Determinate Tomato Variety Trial in a New York High Tunnel, 2011
Cornell Vegetable Program
In collaboration with Harris Seed, Inc.

Introduction

High tunnels are passively heated and vented; soil-based greenhouses. In Eastern North America high tunnels are being widely adopted by fresh market vegetable growers. High tunnels offer season extension and disease management for numerous crops including lettuce, peppers, cucumbers and tomatoes. Among these, tomatoes consistently provide the highest return per square foot. Varieties grown within high tunnels include both determinate and indeterminate types. Determinate varieties offer lower labor inputs and concentrated yields when compared to indeterminates. Growers continue to seek new varieties that perform in the unique microclimate created by high tunnels. A trial of 5 greenhouse varieties provided by Harris Seed was established in a commercial high tunnel in Central New York in the spring of 2011.

Materials and Methods

Tomato varieties BHN 189, BHN 589, Primo Red, HM Exp #1,HM Exp #2, and HM Exp #3 were seeded in a heated greenhouse on February 15, 2011. Seedlings were transplanted into 50 count trays four weeks later, and finally transplanted into the high tunnel soil, a Lima Silt Loam, on April 12. The high tunnel, fabricated on farm, is a 30 by 120 foot galvanized steel structure, covered with Tuff Lite IV 6 mil polyethylene. No supplemental heat was used in growing the crop post-transplant. The trial was arranged as a randomized block design with 4 replications. Each replicate consisted of 8 plants, transplanted into black plastic mulch with an 18-inch single row with drip irrigation. The grower cooperator maintained the trial site for fertilization, irrigation and weed control to their standards (see appendix 1). No pesticides were applied. Tomatoes were harvested from June 24 to October 31. The weight and number of mature fruit was recorded at each harvest date. Mean yield (lbs) per plant, mean fruit per plant and mean fruit weight were calculated. Disease ratings of Brown Leaf Mold (*Fulvia fulva*) were taken on July 12 and October 13, using a 0-9 ordinal scale, with 0 representing no infection and 9 plant death. Data were analyzed using statistical software Analysis of Variance (ANOVA) procedure, and treatment means were separated using Fishers Protected Least Significant Difference Test ($p<0.05$).

Results

Yield as measured by pounds of fruit per plant were not significantly different among the 6 varieties. BHN 589 yielded the highest with 27.53 lbs per plant, followed by HM Exp #2 with 25.15 lbs per plant, Primo Red with 24.98 lbs per plant, HM Exp #1 with 24.60 lbs per plant, HM Exp #3 with 24.28 lbs per plant and BHN 189 with 20.40 lbs per plant (Chart 1). Mean fruit per plant was also not significantly different among the varieties. Fruit weights were significantly different with HM Exp #2 and Primo Red the heaviest mean fruits at 0.49 lbs. BHN 589 and BHN 189 were the only varieties susceptible to Brown Leaf Mold. BHN 189 was significantly more infected than BHN 589.

Discussion

All varieties trialed this season yielded acceptably as measured by both pounds per plant and fruit number. Apparent resistance to Brown Leaf Mold was displayed by the varieties HM Exp #, HM Exp #2, HM Exp #3 and Primo Red (Figure 1). The cooperating grower preferred XT44748 for fruit quality and earliness. Although BHN 589 yielded more pounds of fruit per plant than any other variety, a high percentage of the harvest was either culls or #2 fruit due to yellow shoulders. This color disorder is likely due excess sunlight on the fruit caused by a foliar reduction from Brown Leaf Mold infection. HM Exp #2 also yielded well, but was slightly soft for shipping purposes. Primo Red and HM Exp #1 were the grower favorites for commercial purposes in this trial. Growers with a shorter value-chain may find softer varieties such as HM Exp #2 acceptable.

Conclusions

Determinate tomatoes are the variety of choice for many high tunnel growers due to lower labor inputs and concentrated yields. However, susceptibility to Brown Leaf Mold is an important factor in variety selection. We were pleased that several varieties tested this year were resistant to the disease. Other important factors in variety selection are total yield per plant, fruit size and shipping/eating qualities. Each grower must assess their market demands and make a choice that will work for their high tunnel production.

