



Shade Gardens for Pollinators



Why Should We Care About Pollinators?

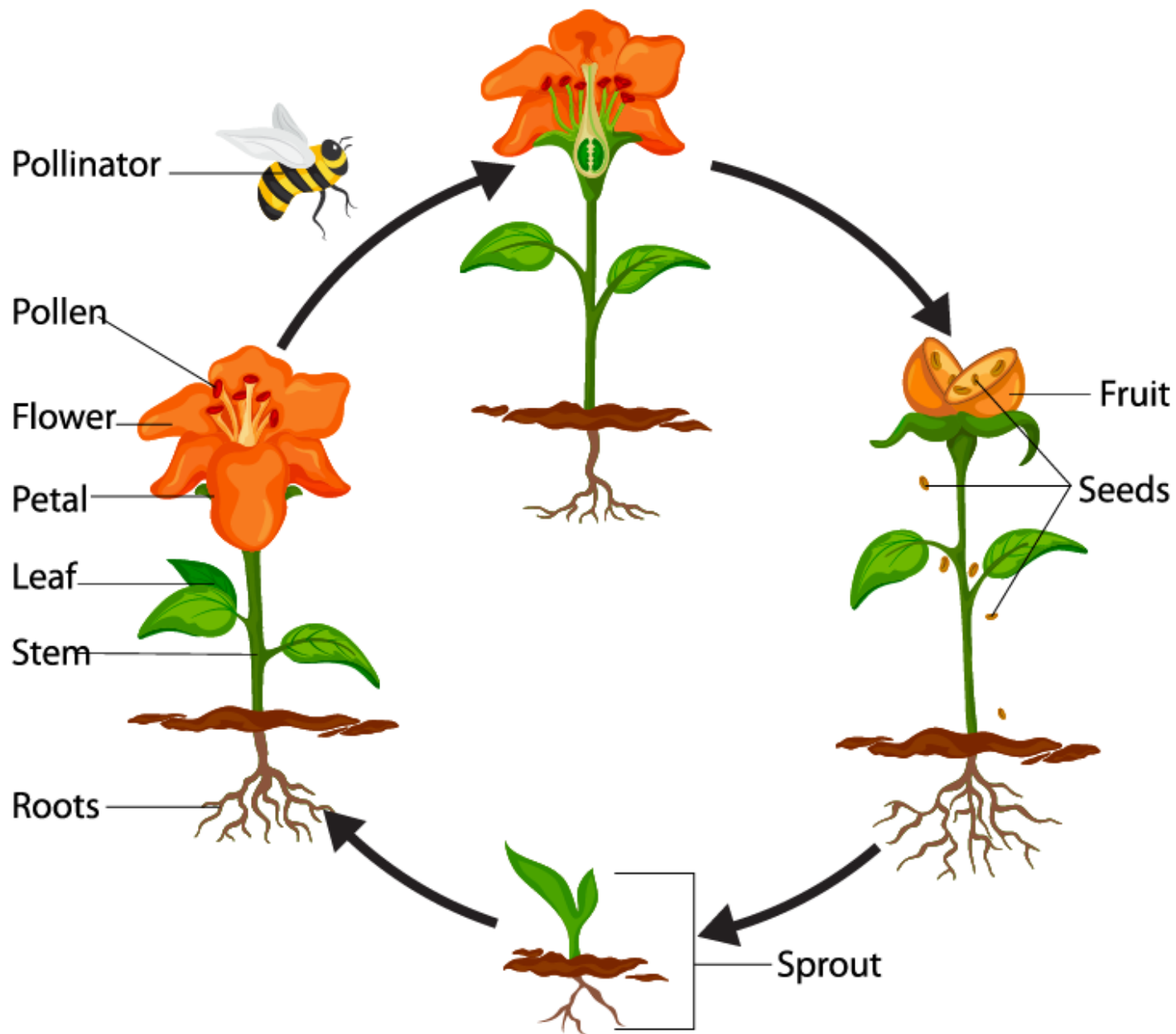
- 80% of plant species rely on pollination for survival.
- Pollinators play a vital role for:
 - native wildflowers, trees and shrubs
 - many horticulture crops (e.g. apple, peach, blueberry, tomato, watermelon)



Photo credit: Jerry Payne

Southeastern blueberry bee
pollinating blueberry

Pollination



Pollinators Face Increasing Challenges!

