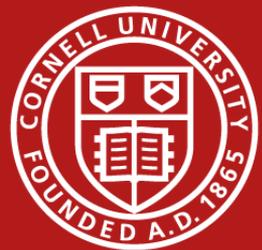


Growing Bedding Plants and Hanging Baskets in an Un-heated High Tunnel

Neil Mattson

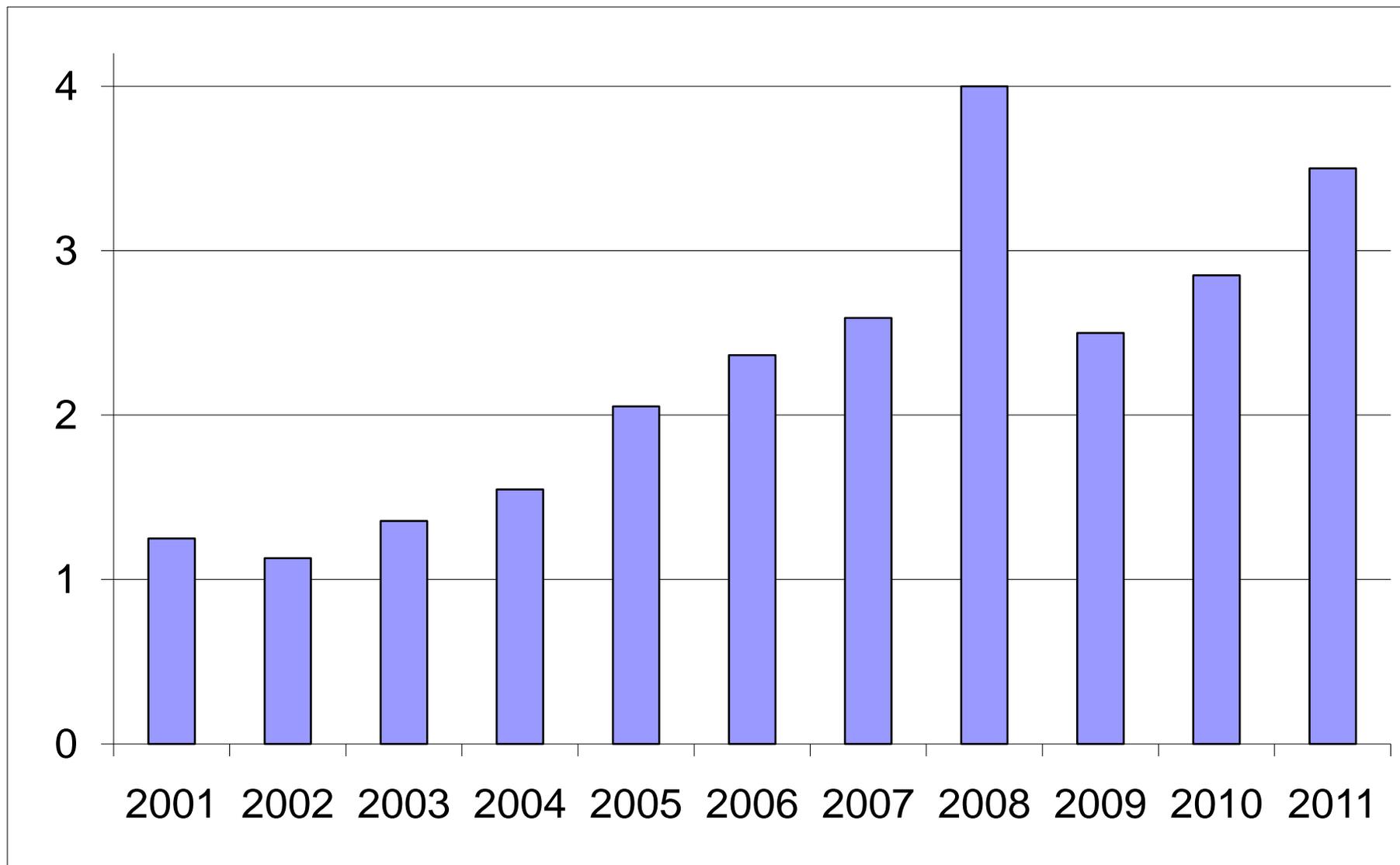
Assistant Professor and
Floriculture Extension Specialist



Cornell University
Department of Horticulture

The Problem: Rising Energy Costs

\$ for one gallon of #2 Fuel Oil



Source: U.S. Energy Information Administration

<http://www.eia.doe.gov/>

Can you grow bedding plants and hanging baskets with no heat?



