

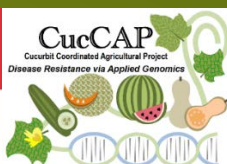
2023 North Carolina Mini Size Triploid Watermelon Cultigen Evaluation Study



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NC STATE
EXTENSION



National Institute of Food and Agriculture
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**2023 North Carolina
Mini Size Triploid Watermelon
Cultigen Evaluation Study
Hort. Series #244**

Principal Investigators

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Disclaimer

This publication presents data from the mini size triploid watermelon cultigen evaluation study conducted during 2023. Information in this report is believed to be reliable but should not be relied upon as a sole source of information. Limited accompanying detail is included but excludes some pertinent information, which may aid interpretation.

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Introduction

In 2021-2022, approximately 305 million pounds of mini watermelon were sold in retail markets across the U.S. In 2022-2023, approximately 324 million pounds of mini watermelon were sold, making up 10.1% of total watermelon sales and demonstrating an increase of 6.4% from the previous year. The price per pound of mini watermelon increased by \$0.02 as well, averaging \$0.78 per pound in 2022-2023 versus \$0.76 in 2021-2022.

Retail scanner data shows growing demand for mini watermelons in the Mid-South and Southeast regions of the US, which demonstrated 28.4% and 16.4% increases in mini watermelon sales, respectively. North Carolina is one of the top 5 watermelon producing states in the U.S and in 2022-2023 demand for mini watermelon increased by as much as 49.3% in the Raleigh/Greensboro area and 46.7% in the Charlotte area (watermelon.org) compared to 2021-2022.

In 2023, Dr. Schultheis and the Cultural Management Program in the Horticultural Sciences Department at NC State University conducted an evaluation of 16 mini size triploid (seedless) watermelon cultigens from 7 seed companies at the Horticultural Crops Research Station in Clinton, NC. The watermelon entries were evaluated for yield and quality characteristics such as soluble solids (sweetness or Brix), color, firmness, and hollow heart. The methods, results, and representative photos are presented below (Figures 2-17).

Materials and Methods

Sowing and Field Preparations

Once all seeds were received from participating companies, they were planted into 72-cell poly trays (Hummert Int.; Earth City, MO) to grow transplants. The mini watermelon cultigens were sown on 28 and 29 March 2023. The trays of sown seeds were placed in a germination room for 24-48 hours. Temperature in the germination room was kept between 90-95°F and humidity was kept between 85-90%. The planting medium used was a 'fine germinating mix', a commercial soilless mix (SunGro, Agawam, MA). After germination, transplants were moved to a greenhouse set to 85°F and hand watered twice daily. Due to a heater malfunction, transplants were moved to a larger greenhouse after approximately 1 week and remained there for 4 weeks until planting. Transplants were fertilized once a week with 20-10-20 water soluble fertilizer at a rate of 200-250 ppm.

The field planting site was located at the Horticultural Crops Research Station in Clinton, NC. The mini watermelons were planted in block S1 and S2; a Lynchburg sandy loam soil type. Telone II (12 gal/ac) was applied broadcast to the entire study area on 1 March 2023 for weed and nematode control. K-Mag fertilizer (0-0-22-22-11Mg) at 150 lb/ac was applied pre-plant on 3 April 2023 and NPK fertilizer (10-10-10) at 500 lb/ac was applied on 12 April 2023. Black polyethylene plastic (1.25 mil thick, high density plastic film, 54 inches wide; TriEast Ag Group, Inc., Clinton, NC) was laid on 18 April 2023.

Transplanting and Vine Training

The mini triploid watermelon transplants were established in the field on 9 May 2023. Plot size for mini triploid watermelons was 1 row, 10 plants per row, 15 feet long with alleys of 10 feet between plots. Row middles were 10 feet and in-row spacing was 1.5 feet. Plots with missing plants were replaced 1 week after planting to achieve 100% plant stand. ‘SP-7’ and ‘Wingman’ (4 plants/plot) were used as the pollenizer plants in this study. ‘SP-7’ pollenizers were planted after triploid plants 1 and 7 while ‘Wingman’ pollenizers were planted after triploid plants 4 and 10 in each plot. Once vines had grown over the plastic mulch, they were gently turned/trained back into the plot each week. This aided with harvest by avoiding mixing cultigens and reducing vine damage at harvest.

Fertilizer and Pest Management

A total of 50 units/ac N, 50 units/ac P, 83 units/ac K, 33 units/ac S, and 16.5 units/ac Mg were all applied broadcast (pre-plant) to the entire study area. Drip tape (NETAFIM, 12 in spacing, 0.24 gph; NETAFIM, Tel Aviv, Israel) was installed beneath the black plastic mulch to fertigate the crop throughout the growing season. Liquid fertilizer with 4-0-8 analysis was applied through drip tape fertigation 11 times at rates of 25, 20, or 15 gal/ac. Cumulative totals, preplant and through the drip tape, of applied fertilizer nutrients were: 166 units/ac N, 50 units/ac P, 314 units/ac K, 33 units/ac S, and 16.5 units/ac Mg.

Herbicides (Table 1), insecticides (Table 2), and fungicides (Table 3) were applied as needed and as directed by the label for that crop ([2023 North Carolina Agricultural Chemicals Manual](#)). Different products were rotated to avoid potential development of resistance.

