

Postharvest Handling of Cut Flowers

A close-up photograph of a vibrant red poppy flower. The petals are a deep, rich red with visible veins and a slightly wrinkled texture. The center of the flower is a bright yellow, composed of numerous stamens. The background is a soft, out-of-focus green, suggesting foliage.

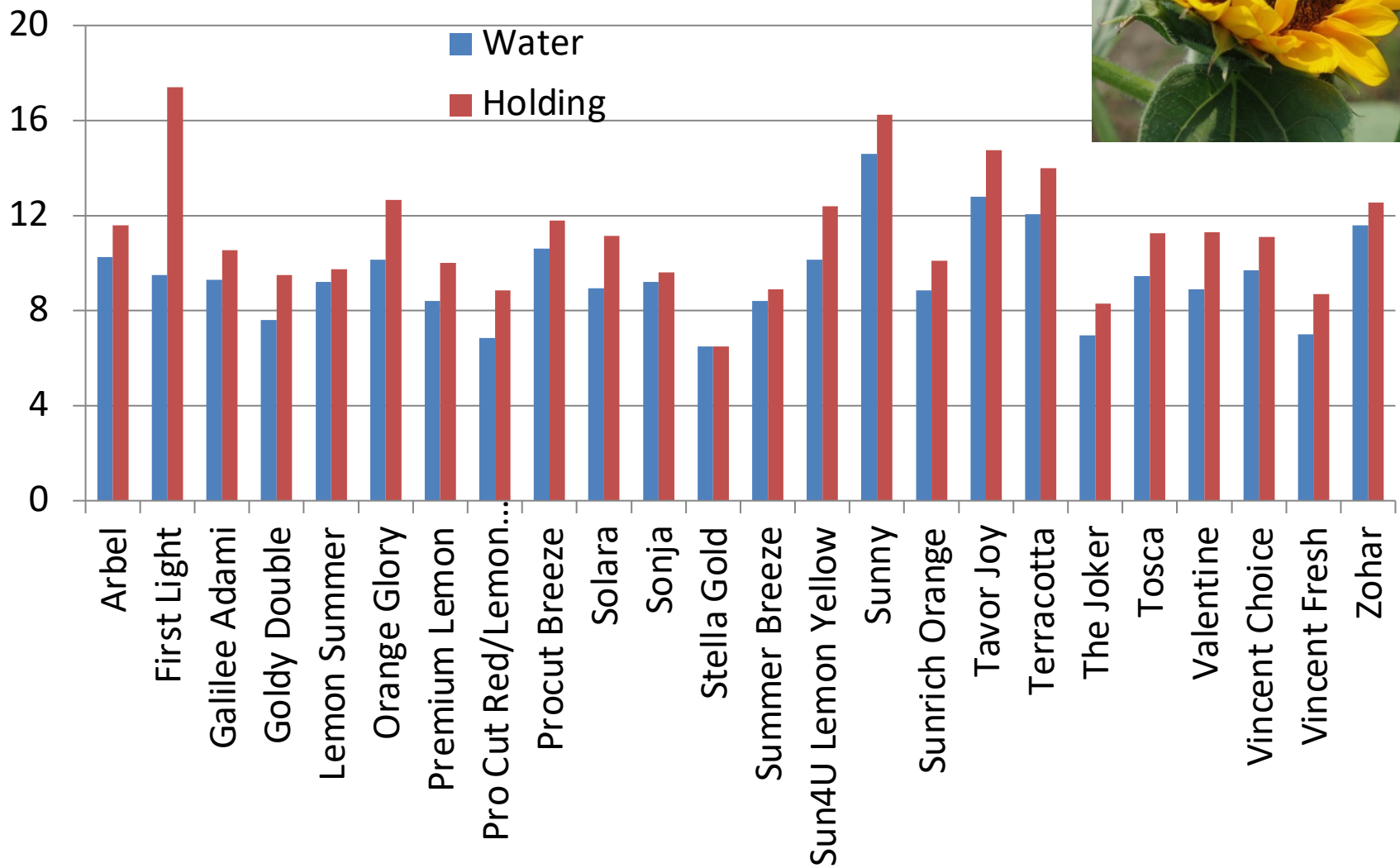
John Dole, North Carolina State University

