

# Jump Start

## Your Greenhouse with New Varieties, Containers & High Tunnels



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Dr. Steve Millett

# Jump Start

- ◆ New varieties
- ◆ Container gardening
- ◆ High tunnels
- ◆ Putting it all together





# Looking for something new?



# New Varieties



<http://www.agristarts.com/>



<http://www.ecgrowers.com/>



<http://www.provenwinners.com/>



<http://www.syngentaflowersinc.com/>





# The Black Petunia 2011

<http://www.ballhort.com/>

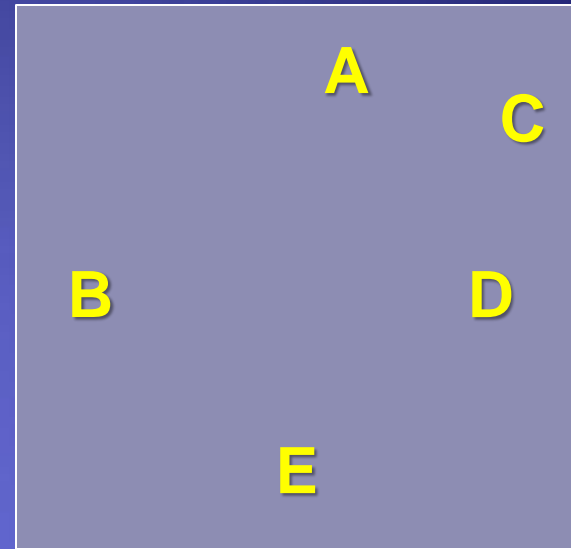








# Container Recipes



**A** Graceful Grasses Toffee Twist, *Carex* (Sedge)

**B** Flying Colors Appleblossom, *Diascia* (Twinspur)

**C** Helena's Blush, *Euphorbia* (Wood Spurge)

**D** Supertunia Royal Magenta *Petunia*

**E** Heigh-Ho Silver *Plectranthus*

**Exposure:** Sun

**Pot Size:** 16 inches

**Pot Style Shown:** Upright container

**Can be adapted for:** Window Box, Wall sconce

**Color Scheme:** Vibrant Mix



# Plant Artists











# Art & Science



# High Tunnels



# High tunnel

- ◆ Solar-heated
- ◆ Plastic covered greenhouse
- ◆ No electrical or automated ventilation
- ◆ Crops grown in ground with drip irrigation
- ◆ Protection and environmental control in between field conditions and a heated greenhouse





# High Tunnels

- Low-Cost Technology
- Increases Yields
- Improves Quality
- Extends Season





# High Tunnel Dimensions

- ◆ Tall enough to walk-in and to grow tall, trellised crops such as tomatoes
- ◆ No standard dimensions for high tunnel sizes
- ◆ Usually 14 to 30 feet wide by 30 to 96 feet long



# Price Comparison

Type	Cover	Square Feet	Price/ SF*	Extras
High Tunnel	Single layer poly 6ml; 4yr	2,000 to 3,000	\$0.85 to \$2.25	Wiggle wire, roll up wall
Commercial Greenhouse	Lexan sides & ends; double poly roof	13,000	\$7.60	Ag-rated loading, no benches, heaters, roll up walls, minimum fan ventilation & HAF
Education Greenhouse	Lexan roof, sides & ends	1,800	\$26	Pad & fan cooling, environmental controls, benches, irrigation, shade cloth, heaters, meets IBC codes
* Labor & freight not included				

# High Tunnel Environmental Controls



- ◆ Passively ventilated
- ◆ Crops generally require no heat
- ◆ Supplementary heat extends season
- ◆ Row covers can be used inside high tunnels
- ◆ Single layer poly provides one hardiness zone of protection
- ◆ Second (the row cover) will provide another zone of protection





# Hummert High Tunnel

## 20' & 30' wide



- ◆ Standard lengths – 48', 72', 96' long
- ◆ Bow spacing 6' on center
- ◆ Sidewall height - 5' and 8'
- ◆ Ridge height – 12' and 15' for 20' width
- ◆ Ridge height – 13' and 16' for 30' width



**30' x 72' Hummert high tunnel**





**30' x 72' Hummert high tunnel with single layer poly at roof, sides and ends with roll-up walls**



# **Roll up end wall on High Tunnel at Kansas State**





# Empty High Tunnel using rope as poly hold down













# **Poly Storage during the summer month on a gutter connected high tunnel**







**Ground can be worked with tractor mounted tiller**



# Hummert Junior High Tunnel 14' wide



- ◆ Standard lengths – 48', 72', 96' long
- ◆ Lengths – 16', 20', 24', 32' long
- ◆ Bow spacing 6' on center
- ◆ Sidewall height 5'
- ◆ Ridge Height 9'

# Small High Tunnel





# Wind Damage



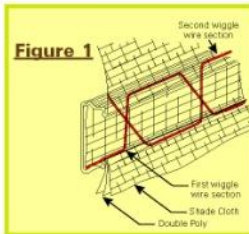
# Polyethylene Film Accessories . . .