Table 1. Herbicides¹ Standard Size Seedless Watermelon Study 2023

Product	Rate per acre	Application Date(s)
ROUNDUP ORIGINAL MAX	1 qt	8-Feb, 16-Feb
SANDEA	0.75 oz	5-May
Strategy	4 pt	5-May
Liberty	29 fl oz	25-May
Dual Magnum	1.5 pt	6-Jun
Gramaxone	1 qt	28-Jun
Crop Oil	1 qt	28-Jun
Select	16 fl oz	6-Jul

1. Herbicides were applied to the row middles

Table 2. Insecticides Standard Size Seedless Watermelon Study 2023

Product	Rate per acre	Application Date(s)
Admire	10 fl oz	22-May
Asana	8 fl oz	2-Jun, 9-Jun, 28-Jun, 11-Aug
Carbaryl	1 qt	16-Jun, 18-Aug
Abba Ultra	8 fl oz	28-Jun
Sevin XLR	1 qt	28-Jul

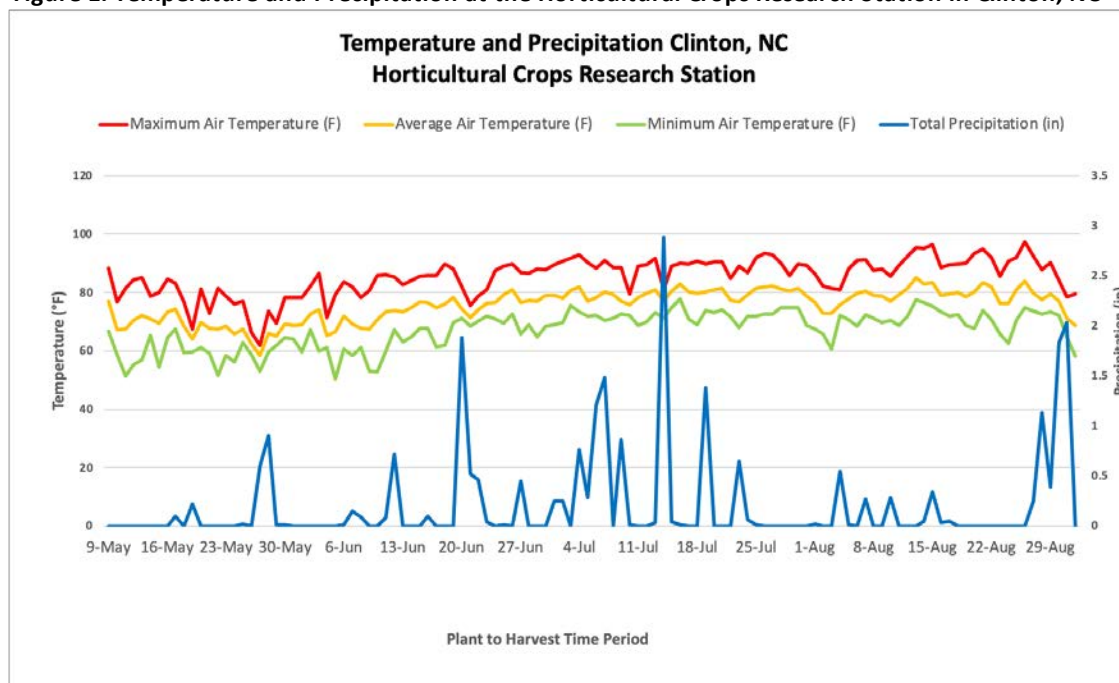
Table 3. Fungicides Standard Size Seedless Watermelon Study 2023

Product	Rate per acre	Application Date(s)
Proline	5.5 fl oz	26-May
Bravo Weather Stick	1 qt	2-Jun, 16-Jun
Quadris	15 fl oz	2-Jun, 18-Jul
Cabrio	16 oz	9-Jun, 18-Aug
Copper	1 lb	9-Jun
Manzate Pro Stick	3 lb	9-Jun, 16-Jun, 18-Jul, 18-Aug
SWITCH 62.5WG (US)	14 oz	28-Jun
Aprovia	15 fl oz	21-Jul, 28-Jul
Topsin	8 oz	28-Jul, 11-Aug
Previcur Flex	0.6 qt	11-Aug

Weather

The weather was generally favorable for the duration of the study (Figure 1). Temperatures in the spring were cool until around June when the averages rose to around 80 °F and conditions remained hot throughout the summer. We had a few periods of heavy rainfall, but precipitation was generally consistent. One exception was the 3 inches of rain in mid-July which resulted in some flooding in one of the replications. Two to three inches of rain occurred in late August at the end of the study. A total of 24 inches of rain occurred at the field planting site in Clinton, NC throughout the duration of the study.

Figure 1. Temperature and Precipitation at the Horticultural Crops Research Station in Clinton, NC



Study Design and Data Collection

The study used a randomized complete block design with 4 replications. There was a total of 7 harvest collected over 56 days (7 July through 1 September). Fruits were picked when signs indicated they were ripe; yellow to tan ground spot, dead tendrils, ribbing, color. Fruits were counted and weighed individually. Fruit with pest damage and or rot were weighed and counted if the fruit was intact and representative of the rest of the plot. Vines were moved to cover unpicked fruit that were exposed during the harvests.

Quality Evaluations

Measurements were taken on 20 fruit (5 per block) of each cultigen to determine the fruit size, fruit shape, soluble solids (sweetness of Brix), interior flesh firmness, flesh color, rind thickness, seed trace size, hard seed population, and hollowheart. The most representative fruit were selected for quality measurements and measurements were retaken on additional fruit if necessary. Soluble solids were measured by cutting a piece of flesh from the center of the fruit and squeezing out the fruit juice onto the digital refractometer (Atago, Vernon Hills, IL). Flesh firmness was taken using a Penetrometer FT 011 with a 7/16" plunger tip (QA Supplies LLC, Norfolk, VA), and was recorded in pounds. Samples were obtained by cutting the center of the fruit from the stem to blossom end. Pressure was then taken in five areas of the fruit: stem end, top side, ground spot side, blossom end, and center. The reported measures on flesh firmness are an average of the five sample areas; pressure was not taken on fruit with hollowheart. Hard seed in triploid fruit was determined according to the USDA standards. Fruits were cut longitudinally in half, and then the halves were cut laterally. The number of hard seeds exposed on the cut surface were counted and recorded. Most of the quality measurements were taken in the early harvests (1-2). Additional information on the quality measurements is presented in the Quality section on page 8 and in Table 7.

