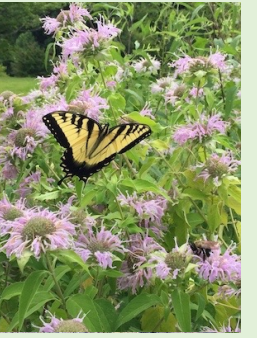


Native Plant Species & Cultivars



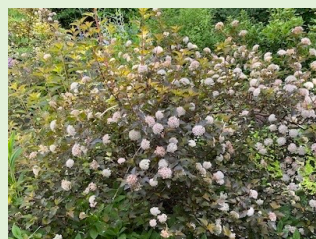
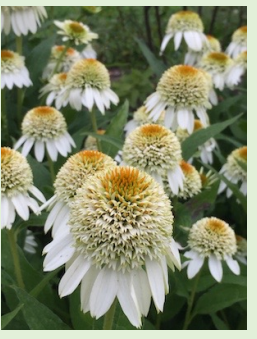
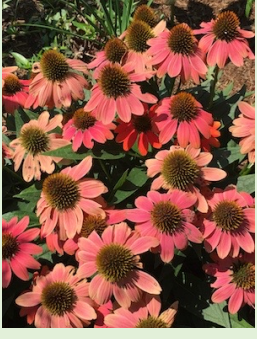
Challenges to gardeners

- Nursery stock dominated by non-native ornamentals
- Large Mid-Atlantic nurseries carry only 25% native species
- Majority of those native plants only available as cultivars
- Lack of information on sources of plants & how they were propagated



Are straight species of native plants always the best choice for home gardens?

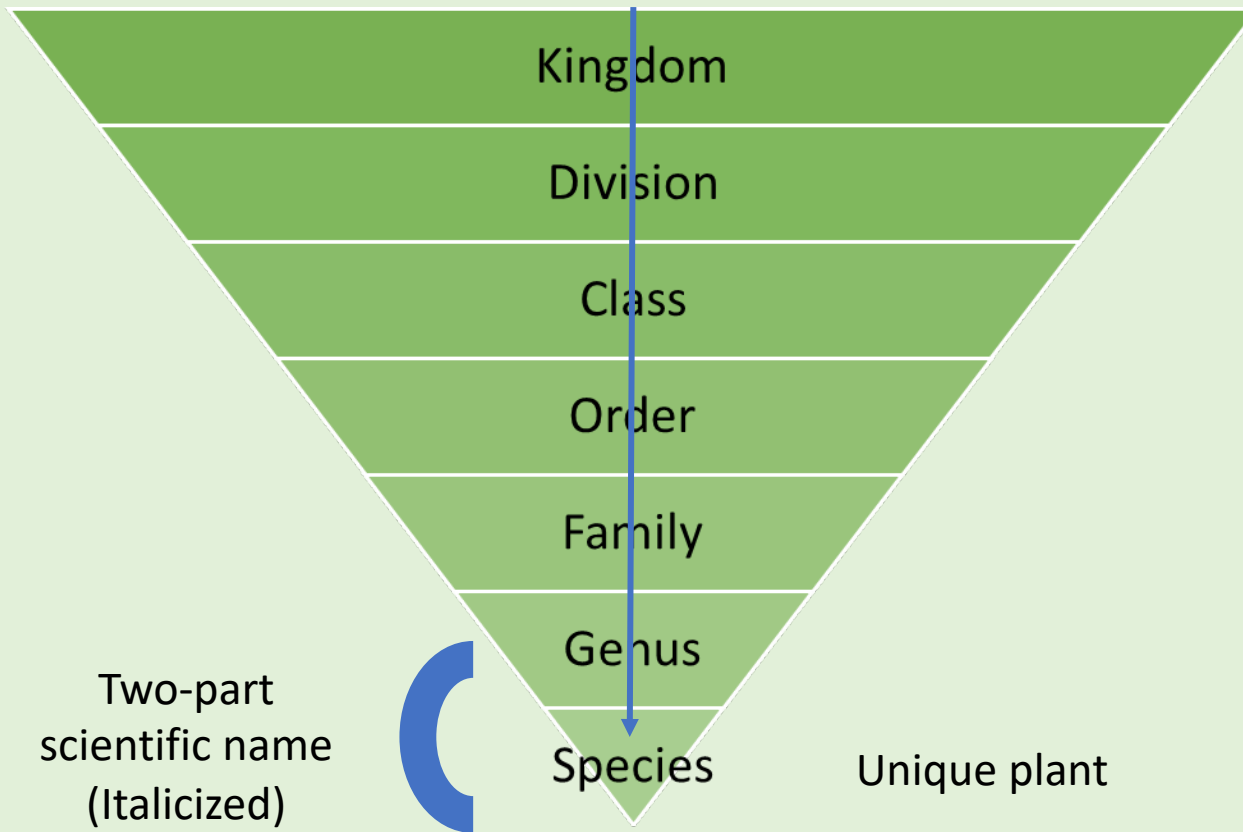
Can cultivars of native plants provide adequate support for wildlife?



Overview

- Definitions of botanical terms
- Trials of woody plants
- Trials of herbaceous plants
- Recommendations & Resources

Hierarchy of plant classification



Plants

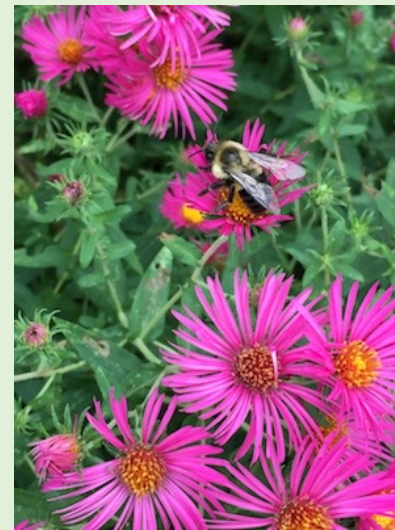
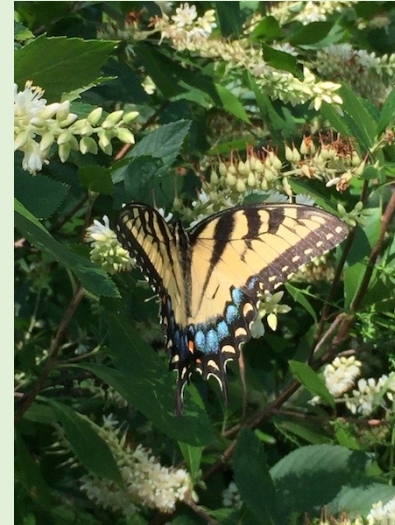
Woody plants w/
compound or
lobed leaves &
multi-petaled
flowers

Insect-pollinated

Lobed leaves &
winged samaras

Species

- Genetically distinct plant form found in the wild in a particular geographic region
- No human involvement in its evolution
- Has evolved as part of an ecosystem
- Interacts with other plants that share the same physical environment
- Has special relationships with animals as part of food web:
 - Nectar & pollen for insects
 - Fruit & seed for birds & other animals
 - Larval host plant for Lepidoptera



Species

- Reproduces sexually through pollination of its flowers & production of seed
- Has genetic variability to adapt to changes in environment
- May also reproduce vegetatively (asexually) by:
 - Rhizomes (horizontal underground stems)
 - Stolons (runner, stem along ground)
 - Suckering (forming sprouts at base)



Cultivar

- Cultivated variety of a species
- Larger role of horticulture trade in bringing certain plants to market
- Named and propagated by a nursery
- Name in single quotes (not italicized) following species name
- E.g., *Phlox paniculata* 'Bright Eyes'
- Cultivars of native plants sometimes referred to as "nativars"



“Discovered” Cultivar

- Can originate from a naturally occurring individual mutation within a species
- Discovered by a horticulturist in a wild population
- Judged distinctive enough to market
- Referred to as “a natural selection”
- May be produced commercially by seed (genetically variable) or propagated vegetatively for volume efficiency

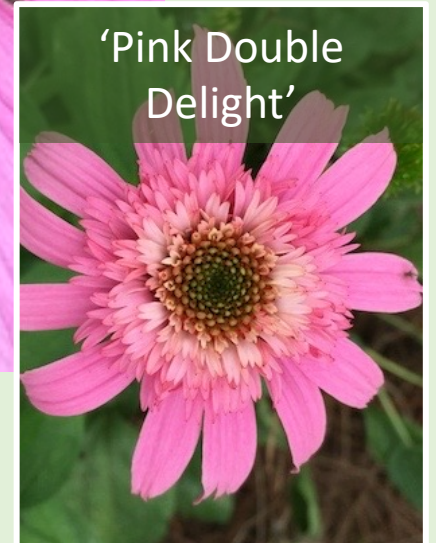
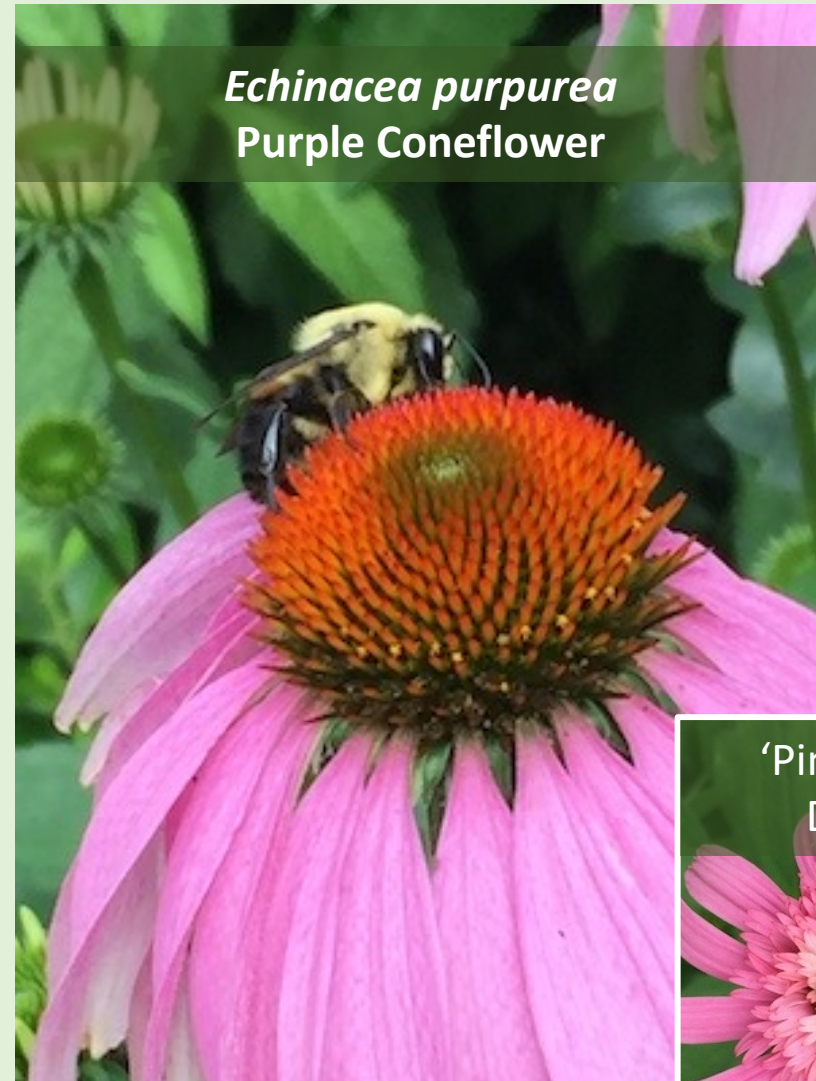
Mutation with large, gray-green pubescent foliage and dense mat-forming habit
Found on property near Virginia Beach, VA



Named for nearby Lynnhaven River

“Bred” Cultivar

- Result of selective breeding for certain traits preferred by humans
- Propagated vegetatively to retain desired traits in offspring
- Lack genetic variability to promote biodiversity (clones)
- Chosen cultivar name often reflects a featured characteristic
- May also have trademark name
- E.g., *Viburnum dentatum* ‘Christom’
BLUE MUFFIN®



Hybrid

- Cross-pollination between two species in same genus
- Can occur in nature with plants in proximity (within 500')
- Resulting seed = new plant
- Most created by plant breeders
- Combine traits of both parents
- Ideally indicated by “x” in the scientific name



X =



Displays intermediate characteristics, a blend of colors of the parents

Trials of Woody Plants

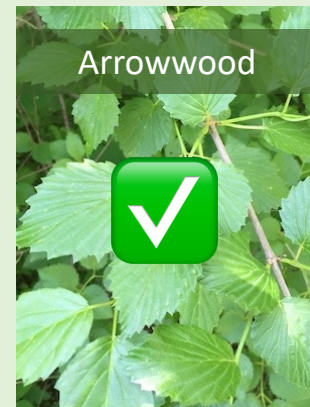
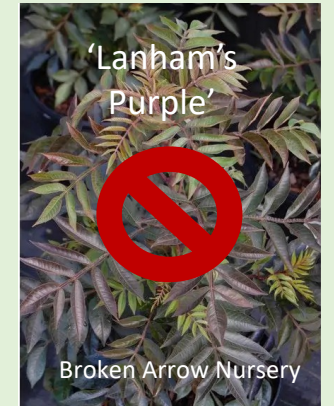
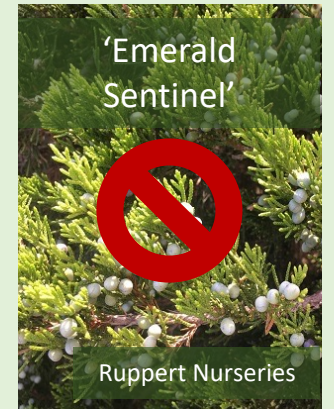
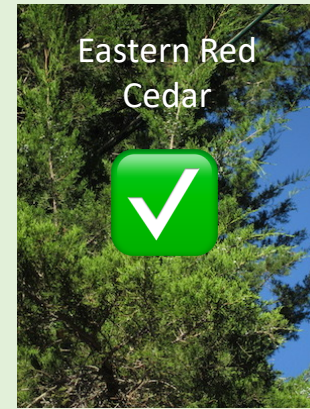
Baisden/Tallamy study of woody plants

- Experimental garden at Mt. Cuba Center, Hockessin, DE (2014-2016)
- Studied potential impact of cultivars on insect herbivores
- Focus on feeding of the caterpillar stage of butterflies & moths
- (Tallamy's "Ten-step Rule")
- Measured effect of 6 traits of trees and shrubs on feeding preference
- Insects collected via vacuum sampling



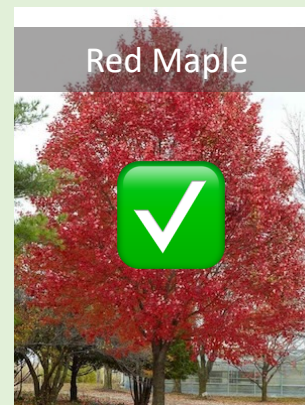
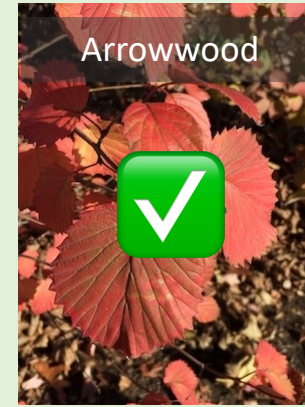
Impact of leaf color change

- Compared three species/cultivar pairs:
 - Eastern Red Cedar / 'Emerald Sentinel'
 - Winged Sumac / 'Lanham's Purple'
 - Arrowwood / 'Red Feather'
 - Cultivar foliage change (blue, purple or red)
- Clear feeding preference for species
- Replacement of chlorophyll by anthocyanins or carotenoids = deterrent
- **Species with unchanged leaf color = best choice as larval host plants**



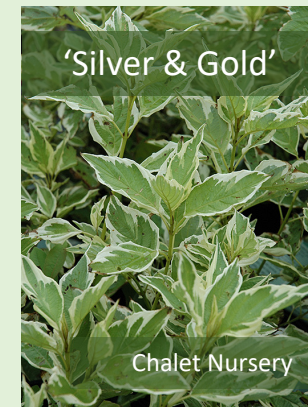
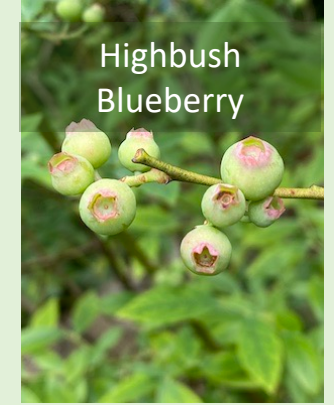
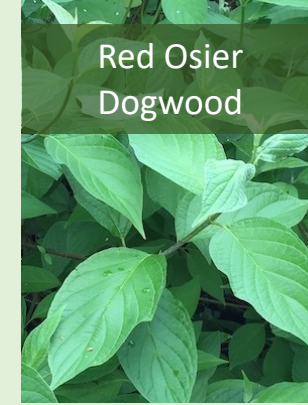
Impact of intense fall color

- Compared three species/cultivar pairs:
 - Arrowwood / 'Crimson Tide'
 - Red Osier Dogwood / 'Baileyi'
 - Red Maple / 'Red Sunset'
 - Cultivars with more intense coloration
- Clear feeding preference for species
- **Species with unchanged fall color = best choice as larval host plants**



Measuring effects of additional traits

- Comparison for:
 - Growth habit
 - Disease resistance
 - Variegated foliage
 - Enhanced fruit size /yield
- Mixed results
- No evidence that these traits degrade insect-based food webs
- **Cultivars acceptable to insect herbivores as larval host plants**

