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Comparison of Attractiveness and Reaction of Melon Cultivars to the Striped Cucumber Beetle and Bacterial Wilt, 2015

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Introduction

Melon (*Cucumis melo*), is one of the most important vegetable crops in the United States. It is grown throughout the United States, and Indiana ranked third in production after California and Arizona with 2,088 Mg in 2013. Bacterial wilt of cucurbits, which is caused by *Erwinia tracheiphila* and vectored by striped cucumber beetle (*Acalymma vittatum*), is one of the most serious diseases of muskmelon that influences muskmelon quality and yield.

There are many varieties of melon that are grown around the United States, especially in the Midwest. Most common varieties in Midwest are susceptible to the striped cucumber beetle (SCB) and bacterial wilt (BW), and no resistant variety has been introduced. The main objective of these studies at different locations is identify the varieties most tolerant and susceptible to SCB and BW.

Materials and Methods

In 2015, experiments on 10-11 varieties of melon were conducted at three Indiana locations: Purdue Meigs Farm at Throckmorton Purdue Agriculture Center (TPAC) near Romney, Purdue Pinney Agriculture Center (PPAC) near Wanatah, and Southwest Purdue Agriculture Center (SWPAC) near Vincennes (Figure 1). The 11 varieties (Table 1 and Figure 2) were planted in 72-cell black seedling flat trays on April 13 at SWPAC, April 21 at TPAC, and May 3 at PPAC. The experimental fields were prepared with tillage and raised beds and the recommended fertilizers were applied before planting. Black plastic mulch and drip irrigation were applied to maintain the soil moisture and control weeds.

All experiments were laid out in randomized completed block designs (RCBD) with 10 (TPAC and PPAC) or 11 (SWPAC) treatments and four replications. Seedlings were transplanted (May 13 at SWPAC, May 21 at TPAC, and June 4 at PPAC) 2-4 feet apart on raised beds 3 feet wide, 100-160 feet long, and 6-8 feet on center (12, 16, and 20 plants per replication unit at SWPAC, TPAC, and PPAC, respectively).

Fungicides were applied to prevent downy mildew and powdery mildew. To know the SCB's feeding behavior, an experiment was conducted at TPAC in which two plants were covered by row covers after transplanting to protect them from the feeding of other insects, but 10 SCBs were added under row covers in each replication and allowed to feed for three weeks. After three weeks the row covers were removed. The number of live beetles per five plants in each replication and their feeding behavior, plant vigor, percentage of BW once per week, and number of marketable fruits with their individual weight, total marketable and cull yield per plot per harvest were observed and recorded. All collected data from different aspects were analyzed by SPSS statistical program.

Results

The greatest numbers of SCB were recorded on varieties of Diplomat (TPAC) and RML 9818 (PPAC), and there were significant differences in numbers of beetles on these varieties and others (Table 2). On the other hand, the number of beetles in the row cover treatments (RC) were high compared to the non-row cover treatments (NRC), which might correlate to the plant vigor.

The highest percentages of BW were observed in Dream Dew (all locations) and RML 9818 (TPAC with no row cover and PPAC), followed by Diplomat, which had fairly high percentages of BW at all locations compared to the other varieties (Table 3). At SWPAC Wrangler had highest number of fruits followed by Aphrodite, Superstar and Hales Best.

However, the maximum yield (1b. per plot) was recorded for Superstar due to its large fruit size, followed by Aphrodite and Wrangler. Athena had the highest number of fruits and yield followed by Superstar at TPAC with row covers. On the other hand, at both TPAC with no row cover, and PPAC, the maximum number of fruits and yield were recorded for Superstar and then Wrangler, Athena and Aphrodite (Table 4).

References

- Egel, D., R. Foster, E. Maynard, et al. 2015. *Midwest Vegetable Production Guide for Commercial Growers*, (ID-56). Purdue University. mwveguide.org.
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SWPAC experiment (2015)



PPAC experiment (2015)



TPAC (NRC) experiment (2015)



TPAC (RC) experiment (2015)

Figure 1. Overview of experimental plots at SWPAC, PPAC, and TPAC in 2015. Photos by Ahmad Shah Mohammadi.

Table 1. Varieties for melon trials at three locations in Indiana (SWPAC, TPAC, and PPAC), 2015.

Varieties	Seed Source	Comments
Athena (not FarMore treated)	Seedway	Hybrid
Savor	Johnny's selected seeds	Hybrid
Diplomat	Johnny's selected seeds	Hybrid
Aphrodite	Seedway	Hybrid
Superstar	Harris Moran	Hybrid
Majus	Rupp	Hybrid
Wrangler	Johnny's selected seeds	Hybrid
Hales Best	Rupp	Open pollinated
Dream Dew	Harris Moran	Hybrid
RML 9818	Syngenta	Hybrid
Green (SWPAC only)	Syngenta	Open pollinated



Figure 2. Melon varieties. (Top row, from left) 1=Athena. 2=Savor. 3=Diplomat. 4=Aphrodite. 5= Superstar. (Bottom row, from left) 6=Majus. 7=Wrangler. 8=Hale's Best. 9=Dream Dew. 10=RML 9818. 11=Green. Photos by Ahmad Shah Mohammadi.

