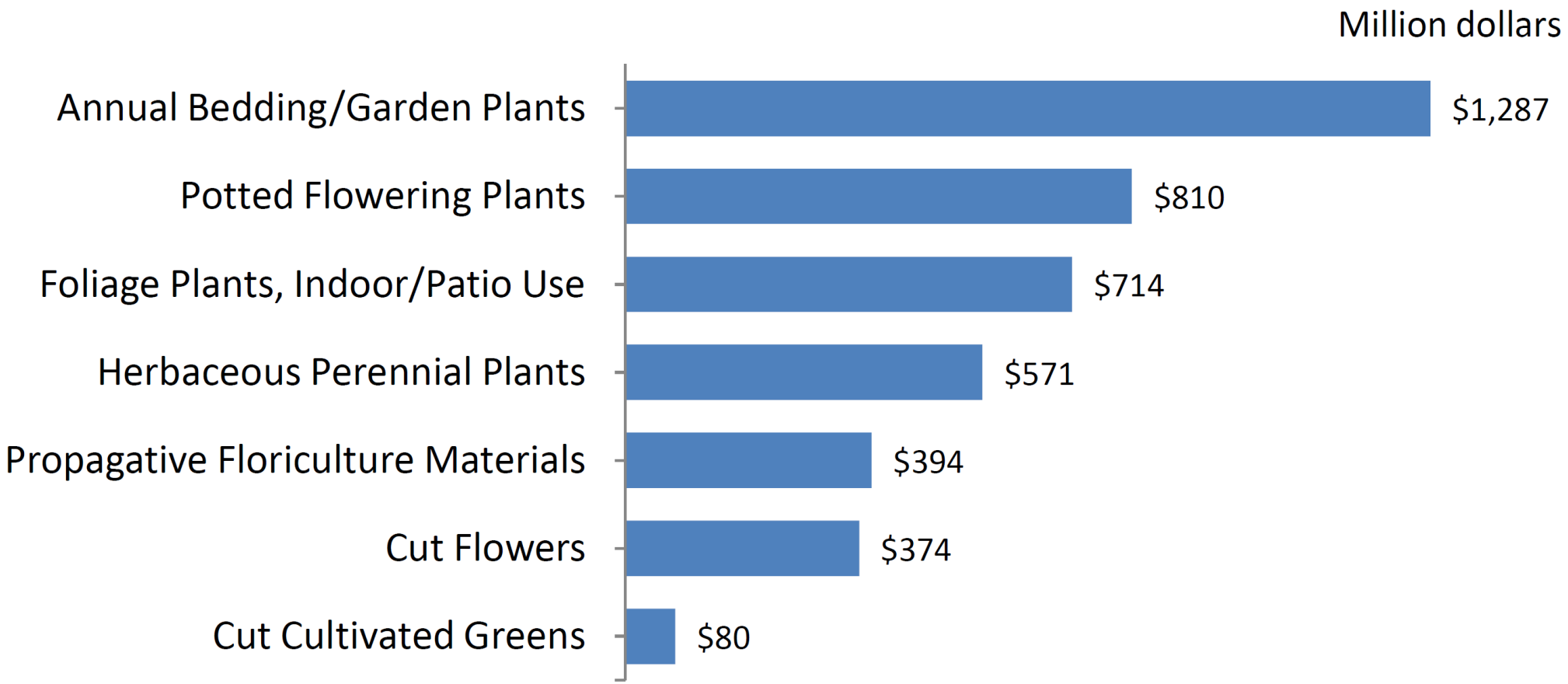
Bedding Plant Production

Bedding plants have largest wholesale value among floriculture crops

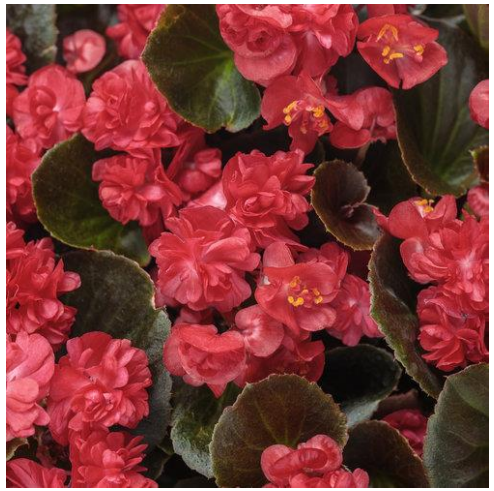


Source: USDA

Popular Bedding Plant Species

Petunia

Marigold



Begonia

Pansy

Impatiens

Geranium

Salvia

Phlox

Snapdragon

Zinnia

Plug Production

- A plug is an independent seedling grown in a small cell filled with a substrate

