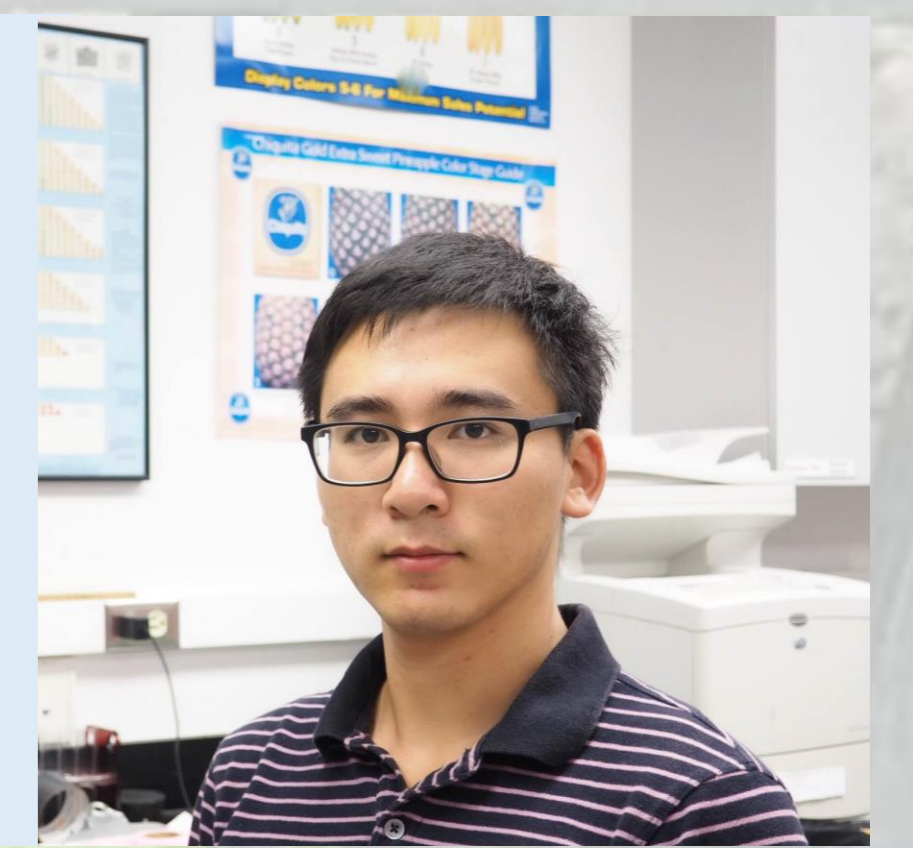


# Fruit Quality and Volatile Compounds of Seedless Watermelon as Affected by Grafting

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## Abstract

- ◆ This study was conducted to explore the influence of grafting with interspecific squash rootstock and in-row plant spacing on fruit quality modification, including volatile compounds, in seedless cv. Melody watermelon.
- ◆ Rind firmness of grafted watermelon fruit was significantly higher than that of non-grafted fruit. The flesh firmness in grafted fruit at 0.76 m spacing was significantly higher than non-grafted fruit at 1.68 m spacing.
- ◆ Neither grafting nor plant spacing exhibited any significant impacts on fruit soluble solids content, titratable acidity, pH, flesh color, or lycopene content.
- ◆ (E)-2-nonen-1-ol, (Z)-3-hexenol, and (E, Z)-3,6-nonadien-1-ol were found to be significantly higher in their relative levels at 1.68 m spacing in grafted than non-grafted fruit. Grafting with 'Super Shintosa' significantly decreased (E)-2-nonenal content at 1.68 m spacing, while (E)-2-nonenal in non-grafted 'Melody' showed a significantly higher level at 1.68 m spacing as compared to 0.76 m spacing. Levels of other alcohols and aldehydes did not differ between grafted and non-grafted fruit. Hexyl butyrate content was significantly higher in non-grafted than grafted fruit at 1.68 m spacing, while fruit from grafted plants showed a higher level of limonene than the non-grafted treatment at 0.76 m spacing.

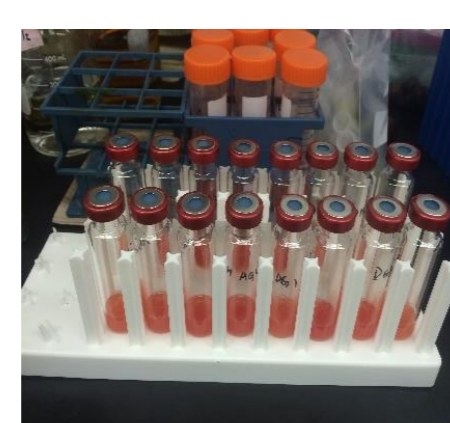
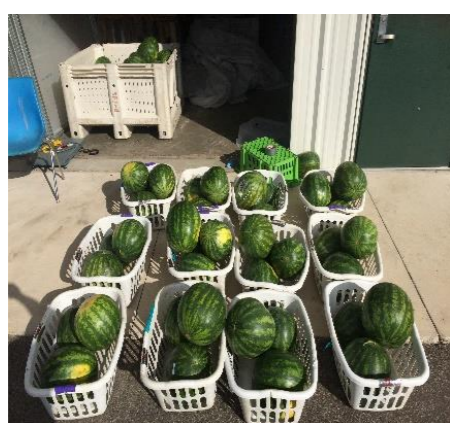
## Introduction

Interest in watermelon grafting is growing in the U.S.; however, limited information is available regarding the changes in flavor-related fruit characteristics, particularly volatile compounds of seedless watermelons as a result of grafting.



