2004 NEW JERSEY HEIRLOOM TOMATO CULTURAL TRIAL RESULTS[1]

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Introduction

Most heirloom tomatoes have an indeterminate growth habit which makes them difficult to manage. At present all cultivar evaluations have been carried out using eight-foot stakes. These stakes are hard to place and are less stable than standard tomato stakes. Some growers are trying to produce heirlooms on the ground with straw mulch. The objective of this study was to evaluate the use of three different growing systems to produce heirloom tomatoes.

Materials and Methods

Culture

All seeds were disinfected with chlorine bleach (1 part Clorox in 4 parts water for two minutes then rinsed in water for 10 minutes). Seeds were sown on April 8 in 72-cell trays (1 1/2" X 1 1/2") containing peat vermiculite media at the Rutgers Agricultural Research and Extension Center (RAREC). Seedlings were thinned to 1 plant per cell on April 27. Plants were grown in a greenhouse until one week before transplanting when they were placed in an outside protected area to harden off. On May 7 *imidacloprid* (Admire) was applied as a drench to the seedlings before transplanting at a rate of three milliliters (ml) per flat (72 plants) in sufficient water to saturate the growing media without draining off.

The trial was established in a field (Chillum silt loam, 6.45 pH) at RAREC in Upper Deerfield. Beds on 6-ft centers were formed and black plastic mulch with drip irrigation tube was laid. On May 14 plants were set in the field using a water wheel transplanter in single rows with 24 inches between plants. After transplanting, the two lower suckers were removed from each plant and the following treatments were superimposed on the cultivar 'Mortgage Lifter':

1. 4 ft. tomato stakes
2. 8 ft tomato stakes
3. No stakes with straw mulch placed over the black plastic

For those plots with stakes, one stake was placed between every two plants. Tomato string was used to hold the plants on the stakes. The first string was placed 6 inches off the ground and the remaining strings (5 – 7) were placed at 8 – 12 inch intervals.

Before bed making and based on soil testing, 60 lbs/A of nitrogen, plus phosphorus (P_2O_5) and potassium (K_2O) were disked into the sandy loam soil. For weed control, Devrinol 50DF (3 lbs/A) was applied and incorporated during bedding. After laying plastic, Devrinol 50DF(4 lbs/A), Sandea (1 oz/A) and Sencor 75 (1/3 lb/A) was applied between the beds. Three applications of 37 lbs/A of N, P_2O_5 and K_2O were applied through the drip system during the growing season. A total of 1.4 pounds per acre boron was applied with the other nutrients through the drip system. Insecticides (Spintor-6 oz/A July 18, Provado-3oz/A August 29 and Actara-4oz/A September 5) were applied for insect control. Diseases were controlled by applying the following materials: Bravo WS 3 pt/A (July 18, August 29, September 5 and 12); Bravo WS 1.5 pt/A (August 6); and

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Curzate 5 oz/A (July 18 and August 29). Rainfall was 3.82, 3.42, 5.55, 4.23 and 2.60 inches in May, June, July, August and September, respectively. Rainfall was supplemented with drip irrigation.

Experimental Design, Harvesting and Evaluations

The trial was arranged in a randomized complete block design in four replications with eight plants per replication. Tomatoes were hand harvested on July 15, 22 and 29, August 5, 11, 17 and 26, September 2, 8 and 16. Fruits were graded into marketable and culls, counted and weighed. Culls were further divided by type of defect (blossom end rot, insect damage, green shoulder, cat facing, zipper, rot, small, misshapen, cracks, sunburn and rain checking) and counted. All yield data is recorded in 25 lb. boxes.

Results and Discussion

Rainfall was distributed evenly throughout the production season, but the plants were not as vigorous in 2004. Data for the early harvest period are summarized in table 1. There were no statistical differences for total or marketable yield for the early harvests. The straw treatment did have significantly higher cull fruit, lower percentage marketable fruit and a smaller fruit size. There were statistically more rotten and fruit misshapen for the straw treatment than the stakes. For the early harvest period either 4 foot or 8 foot stakes would be sufficient to produce heirloom tomatoes.

Table 1. Heirloom tomato yield and fruit size for first, second, third and fourth harvest (early) – Rutgers Agricultural Research and Extension Center, Bridgeton, New Jersey – 2004.