Financial Support

In addition to seed companies, this research was supported by the College of Life and Agricultural Sciences, North Carolina Agriculture Research, the North Carolina Cooperative Extension Services, and the North Carolina Department of Agriculture and Consumer Services. This work was in part supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2020-51181-32139 ([CucCap](#)).

Results and Discussion

Overall fruit yield and quality were good for the duration of the study. Heavy rains resulted in flooding in some parts of the field and increased disease pressure in the standard size watermelon study, but the mini watermelon plots were largely unaffected. For the analysis, fruits were placed in the following categories: < 3 lb, 3 – 7 lb, 7.1 – 9 lb, and ≥ 9.1 lb.

Cumulative Harvests (1-7)

Yield: Pounds per acre

'Sugar Rush' from US Agriseeds had the highest marketable yield of all 16 entries in this study at 88,151 pounds per acre (lb/ac) (Table 4). 'Excite' from Hazera ranked second with a marketable yield of 80,499 lb/ac, and 'Proxima' from Origene ranked third with a marketable yield of 79,432 lb/ac. Average marketable yield across all entries was 69,959 lb/ac. Cultigens 'Exceed' and 'Extazy' from Hazera, 'Petite Perfection' from Syngenta, and 'Bolita' from BASF/Nunhems all yielded above the average. The majority of the yield in this study fell into the 3-7 lb category. '70475' and 'Altata' had a substantial tonnage (40,387 and 37,895 lb/ac, respectively) that produced oversized fruits (> 9.1 lb) that were not considered marketable, otherwise, these cultigens would have ranked much higher.

Table 4. Total Yield (lb/ac) of Mini Size Seedless Watermelon Cultigens 2023

Pounds (lb) per acre by size category								
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total lb/ac	Mkt lb/ac ²
Sugar Rush	US Agriseeds	1	1365	52700	35451	13838	103353	88151
Excite	Hazera	2	1496	47197	33302	23116	105110	80499
Proxima	Origene	3	1808	52657	26775	14026	95266	79432
Exceed	Hazera	4	1488	36598	37026	25802	100914	73624
Petite Perfection	Syngenta	5	1408	60882	11834	682	74807	72716
Bolita	BASF/Nunhems	6	2042	45805	24239	13872	85978	70778
Extazy	Hazera	7	1336	37549	32576	24234	95694	70124
70475	Origene	8	1154	36017	32714	40387	110272	68730
Altata	Rijk Zwaan	9	242	40423	27511	37897	106093	68668
Gentility	Known You Seed	10	2251	51720	14142	6694	74807	65863
Amazing	Known You Seed	11	2052	53278	10851	4753	70954	64863
Crimson Belle	Known You Seed	12	2737	50145	14026	5706	72615	64171
Melania	Origene	13	1248	39155	23764	23252	87439	63653
3F-4109	Known You Seed	14	2055	48163	15021	2040	67278	63184
Queenlet	Known You Seed	15	1241	41382	21279	27138	91040	62661
Onza	Hazera	16	1212	46566	15667	6461	69907	62233
Average:			1571	46265	23511	16869	88220	69959
LSD (0.05) ³ :			3602	25182	24265	34851	56499	40030

Yield data were collected over 7 harvests (7 July through 1 September) with some harvests collected over 2-4 days.

1. Ranked by marketable pounds per acre lb per acr (Mkt lb/ac).
2. Marketable pounds per acre (Mkt lb/ac) includes all size categories except the less than 3 lb (< 3 lb) and the greater than 9.1 lb (> 9.1 lb) categories.
3. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at P < 0.05.

Yield: Number of fruit per acre and number of fruit per plant

The cultigen Sugar Rush from US Agriseeds had the highest number of marketable fruit per acre (Mkt no/ac) at 14,520 (Table 5). 'Proxima' from Origene ranked second with 13,576 no/ac, and 'Petite Perfection' from Syngenta ranked third at 13,141 no/ac. The average number of marketable fruit per acre across all 16 entries was 11,851. Cultigens Excite from Hazera, Amazing and Gentility from Known You Seed, and Bolita from BASF/Nunhems all yielded above average.

'Sugar Rush' had the highest number of fruit per plant at 5.7 across all 16 entries. 'Proxima' ranked second for number of fruit per plant (Fruit no/plant) at 5.4. 'Altata' from Rijk Zwaan and '70475' from Origene both ranked third for number of fruit per plant at 5.1 but ranked thirteenth and fourteenth for marketable number per acre, respectively, due to many fruit being greater than 9.1 lb and therefore unmarketable as a mini size watermelon. Fruit number per plant ranged from a low of 4.2 to a high of 5.7.

Table 5. Total Yield (no/acre) and Number of Fruit Per Plant of Mini Size Seedless Watermelon Cultigens 2023

			Number (no) of fruit per size category						
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total no/ac	Mkt no/ac ²	Fruit no/plant ³
Sugar Rush	US Agriseeds	1	653	10019	4501	1379	16553	14520	5.7
Proxima	Origene	2	726	10164	3412	1379	15682	13576	5.4
Petite Perfection	Syngenta	3	581	11616	1525	73	13794	13141	4.8
Excite	Hazera	4	581	8567	4138	2178	15464	12705	5.3
Amazing	Known You Seed	5	853	10842	1355	510	13634	12229	4.7
Gentility	Known You Seed	6	871	10309	1815	653	13649	12124	4.7
Bolita	BASF/Nunhems	7	853	8809	3098	1381	14215	11939	4.9
3F-4109	Known You Seed	8	871	9656	1960	218	12705	11616	4.4
Crimson Belle	Known You Seed	9	1162	9728	1815	581	13286	11543	4.6
Exceed	Hazera	10	581	6607	4646	2396	14230	11253	4.9
Extazy	Hazera	10	653	7187	4066	2178	14084	11253	4.9
Onza	Hazera	10	508	9220	2033	653	12415	11253	4.3
Altata	Rijk Zwaan	13	78	7647	3485	3607	14892	11164	5.1
70475	Origene	14	436	6607	4066	3775	14883	10672	5.1
Melania	Origene	15	466	7357	3001	1284	12182	10390	4.2
Queenlet	Known You Seed	16	581	7550	2686	2541	13358	10237	4.6
Average:			653	8868	2975	1549	14064	11851	4.9
LSD (0.05) ⁴ :			1591	4439	3091	2895	6805	5879	2.3

Yield data were collected over 7 harvests (7 July through 1 September) with some harvests collected over 2-4 days.

