Icebox Watermelon Variety Trial 2004: Organic Production in Western Washington

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Introduction

Icebox watermelons weigh between 6 and 15 pounds (2.7 - 6.8 kilograms) and are growing in popularity in the United States. Sugar Baby was the first icebox watermelon variety in the United States, and was discovered in a field of picnic watermelon in Oklahoma by M. Harden in 1955 (Wehner and Barrett, 1996). It was not until 1986 that the next icebox watermelon varieties were released (Maynard, 2004). Today, many new icebox varieties have been developed and released in the United States. Icebox watermelon come in a variety of shapes and colors, and their smaller size is ideal for small families and for storage in home refrigerators. With a rise in interest in organic produce, local production and direct marketing, farmers in Washington are looking to diversify crop varieties to meet these demands. The purpose of this study was to determine which varieties of icebox watermelon are most suitable for organic production in our region. Icebox watermelons offer organic and conventional farmers throughout Washington a means of producing high quality watermelons locally.

Methods

Forty-four varieties of icebox watermelon were grown and evaluated at Washington State University Vancouver Research and Extension Unit. The greenhouse and field were managed organically, however, some varieties were only available as chemically treated seeds. The plants from treated seed were grown separately in the field from the plants grown from untreated seed. Field blocks were separated by a 30 foot buffer. The field was certified organic, but certification was suspended for the area where treated seed varieties were planted. The study design was a randomized complete block with three replications. Plots were single rows, 20 feet long, with 7 plants per plot. Spacing was three feet between plants in the rows, and 10 feet between rows. Varieties were seeded in the greenhouse on April 12, 2004, and were transplanted into the field on May 26. Due to late delivery, one variety (Smile) was not seeded until 5/12 and transplanted on 6/24. Rows were mulched with black plastic (1.0 mil polyethylene), with drip tape beneath. Plants were drip-irrigated twice weekly for 4 hour intervals. Watermelons were harvested twice weekly from August 12 to October 4, 2004. Harvested melons were measured for weight, length and width, and number of fruit per plot. After each harvest, one melon per plot was measured for soluble solids using a Brix meter. The percent of soluble solids is an estimate of sugars, and is used to evaluate ripeness and flavor. General eating quality was evaluated five times throughout the course of this study.

Results & Discussion

Yield. Because plants from treated and untreated seeds were grown separately, we evaluated them separately as well. Results from the first year of this study show significant differences among varieties in yield, average melon weight, and number of marketable melons (Tables 1 and 2).

Of the untreated-seed varieties, Navajo Sweet, Winter King and Queen, Early Crimson Treat, and Tiger Baby produced the highest total marketable yields (Table 1). Golden Midget (personal size), Yellow Doll, Winter King and Queen, and Navajo Sweet produced the greatest number of fruit. Cathay Belle was the least productive variety in the untreated-seed plots, with the smallest total yield and below average number of melons per plot. Of the treated-seed varieties, Baby Doll (picnic type), Bobbie, Imagination, and Yellow Doll were highest yielding (Table 2). Gypsy, Mini Seedless, Bobbie, and Yellow Doll produced the greatest number of fruit. Lycosweet, Thai Black, and Desert King were the least productive, with very low total yields and fruit numbers.

Length and Width. Varieties grown in this study ranged in length from 15.8 to 24.6 cm, and in width from 12.9 to 22.5 cm. Comparisons of melon length and width data with melon weight indicate that current weight classifications do not adequately represent the size category for each watermelon (personal, icebox, or picnic). Current size classifications are: personal (<8 lbs), icebox (8-12 lbs), and picnic (>12 lbs). Based on the results of this study, a more accurate size classification system may be: personal (<6 lbs), icebox (6-15 lbs), and picnic (>15 lbs).

Days to Maturity. Because the demand for watermelon is highest in the summer, and ends after Labor Day, early maturity is a highly desirable trait for watermelon producers in Washington. Icebox watermelon varieties grown in this study ranged between 78 to 120 days from transplanting to maturity. Varieties grown from untreated seed took an average of 87 days to mature, and varieties grown from treated seed took an average of 93 days. Among the untreated-seed varieties, Smile was the first to mature (75 days after transplanting), while 9 varieties were ready for harvest 78 days after transplanting (Table 1). Ultra Cool (110 days), Southern Light (110 days) New Queen (104 days), and Gold Baby (104 days) matured very late. Among the treated-seed varieties, Gypsy and Imagination were the earliest to mature (82 days after transplanting), while Desert King (120 days), Valdoria (104 days), Extazy (104 days), and Baby Doll (104 days) were the latest. The late-maturing varieties were not ready for harvest until mid-September, thus these varieties may be undesirable to grow in our region.