- Habitat loss
- Parasite and disease pressures
- Unintended consequence of pesticide misuse





**Help by Making Your Yard
Pollinator-Friendly!**

Meet the Pollinators!

Bees



Wasps



Butterflies
& Moths



Flies



Beetles



Hummingbirds





 honey bee



carpenter bee

bumblebee



sweat bee



small carpenter bee



metallic green sweat bee



long-horned bee



leafcutter (mason) bee



common buckeye



eastern tiger swallowtail



variegated fritillary



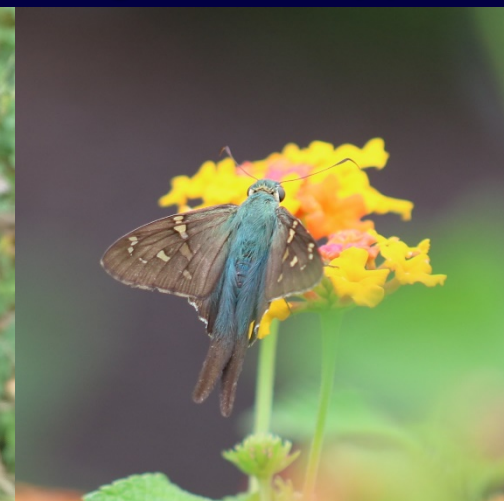
cloudless sulfur



silver-spotted
skipper



common
checkered skipper



long-tailed skipper

clearwing moth



painted lady



red-banded hairstreak



ctenucha moth



monarch



wasp & black digger wasp



thread-waisted wasp



paper wasp



scoliid wasp



tiphiid wasp



potter wasp





syrphid flies (hoverflies)





tachinid fly



bee fly



calliphorid fly



lady beetle



tumbling flower beetle



wedge-shaped beetle



 long-horned beetle



soldier beetle



ruby-throated hummingbird



Pollen and Nectar: Food

- pollen (protein)
 - collected or consumed on site
- nectar (sugars)
 - floral nectaries



honeybee drinking
nectar at the base of
the flower



pollen 'bags'



pollen collected on abdomen
(‘pollen bellies’)

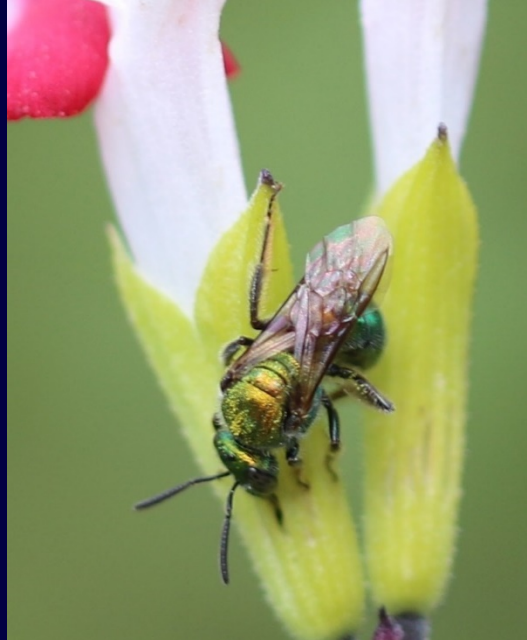


butterflies and moths
have long tongues
(proboscis)

