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2023 Personal-sized Seedless Watermelon Cultivar Evaluation in Indiana

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Introduction

Indiana ranks sixth in watermelon production in the U.S., following Florida, Georgia, Texas, California, and North Carolina in 2022. A total of 7,000 acres of watermelons were planted, with a production value of \$71 million (USDA, 2023). Watermelons grown in Indiana are primarily red flesh seedless, and around 10% are personal-sized seedless watermelons (6-8 lbs).

Materials and Methods

Twelve personal-sized seedless watermelon cultivars were evaluated at the Southwest Purdue Agricultural Center (SWPAC) in Vincennes, IN in 2023. Cultivar names and seed sources are provided in Table 1.

Watermelon seeds were planted in 50-cell black seeding flats filled with a peat-based potting medium on 19 Apr. Transplants were grown in greenhouses at the Southwest Purdue Agricultural Center (SWPAC) and transplanted in the field on 17 May.

The soils of the experimental fields are Henshaw silt loam with 1.5% organic matter, and no vegetable crops have been grown in these fields in the past 30 years. Granular fertilizers at a rate of 325 lb/acre urea (46-0-0) (150 lb/acre nitrogen), 300 lb/acre potash (0-0-60) (150 lb/acre potassium), 7 lb/acre boron 14.3% (1 lb/acre boron) and 10 lb/acre Zinc 10% LS (1 lb/acre zinc) were broadcast applied preplant. Plants were grown on raised beds covered with black plastic mulch. Drip tapes with a 12-inch emitter spacing and a flow rate of 0.22 gpm/100 feet were used for irrigation. At transplant, each seedling received approximately one cup of starter fertilizer solution using Brandt Plant Start 8-27-2 at a rate of 4 quarts/acre.

A randomized complete block design with three replications was used for the trial. Experimental plots were comprised of three 12-ft rows spaced on 6-ft centers. Transplants were planted 2 ft apart for a total of 18 plants per experimental plot. Pollenizers were planted in one row for every three rows of personal-size triploid watermelons (Figure 1). Pollenizer SP-7 (Syngenta) was used for the trial.

Fungicides used include Initiate[®] 720, Aprovia Top[®], Inspire Super[®], Presidio[®], Ranman[®], Rally[®], Miravis[®] Prime, Rampart[®], Zampro[®], Quadris[®] Top, and Orondis[®] Ultra. They were rotationally sprayed to control foliar diseases and *Phytophthora* in watermelons. Insecticide Oberon[®] 25C was sprayed once to control two-spotted spider mites.

Harvests were conducted on 25 Jul., 1 Aug., 8 Aug., and 15 Aug. Fruit were weighed individually. Three fruit per cultivar per replication were collected for quality measurement. Fruit size and rind thickness were recorded. Soluble solids contents (SSC%) were measured with a digital refractometer. Flesh firmness was measured using a force gauge (FT 011) with 11 mm diameter tip. Hollow heart severity was evaluated using a 1-5 scale: 1. none; 2. carpel separation evident; 3. one large gap evident; 4. more than 2 large gaps; 5. severe. Seedlessness was evaluated by counting black hard seeds on cut surfaces of quartered melons.

Analysis of variance was performed using JMP Pro 16. Fisher's least significant difference test ($\alpha = 0.05$) was conducted for multiple comparisons of different measurements among watermelon cultivars.

Results and Discussion

The 2023 personal-sized seedless watermelon trial had an outstanding yield, ranging from 100,995 to 69,099 lbs/acre, or 37.10 to 25.38 lbs/plant. Each plant produced 4-5 fruit. The yield was similar to 2021 harvest, and remarkably higher compared to the other years. The environmental conditions in 2023 were generally good for watermelon production (Figure 2), and no significant disease was observed in the trial.

Queenlet was the highest-yielding cultivar by weight, followed by Cheetah, Exceed and Expert (Table 2). Queenlet was also the highest-yielding cultivar in the 2022 trial. It has round-shaped fruit; a dark green rind with faint strips. Average fruit weight was 7.26 lb in 2023, and 7.31 lb in 2022, slightly larger compared to the other personal-sized watermelons. Queenlet had thick rind, ranked in the middle in sugar content, and was relatively low in flesh firmness (Table 4). Cheetah was the second highest-yielding cultivar by weight and produced the most fruit by count (5.7 fruit/plant), average fruit weight was 6.25 lb in 2023 and 6.92 in 2022. Cheetah ranked low in sugar content and had a relatively high value in flesh firmness. Cultivar Amazing, 3F94-2730 and Crimson Belle had higher yields in the first harvest, while Onza, Exceed and Expert had relatively lower yields in the first harvest (Table 3 and Figure 3).

