



Healthy Food, Diverse Farms, Vibrant Communities

## Blue Gate Farm High Tunnels Take 2

### Cooperators

Jill Beebout, Sean Skeeahan

### Project Timeline

March-October 2009

### Web Link

[practicalfarmers.org/resources](http://practicalfarmers.org/resources)

### Contact

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### Funding

The Ceres Foundation

### Abstract

Jill Beebout and Sean Skeeahan of Blue Gate Farm constructed two high tunnels on their land. They recorded cultural and sales data in the fall of 2008 and spring and summer of 2009 to help determine if the high tunnels were paying back the cost of construction and providing potential to generate additional profit for the farm. Fall 2008 data report is available at the web link to the left. This report summarizes their spring and summer 2009 data. Revenue generated from their high tunnels paid back the initial investment. Blue Gate Farm looks to gain significant profit from their high tunnels, and the structures proved vital in 2009 when their outdoor crops performed poorly due to adverse weather conditions.

### Background

Iowa fruit and vegetable growers are extremely interested in season extension. Season extension allows crops to be grown, harvested, and marketed outside of their normal growing season. This appeals to farmers because they can get price premiums by selling "off season." Getting revenue for a larger part of the year makes it more plausible for fruit and vegetable growers to make a living. Season extension may also take the overwhelming work load off of the main season, when many growers work long hours.

High tunnels are a common season extension method. They are an investment, so it is important that crops grown inside of the high tunnel create enough revenue to cover the costs of the structure as well as add income to the farm operation. Extensive studies have been done about high tunnel crop production, but few have been conducted in Iowa. Season extension crop production, including scheduling and marketing, is site-specific, and growers need more information about Iowa's growing and selling climate in order to make informed decisions about the future of season extension in their operation.

High tunnels are often touted for their season extension, but can also be valuable in the main season where they offer a controlled environment. High tunnels have the potential to generate a higher quality crop, especially with sensitive crops.

The objective of this project was to create Iowa-specific documentation of scheduling and marketing of various crops in a spring and summer high tunnel.

### Method

Jill Beebout and Sean Skeeahan of Blue Gate Farm constructed two high tunnels on their farm. They plant two to three crops per bed each year in these tunnels.

High tunnel one is 26' x 48' x 12' with 4' roll-up sides (**FarmTek Premium High Tunnel with 4' rib spacing**). This high tunnel is covered with a double layer of 6 MIL plastic with an inflation fan to provide plastic tension and additional insulation. Ends are framed in for stability and access is through a 36" pedestrian door. Framing is done so end walls can be rolled up 36" if additional air venting is needed. There is one thermostat-controlled exhaust fan on the east end and 2 ceiling fans to promote air circulation. Small broadcast sprinklers are used for salad crops, all other irrigation utilizes T-Tape with 8" emitter spacing (12" emitter spacing for tomatoes). NOTE: for winter season roll-up sides are battened down with additional wire-lock, any necessary outside air comes from opening pedestrian door and rolling up ends. High tunnel one has four beds with 4' by 42' dimensions.

High tunnel two is 42' x 48' x 15' (**FarmTek Colossal High Tunnel with 4' rib spacing**). It is covered with a double layer of 6 MIL plastic with an inflation fan to provide plastic

tension and additional insulation. Ends are framed in for stability and access is through a 36" pedestrian door. The tunnel is framed so end walls can be rolled up 36" if additional air venting is needed. There is a thermostat-controlled exhaust fan and four ceiling fans to promote air circulation. Small broadcast sprinklers are used for salad crops, all other irrigation utilizes T-Tape with 8" emitter spacing (12" emitter spacing for tomatoes). High tunnel two has seven beds with 4' by 42' dimensions.

Data was taken on: plant date, transplant date (if applicable), planting rate and total square feet of crop, irrigation, indoor and outdoor temperature and humidity, labor hours, harvest window, yield, quality, and market price for each crop. Plant observations were recorded weekly.

Jill and Sean also observed differences in tomatoes planted in the high tunnel versus outdoors.