The Cornell Vegetable Program and cooperating grower express gratitude to Harris Seed, Inc. for their collaboration in this project.

Table 1. Mean yields per plant of 6 high tunnel grown greenhouse tomato varieties.

Variety	Mean Yield per Plant (lbs)	Mean Fruit Number per Plant	Mean Fruit Weight (lbs)	Mean Brown Leaf Mold Rating (0-9)
BHN 589	27.53	62.48	0.44 ab**	5.95 b**
HM Exp #2	25.15	51.60	0.49 a	0.00 c
Primo Red	24.98	50.53	0.49 a	0.00 c
HM Exp #1	24.60	62.95	0.39 bc	0.00 c
HM Exp #3	24.28	57.15	0.43 b	0.00 c
BHN 189	20.40	55.93	0.36 c	7.00 a
LSD	*NS**	*NS**	*0.0580*	*0.0000*

* No significant differences detected.

** Means with different letters (groupings) are significantly different according to Fishers Protected Least Significant Difference Test ($p<0.05$).

Figure 1. Varieties that displayed resistance to Brown Leaf Mold

Figure 2. Varieties that displayed suceptibility to Brown Leaf Mold


Primo Red

Appendix 1. Fertilizer schedule for determinate tomatoes.

10-May	20-20-20 *	0.19	
21-May	20-20-20	0.30	
25-May	20-20-20	0.31	
30-May	20-20-20	0.30	
1-Jun	20-20-20	0.31	
4-Jun	20-20-20	0.36	plus 0.02 fluid oz. 66% sulfuric acid
8-Jun	20-20-20	0.39	
9-Jun	Epsom salt (magnesium sulfate)	0.39	
10-Jun	Epsom salt (magnesium sulfate)	1.04	Foliar application
11-Jun	9-15-30**	0.42	plus 0.02 fluid oz. 66% sulfuric acid
14-Jun	9-15-30	0.42	
15-Jun	Epsom salt (magnesium sulfate)	0.24	
16-Jun	9-15-30	0.27	
17-Jun	9-15-30	0.42	
18-Jun	Epsom salt (magnesium sulfate)	0.28	
18-Jun	Epsom salt (magnesium sulfate)	1.56	Foliar application
21-Jun	9-15-30	0.42	
22-Jun	9-15-30	0.27	
23-Jun	Epsom salt (magnesium sulfate)	0.28	
24-Jun	9-15-30	0.42	plus 0.03 fluid oz. 66% sulfuric acid
25-Jun	Epsom salt (magnesium sulfate)	0.06	
27-Jun	9-15-30	0.45	
28-Jun	9-15-30	0.21	
30-Jun	Epsom salt (magnesium sulfate)	0.30	
1-Jul	9-15-30	0.30	
5-Jul	Epsom salt (magnesium sulfate)	0.18	
6-Jul	9-15-30	0.24	
7-Jul	9-15-30	0.18	
9-Jul	9-15-30	0.39	
12-Jul	9-15-30 to 4 tunnels	0.51	
13-Jul	Epsom salt (magnesium sulfate)	0.15	
14-Jul	9-15-30	0.21	
16-Jul	9-15-30	0.24	
19-Jul	9-15-30	0.15	
20-Jul	9-15-30	0.09	
21-Jul	20-20-20	0.42	
22-Jul	20-20-20	0.36	
23-Jul	20-20-20	0.12	
26-Jul	9-15-30	0.30	
28-Jul	9-15-30	0.24	
29-Jul	9-15-30	0.37	
30-Jul	9-15-30	0.30	
5-Aug	20-20-20	0.24	
8-Aug	9-15-30	0.37	
11-Aug	9-15-30	0.22	
13-Aug	9-15-30	0.15	
27-Aug	9-15-30	0.18	
29-Aug	9-15-30	0.12	
	*Miller's Greenhouse Grade 20-20-20 (N-P-K) plus micronutrients In irrigation water sufficient to moisten the rootzone.		
	**Miller's Greenhouse Grade 9-15-30 (N-P-K) plus micronutrients In irrigation water sufficient to moisten the rootzone.		