

Northeast Sustainable Agriculture Research and Education Program  
Final Grant Report

**1. Project Name:** TUNNEL PRODUCTION OF HIGH VALUE CUT FLOWERS

Grant Number: FNE 04-539

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**2. Project Goals:**

- evaluate the benefit of growing two high value cut flowers – Lisianthus and Sunflowers – in high tunnels to reduce risks associated with our short season and improve flower quality
- determine if growing Lisianthus in a high tunnel will result in increased stem length which adds value to the crop
- extend our marketing season earlier in spring and later in fall so that we can offer high quality cut flowers to florist customers for a longer season, and increase farm income
- gain experience growing cut flowers in high tunnels
- share information with other growers

**3. Farm Profile:**

Littleflowers is a 5-acre cut flower farm in Newfield, NY (about 10 miles south of Ithaca) where I have been farming full-time for 19 years. I have one seasonal farm employee who helps me from March through November with everything from seeding and planting to harvesting and marketing. We grow many varieties of annual and perennial cut flowers, sunflowers being our specialty. All our flowers are grown from seed or plugs raised in our greenhouse and planted in the field as weather permits. In winter 2004 we erected a 30'x96' high tunnel that was used for this trial during the 2004 growing season. Five raised beds each 96 feet long were prepared and planted (2 beds with Lisianthus, 3 beds with sunflowers). This was our first experience producing cut flowers in high tunnels. We sell all our flowers directly to florists in the Ithaca area and to customers at the Ithaca Farmers' Market.

**4. Project Participants/Advisors:**

*Lisa White*, Cut Flower Trial Manager at Penn State University, Horticulture Dept. and *Ted Blomgren*, Cornell Cooperative Extension Specialist in the Capital District and Cut Flower Grower, were consulted early on to gather information on using high tunnels for cut flower production.

*Tyrone Hall*, area fruit and vegetable specialist with the Cornell Cooperative Extension South Central NY Agriculture Program, ended up leaving his job for another position in May 2004, therefore was not involved in this project.

*Dr. Chris Wien* was an invaluable partner in this project. He helped plan the trial and consider what data to collect. He provided colored mulch that we used in the trial to compare impact of mulch on flower growth. He visited regularly to check on plant growth and advise as needed. And he was involved in organizing outreach efforts

including the summer cut flower grower tour and workshop and the presentation we gave at the NYS Farmers' Direct Marketing Conference in January 2005.

*Monika Roth*, Extension Educator, South Central NY Agriculture Program – Technical Advisor – arranged meetings with Dr. Wien, discussed data collection, recruited a student employee who was hired to work on this project and record data, advised the student on data collection, and was involved with the outreach efforts including organizing the summer tour and arranging the speaking engagement at the NYS Farmers' Direct Marketing Conference.

*Carlan Gray*, Student Intern, hired part-time to work on this project. Carlan worked on Mondays and Fridays from June through the end of August to help with data collection. She kept data on flower growth and harvest dates. The data she collected is summarized in this report.

*Tara Smith*, farm employee, was involved in all aspects of this project from planting through harvest and data collection.

*Kermit Cutter*, farm partner, helped with bed preparation, irrigation set-up and other labor as needed.

## **5. Project Activities:**

Inside the tunnel, we prepared 5 raised beds using our bed shaper and laid drip tube and plastic mulch on each bed. Three of the 96' long beds were used for sunflowers and two were planted to lisianthus. For all beds, we recorded planting dates for both early and late season harvest, first harvest and peak harvest. We also compared plant maturity and quality inside of the greenhouse to field grown plants.

