Quality and Yield of Hybrid and Heirloom Tomatoes Grown for the Early Market Using Season Extension Structures

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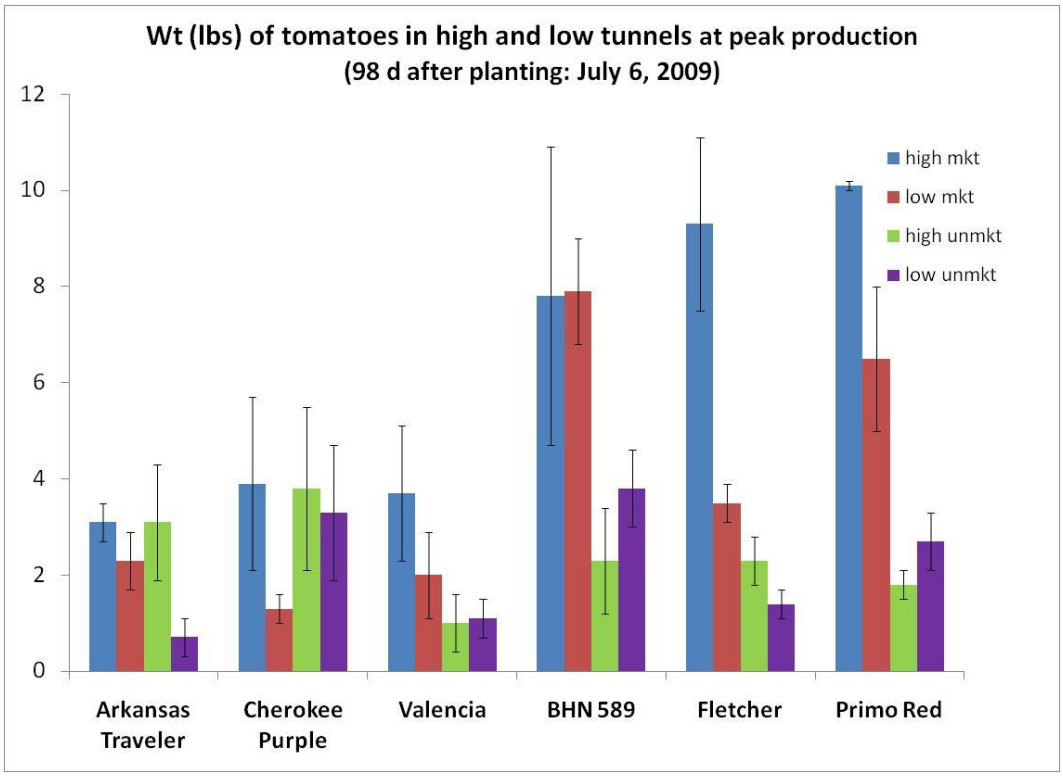
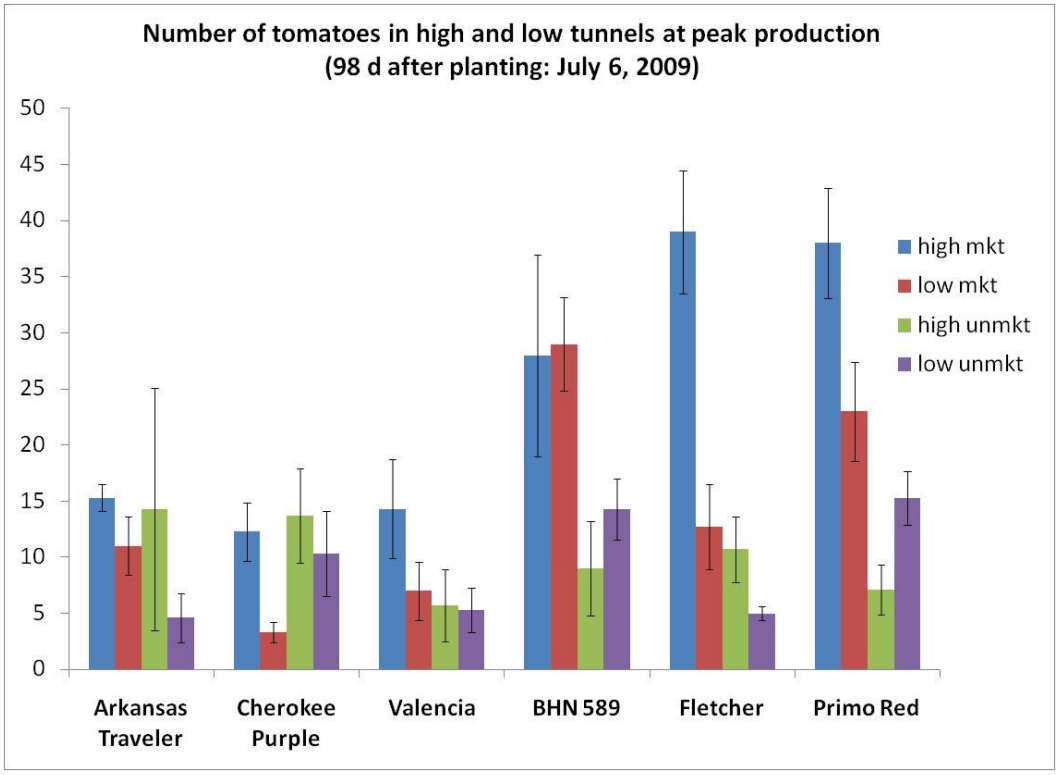
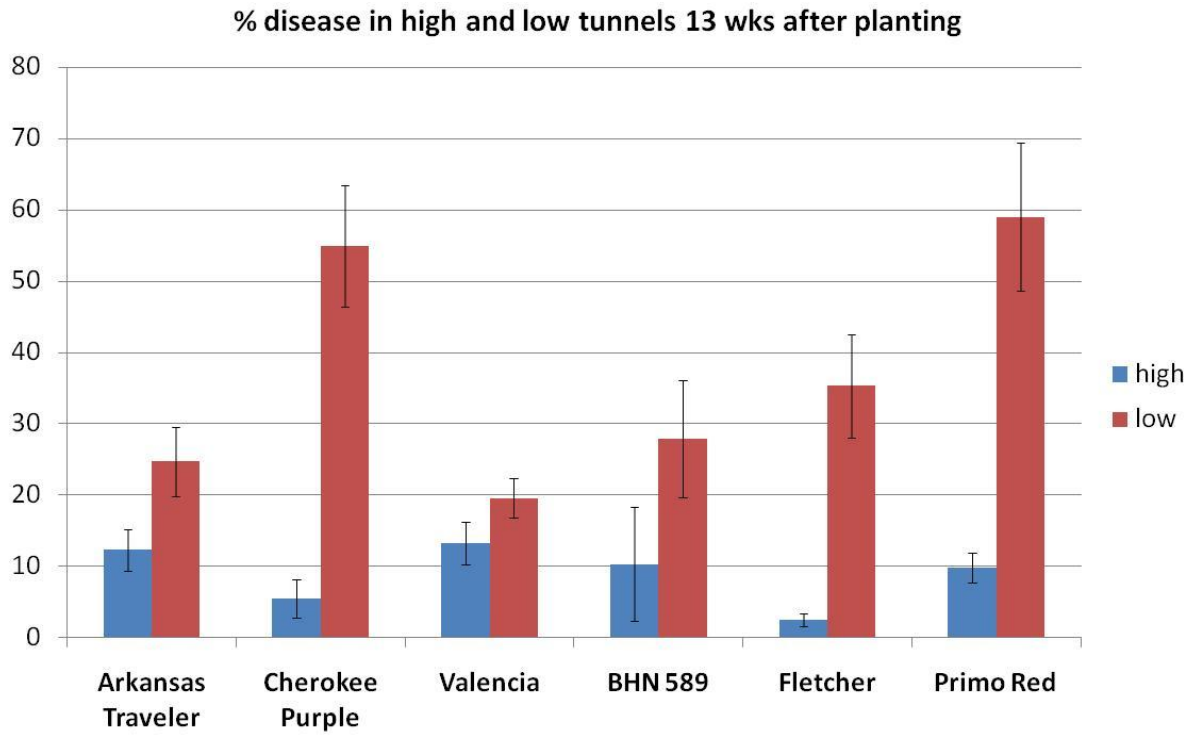
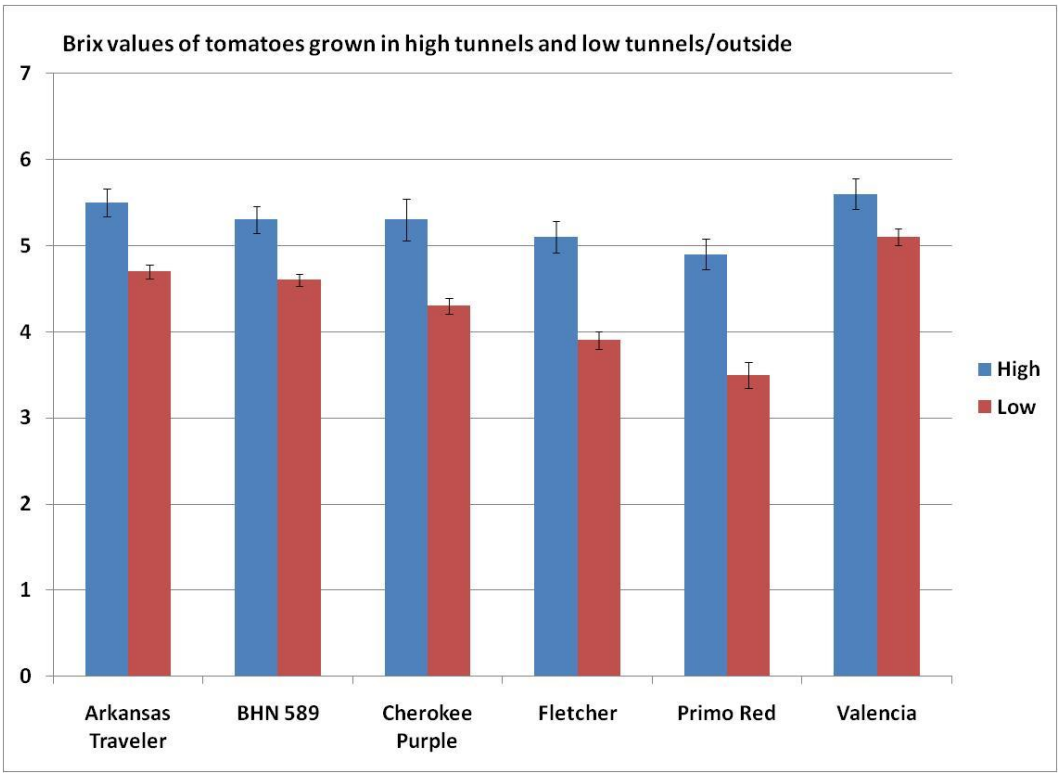
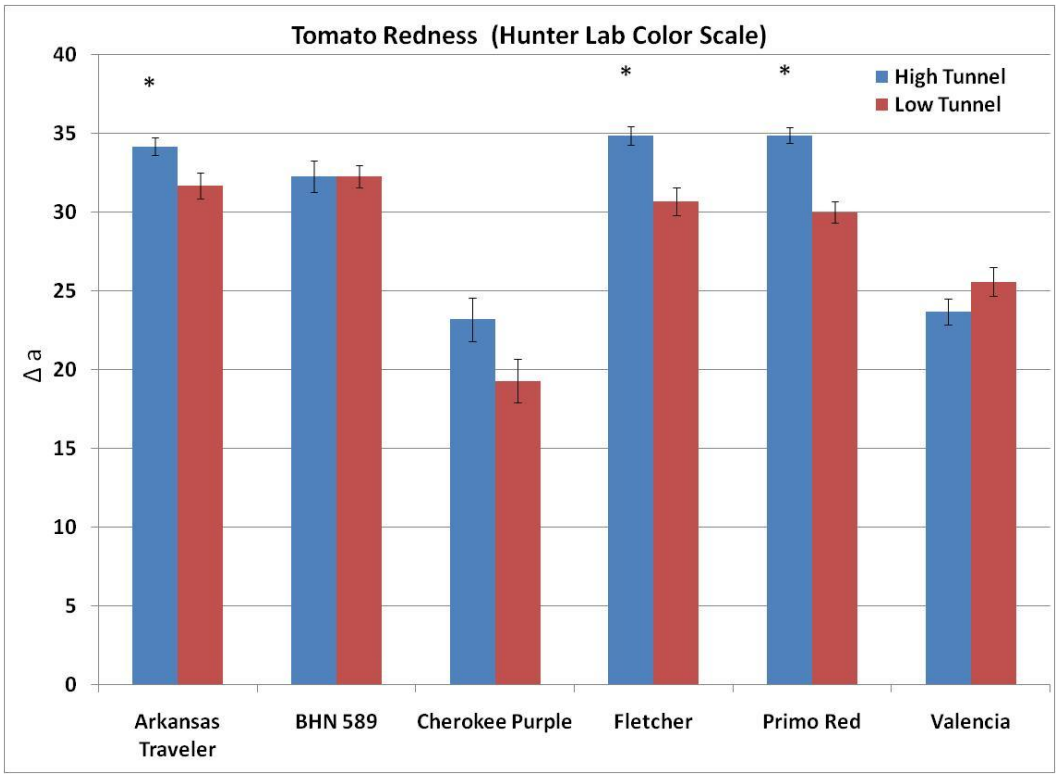
Production in high tunnels offers the potential to improve crop yield and quality, while also extending the growing season. In 2009, a field trial was conducted with 3 hybrid ('Fletcher', 'Primo Red' and 'BHN 589') and 3 heirloom ('Cherokee Purple', 'Valencia' and 'Arkansas Traveler') tomato (*Solanum lycopersicum*) varieties to compare production inside high tunnels versus outside. Tomatoes were transplanted into the field and tunnels on March 27, April 17 and May 8. The plots were managed organically and no pesticides were used in the study. Tomatoes were harvested twice a week for 7 weeks starting June 24 for the March planted tomatoes. Yield, disease incidence and fruit quality data were collected. Tomatoes grown inside the tunnels had a significantly lower incidence of Early Blight than those grown outside. Tomato varieties 'Fletcher' and 'Primo Red' grown inside the tunnels out yielded the same varieties grown in the field. Hybrid tomato plants grown both inside and outside the tunnels had greater yields than heirloom plants. The earlier plantings (March and April) tended to have higher yield than the May planting. All tomato varieties grown in high tunnels had higher soluble solids values than those grown outside. 'Arkansas Traveler', 'Fletcher' and 'Primo Red' fruit grown inside the tunnels had significantly greater red color (higher absorbance values) than the same varieties grown outside. Lycopene values were significantly higher in 'Cherokee Purple', 'Fletcher' and 'Primo Red' fruit grown inside the tunnels versus outside. High tunnels were found to not only increase yield and decrease disease incidence in tomato, but also increase fruit sugar content, red color and lycopene content.


