

Kentucky Seedless Watermelon Variety Trial, 2016

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Based on the most recent census data, watermelon is the second largest planted vegetable crop in Kentucky (USDA, 2013). Watermelon is a favorite summertime treat and has been increasing in acreage as have vegetables as a whole in the state (Snell et al., 2013). It is both marketed directly and via wholesale with production scattered throughout the state. Some areas of concentrated watermelon production include Allen, Casey, Christian, Daviess, Hart, Lincoln, Scott, Taylor, and Todd Counties.

Variety selection continues to be a primary consideration for farmers so they can make decisions to suit their needs in yield and disease resistance while also suiting their buyers' needs for quality and appearance. Based on an individual's market channels, their needs may differ for varieties. The objective of the experiment was to evaluate thirty-five seedless watermelon varieties produced under local conditions in Central Kentucky.

Materials and Methods

Thirty-five varieties were sown in fifty-cell black seedling flats (Landmark Plastic, Akron, OH) on 18 April and placed in a transplant production greenhouse at the University of Kentucky Horticulture Research Farm in Lexington, KY. The seedling media used was Jiffy-Mix #17 (Jiffy Products of America, Lorain, Ohio) which is a peat and vermiculate blend. The non-harvested pollenizer SP-6 was sown at the same time as the seedless varieties. Pre-emergent herbicide, Command, was applied 24 April at 0.67 pt/acre. All varieties, as well as the non-harvested pollinizer, were transplanted on 23 May with a Rain-Flo waterwheel setter into a Maury silt loam at a commercial vegetable farm in Scott County, Kentucky. Experimental plots were 40 ft. in length with ten seedless plants per plot. Rows were spaced on 8 ft. centers with 4 ft. in-row spacing. Pollenizers were interplanted within the row at a ratio of one pollenizer for every two trial plants. The experiment was a randomized complete block design with three replications. Urea (46-0-0) and muriate of potash (0-0-60) were applied pre-plant at 110 lbs. and 83.5 lbs., respectively with amounts based on soil test results. A Rain-Flo plastic layer was used to form raised beds and install black plastic-mulch (4 ft x 1 mil, Filmtech Plastics of the Sigma Plastics Group, Lyndhurst, NJ) with drip tape (12 inch emitter spacing, 30 gph/100 ft, Aqua Traxx, The Toro Company, Bloomington, MN) under the plastic. Fertigation was started on 27 May and done on a weekly basis through 5 August using calcium nitrate or potassium nitrate. Nine pounds of nitrogen per acre were applied at each fertigation event. Between the dates of 10 June and 1 July vines were turned back onto the plastic weekly to keep varieties separated and to allow for management of weeds in the row middles. Weekly scouting in conjunction with the use of the (ID-36) Vegetable Production Guide for Commercial Growers (Saha et al, 2015) to select fungicides and insecticides and to properly rotate between pesticide modes of action. MELCAST was utilized to determine the timing of preventative fungicide sprays (Egel, 2014).

There is a potential for a reduction in two – three fungicide applications when utilizing this disease forecasting system (Egel and Latin, 2012).

Five total harvests were collected on a weekly basis beginning 19 July with the final harvest on 16 August. All fruit was weighed individually with any fruit weighing less than nine pounds not considered marketable. Post-harvest analysis was conducted on four fruit from every variety and replication for Brix, flesh firmness, hollow heart rating, and black seed production. Brix were measured using a refractometer (RF-12, Extech Instruments, Nashua, New Hampshire). An analog penetrometer (FT, Wagner Instruments, Greenwich, Connecticut) was used for measuring fruit firmness using a 7/16 of an inch diameter cylindrical probe. Black seeds were counted by cutting the melon into half both lengthways and crossways and counting seeds on the cut faces of the fruit (USDA, 2006). Yield data were analyzed by general linear model and means were separated by Fisher's least significant difference test using SAS statistical programs (SAS Institute, Cary, NC.)

