Evaluation of Triploid Personal-size Watermelon Varieties for Production in Southwest Indiana, 2010

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Introduction

Personal-size watermelon are triploid (seedless), can range from 5-10 lbs, and are intended for personal consumption. First released in 2003 (Maynard, 2003), personal-size watermelon are significantly smaller than traditional triploid and diploid watermelon varieties. When first released, personal-size watermelons were sold at a premium: as high as $9 per fruit in retail markets. However, they are no longer sold at a premium, being sold for as little as $3 per fruit, which is what traditional-size triploid and diploid melons are sold for. As a result of there no longer being a premium for personal-size watermelons, production acreage is far less than that of standard-size triploid watermelons. Nevertheless, it does occupy a portion of the watermelon market in southwest Indiana and it is essential to utilize the best possible varieties. There are several important traits to consider when selecting a variety including high yield, resistance to biotic diseases and disorders, good internal qualities (such as firmness and soluble solids content), and good external qualities. The objective of these experiments was to evaluate experimental or newly available varieties to assess adaptability to growing in the climate of southwest Indiana including partial resistance to Fusarium wilt.

Materials and Methods

Field Experiment

The experiment was established on April 21, 2010, when seeds of each variety were sown in 52-cell seedling flats for production of transplants in a greenhouse. A total of six different seedless watermelon varieties from various companies were transplanted in the field on May 13, 2010, with SP-5 as the pollenizer. The experiment was conducted as a randomized complete block design with three replications. Experimental plots were 48 feet in length and 4 feet wide. Rows were spaced on 6-foot centers with 4-foot in-row spacing. There were 12 plants per plot in addition to six pollenizers per plot. Plants were grown in a typical plasticulture vegetable system utilizing raised beds with black polyethylene mulch in combination with drip tape for irrigation when rainfall was insufficient. All fertilizer applications were pre-plant including 350 lbs (46-0-0), 100 lbs (0-0-60), and 200 lbs of pelletized lime. Plants were harvested four times from July 22 to August 19, at which times each fruit was weighed. Additionally, nine fruits from each variety were evaluated for quality characteristics including percent soluble solids, size, rind thickness, and firmness. Yield data were analyzed by Fisher’s least significant difference test using SAS statistical programs (SAS Institute, Cary, NC.)
Greenhouse Experiment
A greenhouse trial was conducted to score five, personal-size, triploid watermelon varieties for resistance to Fusarium wilt of watermelon. On September 16, six seeds of each variety were planted in 1.67-liter pots filled with a 4:1:1 mixture (v:v) of sand:peat:vermiculite. Each pot was an experimental unit and was replicated four times per variety. The experiment was a completely randomized design. Approximately seven days later, emerged seedlings were thinned to three per pot. Four pots of Lil’ Deuce and Tri-X-313 (not a personal-size variety) were left uninoculated as controls. A race 1 strain of *Fusarium oxysporum* fsp. *niveum* (FON) was stored on sterile filter paper at 4°C. Four 1-cm disks from the leading edge of a FON colony on PDA were added aseptically to 100 ml of a liquid mineral salts medium (Esposito and Fletcher, Arch. Biochem. Biophys. 93:369). The liquid medium was shaken at 150 rpm for 72 hours. The predominately microconidial suspensions were filtered through cheesecloth and adjusted to $1 \times 10^6$ conidia/ml with the aid of a hemacytometer. Each pot received 150 ml of this solution poured on the soil surface except for the Tri-X 313 controls. The Horsfall-Barratt rating system was used to evaluate severity of Fusarium wilt on watermelon seedlings on March 5, 7, 9, 11, and 14. The Area Under the Disease Progress Curve (AUDPC) was determined by trapezoidal integration.

Results
RWT8225 had the highest numerical yield at 38.6 tons/acre although it was not statistically greater than three of the other five varieties. RWT8225 did have a yield that was statistically greater than Little Deuce Coupe and Petite Perfection (Table 1). RWT8225 also had an average fruit size that was statistically greater than all other varieties at 7.8 lbs/fruit (Table 1). WDL8312 had the numerically highest soluble solids content and was statistically greater than four of the other five varieties at 12.9 (Table 2). Although RWT8225 was not the variety with the highest soluble solids it was a high yielder and the average soluble solid content was 12.1. There were no statistically significant differences in fruit firmness amongst any of the varieties, but RWT8225 had the highest numerical firmness at 3.7 lbs of force. Additionally RWT8225 had a significantly thicker rind compared to all other varieties with the exception of Vanessa (Table 2).

Symptoms of Fusarium wilt were first observed eight days after inoculation. No symptoms were observed on the uninoculated Lil’ Deuce or Tri-X-313 controls. The AUDPC of RWT 8225 was not significantly different than either of the untreated controls. RWT 8212, Lil Deuce, and Petite Perfection had AUDPC values that did not significantly differ from each other, but had significantly higher AUDPC values than all other varieties tested.

Acknowledgements
The authors would like to extend their appreciation to the following individuals for all their help and assistance with the completion of the variety trials this year: Bill Davis, Sara Hoke, Dennis Nowaskie, Angie Thompson, and Chelsey Cardinal.