Maximizing Postharvest Life

- Many factors effect vase life of cut flowers:
 - Pre-harvest
 - Harvest
 - General issues
 - Temperature
 - Botrytis
 - Ethylene
 - Water
 - Post-harvest



Cultivar



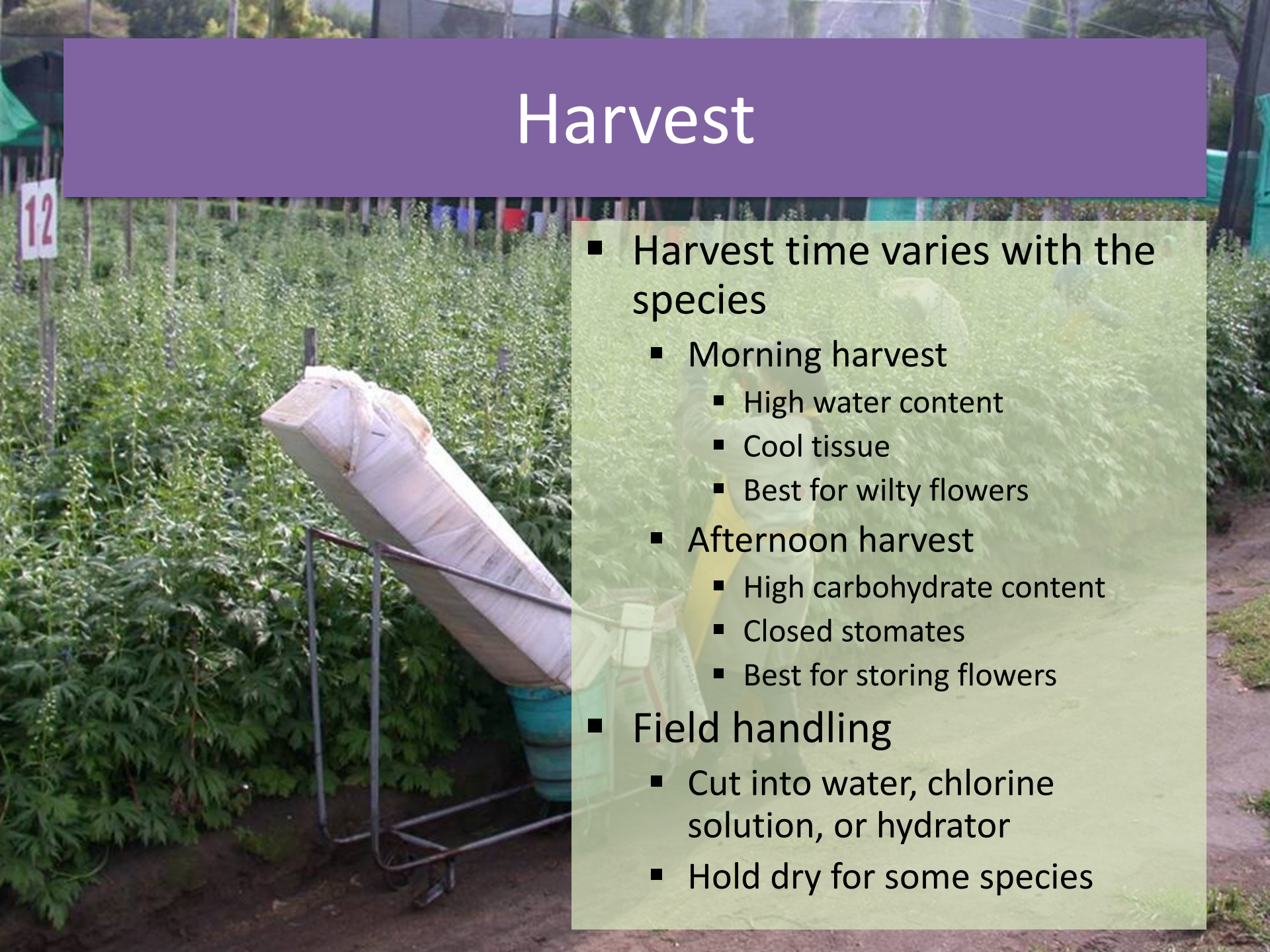
Developmental Stage

- Harvest at optimum stage to maximize postharvest life
- Varies with market
 - Direct to consumer
 - Retailers
 - Wholesalers

