

Yield, Income, and Quality of Staked Tomato Cultivars in Eastern Kentucky

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Introduction

Kentucky growers produce approximately 1200 acres of staked, vine-ripe tomatoes for local and national sales. Kentucky tomatoes have an excellent reputation for quality among produce buyers. This trial evaluated new and existing cultivars to identify those that might produce a premium tomato with resistance to a potentially serious virus problem (Tomato Spotted Wilt Virus, TSWV). Cultivars were evaluated for yield, appearance, and potential return to growers. We wanted to see if new tomato cultivars with resistance to TSWV would produce attractive fruit, acceptable to the industry.

Materials and Methods

Sixteen fresh market, red-fruited tomato cultivars were evaluated at Quicksand, Kentucky (Table 1). According to soil test results (Table 2) the plot received 59 lb P₂O₅, 118 lb of K₂O and 59 lb N/A preplant. An additional 75 lb of N/A was applied through the drip irrigation lines during the growing season. Pest control was based on recommendations from ID-36, *Vegetable Production Guide for Commercial Growers*. Fungicides were applied weekly and insecticides, as needed.

Trays were seeded in the greenhouse at Quicksand on March 29th. Black plastic mulch and drip tape were laid on May 9 and tomatoes were transplanted the same day. Cultivars were replicated four times with eight plants per replication. Plants were spaced 18 in. within rows. Rows (bed centers) were 7 ft. apart to allow the sprayer to be driven between beds.

Eight harvests were made during this trial. The tomato cultivars were harvested when the fruit was at the breaker stage. Data collected included: grade, weight and count for extra large (>3.5 in.), large (>2.5, <3.5 in.), No. 2, small (<2.5, >2.0 in) and cull tomatoes. Reasons for culling included catfacing, concentric or radial cracks, disease, scars, blossom end rot and uneven ripening. Incomes were calculated based on the prices received by growers for staked tomatoes in 2003 (Table 3).

Results and Discussion

The 2005 growing season was drier and warmer than normal. Rainfall totals for May through August were: 3.76, 2.86, 4.14 and 0.0 inches for a total of 10.76 inches. Extreme heat caused the tomatoes to stop fruiting in mid August. Bloom returned in September when lower temperatures returned. Due to dry weather the appearance of tomato fruit harvested was better than it was in 2003 and 2004.

Crista had the highest full season total marketable yield, but it was not significantly different from the yields of twelve of the other fifteen large-fruited cultivars (Table 4). BHN543, Crista and Quincy had significantly more boxes of jumbo and extra large tomatoes than Sunshine, Debut, and Applause. Biltmore had the highest percentage (19 %) of cull tomatoes which was significantly higher than ten of the other cultivars. Cash returns ranged from \$6429 to \$9429 per acre but did not differ significantly among the sixteen cultivars. Crista, Amelia and

BHN543 had the highest cash returns, but did not differ significantly from the other 13 cultivars. The major reason there were no significant differences can be seen in Table 5. Most of the lower yielding cultivars (Applause, Debut, Sunshine) produced over 70% of their fruit early and received higher prices. Higher yielding cultivars BHN543, Crista, and Quincy produced higher percentages (22-48%) of fruit later in the growing season when prices were lower. A good yield and a high percentage of early fruit helped Amelia finish second in total returns while being eighth in total marketable fruit for the season.

There was a significant difference in the percentage of jumbo/extra large tomatoes. Mountain Fresh Plus, Indy, Mtn. Crest and Sunshine had significantly lower percentages than three of the other cultivars.

Tomatoes were rated for visual appearance at both Lexington and Quicksand. Based on visual ratings of the sixteen cultivars (Table 6), Sunshine, Applause, Debut did not produce commercially acceptable fruit. The best looking tomato cultivars were Mtn. Spring followed by Mtn. Fresh Plus, Crista and Mtn. Crest.

Growers should use caution when selecting any vegetable cultivar based on one year's results at a single location. See also the trial report for the same varieties tested at Lexington.

Table 1. Tomato cultivars, descriptions and reported disease resistance, grown at Quicksand and Lexington, KY, 2005.