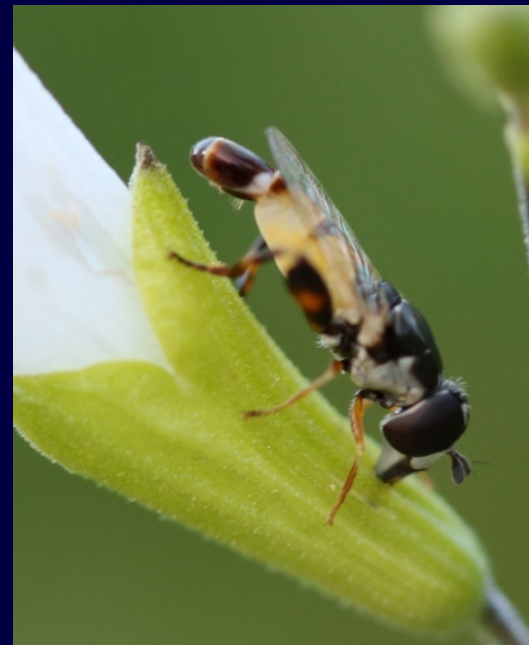




Bumblebee
brushing against
pollinating
structures of the
flower



bees, wasps, & flies have short tongues



Challenge: Shade!

- Partial shade: 4-6 hrs sun/day
 - Morning – cool; afternoon - hot
- Full shade: no direct sun



We Can Work with Shade!

- Woodland edges
- Softly shaded areas (dappled sun)
- Full shade
 - deciduous – good for spring bulbs & ephemerals
 - evergreen – only shade-tolerant plants
- Good news – tree canopy is actually one of the requirements for optimal pollinator habitat!



Layers of Vegetation





**The Four Basic Needs:
Food, Water, Shelter, & Space**

Essential Elements of the Garden

- ✓ Nectar year-round
- ✓ Forage for larvae (caterpillars)
- ✓ Diverse sources of nectar & forage
- ✓ Vertical vegetation layers (trees, shrubs, herbaceous, groundcovers)
- ✓ Shelters
- ✓ Sources of moisture/soil salts



Plant Selection

- Natives
- Non-native exotics (well-behaved)



leopard plant,
Farfugium japonicum

**NO
NON-NATIVE
INVASIVES!!**

(www.gaeppc.org)²⁷

Essential Plant Characteristics

- ✓ Shade-tolerant
- ✓ Nectar-producing
- ✓ Larval food

swallowtail larva on
fennel




gulf fritillary larvae
on passion vine



moth larva on sweetspire



A photograph of a forest floor covered in a dense carpet of ferns. The ferns are in various stages of growth and color, ranging from bright green to yellowish-brown, suggesting an autumn setting. Several thin tree trunks are visible, rising from the forest floor. The background is a soft-focus view of more trees and foliage.

Shade plants thrive in highly organic soils – you must simulate their natural environment as close as possible.

✓ Organic soil amendment

Sources of moisture



Bare Soil

- Leave dry patches of soil
 - ✓ nesting habitat
 - ✓ mineral salts



Female digger bee approaching her nest

Photo: Kathy Keatley Garvey, UC Davis

common buckeye, licking soil salts

Insect boxes



holes filled with mud by
mud dauber wasps



nesting box
for bees

Additional Nesting Sites

- Provide stem stubble for cavity-nesting bees.
- Plant pithy perennial plants and leave stems in the fall.
- In the spring cut off the top of the old stems 15 inches.

pithy stem
of fennel



Safe Habitats

- Provide overgrown area of stumps, snags, logs, and brush piles.
- Leave piles of unraked fallen leaves on the ground.
- Reduce light pollution from artificial sources at night.



imperial moth

Over-Wintering Shelters

- Old log piles - warmth from the decomposing logs attract the insects deep within the logs.



- Rock walls - crevices for shelter.