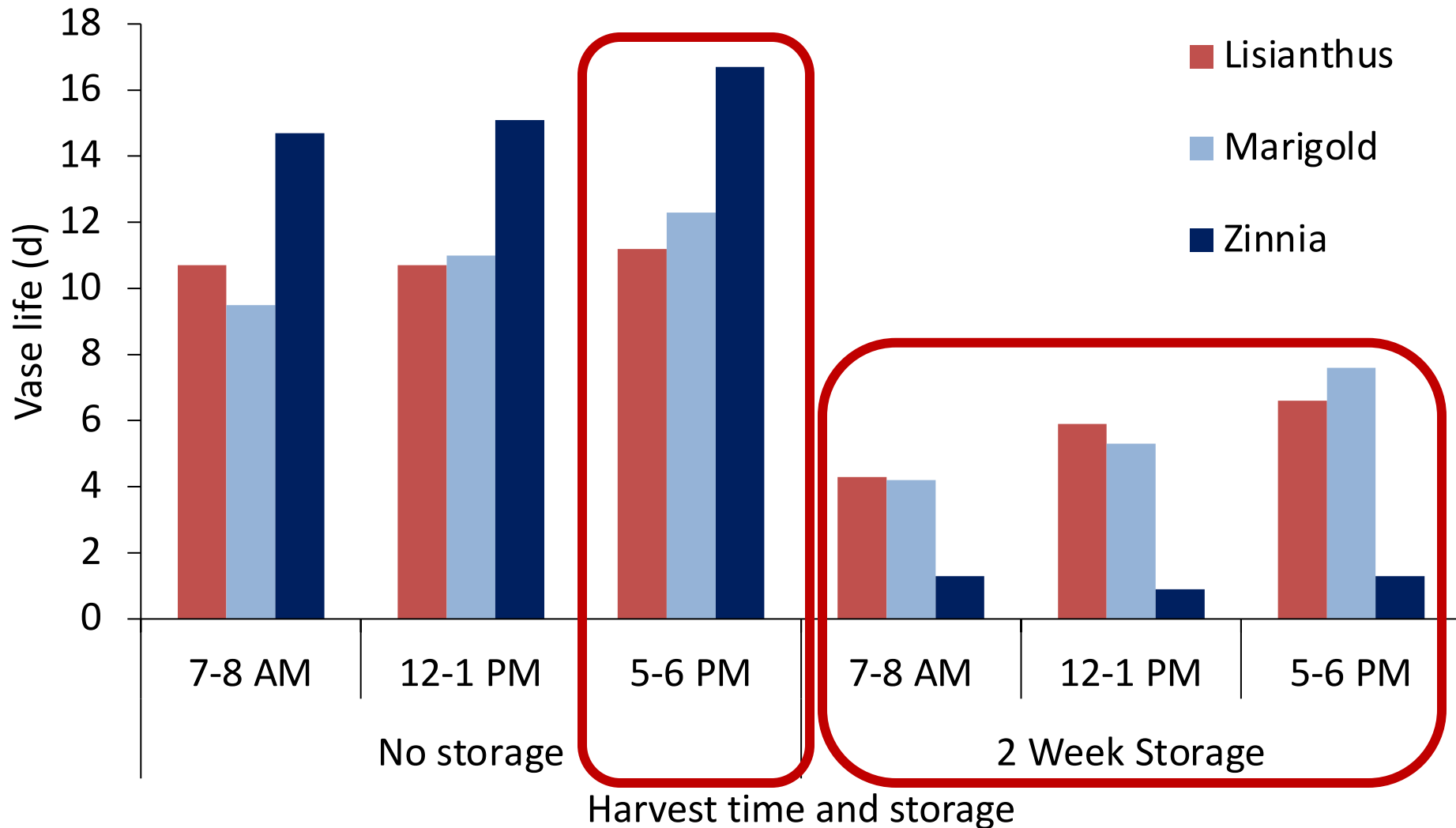


Harvest

- Harvest time varies with the species
 - Morning harvest
 - High water content
 - Cool tissue
 - Best for wilted flowers
 - Afternoon harvest
 - High carbohydrate content
 - Closed stomates
 - Best for storing flowers
- Field handling
 - Cut into water, chlorine solution, or hydrator
 - Hold dry for some species



Harvest: Time of Day



Temperature

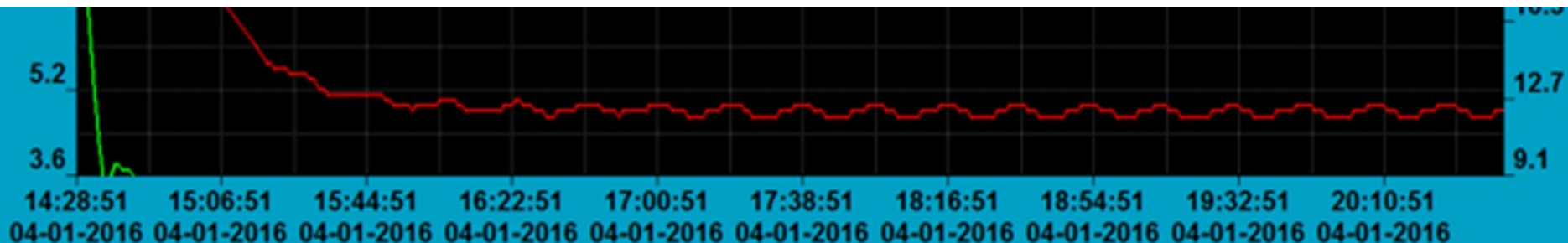


Stem bending in gerbera after storage

- The warmer the temperature:
 - Faster the respiration rate
 - Faster bacteria grow
 - More stems bend after storage

Temperature Drives Respiration

- For every 10°C increase in temperature
 - Respiration rate doubles
 - One day vase life is lost
- Get field heat out ASAP
- Set cooler at 34 to 38°F
 - Close to 32°F is optimum for most species
 - 34-35°F or 34-38°F is more practical
- A few crops are cold sensitive
 - Oriental lilies, zinnias, celosia, tropicals
 - Cool gradually
- Storage take home: Short and cold as possible for species



Botrytis

- Main postharvest disease on flowers and foliage
- Often present during production
- Becomes a major issue during storage and shipping
- Should be controlled during production



Ethylene Exposure



Hydrangea

- Leaf, flower and bud abscission
- Bud abortion
- Epinasty - distinctive curling, drooping of leaves or bracts
- Rapid flower senescence



Lily



Delphinium

Minimizing Ethylene Effects

- Lower temperature
- Apply anti-ethylene agents
 - Ethylbloc (MCP)
 - AVG (STS)
- Remove sources
- Can cut flowers and veggies/fruit be stored together?
 - Generally no
 - Possibly, if duration is short and temperature is close to 32F



Cut Flower Handling

- Decline due to lack of water uptake
- Stems blocked by:
 - Microorganisms
 - Bacteria and fungi naturally on plants and in tap water
 - Build up in buckets or vase solutions



