

**High Tunnel Hanging Baskets, 2010**  
**A Partnership grant funded by NE SARE**  
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**Cornell Vegetable Program**

**Introduction**

High tunnels offer a vertical production environment that is often not fully utilized. Hanging baskets of petunias were selected by the PI and cooperating farmer as a trial crop for economic evaluation due to their ability to harvest sunlight while, potentially, not interfering with the production of other tunnel crops grown below. The production of hanging baskets in an unheated high tunnel also would represent a dramatic decrease in fuel inputs compared to a heated greenhouse. Risks include the shading of an in-ground tomato crop and spread of insects and diseases between the flowers and vegetables. Although research from 2009 showed a net positive impact of the baskets on tunnel economic performance, tomato yields were decreased and overall profits were negligible. In 2010 the project team repeated the research with an additional lower density treatment. Will hanging baskets always reduce tomato yield? Please read on.

**Materials and Methods**

Multiple colors of 'Shock Wave Petunias' (Ball Seed Company, Chicago, Ill) were seeded on February 16 (pelleted seed) in a commercial potting mix (Promix, Premier Horticulture, Quebec). These were subsequently transplanted to 48-cell transplant flats at the 2-leaf true stage on March 12. A final transplant took place on April 12, when 4 plants per 12-inch hanging basket were transplanted and hung on the hoop-cross pieces of a 20 by 240-foot unheated high tunnel. Baskets were hung in two blocks of densities, 16 square feet per basket and 32 square feet per basket. A 24 x 20' portion of the tunnel was left without baskets as a control. Irrigation was accomplished with drip emitters, fertigation twice per week with 20-20-20 plus micronutrients (Millers Nutri-Leaf Greenhouse Grade) at 150-200 ppm Nitrogen, plus phosphoric acid sufficient to achieve irrigation water pH of 6.2, per grower standards.

Seeds of BHN 589 tomatoes (obtained from Sieger's Seeds) were also planted on February 16 and subsequently transplanted to 3-inch pots once foliage from adjoining plants began to shade each other on March 2. Tomatoes were then transplanted on April 12 into the tunnel soil, a Lima silt loam soil (pH 6.6), with 5 blocks of 8 plants each randomized under the three different blocks of baskets; 16 sq ft spacing, 32 sq ft spacing, and the control without any overhead baskets. Black plastic mulch and drip tape (Chapin Watermatics, 1.0 GPM/100', 4-inch emitter spacing) were laid prior to transplanting. Plants were irrigated as needed and fertilized with 12-48-8, 20-20-20 and 9-15-30 plus micronutrients throughout the season, per grower practice.

Petunia baskets were 'pinched' one time on April 22 to promote branching. A Cornell Vegetable Program Technician scouted weekly for pests and diseases. Baskets were removed from the tunnel beginning May 12 with the last sale on June 12. Price data was collected for all baskets sold at the Finger Lakes Produce Auction (Penn Yan, NY). Tomatoes were harvested multiple times per week from June 23 to October 22. Total weight of fruit per block was recorded at each harvest. Data was analyzed using statistical software Analysis of Variance (ANOVA) procedure, and treatment means (baskets vs. no-baskets) were separated using Fisher's Least Significant Difference ( $p < 0.05$ ).

## **Results**

Tomatoes grown without any baskets overhead (control) gave a mean yield of 24.63 lbs per plant compared to 24.18 lbs per plant for those with a low density of baskets and 25.08 lbs per plant under the high density of petunia hanging baskets. These differences were not significantly different (chart 1). The Baskets received an average price of \$8.09 at wholesale auction (chart 2). There were no recorded insect or disease issues on either crop. The cooperating grower then estimated a \$4.59 input cost per basket, which includes labor for the project at the rate of \$10.00/hour.