1. Ranked by marketable number per acre (Mkt no/ac).
2. Marketable number per acre (Mkt no/ac) includes all size categories except the less than 3 lb (< 3 lb) and the greater than 9.1 lb (> 9.1 lb) categories.
3. Average number of fruit per plant (Fruit no/plant)
4. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.

Yield: Average Fruit Size and Distribution

‘Exceed’ from Hazera had the largest fruit, on average, at 6.6 lb/fruit (Table 6). ‘70475’ from Origene and ‘Excite’ from Hazera ranked second and third for average fruit size at 6.4 lb/fruit and 6.3 lb/fruit, respectively. The average fruit size across all 16 cultigens was 5.9 lb/fruit. ‘Extazy’ from Hazera, ‘Altata’ from Rijk Zwaan, ‘Melania’ from Origene, ‘Queenlet’ from Known You Seed, and ‘Sugar Rush’ from US Agriseeds all were above the average for fruit size.

Some cultigens had fruit that were considered unmarketable as mini size watermelons as they were greater than 9.1 lb. 25% of ‘70475’, 22% of ‘Altata’, and 19% of ‘Queenlet’ fruit harvested were in the greater than 9.1 lb (> 9.1 lb) size category. On average, across all 16 cultigens, 10% of fruit were oversized and therefore unmarketable as mini size watermelons. Most fruit were in the 3-7 lb category.

Table 6. Average Fruit Size and Size Distribution of Mini Size Seedless Watermelon Cultigens 2023

Cultigen	Company	Rank ¹	Avg lb/fruit	L/D ²	Percent (%) of fruit per size category			
					< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb
Exceed	Hazera	1	6.6	1.0	4	46	33	17
70475	Origene	2	6.4	1.0	3	44	27	25
Excite	Hazera	3	6.3	1.0	4	55	27	14
Extazy	Hazera	4	6.2	1.0	5	51	29	15
Altata	Rijk Zwaan	5	6.1	1.1	2	53	23	22
Melania	Origene	5	6.1	1.0	4	63	24	10
Queenlet	Known You Seed	5	6.1	1.0	4	57	20	19
Sugar Rush	US Agriseeds	5	6.1	1.0	4	61	27	8
Bolita	BASF/Nunhems	9	5.9	1.0	7	64	21	8
Proxima	Origene	9	5.9	1.0	5	65	22	9
Crimson Belle	Known You Seed	11	5.5	1.1	9	73	14	4
Onza	Hazera	11	5.5	1.0	4	74	16	5
Petite Perfection	Syngenta	11	5.5	1.0	4	84	11	1
Gentility	Known You Seed	14	5.4	1.1	6	76	13	5
3F-4109	Known You Seed	14	5.4	1.1	7	76	15	2
Amazing	Known You Seed	16	5.2	1.0	7	81	10	3
Average:			5.9	1.0	5	64	21	10
LSD (0.05) ³ :			0.9	0.1				

Yield data were collected over 7 harvests (7 July through 1 September) with some harvests collected over 2-4 days.

1. Ranked by average weight of the fruit (Avg lb/fruit).

2. The ratio of the length of the fruit over the width/diameter of the fruit (L/D)

3. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.

Quality

'Exceed' from Hazera had the highest Brix or sugar content across all 16 cultigens at 11.7, followed by 'Petite Perfection' from Syngenta at 11.6 (Table 7). Brix is a measure of sweetness, and the units equate to 1 gram of sucrose in 100 grams of solution. The average sugar content across all entries was 11.0. 'Amazing', '3F-4109', and 'Crimson Belle' from Known You Seed and 'Melania' from Origene all had above average sugar content at 11.2 and 11.1.

'Onza' from Hazera and '70475' from Origene had the two firmest flesh ratings across all 16 entries at 4.3 lb and 3.8 lb, respectively (Table 7). The average firmness of all entries was 3.2 lb.

'Exceed' had the highest flesh color rating out of all 16 entries at 4.8; color is based on a 1 to 5 scale with 1 being pale or white and 5 being a deep blood red (Table 7). The average flesh color rating for all entries was 4.4.

'Petite Perfection', 'Gentility', and 'Amazing' had the smallest rind thickness measurements on average across all entries at 8.3 mm, 8.6 mm, and 9.8 mm, respectively (Table 7). The average rind thickness across all 16 entries was 12.7 mm.

'Amazing' and 'Bolita' had the lowest hard seed population across all 16 entries at 0.1 for both entries (Table 7). Hard seed population was low overall, with an average population of 0.7 across all 16 cultigens.

'Onza' had the smallest seed traces across all entries at 0.8; seed trace was measured on a 1-5 scale with 1 being small and 5 being large (Table 7). 'Queenlet' and 'Gentility' had the largest seed traces on average at 1.8 for both entries. Overall, seed traces were small, with an average size of 1.3.