### Farm Cooperators



Jill Beebout and Sean Skeehan operate Blue Gate Farm near Chariton Iowa. They sell vegetables, honey, jam, fiber, and free range eggs via a 31 member CSA and the Des Moines farmer's market. They have two high tunnels that they will be using for this project.

## Results

Blue Gate Farm raised and took data on 26 crops in their high tunnels spring and summer 2009. Table 1 summarizes their overall sales from these crops.

Table 1. 2009 spring and summer high tunnel sales	
Direct sales revenue	\$4,662
CSA revenue	\$6,069
<b>Total revenues generated from high tunnels:</b>	<b>\$10,731</b>
Approximate seed expense	(\$262)
Approximate labor expense	(\$2,996)
Approximate insurance/utility expense	(\$200)
<b>Total seasonal expense for high tunnels:</b>	<b>(\$3,458)</b>
<b>Net high tunnel spring/summer 2009:</b>	<b>\$7,273</b>

Labor included wages paid at \$8/hour to their paid employee. Jill and Sean did not include their labor hours for this project, as they do not include their labor hours in profit and loss calculations for the farm. CSA revenue was calculated at 85% of retail price.

Appendix 1 summarizes the 26 crops grown in the high tunnel. More detailed records for these crops are available. Contact Sally if you are interested in acquiring these records. Seeding occurred from March 8 to April 20, transplanting from May 7 to June 10, and harvest from May 1 to October 13. Blue Gate Farm was able to provide fresh produce at the first farmer's market due to their high tunnel crops.

Chart 1 shows the top five revenue-generating crops. Varieties were

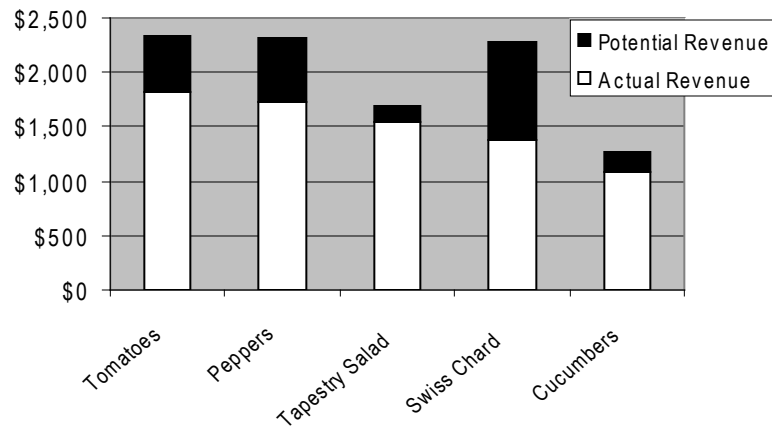


Chart 1. 2009 Revenue

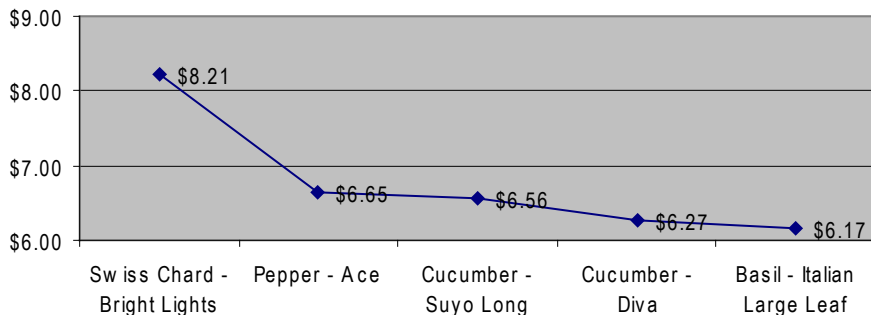


Chart 2. Revenue per square foot



Inside Blue Gate Farm's large high tunnel April 2009

combined into crop types to calculate revenue totals.