## **Discussion**

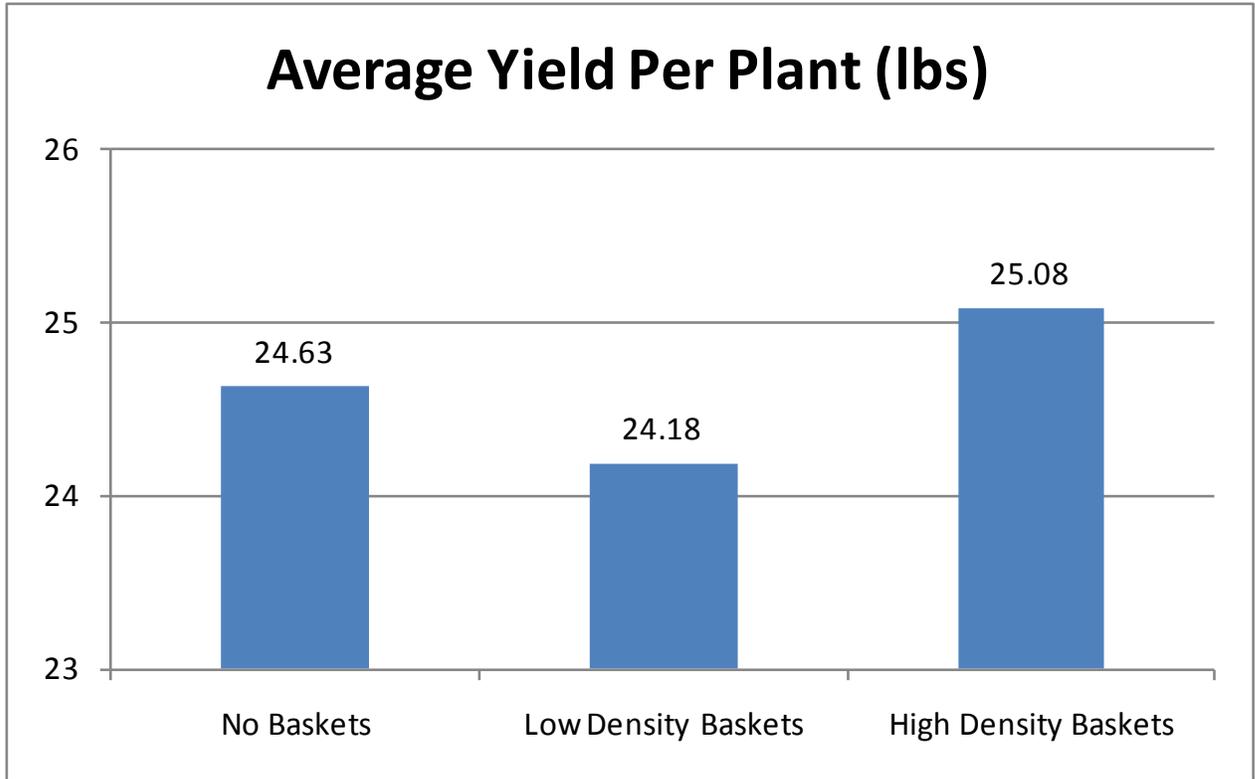
In this trial hanging baskets above high tunnel tomatoes did not reduce tomato yield, although they did in a 2009 trial. The baskets themselves performed well economically with a wholesale gross of 8.09 per basket, netting \$3.50/basket (after expenses are deducted). Hanging petunia baskets would give a net return of \$525 per tunnel, if the tunnel were planted uniformly at a density of 32 sq ft per basket (75 baskets in 4800 sq ft). At the high density planting, of 16 sq ft per basket, the net return increases to \$1050 for the tunnel. It should be noted the grower reported a higher price for retail markets of 13.75 per basket. This would dramatically improve economic performance, yet these markets have additional marketing expenses and may not sustain the same volume of sales as the wholesale auction.