*Sunflowers:* Green plastic was applied to one bed and black plastic on the other two to compare its effect on plant growth and harvest dates. Seeds were started on 3/26 in a greenhouse and planted in the tunnel on 4/23. Nine trays of 72 cells with 2 seeds per cell were planted for a total of 1296 sunflowers. Plants were spaced in two rows and 9 inches apart in the row. Varieties included: Superior Gold, Sunbright, Tiffany, Sunny, and Sunrich Lemon. A second planting of sunflowers was seeded on 8/8 and planted in the tunnel on 9/8. The spring crop was removed and the same beds were replanted with 1296 plants. Varieties planted include: Superior Sunset, Tiffany, Sunbright Supreme, Sundown, Sunny, Sunbright, and Sunrich Lemon.

*Lisianthus:* Lisianthus were seeded on January 5 in 288 plug trays, transplanted March 20 into 72 plug trays and planted in the high tunnel on May 5. The two 96 foot long lisianthus beds were covered with white plastic and we planted both 2 rows and 3 rows of plants per bed; plants within the row were spaced approx. 9 inches apart. Varieties included: Echo series: lavender, champagne, pink picotee, blue; Mariachi series: blue, pink, grande white, and pink pictoe; Flamenco: purple, pink, white; Ventura: peach (approx. 70 of each variety was planted). We measured stem length and quality of lisianthus grown in the tunnel and compared that to lisianthus growing outside the tunnel on white plastic. Outdoor plants were also planted on black plastic but stem length measurements were only taken on the white plastic.

## 6. Results:

*Sunflowers:* Sunflowers inside the tunnel bloomed 3 weeks earlier than normal field grown sunflowers. Peak harvest for the all spring grown sunflower varieties inside the tunnel was June 19, with 199 sunflowers harvested. The total harvest period was extended from May 28 to July 20. In the fall, we were able to extend harvest season by 4 weeks inside the tunnel. First harvest began on October 7, peaked on October 17, and continued through October 29. Harvest of field grown sunflowers ended around September 20, which was earlier than usual because of cool fall weather. In comparing sunflowers inside the tunnel on green versus black plastic, we found that those growing on green plastic bloomed first (with the exception of Superior Gold) and provided a more steady bloom compared to black plastic where bloom peaked earlier. The biggest discrepancy existed between the Tiffany plantings. Tiffany bloomed first on green plastic, but peak harvest was not until July 4, whereas the same variety on black plastic peaked on June 14. By growing sunflowers in the tunnel our harvest and marketing season was extended by a total of 7 weeks.

*Lisianthus:* Lisianthus on the white plastic in the tunnel were harvested 12 days earlier than those growing outside. Peak harvest for lisianthus growing inside the tunnel was July 20 and outdoors was July 30. Lisianthus planted on black plastic outdoors came into peak production earlier than plants growing on white plastic. The biggest benefit to growing inside tunnels was that average stem length was 22 inches compared to 18 inches outside. The variety that showed the biggest discrepancy in height between inside and outside was Ventura Peach, which had an average inside height of 24 inches while outside plants reached an average of 18 inches. Stems inside tended to be taller and more delicate, while those outside had thicker and shorter stems. There was little difference in stem length between indoor and outdoor plants for the second harvest. Flower head size of all lisianthus varieties was larger and of better quality than field grown plants. Plants growing inside the tunnel produced up to 20 buds per plant compared to half that number outdoors.

**7. Conditions:** Cool spring weather delayed the first sunflower planting. The cool wet growing season also impacted the outdoor crop. The continuous rain resulting in slow growth, late bloom, and poor flower quality significantly affected lisianthus in the field.

## 8. Economics:

*Sunflowers:* The early sunflower planting generated \$1,935 and the later planting generated a total of \$1,710 for a total of \$3,645 additional farm income from sunflowers in tunnels.

*Lisianthus:* Lisianthus in the tunnel generated about \$1,680 additional income.

Total additional income from growing these two crops grown in the tunnel was \$5,325. The cost of the tunnel and materials was \$4,215, plus 97 hours of labor – figured at \$25/hour = \$2,425. So the first year crop paid for the material investment and about half of the labor to put up the structure.