Sunny Resting Areas

- Insects are cold-blooded and require frequent sunning periods to stay warm and active.
- Open, flat surfaces that are warmed by the sun are ideal.
- Large boulders and flagstones are excellent sunning areas.



painter lady

Recommended Plants



N (native)



Selected Annuals

Common Name Scientific Name	Native/ Non-native (N, NN)	Bloom Period (Sp, Su, F)	Placement in Garden (Part Shade Full Shade)	Function (Nectar, Pollen)
floss flower <i>Ageratum</i> spp.	NN	Sp	PS, FS	N, P
begonia <i>Begonia</i> spp.	NN	Su	PS, FS	N, P
impatiens <i>Impatiens walleriana</i> , <i>I. capensis</i>	N & NN species	Su	PS, FS	N, P
rough skullcap <i>Scutellaria integrifolia</i>	N	Su	PS	N, P
partridge pea <i>Chamaecrista fasciculata</i>	N	Su	PS	N, P
shade coleus ‘Wizard Mix’ <i>Solenostemon scutellarioides</i>	NN	Su	PS, FS	N, P
monkey flower <i>Torenia flava</i>	NN	Su	PS, FS	N, P
viola, johnny jump-up <i>Viola</i> spp.	NN	F, Sp	PS	N, P



floss flower
Ageratum spp.

Non-native



viola, johnny jump-up
Viola spp.



← bumblebee



↑
hover fly



Non-native

begonias

impatiens



black swallowtail

Non-native



jewelweed
Impatiens capensis

N



pale touch-me-not
Impatiens pallida

N

bizzy Lizzy
Impatiens walleriana



monkey flower *Torenia flava*
sun torenia *T. fournieri*



Non-native





rough skullcap
Scutellaria integrifolia



partridge pea
Chamaecrista fasciculata



Photos credit: Eugene Wofford



Selected Native Perennials for Spring Bloom

Botanical Name	Common Name	Plant and Culture Info										Flower Color
		Plant Size			Light Level ^x			Moisture Preference				
		<1 ft.	1-3 ft.	> 3 ft.	○	◉	●	Well-Drain	Dry	Moist	Wet	
<i>Actea pachypoda</i>	doll's eyes		x			x	x	x		x		white
<i>Actaea racemosa</i> (syn. <i>Cimicifuga racemosa</i>)	black cohosh			x		x	x	x		x		white
<i>Amsonia ciliata</i>	fringed blue star		x		x	x		x				blue
<i>Amsonia tabernaemontana</i>	wideleaf blue-star		x		x	x		x				blue
<i>Anemone quinquefolia</i>	wood anemone	x				x				x		white or pink
<i>Anemonella thalictroides</i>	rue-anemone	x				x	x			x		white
<i>Aquilegia canadensis</i>	eastern columbine		x		x	x		x				red and yellow
<i>Arisaema triphyllum</i> spp <i>quinatum</i>	jack-in-the-pulpit		x			x				x		green to purple
<i>Asarum canadense</i>	canadian wild ginger	x				x	x	x		x		purple
<i>Caulophyllum thalictroides</i>	blue cohosh		x				x	x		x		brown to yellow green
<i>Chamaelirium luteum</i>	fairy wand		x			x	x			x		white
<i>Chrysogonum virginianum</i>	green-and-gold	x				x		x		x		yellow
<i>Dodecatheon meadia</i>	eastern shooting star	x					x			x		white to pink



Selected Native Perennials for Spring Bloom cont.

Botanical Name	Common Name	Plant and Culture Info										Flower Color
		Plant Size			Light Level ^x			Moisture Preference				
		<1 ft.	1-3 ft.	> 3 ft.	○	◉	●	Well-Drain	Dry	Moist	Wet	
<i>Erythronium umbilicatum</i>	dimpled trout lily	x				x	x	x		x		yellow
<i>Geranium maculatum</i>	wild geranium		x		x	x		x		x		pink
<i>Hepatica americana</i>	hepatica, liverleaf hepatica	x				x		x		x		blue, white
<i>Heuchera americana</i>	coral bells, alumroot		x			x	x	x				chartreuse
<i>Hexastylis arifolia</i> (syn. <i>Asarum arifolia</i>)	heartleaf	x				x	x		x	x		red-brown
<i>Iris cristata</i>	dwarf crested iris	x				x	x			x		pale blue, gold crest
<i>Iris fulva</i>	copper iris	x			x	x				x	x	copper yellow
<i>Iris virginica</i>	virginia iris			x	x	x				x	x	violet blue
<i>Maianthemum racemosum</i>	solomon's plume		x			x				x		white
<i>Mitchella repens</i>	partridge-berry	x				x				x		white
<i>Phlox divaricata</i>	woodland phlox		x		x	x		x		x		lavender, white
<i>Polygonatum biflorum</i>	solomon's-seal		x			x				x		greenish white