High Tunnels

Used for season extension

Some frost protection

Much warmer day temperatures

Ventilation required

Protection from rain/elements



Rimol high tunnel, showing louvered vents in endwall, and roll-up sides

West Haven Farms, Ithaca, NY

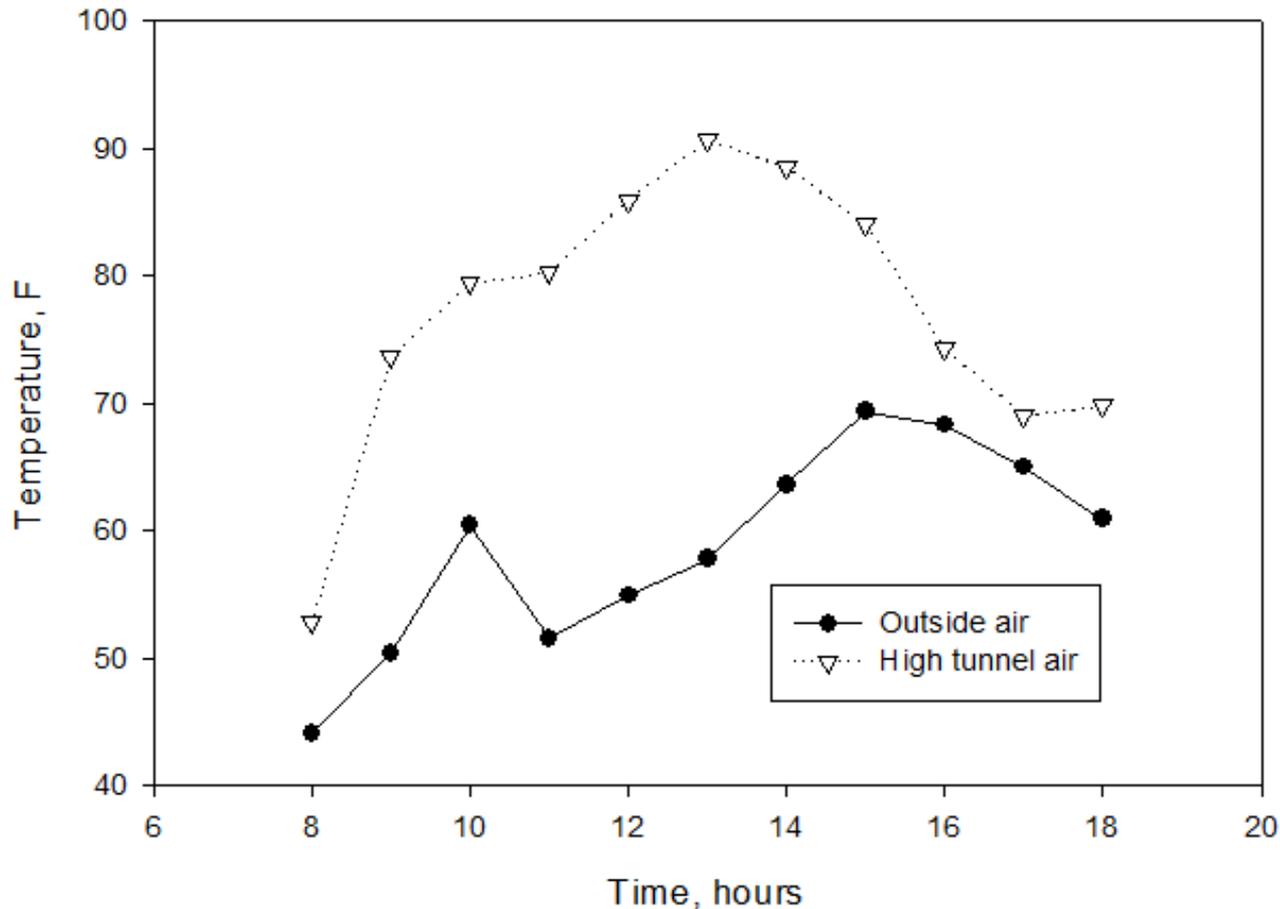


Slide: Chris Wien Cornell University

High tunnels more info

- High tunnel = unheated poly-house or hoop house
 - taller and more uniform temp than a cold frame
- Cost to construct \$1-3 per square foot
- For overwintering plants typically adds 2 USDA hardiness zones additional protection
- Usually covered with a single layer of plastic
 - double layer may be used / or additional covering inside
- Some are erected on skids so that the structure can be moved during the production cycle