Percent Sugars. A Brix meter measures % soluble solids (% sugars) and is a valuable tool for determining when a particular variety is ripe when the range of % soluble sugars at ripeness is known. In this study, the varieties sampled had a range of 7.2% to 10% sugars at maturity. Among untreated-seed varieties, those with the highest Brix readings were Petite Perfection (9.92), Hime Kansen (9.66), Ultra Cool (9.65), and Smile (9.60), and the varieties with the lowest Brix readings were Blacktail Mountain (7.32) and Melitopolski (7.41). Among the treated-seed varieties, Fenway (10.0) Mini Seedless (9.68), and Gypsy (9.51) had the highest Brix readings, while Thai Black (7.23) and Desert King (7.38) had the lowest. These results were generally lower than expected, as most seed companies estimate 10 to 12% sugars at maturity. The difference in expected and measured Brix may be due to climatic differences, but is more likely due to differences in sampling procedure.

Red Fleshed Varieties. The majority of the varieties included in this study, and the majority of icebox watermelon varieties that are available, are red fleshed. There was much variation among these varieties in shape, size, rind color, and seed content. There was also much variation in sweetness and flavor quality. Many of these varieties had excellent color, flavor, and appearance.

Yellow Fleshed Varieties. This study included 5 varieties with yellow flesh: Baby Doll, Gold Baby, New Queen, Orchid Sweet, and Yellow Doll. These melons tended to have above average % soluble sugars, and did

well in our taste tests. Orchid Sweet and Yellow Doll were the best overall in terms of flavor, yield, and days to maturity.

Cream Fleshed Varieties. This study included 4 varieties of icebox watermelon with cream colored flesh: Cream of Saskatchewan, Desert king, Japanese Cream-Fleshed Suika, and Melitopolski. All of these varieties had below average Brix readings, and tended to be mildly sweet and/or slightly tart. Japanese Cream Fleshed Suika was the best overall in terms of flavor, yield and days to maturity. These melons were preferred by some people in farmers market taste tests, and some suggested eating them with lime and salt.

Seedless Varieties. All of the seedless varieties in this study were red-fleshed except for Orchid Sweet, which has yellow flesh. The seedless varieties were: Bobbie, Extazy, Gypsy, Lycosweet, Mini Seedless, Orchid Sweet, Solitaire, Ultra Cool, Valdoria and Vanessa. Gypsy, Mini Seedless, and Orchid Sweet were the best seedless varieties overall in terms of flavor, yield, and days to maturity.

Conclusions

Preliminary results of this study indicate that over 40 varieties of icebox watermelon produce well when grown organically in our region. There is great diversity among these varieties in fruit yield, number, color, sugar content, flavor, size, and length of growing season. Preferences for fruit taste and appearance vary among different consumer groups, and growers who are considering production should test several varieties for productivity and taste preferences in their area.

Melon weight is used to distinguish between personal, icebox , and picnic varieties of watermelon, and traditionally, icebox watermelons are considered to be between 8 and 12 lbs. However, in this study we found that a large number of varieties produced an average melon weight between 6 and 8 lbs, but showed average lengths and widths that correspond with the general size concept of icebox watermelon. Additionally, several varieties produced an average melon weight of between 12 and 15 lbs, but were small enough in terms of length and width to be considered an icebox type. Based on these results, we suggest that the categories for watermelon should be: personal (<6 lbs), icebox (6-15 lbs), and picnic (>15 lbs).

Three varieties in this study should be considered “personal” size: Golden Midget, Hime Kansen, and Red Doll. All three of these varieties had average melon weights below 5 lbs, and average lengths and widths were significantly smaller than the study mean. Two varieties in this study could be considered picnic size: Baby Doll and Desert King. These varieties were much larger than average in length, width, and weight, which was greater than 15 lbs in both cases.

One challenge for organic growers is obtaining organic or untreated seed. Although placing a seed order early may help to ensure that untreated seed will be available, it is no guarantee. It is only through increased demand for untreated and organic seed that seed companies will begin to fill this need. It is work such as this study that has the potential to help increase demand for seed which will then result in increased availability of untreated and organic seed.

References:
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Wehner, T.C. and Barrett, C. 1996. Watermelon Cultivars. http://cuke.hort.ncsu.edu/cucurbit/wmelon/wmcults.html

Table 1. Mean total yield (lbs), number of watermelons harvested per plot, average melon weight (lbs), average melon length and width (inches), mean Brix readings (% sugars), and number of days to harvest of icebox watermelon varieties grown from untreated seeds at Washington State University Vancouver REU in 2004.