Selected Native Perennials for Spring Bloom cont.2

Botanical Name	Common Name	Plant and Culture Info										Flower Color
		Plant Size			Light Level ^x			Moisture Preference				
		<1 ft.	1-3 ft.	> 3 ft.	○	◉	●	Well-Drain	Dry	Moist	Wet	
<i>Sanguinaria canadensis</i>	bloodroot	x					x			x		white
<i>Silene virginica</i>	fire pink, scarlet catchfly		x			x		x				scarlet
<i>Spigelia marilandica</i>	indian-pink		x			x		x		x		crimson red
<i>Stellaria pubera</i>	star chickweed	x	x				x	x		x		white
<i>Tiarella cordifolia</i>	foamflower	x					x	x		x		white to pink
<i>Trillium catesbaei</i>	catesby’s trillium		x				x		x			pink to rose
<i>Trillium cuneatum</i>	sweet betsy, toad trillium	x					x	x		x		maroon, chartreuse
<i>Trillium lancifolium</i>	lance-leaved trillium		x				x			x		brownish maroon
<i>Trillium luteum</i>	yellow trillium		x			x	x	x		x		yellow
<i>Viola pedata</i>	bird’s foot violet	x			x	x		x	x			pale purple
<i>Viola rostrata</i>	longspur violet	x			x	x				x		lilac purple
<i>Zizia aurea</i>	golden alexander		x			x		x		x		yellow



virginia blue bells
Mertensia virginica

ephemerals



bloodroot
Sanguinaria canadensis



dimpled trout lily
Erytronium umbilicatum



bird's foot violet
Viola pedata

Photo credit: Hugh & Carol Nourse



longspur violet
Viola rostrata

Photo credit: Gill Nelson



lenten rose
Hellebore spp.

Evergreen

Non-native

golden alexander, wild geranium



Photo credit: Dr. Allan Armitage



hybrids & cultivars



'Caramel'

'Citronelle'

'Georgia Peach'



coral bells, alumroot
Heuchera americana



Photos credit: Hugh & Carol Nourse

partridge-berry
Mitchella repens



green-and-gold,
Chrysogonum virginianum

fragrant
Solomon's seal
Polygonatum odoratum

Non-native



great solomon's seal
Polygonatum biflorum

N

golden ragwort, foamflower, woodland phlox



Photo credit: Dr. Allan Armitage

N

dwarf crested iris, toad trillium, foamflower



Photo credit: Dr. Allan Armitage

N



Selected Native Perennials for Summer Bloom

Botanical Name	Common Name	Plant and Culture Info										Flower Color
		Plant Size			Light Level ^x			Moisture Preference				
		<1 ft.	1-3 ft.	> 3 ft.	○	◉	●	Well-Drain	Dry	Moist	Wet	
<i>Chelone glabra</i>	white turtlehead		x			x				x	x	white
<i>Chelone lyonii</i>	pink turtlehead		x			x	x			x		pink to rose purple
<i>Eryngium yuccifolium</i>	rattlesnake-master, button snake-root		x			x	x	x	x	x		white
<i>Eurybia divaricata</i> , syn. <i>Aster divaricatus</i>	white wood aster, heartleaf aster		x		x	x		x				white
<i>Liatris spicata</i>	dense blazing star, marsh blazing star		x	x	x	x				x	x	deep purple
<i>Lobelia cardinalis</i>	cardinal flower		x	x	Mo rn.		Aft	.		x		red
<i>Monarda fistulosa</i>	appalachian bergamot		x	x	x	x		x		x		lavender
<i>Monarda punctata</i>	spotted horse-mint		x		x	x		x	x	x		yellow with purple spots
<i>Phlox paniculata</i>	garden phlox, summer phlox			x	x	x				x		pink to lavender
<i>Phlox stolonifera</i>	creeping phlox	x				x		x		x		lavender
<i>Pycnanthemum pycnanthemoides</i>	southern mountain mint			x		x		x				white to lavender



