HEAT-TOLERANT TOMATO CULTIVAR EVALUATION – 1998

EXECUTIVE SUMMARY: This study compared the growth and yield of five tomato cultivars and three advanced experimental lines reported to be tolerant of high temperatures. The highest yielding entries 'Heatwave' and XPH-10035 were equal in total yield to that of 'Sunleaper', 'Equinox', 'Sunmaster', and XPH-10047, but they produced significantly greater total yield than ACX-12 and 'Solar Set'. The experimental line XPH-10035 yielded significantly more extra-large fruit and had a significantly higher average fruit weight than any other entry in this study.

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LOCATION: Horticulture Research Unit, Verona

COMMODITY: Vegetables

STATUS: First year of a continuing study

REPORT:

Soil Type: Quitman silt loam.

Experimental Design: Randomized complete block design with four replications.

Materials and Methods: This study was located on the "upland" soils of the Verona experiment station. Plant beds were formed six inches high and 30 inches across the top with a press-pan-type bed shaper. Preplant fertilizer was banded on both sides of the plant bed during formation at the rate of 9 lb of 13-5-31 (N-P_2O_5-K_2O) per 100 ft of row. Drip tape, rated at 0.5 gallons per 100 ft at 10 psi, was placed on top of the raised beds while white-on-black plastic mulch, white side up, was applied over the beds.

Seed of the eight entries were planted into 48-cell flats containing a commercial peat/vermiculite potting medium. Seven of the entries were seeded the first week of June at the Truck Crops Research and Extension Center in Crystal Springs and the remainder, 'Equinox', was seeded the second week of June at the Verona location. Plants of each entry were transplanted by hand to the Verona study July 24. Plants were spaced 20 inches apart in rows spaced six feet apart. Ten plants were planted in each plot, making a total of 320 plants in this study (ten plants x eight cultivars x four replications). Commercial tomato stakes were placed every other plant and plastic twine was applied as plants grew to form a stake-and-weave support system.

Entry	Source
ACX-12	Abbott & Cobb
Equinox	GCREC
Heatwave	Petoseed
Solar Set	Asgrow
Sunleaper	Seedway
Sunmaster	Petoseed
XPH-10035	Asgrow
XPH-10047	Asgrow

Asana XL or Thiodan EC was mixed with Bravo WS and applied on a 7- to 10-day spray schedule with an air-blast sprayer for insect and disease control. Water or fertilizer

solution was applied through the drip tape on an as-needed basis. Fertilizer was applied by injecting a concentrated fertilizer solution (13.3 oz of a high-grade soluble 20-20-20 fertilizer per gallon of water) at a 1:200 ratio to achieve a final N content of 100 ppm.

A total of eight harvests lasted from Sept. 12 to about the first frost, Oct. 22. Fruit from each plot were separated into USDA categories of medium, large, extra-large, and cull and then counted and weighed. Southern blight was the most common cause of plant loss.

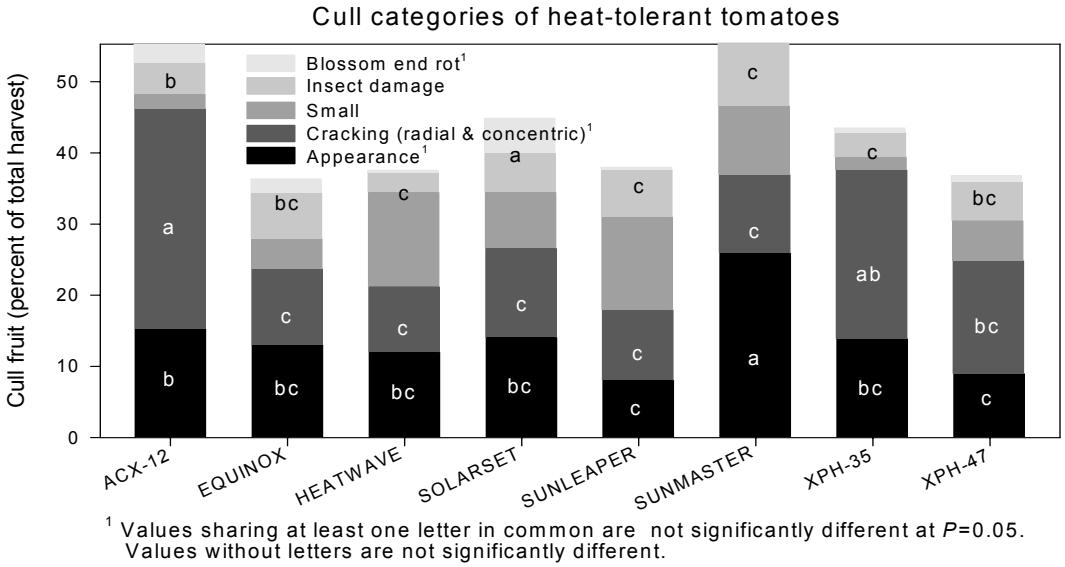
Results: Results are shown in the table below. The highest yielding entries 'Heatwave' and XPH-10035 were equal in total yield to that of 'Sunleaper', 'Equinox', 'Sunmaster', and XPH-10047, but they produced significantly greater total yield than ACX-12 and 'Solar Set'. 'Heatwave' produced significantly more medium-sized fruit than any other entry—37% of total yield. In contrast, XPH-10035 produced significantly more extra-large fruit than any other entry—80% of total yield. XPH-10035 also produced significantly greater average fruit weight than any other entry.