Air temperatures, April 26, 2006



Ventilation is absolutely necessary during the day, even when outside air temperatures are not extreme

Air temperature inside and outside a high tunnel on a sunny April 26, 2006, in Ithaca, NY.



Before.....



•High Tunnels are not for everyone:

- Need sturdy construction

- Protection from wind, snow



After 55 mph winds

Feb 2010 – 18” of snow overnight in Ithaca



Photo: Chris Wien Cornell University

Finishing Bedding Plants in a High Tunnel

Cornell Trial

Ithaca, NY – USDA
Hardiness Zone 5

5 bedding plants
Transplanted April 1 into
4" pots

Target: Ready for
Mother's Day



Temperatures April 1 – May 15

	Average	Minimum	Maximum
Greenhouse	66°	55°	89°
High Tunnel	61°	30°	107°
Outside	51°	26°	85°

Greenhouse heating set points were 70 F during the day and 60 F at night





Petunia 'Dreams Midnight'



Marigold 'Safari Orange'



Greenhouse



High Tunnel

Pansy 'Delta Formula Mix'



Greenhouse



High Tunnel

Snapdragon 'Montego Mix'



Greenhouse



High Tunnel

Zinnia 'Dreamland Mix'



Greenhouse



High Tunnel

Finishing in High Tunnel

(avg flower date)

	Greenhouse flower date	High tunnel flower date
Marigold 'Safari Orange'	April 26	May 1
Pansy 'Delta Formula Mix'	May 9	May 10
Petunia 'Dreams Midnight'	April 29	May 4
Snapdragon 'Montego Mix'	May 4	May 11
Zinnia 'Dreamland Mix'	April 30	May 6

Plant Size (Fresh weight in grams)

	Greenhouse FW	High tunnel FW
Marigold 'Safari Orange'	46.6 g	47.0 g
Pansy 'Delta Formula Mix'	20.6	25.4
Petunia 'Dreams Midnight'	13.5	15.0
Snapdragon 'Montego Mix'	15.5	17.8
Zinnia 'Dreamland Mix'	14.3	12.1

Hanging Basket Experiment

- Petunia 'Purple Wave' experiment
- transplanted on April 8
 - 144, 288, or 512 cell plugs
 - 12" pots had 3, 4, or 5 plants
- Fertilized weekly with 21-5-20 at 400 ppm N
- assessed marketability on May 27
 - flower #, plant width, visual index