## Materials and Methods

- ◆ Scion: Triploid watermelon 'Melody' (*Citrullus lanatus*)
- ◆ Rootstock: Interspecific squash 'Super Shintosa' (*Cucurbita maxima* × *C. moschata*)
- ◆ Grafted (G) and non-grafted (NG) watermelon with in-row spacings of 0.76 m and 1.68 m, and a constant between-row spacing of 2.44 m.
- ◆ Split-plot design with four replications, Fall 2015, Citra, FL
- ◆ Fully ripe watermelon fruit were sampled for quality assessment.
- ◆ Volatile compounds: using solid-phase microextraction (SPME) with gas chromatography-mass spectrometry (GC-MS).
- ◆ Statistics: Glimmix procedure in SAS 9.4 version was used



## Results

Table 1. Effects of grafting and in-row spacing on fruit rind and flesh firmness

Treatment	Rind firmness (kgf)	Flesh firmness (gf)
0.76G	9.31 a	657.92 a
1.68G	8.46 a	587.91 ab
0.76NG	6.96 b	586.25 ab
1.68NG	6.76 b	510.00 b

Means within a column followed by the same letter were not significantly different by Fisher's LSD test at  $P \leq 0.05$ .

Table 2. Effects of grafting and in-row spacing on fruit soluble solids content (SSC), titratable acidity (TA), and pH.

Treatment	SSC (Brix°)	TA (% malic acid)	pH
	0.76G	10.9 a	
1.68G	10.8 a	0.060 a	6.48 a
0.76NG	10.1 a	0.065 a	6.32 a
1.68NG	10.6 a	0.058 a	6.40 a

Means within a column followed by the same letter were not significantly different by Fisher's LSD test at  $P \leq 0.05$ .

Table 3. Effects of grafting and in-row spacing on flesh color and lycopene content.

Treatment	Lycopene ( $\mu\text{g/g fw}$ )	Flesh color		
		L*	a*	b*
0.76G	91.443 a	35.76 a	23.95 a	18.43 a
1.68G	85.472 a	36.75 a	23.35 a	18.33 a
0.76NG	92.388 a	35.16 a	22.23 a	17.68 a
1.68NG	79.130 a	36.98 a	23.71 a	20.09 a

Means within a column followed by the same letter were not significantly different by Fisher's LSD test at  $P \leq 0.05$ .

Table 4. Effects of grafting and in-row spacing on relative content levels of volatile compounds.

Volatile compound	Treatment			
	0.76G	1.68G	0.76NG	1.68NG
Benzyl alcohol	1.436 a	1.491 a	0.962 a	1.604 a
1-Hexanol	1.175 b	2.192 a	1.352 ab	1.502 ab
(E)-2-nonen-1-ol	0.575 a	0.785 a	0.587 a	0.162 b
(Z)-3-hexenol	0.920 b	2.245 a	1.502 ab	0.958 b
(E)-3-nonen-1-ol	3.357 a	3.412 a	2.502 a	2.960 a
(Z)-3-nonen-1-ol	3.670 a	3.667 a	2.675 a	3.217 a
(E,Z)-3,6-nonadien-1-ol	0.475 ab	0.678 a	0.605 ab	0.330 b
Octanal	0.932 a	0.990 a	1.172 a	1.610 a
(E)-2-octenal	1.825 a	1.750 a	2.337 a	3.950 a
1-Octanal	0.942 a	1.142 a	1.117 a	1.317 a
(E)-4-nonenal	5.397 a	1.130 a	1.957 a	2.467 a
(Z,Z)-3,6-nonadienal	26.177 a	3.237 a	10.085 a	12.667 a
(E)-6-nonenal	4.532 a	1.852 a	1.805 a	3.470 a
Nonanal	1.910 a	1.255 a	1.287 a	1.532 a
(E)-2-nonenal	1.312 ab	1.135 b	1.102 b	1.970 a
(E,Z)-2,6-nonadienal	3.865 a	3.685 a	2.690 a	3.230 a
(E,E)-2,4-nonadienal	2.427 a	1.473 a	1.418 a	2.706 a
Hexyl butyrate	0.842 ab	0.805 b	0.930 ab	1.075 a
Limonene	16.732 a	3.635 b	0.960 b	8.310 ab

Means within a row followed by the same letter were not significantly different by Fisher's LSD test at  $P \leq 0.05$ .

## Conclusions and Discussion

- ◆ Overall, grafting did not show adverse impacts on fruit quality characteristics except for rind firmness of seedless watermelon.
- ◆ Can watermelon volatile profile modification by the rootstock selected for grafting affect fruit flavor perceived by consumers?

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