Minimize Cross Contamination



High-polluting Flowers

- Celosia
- Dahlia
- Gerbera
- Mums
- Sunflower
- Yarrow
- Zinnia

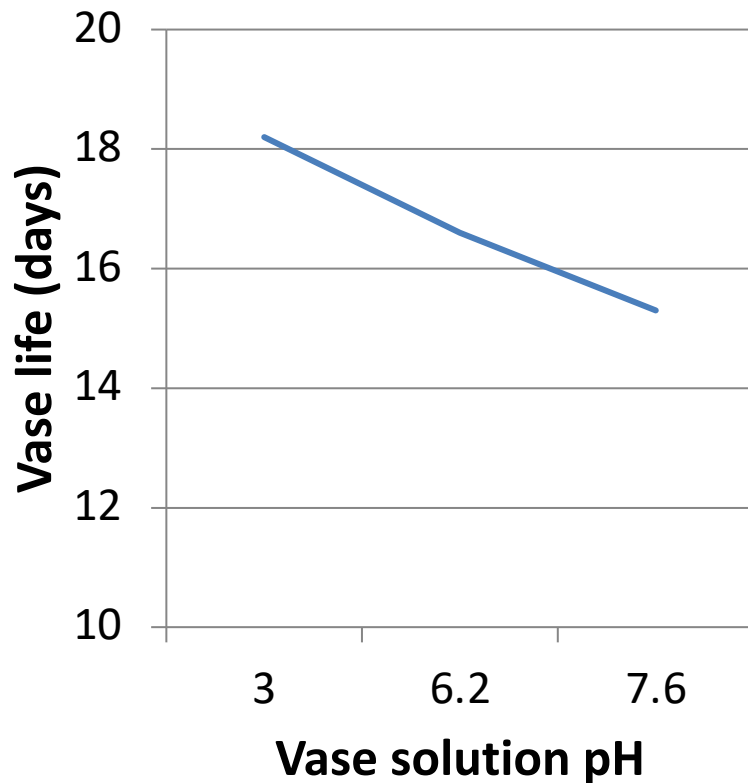


Cut Flower Handling

- Air plugs
 - Form from air drawn into xylem
 - When stems cut or out of water, recut to remove plug
- Physiological blockage
 - Eventual halt of water uptake
 - No way to overcome



Vase solution pH



- Low pH optimum for almost all species
- Tap water usually has too high of pH
- Adjust it!!



Mum 'Naru Lavender'