## **9. Assessment:**

My experiences growing sunflowers and lisianthus in high tunnels have been very positive. For the 2005 season, I plan to perfect growing sunflowers and lisianthus in tunnels and anticipate making changes to planting dates:

- plant spring sunflower crop in tunnels earlier (5 days), weather permitting
- plant fall sunflower crop at least 10 days earlier for fall harvest
- plant lisianthus 2-3 weeks earlier

## **10. Adoption:**

This technology provided the opportunity to extend my season, improve crop quality, increase customer satisfaction and increase my farm income. In the future I hope to construct additional tunnels that would allow me to experiment growing other cut flowers in tunnels.

## **11. Outreach:**

### **Northeast Regional Cut Flower Meeting – July 27 & 28, 2004**

Co-sponsored by Association of Specialty Cut Flower Growers (ASCFG) and Cornell University Horticulture Department. July 27 included a tour of Newfield Cut Flower Farms. A total of 65 people attended touring farms in the pouring rain. The tour started at Butternut Creek Flower Farm (this is the home farm where Alison lives) to showcase the high tunnel experiments with sunflower and lisianthus. Next stop was Alison's main farm – Little Flowers – where we toured her fenced 5-acre field of annuals and perennials, her bouquet room and cold storage barn. The final stop was a neighboring farm – Plenty of Posies. During the evening program and next day, Alison, Tara and Carlan were also available to answer questions. (Copy of the program enclosed).

### **NYS Farmers' Direct Marketing Conference – January 17-19, 2005**

Alison Wiley and Chris Wien gave a presentation on High Tunnels during a session at this conference held in Syracuse on January 17, 2005. Alison talked about her experiences using tunnels at her farm. A total of 36 people attended the session representing growers from throughout NY. Additionally, Alison also spoke about marketing during an afternoon session. (Copy of the DMC Program and Powerpoint presentation is enclosed). These sessions were also audiotaped and tapes can be purchased through the NYSDFMC.

### **Future outreach –**

1) On July 6 and 7, 2005, extension educators and VoAg personnel will be touring the farm to learn about the advantages and drawbacks of using high tunnels. This tour is sponsored by Penn State University Horticulture Dept. who hosted tours of high tunnels in various locations in the Northeast in 2004, and asked Cornell Horticulture Dept. to help put one on here. Their funding comes from NE-SARE.

2) Articles for CCE newsletters and ASCFG Quarterly Newsletter – based on the results summarized in this report, we will prepare a short article for submission to these newsletters.

**Informing Cornell Research** – This cut flower trial provided useful information to research being conducted by Dr. Chris Wien, Cornell Horticulture. This was Dr. Wien's first summer of experimenting with growing cut flowers in tunnels so he was able to directly compare his results with those at Littleflower's farm and gain valuable insight from our years of experience growing cut flowers.

## 12. Report Summary:

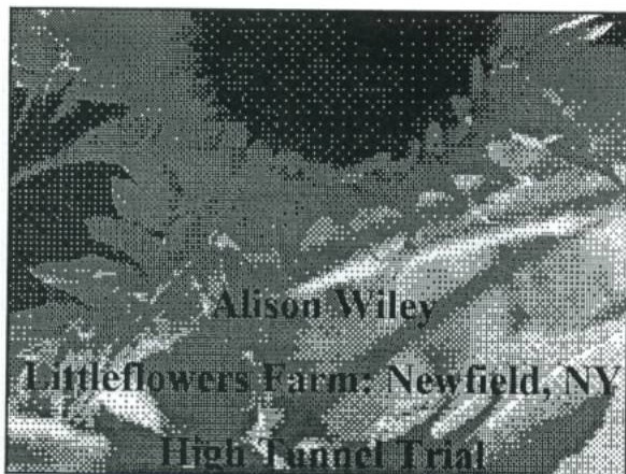
The purpose of this project was to gain experience and evaluate the benefit of growing two high value cut flowers-Lisianthus and Sunflowers-in high tunnels. By growing these crops in a tunnel we hoped to extend our spring and fall marketing season thereby increase farm income.

