fruit Above Standard for Mature Seeds*

Variety	% Above Standard for Mature Seeds	
SVWA7844	0	a
Jet Ski	0	a
Hazera 53021	10	ab
Hazera 53016	10	ab
Troubadour	10	ab
SVWA7826	18	ab
Hazera 53022	28	b
Eleanor	65	c
Crunchy Red	80	c
Fascination	85	c
p-value	***<0.0001***	
CV	***44.34***	

Means followed by the same letter are not significantly different from one another at α=0.05.

* the USDA standard for seedless watermelons: "Watermelons of a size greater than ten (10) pounds may have 4 or fewer mature seeds, not to include pips/caplets, on the face of the melon which has been cut into four equal sections (one lengthwise cut and one crosswise cut)"

Figure 2. 2023 Seedless Watermelon Variety Trial: Amounts of Marketable I Fruit that are Marketable Based on Presence of Hard Seeds



APPENDIX A:

Photographs of Varieties in the 2023 Seedless Watermelon Variety Trial

Varieties from the 2023 Seedless Watermelon Trial

Crunchy Red

Marketable I Yield: 60,509 lbs/A (1)
Marketable II Yield: 53,857 lbs/A (3)
Fruits Per Acre: 3,786
Mean Weight: 15.92 lbs
Count 60-45-36-30 %: 27-45-16-11
Soluble Solids: 10.9 %
% Unmarketable Hard Seeds: 80 %

HM Clause (*standard*)

Fascination

Marketable I Yield: 57,388 lbs/A (2)
Marketable II Yield: 56,066 lbs/A (1)
Fruits Per Acre: 3,682
Mean Weight: 15.63 lbs
Count 60-45-36-30 %: 21-52-18-8
Soluble Solids: 12.1 %
% Unmarketable Hard Seeds: 85 %

Syngenta (*standard*)

Eleanor

Marketable I Yield: 57,256 lbs/A (3)
Marketable II Yield: 54,698 lbs/A (2)
Fruits Per Acre: 3,630
Mean Weight: 15.75 lbs
Count 60-45-36-30 %: 30-40-23-7
Soluble Solids: 12.8 %
% Unmarketable Hard Seeds: 65 %

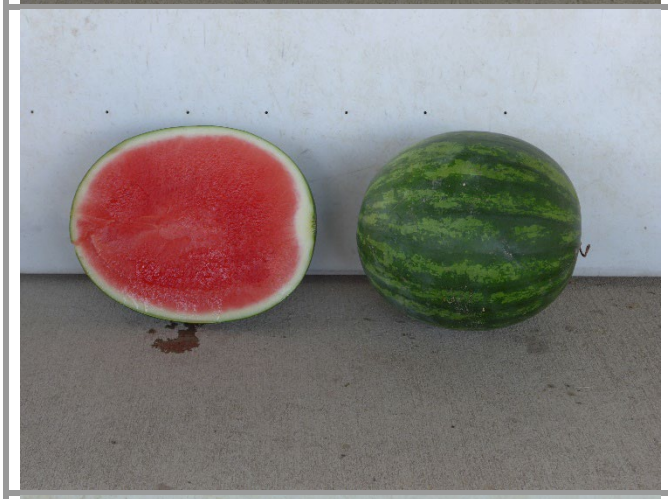
HM Clause

Varieties from the 2023 Seedless Watermelon Trial

Hazera 53021

Marketable I Yield: 53,931 lbs/A (4)
Marketable II Yield: 52,662 lbs/A (4)
Fruits Per Acre: 3,267
Mean Weight: 16.55 lbs
Count 60-45-36-30 %: 16-51-25-8
Soluble Solids: 11.2 %
% Unmarketable Hard Seeds: 10 %

Hazera USA



Troubadour

Marketable I Yield: 53,071 lbs/A (5)
Marketable II Yield: 50,445 lbs/A (6)
Fruits Per Acre: 3,630
Mean Weight: 14.61 lbs
Count 60-45-36-30 %: 44-43-6-7
Soluble Solids: 11.6 %
% Unmarketable Hard Seeds: 10 %

HM Clause (*standard*)

Jet Ski

Marketable I Yield: 51,484 lbs/A (6)
Marketable II Yield: 51,366 lbs/A (5)
Fruits Per Acre: 3,619
Mean Weight: 14.30 lbs
Count 60-45-36-30 %: 48-40-12-0
Soluble Solids: 12.5 %
% Unmarketable Hard Seeds: 0 %

Seminis

Varieties from the 2023 Seedless Watermelon Trial

Hazera 53016

Marketable I Yield: 49,604 lbs/A (7)
Marketable II Yield: 45,470 lbs/A (7)
Fruits Per Acre: 3,215
Mean Weight: 15.45 lbs
Count 60-45-36-30 %: 34-44-16-6
Soluble Solids: 12.1 %
% Unmarketable Hard Seeds: 10 %

Hazera USA

Hazera 53022

Marketable I Yield: 42,016 lbs/A (8)
Marketable II Yield: 42,016 lbs/A (8)
Fruits Per Acre: 2,801
Mean Weight: 15.04 lbs
Count 60-45-36-30 %: 26-57-13-4
Soluble Solids: 12.1 %
% Unmarketable Hard Seeds: 28 %

Hazera USA

SVWA7844

Marketable I Yield: 36,887 lbs/A (9)
Marketable II Yield: 36,887 lbs/A (9)
Fruits Per Acre: 2,645
Mean Weight: 14.00 lbs
Count 60-45-36-30 %: 53-37-10-0
Soluble Solids: 12.5 %
% Unmarketable Hard Seeds: 0 %

Seminis

Varieties from the 2023 Seedless Watermelon Trial

SVWA7826

Marketable I Yield: 35,286 lbs/A (10)
Marketable II Yield: 35,286 lbs/A (10)
Fruits Per Acre: 2,593
Mean Weight: 13.55 lbs
Count 60-45-36-30 %: 48-46-6-0
Soluble Solids: 11.8 %
% Unmarketable Hard Seeds: 18 %

Seminis

Appendix B:

Weather Summary for the 2023 Watermelon Variety Trial
May 24 – September 15, 2023

Appendix B: Season-Long Weather Summary for 2023 Watermelon Variety Trial