A considerable variation in flesh firmness was noted among the personal-sized watermelons (Table 4). Onza, Exceed, and Expert exhibited the highest values in flesh firmness, while 3F94-2730 and Amazing showed the lowest values. The cultivar Amazing and 3F94-2730, which recorded the lowest values in flesh firmness, also exhibited the highest sugar content. It is noteworthy that studies indicate watermelon quality is driven by sweetness, crispness, and juiciness. Consumers generally prefer watermelons with firm and crisp flesh (Liu et al., 2023). However, the understanding of consumer preferences for quality attributes in cultivars such as Amazing and 3F94-2730 remains lacking.

The occurrence of Hollow Heart (HH) was most prevalent in fruit from Amazing and 3F94-2730. Among nine fruit evaluated for quality parameters, seven fruit of 3F94-2730 had different levels of HH, and four fruit of Amazing had minor HH. Of all the evaluated fruit, one fruit of 3F-4109 and one fruit of Crimson Belle had more than 5 hard black seeds on the cut surfaces of quartered watermelons.

References

USDA, 2023. National Agricultural Statistics Service. Vegetables 2022 Summary.
Liu, Y. et al., 2023. Consumer perception of whole watermelons. *J. Food Sci.* DOI:
10.1111/1750-3841.16843

Acknowledgments

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Table 1. Cultivar names, seed sources and rind patterns of personal-sized seedless watermelons in the 2023 cultivar evaluation trial at Southwest Purdue Agricultural Center in Vincennes, IN.

| Cultivar | Seed Source | Rind Pattern |
|-----------------|--------------------|---------------------|
| Bolita | BASF | Striped |
| Exceed | Hazera | Striped |
| Expert | Hazera | Striped |
| Cheetah | Hazera | Striped |
| Onza | Hazera | Striped |
| Nectaro | Hazera | Striped |
| Amazing | Known-You | Striped |
| Gentility | Known-You | Striped |
| Queenlet | Known-You | Solid dark green |
| Crimson Belle | Known-You | Striped |
| 3F-4109 | Known-You | Striped |
| 3F94-2730 | SWPAC_ Known-You | Striped |

Table 2. Yield per acre and per plant of personal-sized seedless watermelons in the 2023 cultivar evaluation trial at Southwest Purdue Agricultural Center in Vincennes, IN.

| Cultivar | Yield per Acre | | | | Yield per Plant | | | | Avg Fruit Wt. (lbs) | |
|---------------|----------------|----------------|-------------|-----|-----------------|-----|-------------|-----|---------------------|---|
| | Weight (lbs) | | Fruit Count | | Weight (lbs) | | Fruit Count | | | |
| Queenlet | 100995 | a ^z | 13915 | abc | 37.10 | a | 5.11 | abc | 7.26 | a |
| Cheetah | 96802 | ab | 15528 | a | 35.56 | ab | 5.70 | a | 6.25 | b |
| Exceed | 93904 | abc | 13108 | bcd | 34.49 | abc | 4.81 | bcd | 7.16 | a |
| Expert | 90056 | a-d | 14318 | ab | 33.08 | a-d | 5.26 | ab | 6.29 | b |
| Nectaro | 88771 | bcd | 13814 | abc | 32.61 | bcd | 5.07 | abc | 6.41 | b |
| Amazing | 85407 | b-e | 13310 | bcd | 31.37 | b-e | 4.89 | bcd | 6.43 | b |
| Bolita | 82335 | cde | 11999 | d | 30.24 | cde | 4.41 | d | 6.86 | a |
| Onza | 81658 | de | 14369 | ab | 29.99 | de | 5.28 | ab | 5.70 | c |
| 3F94-2730 | 79008 | def | 12453 | cd | 29.02 | def | 4.57 | cd | 6.34 | b |
| Crimson Belle | 78571 | def | 12403 | cd | 28.86 | def | 4.55 | cd | 6.34 | b |
| 3F-4109 | 76001 | ef | 11798 | d | 27.91 | ef | 4.33 | d | 6.42 | b |
| Gentility | 69099 | f | 11949 | d | 25.38 | f | 4.39 | d | 5.78 | c |

^z Means within a column followed by the same letter do not differ significantly at $P < .05$.