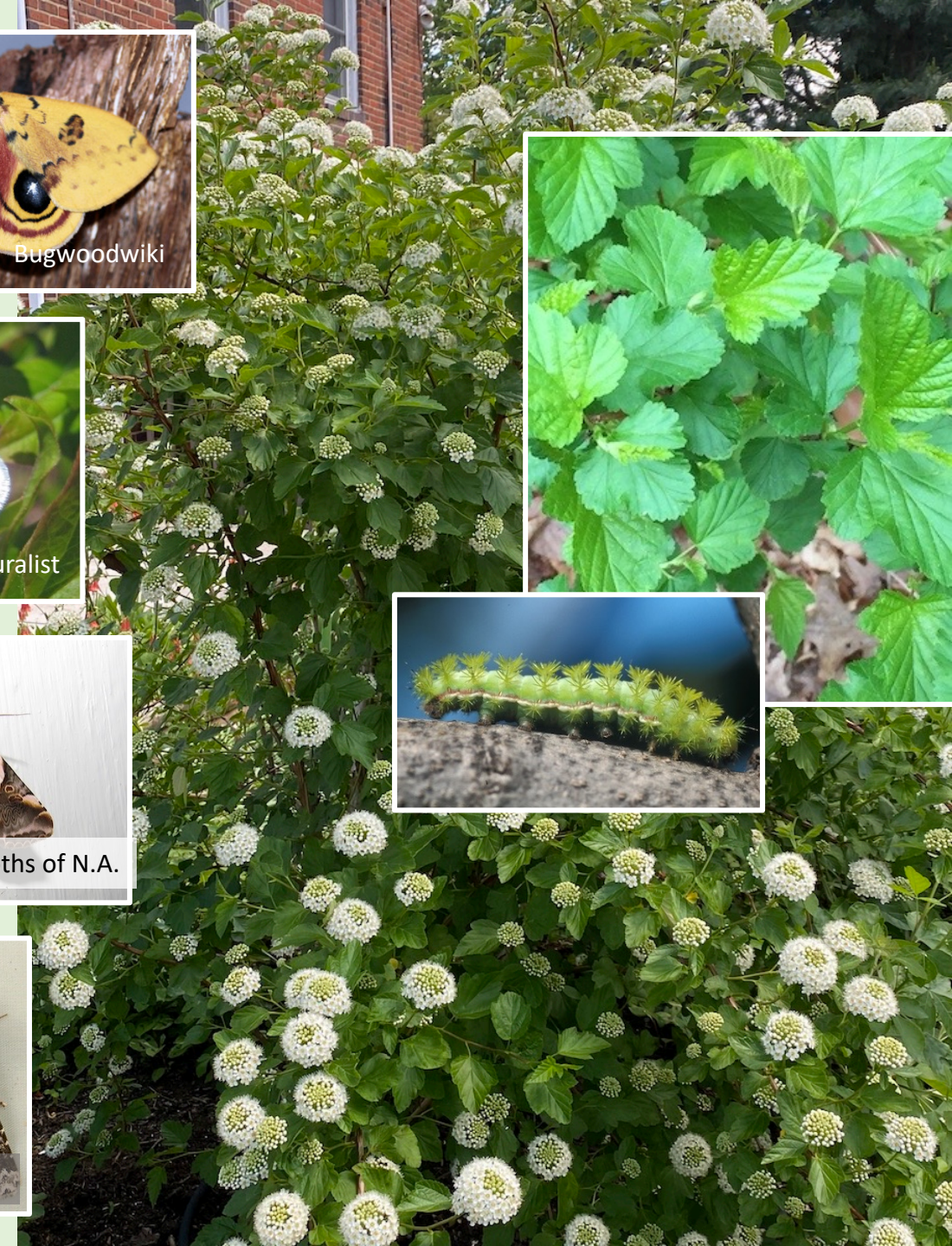
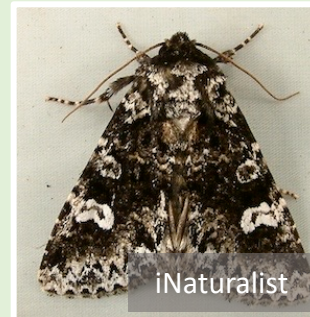
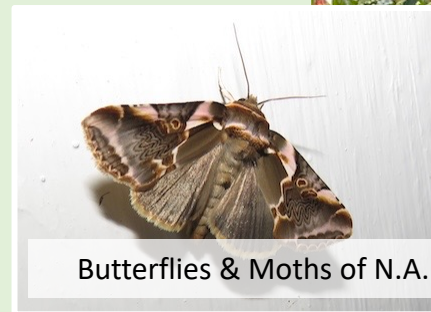


Impact of leaf color

Common Ninebark

Physocarpus opulifolius

- Green, lobed leaves
- Host plant for caterpillars of:
 - Io Moth
 - Bluish Spring Moth
 - Glorious Habrosyne
 - Hitched Arches Moth



Numerous cultivars of Ninebark

- 'Amber Jubilee'
- 'Aurea'
- 'Burgundy Candy'
- 'Caramel Candy'
- 'Center Glow'
- 'Coppertina'
- 'Dart's Gold'
- 'Diabolo'
- 'Ginger Wine'
- 'Lady in Red'
- 'Lemon Candy'
- 'Luteus'
- 'Nanus'
- 'Nugget'
- 'Snowfall'
- 'Summer Wine'
- Sweet Cherry Tea'



Some modified
for height



**Ornamental but cannot
serve as larval host plants**



Most modified
for leaf color

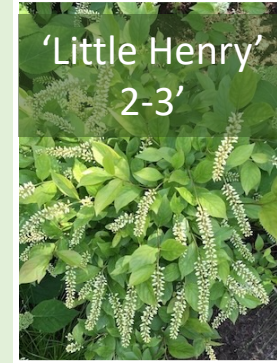
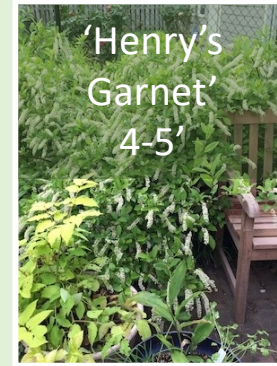


Impact of modified height

Virginia Sweetspire

Itea virginica

- Host plant for caterpillar of American Holly Azure
- Leaves & flowers of cultivars appear unmodified
- **Shorter cultivars acceptable for caterpillars and pollinators**



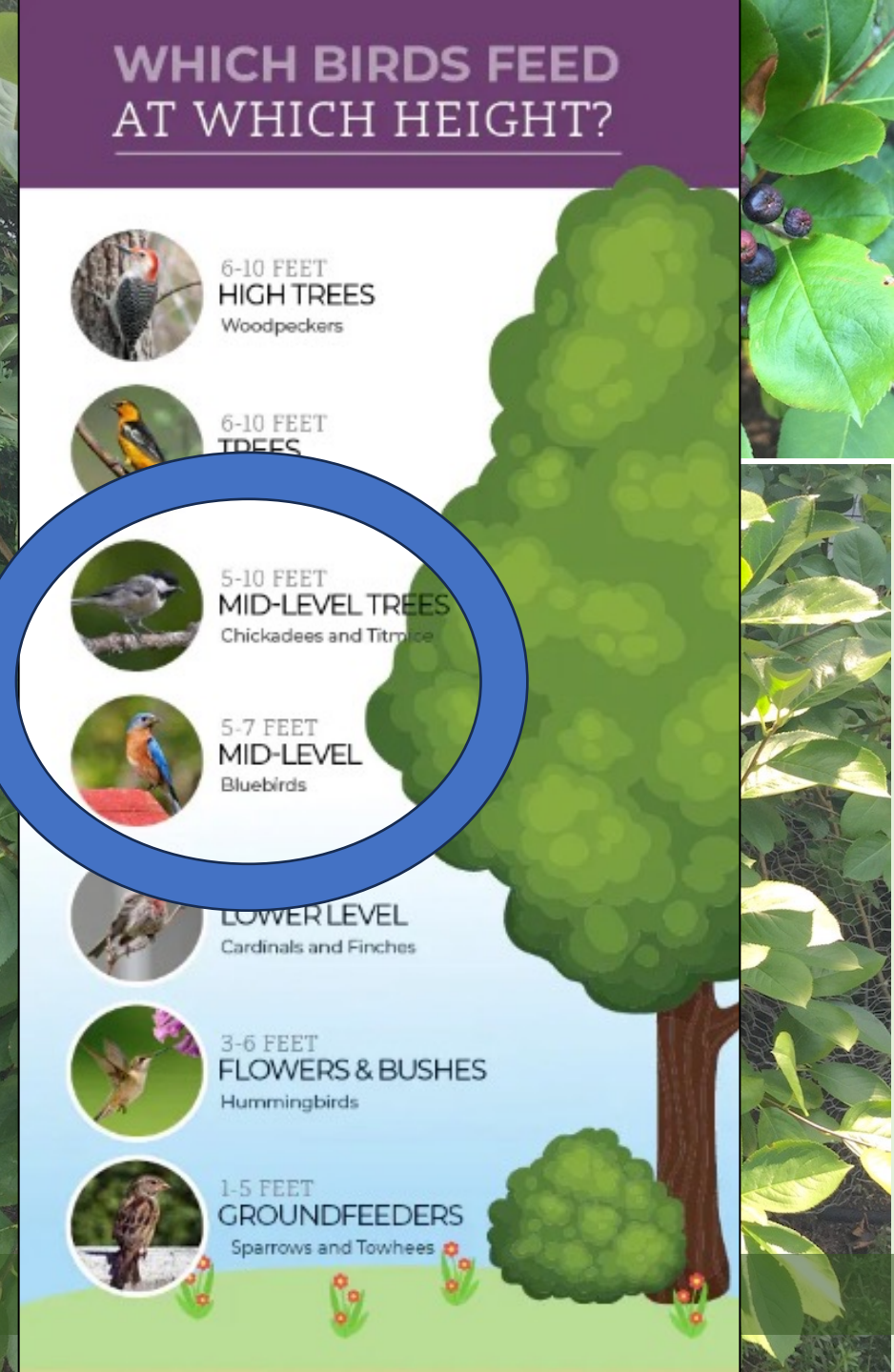
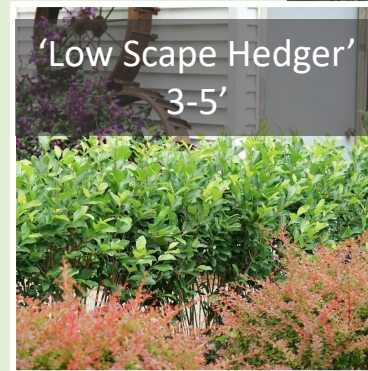
Straight species 6-10'

Impact of modified height

Black Chokeberry

Aronia melanocarpa

- Leaves and flowers unmodified
- **Cultivars acceptable for caterpillars and pollinators**
- Fruit of shortest cultivar is close to ground height
- **Raises questions about comfort of birds feeding at that level**



Impact of fruit size

Highbush Blueberry

Vaccinium corymbosum

- Leaves and flowers unmodified
- **Cultivar acceptable for caterpillars and pollinators**
- Impact of enhanced fruit on birds
- **Larger fruits require more manipulation & may be hard for birds to swallow**



Keystone genus
Supporting 288
species

World's largest blueberries,
the size of cherries



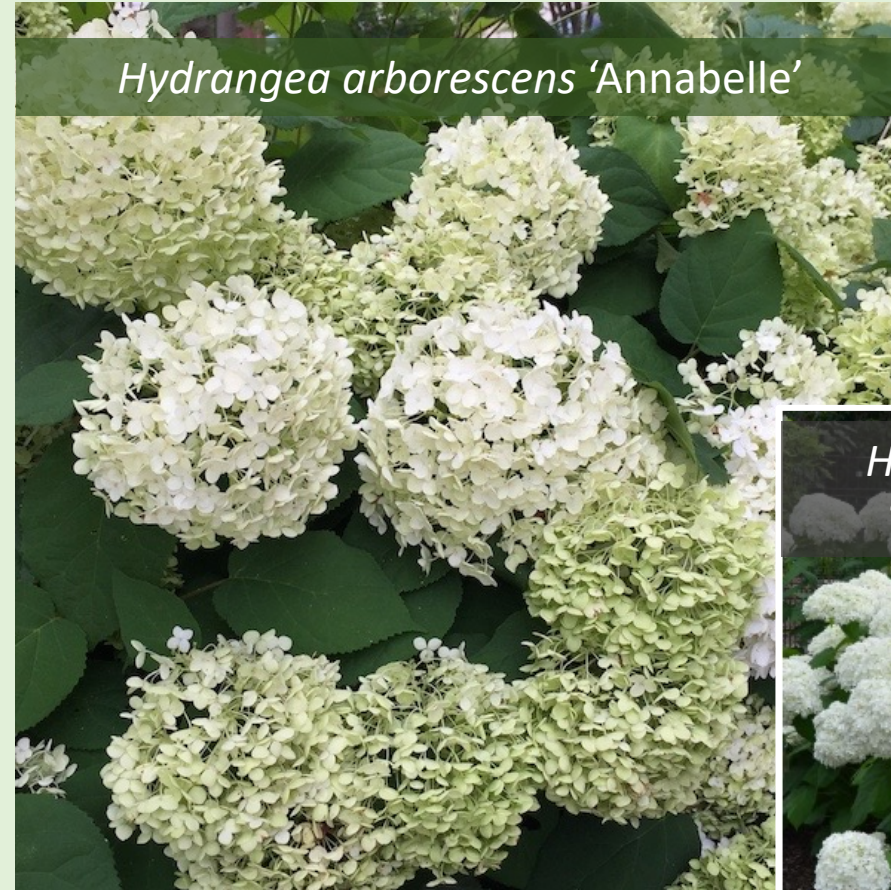
Mt. Cuba trials on Wild Hydrangea & cultivars

- Trial conducted 2017-2021
- Species (*Hydrangea arborescens*) blooms in June on new wood
- Inflorescences consist of hundreds of white fertile flowers
- Flower color is not affected by pH of soil as with non-native species



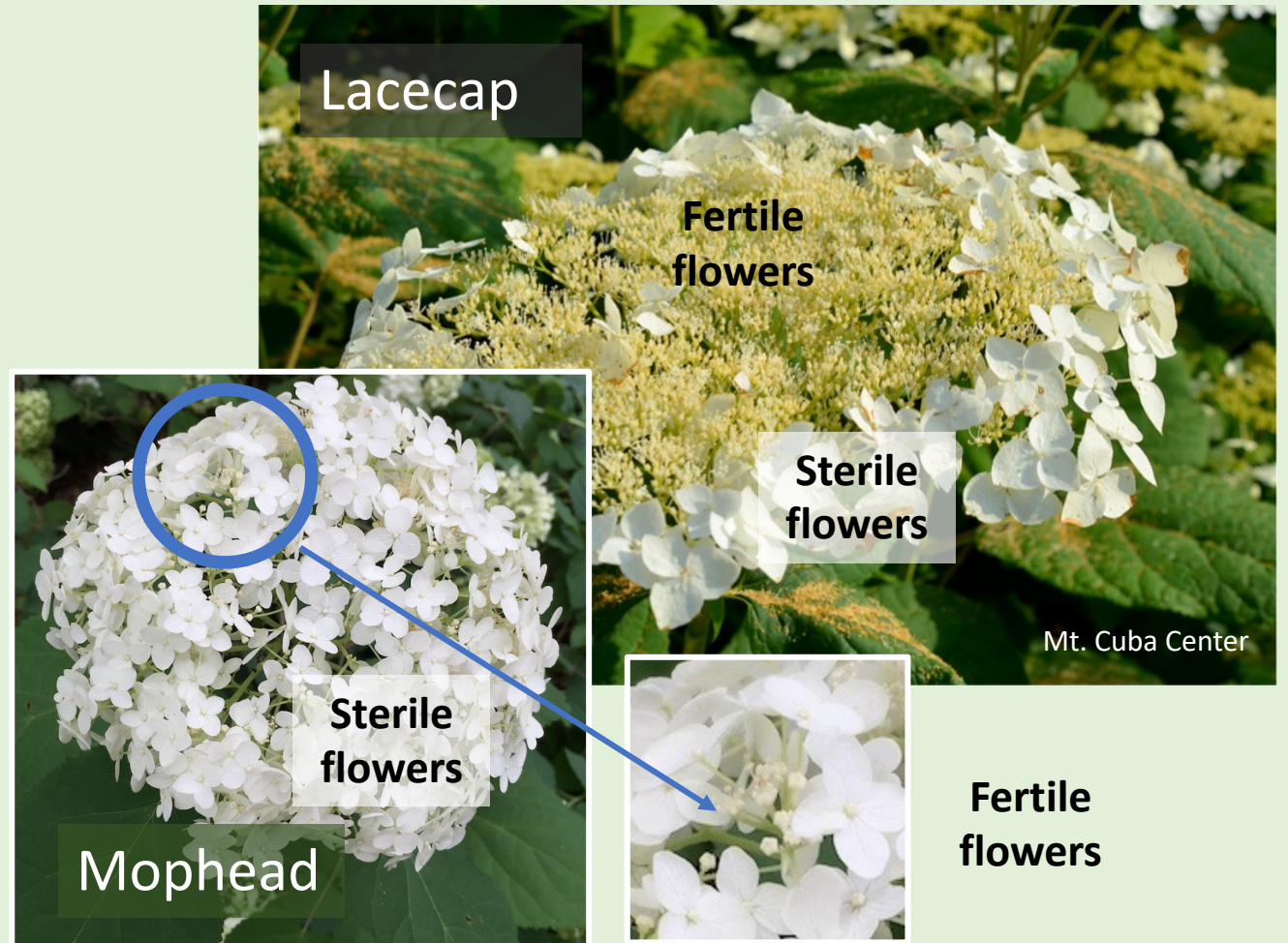
Early cultivars of Wild Hydrangea

- Naturally occurring variants with mophead mutation
- Produced commercially as
 - *Hydrangea arborescens* 'Grandiflora'
 - *Hydrangea arborescens* 'Annabelle'
- Weak stems & floppy habit due to large size of flowerheads



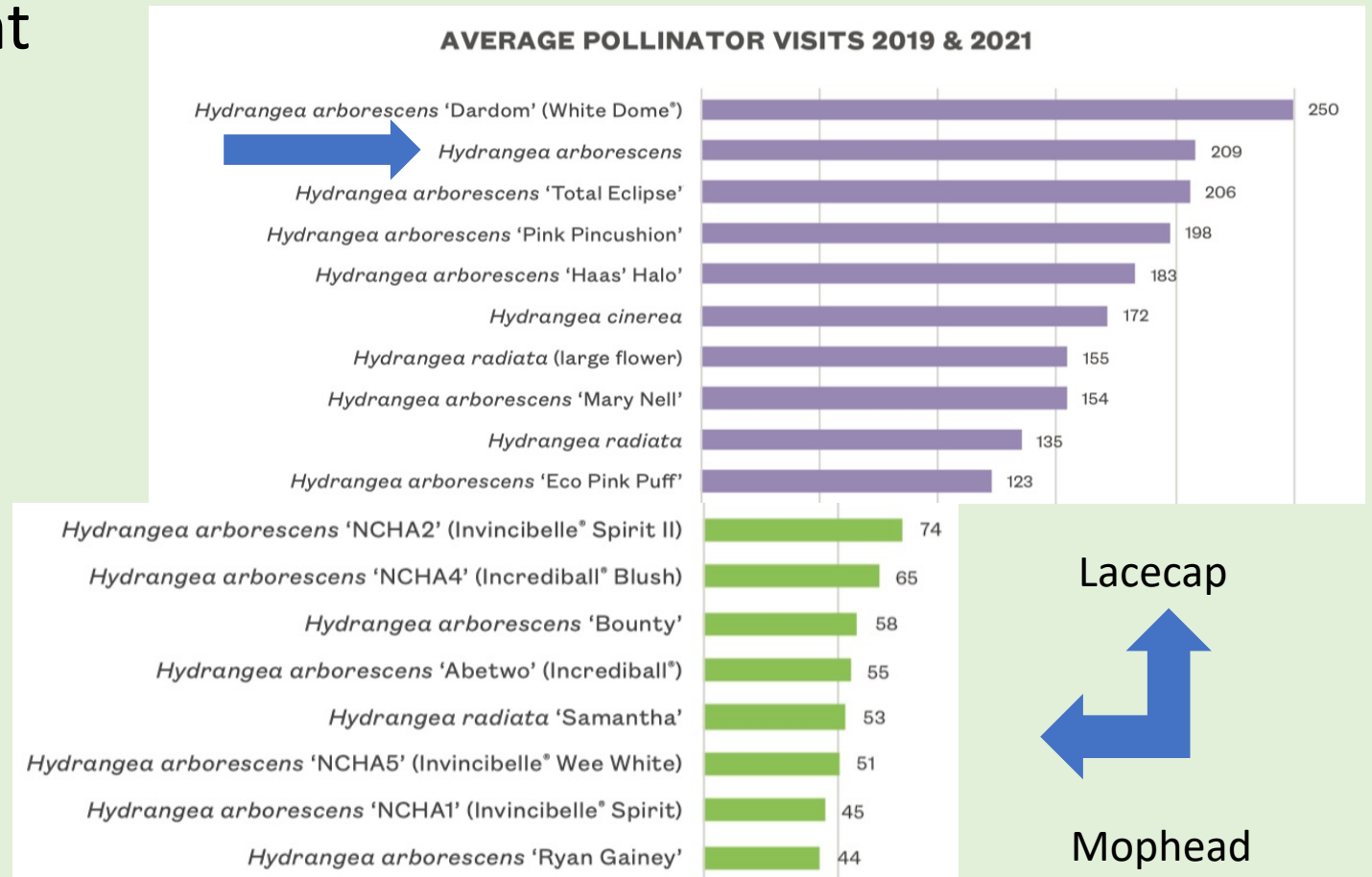
Newer cultivars of Wild Hydrangea

- Result of selective breeding for desirable garden traits:
 - Compact habit
 - Sturdy stems
 - New flower forms & colors
- Two categories of flower forms:
 - Lacecap – fertile flowers with showy ring of sterile flowers
 - Mopheads – masses of sterile flowers, few hidden fertile flowers
- Mopheads especially popular, but don't support pollinators