## WIGGLE WIRElock™

### WIGGLE WIRE POLY FASTENER INSTALLATION

**WIGGLE WIRE** is capable of holding two layers of polyethylene, plus a piece of shade cloth. You simply lock the polyethylene with one wire, then go back and install a second wire to hold the shade cloth in place. **The wires must be installed with the patterns reversed (see Figure 1).** **WIGGLE WIRE** is capable of securing greenhouse poly, shade cloth, screening, and a multitude of other flexible materials.



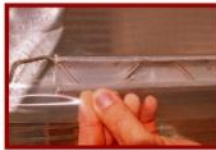
#### INSTALL BASE

Attach base to wood or metal surface. Install screws no more than 12" apart.

#### INSTALL COVER AND WIRE

Stretch single or double poly across base and snap wire into place. You can use more than one material with one wire.

Materials can range from 2 mil to 10 mil thick.



#### OVERLAP WIGGLE WIRE ENDS

Overlap wiggle wire one section during installation. **Be sure that the pattern is reversed for the top section.** See Figure 2.

#### LOCK ENDS

**IMPORTANT:** Install 12" wire sections wherever poly fastener turns a corner. **Be sure to reverse the wire pattern.** Figure 3.

**WIGGLE WIRE** can also be installed on arched structures. Start at the bottom and follow the bend.

Attach screws every 12".

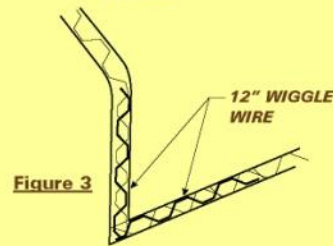
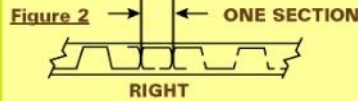


Figure 3

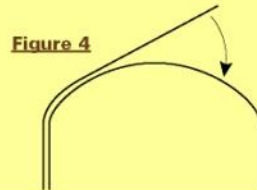


Figure 4





# High Tunnel Production

- ◆ Crops grown in ground beds
- ◆ Drip or row tape irrigation necessary
- ◆ Can be constructed on skids for movement during production





# High Tunnels





# Cut Flower Production



# High Tunnels for Cut Flowers

- ◆ Really great protection – can grow crops not possible in outside field, better quality
- ◆ Stem length improved (convenience for all)
- ◆ Some diseases and pests reduced (though powdery mildew can be worse – don't bother to grow zinnias?)
- ◆ Harvesting when it's raining!
- ◆ Season extension (Mother's Day?)







**Flowers are often  
important on a  
produce farm**







# *Dianthus barbatus* (Sweet William)

- 'Electron' and 'Tall Doubles' plant in the fall for early spring
- 'Amazon Neon' and 'Purple Bouquet' don't need vernalization, so plant in spring in succession





# *Salvia leucantha* (Mexican Sage)

Grows tall during hot summer, but is very frost sensitive. Won't bloom till mid-Sept.









# Plant Support Structure





# Some roll down

Solar powered roll-down side.

Bryan Boeckmann, Rocky Top Farm, MO





# References

- <http://www.hightunnels.org/foreducators.htm>

## Funding

### ◆ Sustainable Agriculture Research & Education

- SARE Youth Educator Grants up to \$2,000
- <http://www.sare.org/grants/>

### ◆ National Institute of Food & Agriculture

- USDA-NIFA Secondary Education Challenge Grants Program  
\$25,000 to \$300,000
- <http://www.csrees.usda.gov/fo/educationchallengessecondaryhep.cfm>

### ◆ USDA

- [http://www.ma.nrcs.usda.gov/program/PDF/MA\\_Greenhouse\\_factsheet.pdf](http://www.ma.nrcs.usda.gov/program/PDF/MA_Greenhouse_factsheet.pdf)

# Putting it all together





**Thank you**

**Questions**