| Variety Name (Company) | Comments/Description ¹ |
|-----------------------------|--|
| Amelia VR (HM) | Determinate, red, 80 days, resistant to 1,2,3,12 |
| BHN444 (BHN) | Determinate, red, 80 days, resistant to 1,2,3,12 |
| Crista [NC 0256] (HM) | Determinate, red, 75 days, resistant to 1,2,3,4,9,12 |
| SunGuard (SM) | Determinate, red, 77 days, resistant to 1,2,3,6,7,9 |
| SunShine (SM) | Determinate, red, 67 days, resistant to 1,2,3,6,7 |
| Mt. Spring (RG) | Determinate, red, 72 days, resistant to 1,2,3 |
| Mt. Fresh Plus (HM) | Determinate, red, 78 days, resistant to 1, 2, 3, 13. |
| Mt. Crest (SU) | Determinate, red, 75 days, crack resistant, resistant to 1,2,3 |
| Applause (SM) | Determinate, red, 67 days, unknown resistance |
| Quincy (SM) | Determinate, red, 80 days, early to midseason, resistant to 12 |
| Debut (SM) | Determinate, red, 66 days, resistant to 1,2,3,6 |
| Soraya (SM) | Determinate, red, 80 days, resistant to 1,2,3,7,9 |
| Biltmore VFF (RG) | Determinate, red, 77 days, resistance to 1,2,3,6,7 |
| RTF 6153 (RG) | Determinate, red, 77 days, resistant to 1,2,3,7 |
| Indy (RG _{ljcs1}) | Determinate, red, 75 days, resistant to 1,2,3,7 |
| BHN 543 (BHN) | Determinate, red, 72 days, resistant to 1,2,3,4 |

¹1-Verticillium Wilt, 2-Fusarium Wilt R1, 3-Fusarium Wilt R2, 4-Nematode tolerant, 5-TMV tolerant, 6-Alternaria Stem Canker tolerant, 7-Stemphylium tolerant, 8-Bacterial Speck tolerant, 9-Fusarium Wilt R3, 10-Late Blight, 11-Bacterial Leaf Spot, 12- Tomato Spotted Wilt Virus, 13-Early Blight tolerant.

Table 2. Results from soil test at Quicksand, KY, 2005.

| pH | Buffer pH | P | K | Ca | Mg | Zn |
|-----------|------------------|----------|----------|-----------|-----------|-----------|
| 6.6 | 7.02 | 75 | 245 | 2906 | 210 | 3.5 |

Table 3. Prices used to calculate incomes--actual farm gate prices paid by Cumberland Farm Products Cooperative in 2003. Yields of each size class/grade were multiplied by these prices for the appropriate harvest dates to calculate "income per acre" for each cultivar.

| Week | No. 1 Jumbo & X-Large | No. 1 Large | No. 2s |
|-------------|--------------------------------------|--------------------|---------------|
| | -----price per pound----- | | |
| 7/12 | \$0.34 | \$0.21 | \$0.21 |
| 7/19 | 0.34 | 0.21 | 0.22 |
| 7/26 | 0.30 | 0.17 | 0.22 |
| 8/2 | 0.29 | 0.15 | 0.19 |
| 8/9 | 0.20 | 0.11 | 0.09 |
| 8/16 | 0.12 | 0.09 | 0.08 |

Table 4. 2005 Fresh market tomato full season yields at Quicksand, KY, 2005. Data are means of 4 replications.

| Cultivar | Jumbo & extra large (boxes/acre) ¹ | | Total marketable yield (lbs) ^{1,2} | | Pounds | |
|----------------------|---|-------------------|---|-------------|-----------------------------|------------------------------|
| | extra large | % extra large | yield | Income (\$) | No. 2 Tomatoes ¹ | Percent culls ^{1,3} |
| BHN 543 | 3126 ^A | 95 ^{ABC} | 82,349 ^{AB} | \$9,114 | 8012 ^{ABC} | 14 ^{AB} |
| Crista | 3062 ^A | 93 ^{ABC} | 83,273 ^A | \$9,668 | 3293 ^F | 6 ^B |
| Quincy | 3048 ^A | 95 ^{ABC} | 79,951 ^{ABC} | \$8,453 | 7571 ^{ABCDE} | 10 ^B |
| BHN 444 | 2889 ^{AB} | 92 ^{ABC} | 79,069 ^{ABC} | \$8,227 | 9490 ^A | 9 ^B |
| SunGuard | 2871 ^{AB} | 94 ^{ABC} | 76,424 ^{ABCD} | \$8,672 | 5121 ^{BCDEF} | 8 ^B |
| Amelia | 2858 ^{AB} | 96 ^{AB} | 74,181 ^{ABCD} | \$9,201 | 4693 ^{BCDEF} | 9 ^B |
| Mt. Fresh Plus | 2754 ^{AB} | 90 ^{BC} | 76,346 ^{ABCD} | \$8,660 | 4958 ^{DEF} | 7 ^B |
| Indy | 2724 ^{AB} | 89 ^C | 75,828 ^{ABCD} | \$8,727 | 3850 ^{EF} | 8 ^B |
| Mt Spring | 2711 ^{AB} | 95 ^{ABC} | 71,446 ^{ABCD} | \$8,003 | 5147 ^{BCDEF} | 8 ^B |
| Mt Crest | 2672 ^{AB} | 91 ^{BC} | 73,559 ^{ABCD} | \$7,938 | 4900 ^{BCDEF} | 10 ^B |
| Soraya | 2552 ^{AB} | 96 ^{AB} | 66,312 ^{ABCD} | \$6,429 | 3967 ^{DEF} | 12 ^{AB} |
| Biltmore VFF | 2530 ^{AB} | 98 ^A | 64,536 ^{ABCD} | \$7,480 | 4408 ^{CDEF} | 19 ^A |
| RFT 6153 | 2417 ^{AB} | 94 ^{ABC} | 63,810 ^{ABCD} | \$7,106 | 5523 ^{BCDEF} | 12 ^{AB} |
| SunShine | 2092 ^B | 89 ^C | 58,715 ^{BCD} | \$7,392 | 7856 ^{ABCD} | 12 ^{AB} |
| Debut | 2090 ^B | 92 ^{ABC} | 56,991 ^{CD} | \$7,091 | 8505 ^{AB} | 13 ^{AB} |
| Applause | 2006 ^B | 94 ^{ABC} | 53,102 ^D | \$6,826 | 4849 ^{BCDEF} | 10 ^B |
| <i>Duncan-Waller</i> | | | | | | |
| <i>LSD (5%)</i> | 925 | 6.6 | 24,894 | <i>ns</i> | 3948 | 8.5 |