- Why plugs are used in production?
  - Uniformity
  - Less transplant shock
  - Less seed wastage
  - Better crop scheduling
  - Better growth

- Disadvantages:
  - Higher costs
  - Strict environmental control

Larger cell volume increases holding time, produces larger plants

Seeds

- Primed seed: seeds soaked in osmotic solution, pre-germination activities initiated in seed and packed, uniform germination under wide range of environments
- Refined seed: graded for size, shape, weight etc.
- Pelleted seed: thick coating to enable mechanical seeding
- Coated seed: seed treated with fungicide or growth regulator

Primed Seed

Pelleted Seed

Coated Seed

Species that can be propagated by cuttings: petunia, impatiens, begonia, geranium

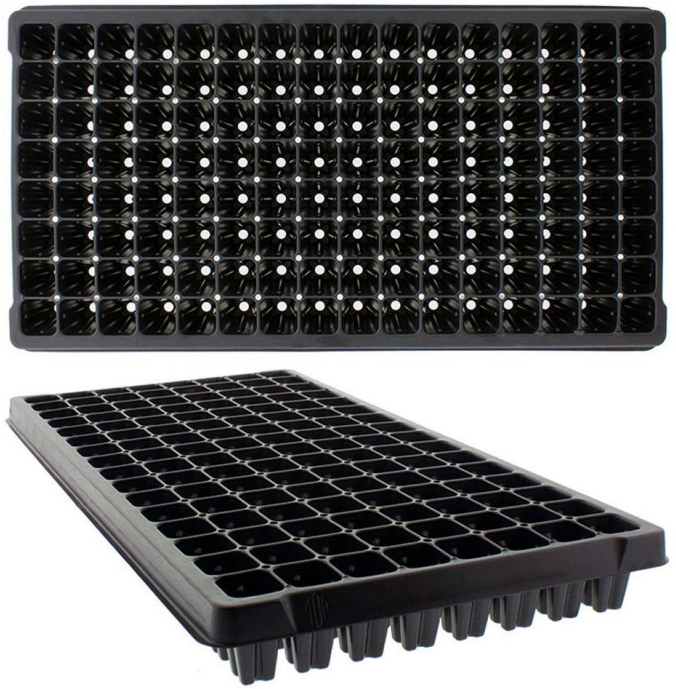
Substrates

Characteristics

- Fine peat moss (75-80%) plus fine vermiculite (20-25%)
- Dolomitic limestone, wetting agent and starter fertilizer are added
- pH 5.2 to 6.0
- Light weight, low drainage and high water retention

Plug Flats

Description	Configuration	Perimeter Trim	Drain Hole	Vent Hole	Cell Depth	Cell Top	Max Dry (Cu. In.)
98 square cells per sheet	7 x 14	11.00" x 21.22"	0.37"	0.25"	2.00"	1.34"	2.26
128 square cells per sheet	8 x 16	11.00" x 21.22"	0.31"	0.18"	2.00"	1.19"	1.53
200 square cells per sheet	10 x 20	11.00" x 21.22"	0.25"	N/A	1.75"	0.90"	0.85
288 square cells per sheet	12 x 24	11.00" x 21.22"	0.31"	N/A	1.25"	0.76"	0.43
512 square cells per sheet	16 x 32	11.00" x 21.22"	0.31"	0.19"	.94"	0.55"	0.24



128-cell plug flat

Larger cells increase holding time and result in bigger plugs, but increases production costs

Fertigation

- Initial stages of plug production requires high moisture to ensure uniform germination
- As plugs grow, moisture should be decreased to allow root growth and hardening for transplanting
- It can be challenging to manage substrate moisture during plug production; small volume makes substrate easily saturated in plug cells
- Apply a fertilizer solution with an EC of 0.5 to 0.75 dS/m for plugs. Excess fertilizer can result in the death of seedlings