Literature Cited

Table 1. Yields of six personal-size seedless watermelons.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Seed Company</th>
<th>Cwt/Acre</th>
<th>Tons/Acre</th>
<th>Fruit No./Acre</th>
<th>Avg. Fruit Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWT8225</td>
<td>SY</td>
<td>771.4</td>
<td>38.6 a1</td>
<td>9,882.0 ab</td>
<td>7.8 a</td>
</tr>
<tr>
<td>Vanessa</td>
<td>NH</td>
<td>757.7</td>
<td>37.9 a</td>
<td>11,495.0 a</td>
<td>6.6 b</td>
</tr>
<tr>
<td>RWT8212</td>
<td>SY</td>
<td>591</td>
<td>29.6 ab</td>
<td>9,025.0 ab</td>
<td>6.5 b</td>
</tr>
<tr>
<td>WDL8312</td>
<td>SY</td>
<td>566.5</td>
<td>28.3 ab</td>
<td>8,369.0 b</td>
<td>6.8 b</td>
</tr>
<tr>
<td>Little Deuce Coupe</td>
<td>SY</td>
<td>545</td>
<td>27.3 b</td>
<td>8,621.0 ab</td>
<td>6.4 b</td>
</tr>
<tr>
<td>Petite Perfection</td>
<td>SY</td>
<td>539.15</td>
<td>27.0 b</td>
<td>8,420.0 b</td>
<td>6.5 b</td>
</tr>
</tbody>
</table>

1Means in columns separated by Fisher’s least significant difference test (P ≤ 0.05), means with same letter are not significantly different.

Table 2. Internal fruit quality of seedless watermelons.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Seed Company</th>
<th>%SS1</th>
<th>Firmness (lbs force)2</th>
<th>Fruit Length (in)</th>
<th>Fruit Width (in)</th>
<th>Rind Thickness (in)</th>
<th>Degree of Seedlessness3</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDL8312</td>
<td>SY</td>
<td>12.9 a4</td>
<td>2.8</td>
<td>7.7 b</td>
<td>7.2 b</td>
<td>0.25 c</td>
<td>1.8 b</td>
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<tr>
<td>Petite Perfection</td>
<td>SY</td>
<td>12.2 ab</td>
<td>3.2</td>
<td>7.4 b</td>
<td>7.0 b</td>
<td>0.21 c</td>
<td>2.4 a</td>
</tr>
<tr>
<td>RWT8225</td>
<td>SY</td>
<td>12.1 b</td>
<td>3.7</td>
<td>8.4 a</td>
<td>7.8 a</td>
<td>0.63 a</td>
<td>1.4 b</td>
</tr>
<tr>
<td>RWT8212</td>
<td>SY</td>
<td>11.9 b</td>
<td>2.8</td>
<td>8.1 a</td>
<td>7.2 b</td>
<td>0.41 b</td>
<td>1.8 b</td>
</tr>
<tr>
<td>Little Deuce Coupe</td>
<td>SY</td>
<td>11.7 b</td>
<td>3.0</td>
<td>7.7 b</td>
<td>7.1 b</td>
<td>0.31 bc</td>
<td>1.8 b</td>
</tr>
<tr>
<td>Vanessa</td>
<td>NH</td>
<td>10.7 c</td>
<td>3.0</td>
<td>8.3 a</td>
<td>7.7 a</td>
<td>0.56 a</td>
<td>1.3 b</td>
</tr>
</tbody>
</table>

1%SS=percent soluble solids. Higher values are related to higher sugar content in the fruit.
2Firmness measures the firmness of the melon’s flesh. Higher values are associated with higher firmness.
3Degree of Seedlessness. 1=0 seeds, 2=1-5 seeds, 3=> 5 seeds
4Means in columns separated by Fisher’s least significant difference test (P ≤ 0.05), means with same letter are not significantly different.

Table 3. Susceptibility to Fusarium wilt of various personal-size triploid watermelon varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Seed Company</th>
<th>AUDPC1</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWT 8212</td>
<td>SY</td>
<td>371.0 a2</td>
</tr>
<tr>
<td>Little Deuce Coupe</td>
<td>SY</td>
<td>288.4 a</td>
</tr>
<tr>
<td>Petite Perfection</td>
<td>SY</td>
<td>283.6 a</td>
</tr>
<tr>
<td>Tri-X-313</td>
<td>SY</td>
<td>146.3 b</td>
</tr>
<tr>
<td>Vanessa</td>
<td>NH</td>
<td>120.3 bc</td>
</tr>
<tr>
<td>RWT 8225</td>
<td>SY</td>
<td>25.1 cd</td>
</tr>
<tr>
<td>Little Deuce Coupe3</td>
<td>SY</td>
<td>0 d</td>
</tr>
<tr>
<td>Tri-X-313 control3</td>
<td>SY</td>
<td>0 d</td>
</tr>
</tbody>
</table>

1Area Under the Disease Progress Curve.
2Means within each column with a letter in common are not significantly different (Fisher’s Protected LSD), P=0.05.
3Uninoculated control.