144 cell, 5 plugs
avg 34 flowers

512 cell 3 plugs
avg 2 flowers

May 27th



5

4

3

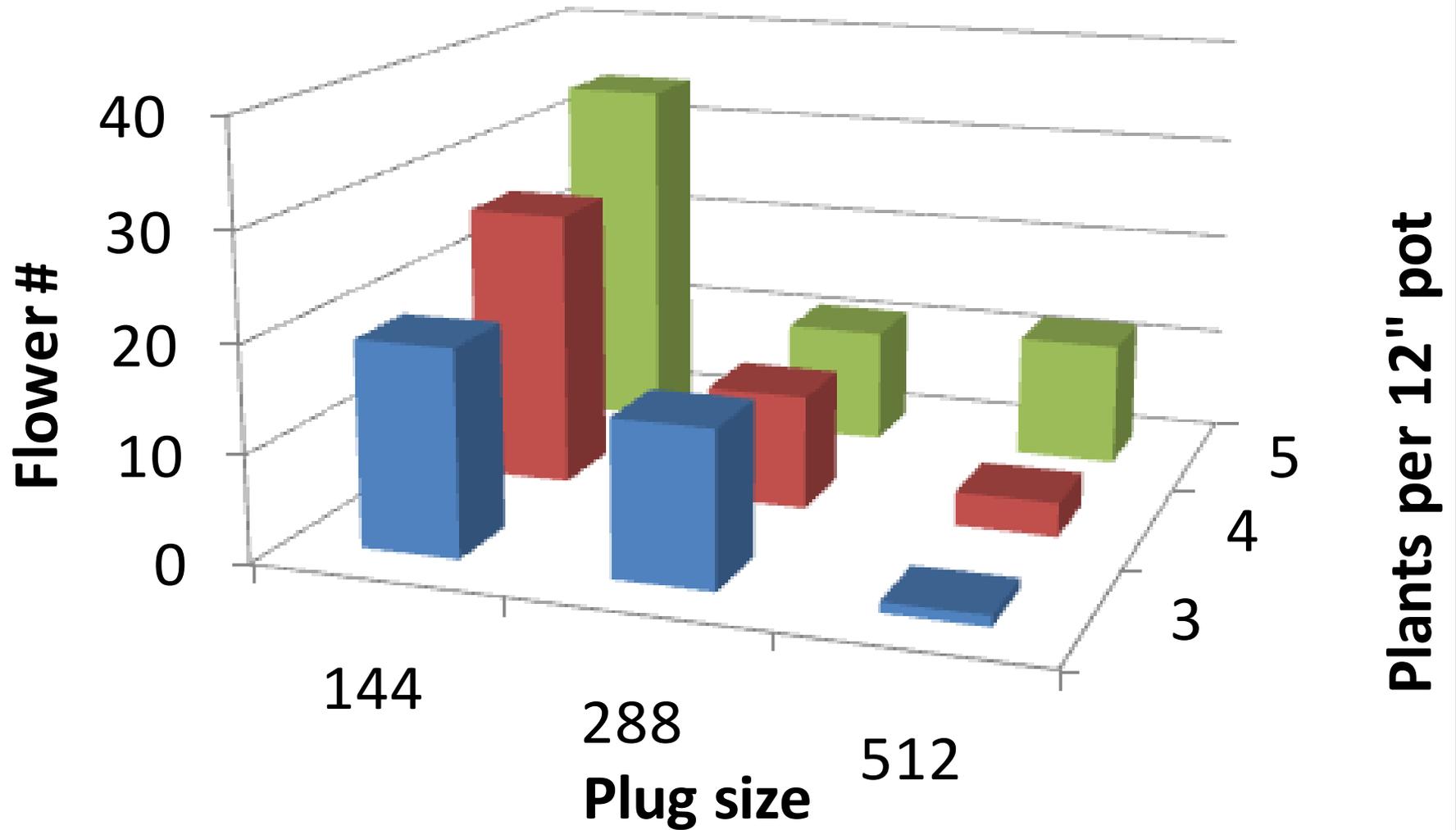


144 cell

288 cell

512 cell

Cell-Size and Plug # Affect Flower



**EFFECT OF TEMPERATURE ON
FLOWERING DAY 42
PETUNIA WAVE PURPLE**

54°



61°



68°



75°



Should you consider high tunnels?

- Do you grow plants that need heat year round?
 - don't use for those plants (poinsettias, propagation)
- Do you have extra space
 - i.e. less crop turns per house than in a heated greenhouse
- Do you need to target specific ship dates?
 - If so, high tunnels are risky
 - If you retail out of your facility may be okay
- Can you handle the risk of frost?

Avoiding Risk Under Bench Heating





Under bench heat with electric hot water heater

Temporary heating for cold nights

- Have temporary kerosene or propane burners on hand for cold nights



Wooden beams provide some support against high snow load. This high tunnel on Long Island made it through a 20 inch snow event



Solar Greenhouses in China







Be Creative - doesn't have
to be a high tunnel







Reemay fabric provides some frost protection for these outdoor petunias

Resources

- www.hort.cornell.edu/hightunnel/
 - Business & Marketing → Example Crop budgets
- www.hightunnels.org
- <http://www.attra.ncat.org/>
 - search for high tunnels
 - also see video: Hoop Houses for Crop Extension

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Contact Neil Mattson:

nsm47@cornell.edu

www.greenhouse.cornell.edu