Table 3. Marketable yield (lbs/plant) at each harvest date of personal-sized seedless watermelons in the 2023 cultivar evaluation trial at Southwest Purdue Agricultural Center in Vincennes, IN.

| Cultivar | Jul. 25 | | Aug. 1 | Aug. 8 | | Aug. 15 | |
|-----------------|----------------|------------------|---------------|---------------|-----|----------------|----|
| Queenlet | 4.40 | bcd ^z | 4.49 | 13.84 | ab | 14.37 | ab |
| Cheetah | 3.53 | cde | 2.09 | 11.90 | bc | 18.03 | a |
| Exceed | 1.03 | f | 3.24 | 15.83 | a | 14.39 | ab |
| Expert | 1.11 | f | 1.95 | 13.57 | ab | 16.45 | a |
| Nectaro | 2.14 | ef | 3.62 | 12.51 | abc | 14.33 | ab |
| Amazing | 6.70 | a | 2.59 | 9.99 | bc | 12.10 | bc |
| Bolita | 3.23 | de | 3.31 | 11.96 | abc | 11.74 | bc |
| Onza | 0.53 | f | 1.70 | 10.68 | bc | 17.09 | a |
| 3F94-2730 | 5.35 | ab | 3.92 | 10.19 | bc | 9.57 | c |
| Crimson Belle | 5.14 | abc | 3.02 | 9.06 | c | 11.64 | bc |
| 3F-4109 | 3.41 | de | 3.68 | 11.12 | bc | 9.71 | c |
| Gentility | 2.86 | de | 1.63 | 9.13 | c | 11.76 | bc |

^z Means within a column followed by the same letter do not differ significantly at $P < .05$. The yields were similar among cultivars on Aug. 1.

Table 4. Fruit quality characteristics of personal-sized seedless watermelons in the 2023 watermelon cultivar trial at Southwest Purdue Agricultural Center in Vincennes, IN.

| Cultivar | Length (cm) | Width (cm) | | Rind thickness (cm) | | Soluble solids content (°Brix) | | Firmness (lbs-force) | | Hollow Heart | |
|---------------|-------------|------------|------------------|---------------------|-----|--------------------------------|-----|----------------------|----|--------------|----|
| | | | | | | | | | | | |
| Bolita | 19.1 | 18.8 | abc ^z | 1.54 | bcd | 10.21 | bcd | 4.33 | c | 1.00 | d |
| Exceed | 19.4 | 19.0 | ab | 1.78 | ab | 10.12 | bcd | 5.54 | a | 1.00 | d |
| Expert | 18.2 | 18.0 | cde | 1.41 | def | 9.74 | cd | 5.38 | ab | 1.11 | cd |
| Cheetah | 19.0 | 18.7 | abc | 1.69 | abc | 9.68 | d | 4.70 | bc | 1.00 | d |
| Onza | 18.8 | 17.7 | de | 1.22 | efg | 10.30 | bc | 5.83 | a | 1.00 | d |
| Nectaro | 18.6 | 17.7 | de | 1.31 | def | 9.90 | cd | 4.53 | c | 1.00 | d |
| Amazing | 19.0 | 18.3 | bcd | 1.20 | fg | 11.34 | a | 2.41 | d | 2.11 | b |
| Gentility | 18.6 | 17.4 | e | 1.06 | g | 9.71 | cd | 2.84 | d | 1.11 | cd |
| Queenlet | 19.6 | 19.5 | a | 1.89 | a | 10.62 | b | 2.82 | d | 1.50 | c |
| Crimson Belle | 19.4 | 18.3 | bcd | 1.71 | ab | 10.58 | b | 2.84 | d | 1.22 | cd |
| 3F-4109 | 20.0 | 18.2 | bcd | 1.46 | cde | 10.69 | b | 2.72 | d | 1.17 | cd |
| 3F94-2730 | 20.3 | 19.3 | a | 1.54 | bcd | 11.56 | a | 2.13 | d | 2.78 | a |

^z Means within a column followed by the same letter do not differ significantly at $P < .05$.