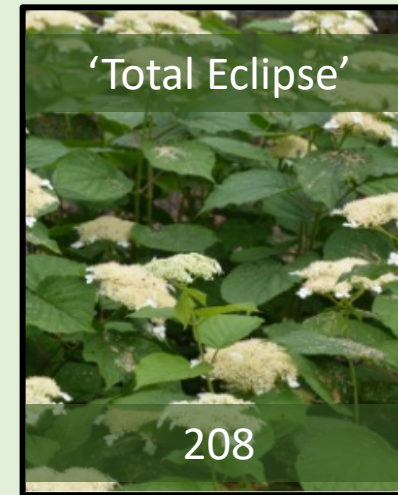


Pollinator visitation to Wild Hydrangeas

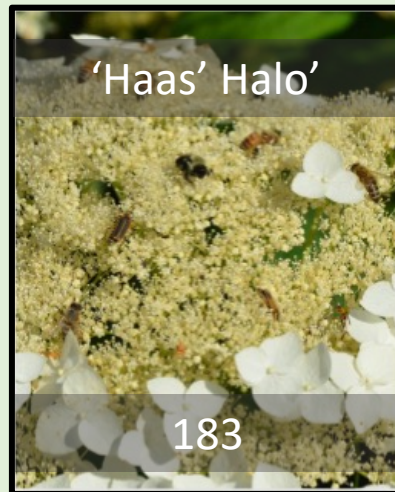
- Visits recorded during plant trials in 2019 & 2021
- Observations recorded by Pollinator Watch Team
- Daily observations during bloom season
- **Lacecap preferred over mophead**



Top-rated Wild Hydrangeas for pollinators



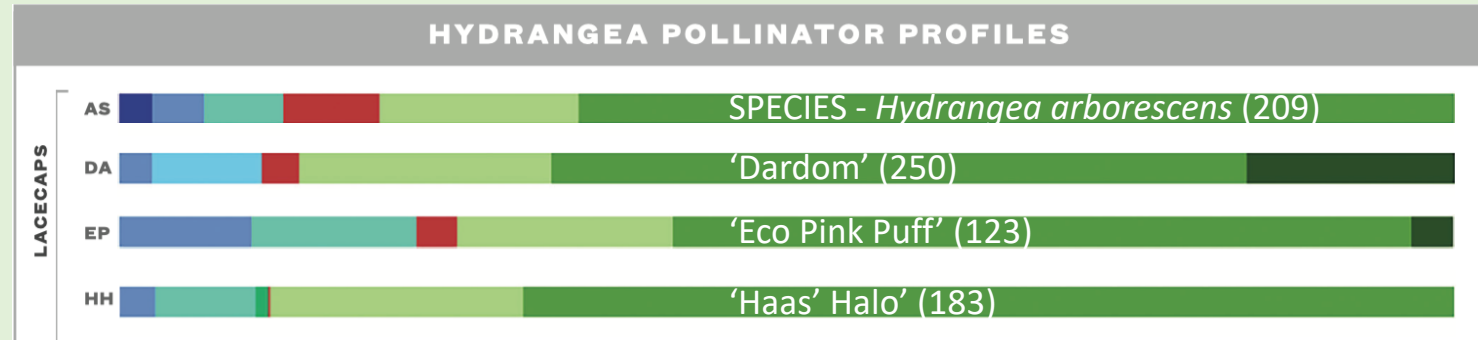
One cultivar of
Hydrangea arborescens
ranked above
the species



Straight species
generally
preferred
among
lacecaps

University of Delaware pollinator study

- Conducted 2018 in Mt. Cuba trial gardens
- Dr. Deborah Delaney & Lindsey Cathcart, U of DE
- Filmed inflorescences for 10-minute intervals
- Reviewed footage to ID and count insect visitors
- Pollinators visit lacecaps more than mopheads
- **Visitation profiles vary**



Beetles

- Cantharidae
- Cerambycidae
- Mordellidae
- Nitidulidae
- Scarabaeidae

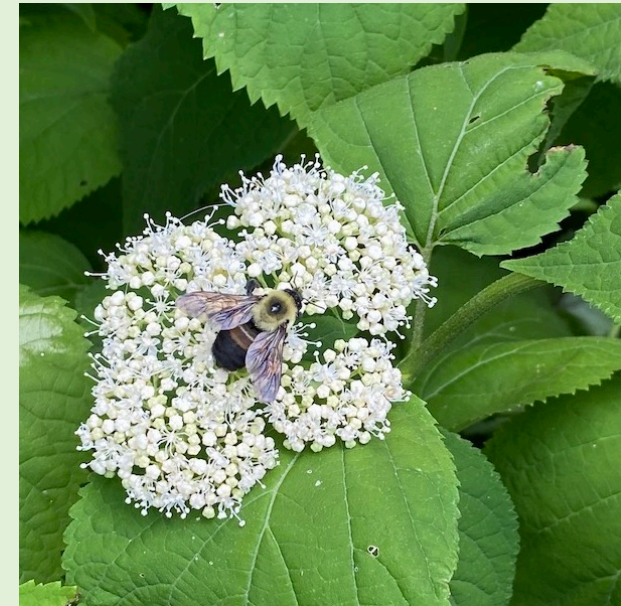
Flies

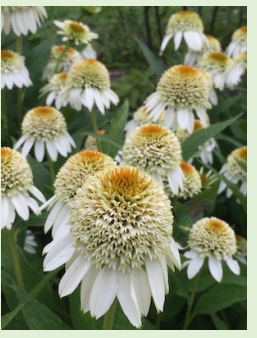
- Conopidae
- Syrphidae

Bees and Wasps

- Andrenidae
- Apidae
- Halictidae
- Vespidae

Apidae = bumble bees, carpenter bees
Andrenidae = mining bees (small-medium)
Halictidae = sweat bees (small)





QUESTIONS?



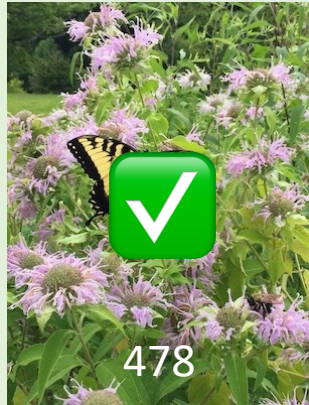
Trials of Herbaceous Plants

Penn State Extension pollinator trial

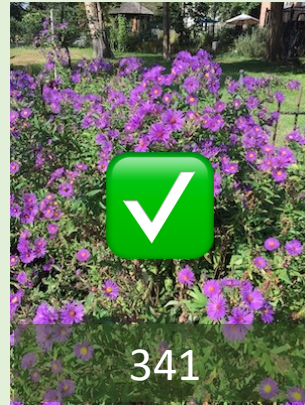
- Bees, Bugs & Blooms (2012-2014)
- Evaluating native plant species & cultivars for attracting pollinators
- Master Gardeners planted 4,500 plugs of herbaceous perennial plants at state research center
- Weekly monitoring
- Evaluation of insect visitation, plant vigor & blooming



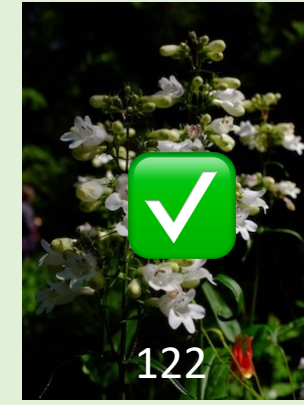
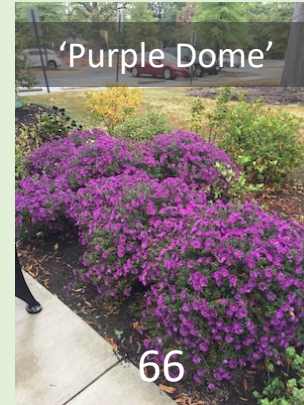
Comparison of species vs cultivars



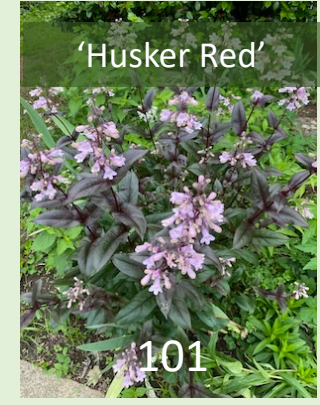
Monarda fistulosa
Wild Bergamot



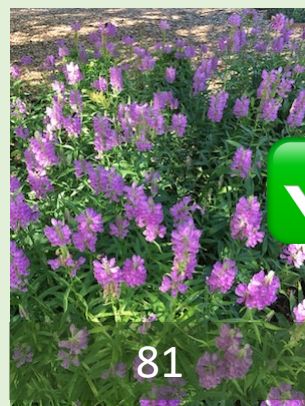
Symphyotrichum novae-angliae
New England Aster



Penstemon digitalis
Foxglove Beardtongue



Oenothera fruticosa
Sundrops



Physostegia virginiana
Obedient Plant

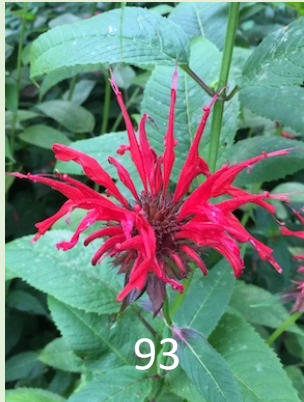


**Straight species
preferred or
equal**

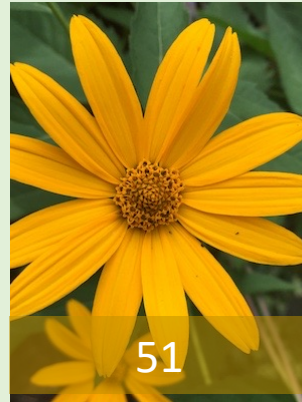
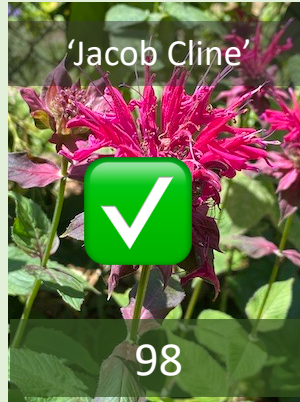


More comparisons

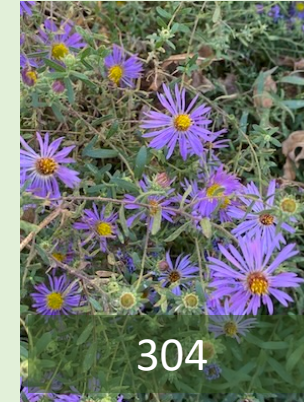
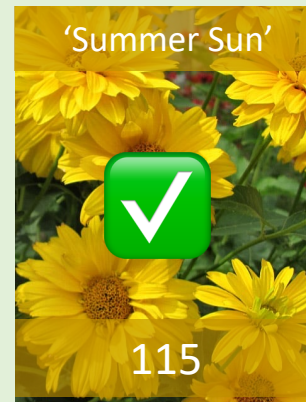
Cultivar preferred



Monarda didyma
Scarlet Beebalm



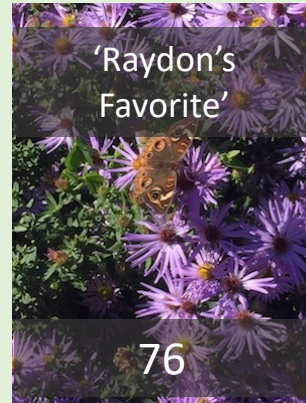
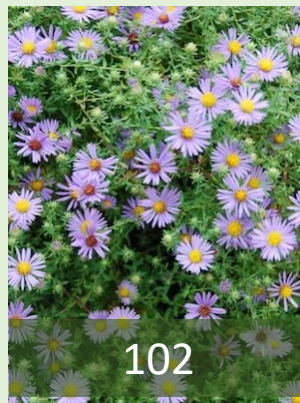
Heliopsis helianthoides
Oxeye



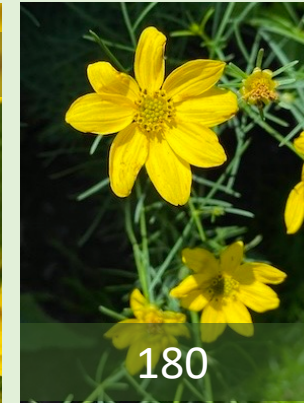
Symphyotrichum laeve
Smooth Aster



Symphyotrichum oblongifolium
Aromatic Aster



Coreopsis verticillata
Threadleaf Coreopsis



Conclusions

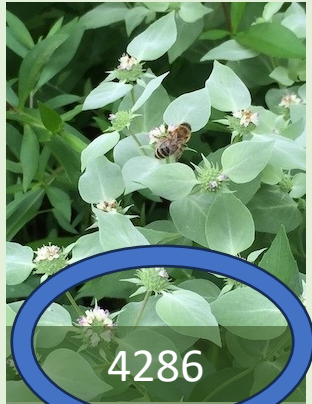
Results of 14 direct comparisons:

- ~ 50% of species better
- In other cases, cultivars outperformed species

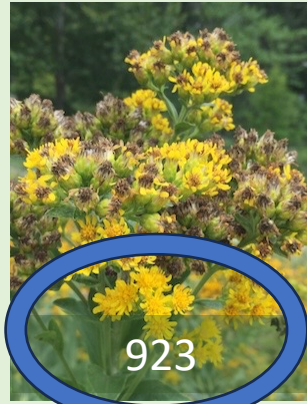
“It appears that it is not possible to generalize that the cultivar is better than or poorer than the species.”



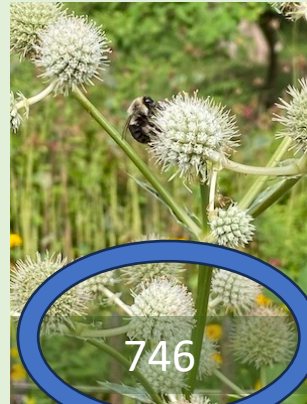
Top 10 plants for total pollinator visits



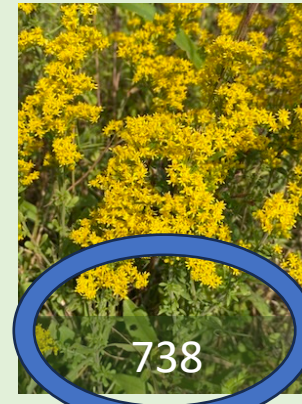
Pycnanthemum muticum
Clustered Mountain-mint



Solidago rigida
Stiff Goldenrod



Eryngium yuccifolium
Rattlesnake Master



Solidago nemoralis
Gray Goldenrod



Eupatorium hyssopifolium
Hysop-leaf Thoroughwort



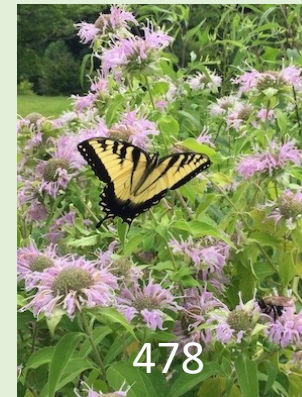
Liatris microcephala
Dwarf Blazing Star



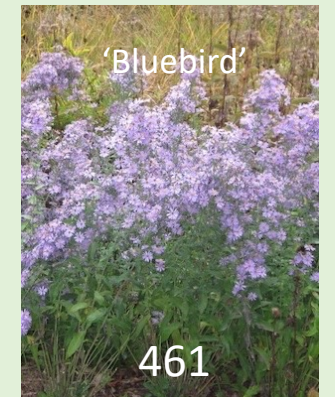
Eutrochium dubium
Coastal Plain Joe-pye-weed



Asclepias incarnata
Swamp Milkweed



Monarda fistulosa
Wild Bergamot



Symphyotrichum laeve
Smooth Aster

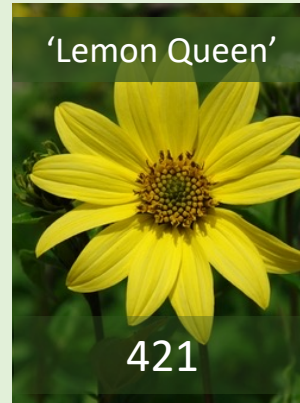
Second 10 plants for pollinator visits



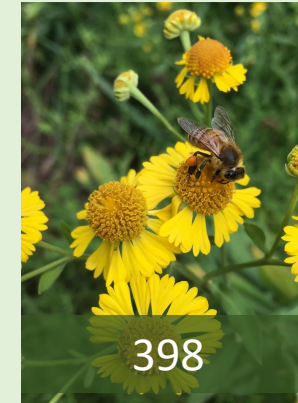
Eupatorium perfoliatum
Common Boneset



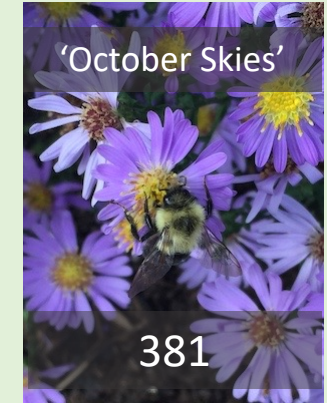
Veronicastrum virginicum
Culver's-root



Helianthus
hybrid



Helenium autumnale
Sneezeweed



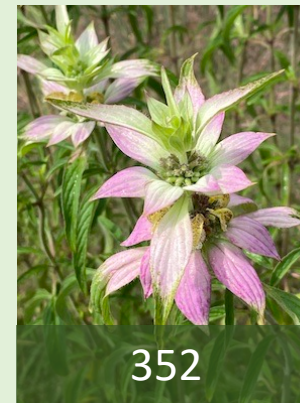
Symphyotrichum oblongifolium
Aromatic Aster



Monarda
hybrid



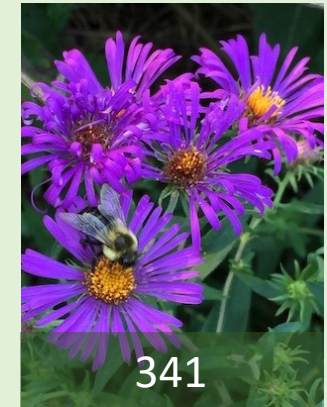
Coreopsis verticillata
Threadleaf Coreopsis