Wt (lbs) of tomatoes in high and low tunnels at peak production
(98 d after planting: July 6, 2009)
12
10
8
6
4
2
0
high mkt
low mkt
high unmkt
low unmkt
Arkansas Traveler
Cherokee Purple
Valencia
BHN 589
Fletcher
Primo Red


Number of tomatoes in high and low tunnels at peak production
(98 d after planting: July 6, 2009)
50
45
40
35
30
25
20
15
10
5
0
high mkt
low mkt
high unmkt
low unmkt
Arkansas Traveler
Cherokee Purple
Valencia
BHN 589
Fletcher
Primo Red


% disease in high and low tunnels 13 wks after planting
80
70
60
50
40
30
20
10
0
high
low
Arkansas Traveler
Cherokee Purple
Valencia
BHN 589
Fletcher
Primo Red


Brix values of tomatoes grown in high tunnels and low tunnels/outside
7
6
5
4
3
2
1
0
High
Low
Arkansas Traveler
BHN 589
Cherokee Purple
Fletcher
Primo Red
Valencia


Tomato Redness (Hunter Lab Color Scale)
High Tunnel
Low Tunnel
Δ a
40
35
30
25
20
15
10
5
0
*
*
*
Arkansas Traveler
BHN 589
Cherokee Purple
Fletcher
Primo Red
Valencia

Tomato Phytonutrients*						
Variety	**Lycopene**		**Lutein**		**Beta Carotene**	
	HT	**Out**	**HT**	**Out**	**HT**	**Out**
Arkansas Traveler	2.7 **a**	3.5 **a**	.068 **a**	.070 **a**	.34 **b**	.40 **a**
BHN 589	3.4 **a**	3.8 **a**	.073 **a**	.073 **a**	.33 **a**	.33 **a**
Cherokee Purple	7.1 **a**	4.4 **b**	.120 **a**	.103 **a**	.53 **a**	.46 **a**
Fletcher	4.9 **a**	3.0 **b**	.068 **a**	.054 **a**	.33 **a**	.30 **a**
Primo Red	2.8 **a**	1.3 **b**	.060 **a**	.053 **a**	.25 **a**	.21 **a**
Valencia	0 **a**	0 **a**	.025 **a**	.025 **a**	.90 **a**	.89 **a**

*Actual Recovered mg/100 gfw

Numbers followed by different letters indicate significant difference at $\alpha = 0.05$