Results and Discussion

Yields in 2016 were higher than last season with a high yield of 61,522 lbs/acre as compared to 40,500 lbs/acre (Table 1) (Saha et al., 2015). Talca had statistically greater yield (61,522 lbs/acre) when compared to thirty-two of the other thirty-four varieties being evaluated including the standard Fascination (Table 1). Talca (3,448.5 fruit/acre) had statistically greater fruit number per acre harvested as compared to twenty-six of the varieties evaluated (Table 1). Other comparable varieties with regards to fruit number includes: Maxima, Neptune, Summer Breeze, Razorback, Exclamation, Crunchy Red, Wolverine, and Joy Ride. Talca had greater total bins per acre (86.7) as compared to all but one of the varieties, Maxima (Table 2). Talca was larger in size as 48% of the fruit harvested were in the 36 or 30-count size with 38% in the 45-count size (Table 2).

There were no statistically significant differences in percentage of fruit harvested in the 45-count size amongst varieties (Table 2). Varieties that did not differ statistically from Maxima for total bins per acre that had 40% or greater fruit in the 45-count size include: Unbridled, Wolverine, Joy Ride, Exclamation, and Crunchy Red (Table 2). Varieties that did not differ statistically from Maxima for total bins per acre that had 35% or greater fruit in the 60-count size include: Neptune (46%) and Summer Breeze (38%) (Table 2).

Sweet Dawn (34%) had greater percentage of fruit in the 36-count size as compared to twenty two of the varieties evaluated (Table 2). Other varieties that did not differ statistically from Sweet Dawn that had comparable total bin yields when compared with Maxima, includes: Wolverine, Crunchy Red, Joy Ride, Razorback, and Summer Breeze (Table 2). Maxima (28%), Talca (24%), and Excursion (23%) produced significantly more fruit in the 30-count size as compared to thirty one of the other varieties (Table 2).

Road Trip (11.9%) had an average brix statistically greater than twenty-five of the varieties evaluated (Table 3). Other varieties comparable to Road Trip with regards to brix that also had a

yield greater than fifty bins per acre included: Summer Breeze, Wolverine, Razorback, Joy Ride, and Unbridled (Table 3). Maxima (10.8%) and Talca (10.3%) did not differ significantly from several varieties that had an average Brix of 11% or greater, while having greater yield (Table 2 and 3).

Only two varieties averaged greater than the maximum (10) number of allowable black seeds to be marketed as a seedless watermelon per the USDA grading standards. Those varieties were Wayfarer (14.5) and UGR 1317-12 (11.8) (Table 3). Fruit firmness ranged from 2.1 to 4.5 lbs-force with ORS 6064B having greater flesh firmness as compared to thirty-two other varieties (Table 3). Conversely, Prime (2.1 lbs-force) had softer flesh when compared to twenty-six of the varieties in the trial (Table 3). There was no statistically significant differences amongst varieties with regards to hollow heart, which was generally low this season.

In summary, varietal selection is a critical choice in preparation for each season. Further, varieties should be shown to have proven and consistent performance in our region over multiple seasons. While the results discussed here are of only one season, many of these varieties have been also seen in the last three seasons. Talca and Maxima have consistently performed well for yield and quality the last three seasons with regard to yield and quality. Other varieties performing well over multiple seasons include: Road Trip, Wolverine, Razorback, Joyride, and Unbridled. Lastly, these were all better or comparable to Fascination with regard to yield and quality, a variety widely used in the southeast and the most utilized in Kentucky comprising nearly 40% of the total watermelon acreage.

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Table 1. Yield of seedless watermelon varieties, 2016.