Heat-tolerant tomato evaluations

Entry	Total[1] (lbs/100 ft)	Medium[2] (%)	Large[2] (%)	X-large[2] (%)	Total[3] (%)	Fruit wt.[4] (oz)	Stand[5] (%)
Heatwave	364 a[6]	37 a	28 bc	35 d	60 a	6.9 e	85
XPH-10035	363 a	5 d	16 d	80 a	57 a	10.0 a	90
Sunleaper	356 ab	20 bc	31 abc	49 c	59 a	7.4 cde	83
Equinox	341 ab	23 b	35 ab	42 cd	63 a	7.4 cde	95
Sunmaster	302 ab	21 b	27 c	52 bc	44 b	7.7 bcd	93
XPH-10047	293 ab	16 bc	31 abc	54 bc	61 a	7.9 bc	88
ACX-12	257 bc	12 cd	25 c	64 b	45 b	8.0 b	95
Solar Set	182 c	20 bc	38 a	42 cd	54 ab	7.2 de	78

[1] Total pounds of marketable yield per 100 ft of row.
[2] Relative pounds of medium, large, or extra-large fruit as the percentage of total pounds marketable fruit.
[3] Relative number of marketable fruit as the percentage of total number (marketable plus cull) harvested.
[4] Average weight of marketable fruit.
[5] Relative number of surviving plants as the percentage of total number planted.
[6] Values in columns sharing at least one letter in common are not significantly different at P=0.05. Values in columns without letters are not significantly different.

A large number of cull fruit were produced by all entries in this study and this resulted in low values for relative number of marketable fruit, ranging from a high of 63% to a low of 44%. The graph below shows the relative number and type of cull fruit for each entry. The most severe problems were associated with fruit appearance (scarring, misshapen fruit, and sunscald) and fruit cracking. 'Sunmaster' exhibited significantly more problems with fruit appearance than any other entry because it was especially prone to blossom end catfacing. Catfacing occurred during the last two harvests of September and is reported to be caused by lower than normal temperatures, high levels of nitrogen fertilization, and/or heavy pruning. 'Sunmaster' was also prone to the formation of small scars on the shoulders of the fruit, which occurred on most entries toward the end of the experiment



and may have been caused by spray injury. XPH-10035 exhibited significantly more cracking than any other entry except ACX-12 and XPH-10047. The relative number of fruit exhibiting blossom end rot was small; however, 'Solar Set' exhibited significantly more blossom end rot than any other entry. 'Sunleaper' produced the most number of small fruit, but this number was not significantly more than any other entry. 'Heatwave' exhibited noticeably thinner, less dense, foliage than the other entries, but this did not appear to cause more problems with sunscald.

Discussion: Most tomato cultivars exhibit problems with fruit set during hot and humid weather. This is often the result of low pollen viability and inadequate pollen transfer from the stamens to the pistil at high temperatures and high humidities. Heat-tolerant tomatoes are reported to have the ability to set fruit at higher temperatures than normal tomatoes. The ability to produce high yields of high quality tomatoes during the heat of the summer's growing season would benefit North Mississippi producers.

This report represents data from one study and one growing season; therefore, care should be taken when applying these results without further information. Heat-tolerant tomato cultivars and advanced experimental lines will be evaluated again next season during the heat of Mississippi's summer.

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