N


cardinal flower
Lobelia cardinalis

dense blazing star *Liatris spicata*



N

Photo credit: Ed McDowell

A close-up photograph of a southern mountain mint plant. The plant has green, opposite, ovate leaves and clusters of small, green, rounded flower heads. Several bees are visible on the plant, including a large blue and black bee in the upper right and a smaller black bee in the lower right. The background is blurred, showing more foliage and brown leaves on the ground.

southern mountain mint
Pycnanthemum
pycnanthemoides



Selected Native Perennials for Fall Bloom

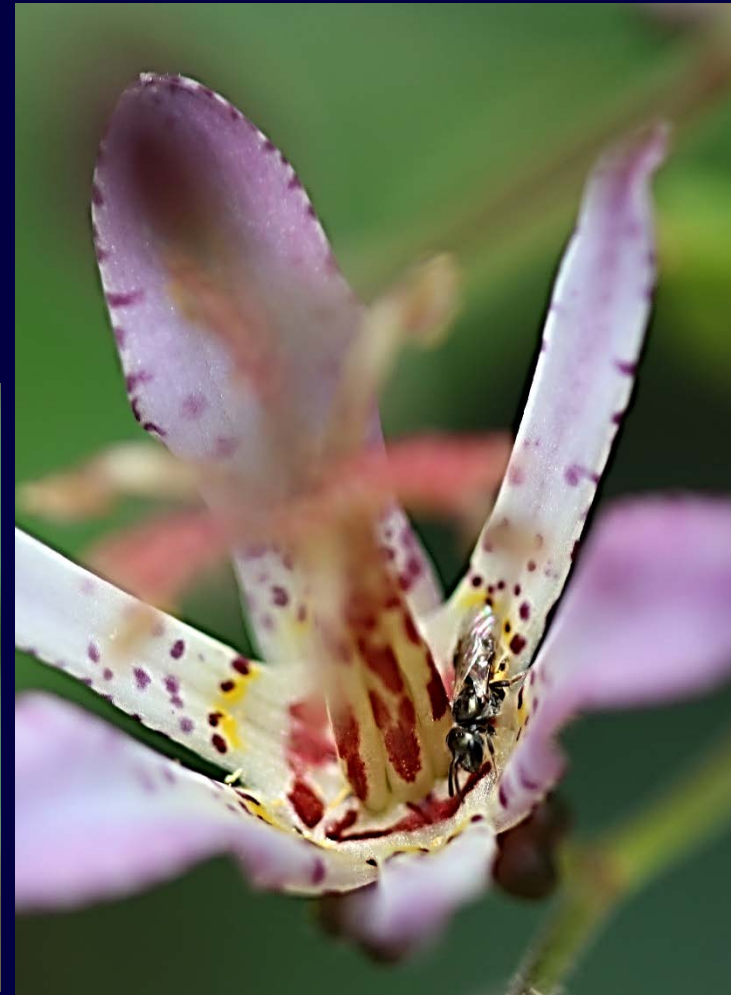
Botanical Name	Common Name	Plant and Culture Info										Flower Color
		Plant Size			Light Level ^x			Moisture Preference				
		<1 ft.	1-3 ft.	> 3 ft.	○	◉	●	Well-Drain	Dry	Moist	Wet	
<i>Gentiana saponaria</i> (syn. <i>Dasystephana saponaria</i>)	Soapwort Gentian		x			x	x	x		x		blue
<i>Helianthus angustifolius</i>	Narrowleaf Sunflower, Swamp Sunflower		x		x	x			x	x		yellow
<i>Liatris pilosa</i> (syn. <i>Liatris graminifolium</i>)	Shaggy Blazing Star, Grass-leaf Blazing Star		x		x	x		x		x		pink
<i>Physostegia virginiana</i>	Obedient Plant			x	x	x				x		pink, lavender
<i>Solidago nemoralis</i>	Gray Goldenrod		x		Mor n		Aft.		x			yellow
<i>Symphyotrichum concolor</i>	Eastern Silvery Aster		x		x	x		x	x			lilac
<i>Symphyotrichum novae-angliae</i>	New England Aster			x	x	x		x		x		purple, lavender, white
<i>Symphyotrichum patens</i> (syn. <i>Aster patens</i>)	Late Purple Aster		x		x	x		x		x		purple rays, yellow disks