Variety	Seed Source	Total Fruit Weight (lbs) per plot ^z		Total Fruit Number per plot		Fruit Weight (lbs) per acre		Fruit Number per acre	
Talca	OG	452.0	A ^y	25.3	A	61,522	A	3,448.5	A
Maxima	OG	382.0	AB	21.0	AB	52,001	AB	2,858.6	AB
Exclamation	SY	345.6	ABC	20.0	ABC	47,045	ABC	2,722.5	ABC
Excursion	SY	319.8	BCD	18.0	BCD	43,535	BCD	2,450.3	BCD
Razorback	HI	311.6	BCDE	20.3	ABC	42,410	BCDE	2,767.9	ABC
Crunchy Red	HM	310.9	BCDE	20.0	ABC	42,320	BCDE	2,722.5	ABC
Summer Breeze	S	307.8	BCDEF	20.3	ABC	41,892	BCDEF	2,767.9	ABC
Wolverine	HI	307.6	BCDEF	18.7	ABCD	41,865	BCDEF	2,541.0	ABCD
Neptune	SW	307.5	BCDEF	21.0	AB	41,852	BCDEF	2,858.6	AB
Joy Ride	S	295.0	BCDEFG	18.7	ABCD	40,159	BCDEFG	2,541.0	ABCD
Unbridled	SK	280.8	BCDEFGH	18.3	BCD	38,219	BCDEFGH	2,495.6	BCD
Kingman	SK	270.6	CDEFGH	18.0	BCD	36,838	CDEFGH	2,450.3	BCD
UGR 1762-14	UG	263.5	CDEFGHI	17.0	BCDE	35,864	CDEFGHI	2,314.1	BCDE
UGR 1317-12	UG	261.9	CDEFGHI	14.0	CDEF	35,647	CDEFGHI	1,905.8	CDEF
Charismatic	SK	260.8	CDEFGHI	15.3	BCDEF	35,501	CDEFGHI	2,087.3	BCDEF
KB12106	KB	260.1	CDEFGHI	17.3	BCD	35,404	CDEFGHI	2,359.5	BCD
Sweet Dawn	SY	253.9	CDEFGHI	15.3	BCDEF	34,567	CDEFGHI	2,087.3	BCDEF
KB15010	KB	248.4	CDEFGHI	17.7	BCD	33,811	CDEFGHI	2,404.9	BCD
Road Trip	S	247.6	CDEFGHI	17.0	BCDE	33,702	CDEFGHI	2,314.1	BCDE
Fascination	SY	246.6	CDEFGHI	15.7	BCDEF	33,571	CDEFGHI	2,132.6	BCDEF
ORS 6227	OG	245.0	CDEFGHI	15.0	BCDEF	33,355	CDEFGHI	2,041.9	BCDEF
Secretariat	SK	237.4	CDEFGHIJ	16.3	BCDE	32,312	CDEFGHIJ	2,223.4	BCDE
Traveler	HM	236.6	CDEFGHIJ	16.7	BCDE	32,207	CDEFGHIJ	2,268.8	BCDE
Captivation	SY	231.9	DEFGHIJ	16.3	BCDE	31,572	DEFGHIJ	2,223.4	BCDE
UGR 1763-14	UG	227.8	DEFGHIJ	14.3	BCDEF	31,002	DEFGHIJ	1,951.1	BCDEF
Sugar Fresh	SY	204.0	EFGHIJ	14.3	BCDEF	27,765	EFGHIJ	1,951.1	BCDEF
Wayfarer	HM	199.7	FGHIJ	14.3	BCDEF	27,184	FGHIJ	1,951.1	BCDEF
Poseidon	SW	193.8	GHIJ	14.7	BCDEF	26,379	GHIJ	1,996.5	BCDEF
ORS 6064B	OG	192.0	GHIJ	14.3	BCDEF	26,131	GHIJ	1,951.1	BCDEF
Prime	KU	180.3	HIJ	12.7	DEF	24,540	HIJ	1,724.3	DEF
3F-4139	KU	174.3	HIJ	13.0	DEF	23,724	HIJ	1,769.6	DEF
ORS 12154b	OG	173.1	HIJ	13.7	CDEF	23,563	HIJ	1,860.4	CDEF
Chubbiness	KU	154.2	IJ	13.0	DEF	20,995	IJ	1,769.6	DEF
3-F4221	KU	134.0	J	10.3	EF	18,243	J	1,406.6	EF
3F-2186	KU	130.2	J	9.3	F	17,717	J	1,270.5	F

^zPlot size: 320 ft².^yMeans within columns separated by Fisher's least significant test ($P \leq 0.05$), means with same letter are not significantly different.