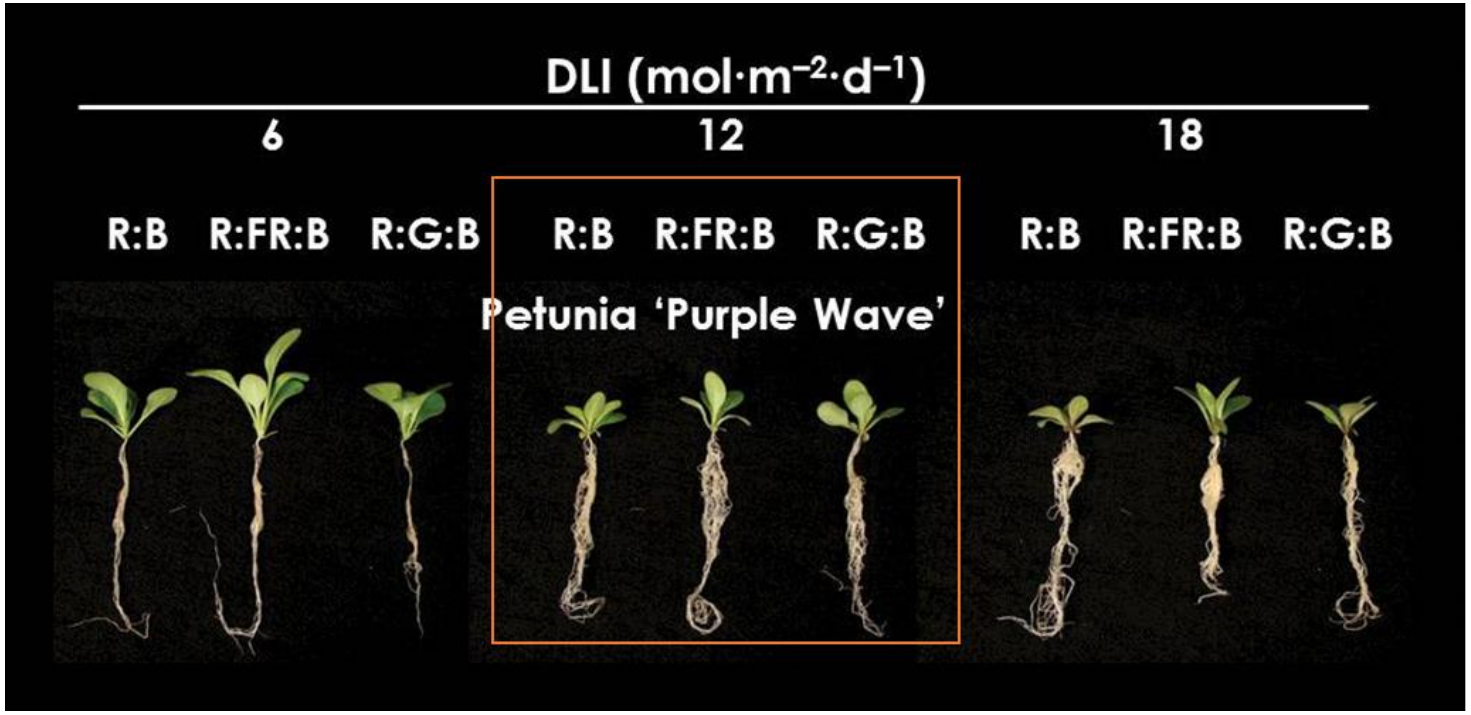
Temperature

57°F 63°F 68°F 73°F 79°F

Courtesy: Pramuk and Runkle, 2003

Optimal temperature for plug production is around 70°F

Light Requirement



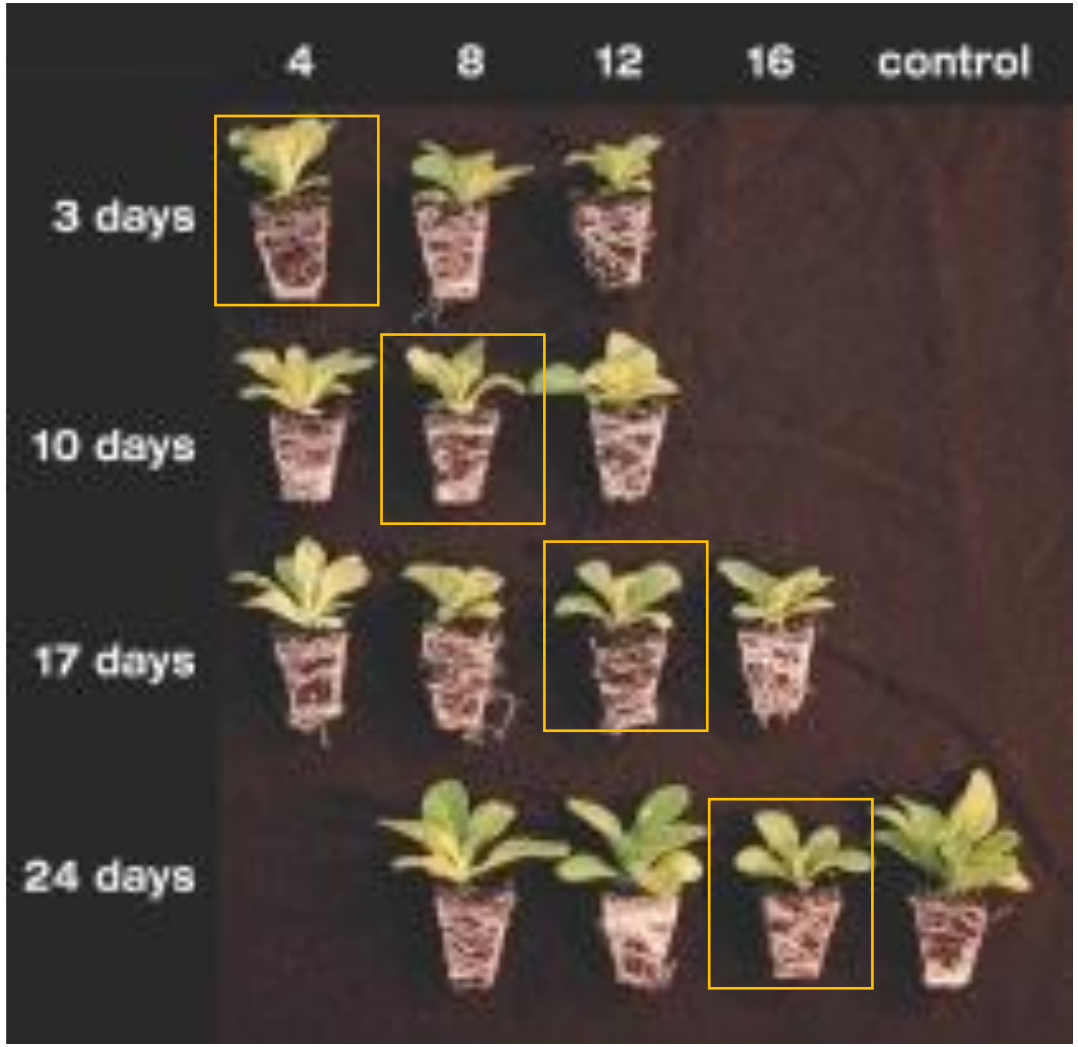
Craver and Lopez, 2015

Optimal light intensity for plugs is around 10 mol/m^2/d
Slightly higher levels of blue light may be useful (why?)

Plant Growth Regulators

- Chemical pesticides that are used to control seedling height
- Spraying is a preferred method
- Concentration varies by species; see Ball article for additional information https://www.ballpublishing.com/pdf/PGR_GUIDE_2013-LowRez.pdf
- Apply CGRs at 2-3 leaf stage
- Higher PGR concentration to be avoided during early applications

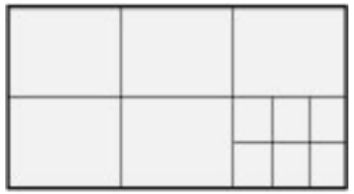
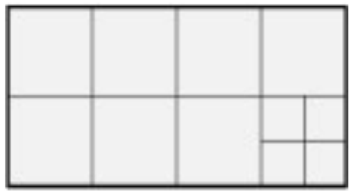
Concentration (ppm)



Whitman and Runkle, 2003

Finished Plant Production

- Plugs are transplanted into finishing containers
- Usually 3 to 6 weeks of production time
- Cell packs and pots are used for finishing

#	Cells per pack	Packs per insert	Total cells	Diagram
606	6	6	36	
804	4	8	32	

Cell Packs

Pots

4-inch

6-inch

Substrates for finishing plants

- Coarse peat moss (70-75%)
- Perlite (10-15%)
- Vermiculite (15-20%)
- Limestone + wetting agent
- pH 5.5 to 6.5
- High porosity
- Light weight

Considerations:

- More drainage than germination substrates
- Low AEC results in loss of nitrates and phosphates
- Containers to be filled with gentle compaction
- Physical properties of substrates will change during 3 to 6 weeks of container production

Light Requirement

Adding more light may not necessarily result in higher growth in some species

Light Requirement

20 mol/m^2/d 10 mol/m^2/d

Low light has more negative effects on the growth of sun-loving than shade-tolerant species