Varieties with Untreated Seed	Total Marketable Yield (lbs)	Number of Melons harvested	Avg Melon Wt. (lbs)	Avg Melon Length (inches)	Avg Melon Width (inches)	Mean BRIX (% soluble sugars)	First harvest date	Days from Seeding (4/12)	Days from Transplant (5/26)
Belle 460	75.0	14.0	5.4	7.8	5.8	9.2	8/16	126	82
Blacktail Mountain	112.9	13.0	9.2	8.1	7.6	7.3	8/12	122	78
Cathay Belle	38.6	9.0	5.0	6.8	5.9	9.0	8/23	133	89
Cream of Saskatchewan	78.3	8.7	8.5	7.4	7.6	7.8	8/23	133	89
Early Crimson Treat	127.5	14.0	10.0	8.1	7.4	9.0	8/12	122	78
Genesis	51.6	6.0	9.4	8.1	7.5	9.3	8/23	133	89
Gold Baby	55.6	10.7	5.3	6.8	6.4	9.2	9/7	147	104
Golden Midget	78.7	19.8	3.9	6.4	5.4	7.5	8/12	122	78
Hime Kansen	46.7	13.0	3.7	6.2	5.1	9.7	8/19	129	85
Japanese Cr. Fl. Suika	114.1	11.3	9.5	8.3	7.9	8.7	8/30	140	96
Jubilee	85.6	8.7	8.7	7.5	7.2	8.6	8/12	122	78
Little Boy	70.6	12.3	6.0	7.6	6.2	9.6	8/16	126	82
Melitopolski	83.9	7.3	12.4	9.0	8.9	7.4	8/30	140	96
Navajo Sweet	186.2	16.7	11.6	8.2	8.2	8.5	8/12	122	78
New Queen	63.1	11.7	5.7	7.3	5.7	8.9	9/7	147	104
Orchid Sweet	110.8	12.0	9.4	8.3	8.1	9.0	8/12	122	78
Petite Perfection	55.3	9.3	5.3	7.0	6.3	9.9	8/12	122	78
Red Doll	60.0	11.3	4.9	6.6	5.7	9.2	8/16	126	82
Small Shining Light	97.5	12.0	8.0	7.1	7.5	7.8	8/30	140	96
Smile	106.0	16.2	6.5	7.3	6.7	9.6	9/8*	118	75
Southern light	56.2	7.7	7.2	6.6	6.8	8.5	9/13	153	110
Sugar Baby	53.5	6.6	7.8	9.7	5.5	7.6	8/12	122	78
Sweet Beauty	87.6	13.3	6.2	5.9	4.4	9.4	8/16	126	82
Tiger Baby	122.2	16.0	7.7	7.3	6.9	9.2	8/12	122	78
Ultra Cool	96.3	8.3	10.9	8.7	8.3	9.7	9/13	153	110
Winter King & Queen	160.1	17.3	9.4	7.6	7.2	7.9	8/26	136	92
Yellow Doll	91.7	18.0	6.1	7.6	6.7	9.3	8/23	133	89
Mean	87.6	12.0	7.6	7.5	6.8	8.8	8/21	131.0	87.2
P Value	0.0340	0.0809	0.0000	0.2074	0.0001	0.0000			

* Smile was seeded on 5/12 and transplanted on 6/24

Table 2. Mean total yield (lbs), number of watermelons harvested per plot, average melon weight (lbs), average melon length and width (inches), mean Brix readings (% sugars), and number of days to harvest of icebox watermelon varieties grown from treated seeds at Washington State University Vancouver REU in 2004.

Varieties with Treated Seed	Total Marketable Yield (lbs)	Number of Melons harvested	Avg Melon Wt. (lbs)	Avg Melon Length (inches)	Avg Melon Width (inches)	Mean BRIX (% soluble sugars)	First harvest date	Days from Seeding (4/12)	Days from Transplant (5/26)
Baby Doll	149.7	10.3	16.0	9.8	8.8	8.4	9/7	147	104
Bobbie (8101)	111.1	12.0	8.7	7.0	7.1	8.6	8/26	136	92
Desert King	42.2	2.3	18.1	10.5	9.6	7.4	9/23	163	120
Extazy 6008	69.8	10.0	7.4	7.2	7.1	9.3	9/7	147	104
Fenway	67.2	10.3	13.5	6.8	6.6	10.0	8/23	133	89
Gypsy	83.5	14.0	7.2	6.9	6.8	9.5	8/16	126	82
Imagination	95.1	9.3	10.0	8.6	8.1	8.7	8/16	126	82
Jade Star	50.9	5.0	10.8	8.3	7.5	8.0	8/30	140	96
Lycosweet 5109	34.6	4.0	9.7	7.4	7.0	9.3	8/23	133	89
Mini Seedless	79.1	12.3	6.9	6.9	6.1	9.7	8/23	133	89
Nova	66.7	6.0	9.3	8.0	7.8	9.0	8/23	133	89
Precious Petite	46.5	8.0	5.6	6.5	6.0	8.3	8/23	133	89
Quetzali	86.9	8.3	10.7	7.6	6.8	8.7	8/23	133	89
Solitaire	79.8	9.3	9.6	7.6	7.5	8.9	8/19	129	85
Sugar Baby	45.7	5.7	6.5	7.6	7.3	7.4	9/2	142	99
Thai Black	36.6	3.7	7.0	7.2	6.8	7.2	8/26	136	92
Tiger Baby	88.0	10.3	8.2	7.9	7.3	9.1	8/23	133	89
Valdoria	41.2	7.7	5.5	6.7	6.4	8.6	9/7	147	104
Vanessa	81.4	6.7	14.1	9.1	8.8	9.1	8/23	133	89
Yellow Doll	87.0	11.7	9.6	7.9	7.3	8.8	8/19	129	85
Mean	72.1	8.4	9.7	7.8	7.3	8.7	8/26	136.6	92.9
P Value	0.3424	0.2327	0.0002	0.0000	0.0000	0.0009			