Monarda punctata
Spotted Beebalm



Coreopsis tripteris
Tall Coreopsis

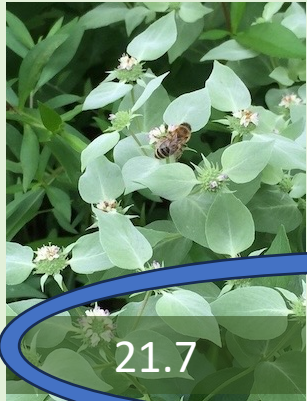


Symphyotrichum novae-angliae
New England Aster

Top 10 plants for insect diversity

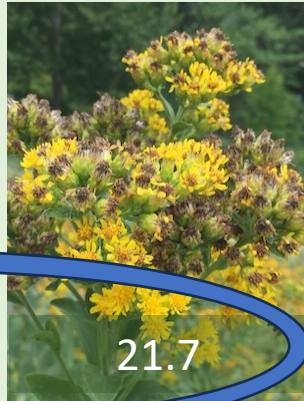


72 insect species
identified



21.7

*Pycnanthemum
muticum*



21.7

Solidago rigida



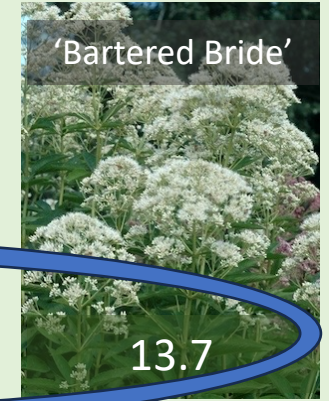
15.3

*Eupatorium
hyssopifolium*



14.0

*Eryngium
yuccifolium*



13.7

*Eutrochium
fistulosum*



13.7

*Coreopsis
tripteris*



13.3

*Helianthus
divaricatus*



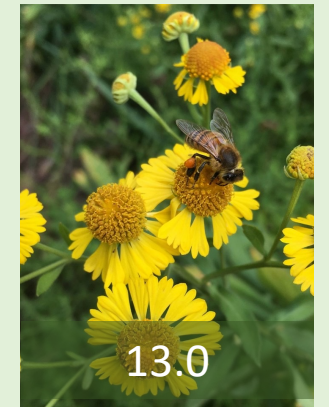
13.0

*Symphyotrichum
laeve*



13.0

*Eutrochium
maculatum*



13.0

*Helenium
autumnale*

Best plants for attracting specific insects



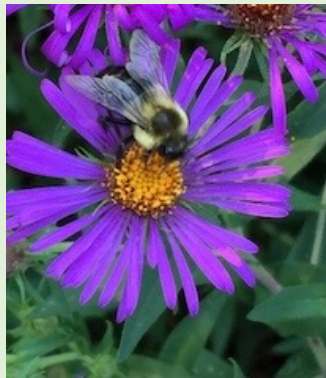
Best plants for sheer # of bee and syrphid visitors

- Clustered mountain mint (*Pycnanthemum muticum*): 19 bees/syrphids*
- Gray goldenrod (*Solidago nemoralis*): 14 bees/syrphids
- Pink tickseed (*Coreopsis rosea*): 14 bees/syrphids
- Lance-leaved coreopsis (*Coreopsis lanceolata*): 13 bees/syrphids
- Spotted joe pye weed (*Eupatoriadelphus maculatus* 'Bartered Bride'): 12 bees/syrphids
- Rattlesnake master (*Eryngium yuccifolium*): 12 bees/syrphids



Best plants for attracting bumble bees

- Lemon queen sunflower (*Helianthus* 'Lemon Queen'): 8 bumble bees*
- New England aster (*Symphyotrichum novae-angliae*): 8 bumble bees
- Purplestem aster (*Symphyotrichum puniceum*): 7 bumble bees
- Stiff goldenrod (*Solidago rigida*): 6 bumble bees
- Coastal plain joe pye weed (*Eupatoriadelphus dubius*): 6 bumble bees
- Wild bergamot (*Monarda fistulosa*): 6 bumble bees



Best plants for attracting butterflies

- Coastal plain joe pye weed (*Eupatoriadelphus dubius*): 17 butterflies/skippers*
- Blue mistflower (*Conoclinium coelestinum*): 5 butterflies/skippers
- Showy aster (*Eurybia spectabilis*): 4 butterflies/skippers
- Sweet joe pye weed (*Eutrochium purpureum* subsp. *maculatum* 'Gateway'): 3 butterflies/skippers
- Dwarf blazing star (*Liatris microcephala*): 3 butterflies/skippers

Annie White study

- Research done for PhD dissertation, University of Vermont (2012-2015)
- Evaluated differences between native wildflowers & cultivars in supporting pollinators
- Plots at two research sites (farms)
- 11 species paired with cultivars
- Visited 4 times per month, May to October in 2013 and 2014
- Visitation rates observed during 5-minute scans

Site A:

(Organic farm)

Bumble bees (43%)

Honeybees (30%)

Other bees (13%)

Flies (6%)

Site B:

(Conventional farm)

Bumble bees (68%)

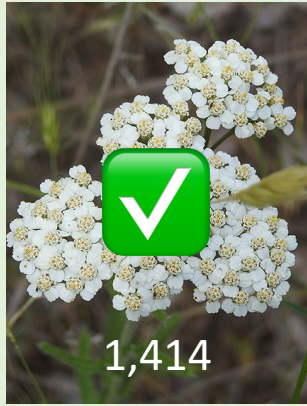
Flies (14%)

Other bees (11%)

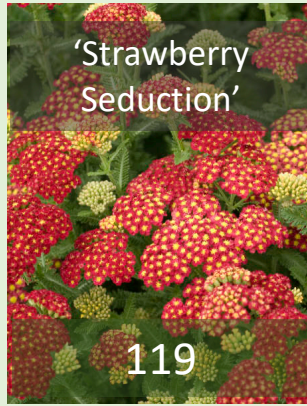
Honeybees (Sep & Oct)



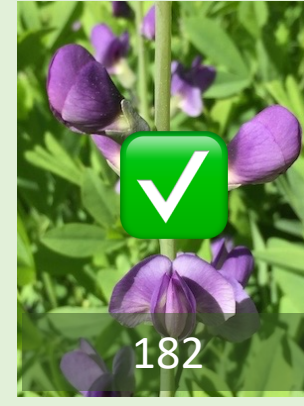
Species preferred over other forms



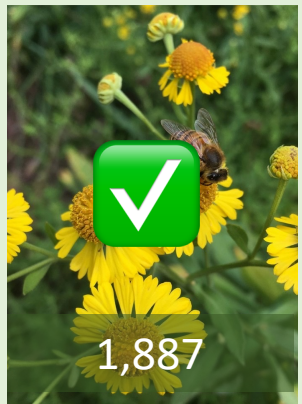
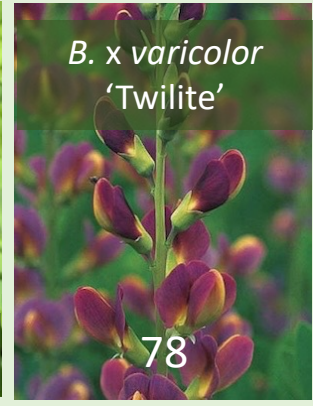
Achillea millefolium
Yarrow



Agastache foeniculum
Anise Hyssop



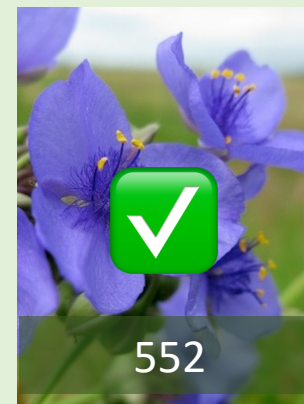
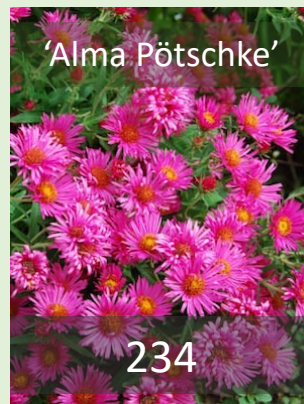
Baptisia australis
Blue Wild Indigo



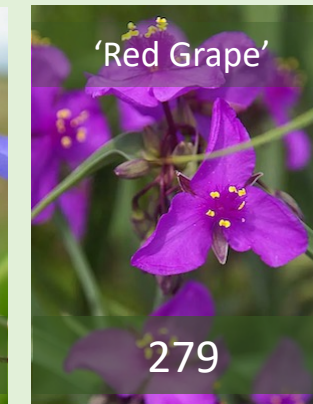
Helelenium autumnale
Helen's Flower



Symphyotrichum novae-angliae
New England Aster



Tradescantia ohiensis
Ohio Spiderwort



Additional pairings

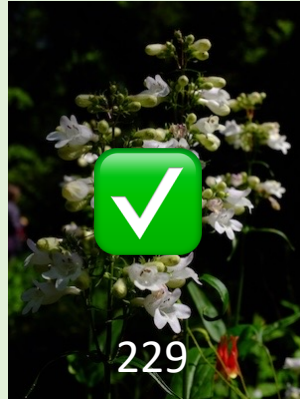


877

Monarda fistulosa
Wild Bergamot



660



229

Penstemon digitalis
Foxglove Beardtongue



147



119

Rudbeckia fulgida
Orange Coneflower

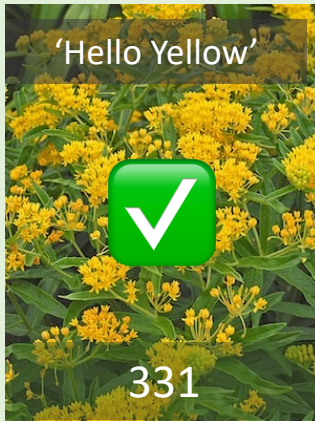


120



230

Asclepias tuberosa
Butterfly-weed



331



616

Veronicastrum virginicum
Culver's-root



1,347

**Cultivars need to
be evaluated on an
individual basis**

Pollinator profiles for pairs

No bumble bees



= species preferred

Fewer wasps to cultivar

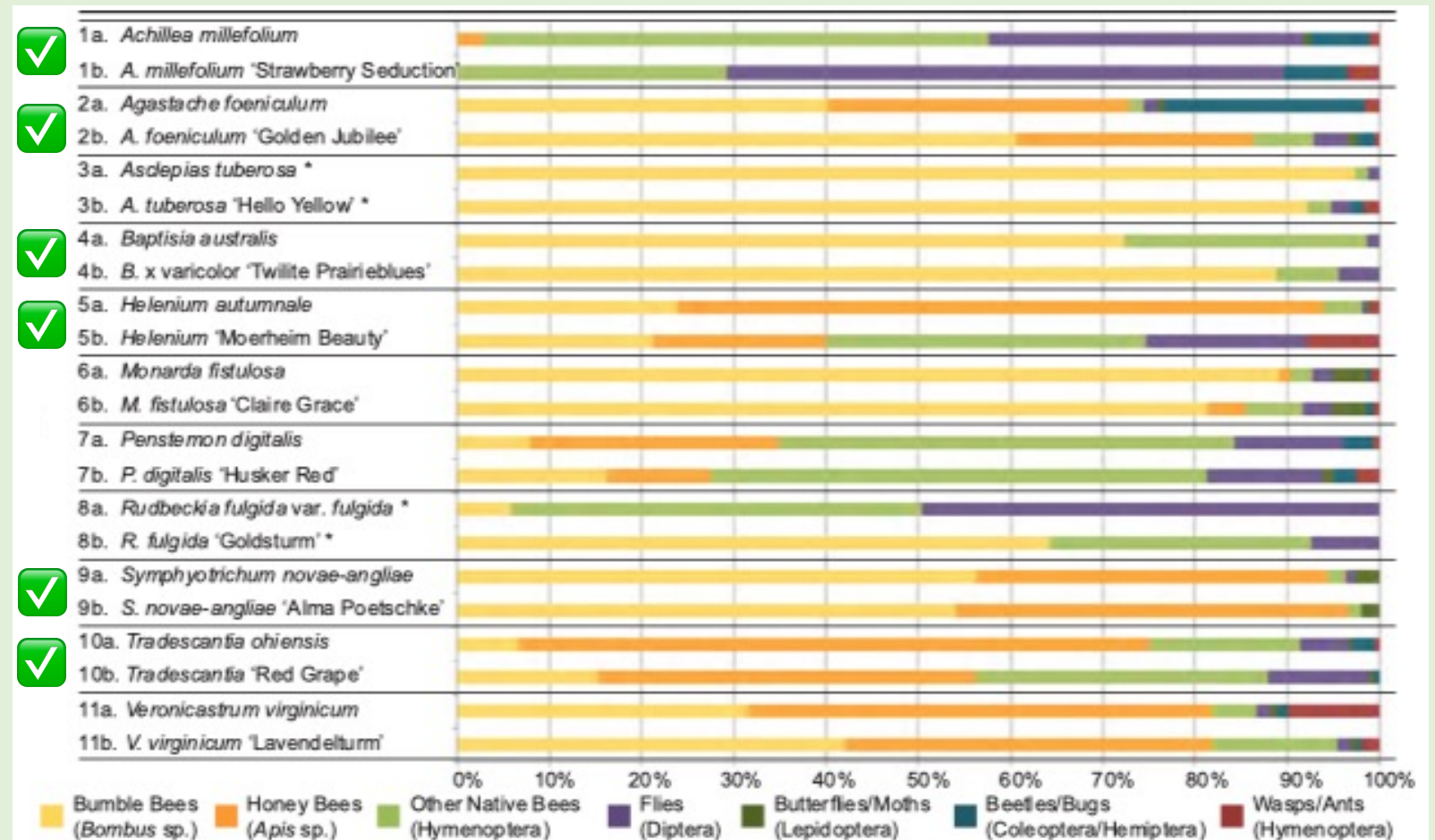
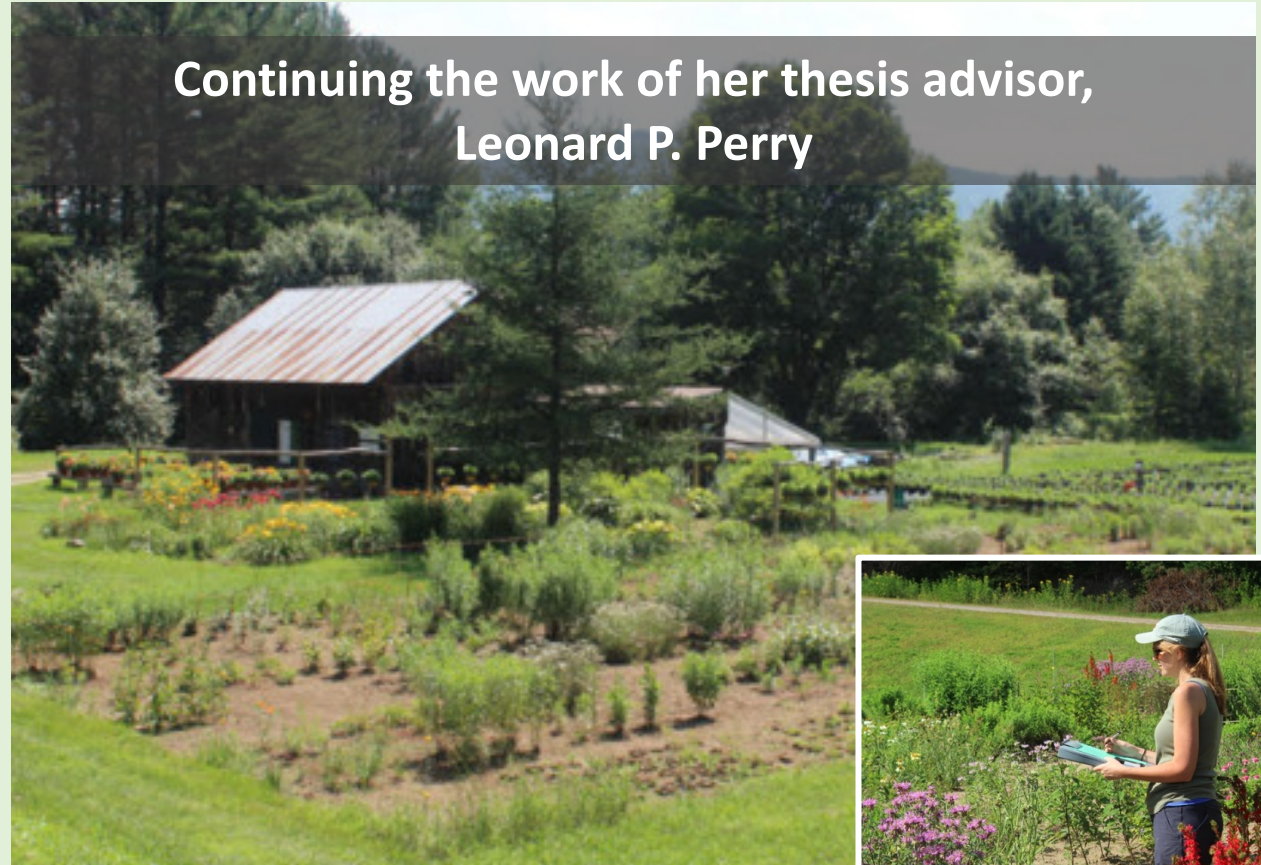


Figure 2.6. Proportions of pollinator groups observed visiting each native species and native cultivar at Site A from 2013-2015.

* Plants studied only at Site B where no honey bees were present in the landscape at bloom time.