Table 7. Quality of Mini Size Seedless Watermelon Cultigens 2023

Cultigen	Company	Rank ¹	Brix (% Sugar) ²	Firmness (lb) ³	Flesh Color ⁴	Rind (mm) ⁵	Hard Seed Pop. ⁶	Seed Trace Size ⁷
Exceed	Hazera	1	11.7	3.6	4.8	14.5	0.4	1.1
Petite Perfection	Syngenta	2	11.6	3.2	4.5	8.3	0.2	1
Amazing	Known You Seed	3	11.2	2.5	4	9.8	0.1	1.3
Melania	Origene	3	11.2	3.2	4.7	13.2	1.1	1
3F-4109	Known You Seed	3	11.2	2.8	4.3	10.1	0.9	1.7
Crimson Belle	Known You Seed	4	11.1	2.9	4.3	12	0.2	1.1
Altata	Rijk Zwaan	5	11.0	2.8	4.2	14.8	0.2	1.7
Onza	Hazera	5	11.0	4.3	4.7	11.5	0.6	0.8
Bolita	BASF/Nunhems	6	10.9	3.3	4.3	13.5	0.1	1
Gentility	Known You Seed	6	10.9	3	4.1	8.6	1.1	1.8
Extazy	Hazera	7	10.8	3.5	4.7	17.1	0.5	1.1
Proxima	Origene	7	10.8	3.3	4.6	14.2	1.1	1.4
Sugar Rush	US Agriseeds	7	10.8	3.6	4.3	13.7	0.6	1.1
Excite	Hazera	8	10.7	3	4.4	14.1	1	1.3
Queenlet	Known You Seed	8	10.7	2.6	4.2	13.6	0.9	1.8
70475	Origene	8	10.7	3.8	4.7	14.6	1.5	1.2
Average:			11.0	3.2	4.4	12.7	0.7	1.3
LSD (0.05) ⁸ :			1.0	0.9	0.5	3.6	1.4	0.6

Quality data were collected over 7 harvests (7 July through 1 September) with some harvests collected over 2-4 days.

1. Ranked by Brix (Sugar %).

2. Brix (Sugar %) is a measure of dissolved sugar. One degree Brix is 1 gram of sucrose in 100 grams of solution. Measurements taken with Atago PAL-1 refractometer.

3. Firmness is a measure of the pressure resistance of the flesh of the fruit. Taken on five places on one half of the fruit (top, bottom, blossom end, stem end, and heart or middle of the fruit) with a QA Supplies FT 011 handheld Penetrometer with a 7/16" plunger tip and was recorded in pounds (lb).

4. Flesh color was rated on a 1-5 scale; 1 being pale or pink and 5 being deep red.

5. Rind thickness was measured from the edge of the fruit to where white and colored flesh met in the fruit and was recorded in millimeters (mm).

6. Hard seed population is the average number of hard seeds counted in the fruit.

7. Seed trace size is the average size of the white seed traces (pips) and was rated on a 1-5 scale with 1 being small (i.e. tomato seed) and 5 being large.

8. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.

Quality: Hollowheart

Hollowheart incidence was low in this study, with 10 out of 16 entries having no hollowheart (Table 8). The entry with the greatest incidence of hollowheart was 'Queenlet', with 45% of fruit having some degree of hollowheart. Three entries had fruits with a hollowheart rating of 3 or higher, which are considered unmarketable: 'Crimson Belle' with 5% HH3 and 5% HH4, 'Amazing' with 20% HH3, and 'Queenlet' with 15% HH3 and 5% HH4.

Table 8. Hollow Heart Incidence in Mini Seedless Watermelon Cultigens 2023

Cultigen	Company	Rank ¹	HH0 ²	HH1 ³	HH2 ⁴	HH3 ⁵	HH4 ⁶
Bolita	BASF/Nunhems	1	100	0	0	0	0
Exceed	Hazera	1	100	0	0	0	0
Excite	Hazera	1	100	0	0	0	0
Extazy	Hazera	1	100	0	0	0	0
Melania	Origene	1	100	0	0	0	0
Onza	Hazera	1	100	0	0	0	0
Petite Perfection	Syngenta	1	100	0	0	0	0
Proxima	Origene	1	100	0	0	0	0
Sugar Rush	US Agriseeds	1	100	0	0	0	0
70475	Origene	1	100	0	0	0	0
Altata	Rijk Zwaan	2	93	0	7	0	0
3F-4109	Known You Seed	3	90	10	0	0	0
Gentility	Known You Seed	4	90	5	5	0	0
Crimson Belle	Known You Seed	5	80	10	0	5	5
Amazing	Known You Seed	6	67	0	13	20	0
Queenlet	Known You Seed	7	55	10	15	15	5
Average:			92.2	2.2	2.5	2.5	0.6

Hollowheart data were averages collected from 20 fruit over 7 harvests (7 July through 1 September)

1. Ranked by percent of fruit with HH0.

2. Hollowheart 0 percent (HH0%) is the percent of fruit with a hollowheart rating of 0 (no crack in flesh).

3. Hollowheart 1 percent (HH1%) is the percent of fruit with a hollowheart rating of 1 (hairline crack in flesh).

4. Hollowheart 2 percent (HH2%) is the percent of fruit with a hollowheart rating of 2 (obvious crack, marketable).

5. Hollowheart 3 percent (HH3%) is the percent of fruit with a hollowheart rating of 3 (moderate cracking, unmarketable).

6. Hollowheart 4 percent (HH4%) is the percent of fruit with a hollowheart rating of 4 (complete separation in flesh to rind, unmarketable).

Early Harvests (1-2): 7 July (harvest 1) and 18 July (harvest 2)

Early Yield: Pounds per acre

In the early harvests (1-2), 'Queenlet' from Known You Seed had the highest marketable yield at 19,471 lb/ac (Table 9). 'Bolita' from BASF/Nunhems had the second highest marketable yield at 16,688 lb/ac, and 'Altata' from Rijk Zwaan had the third highest at 16,543 lb/ac. The average marketable yield across all 16 entries for the early harvests was 14,100 lb/ac. 'Petite Perfection' from Syngenta, 'Excite' from Hazera, and 'Crimson Belle' from Known You Seed all yielded above the average for the early harvests.

