

Evaluation of Grafted ‘BHN 589’ Tomatoes within High Tunnels in West Virginia

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In high tunnel production systems, tomatoes are often not rotated as recommended given the strong market demand and limited space for production. Grafting can potentially improve vigor and yield of slicing tomatoes. Therefore, the use of grafted tomatoes may be a Best Management Practice for controlled environment tunnel production.

Materials & Methods:

Grafted ‘BHN 589’ tomatoes were evaluated within high tunnels at six locations across West Virginia in 2020. Planting dates were from May 15-May 22, 2020. In Morgantown, WV the grafted lines were assigned a number and planted on white plastic mulch with drip irrigation in a randomized complete block design with three replications (Figure 1). Each rootstock was assigned a number and distributed to growers. Each tomato plant was spaced 24 inches apart in rows approximately 42-48 inches on-center. Standard fertilization and pest management was performed across the growing season according to the Mid-Atlantic Vegetable Production Guide. Tomatoes were either trellised by string-weave or plant clips. At first flower the plants were pruned to two primary stems.

Growers were instructed to take pictures and record yields if possible. Harvest commenced in most locations in early August and continued through October. In Morgantown, WV the tomatoes were harvested for 6 weeks. Marketable yield was separated into US #1, #2 and culls. Average weight from a subsample (4 fruit) of fruit within each grade class was recorded.



Figure 1. Grafted ‘BHN 589’ tomatoes were relay-planted in established annual strawberry beds at WVU Research Farm and strawberry crop harvested for an additional 3 weeks while tomatoes became established. Strawberry plants were removed in late June.

Results:

Table 1. Marketable yield of grafted ‘BHN 589’ from WVU Experimental Farm, 2020.

Rootstock (#)	US #1		US #2		Total Mkt/plant (lbs.)	Culls (%)
	No./plant	Wt./fruit (g)	No./plant	Wt./fruit (g)		
Estamino (1)	10.4	373	7.8	236	12.6	12.1
Maxifort (2)	9.6	365	7.6	210	11.2	12.7
GRTM-RS (3)	7.5	309	6.1	225	8.1	11.6
Non-Grafted	8.8	310	5.6	225	8.7	5.0



Figure 2. Relative yield of grafted tomatoes from grower trials (Source: T.L. Rayfes)

Table 2. Summary of grower evaluations of 3 tomato rootstocks within high tunnels, 2020.

Farm	County	Ranking of rootstocks ^z	Marketable yield (lbs.)/plant	Comments
Sickler Farms	Barbour (North WV)	1, 2, 3	1: 22.4lbs. 2: 17.9 lbs. 3: 15.0 lbs.	Grafted plants very productive even in heat stress. Incredible size of US No.1 tomatoes. Marketable yield and flavor good; Preferred Rootstock #1. Out yielded open field plants significantly.
Shafer Farms	Preston (North WV)	2, 1, 3	1: 10.2 lbs. 2: 11.0 lbs. 3: 9.5 lbs.	Grafted plants were highly productive relative to nongrafted plants within the same high tunnel.
TLR Farms	Monroe (Southeast WV)	1, 2, 3	N/A	Preferred Rootstock #1. Picking grafted tomatoes through Nov.
Tracey Adkins	Fayette South Central WV)	2, 1, 3	N/A	Preferred rootstock # 2
Winters Farm	Cabell (Southwest WV)	1, 2, 3	N/A	Preferred Rootstock #1. Impressed with stress tolerance in heat of all grafted lines.

^z1='Estamino'; 2= 'Maxifort'; 3=GRTM RS

Conclusion:

Grafted tomatoes have not been widely used for high tunnel production in West Virginia. Lack of access to plant material or perceived lack of grafting knowledge may be the problem. We have observed growers failing to rotate tomatoes within high tunnels which can lead to long-term soil disease problems. Using grafted plant material is one tool to increase productivity in high tunnel systems.

Six locations evaluated the three grafted lines with one of the sites having a control, nongrafted comparison. The 'Estamino/BHN589' rootstock performed best at 4 of the six test locations relative to the other two rootstocks evaluated for 'BHN 589' tomato. The 'Maxifort/BHN589' rootstock had significant marketable yields and was perceived to be the best rootstock by two of the grower cooperators. The nongrafted control was planted 3 weeks later in the WVU trial but was harvested for the same duration as the grafted rootstocks in this trial. The 'Estamino/BHN589' had the highest total marketable yield with significantly higher weight per fruit relative to nongrafted 'BHN 589' tomatoes. Marketable yield per plant was 30% higher with the "Estamino" rootstock relative to the nongrafted with a 15% higher yield of US #1 tomatoes relative to nongrafted controls. Overall, grafted plants were vigorous with large diameter stems and significantly greater leaf area than the nongrafted tomatoes. There was very little yellow shoulder disorder (YSD) observed on all rootstocks even in extreme heat stress of August. Brix/SS measurements did indicate a higher level of soluble solids of rootstock fruit relative to the control (data not shown). Leaf area duration of the grafted varieties was also significant. Growers were impressed with the longevity of harvest from the grafted tomatoes as well as fruit size and marketable yield. Based on results from this evaluation, growers are very interested in using grafted tomatoes for high tunnel production in West Virginia.

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