Specialty Melons for High Tunnel Production

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Introduction

High tunnel production is on the rise in Iowa and the Midwest given the season extension benefit and control over water and nutrient application, which often results in less incidence of diseases and higher quality produce. High tunnels allow for extension of the growing season and therefore extended cash flow.

Common crops for high tunnel production are those that yield a high return per square foot and commonly include tomatoes, salad greens, and bell peppers. The continuous production of one crop family year after year in the high tunnel creates a strain on the tunnel ecosystem, leading to nutrient depletion and pathogen build up. Creating an ecologically sound high tunnel rotation is crucial for maintaining the long-term profitability of the tunnel system.

Exploring crops outside the nightshade family is critical to keep high tunnel production systems sustainable. Early-season specialty melons is a crop that has potential to fill this niche. Melons can be started in the high tunnel in early spring before field planting for early summer harvest. Melons as a high tunnel crop could be one alternative to the lack of crop rotation in high tunnels. Benefits of this alternative crop include earliness to market compared with field-grown melons and tomatoes, the ability to double plant the high tunnel with another fall crop, and the price incentive for personal size melons in the market for their sweet and often unique size, shape, or appearance.

The objectives of this study were to evaluate several specialty melon cultivars for early-season high tunnel production and to evaluate these for yield and quality.

Materials and Methods

Ten cultivars of specialty melons–Anna's Charentais, Divergent, Eden's Gem, Escorial, Honey Orange, Pixie, Savor, Snow Leopard, Sugar Cube, and Tasty Bites–were chosen based on their small size and unique appearance and flavor characteristics. This study was a randomized complete block design with five replications of each cultivar. Melons were seeded March 29, 2019, in 50-cell plug trays filled with soil-less medium (Beautiful Land Products, West Branch, IA).

This study was conducted in a 30 ft x 96 ft high tunnel at the Horticulture Research Station, Ames, Iowa. The tunnel was tilled followed by application of Sustane® 4-6-4 (Sustane Natural Fertilizer, Inc, Cannon Falls, MN) at a rate coinciding with soil tests and recommendations from the Midwest vegetable production guide. The fertilizer was raked with stone rakes to incorporate. Melon plants were transplanted in single rows April 21 on raised black plastic mulch beds spaced 4.5 ft apart. In-row spacing was 18 in. between plants. Plants were hand watered with 300 ppm of Nature's Source 3-1-1 (Ball DPF, LLC, Sherman, TX). Floating row covers were placed over the rows to protect the plants from cold damage.

As plants grew, they were trellised on 5 ft-high cattle panels. Plants were clipped to the trellis using plastic tomato clips (Johnny's Selected Seeds, Winslow ME). Trellising began May 14, 2019, when plants were tall enough to reach the first wire and continued weekly until plants were taller than the trellis. The tunnel was scouted for cucumber beetles daily and management began when cucumber beetles were first spotted in the tunnel May 26. Spraying occurred May 26 (Trilogy® + Pyganic®), 29 (Surround®), 31 (Azomar®), June 18 (Assana®), and July 1 (Azomar®). Melons were fertigated starting with 300 ppm of Nature's Source 3-1-1 May 6, and 14, and continued with 200 ppm of Nature's Source 3-1-1 May 24 and June 6. Starting June 18, Nature's source 10-4-3 at 200 ppm was used and continued June 28, July 8, and 16.

First male flowers were observed May 12, followed by the first female flowers two weeks later. Harvesting began July 17, followed by additional harvests July 27, August 1, 8, and 16. Fruits were weighed and counted to determine total, marketable, and nonmarketable yield in weight and number of fruits. Marketable yield was determined if fruits were free from insect and disease, blemishes, and other external defects. Fruits were cut open from stem to blossom end and the cavity size (length and width) were measured. Of the total harvest, three fruits from each replication were used to collect total soluble solids (brix) by squeezing slices of fruit through a cheese cloth and analyzing the juice with a handheld refractometer. Three readings from each fruit were collected and averaged.