Table 9. Early Yield (lb/ac) of Mini Size Seedless Watermelon Cultigens 2023

Pounds (lb) per acre by size category								
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total lb/ac	Mkt lb/ac ²
Queenlet	Known You Seed	1	443	14150	5322	4661	24575	19471
Bolita	BASF/Nunhems	2	507	10571	6109	968	18160	16688
Altata	Rijk Zwaan	3	4	8074	8461	9031	25575	16543
Petite Perfection	Syngenta	4	298	15144	1140	0	16582	16284
Excite	Hazera	5	174	8574	5888	4625	19261	14462
Crimson Belle	Known You Seed	6	726	12015	2229	704	15674	14244
Amazing	Known You Seed	7	623	14046	0	0	14665	14046
Gentility	Known You Seed	8	0	12233	1663	0	13896	13896
Onza	Hazera	9	261	10970	2752	741	14723	13721
3F-4109	Known You Seed	10	399	11355	2171	675	14600	13525
70475	Origene	11	152	9329	4022	5975	19479	13351
Extazy	Hazera	12	370	6759	5888	0	13017	12647
Sugar Rush	US Agriseeds	13	0	6353	6287	3608	16248	12640
Proxima	Origene	14	0	6244	6178	777	13199	12422
Melania	Origene	15	0	3205	7977	0	11190	11190
Exceed	Hazera	16	138	8182	2294	2127	12741	10476
Average:			341	9825	4559	3081	16474	14100
LSD (0.05) ³ :			1197	8941	6984	6675	10123	11063

Early yield data were collected for harvest 1 (7 July) and harvest 2 (18 July).

1. Ranked by marketable pounds per acre (Mkt lb/ac).
2. Marketable pounds per acre (Mkt lb/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.
3. Least Significant Difference (LSD) is the minimum differences required between two cultigens for a significant difference in that category at a P < 0.05.

Early Yield: Number of fruit per acre and number of fruit per plant

In the early harvests (1-2), 'Petite Perfection' from Syngenta and 'Queenlet' from Known You Seed had the highest marketable number of fruit at 3,122 no/ac for both entries (Table 10). 'Amazing' from Known You and 'Bolita' from BASF/Nunhems ranked second and third with 3,001 no/ac and 2,710 no/ac, respectively. The average number of marketable fruit across all 16 entries for the early harvests was 2,423 no/ac. 'Gentility', 'Crimson Belle' and '3F-4109' from Known You Seed, 'Altata' from Rijk Zwaan, and 'Onza' from Hazera all yielded more marketable fruit than the average for the early harvests.

'Queenlet' had the highest number of fruit per plant at 1.3 no/plant, but many were unmarketable due to being greater than 9.1 lb. 'Altata' had the second highest number of fruit per plant at 1.2 no/plant but had similar issues with oversized fruit. 'Petite Perfection' and 'Amazing' both yielded 1.1 no/plant but had no oversized fruit and therefore increased marketable yield.

Table 10. Early Yield (no/ac) and Number of Fruit Per Plant of Mini Size Seedless Watermelon Cultigens 2023

			Number (no) of fruit per size category						
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total no/ac	Mkt no/ac ²	Fruit no/plant ³
Petite Perfection	Syngenta	1	145	2977	145	0	3267	3122	1.1
Queenlet	Known You Seed	1	218	2468	653	436	3775	3122	1.3
Amazing	Known You Seed	3	292	2996	0	0	3293	3001	1.1
Bolita	BASF/Nunhems	4	195	1931	774	97	3002	2710	1
Gentility	Known You Seed	5	0	2468	218	0	2686	2686	0.9
Altata	Rijk Zwaan	6	2	1544	1065	871	3486	2614	1.2
Crimson Belle	Known You Seed	6	290	2323	290	73	2977	2614	1
Onza	Hazera	8	145	2105	363	73	2686	2468	0.9
3F-4109	Known You Seed	8	145	2178	290	73	2686	2468	0.9
Excite	Hazera	10	73	1525	726	436	2759	2251	1
70475	Origene	11	73	1670	508	581	2831	2178	1
Extazy	Hazera	12	145	1379	726	0	2251	2105	0.8
Sugar Rush	US Agriseeds	12	0	1307	799	363	2468	2105	0.9
Proxima	Origene	14	0	1162	799	73	2033	1960	0.7
Exceed	Hazera	15	73	1525	290	218	2105	1815	0.7
Melania	Origene	16	0	576	968	0	1550	1549	0.5
Average:			150	1883	574	299	2741	2423	0.9
LSD (0.05) ⁴ :			541	1686	891	666	1826	1851	0.6

Early yield data were collected for harvest 1 (7 July) and harvest 2 (18 July).

1. Ranked by marketable number per acre (Mkt no/ac).

2. Marketable number per acre (Mkt no/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.

3. Average number of fruit per plant (Fruit no/plant).

4. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.

Mid-season Harvests (3-5): 26 July (harvest 3), 3 August (harvest 4) and 10 August (harvest 5)

Mid-season Yield: Pounds per acre

In the mid-season harvests (3-5), 'Proxima' from Origene had the highest marketable yield per acre at 39,153 lb/ac (Table 11). 'Excite' from Hazera and 'Sugar Rush' from US Agriseeds ranked second and third at 38,623 lb/ac and 37,890 lb/ac, respectively. The average marketable yield across all 16 entries for the mid-season harvests was 30,568 lb/ac. '3F-4109' and 'Gentility' from Known You, 'Petite Perfection' from Syngenta, and '70475' from Origene all yielded above the average for the mid-season harvests.