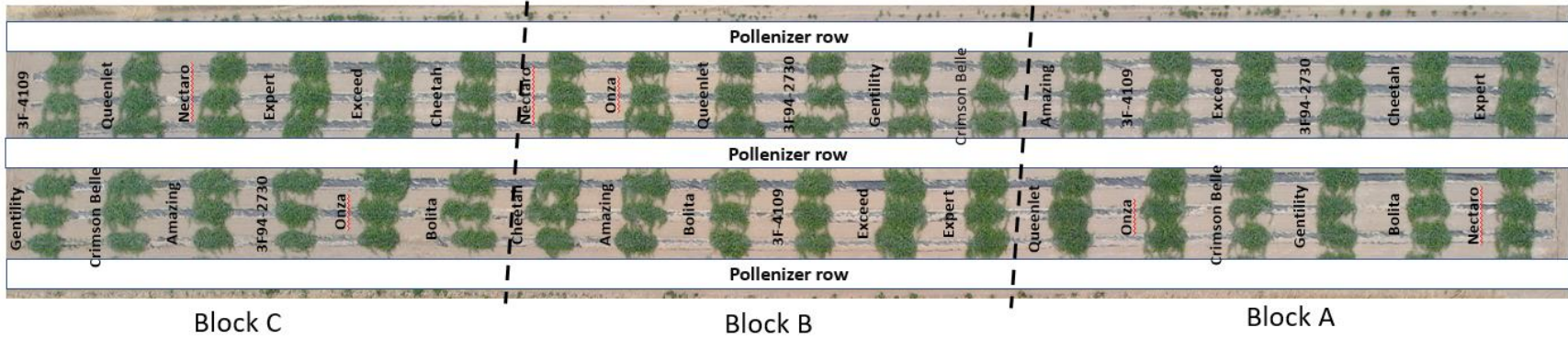


Figure 1. Overview of the 2023 personal-sized seedless watermelon cultivar trial at Southwest Purdue Agricultural Center in Vincennes, IN. The picture was taken on June 28 by Alex Helms.

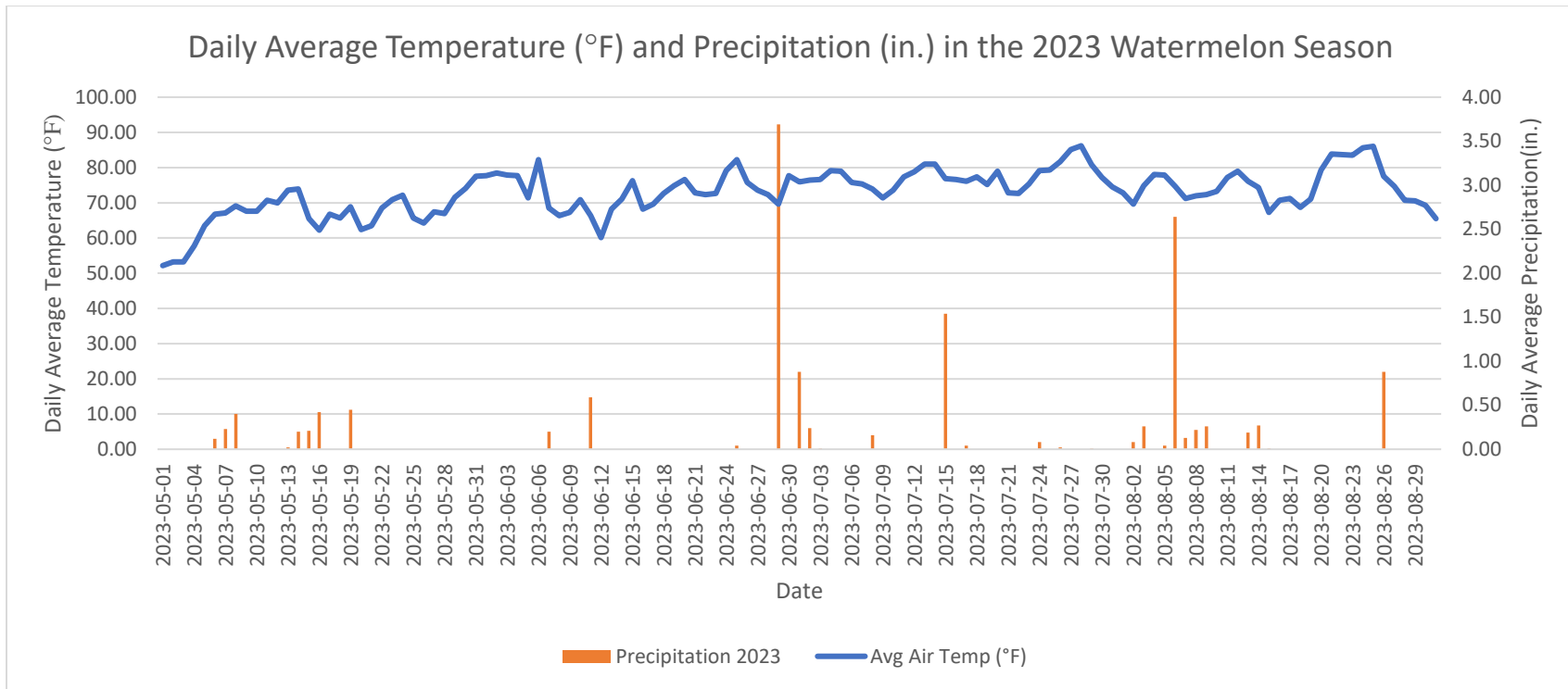


Figure 2. Daily precipitation (in.) recorded at Southwest Purdue Ag Center (SWPAC) from May to August in 2023. Data was adapted from [Purdue Mesonet Data Hub](https://mesonet.purdue.edu/) at Indiana State Climate Office (<https://ag.purdue.edu/indiana-state-climate/>).