Evaluation of Purple Coneflower & cultivars

- *Echinacea purpurea* one of most widely promoted species
- Subject of intensive breeding efforts; ~ 200 varieties
- Focus: selecting traits valuable to ornamental gardeners
- Study to evaluate benefits of cultivars & hybrids to pollinators
- Research gardens at two farms (part of larger 2013-2014 study)
- 48 five-minute observations



Continuing the work of her thesis advisor,
Leonard P. Perry



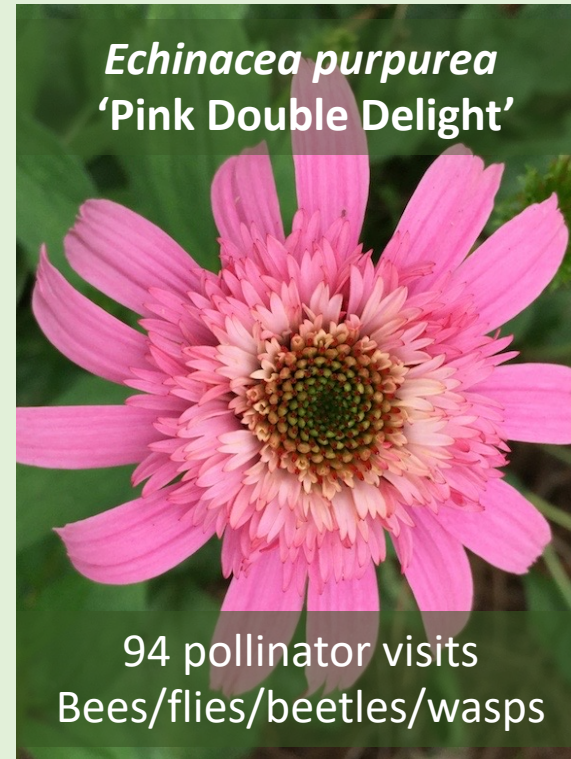
Plants evaluated in study & results



Species grown from seed



Popular cultivar grown from seed, same form, different color



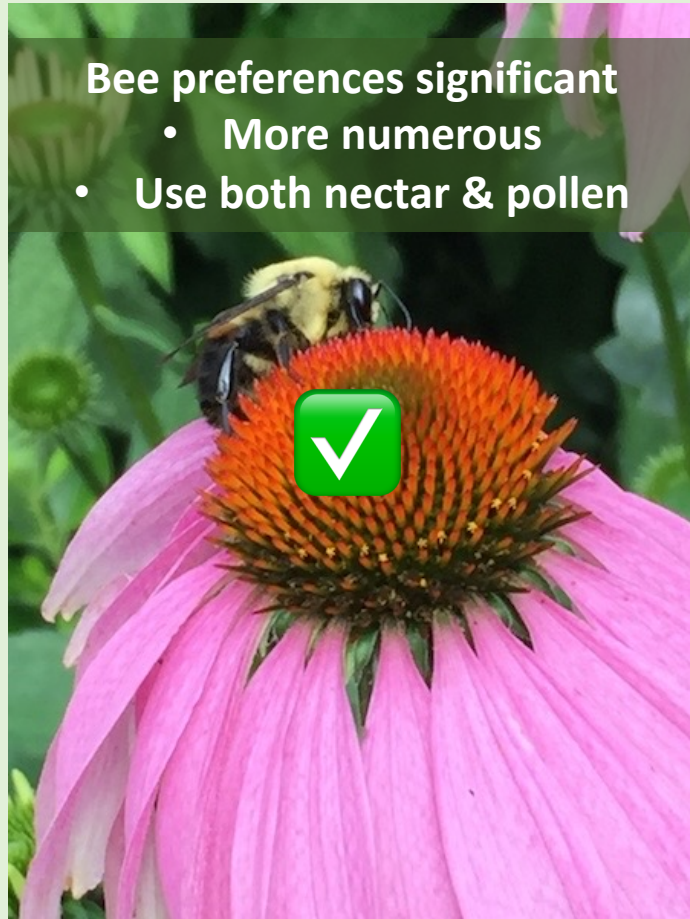
Patented, double-flowered cultivar, propagated via tissue culture



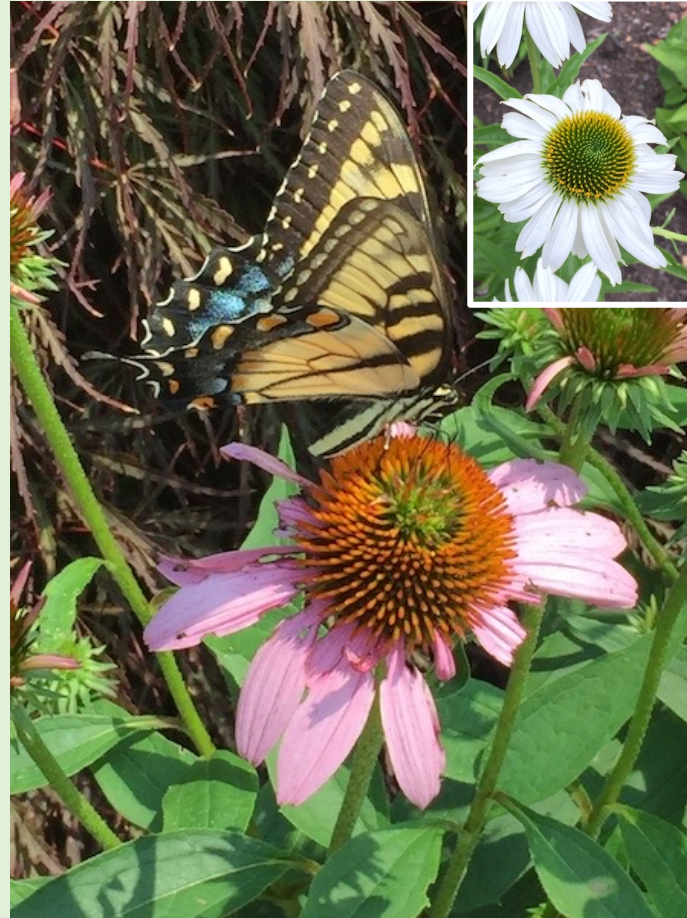
Interspecific hybrid cultivar ('White Swan' crossed with *E. purpurea* x *E. paradoxa*)

Conclusions

Breeding of cultivars & hybrids decreases pollinator support



Bees strongly preferred species;
then 'White Swan' over others

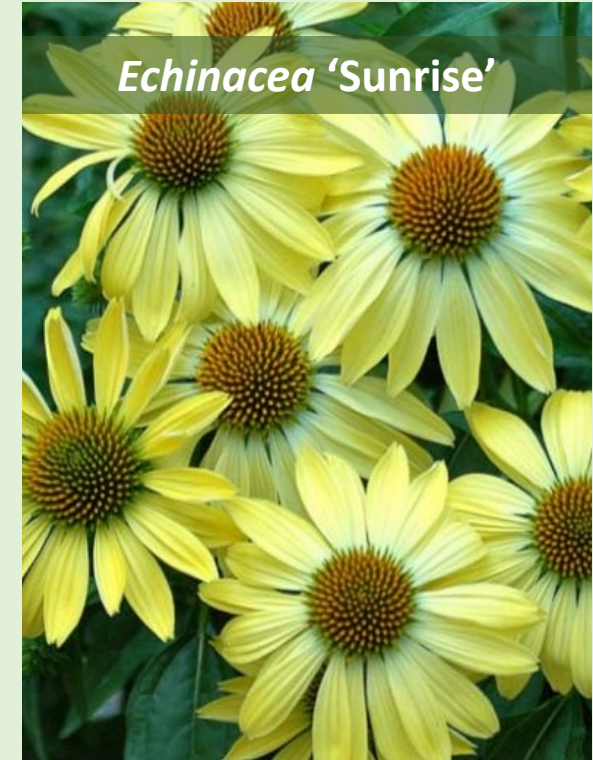
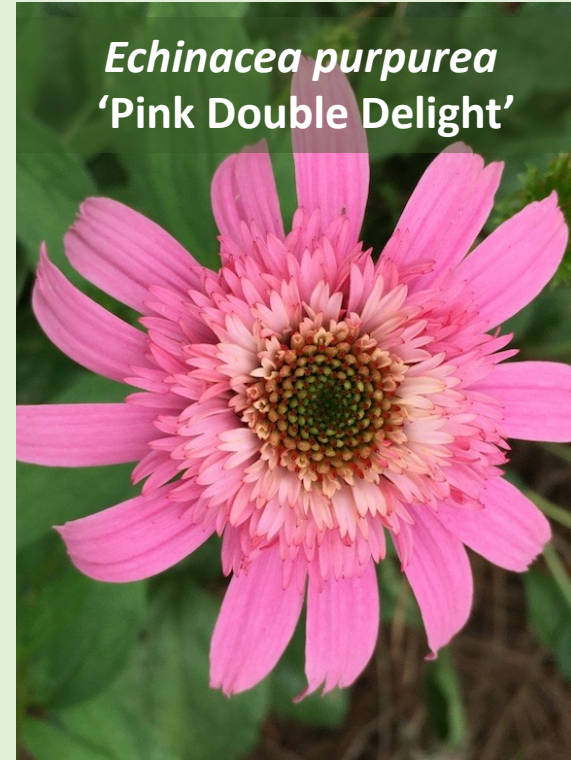
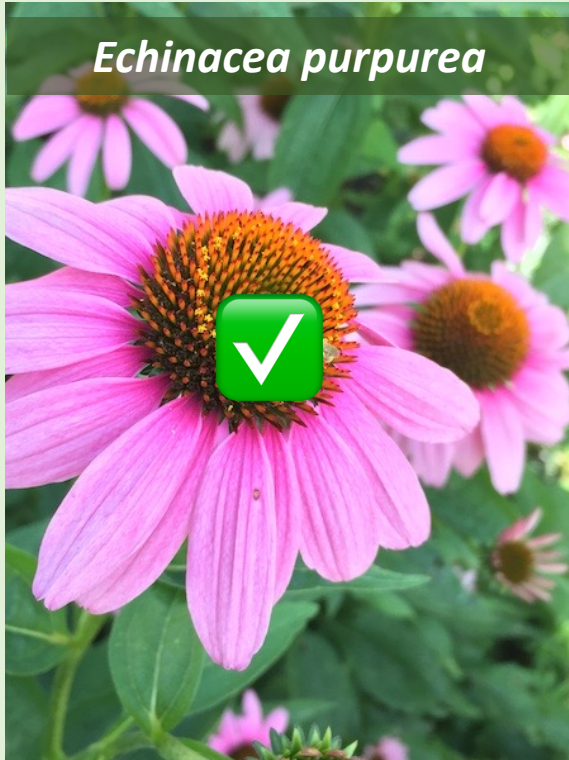


Butterflies & moths preferred
species & 'White Swan'



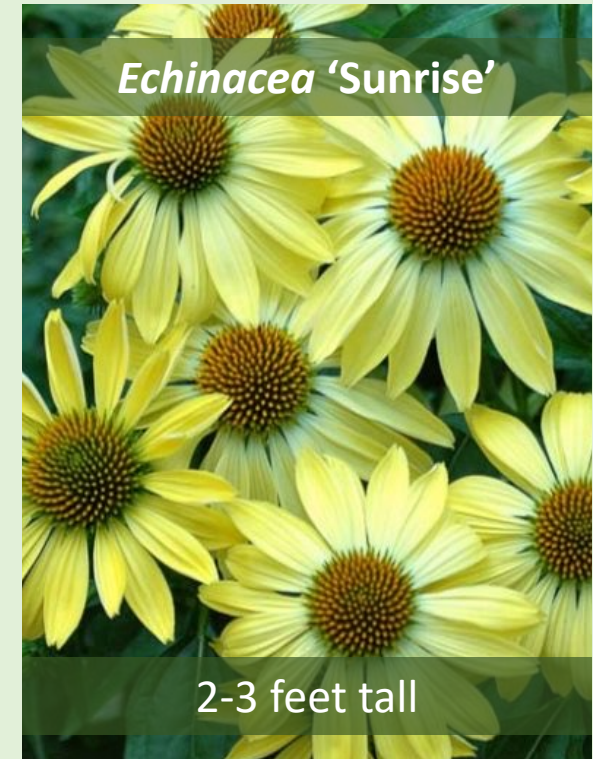
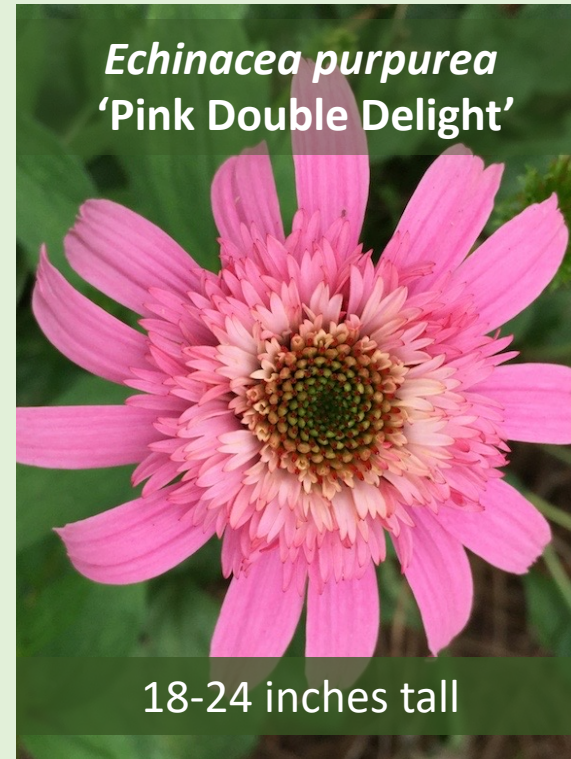
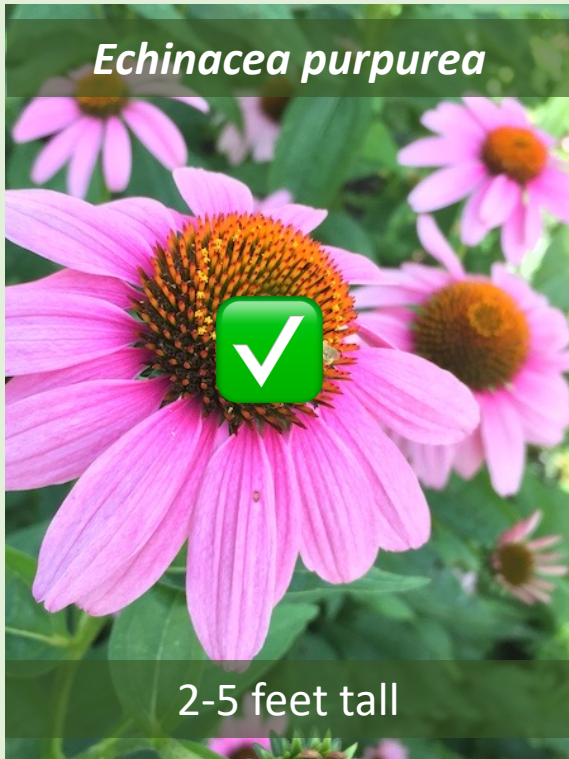
Flies/bugs/beetles/wasps/ ants
exhibited no strong preferences

Effect of color trait on pollinators



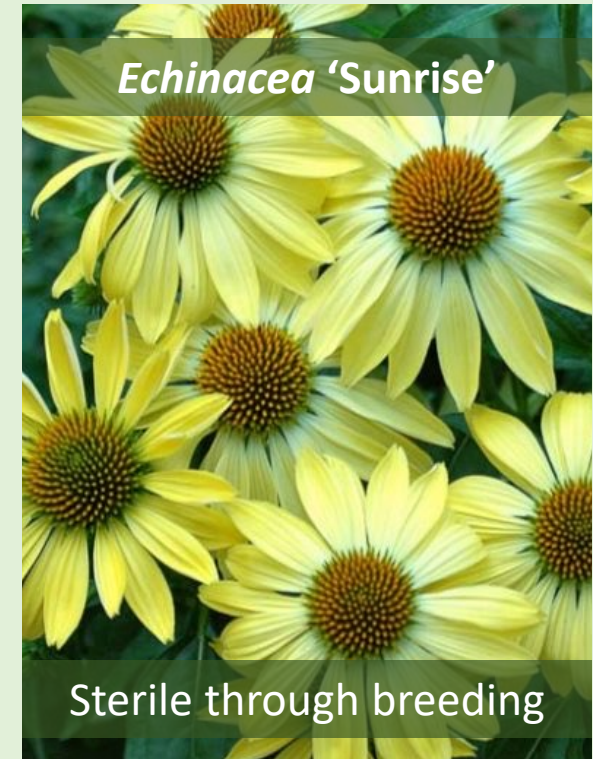
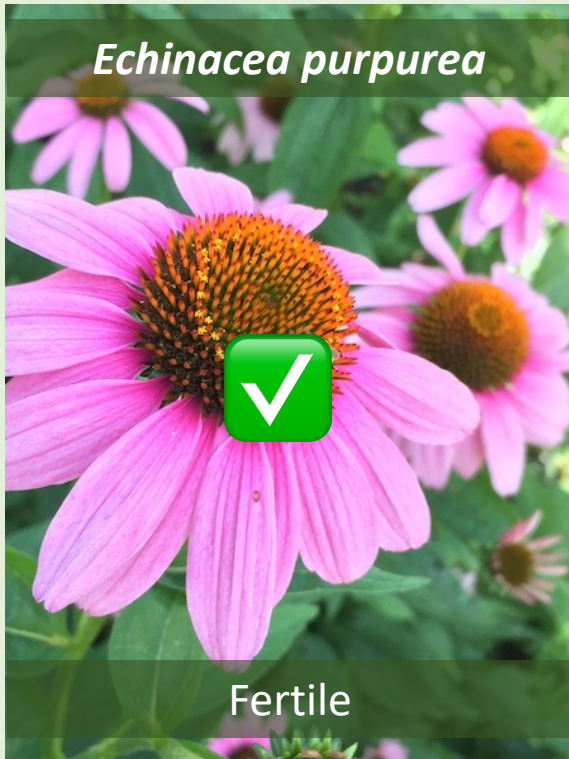
Color a significant signal; enables pollinators to discriminate flowers at a distance.
Bumble bees are eusocial and use systems of communication to improve foraging efficiency.
Bumble bees prefer colors they have learned are associated with higher floral rewards.

Effect of size trait on pollinators



Compactness equates with fewer flowers and fewer floral rewards.
In pollinator gardens, best to make use of vertical space with taller plants.

Effect of sterility trait on pollinators



Extra petals replace reproductive parts, reducing/eliminating floral rewards.
Breeding for sterility to increase bloom duration affects nectar and pollen production.

Recommendations

- Traditional breeding done for traits humans find desirable
- Breeders should introduce selections that also maximize nectar & pollen production to support pollinator populations



Comparison of nectar production

- Measured nectar in μl with disposable microcapillary tubes
- Used refractometer to measure sugar concentration
- Discussion on nectar in thesis
- Comparison of *Lobelia* species and hybrids





Hummingbird
pollinated

Hummingbirds
attracted to color

Bumble bee
pollinated

Lobelia cardinalis
Cardinal Flower



Nectar: 5.47 μL

Lobelia x speciosa
'Fan Scarlet'



Nectar: 0.72 μL

but undernourished

Hybrids

Lobelia x speciosa
'Fan Blue'



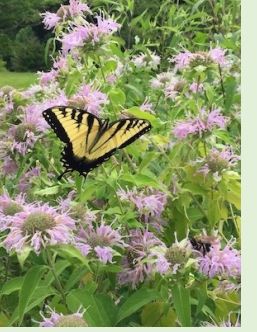
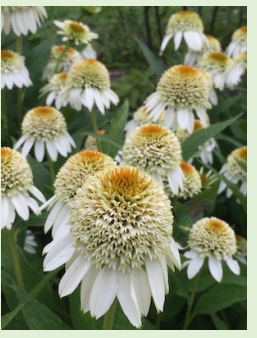
Nectar: 0.89 μL

Lobelia siphilitica
Great Blue Lobelia



Nectar: 0.79 μL

Hybrid modifications of flowers can have an unforeseen negative impact
on floral resources for wildlife



QUESTIONS?