Table 11. Mid-season Yield (lb/ac) of Mini Size Seedless Watermelon Cultigens 2023

Pounds (lb) per acre by size category								
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total lb/ac	Mkt lb/ac ²
Proxima	Origene	1	1067	25279	13874	10447	50668	39153
Excite	Hazera	2	806	20096	18528	13032	52461	38623
Sugar Rush	US Agriseeds	3	784	21250	16640	7398	46072	37890
3F-4109	Known You Seed	4	944	23617	9496	675	34732	33113
Gentility	Known You Seed	5	1285	25809	6890	5968	39952	32699
Petite Perfection	Syngenta	6	900	24132	7304	0	32336	31436
70475	Origene	7	407	13162	17772	23290	54632	30935
Crimson Belle	Known You Seed	8	1670	21925	8632	3499	35726	30557
Onza	Hazera	9	951	20589	9532	2846	33919	30122
Exceed	Hazera	10	726	9373	20205	11391	41694	29577
Bolita	BASF/Nunhems	11	1200	18235	11146	8967	39552	29044
Altata	Rijk Zwaan	12	281	16386	12627	23177	52475	28677
Extazy	Hazera	13	893	13402	13366	17489	45150	26768
Amazing	Known You Seed	14	1210	20113	6693	4969	32989	26470
Queenlet	Known You Seed	15	363	10890	13308	20422	44983	24198
Melania	Origene	16	513	13918	6238	10670	31344	19819
Average:			875	18636	12016	10949	41793	30568
LSD (0.05) ³ :			2558	16553	16249	21397	30690	23949

Mid-season yield data were collected for harvest 3 (26 July), harvest 4 (3 August), and harvest 5 (10 August).

1. Ranked by marketable pounds per acre (Mkt lb/ac).

2. Marketable pounds per acre (Mkt lb/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.

3. Least Significant Difference (LSD) is the minimum differences required between two cultigens for a significant difference in that category at $P < 0.05$.

Mid-season Yield: Number of fruit per acre and number of fruit per plant

In the mid-season harvests (3-5), 'Proxima' from Origene had the highest number of marketable fruit at 6,607 no/ac (Table 12). 'Gentility' from Known You Seed and 'Sugar Rush' from US Agriseeds both ranked second at 6,026 no/ac. The average number of marketable fruit for the mid-season harvests was 5,050 no/ac. 'Excite' and 'Onza' from Hazera, '3F-4109' and 'Crimson Belle' from Known You Seed, and 'Petite Perfection' from Syngenta all yielded more marketable fruit than the average for the mid-season harvests.

'Proxima' from Origene also had the highest number of fruit per plant at 2.8 no/plant. 'Excite' from Hazera had the second highest number of fruit per plant at 2.6 no/plant but ranked fourth for marketable number per acre due to many fruit being oversized.

Table 12. Mid-season Yield (no/ac) and Number of Fruit Per Plant of Mini Size Seedless Watermelon Cultigens 2023

Number (no) of fruit per size category									
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total no/ac	Mkt no/ac ²	Fruit no/plant ³
Proxima	Origene	1	436	4864	1742	1016	8059	6607	2.8
Gentility	Known You Seed	2	508	5155	871	581	7115	6026	2.5
Sugar Rush	US Agriseeds	2	363	3920	2105	726	7115	6026	2.4
Excite	Hazera	4	290	3557	2323	1234	7405	5881	2.6
3F-4109	Known You Seed	5	436	4574	1234	73	6316	5808	2.2
Petite Perfection	Syngenta	6	363	4574	944	0	5881	5518	2
Onza	Hazera	7	363	4138	1234	290	6026	5372	2.1
Crimson Belle	Known You Seed	8	726	4211	1089	363	6389	5300	2.2
Bolita	BASF/Nunhems	9	484	3446	1401	877	6236	4792	2.1
Amazing	Known You Seed	10	484	3930	820	490	5752	4695	2
70475	Origene	11	145	2396	2178	2105	6824	4574	2.4
Altata	Rijk Zwaan	12	97	2962	1594	2136	6817	4501	2.3
Exceed	Hazera	13	290	1670	2541	1016	5518	4211	1.9
Extazy	Hazera	13	436	2541	1670	1525	6171	4211	2.1
Queenlet	Known You Seed	15	145	2178	1670	1888	5881	3848	2
Melania	Origene	16	194	2671	820	974	4687	3436	1.6
Average:			360	3549	1515	1020	6387	5050	2.2
LSD (0.05) ⁴ :			1099	3280	2023	1980	4400	3931	1.5

Mid-season yield data were collected for harvest 3 (26 July), harvest 4 (3 August), and harvest 5 (10 August).

1. Ranked by marketable number per acre (Mkt no/ac).

2. Marketable number per acre (Mkt no/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.

3. Average number of fruit per plant (Fruit no/plant).

4. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.

Late Harvests (6-7): 17 August (harvest 6) and 1 September (harvest 7)

Late Yield: Pounds per acre

In the late harvests (6-7), 'Sugar Rush' from US Agriseeds had the highest marketable yield per acre at 37,621 lb/ac (Table 13). 'Exceed' from Hazera and 'Melania' from Origene ranked second and third for marketable yield per acre at 33,570 lb/ac and 31,334 lb/ac, respectively. Both 'Exceed' and 'Melania' had over 12,000 lb/ac in oversized fruit, which is the primary reason that fruit were considered unmarketable. The average marketable yield across all 16 entries for the late harvests is 24,964 lb/ac. 'Extazy' and 'Excite' from Hazera, 'Proxima' from Origene, and 'Petite Perfection' from Syngenta all yielded above the average for the late harvests.