Potential revenue includes marketable crop that was not sold as well as crop unmarketable due to damage from frost, pests, or disease. Primary pests in the high tunnel in 2009 were spider mites and flea beetles, but overall damage was minimal. Tomatoes suffered from a potassium deficiency early in the season, but recovered after foliar applications of seaweed and liquid fish.

Chart 2 illustrates the five crops that rated highest for yield per square foot. Varieties were not combined and averaged into single crops for these as there were significant differences in this value by variety. Swiss chard harvest spanned both spring and summer, where other crops were harvested over a shorter window. Chart 3 shows total revenue percentages per crop.

Field tomatoes were planted roughly ten days after high tunnel tomatoes. 85% of Blue Gate's tomatoes for the season came from the high tunnel. Quality and yield of the high tunnel tomatoes greatly surpassed the field tomatoes. This was typical for many of the crops grown in the high tunnel. "With such unideal wet and cool conditions outdoors in 2009, our high tunnel crops were a staple in our CSA and at our farmer's market stand," said Sean. "We had some things such as zucchini planted in the tunnel that we wouldn't have if it weren't for this study. We saw how it performed in the high tunnel. It was great."

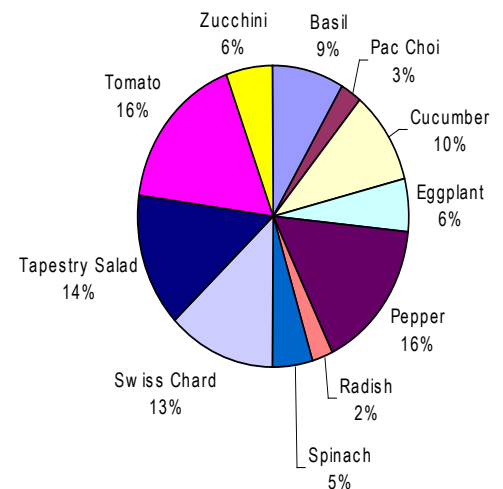


Chart 3. Revenue percentages per crop

## Conclusions

Blue Gate Farm invested a total of \$11,208 to construct their two high tunnels. Combined net revenue of fall 2008 (\$1,105) and spring and summer 2009 (\$7,273) paid off approximately 75% of the capital outlay. Blue Gate Farm recorded net revenue of \$3,800 from fall/winter 2009 crops. Although outside of the PFI trial dates, this additional revenue paid off the entire capital investment for both high tunnels in a time period of 16 months.

For Blue Gate Farm, this trial provided clear answers. Sean: “It confirmed what we already knew from prior high tunnel experience and suspected with these new tunnels: growing in a high tunnel can be profitable, and you can recover your capital expenses fairly quickly if the market is there.”

Records acquired from this trial paint an optimistic future for the use of high tunnels for Iowa growers.