Additional Research on Herbaceous Plants

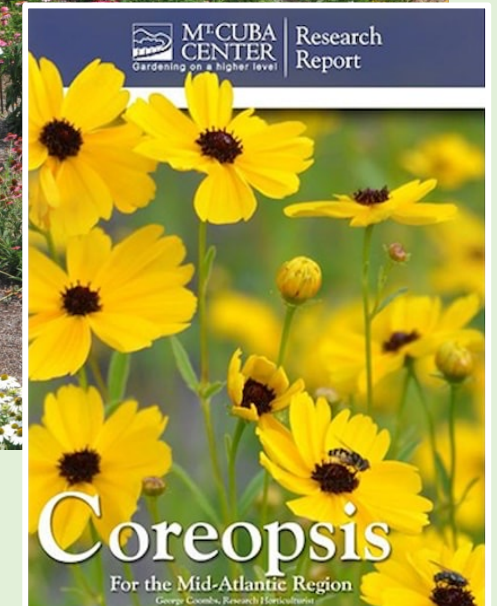
Mt. Cuba Center

- Non-profit botanical garden
- Former du Pont estate near Wilmington, DE
- Grows plants native to Piedmont region of Mid-Atlantic
- Evaluates those plants & related cultivars and hybrids
- Multi-year trials simulating home gardening conditions
- Strive to introduce desirable new plants to nursery trade

Plants rated on 1-5 scale

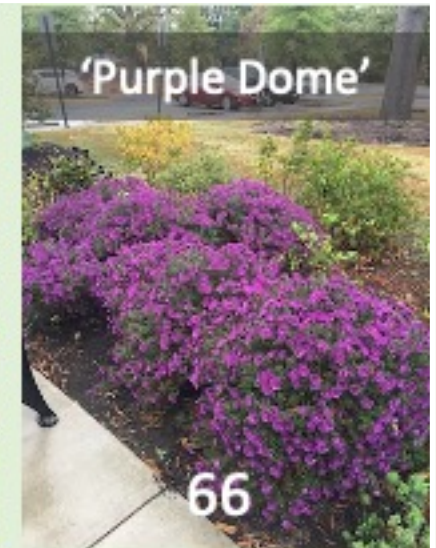
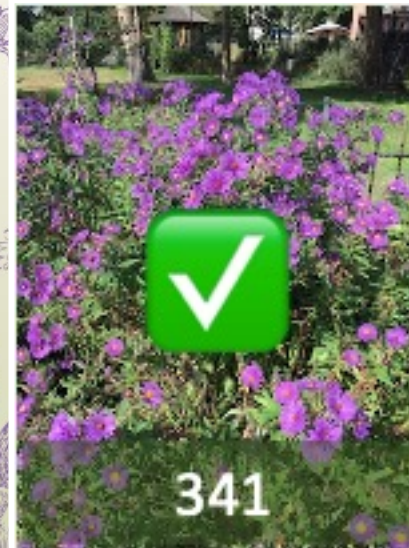
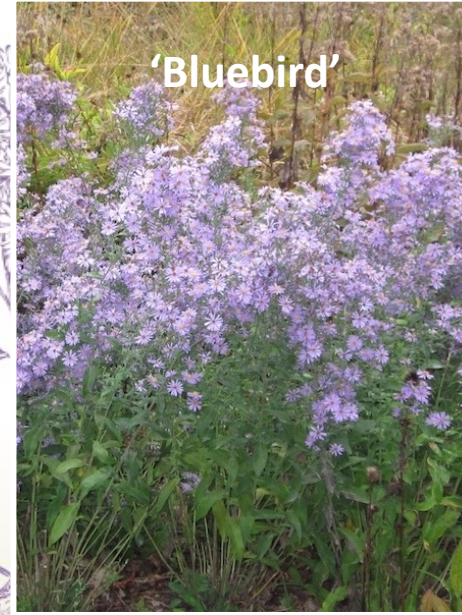


Publish reports on findings (2005 to present)



Asters

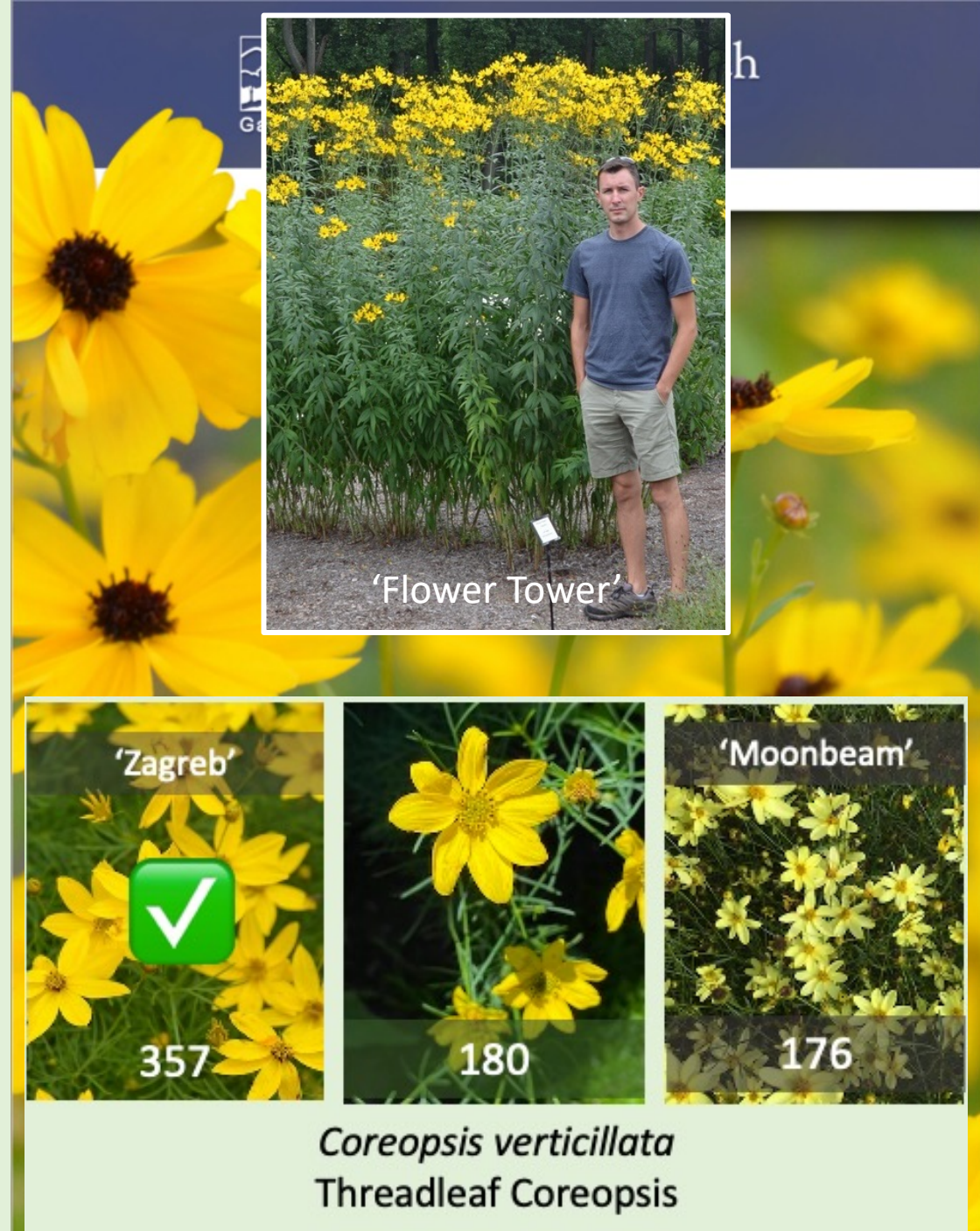
- Grew 56 species from Asteraceae Family (2002-2005)
- Measured plant performance but not benefit to pollinators
- Smooth Aster 'Bluebird' & Aromatic Aster 'October Skies' ranked high (4.8 & 4.7)
- New England Aster 'Purple Dome' (3.9) described as more manageable than species



Symphotrichum novae-angliae
New England Aster

Coreopsis

- Grew 13 perennial species and related cultivars & hybrids (2012-2014)
- Many popular cultivars performed poorly (disease/winter survival)
- Cultivars of Tall Coreopsis ranked high, (4.7) but too large for home garden
- 'Zagreb' cultivar of *C. verticillata* ranked above species (4.5 vs 4.4)
- Conducted pollinator diversity study: vacuum sampling & visual observation



Insect visitation

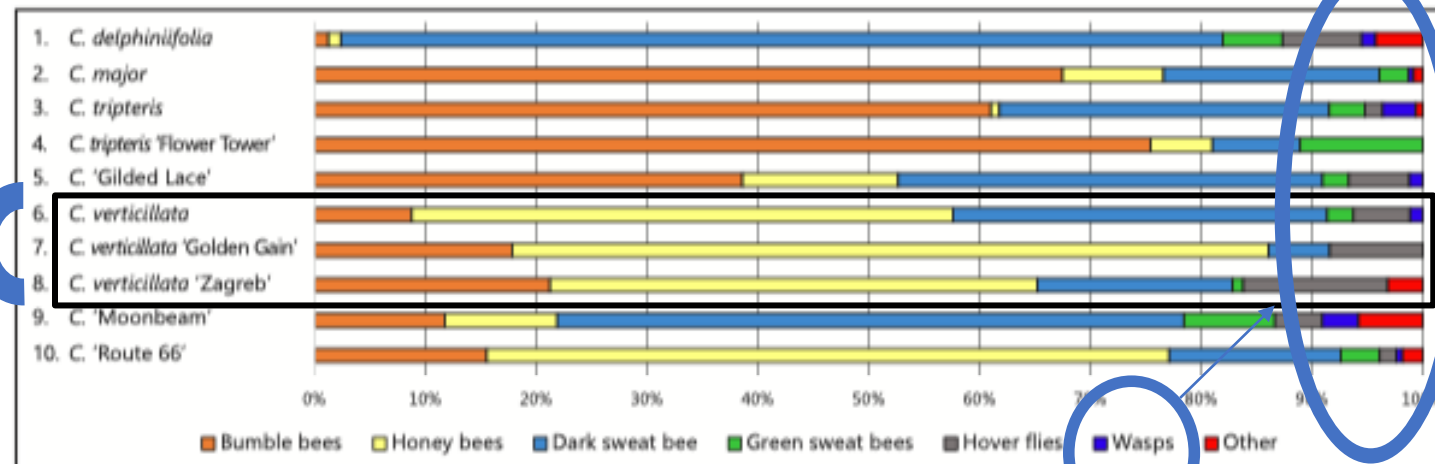
1. *C. delphiniifolia*
2. *C. major*
3. *C. tripteris*
4. *C. tripteris* 'Flower Tower'
5. *C. 'Gilded Lace'*
6. *C. verticillata*
7. *C. verticillata* 'Golden Gain'
8. *C. verticillata* 'Zagreb'
9. *C. 'Moonbeam'*
10. *C. 'Route 66'*



Coreopsis Pollinator Diversity (2014)	
6 species of mining bee (<i>Andrenidae</i>)	
4 species of carpenter bee (<i>Apidae</i>)	
1 species of honey bee (<i>Apidae</i>)	
1 species of masked bee (<i>Colletidae</i>)	
10 species of sweat bee (<i>Halictidae</i>)	
3 species of leafcutter bee (<i>Megachilidae</i>)	
9 genera of wasps (<i>Hymenoptera</i>)	
3 genera of hover flies (<i>Syrphidae</i>)	
2 families of beetles (<i>Coleoptera</i>)	
3 families of moths/butterflies (<i>Lepidoptera</i>)	

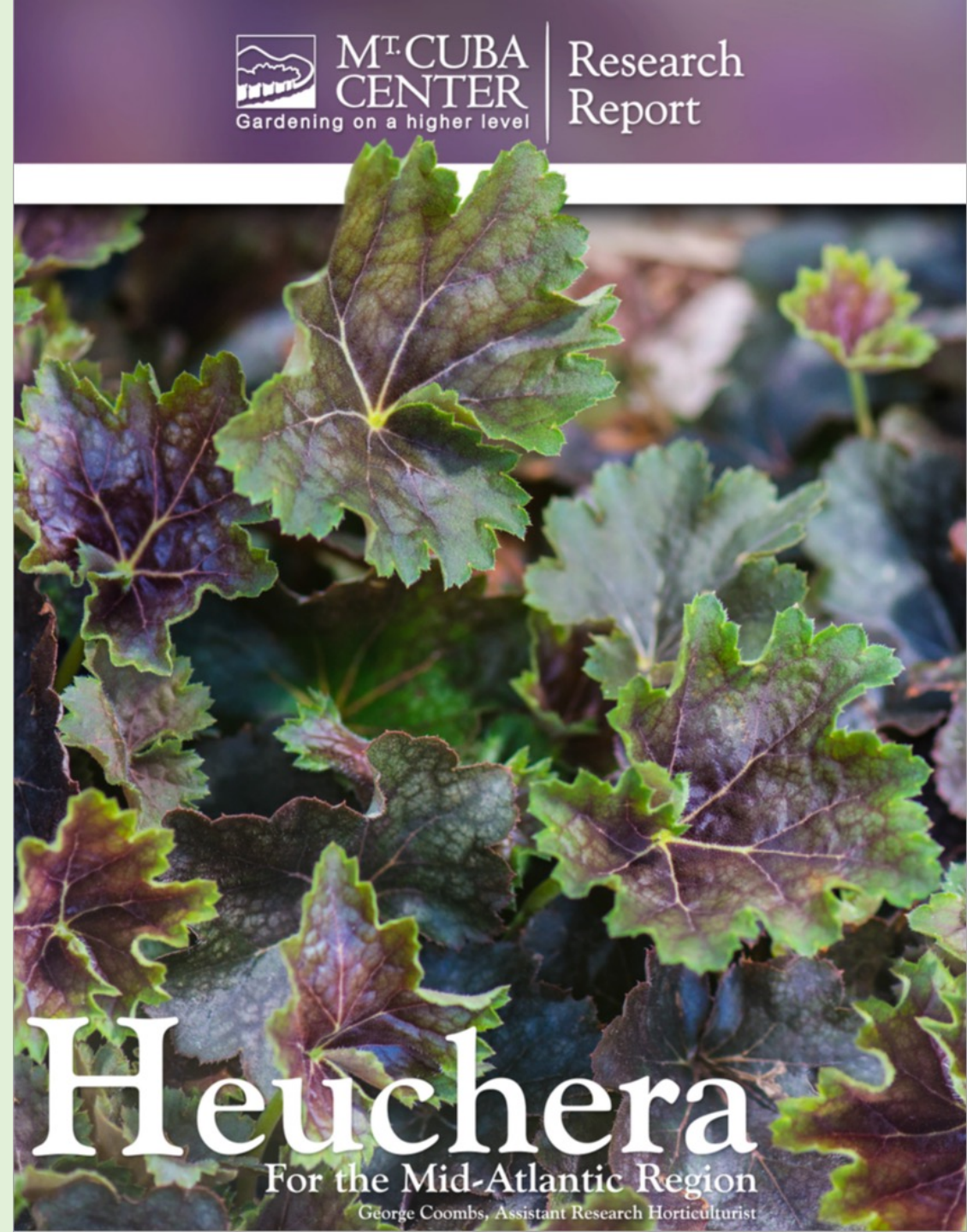
- Each plant supports a slightly different community of pollinators
- 91% bees & flies, but natural predators (wasps) also important
- Further study to determine how color, shape & pollen production affect preferences

Composition of Insects Observed Visiting Coreopsis Flowers



Heuchera

- Grew 83 cultivars of popular, shade-garden perennials (2012-2014)
- Hybrids derived from native Alumroot:
 - *H. americana*: Medium-size leaves w/ scalloped edges & silver veil
 - *H. villosa*: Large, angular, hairy leaves
- Most plants rated on their foliage; floral display rated separately
- No data on use by insects





Both *Heuchera* species
are larval hosts for
moth caterpillar



Preferred over
top-rated
hybrid
grown for
foliage color

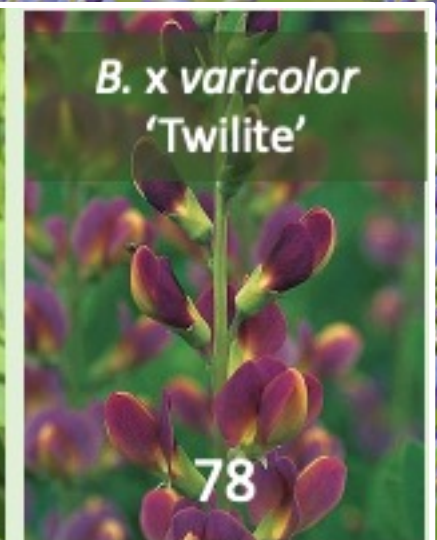
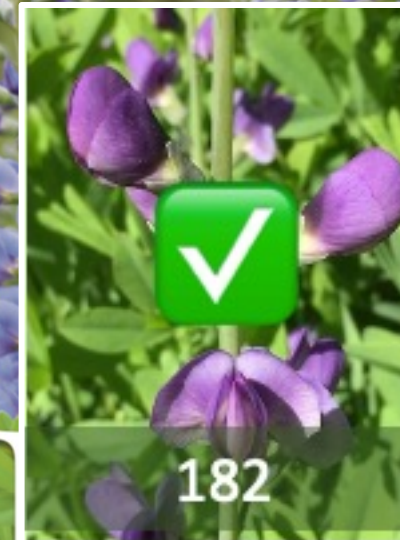


Both species provide
nectar & pollen
for small bees,
including specialist



Baptisia

- Grew 46 selections of 11 different species (2012-2015)
- Focus on floral displays with lush, sturdy foliage
- Mention use as food source for bumble bees & larval host plant, but no comparative data
- 'Twilite' hybrid ranked high (4.6), above *B. australis* (3.7) and dwarf variant, *B. australis* var. *minor* (4.0)



Baptisia australis
Blue Wild Indigo



Monarda

- Grew 40 hybrids or selections of 2 native species (2014-2016)
 - *Monarda didyma* (Beebalm)
 - *Monarda fistulosa* (Wild Bergamot)
- Breeding focus on creating compact, disease-resistant selections with large, colorful flowers
- Compact hybrids performed poorly
- Trial focus on habit, mildew resistance, leaf retention & flower coverage

Monarda x 'Judith's
Fancy Fuchsia'



Monarda punctata
Spotted Beebalm



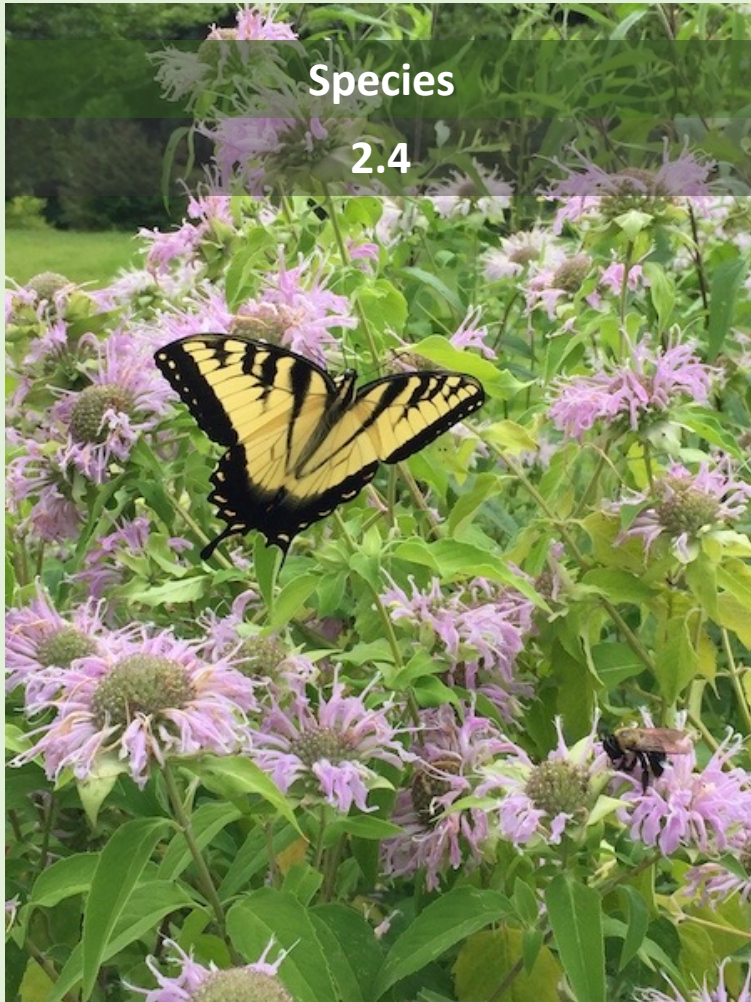
Highly ranked (4.1 & 4.0)
Abundant, long-lasting flowers
Excellent resistance to powdery mildew

Monarda

For the Mid-Atlantic Region

George Coombs, Research Horticulturist

Wild Bergamot (*Monarda fistulosa*)



Species:
Powdery mildew resistance very poor

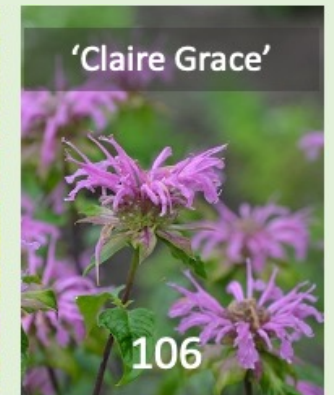
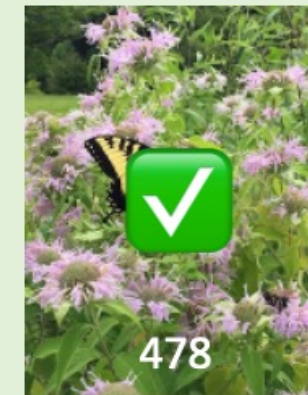