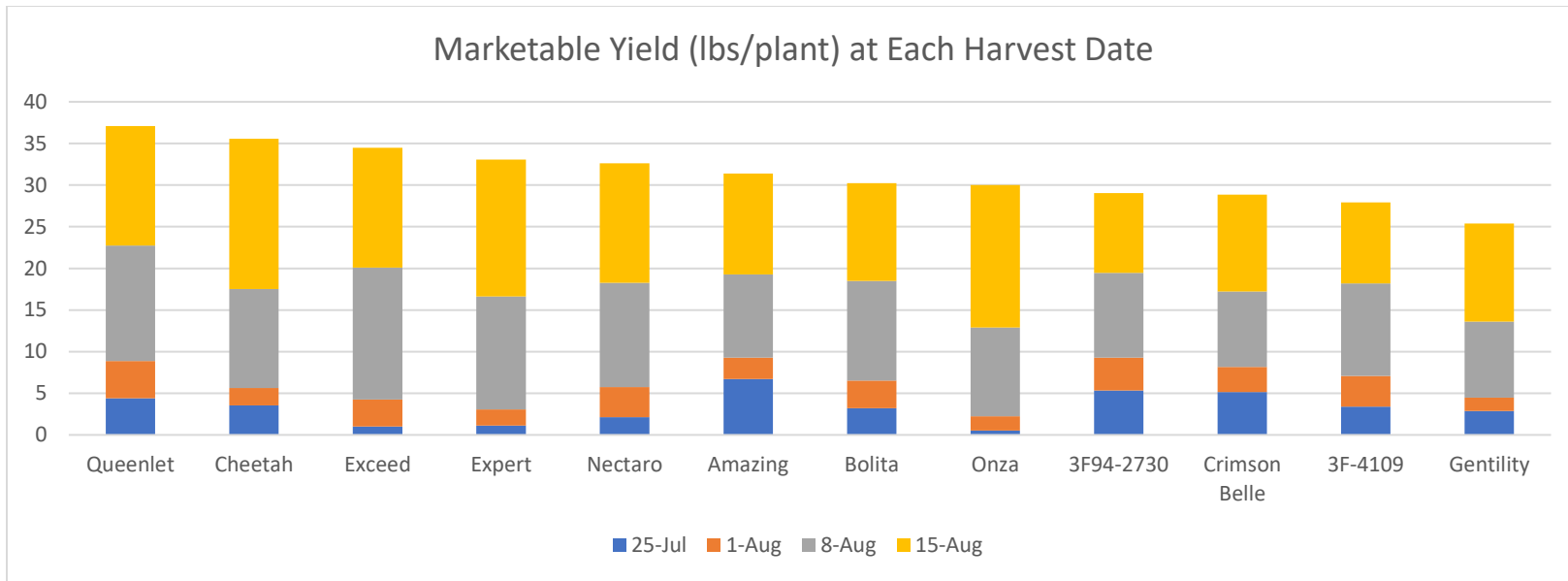

















Figure 3. Yield (lbs/plant) at each harvest date of personal-sized seedless watermelons in the 2023 watermelon cultivar trial at Southwest Purdue Agricultural Center in Vincennes, IN.

| | | | |
|-----------------------|---|---|--|
| <p>Bolita</p> |  |  |  |
| <p>Exceed</p> |  |  |  |
| <p>Expert</p> |  |  |  |
| <p>Cheetah</p> |  |  |  |
| <p>Onza</p> |  |  |  |
















| | | | |
|-----------------------------|---|---|--|
| <p>Nectaro</p> |  |  |  |
| <p>Amazing</p> |  |  |  |
| <p>Gentility</p> |  |  |  |
| <p>Queenlet</p> |  |  |  |
| <p>Crimson Belle</p> |  |  |  |



Figure 4. Exterior and interior of personal-sized seedless watermelons in the 2023 watermelon trial.