

Kentucky Greenhouse Tomato Production Trials

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Many questions regarding greenhouse tomato production in tobacco transplant greenhouses were generated in the early 1990s. Years of experience showed that low winter light and high heating costs created a major problem for fall winter greenhouse tomato production in Kentucky. We felt that determinate field tomato varieties might be grown for a fall crop in a simple tobacco transplant greenhouse. Trials were completed with farmer cooperators and at the University of Kentucky Horticulture Research Farm in 1995 and 1996 to evaluate late summer and fall production for greenhouse tomatoes. Results of these low-tech trials are presented here.



Fertilizer and Growing Media

In our 1995 and 1996 tomato trials at UK, Scotts (Peters) MiracleGro Excel CalMag, 15-5-15, fertilizer was used successfully as a single fertilizer from a single injector. This fertilizer combines all nutrients in the same mix. The pH of the growing media did increase during the later stages of the crop due to the alkaline reaction of the fertilizer. Applications of acid fertilizer were successful to eliminate iron deficiency symptoms.

A number of growing media - peat based, bark based, coir based, soil based and muck peat based potting soil - were used in the greenhouse tomato trials at UK in 1995. There were no significant differences in fruit yield between these mixes with the variety 'Solarset.' Tobacco growers involved with the same project used the same medium they used for tobacco transplants with success.



Figure 1 Greenhouse tomatoes grown in a tobacco greenhouse by a Kentucky farmer cooperator in 1996.

Table 1. Tomato fruit yield from the determinate variety 'Solar Set' grown in six different growing media in greenhouse tomato trials in the fall of 1995.

Growing Medium	Average pounds per plant	Average number of fruit per plant	Average ounces per fruit
MetroMix 360 (coir)	7.2	12.8	8.9
MetroMix 360 (peat)	6.4	12.4	8.2
MetroMix 510 (bark)	7.2	13.3	8.6
Progrow (bark)	7.0	12.6	8.8
House Plant Potting Soil (muck peat)	5.9	10.6	8.9
Recycled media (20% soil, 80% peat; sterilized)	6.6	13.0	8.1

Tomato Variety Selection

The 1995 UK greenhouse tomato trials involved the use of determinate field tomato varieties. We chose these varieties because they produce only 4-6 clusters of fruit. We hoped all fruit would be harvested from October 15 to December 15 in order to reduce the typical high heat costs and low light problems of winter production. Observations in the fall of 1994 demonstrated that the determinate varieties 'Solar Set,' 'Mt. Spring' and 'Sunbeam' might be successful.

Table 2. Tomato fruit yield from four determinate varieties and one indeterminate variety (Greenhouse 761) from greenhouse trials in the fall of 1995. Seed were sown July 6, 1995 or July 18 (for Solar Set-18) and transplanted August 15. Fruit were harvested from October 20 to December 20, 1995.

Tomato Variety	Average pounds per plant	Average number of fruit per plant	Average ounces per fruit
Florasette	6.3	11.2	9.0
Greenhouse 761	7.8	12.0	10.4
Mountain Spring	6.1	8.7	11.4
Solar Set-6	7.0	12.3	9.1
Solar Set-18	6.8	10.9	10.1
Sunbeam	6.4	10.2	9.9

The average total weight of fruit harvested from each plant ranged from 6.1 to 7.8 pounds (Table 2), but was quite variable between plants ranging from 4 to 13 pounds per plant. Approximately 11 fruit were harvested from each plant, as an overall average, and the average fruit weighed about 10 ounces. There were no statistical differences between the yields of the five varieties in the UK trials in 1995, but we felt 'Solarset' was the best variety for fall performance.

The 1996 UK greenhouse tomato trials compared determinate field tomato varieties with indeterminate garden varieties and indeterminate commercial greenhouse varieties. Two of the garden varieties selected had small fruit size so potential yields of these specialty salad tomatoes could be determined.

Table 3. Tomato fruit yield from five determinate varieties and nine indeterminate varieties (four garden varieties and five commercial greenhouse varieties) from greenhouse trials in the fall of 1996. Seed were sown July 15, 1996 and were transplanted August 20. Fruit were harvested from October 20 to January 8, 1997.

Tomato Variety	Average pounds per plant	Average number of fruit per plant	Average ounces per fruit
Common Indeterminate Garden Tomato Varieties from Park Seed Co.			
Better Boy	9.6	18.3	8.5
Celebrity	10.0	21.0	7.7
Enchantment	8.5	40.9	3.4
First Lady	8.2	27.2	4.8
Common Determinate Fresh Market Commercial Tomato Varieties			
Florasette	7.1	15.9	7.0
Mountain Fresh	8.5	15.1	9.1
Mountain Spring	7.4	12.8	9.4
Solar Set	7.3	14.8	7.8
Sunbeam	7.8	14.6	8.6
Commercial Indeterminate Greenhouse Tomato Varieties from DeRuiter Seed Co.			
DRW3579	12.0	23.3	8.3
Furora	9.8	24.3	6.4
Laura	9.1	15.9	9.1
Switch	11.0	23.6	7.5
Twin	10.4	20.4	8.0

The average total weight of fruit harvested from the determinate varieties was quite similar in both years, but fruit size decreased and fruit number per plant increased in 1996 (Table 3). Yields of 'Better Boy' and 'Celebrity' and the commercial indeterminate varieties had significantly higher yields than the determinate varieties. The average total weight of fruit and average fruit number per plant was greater but average fruit weight was variable. However, harvest was delayed 1 to 2 weeks on the greenhouse varieties when compared to the determinate varieties. The small-fruited varieties performed reasonably well. The determinate varieties grew to a height of 3 to 4 feet while the indeterminate varieties, topped after the 6th cluster, grew to 6 feet tall. The general yield increase in 1996 could be attributed to better weather in November and December compared to 1995. Ten pounds per plant was the general goal of this demonstration project when it was initiated and this goal was met with standard greenhouse varieties. Thus, it is appropriate that greenhouse operators choose commercial greenhouse tomato varieties, e.g. 'Trust,' 'Caruso,' etc. for best yields for fall tomato production.

Flower Pollination

In the 1995 and 1996 UK trials, we deliberately did not make a special effort to pollinate the flowers by hand or with purchased bees. We left the greenhouse sidewalls open during the day and feral (native) bees and the wind were responsible for pollination and the fruit yields described

above. Additionally, we did not use pesticides while flowers were open. We cannot recommend that all pollination can be done this way, but it was reasonably successful during our trials.

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