A B C

Floral Preservatives

Acidifier

Biocide

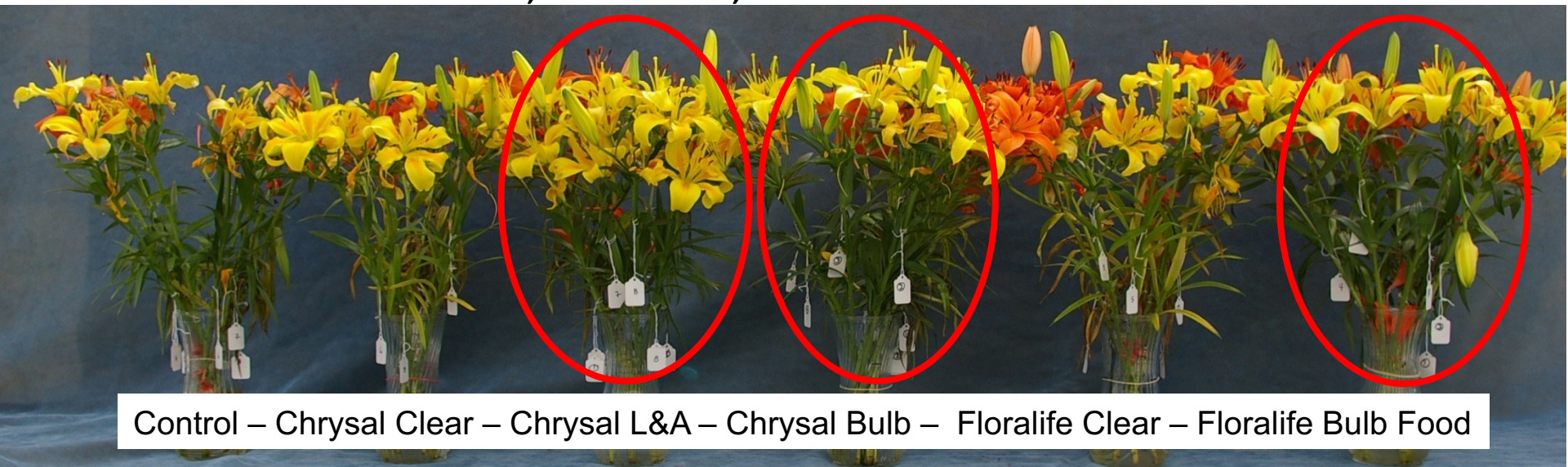
Carbohydrate

- Hydrating
- Holding
- Vase
- Species specific
- Powders
- Liquids
- Pills
- Buckets
- Jugs
- Packets
- Tea Bags



Use Right Solution to Fix Critical Issues

- Wilt-prone flowers
- Bacteria control
- Ethylene sensitivity
- Leaf yellowing
- Other species-species problems
- One size fits most, however,.....



Control – Chrysal Clear – Chrysal L&A – Chrysal Bulb – Floralife Clear – Floralife Bulb Food

.....One Size Fits Most

- Holding (low sugar) formulations
 - A. Provides low pH which boosts water uptake**
 - B. Checks bacteria**
 - C. Provides at least some carbohydrates**
 - D. Active up to 5-6 days
- Carbohydrate effects
 - Open buds
 - Develops, maintains color
 - Extends vase life



NCSU Floral Preservatives Research

Category	Genera (no.)	Cultivars (no.)
Holding – positive	38	125
Holding – negative	15	21

Summary of 16 years of postharvest testing using 213 cultivars
Funded by the American Floral Endowment and ASCFG Research Foundation



Tagetes 'Jedi Gold'/'Jedi Deep Gold'

Marigolds

	Water		Hydrator	
	Water	Holding	Water	Holding
Babuda Deep Gold	9.7	14.5	9.0	13.9
Babuda Gold	12.9	18.7	12.4	18.1
Babuda Yellow	6.0	10.6	6.3	10.7
Jedi Deep Orange	10.9	16.6	11.7	15.7
Jedi Orange	8.1	13.9	8.2	13.0
Narai Yellow	5.7	7.7	6.3	8.5
Optiva	13.9	16.7	13.8	15.6

Basil 'Cardinal'