**Appendix 1. Data summary of crops grown in Blue Gate high tunnels spring and summer 2009.**

	Sow date	Transplant date	Harvest date range	lbs. Marketable	lbs. not marketable	Potential revenue per sq. foot <sup>1</sup>	Actual revenue per sq. foot <sup>1</sup>	Total potential revenue	Total actual revenue	Labor hours <sup>2</sup>
Basil - Genovese	3/8	6/10	6/30 - 10/6	68.7	1.4	\$3.34	\$2.43	\$560.66	\$408.26	13.25
Basil - Italian Large Leaf	3/8	6/10	7/17 - 10/13	102.4	0.0	\$9.75	\$6.17	\$819.00	\$518.50	15.25
Pac Choi - Fuyo Shomi	3/23		5/1 - 5/22	121.0	0.0	\$2.33	\$1.62	\$392.00	\$271.44	7.50
Cucumber - Diva (market-type)	4/20	5/17	7/3 - 9/3	349.8	9.6	\$7.35	\$6.27	\$617.26	\$526.53	27.50
Cucumber - Suyo Long (Asian-type)	4/20	5/17	6/28 - 9/3	304.2	6.4	\$7.77	\$6.56	\$652.26	\$550.70	28.00
Eggplant - Calliope	3/2	5/7	7/3 - 9/21	100.7	12.6	\$2.35	\$1.87	\$197.29	\$156.91	22.50
Eggplant - Orient Express	3/2	5/7	6/29 - 9/21	145.2	1.8	\$4.94	\$4.42	\$415.30	\$371.65	24.00
Eggplant - Ping Tung Long	3/2	5/13	7/13 - 8/20	24.4	2.3	\$0.71	\$0.55	\$59.92	\$46.59	14.50
Eggplant - Rosa Bianca	3/2	5/13	7/21 - 8/20	24.4	0.8	\$0.36	\$0.30	\$30.29	\$24.93	10.75
Pepper - Ace	3/2	5/7	6/30 - 10/9	183.5	8.0	\$7.85	\$6.65	\$659.41	\$558.82	31.00
Pepper - Golden Marconi	3/2	5/7	7/17 - 10/9	61.0	11.6	\$6.27	\$4.68	\$263.46	\$196.63	19.25
Pepper - Islander	3/2	6/10	7/30 - 10/9	70.6	13.4	\$3.94	\$2.99	\$330.92	\$251.16	21.00
Pepper - Sunray	3/16	6/10	8/6 - 10/9	105.0	12.7	\$6.89	\$5.59	\$578.97	\$469.92	16.25
Pepper - Wenk's Yellow Hots	3/16	5/11	7/9 - 10/9	59.5	1.1	\$11.44	\$6.03	\$480.52	\$253.13	24.25
Radishes	4/2		5/1 - 6/12	63.9	0.0	\$1.37	\$1.49	\$230.77	\$251.10	8.50
Spinach (mix of Bordeaux, Tye & Olympia)	3/22		5/1 - 6/6	55.5	0.0	\$3.30	\$3.07	\$555.00	\$515.00	14.50
Swiss Chard - Bright Lights	3/23		5/22 - 8/14	233.0	52.5	\$13.60	\$8.21	\$2,284.00	\$1,380.00	32.75
Tapestry Salad Mix (mesclun-type mix)	3/23		5/1 - 6/9	121.0	0.0	\$5.04	\$4.60	\$1,694.00	\$1,545.90	34.50
Tomato - Big Zebra	3/2	5/7	7/18 - 9/29	64.7	0.0	\$2.31	\$2.01	\$194.10	\$168.79	25.00
Tomato - Dr. Wychee	3/2	5/13	7/17 - 9/29	166.3	8.2	\$6.23	\$5.20	\$523.47	\$436.43	32.50
Tomato - Juliet	3/2	5/13	7/5 - 10/9	178.3	8.6	\$8.90	\$5.95	\$747.60	\$499.50	41.25
Tomato - Mule Team	3/2	5/13	7/5 - 9/29	111.9	1.3	\$4.04	\$3.48	\$339.42	\$292.23	30.25
Tomato - Paul Robeson	3/2	5/7	7/8 - 9/29	53.5	4.7	\$2.08	\$1.66	\$174.33	\$139.55	26.25
Tomato - Redfield Beauty	3/2	5/13	7/14 - 9/29	111.5	5.4	\$4.18	\$3.47	\$350.91	\$291.82	30.25
Zucchini - Eight Ball	4/20	5/10	6/11 - 9/21	366.8	34.2	\$4.79	\$3.89	\$402.22	\$327.10	37.25
Zucchini - Sebring	4/20	5/10	6/18 - 9/21	257.3	21.6	\$4.00	\$3.32	\$335.84	\$278.85	36.25
<b>TOTALS</b>				<b>3,504</b>	<b>218</b>	<b>\$5.20</b>	<b>\$3.94</b>	<b>\$13,889</b>	<b>\$10,731</b>	<b>624.25</b>
						<b>Average</b>	<b>Average</b>			

1) Per square foot figures are based on bed square footage, not high tunnel square footage

2) Labor hours cover everything from sowing to harvest/packaging and finally clearing the bed (everything but the actual sales time at market)