Five 96-foot beds were planted (3 sunflower, 2 lisianthus) in the tunnel. Data was collected on harvest dates, stem length and flower quality comparing inside to out. We also compared growing sunflowers on green vs black plastic inside the tunnel.

The trial yielded the following results: 1) the spring sunflower crop in the tunnel was harvested 3 weeks in advance of the normal field grown crop; 2) the fall sunflower crop extended the harvest season by 4 weeks; 3) the total 7 week season extension allowed us to gain marketing advantage and increased our sunflower sales by \$3,000; 4) growing lisianthus in tunnels produced flowers about 12 days ahead of those growing outdoors, and the quality of the tunnel grown flowers was far superior in terms of stem length (22 inches indoors vs. 18 inches outdoors), numbers of buds (20 indoors vs. 10 outdoors), flower size and quality; 5) customer satisfaction was increased and sales expanded by a total of \$1,680. The net benefit from growing cut flowers in high tunnels was the ability to extend the harvest season and increase income over the season.

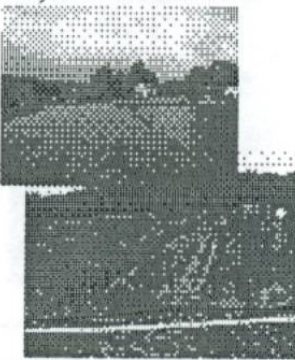
Alison J. Wiley  
Name


March 25, 2005  
Date



Littleflowers Farm, Newfield NY

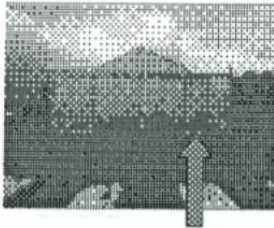
- 5 acres, with one seasonal employee
- In operation for 19 years
- Many varieties: both annuals and perennials



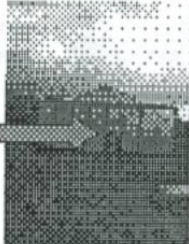
High Tunnel 

- Built in Spring 2004
- Size: 30 feet x 96 feet
- Gothic Style Greenhouse frame
- Roll-up sides
- Five rows of raised beds, maybe more?

High Tunnel



Rear View

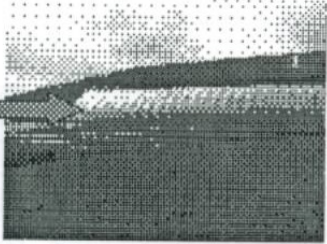


Front View

Removable endwall panels


High Tunnel

- Roll-up sides
- Drip irrigation




What we planted...

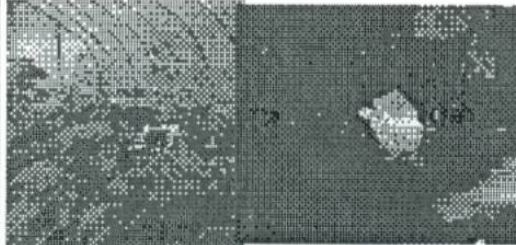
Three beds of Sunflowers



Two beds of Lisianthus



## Sunflower Varieties



Superior Gold   Superior Sunset  
Sunbright   Sunbright Supreme  
Tiffany   Sundown  
Sunny   Sunrich Lemon

## Sunflowers



First Planting:

Seeded in Greenhouse: March 26, 2004   Planted in Tunnel: April 23, 2004

## Second Planting

- Seeded in Greenhouse:  
August 8, 2004

- Planted in Tunnel:  
Sept 8, 2004



## Sunflower Results

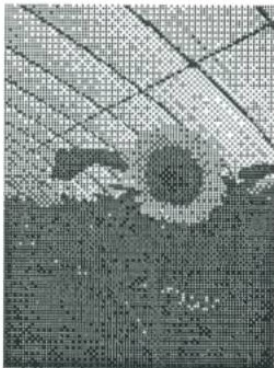
- Tunnel allowed for seven extra weeks in the growing season:
  - Harvest was **three weeks earlier** and extended **four weeks later** than usual
- About 1800 extra flowers:  
Totaling about \$3000