¹ Means followed by the same letter are not significantly different ($P < 0.05$).

² Includes all grades except culls.

³ A small amount of blotchy ripening was seen in some cultivars during the last two harvests in August.

Table 5. 2005 Tomato early and late income by cultivar, Quicksand, KY, 2005. Data are means of 4 replications.

| Cultivar | Early income¹ | Late income¹ | Total Income | % Early income |
|-----------------|---------------------------------|--------------------------------|---------------------|-----------------------|
| Crista | \$4,674 | \$4,995 | \$9,668 | 48% |
| Amelia | \$5,089 | \$4,112 | \$9,201 | 55% |
| BHN 543 | \$3,183 | \$5,931 | \$9,114 | 35% |
| Indy | \$3,883 | \$4,844 | \$8,727 | 44% |
| Sungard | \$3,110 | \$5,562 | \$8,672 | 36% |
| Mt. Fresh Plus | \$2,589 | \$6,072 | \$8,660 | 30% |
| Quincy | \$1,882 | \$6,571 | \$8,453 | 22% |
| BHN 444 | \$3,081 | \$5,146 | \$8,227 | 37% |
| Mt. Spring | \$3,705 | \$4,298 | \$8,003 | 46% |
| Mt. Crest | \$2,387 | \$5,551 | \$7,938 | 30% |
| Biltmore | \$2,670 | \$4,811 | \$7,480 | 36% |
| Sunshine | \$5,812 | \$1,580 | \$7,392 | 79% |
| RTF6153 | \$2,019 | \$5,087 | \$7,106 | 28% |
| Debut | \$5,058 | \$2,033 | \$7,091 | 71% |
| Applause | \$5,349 | \$1,477 | \$6,826 | 78% |
| Soraya | \$2,075 | \$4,354 | \$6,429 | 32% |

¹Early income was that earned with tomatoes harvested prior to July 30 and late income was income earned after this date.

Table 6. Tomato fruit appearance ratings from Lexington and Quicksand, KY, 2005.

| Cultivar | Visual Rating ¹ | | Average | Comments (Quicksand only) |
|----------------|----------------------------|-----------|---------|--|
| | Lexington | Quicksand | | |
| Mt. Spring | 8 | 6 | 7.0 | Blotchy ripening/yellow shoulder disorder (slight 1 picking) |
| Mt. Fresh Plus | 7 | 6 | 6.5 | |
| Mt. Crest | 6 | 7 | 6.5 | BR/YSD ² (slight 1 time) |
| Amelia | 7 | 5 | 6.0 | BR/YSD (slight 1 time) |
| SunGuard | 7 | 7 | 7.0 | |
| Crista | 7 | 6 | 6.5 | |
| BHN 444 | 7 | 5 | 6.0 | |
| BHN 543 | 6 | 6 | 6.0 | BR/YSD (slight 1 time) |
| SunShine | 4 | 4 | 4.0 | Ugly, late in the season |
| Applause | 4 | 2 | 3.0 | Ugly |
| Quincy | 5 | 6 | 5.5 | Ugly later in the year. |
| Debut | 4 | 3 | 3.5 | Ugly! Many times during the year |
| Indy | 5 | 5 | 5.0 | |
| Soraya | 4 | 6 | 5.0 | Ugly |
| Biltmore VFF | 4 | 6 | 5.0 | |
| RTF 6153 | 6 | 6 | 6.0 | |

¹1= worst, 9= excellent, 5 is minimum acceptable for commercial sales.

²BR/YSD = Blotchy ripening or yellow shoulder disorder.