Naturally occurring cultivar:
Sturdy, upright habit, good
resistance to powdery mildew

2016 Citizen Science Project on Visitation



'Claire Grace' top compared to hybrids
(species not tested)



Species top in Penn State trials
& Annie White trials

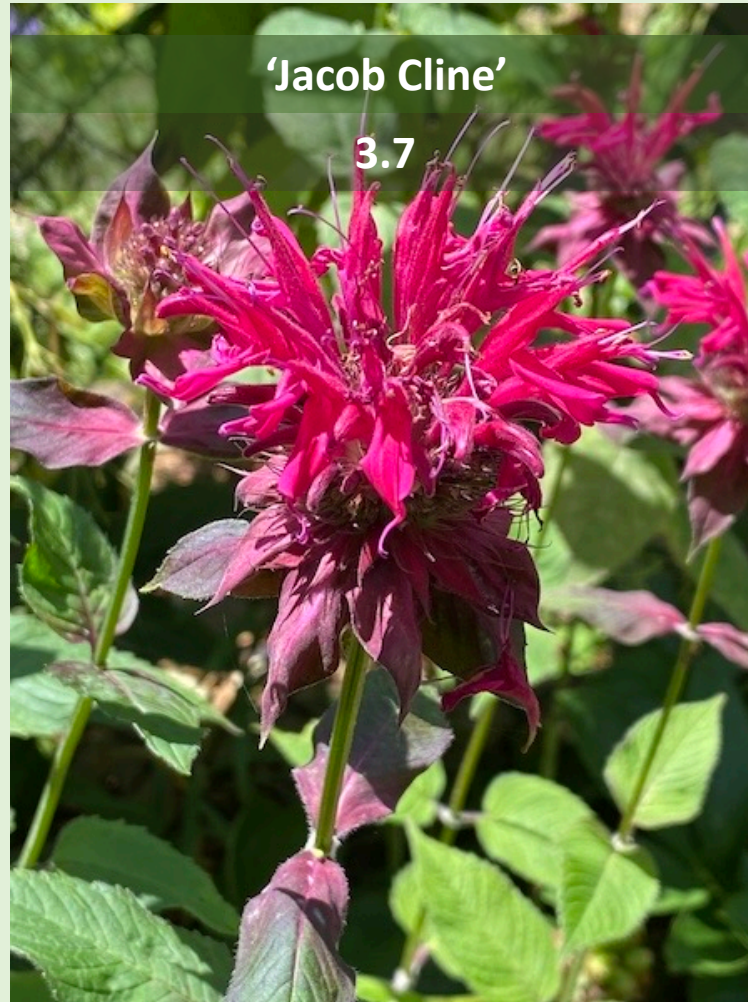
Scarlet Beebalm (*Monarda didyma*)



Species

1.7

Species:
Low flower coverage
Powdery mildew resistance poor

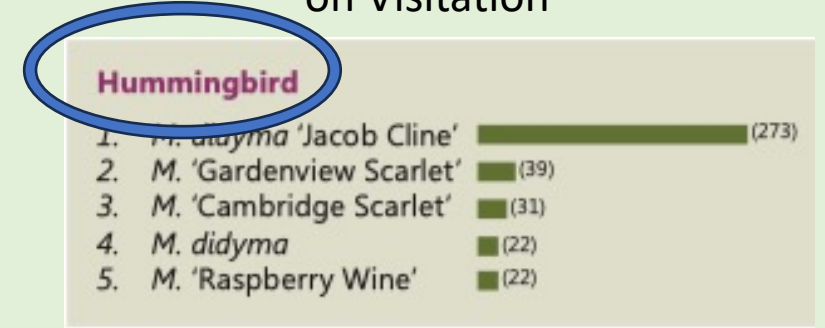


'Jacob Cline'

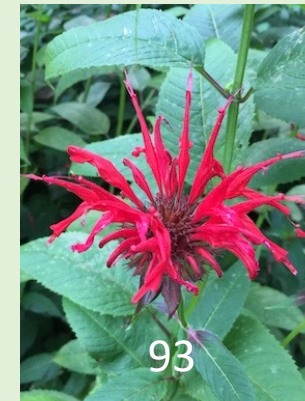
3.7

Naturally occurring cultivar:
Vigorous, abundant flowers
Fair resistance to powdery mildew

2016 Citizen Science Project on Visitation



'Jacob Cline' significantly higher than
hybrids and species



93



'Jacob Cline'

98

Species close in Penn State trials

Phlox for Sun

- Grew 94 hybrids or selections of sun-loving native species (2015-2017)
 - 66 of *Phlox paniculata* (Garden Phlox)
- Trial focus on flowers, foliage quality, habit, powdery mildew resistance
- 'Jeana' ranked top (4.8) among *Phlox paniculata* cultivars
- Also conducted an evaluation of butterfly preference



MT. CUBA
CENTER

Research
Report



'Jeana'

Naturally occurring

Exceptionally
mildew-free foliage
Impressive floral
display

Phlox

For the Mid-Atlantic Region

George Coombs | Manager, Horticultural Research

- Monitored butterfly visitation 2016-2017
- Hour-long shifts by Pollinator Watch volunteers
- *Phlox paniculata* 'Jeana' overwhelmingly preferred
- U of DE graduate student: No correlation between visitation and quantity or sugar content of nectar
- Shallowness of flower tube may allow butterflies quick access to many flowers



Swallowtails frequent visitors
Remember host plants



Best Phlox for Butterflies

(539)	1.	<i>P. paniculata</i> 'Jeana' *
(117)	2.	<i>P. paniculata</i> 'Lavelle' *
(116)	3.	<i>P. paniculata</i> 'John Fanick'
(105)	4.	<i>P. × arrendsii</i> 'Babyface' *
(71)	5.	<i>P. paniculata</i> 'Speed Limit 45'
(61)	6.	<i>P. paniculata</i> 'Dick Weaver' *
(60)	7.	<i>P. paniculata</i> 'Blushing Shortwood'
(58)	8.	<i>P. paniculata</i> 'Tracy's Treasure'
(56)	9.	<i>P. paniculata</i> 'Thai Pink Jade'
(55)	10.	<i>P. paniculata</i> 'David's Lavender'
(50)	11.	<i>P. paniculata</i> 'Robert Poore' *
(48)	12.	<i>P. paniculata</i> 'LSS Vincent'
(45)	13.	<i>P. paniculata</i> 'Shortwood' *
(43)	14.	<i>P. paniculata</i> 'Party Punch'
(43)	15.	<i>P. paniculata</i> 'Delta Snow' *

* = Top horticultural performers



Phlox for Shade

- Grew 43 selections of two native shade-loving species
 - *Phlox divaricata* (Woodland Phlox)
 - *Phlox stolonifera* (Creeping Phlox)
- Trial focus on habit, vigor, and floral display
- Creeping Phlox easier to grow
- Powdery mildew a significant problem with Woodland Phlox (defoliation)
- No data on use by wildlife



Phlox
For the Mid-Atlantic Region

George Coombs | Manager, Horticultural Research



Helenium

- Grew 44 taxa, including species, cultivars & hybrids (2017-2019):
 - *Helenium autumnale* (Helen's Flower)
 - *Helenium flexuosum* (S. Sneezeweed)
- Native to Americas but most breeding in Germany & Netherlands
- Origin of hybrids & cultivars unclear
- 'Can Can' cultivar of *H. autumnale* rated just above species (4.1 & 3.9)
- Species of *H. flexuosum* rated 4.0



'Can Can'



H. flexuosum

Floriferous
Disease-resistant

Profuse flowering
Less need for staking

Helenium

For the Mid-Atlantic Region

Sam Hoadley, Manager of Horticultural Research
George Coombs, Director of Horticulture

Visitation Statistics



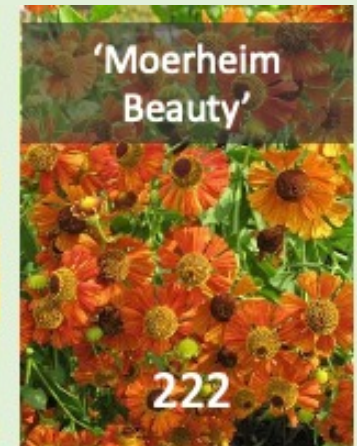
Best *Helianthemum* for Bees & Wasps

(162)	1. <i>H. autumnale</i> *
(151)	2. <i>H. 'Zimbelstern'</i> *
(129)	3. <i>H. 'Kanaria'</i> *
(128)	4. <i>H. autumnale</i> 'Can Can' *
(127)	5. <i>H. 'Tijuana Brass'</i> *
(117)	6. <i>H. 'Kugelsonne'</i> *
(111)	7. <i>H. 'Flammenspiel'</i> *
(104)	8. <i>H. 'El Dorado'</i>
(101)	9. <i>H. 'Potter's Wheel'</i> *
(90)	10. <i>H. 'Sahin's Early Flowerer'</i>
(87)	11. <i>H. 'Kupfersprudel'</i>
(85)	12. <i>H. 'Waltraut'</i>
(85)	13. <i>H. flexuosum</i> (DE ecotype) *
(83)	14. <i>H. 'Helbro'</i> (Mardi Gras)
(80)	15. <i>H. 'Ranchera'</i>

Observed for 1 minute, twice weekly during growing seasons, 2017 & 2018



In Top 10 for insect diversity & Top 20 for total visits in Penn State trial



Helianthemum autumnale
Helen's Flower

Topped hybrid in Annie White trial

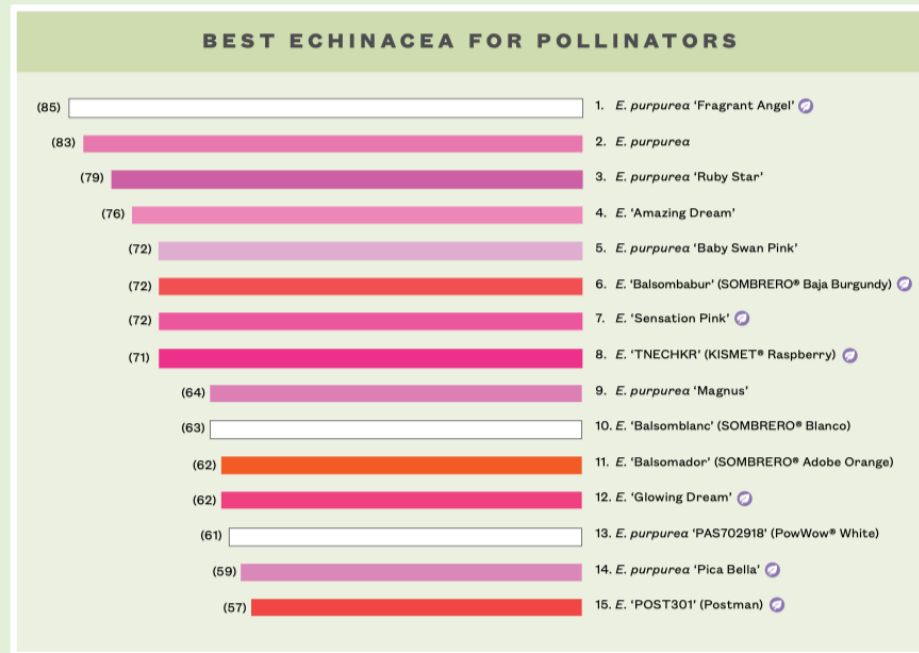
Echinacea

- *Echinacea purpurea* extremely popular & origin of many cultivars
- Repeat of earlier 2007-2009 trial with focus on evaluating new cultivars
- Grew 75 species, cultivars & hybrids (2018-2020)
- 5 species native to TN and Midwest
- Some plants short-lived due to infection rates of aster yellows
- Added component of pollinator study

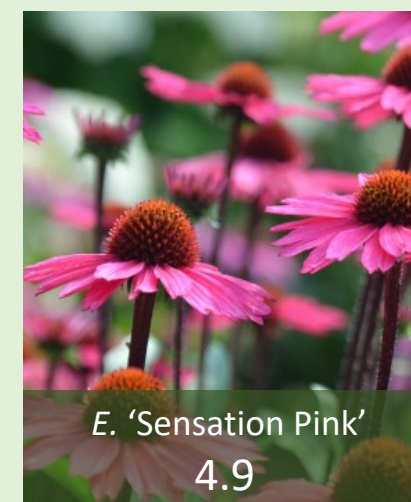
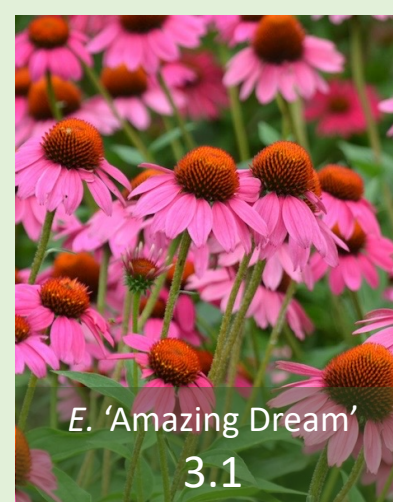
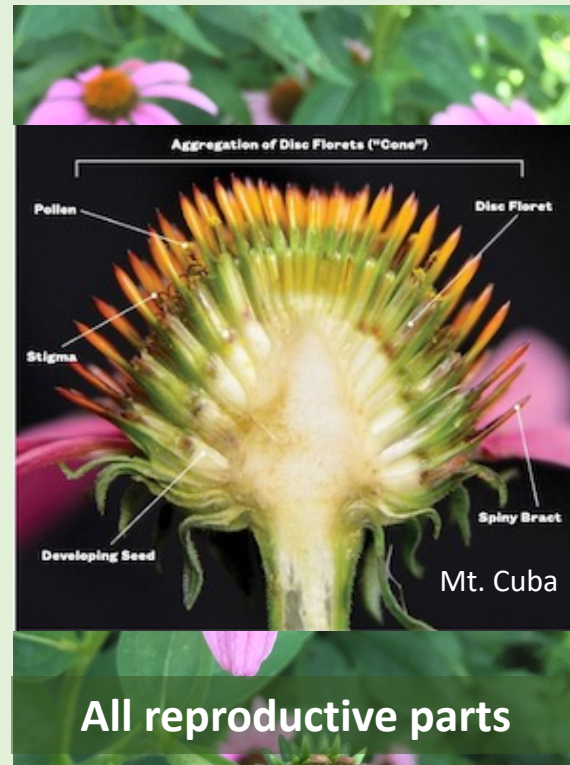


Echinacea
FOR THE MID-ATLANTIC REGION

Sam Hoadley, Manager of Horticultural Research



Majority bees & wasps, some butterflies

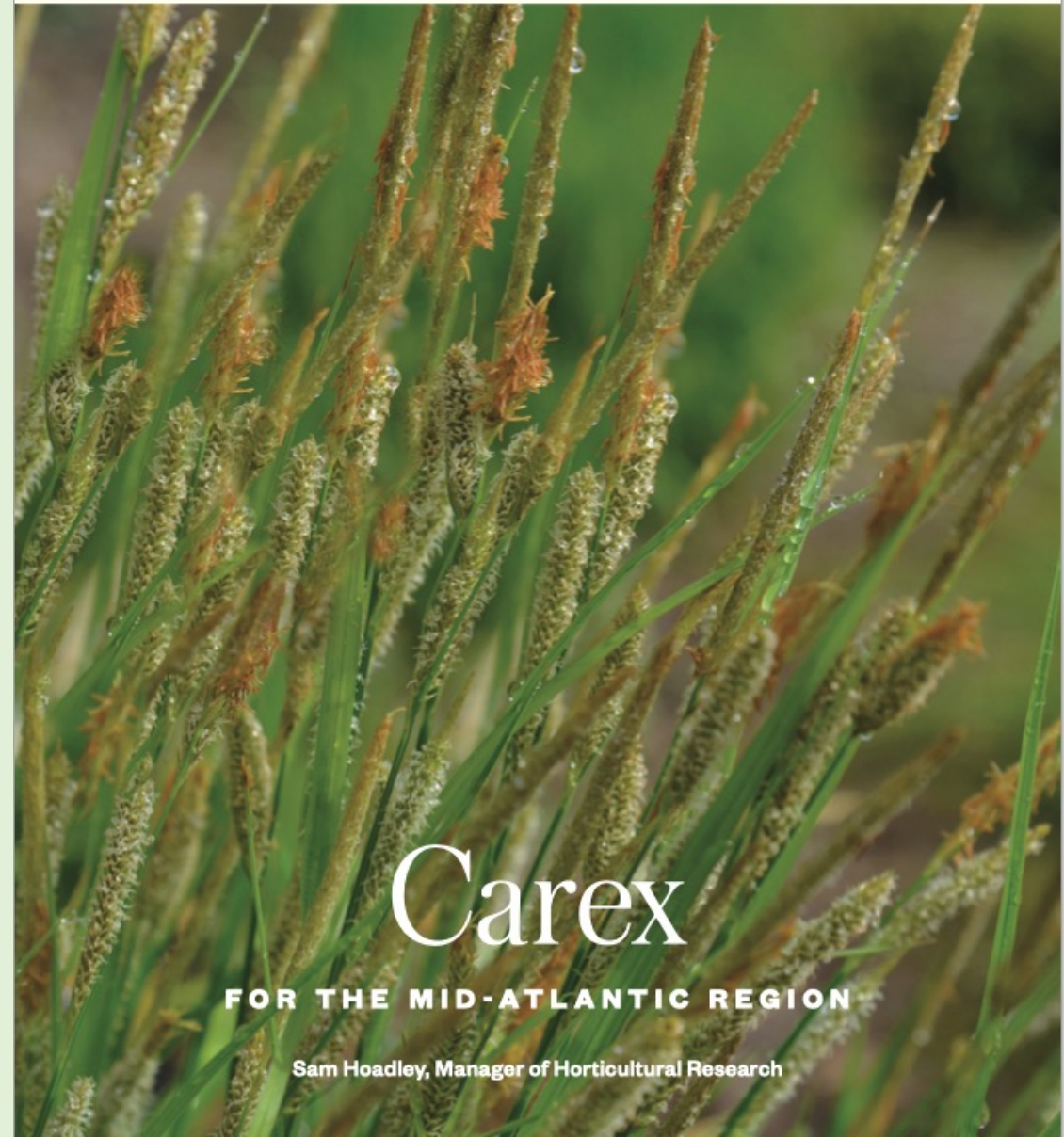


All lower photos Mt. Cuba



Carex

- Grew 65 species & 5 cultivars of native sedges (2018-2022)
- Wind-pollinated, but offer seeds & cover and serve as larval host plants
- Growing popularity as ground covers or as specimens & accents
- Evaluation of horticultural qualities, vigor, and adaptability (sun & shade)
- Final year: response to biweekly mowing to assess potential as lawn substitutes