Table 2. Seedless watermelon varieties by average fruit weight by percentage and total bins, 2015.

Variety	Total Bins per acre		60-count		45-count		36-count		30-count	
			9-13.5 lbs		13.6-17.5 lbs		17.6-21.4 lbs		>21.4 lbs	
Talca	86.7	A ^z	14	M	38	24	ABCDEF	24	AB	
Maxima	74.1	AB	17	LM	26	30	AB	28	A	
Exclamation	65.0	BC	19	JKLM	41	22	ABCDEFGH	16	BCD	
Crunchy Red	61.5	BCD	28	FGHIJKLM	40	29	ABC	3	EFG	
Summer Breeze	60.3	BCD	38	FGHIJKLM	36	22	ABCDEFGH	5	EFG	
Excursion	59.7	BCDE	24	HIJKLM	28	23	ABCDEFGF	23	ABC	
Wolverine	59.7	BCDE	18	LM	47	30	AB	5	DEFG	
Razorback	59.5	BCDE	32	FGHIJKLM	37	27	ABCDE	2	EFG	
Neptune	59.2	BCDE	46	CDEFGH	38	13	DEFGHIJ	3	EFG	
Joy Ride	58.0	BCDEG	24	HIJKLM	45	28	ABCD	3	EFG	
Unbridled	55.0	BCDEGH	31	FGHIJKLM	47	16	BCDEFGHI	5	DEFG	
Kingman	51.9	CDEGHI	38	FGHIJKLM	41	13	DEFGHIJ	7	DEFG	
UGR 1762-14	51.9	CDEGHI	35	FGHIJKLM	36	22	ABCDEFGH	8	DEFG	
Charismatic	51.2	CDEGHI	18	KLM	39	29	AB	13	CDE	
KB12106	50.9	CDEGHI	44	DEFGHIJK	37	8	HIJ	12	DEF	
Sweet Dawn	49.7	CDEGHI	25	GHIJKLM	31	34	A	9	DEFG	
KB15010	49.4	CDEGHI	46	CDEFGHI	40	14	CDEFGHIJ	0	G	
ORS 6227	48.2	CDEGHI	20	IJKLM	41	32	A	7	DEFG	
Fascination	47.9	CDEGHI	36	FGHIJKLM	43	12	EFGHIJ	9	DEFG	
Road Trip	47.9	CDEGHI	46	CDEFGHI	37	13	DEFGHIJ	4	EFG	
Secretariat	46.4	CDEGHIJ	48	CDEFGH	42	8	HIJ	2	FG	
Traveler	46.1	CDEGHIJK	48	CDEFGH	35	14	CDEFGHIJ	3	EFG	
Captivation	45.1	CDEGHIJK	42	EFGHIJKL	49	9	FGHIJ	0	G	
UGR 1763-14	44.4	DEGHIJK	25	GHIJKLM	56	14	CDEFGHIJ	5	EFG	
Sugar Fresh	39.6	EGHIJK	51	BCDEFG	36	13	DEFGHIJ	0	G	
UGR 1317-12	39.3	GHIJK	42	EFGHIJKL	53	4	IJ	2	FG	
Wayfarer	38.8	GHIJK	53	ABCDEF	37	8	HIJ	2	EFG	
ORS 6064B	38.1	GHIJK	53	ABCDEF	42	5	IJ	0	G	
Poseidon	37.8	GHIJK	65	ABCDE	30	2	IJ	3	EFG	
Prime	35.0	HIJK	44	DEFGHIJ	45	11	FGHIJ	0	G	
3F-4139	34.5	IJK	68	ABCD	20	9	GHIJ	3	EFG	
ORS 12154b	34.5	IJK	70	ABC	27	3	IJ	0	G	
Chubbiness	31.8	IJK	75	AB	25	0	J	0	G	
3-F4221	26.5	JK	77	A	20	2	IJ	2	FG	
3F-2186	26.0	K	50	BCDEFG	45	4	IJ	0	G	

^zMeans within columns separated by Fisher's least significant difference test ($P \leq 0.05$), means with same letter are not significantly different. Means without letters were not statistically different.

