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Elizabeth Maynard
Purdue University - Main Campus, emaynard@purdue.edu

Butch Zandstra
Zandstra's Farm

Dan Egel
Purdue University - Main Campus, egel@purdue.edu

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On-Farm Evaluation of Tomato Cultivars for Disease Resistance, 2008

Elizabeth Maynard, Purdue University, Westville, IN 46391
Butch Zandstra, Zandstra's Farm and Greenhouse, Highland, IN 46322
Dan Egel, Southwest Purdue Ag Program, Vincennes, IN 47591

Introduction

Bacterial spot of tomatoes (*Xanthomonas campestris* pv. *vesicatoria)* causes lesions on leaves, stems and fruit. Under conditions of hot, humid, rainy weather, defoliation can result in a loss of yield. In addition, lesions on fruit result in a direct loss of marketability. This disease is managed primarily with applications of fixed copper bactericides, crop rotations, greenhouse sanitation, and healthy seed/transplants. Even in properly managed commercial fields, however, bacterial spot can cause yield losses.

Although there are no varieties with complete resistance to bacterial spot, we report here the results of an on-farm trial that indicates some varieties may have partial resistance.

Methods

Seeds of 23 varieties were planted in the greenhouse facilities of Butch Zandstra in Lake County, Indiana. Transplants were planted in the field on June 10 in a completely randomized design with four replications. Each replication consisted of 12 plants. The plants were placed on 3-foot-wide black plastic and were staked and weaved. A systemic fungicide was applied on July 29, and a contact fungicide and fixed copper bactericide were applied approximately weekly from August 1 to September 6, and again on September 30.

On July 3, plant vigor was rated in each plot using a scale of 1 (least vigorous) to 9 (most vigorous). On October 17, each plot was rated for bacterial spot using the Horsfall-Barratt scale (J.G. Horsfall and R.W. Barratt, *Phytopathology* 35:655). The Horsfall-Barratt scale is used to assign percent foliage affected into one of 11 severity classes. One rating was given based on whole plant disease severity for all plants in the plot. Ratings were also recorded for three individual leaves per plot. Leaves near growing points were chosen. The three leaf ratings per plot were averaged. The ratings were analyzed by ANOVA and means were separated using Fisher's protected least significant difference at P=0.05. The Horsfall-Barratt ratings were converted back into percentages for presentation using the Elanco Conversion Tables (Eli Lilly Company, Indianapolis).

Results and Discussion

Windblown sand and dry conditions injured newly set transplants. Growing points on a number of plants were killed. Injury appeared to vary among plots, so the early vigor rating was taken in part to assess whether the injury would increase susceptibility to disease. Significant differences in vigor rating were observed but low vigor was not consistently associated with high disease ratings (Table 1). There were significant differences in the amount of disease present in leaf and whole plant ratings conducted in October. The percent of disease ranged from a mean of 19 percent for Sweet Elite to 95 percent for Applause in the whole plant rating. Since the only

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disease rating was performed relatively late in the season, the percentages shown below are a snapshot of the amount of disease present and do not reflect the amount of disease that occurred over the entire season. However, the size of the differences shown here suggests that partial resistance to bacterial spot could play a part in the management of this disease. In similar trials published here in 2006 and 2007, Applause also had the highest amount of disease. Florida 91, RFT 6163, Phoenix, and Mountain Fresh had severity values that were not significantly different from the lowest value in 2007 and in 2008.

Acknowledgements

The donation of seed by the companies listed in Table 1 is appreciated.

Table 1. Early season plant vigor and disease ratings for fresh market tomato varieties grown in Lake County, Indiana, 2008.

Cultivar	Seed Source	July - Vigor[y]	HB rating[z]	
			Leaf rating	Plant rating
Applause	Seminis	4.0 bcdef[x]	90.6 a	95 a
SVR 0170	Seminis	4.3 bcde	62.5 b	95 a
HMX 7838	Harris Moran	4.8 abcd	49 bc	92 ab
Tormenta	Bejo	4.5 abcde	68 b	91 ab
Mt Glory	Syngenta	3.0 def	43 bc	87 abcd
Red Defender	Harris Moran	4.8 abcd	22.5 cdef	84 bcde
Carolina Gold	Siegers	5.0 abc	18.8 cdefg	78 bcdef
Rocky Top	Syngenta	3.8 cdef	13.4 cdefg	78 bcdef
BHN 871	Siegers	5.8 ab	37.5 bcde	78 bcdef
Fletcher	Bejo	2.3 f	43 bcde	73 cdef
Scarlet Red	Harris Moran	4.3 bcde	13.4 cdefg	73 cdef
Talladega	Syngenta	5.0 abc	37.5 bcde	68 defg
Reba	Sakata	3.8 cdef	13.4 defg	68 defg
Nico	Harris Moran	6.3 a	11.3 fgh	68 defg
BHN 602	Siegers	3.5 cdef	43 bcd	63 defgh
Linda	Sakata	4.0 bcdef	11.3 fg	55 efghi
Florida 91	Rispens	5.0 abc	9.4 fgh	43 fghij

Continued on next page

Table 1 (*continued*)

Cultivar	Seed Source	July - Vigor[y]	HB rating[z]	
			Leaf rating	Plant rating
RFT 6153	SeedWay	3.8 cdef	7.7 fgh	43 fghij
Phoenix	Rispens	3.0 def	13.4 efg	32 ghij
SVR 0172	Seminis	3.5 cdef	6.4 gh	32 ghij
Mountain Fresh	Rispens	2.8 ef	3.5 h	27 hij
BSS 832	Bejo	3.8 cdef	6.4 gh	23 ij
Sweet Elite	Sakata	4.3 bcde	5.4 gh	19 j
P-value		0.0079	0.0001	0.0001

[z] Plots were rated for severity of bacterial spot using the Horsfall-Barratt scale. Ratings converted to percent foliage affected.
[y] Vigor was rated July 3 on a 19 scale, with 1=the least vigorous and 9=the most vigorous.
[x] Means within each column with a letter in common are not significantly different (Fisher's Protected LSD, *P*=0.05).