Carex

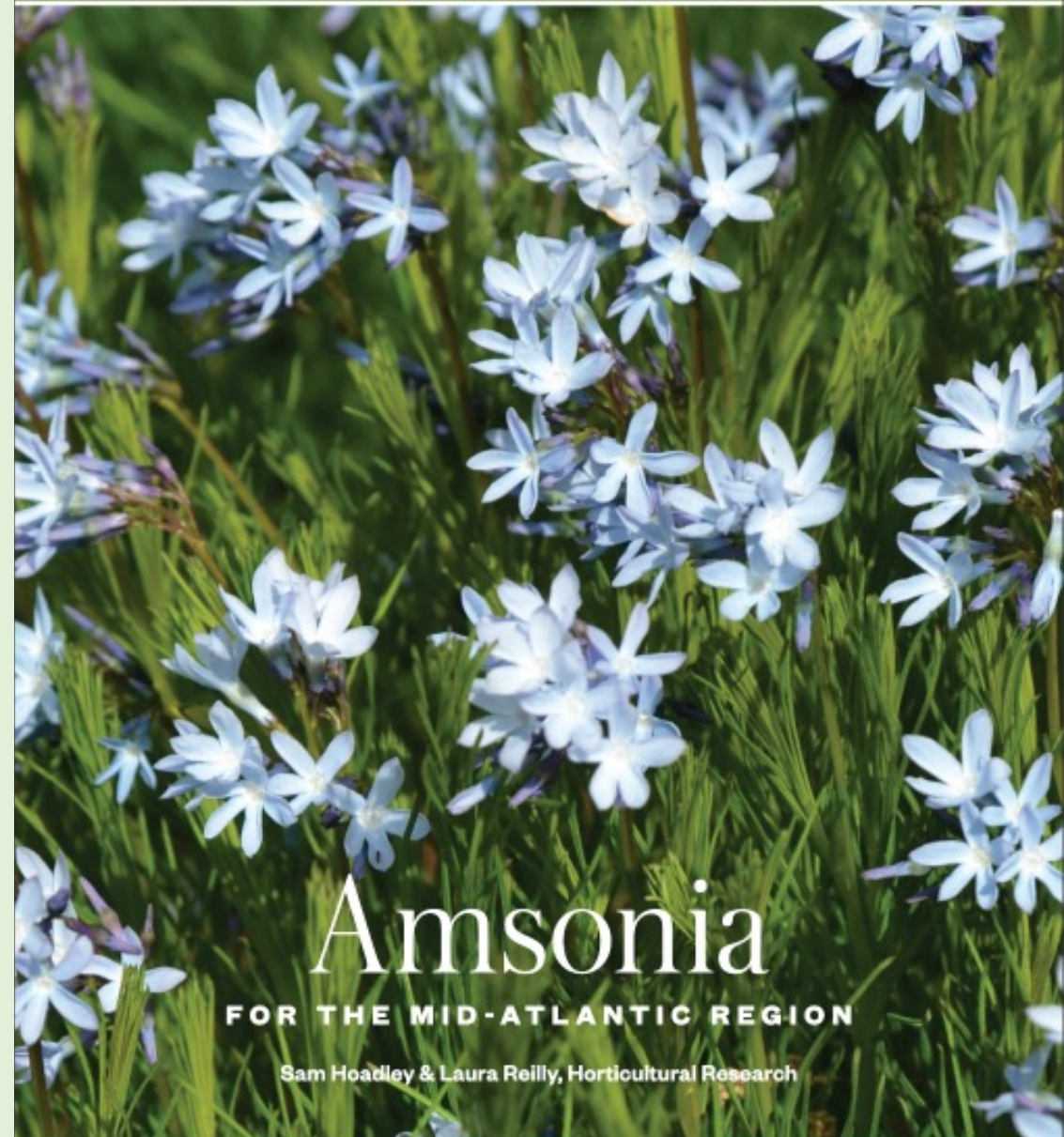
FOR THE MID-ATLANTIC REGION

Sam Hoadley, Manager of Horticultural Research



Amsonia

- Rated 20 taxa, including species (some native to Southeast), cultivars, and hybrids (2013-2023)
- Evaluated for habit, vigor, and floral display
- Observations of pollinator interaction April to June 2023
- Diversity of pollinators (butterflies, native bees, and hummingbirds), but low total numbers
- Host plant to Snowberry Clearwing



OSU Garden Ecology Lab Study

- Doctoral work of Jen Hayes
- Field trials 2020-2022 to compare West Coast native species & cultivars
- Data collected on pollination visits & diversity
- Nectar samples to be analyzed for sugar content and volume
- Nutrient composition of pollen samples to be analyzed for effect on adult bees & developing larvae



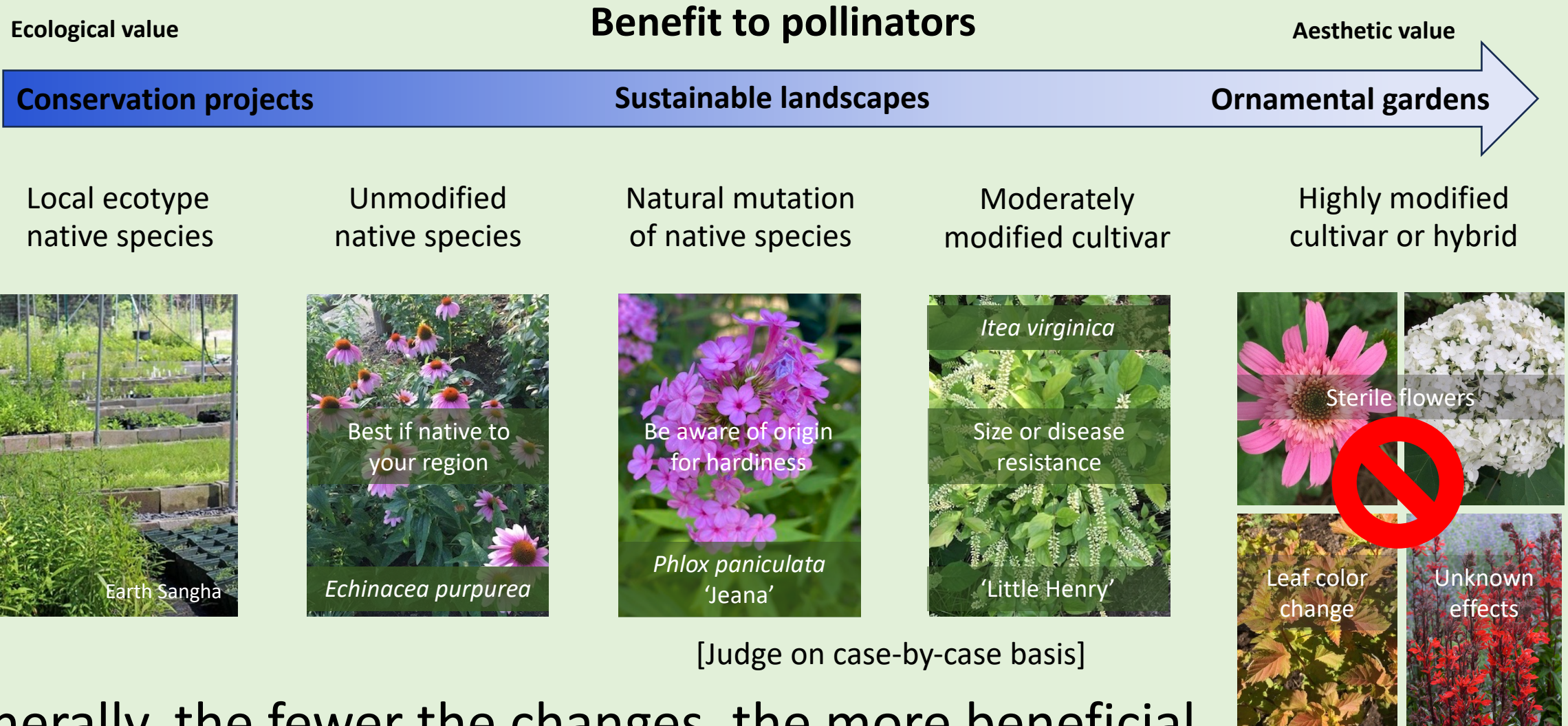
OSU study

- Using multispectral photography for analysis of UV markers
- Changes in fluorescence among cultivars may confuse pollinators



Recommendations & Resources

Spectrum of choices (based on gardener priorities)



Generally, the fewer the changes, the more beneficial

Determining appropriate native plants

It^{ea} virginica

Virginia Sweetpire, Virginia-willow

Master Gardeners of Northern Virginia
Arlington • Alexandria • Springfield

MGNV

Master Gardeners of Northern Virginia
Arlington • Alexandria • Springfield

Tried and True
tive Plant Selections
for the Mid-Atlantic

1733

MGNV

Master Gardeners of Northern Virginia
Arlington • Alexandria • Springfield

Fragrant, showy four-inch spires of white blossoms fall from arching stems in late spring. In autumn, the leaves of Virginia Sweetpire turn a vibrant red to orange. This native* favorite has graceful open growth habit and performs best in partial shade with moist soil.

Shrub	Flowers, Mid-Spring Shrub, Fall Foliage, Fruit
Height: 6–10 feet	
Spread: 4–6 feet	
Bloom Color: White	
Characteristics	
Upright, arching to rounded deciduous shrub	
Oval, lustrous dark green leaves, 1–4 inches long persist well into winter	
Tiny white flowers in cylindrical, drooping clusters cover the shrub May to June	
Fruit appears in June as green capsules turning to brown and persists into March	
Flaming fall color: orange, crimson, burgundy	
Suckers to form thickets	
Attributes	
Tolerates clay soil, wet soil, dense shade, and flooding to 6 inches; no serious pests or diseases; deer occasionally severely damage when favorite food sources are gone	
Green or red twigs provide winter interest	
Attracts bees, butterflies, wasps, and birds; provides nesting habitat and cover for birds	
Growing and Maintenance Tips	
Soil Requirements: Humus-rich soil	Excellent Replacement for <i>Berberis thunbergii</i> - Japanese Barberry
Light Requirements: Sun, Partial Shade	<i>Daphne odora</i> - Winter Daphne
Water Requirements: Moist, Wet	<i>Euonymus alatus</i> - Burning Bush
More prolific flowers/colorful foliage w/ more sun	<i>Spiraea japonica</i> - Japanese Spirea
Use in rain or woodland gardens, at fresh water's edge, naturalized, or to control erosion	<i>Syringa vulgaris</i> - Lilac
Hardiness: USDA Zones 5–9	*It is native to DC and to NoVA (except for Loudoun County) although it is rare in the outer Piedmont. It is common in the Coastal Plains of DE and VA. It is extirpated in PA.
developed by Master Gardeners of Northern Virginia, serving Arlington and Alexandria	

Images by Mary Free, Quarry Shade Garden and by Elaine Mills (bottom), private garden, Arlington, VA

Virginia Cooperative Extension

Virginia Tech • Virginia State University

Virginia Cooperative Extension programs and employment are open to all, regardless of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, veteran status, or any other basis protected by law. An equal opportunity/affirmative action employer. Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture, cooperating with the National Institute of Food and Agriculture, U.S. Department of Agriculture, Virginia State University, Blacksburg, VA. Ray McCreary, Administrator, 1895 Extension Program, Virginia State, Petersburg.

Plant NOVA Natives

Naturally Beautiful!

Digital Atlas of the Virginia Flora

News & Announcements Group Family Genus County Excluded Taxa About Earlier Editions Contribute New Records

Home

Welcome to the Digital Atlas of the Virginia Flora. To search or browse through the Atlas, use the green menu above, or click on a link below.

Lycophytes & Pteridophytes

Gymnosperms

Monocots

Dicots

Bryophytes

Plant ES Natives

Plant NOVA Natives

Plant NNK Natives

Plant Central Rapp Natives

Plant RVA (Capital Region) Natives

Plant Hampton Roads Natives

Plant Southwest Virginia Natives

Plant Southern Piedmont Natives

Plant Northern Piedmont Natives

Plant NNK Natives

Go Native – Grow Native

Plant NOVA Natives

Naturally Beautiful!

Plant RVA Natives

A CAPITAL IDEA!

Plant Central Rapp Natives

BEAUTIFUL BENEFICIAL SUSTAINABLE

Plant HR Natives

Plant ES Natives

They're Sovere Beautiful!

plant northern
PIEDMONT
NATIVES

Plant Southern
Piedmont Natives

PLANT SWVA
NATIVES

PLANT SOUTHWEST
VIRGINIA NATIVES

PLANT SOUTHERN
PIEDMONT NATIVES

PLANT CENTRAL
RAPP NATIVES

PLANT RVA
NATIVES

PLANT HR
NATIVES

PLANT ES
NATIVES

Virginia Native Plant Society

Conserving Wild Flowers and Wild Places

About Membership Chapters Natives Events Conservation Blog Resources Store

In the Spring, 2024

Sempervirens

The 2024 Wildflower of the Year: White Turtlehead and its relationship with Bumblebees, results from our 2023 Natural Area Preserves Fundraiser, our Statement on Utility-Scale Solar, Virginia's 2024 legislative session, a visit to South Africa, and more! Read the latest Sempervirens online and also browse previous editions.

Read Now

News & Updates

• Our 2024 Wildflower of the Year T-Shirt Design Contest has ended. View the winners, voted on by VNPS members. The 1st place design by Nick Garnhart is featured on apparel and merchandise at our VNPS Bonfire.com Store. 4-4-2024

• Please join us in preserving Jocelyn Sladen's legacy and in celebrating her life as a conservationist and a founder of VNPS. Donate now to help us save Torrey's Mountain Mint. 4-4-2024


• The 2024 VNPS Wildflower of the Year is White Turtlehead. Read more about Chelone glabra, including its conservation status and where to see it. 3-1-2024

• Don't miss the Winter, 2024 Sempervirens. News from our 2023

Virginia Native Plant Society

Follow Page 30K followers

Buying native plants



Plant NOVA Natives
Naturally Beautiful!

Promoting native plants
in Northern Virginia

Home

Start here!

Get plants/help

Habitat gardening

Landscaping solutions

Native-only sellers

These native plant sources make it easy to find and purchase native plants for your home and garden without the risk of purchasing a non-native or invasive species.

Natives Sold Exclusively


Northern Virginia

- Nature by Design*** A local native plant nursery in Alexandria, Virginia. Same day browsing appointment are always available, or shop by curbside pickup. <http://www.nature-by-design.com/>
- Watermark Woods*** A local native plant nursery in Hamilton, Virginia. Curbside pickup available. They also sell [seeds here](#). www.watermarkwoods.com
- Virginia Native Plant Society*** Virginia Native Plant Society Potomack Chapter: First Wednesday of each month, 10 am to 1 pm, April through October. Native plants sold in the VNPS propagation beds at Green Spring Gardens Park, behind the horticulture center. No credit cards - cash and checks only.
- Earth Sangha*** is a nonprofit that propagates wild plants for ecological restoration. Curbside pickup, 1-on-1 appointments or "Self-Service Saturdays." <http://www.earthsangha.org>

A little further afield

- Hill House Farm and Nursery*** Native Plants for Harmonious Gardens Castleton, VA Curbside pickup and delivery available. www.hillhousefarmnatives.com
- Chesapeake Natives** offers online sales; see their website for on-site plant sales information in Upper Marlboro, MD. <http://chesapeakenatives.org/>
- Tree Talk Natives** in Clarksburg, MD. <https://www.treetalknatives.com/>
- Wildflower Native Plant Nursery** - Bethesda, MD. open by appointment. www.wildflowernativeplants.com/


* Neonicotinoid-free, per vendor. Note that the Plant NOVA Natives campaign does not verify vendor pesticide use. Click for info on ["Neonics"](#).




Native seed sources

2022 Local Native Plant Sales

Check here for one in your area!





Virginia Native Plant Society
Conserving Wild Flowers and Wild Places

About

Membership

Chapters

Natives

Events

Conservation

Blog

Resources

Native Plant Nurseries

Listing Policy:

- The nursery sells primarily native plants and does not sell invasive species as defined in the [Virginia Invasive Plant Species List](#) published by the Virginia Department of Conservation and Recreation Natural Heritage Program.
- Plants are propagated from nursery stock or responsibly collected seeds and not removed from the wild to sell.

VNPS does not endorse or recommend any individual nursery and is not responsible for the accuracy of claims made by those organizations included in this listing. Please report any infractions to this policy.

To submit a nursery or plant sale to the list, or to provide updates or corrections, please contact the VNPS office at vnps.org@gmail.com or (540) 837-1600.


Download the Native Plant Nursery List as an [Excel File \(.xlsx\)](#) or as a [CSV File \(.csv\)](#)

[View Most Recent Updates](#)

Search Nurseries:

Search

Name	City	Phone	Website
ArcheWild Native Nurseries	Quakertown, PA	(855) 752-6862	archewild.com
Botanique	Stanardsville, VA	(434) 985-3060	pitcherplant.com
Bremo Trees	Bremo Bluff, VA	(434) 842-8733	bremotrees.com
Davis Natives	Ashland, VA	(804) 347-8495	davisnatives.com
Draper Springs Nursery & Gardens	Draper, VA	(540) 251-4349	drapersprings.com
Earth Sangha Wild Plant Nursery	Springfield, VA	(703) 333-3022	earthsangha.org
Farfields Farm	Afton, VA	(434) 326-2157	farfieldsfarm.com
Good Seed Natives	Richmond, Virginia	(804) 396-4278	goodseednatives.com



Maryland Native Plant Society
APPRECIATION • CONSERVATION • EDUCATION

HOME

EVENTS

NATIVE GARDENING

PLANT ID

RESEARCH GRANTS

PUBLICATIONS

MEMBERSHIP

DONATE

Home » [Native Gardening](#) » [Native Plant Nurseries](#)

BUYING NATIVE PLANTS

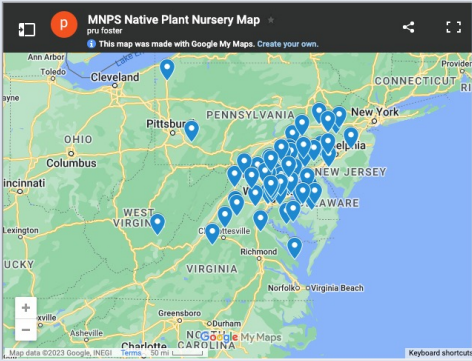
- Check out upcoming [Native Plant Sales](#)
- More information about [Gardens and Natives](#)
- **Is it native to Maryland?** Search for the plant in the [Maryland Plant Atlas](#). This is the most up-to-date information on Maryland nativity.
- [How to Shop for Native Plants](#) (PDF, ~83 KB)
- [The MNPS Shoppers Protest Card](#)

NATIVE PLANT SALES

Baltimore Native Plant Sale
04/15/2023 9:00 AM
Church of the Redeemer, Baltimore

Native Plant Sale: Loudoun County, VA
04/22/2023 9:00 AM
Morven Park, Leesburg VA

Native Plant Sale: Howard County
05/07/2023 12:00 PM
Robinson Nature Center, Columbia



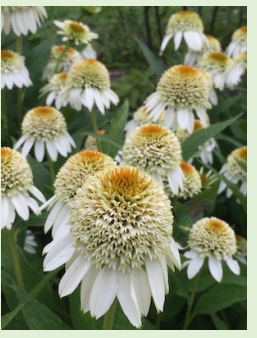
REGIONAL NATIVE PLANT VENDORS

MNPS provides this list solely for the convenience of those who wish to purchase native plants. It is based primarily on information received from the vendors, and therefore is not intended as an endorsement or recommendation of any of the vendors listed. Some vendors sell non-native plants in addition to native plants. Please contact the vendors for additional information about their products.

* Vendors marked with an asterisk are members of the Maryland Native Plant Society.

If you are a vendor who wishes to be listed or if your information has changed, please send an email to nurserylist@MDFlora.org.

Adkins Arboretum*
12610 Eweland Road
Ridgely, MD 21660
Phone: 410-634-2847
Non-profit
Website: www.adkinsarboretum.org
E-mail: nativeplants@adkinsarboretum.org
Call or see the website for spring open house dates (end of April), regular nursery hours, and special sales.



QUESTIONS?