It should be noted that a similar trial in 2009 decreased tomato yields which when entered into the economic analysis brought the net return per basket to \$0.73. At this low return, the system appears marginally profitable, yet increases the risk of insect and/or disease transmission from petunias to tomatoes. These include thrips, aphids, Tomato Spotted Wilt Virus, Botrytis Gray Mold and others. We highly recommend that growers considering this system start all their own petunia and tomato seeds on-farm to avoid importing the many pests and disease common to greenhouse flowers. We cannot recommend this multi-story approach to growers new to high tunnels as the management demand is high.

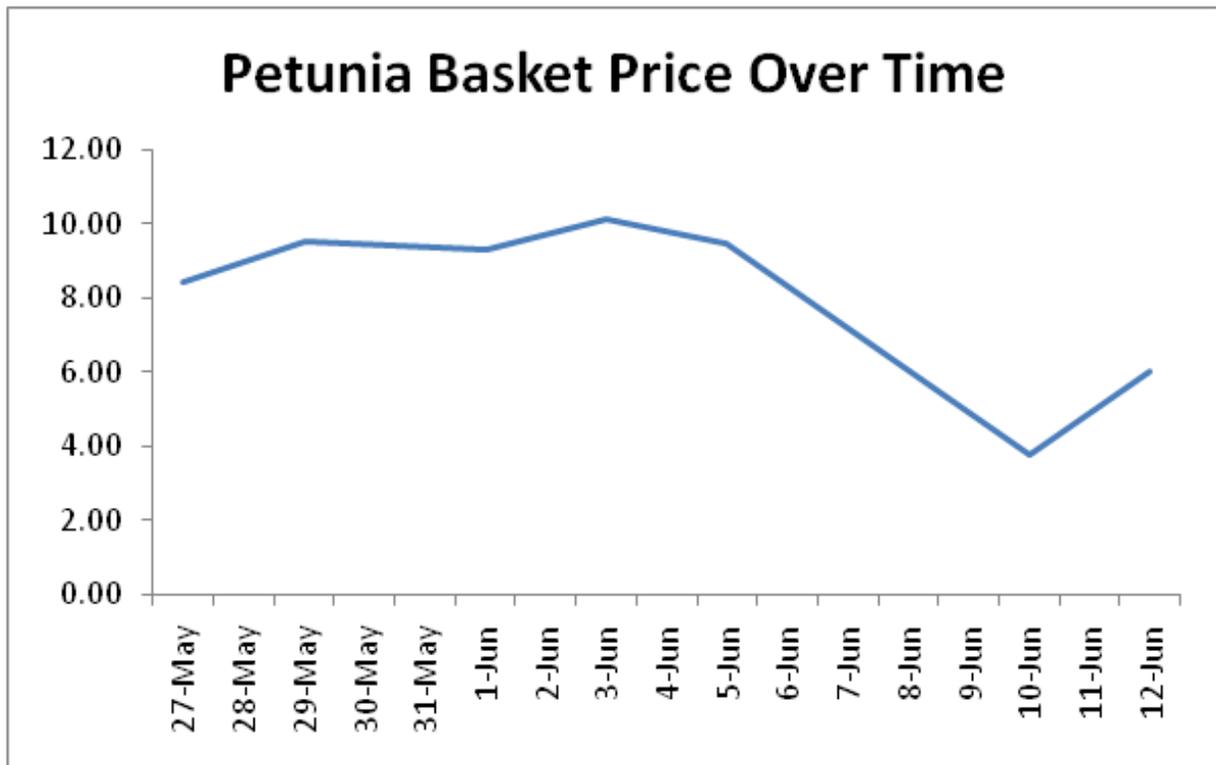
## **Conclusion**

Growing petunia baskets over an in-ground high tunnel crop was a profitable enterprise for the cooperating farm in 2010. Benefits include net economic gains as well as sales early in the growing season. Heat inputs for the flowers were constrained to the seedling production representing a decrease in fuel inputs. Caution is warranted as a 2009 trial did negatively impact tomato yields, and pest threats are significant.

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**Chart 1. Tomatoes yields under different densities of hanging baskets.**



**Chart 2. Wholesale prices of baskets grown without supplemental heat.**