Results and Discussion

Eden's Gem and Snow Leopard yielded the highest total number of fruits compared with all other treatments except Tasty Bites and Sugar Cube (Table 1). Tasty Bites yielded the highest number of marketable fruits compared with Anna's, Divergent, Escorial, Pixie, and Savor. The average weight of marketable fruit was largest for Divergent followed by Honey Orange. Eden's Gem had the lowest weight for a marketable fruit compared with all other cultivars except Sugar Cube. Total soluble solute concentration (brix) was highest for Snow Leopard compared with Divergent, Eden's Gem, Honey Orange, and Savor (Table 2). Divergent and Honey Orange had the longest fruit length compared with all cultivars and Eden's Gem the shortest. Divergent had the widest fruits compared with all other cultivars and Eden's Gem and Sugar Cube the smallest. Divergent and Honey Orange had the largest seed cavity of all the cultivars. Eden's Gem and Sugar Cube had the smallest seed cavities.

Snow Leopard was a sweet and high yielding cultivar, and together with its interesting appearance, it is a promising cultivar for high tunnel specialty melon production in Iowa. Tasty Bites and Sugar Cube also are contenders, especially for markets that may prefer a traditional cantaloupe in a personal size. At the onset of the study, cucumber beetles were managed with OMRI approved insecticides. It quickly became apparent a more aggressive approach was needed to reduce beetle populations and prevent bacterial wilt. Height of trellis also should be addressed in the commercial production of specialty melons. Vines quickly grew taller than the 5-ft panels used in this study and future production should utilize trellising of 6 ft or taller to keep vines off the ground and increase airflow between plants and rows.

Table 1. Yield from specialty melon cultivars grown inside a high tunnel at the ISU Horticulture Research Station, Ames, IA.*

Cultivar	Total number of fruits[1]	Number of marketable fruits[1]	Average weight of marketable fruit (kg)
Anna's Charentais	11 d*	9 c	1.1 bc
Divergent	13 cd	8 c	1.8 a
Eden's Gem	27 a	17 ab	0.5 e
Escorial	15 bcd	7 c	0.9 cd
Honey Orange	17 bcd	15 ab	1.4 b
Pixie	16 bcd	12 ab	1.2 bc
Savor	17 bcd	9 c	0.9 cd
Snow Leopard	26 a	17 ab	1.0 cd
Sugar Cube	21 abc	17 ab	0.8 ed
Tasty Bites	21 ab	21 ab	1.0 cd

[1]Total and marketable data represents yield from five plants from each cultivar.
*Values with the same letters are not significantly different at $P < 0.05$.

Table 2. Quality attributes of specialty melons grown inside a high tunnel at the ISU Horticulture Research Station, Ames, IA.*

Cultivar	Total soluble solute (brix)	Average fruit length (cm)[1]	Average fruit width (cm)[1]	Length of seed cavity (cm)	Width of seed cavity (cm)
Anna's Charentais	12.5 ab*	14.4 b	13.7 c	8.5 b	6.0 b
Divergent	9.5 b	16.0 a	16.4 a	10.1 a	7.1 a
Eden's Gem	11.4 b	10.1 f	10.3 e	6.6 d	6.2 b
Escorial	12.4 ab	12.9 cd	13.7 c	7.8 bc	6.3 b
Honey Orange	11.5 b	16.8 a	15.0 b	10.8 a	7.5 a
Pixie	13.3 ab	14.1 bc	12.9 cd	8.0 bc	5.8 b
Savor	11.5 b	11.6 ed	12.8 d	7.2 cd	6.3 b
Snow Leopard	13.8 a	14.4 b	12.4 d	8.7 b	5.9 b
Sugar Cube	12 ab	11.1 ef	10.9 e	6.7 d	5.1 c
Tasty Bites	12.7 ab	13.8 bc	12.4 d	8.4 b	5.9 b

[1]Fruit length measured from blossom to stem end and width measured from the widest point of the melon.
*Data collected from three marketable fruits/treatment per replication. Values with the same letters are not significantly different at $P < 0.05$.