Variety	Total Boxes/A	Marketable Boxes/A	Cull Boxes/A	% Marketable	Fruit Wt. Oz.
4 foot stake	875	773	102	89	11.12
8 foot stake	911	804	106	88	11.27
Straw mulch	917	734	183	80	10.50
LSD 0.05	**NS**	**NS**	**65.15**	**6.35**	**0.46**

Table 2 summarizes the yield data for the mid season harvests (5-7). The straw mulch treatment had a significantly higher total yield than the 4-foot stake treatment, but neither was different than the 8-foot stake treatment. There were no differences among the treatments for marketable yield. The 4 and 8 foot stake treatments had statistically few cull fruits, higher percentage marketable fruit and a larger fruit size than the straw mulch treatment. As with the early harvest, the straw treatment had significantly more rotten fruit than the other treatments.

Table 2. Heirloom tomato yield and fruit size for the fifth, sixth and seventh harvest (mid season) – Rutgers Agricultural Research and Extension Center, Bridgeton, New Jersey – 2004.

Variety	Total Boxes/A	Marketable Boxes/A	Cull Boxes/A	% Marketable	Fruit Wt. Oz.
4 foot stake	1511	1187	324	79	10.37
8 foot stake	1596	1297	299	81	10.14
Straw mulch	1721	1188	534	70	9.63
LSD 0.05	**156.43**	**NS**	**88.09**	**5.07**	**0.42**

The data for the late harvests are summarized in table 3. The 4 and 8-foot stake treatments did not differ significantly from each other, but out yielded the straw mulch treatment for total and marketable yield, percentage marketable fruit and fruit size. There was no statistical difference among the treatments for cull fruit.

Table 3. Heirloom tomato yield and fruit size for the eighth, ninth and tenth harvest (late season) – Rutgers Agricultural Research and Extension Center, Bridgeton, New Jersey – 2004.

Variety	Total Boxes/A	Marketable Boxes/A	Cull Boxes/A	% Marketable	Fruit Wt. Oz.
4 foot stake	671	541	130	81	7.38
8 foot stake	692	545	148	79	7.27
Straw mulch	482	314	168	65	6.67
LSD 0.05	**109.3**	**72.83**	**NS**	**4.01**	**0.43**

Combined red fruits harvests are summarized in table 4. There were no significant differences among the three treatments for total yield or fruit size. The 8-foot stake treatment did produce statistically higher marketable yield, but it differed only from the straw mulch treatment. Both the 4 and 8-foot treatments had few cull fruit and higher percentage marketable fruit than straw mulch. The straw treatment had statistically more green shoulder, rotten, small and misshapen fruit than the 4 and 8-foot treatments.

Table 4. Heirloom tomato yield and fruit size for all harvests. – Rutgers Agricultural Research and Extension Center, Bridgeton, New Jersey – 2004.

Variety	Total Boxes/A	Marketable Boxes/A	Cull Boxes/A	% Marketable	Fruit Wt. Oz.
4 foot stake	3057	2501	556	82	9.71
8 foot stakes	3199	2646	553	83	9.64
Straw mulch	3120	2235	885	72	9.64
LSD 0.05	**NS**	**241.47**	**96.12**	**2.77**	**NS**

Table 5 contains the data for green fruit harvests. The 4 and 8 foot stake treatments had significantly higher total and marketable yield than the straw mulch treatment. Straw mulch did have statistically lower cull fruit than the 8-foot stake treatment, but it was not different from the 4-foot treatment. The 4-foot treatment did have significantly more small fruit than the other treatments. There were no statistical differences for percentage marketable fruit and fruit size.

Table 5. Heirloom tomato yield and fruit size for green fruit at the end of the season. – Rutgers Agricultural Research and Extension Center, Bridgeton, New Jersey – 2004.

Variety	Total Boxes/A	Marketable Boxes/A	Cull Boxes/A	% Marketable	Fruit Wt. Oz.
4 foot stake	464	383	82	82	5.39
8 foot stake	556	457	99	82	5.54
Straw mulch	228	181	47	80	5.14
LSD 0.05	**92.74**	**95.71**	**41.23**	**NS**	**NS**

Conclusion

Based on this trial heirloom tomatoes can be grown on 4-foot stakes without affecting yields. Staking was not necessary until after the seventh harvest for this cultivar. After that harvest more rotten fruit were observed in the straw mulched plots thus reducing yields. If the early season period had been rainy rots may have shown up earlier reducing straw mulch treatments. This work will be repeated in 2005.

NOTES