Early sunflowers resulted in:

- High Customer satisfaction/  
interest, farmers' market and  
florists sales

- Competitive edge at farmers'  
market



## Lisianthus Varieties

- Echo series:
  - Lavender
  - Champagne
  - Pink Picotee
  - Blue
- Mariachi series:
  - Blue
  - Pink
  - Grande White
  - Pink Picotee



## Lisianthus Varieties

- **Flamenco:**
  - Purple
  - Pink
  - White
- **Ventura:**
  - Peach



## Lisianthus



Seeded in Greenhouse: January 5, 2004 Planted in High Tunnel: May 1, 2004

## Lisianthus

- Initially, seeded into 288 plug trays
- On March 20, transplanted into 72 plug trays
- Planted in high tunnel: May 5, 2004



## Lisianthus Inside Tunnel



Initial Harvest Dates: July 20- August 10, 2004

-Second harvest continuous until early October 2004

## Lisianthus in the High Tunnel

- Two Lisianthus rows
- White plastic
- About 70 of each variety



## Lisianthus Harvest

- Initial harvest cut above second node
- Harvest inside compared to outside plantings:
  - stem length
  - flower quality
- number of buds
- flower size





## Stem Length

- On average:  
Stems inside: 22 inches  
Stems outside: 18 inches
- Venture Peach flourished  
in tunnel:  
average: 24 inches



## Flower Quality



- Number of buds:
- Inside average: 20
  - Outside average: 10

- Flower size:
- Inside: larger  
flower heads

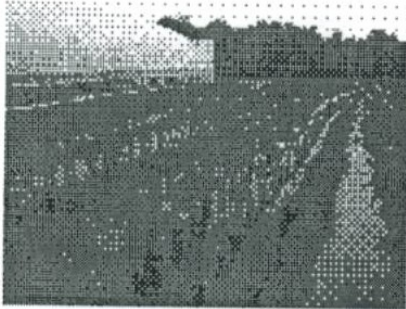
- Outside: smaller,  
less full flower heads  
with weather damage



OUTSIDE

INSIDE

## Lisianthus Outside



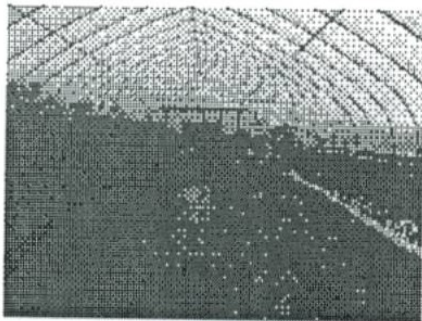
- Flowers on black  
plastic grew taller

- Lots of weather  
issues: flower  
damage, flooding

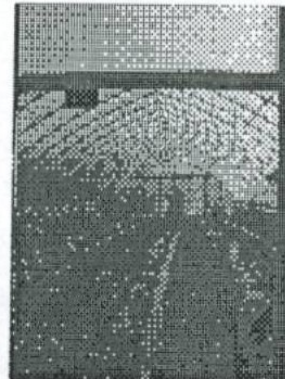
## Lisianthus Inside



## Harvesting in Tunnel



## Tunnel View: Second Harvest



## Early Season Sunflowers...

- Early sunflowers means additions and early season emphasis with:
- Godetia
- Larkspur
- Sweet Pea
- Campanula



## Other early season crops:

- Peonies
- Delphinium
- Sweet William
- Foxglove
- Silene



## Market



- Bouquets
- Flowers by the stem
- Florist bunches

## Market: How Lisianthus and Sunflowers are used



## The kind of summer it was...