Table 2. Average number of live beetles per treatment at three locations in Indiana (SWPAC, TPAC, and PPAC), 2015¹.

Varieties	No. of Beetles per Treatment (SWPAC) ^{2,3}	No. of Beetles per Treatment (TPAC RC) ^{2,4}	No. of Beetles per Treatment (TPAC NRC) ^{2,5}	No. of Beetles per Treatment (PPAC) ^{2,3}
Athena (not FarMore treated)	19.5 a	12.4 ab	36.4 bc	46.0 b
Savor	26.5 a	14.5 a	47.5 ab	70.0 ab
Diplomat	16.8 a	13.8 ab	51.1 a	57.7 b
Aphrodite	13.0 a	10.3 ab	31.9 bc	47.5 b
Superstar	19.6 a	11.3 ab	31.3 bc	41.0 b
Majus	19.9 a	9.6 b	28.5 c	50.5 b
Wrangler	18.7 a	10.1 ab	33.8 bc	55.1 b
Hales Best	18.8 a	11.9 ab	29.3 c	54.4 b
Dream Dew	19.4 a	12.2 ab	30.7 bc	76.0 ab
RML 9818	18.5 a	12.1 ab	32.9 bc	107.5 a
Green (SWPAC only)	17.4 a	—	—	—

¹Averages within a column with the same letters are not statistically significantly different at $P \leq 0.05$.

²RC = row covers (2 plants under row covers). NRC= no row covers (plants without row covers).

³Average from 7 observations.

⁴Average from 6 observations.

⁵Average from 11 observations.

Table 3. Percent of plot affected by bacterial wilt for 10 or 11 varieties of melon at three locations in Indiana (SWPAC, TPAC, and PPAC), 2015¹.

Varieties	July 15 (SWPAC)	Aug. 3 (TPAC RC ²)	Aug. 3 (TPAC NRC ²)	Aug. 28 (PPAC)
Athena (not FarMore treated)	11.3 c	25.0 ab	90.6 bc	43.0 cd
Savor	27.0 abc	36.3 ab	88.7 bc	81.3 bc
Diplomat	77.5 ab	31.3 ab	95.9 ab	84.2 bc
Aphrodite	15.8 abc	30.0 ab	62.5 bc	15.8 d
Superstar	18.8 abc	18.8 b	55.0 c	15.8 d
Majus	13.4 bc	35.0 ab	55.00 c	62.5 bcd
Wrangler	15.8 abc	26.3 ab	49.0 c	81.3 bc
Hales Best	27.0 abc	22.5 ab	88.7 bc	73.0 bcd
Dream Dew	81.3 a	42.5 a	97.7 a	93.6 ab
RML 9818	49.0 abc	30.0 ab	94.56 abc	100.0 a
Green (SWPAC only)	37.5 abc	—	—	—

¹Averages within a column with the same letters are not statistically significantly different at $P \leq 0.05$.

²RC = row covers (2 plants under row covers). NRC = no row covers (plants without row covers).

Table 4. Yield (lb) and number per plot of marketable fruit of each variety for 10 or 11 varieties at three locations in Indiana (SWPAC, TPAC, and PPAC), 2015¹.

Varieties	No. of Fruits Marketable (SWPAC)	Total Yield Marketable (SWPAC)	No. of Fruits Marketable (TPAC RC ²)	Total Yield Marketable (TPAC RC ²)	No. of Fruits Marketable (TPAC NRC ²)	Total Yield Marketable (TPAC NRC ²)	No. of Fruits Marketable (PPAC)	Total Yield Marketable (PPAC)
Athena (not FarMore treated)	12.8 b	76.1 abcd	5.3 a	23.3 a	3.5 bcd	15.0 bc	30.0 ab	131.6 abc
Savor	5.0 c	13.5 d	0.0 c	0.0 c	0.5 cd	1.8 c	5.5 de	14.7 e
Diplomat	11.5 b	53.1 abcd	1.0 c	4.6 bc	0.5 cd	2.3 c	15.75 bcd	28.9 cde
Aphrodite	16.3 ab	110.1 ab	1.3 c	7.1 abc	9.5 a	52.5 a	24.8 abc	148.4 ab
Superstar	16.3 ab	119.3 a	3.8 ab	21.2 ab	5.50 abcd	31.8 ab	36.5 a	181.9 a
Majus	12.8 b	57.8 abcd	1.3 c	6.4 abc	5.8 abc	23.7 bc	24.5 abc	99.2 bcd
Wrangler	27.3 a	96.9 abc	2.3 bc	7.3 abc	8.5 ab	30.7 ab	29.5 ab	97.3 bcd
Hales Best	17.3 ab	58.3 abcd	0.5 c	1.7 c	1.3 cd	4.9 c	9.3 cde	13.2 de
Dream Dew	5.8 c	40.1 bcd	0.0 c	0.0 c	0.3 d	0.8 c	21.5 abc	121.4 abc
RML 9818	8.3 c	32.6 cd	0.0 c	0.0 c	0.3 d	1.1 c	0.0 e	0.0 e
Green (SWPAC only)	6.75 c	37.1 bcd	—	—	—	—	—	—

¹Averages within a column with the same letters are not statistically significantly different at $P \leq 0.05$.²RC = Row covers (2 plants under row covers). NRC = No row covers (plants without row covers).