Sun-loving species:
Petunia, Marigold, Zinnia, Cosmos, Salvia, Snapdragon

Shade-tolerant species:
Begonia, Impatiens

Temperature

57°F 63°F 68°F 73°F 79°F

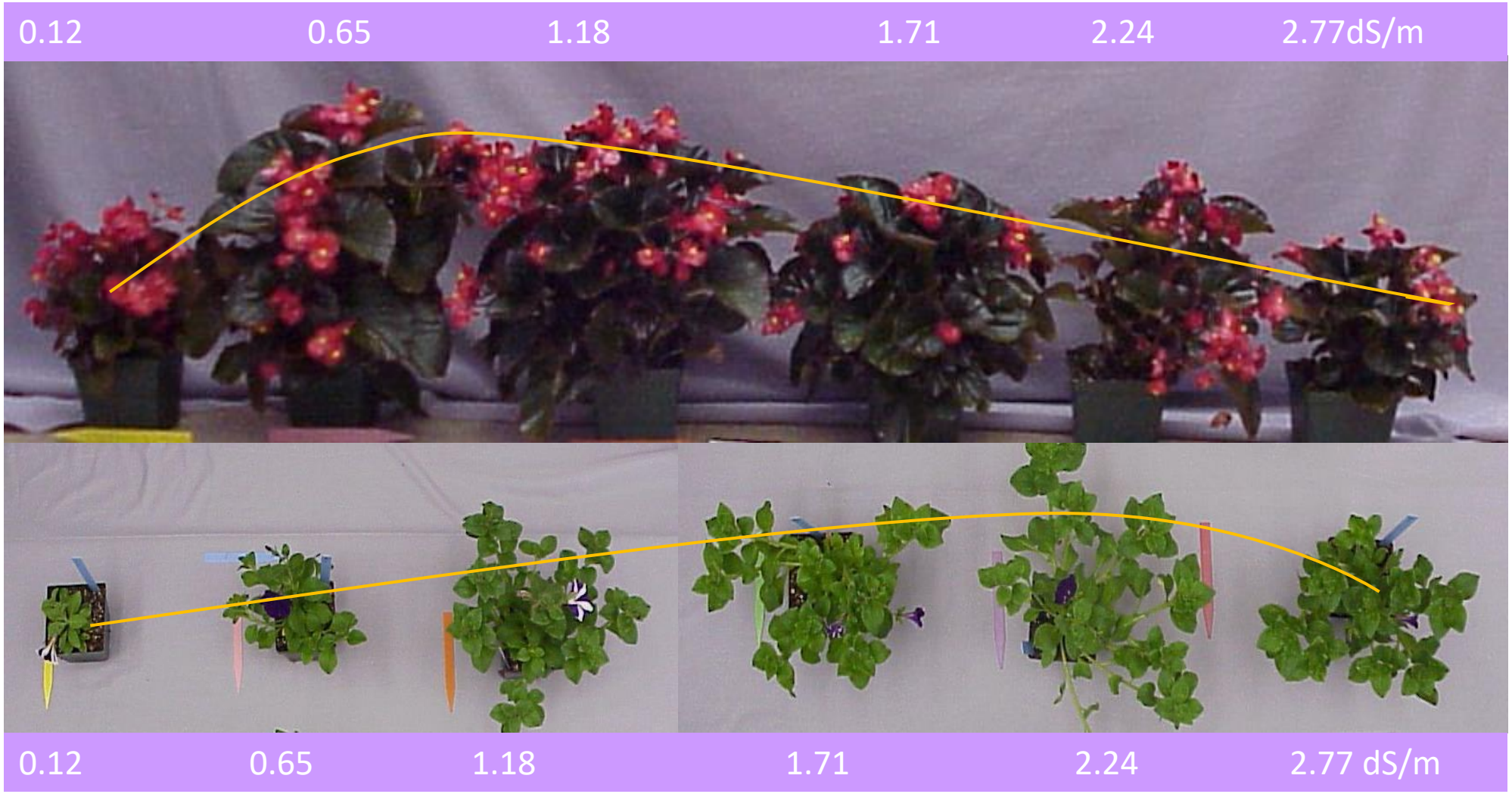
Courtesy: Lee Ann Pramuk and Erik Runkle

Days to flower

Plant	63° F	68° F	73° F
Celosia	52	44	37
Impatiens	31	26	22
Marigold	32	27	24
Salvia	39	33	27

Low temperature delays flowering

Fertilizer requirement should be based on crop growth



Water

Too little or too much water can negatively affect plant growth

A VWC of 35 to 45 % is ideal for growth

Low water can be used to ‘control’ excess growth or promote rooting