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**Research Project Report for the Ohio Vegetable
and Small Fruit Research and Development Program**

Project Title

Disease Management in Cucumber

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Objectives of the Research

Resistance to angular leaf spot is available in some cucumber cultivars, but the relative effectiveness of resistance among different cultivars is not known. **The specific objective of this project was to screen cucumber varieties advertised as having angular leaf spot resistance for reaction to the angular leaf spot pathogen *Pseudomonas syringae* pv. *lachrymans*.**

Experimental Design and Methods

Twelve cucumber cultivars were evaluated for resistance to angular leaf spot on foliage and fruit in a field trial on Wooster silt loam at the Ohio Agricultural Research and Development Center's Snyder Farm in Wooster, Ohio. Cucumber seeds were Clorox treated and sown on 18 May into 50-cell plug trays containing Fafard seedling mix and maintained in a greenhouse at approximately 80 °F day and 75 °F night. On 7 Jun 400 lb/A N-P-K (19-19-19) was broadcast, top dressed, and incorporated into the test field. The herbicide Command 3 ME (0.5 pt/A) was applied for weed control. On 8 Jun, seedlings were transplanted by hand 1 ft apart into single rows 25 ft long on 5 ft centers. Starter fertilizer (N-P-K 9-45-15; 1.65 lb/55 gal water) was applied in the transplant water. Cultivars were arranged in a randomized complete block design with four replications. Thiodan EC was applied at 1 qt/A on 21 Jul, and Asana XL 0.66 EC was applied at 6 oz/A on 21 and 29 Jul to control insects. The field was hand weeded and hoed on 28 Jul and 1 and 2 Aug. Plants were inoculated with approximately 10⁸ CFU/ml *Pseudomonas syringae* pv. *lachrymans* strain JSF1-04 in the evening of 23 Jun using a CO₂-pressurized backpack sprayer (40 psi, 78.9 gal/A). Plants were overhead irrigated with 1.0, 0.5, 0.5 and 0.5 in. water on 10, 23, and 24 Jun and 2 Aug, respectively. Amistar 80 WG (4.25 oz/A) and Quadris 2.08SC (4 oz/A) were applied on 7 and 30 Jul, respectively, alternated with Bravo Ultrex (1.8 lb/A) applied on 13 and 21 Jul and 9 Aug as cover sprays to all plots. Severity of foliar angular leaf spot was evaluated on 12 and 28 Jul and 16 Aug using a modified Horsfall-Barratt rating scale. Fruits were harvested

from plants in the center 15 ft of each row on 12, 19, and 28 Jul and 8 Aug. Weights and numbers of healthy fruits, culls, and fruits with sunscald or angular leaf spot lesions were determined. Numbers of angular leaf spot lesions on fruit were counted separately to estimate disease severity. Fruit incidence data were sqrt transformed prior to analysis; non-transformed means are reported. Data were analyzed by ANOVA using SAS statistical software and means were separated using Fisher's protected least significant difference test. Average maximum temperatures for 8-30 Jun, Jul, and 1-16 Aug were 85.1, 84.7, and 87.0 °F; average minimum temperatures were 61.2, 60.5, and 63.9 °F; and rainfall was 1.21, 1.39, and 1.99 in., respectively.

Results and Conclusion

Angular leaf spot disease pressure was moderate, reaching 50-60% foliar infection in the more susceptible cultivars by the end of the growing season. Disease progress differed significantly among cultivars, with 'Classy', 'Slice More', 'Talladega' and '2409' the least susceptible. 'Intimidator' and 'Speedway' were the most susceptible to foliar infection. Disease incidence on fruit ranged from 0.2-7.5% and severity from 2.80-3.01, but there was no correlation between fruit incidence and severity and foliar disease severity. 'Slice More' had the highest marketable yield, while 'Thunder', 'Sassy' and 'Intimidator' had the lowest. Although 'Speedway' was among the most susceptible to angular leaf spot, it had a relatively high marketable yield and ranked among the highest in percentage marketable fruit. Fruit size varied among cultivars, with 'Speedway' having the largest fruit and 'Sassy' the smallest. Growers should be aware that there are differences in the effectiveness of resistance to angular leaf spot among cultivars advertised as resistant to this disease.

Cultivar	Seed Source	Angular leaf spot ^z			Marketable yield (ton/A)	Marketable (%)	Marketable fruit size (lb/fruit)
		Foliar AUDPC	Fruit incidence (%)	Fruit severity ^x			
Classy	Harris Moran Seed Co.	408.4 d ^y	0.2 d	2.96 ab	16.3 bcd	84.3 a	0.80 d
Slice More	Siegers Seed Co.	563.4 cd	1.0 bcd	2.83 de	23.8 a	82.5 a	0.93 abc
Talladega	Seminis Vegetable seeds	571.6 dc	6.7 a	2.86 cde	18.0 bc	77.5 abc	0.89 bc
2409	Seminis Vegetable seeds	600.9 bcd	2.9 a	2.85 cde	19.2 b	80.0 ab	0.93 abc
Thunder	Seminis Vegetable seeds	733.7 a-d	7.2 a	2.90 bcd	13.1 d	65.5 d	0.91 abc
Thunderbird	Seminis Vegetable seeds	799.8 a-d	3.7 ab	2.85 de	17.6 bc	82.2 a	0.93 abc
Stonewall	Harris Moran Seed Co.	902.0 abc	4.7 a	2.88 b-e	14.5 cd	72.4 bcd	0.89 bc
Sassy	Harris Moran Seed Co.	907.0 abc	0.7 cd	3.01 a	13.2 d	78.5 abc	0.78 d
Green Slam	Siegers Seed Co.	926.9 abc	0.3 cd	2.88 b-e	18.6 b	83.5 a	0.89 bc
Indy	Seminis Vegetable seeds	985.4 ab	4.6 a	2.85 de	17.9 bc	70.0 cd	0.96 ab
Intimidator	Seminis Vegetable seeds	1074.1 a	7.5 a	2.90 abc	13.4 d	71.2 cd	0.85 cd
Speedway	Seminis Vegetable seeds	1129.3 a	4.5 a	2.80 e	18.6 b	83.5 a	0.99 a
<i>P</i> value		0.0151	0.0002	0.0012	0.0001	0.0006	0.0007

^zArea Under the Disease Progress Curve (AUDPC) based on the midpoint values of a modified Horsfall-Barratt rating scale where 1=0%, 2= 1-3%, 3= 4-6%, 4=7-12%, 5= 13-25%, 6=26-50%, 7=51-75%, 8= 76-87%, 9=88-94%, 10= 95-97%, 11=98-99% and 12= 100% angular leaf spot. AUDPC calculated according to the formula: $\sum[(x_i+x_{i-1})/2](t_i-t_{i-1})$ where x_i is the rating at each evaluation time and (t_i-t_{i-1}) is the time between evaluations.

^yValues are the means of four replicate plots; treatments followed by the same letter within a column are not significantly different at $p \leq 0.05$.

^xAngular leaf spot severity was calculated using the number of cucumbers in each of five categories that were based on the number of lesions (0, 1, 2, 3, or 4)/fruit. Severity = $[\sum(\text{category value} * \text{number of plants in category})]/n$, where n = number of total cucumbers harvested.