Table 3. Fruit quality of seedless watermelon varieties, 2016. Four fruit from every replication for each variety.

Variety	% soluble solids	Number of Black Seeds	Firmness (lbs-force)	Hollow Heart ²
Road Trip	11.9 A ^x	0.3 B	3.3 CDEFGH	1.0
3-F4221	11.7 AB	0.3 B	2.6 IJKL	1.0
Joy Ride	11.6 ABC	0.3 B	3.3 CDEFGHI	1.0
Summer Breeze	11.6 ABC	0.3 B	3.1 DEFGHIJK	1.0
UGR 1762-14	11.6 ABC	0.1 B	2.4 KL	2.0
Unbridled	11.5 ABCD	0.3 B	3.2 DEFGHIJ	1.1
3F-2186	11.5 ABCD	0.3 B	2.4 KL	1.0
Charismatic	11.4 ABCD	2.8 AB	3.7 BCDE	1.2
Prime	11.3 ABCDE	0.0 B	2.1 L	1.1
Wayfarer	11.2 ABCDEF	14.5 A	3.1 DEFGHIJ	1.0
Poseidon	11.1 BCDEFG	0.8 B	2.5 JKL	1.3
UGR 1317-12	11.1 BCDEFG	11.8 AB	3.0 FGHIJK	1.2
UGR 1763-14	11.1 BCDEFG	0.2 B	2.9 GHIJK	1.5
Wolverine	11.1 BCDEFG	0.5 B	3.3 CDEFGH	1.0
3F-4139	11.0 BCDEFGH	3.3 AB	3.3 CDEFGH	1.2
Kingman	11.0 BCDEFGH	3.2 AB	3.5 CDEFG	1.0
Secretariat	11.0 BCDEFGH	2.8 AB	3.7 BCDE	1.1
Razorback	11.0 BCDEFGH	0.7 B	3.4 CDEFGH	1.0
Neptune	11.0 CDEFGH	4.3 AB	3.2 CDEFGHIJ	1.0
Chubbiness	10.9 CDEFGH	0.1 B	2.5 JKL	1.0
Sugar Fresh	10.9 CDEFGH	0.2 B	4.3 AB	1.0
KB15010	10.9 CDEFGH	4.8 AB	2.7 HIJKL	1.4
Maxima	10.8 DEFGH	0.3 B	2.7 HIJKL	1.2
ORS 6227	10.8 DEFGH	1.0 B	3.2 DEFGHIJ	1.2
Fascination	10.6 EFGHI	5.5 AB	3.3 CDEFGH	1.0
Sweet Dawn	10.6 EFGHI	5.7 AB	3.1 DEFGHIJK	1.0
Captivation	10.6 FGHI	0.4 B	3.9 ABC	1.0
Exclamation	10.5 FGHI	1.3 B	3.0 EFGHIJK	1.0
KB12106	10.5 FGHI	0.4 B	3.8 BCD	1.1
Crunchy Red	10.4 GHIJ	1.6 B	3.2 CDEFGHIJ	1.1
Excursion	10.4 HIJ	0.7 B	3.7 BCDEF	1.0
Talca	10.3 HIJ	1.8 AB	3.3 CDEFGHI	1.0
Traveler	10.0 IJ	0.3 B	3.2 CDEFGHIJ	1.0
ORS 6064B	9.9 IJ	0.3 B	4.5 A	1.0
ORS 12154b	9.8 J	1.0 B	2.7 HIJKL	1.2

²Hollow Heart: 1-none, 2-slight carpel separation, 3-One large gap evident, 4-2 large gaps, 5-severe carpel separation, 3 or more large gaps; fruit cut crosswise

^xMeans within columns separated by Fisher's least significant difference test ($P \leq 0.05$), means with same letter are not significantly different.