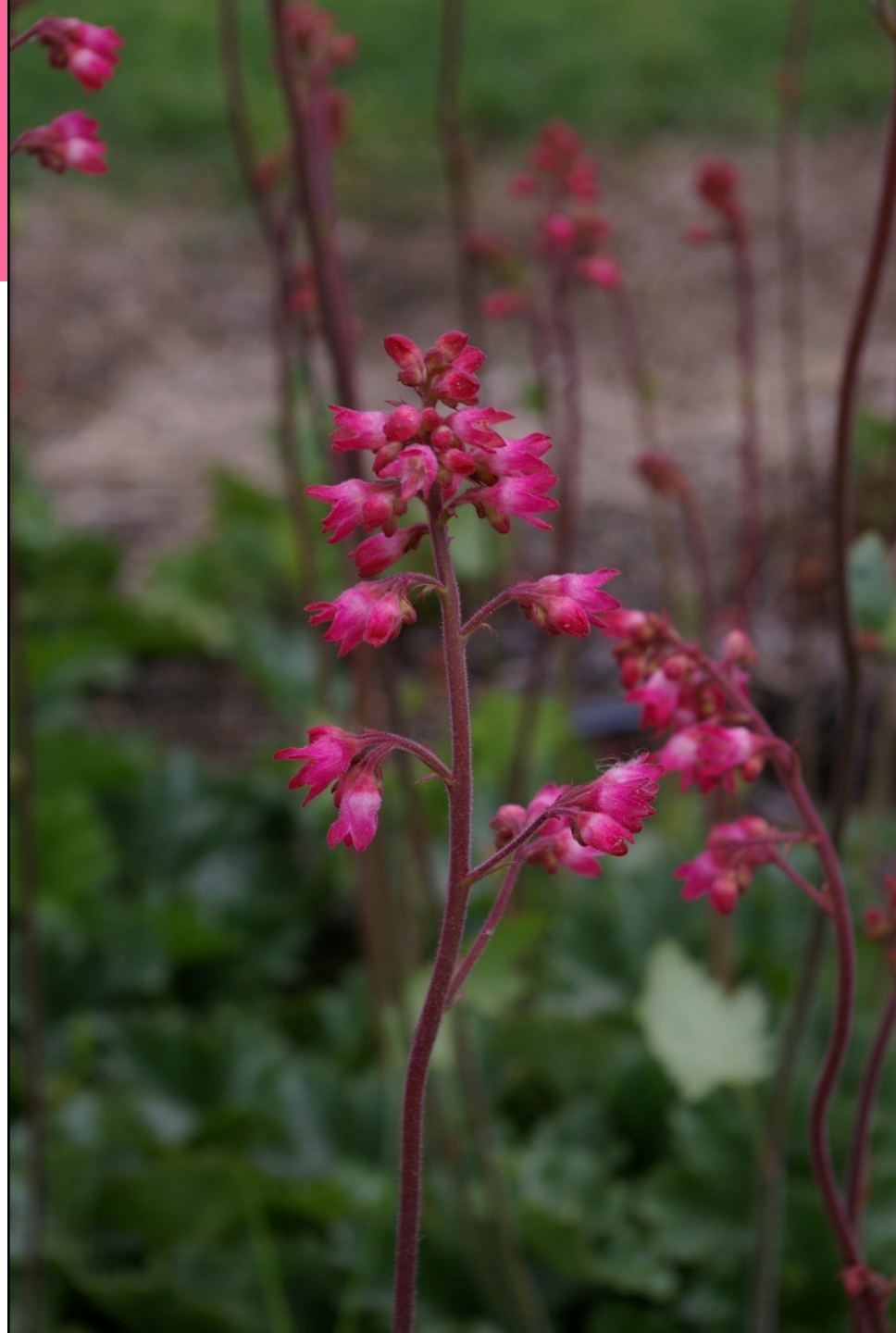
Hydrator: 11.5 days

Water: 4.7 days



Heuchera 'Florists' Choice'

- Hydrator + holding: 13 days
- Holding: 11 days
- Hydrator: 7 days
- Water only: 5 days



Eucomis 'Sparkling Burgundy'

- Hydrator + holding: 11 days
- Hydrator: 29 days
- Holding: 17 days
- Water: 42 days



NCSU Floral Preservatives Research

- **High quality water** (possibly with chlorine pills) should be used to hydrate flowers (4 h), commercial hydration solutions should be used for species that need them
- **Commercial holding** solutions (overnight or longer) should be used for **most** flowers, unless you see a problem (uncommon)

Retailing Hints/Cautions

- Stored flowers may appear okay, but die shortly after sale
 - Manage inventory
- Provide flower food packets to customers
- Prevent physical damage
 - Use sleeves
 - Pack loosely
- Keep in water or floral solution

The Take Home Message

- Store and transport as cold as possible (for species)
- Use proper treatments
- Work clean

The Cut Flower Crew

- Tatiana Osorio Montoya
- Many others over the years:
 - Ifikhar Ahmad
 - Ben Bergmann
 - Alicain Carlson
 - Lane Greer
 - Nathan Jahnke
 - Jen Kalinowski
 - Emma Locke
 - Cristian Loyola
 - Ingram McCall
 - Erin Moody
 - Erin Regan



Support

- ASCFG Research Foundation
- ASCFG Research Committee
- American Floral Endowment
- Floralife/Smithers Oasis
- Chrysal
- Seed and Plant Suppliers
- Growers
- Coor Farm Supply, Dillon Plastics, Fafard, Berger, Scotts



Questions/Comments.....