Table 13. Late Yield (lb/ac) of Mini Size Seedless Watermelon Cultigens 2023

Pounds (lb) per acre by size category								
Cultigen	Company	Rank ¹	< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb	Total lb/ac	Mkt lb/ac ²
Sugar Rush	US Agriseeds	1	581	25098	12524	2831	41034	37621
Exceed	Hazera	2	624	19043	14527	12284	46479	33570
Melania	Origene	3	726	22158	9177	12797	44906	31334
Extazy	Hazera	4	73	17388	13322	6745	37527	30710
Proxima	Origene	5	741	21134	6723	2802	31400	27857
Excite	Hazera	6	515	18528	8886	5460	33389	27414
Petite Perfection	Syngenta	7	211	21606	3390	682	25889	24996
70475	Origene	8	595	13525	10919	11122	36162	24444
Bolita	BASF/Nunhems	9	329	17124	6611	4153	28266	23735
Amazing	Known You Seed	10	213	19244	3795	0	23300	23038
Altata	Rijk Zwaan	11	0	16088	6050	5905	28043	22138
Crimson Belle	Known You Seed	12	341	16204	3165	1503	21214	19370
Gentility	Known You Seed	13	966	13678	5590	726	20960	19268
Queenlet	Known You Seed	14	436	16342	2650	2055	21482	18992
Onza	Hazera	15	0	15006	3383	2875	21265	18390
3F-4109	Known You Seed	16	711	13191	3354	690	17947	16546
Average:			504	17835	7129	4842	29954	24964
LSD (0.05) ³ :			1552	17697	12319	16894	36261	23949

Late yield data were collected for harvest 6 (17 August) and harvest 7 (1 September).

1. Ranked by marketable pounds per acre (Mkt lb/ac).
2. Marketable pounds per acre (Mkt lb/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.
3. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at P < 0.05.

Late Yield: Number of fruit per acre and number of fruit per plant

In the late harvests (6-7), 'Sugar Rush' from US Agriseeds had the greatest number of marketable fruit per acre at 6,389 no/ac (Table 14). 'Melania' from Origene and 'Exceed' from Hazera ranked second and third for marketable number per acre at 5,324 no/ac and 5,227 no/ac, respectively. The average number of marketable fruit per acre for the late harvests was 4,358 no/ac. 'Proxima' from Origene, 'Extazy' and 'Excite' from Hazera, and 'Petite Perfection' from Syngenta all yielded more marketable fruit per acre than the average in the late harvests.

'Sugar Rush' also had the greatest number of fruit per plant at 2.4 no/plant. 'Exceed' ranked second for number of fruit per plant at 2.3 no/plant but ranked third for marketable number per acre due to many oversized fruit in the late harvests.

Table 14. Late Yield (no/ac) and Number of Fruit Per Plant of Mini Size Seedless Watermelon Cultigens 2023

Cultigen	Company	Rank ¹	Number (no) of fruit per size category				Total no/ac	Mkt no/ac ²	Fruit no/plant ³
			< 3 lb	3-7 lb	7.1-9 lb	> 9.1 lb			
Sugar Rush	US Agriseeds	1	290	4792	1597	290	6970	6389	2.4
Melania	Origene	2	269	4156	1162	302	5911	5324	2
Exceed	Hazera	3	218	3412	1815	1162	6607	5227	2.3
Proxima	Origene	4	290	4138	871	290	5590	5009	1.9
Extazy	Hazera	5	73	3267	1670	653	5663	4937	2
Excite	Hazera	6	218	3485	1089	508	5300	4574	1.8
Petite Perfection	Syngenta	7	73	4066	436	73	4646	4501	1.6
Amazing	Known You Seed	8	76	3962	484	0	4555	4453	1.6
Bolita	BASF/Nunhems	9	173	3478	871	399	4943	4356	1.7
Altata	Rijk Zwaan	10	0	3188	774	593	4555	3969	1.6
70475	Origene	11	218	2541	1379	1089	5227	3920	1.8
Crimson Belle	Known You Seed	12	145	3194	436	145	3920	3630	1.4
Gentility	Known You Seed	13	363	2686	726	73	3848	3412	1.3
Onza	Hazera	14	0	2977	436	290	3703	3412	1.3
3F-4109	Known You Seed	15	290	2904	436	73	3703	3340	1.3
Queenlet	Known You Seed	16	218	2904	363	218	3703	3267	1.3
Average:			208	3447	909	411	4928	4358	1.7
LSD (0.05) ⁴ :			663	3205	1579	1192	4822	4194	1.7

Late yield data were collected for harvest 6 (17 August) and harvest 7 (1 September).

1. Ranked by marketable number per acre (Mkt no/ac).

2. Marketable number per acre (Mkt no/ac) includes all size categories except the less than 3 lb (< 3 lb) and the more than 9.1 lb (> 9.1 lb) categories.

3. Average number of fruit per plant (Fruit no/plant).

4. Least Significant Difference (LSD) is the minimum difference required between two cultigens for a significant difference in that category at $P < 0.05$.



Figure 2. Photo of 'Altata' from Rijk Zwaan



Figure 3. Photo of 'Amazing' from Known You Seed



Figure 4. Photo of 'Bolita' from BASF/Nunhems



Figure 5. Photo of 'Crimson Belle' from Known You Seed



Figure 6. Photo of 'Exceed' from Hazera



Figure 7. Photo of 'Excite' from Hazera



Figure 8. Photo of 'Extazy' from Hazera



Figure 9. Photo of 'Gentility' from Known You Seed



Figure 10. Photo of 'Melania' from Origene



Figure 11. Photo of 'Onza' from Hazera



Figure 12. Photo of 'Petite Perfection' from Syngenta



Figure 13. Photo of 'Proxima' from Origene



Figure 14. Photo of 'Queenlet' from Known You Seed



Figure 15. Photo of 'Sugar Rush' from US Agriseeds



Figure 16. Photo of '70475' from Origene



Figure 17. Photo of '3F-4109' from Known You Seed