white wood aster
Aster divaricata



toad lily
Trycirtus spp.
Non-native





Hosta spp.

Non-native





A Word About Ferns...

- Forage for larvae
- Three basic growing requirements:
 - ✓ shade, moisture, and loose, well-drained soil high in organic matter.
- Recommended species:
 - southern wood fern, *Dryopteris ludoviciana*
 - Christmas fern, *Polystichum acrostichoides*
 - sensitive fern, *Onoclea sensibilis*
 - southern maiden fern, *Thelypteris kunthii*
 - cinnamon fern, *Osmunda cinnamomea*

cinnamon fern

wideleaf blue star



Solomon's
seal

cranesbill
geranium

eastern
columbine

Photo credit: Dr. Allan Armitage



Selected Woody Shrubs and Small Trees Suitable for Part Shade*

Botanical Name	Common Name	Growth Habit	Native/ Non-native	Flower Color	Bloom Time
<i>Aesculus parviflora</i>	Bottlebrush Buckeye	shrub	native	white	S
<i>Aesculus pavia</i>	Red Buckeye	shrub	native	red	Sp
<i>Agarista populifolia</i>	Fetterbush	shrub	native	white	S
<i>Callicarpa americana</i>	American Beautyberry	shrub	native	lavender	S
<i>Calycanthus floridus</i>	Sweet Shrub	shrub	native	red	Sp
<i>Cephalanthus occidentalis</i>	Buttonbush	shrub	native	white	S
<i>Cercis canadensis</i>	Eastern Redbud	medium tree	native	pink	Sp
<i>Clethra alnifolia</i>	Clethra	shrub	native	white/pink	S
<i>Cornus florida</i>	Dogwood	medium tree	native	white	S
<i>Crataegus psp.</i>	Mayhaw	small tree	native	white	S
<i>Edgeworthia chrysantha</i>	Paperbush	shrub	non-native	white/gold	Sp
<i>Euonymus americanus</i>	American Euonymus	shrub	native	green/white	Sp
<i>Fothergilla gardenii</i>	Dwarf Fothergilla	shrub	native	white	Sp
<i>Halesia tetraptera</i>	Carolina Silverbell	shrub	native	white	Sp
<i>Hamamelis virginiana</i>	Common Witchhazel	small tree	native	yellow	Sp
<i>Hydrangea arborescens</i>	Smooth Hydrangea	shrub	native	white	S
<i>Hydrangea macrophylla</i>	Lacecap Hydrangea	shrub	non-native	white/blue/pink	S
<i>Hydrangea quercifolia</i>	Oakleaf Hydrangea	shrub	native	white	S
<i>Ilex glabra</i>	Inkberry	shrub	native	white	S
<i>Ilex decidua</i>	Possumhaw	shrub	native	white	S
<i>Ilex opaca</i>	American Holly	small tree	native	white	S
<i>Ilex vomitoria</i>	Yaupon Holly	shrub/small tree	native	white	S
<i>Illicium floridanum</i>	Florida Anise-Tree	shrub	native	red	S

*For more complete information refer to

Selected Woody Shrubs and Small Trees Suitable for Part Shade cont.*

Botanical Name	Common Name	Growth Habit	Native/ Non-native	Flower Color	Bloom Time
<i>Itea virginica</i>	Sweetspire	shrub	native	white	Sp
<i>Leucothoe fontanesiana</i>	Drooping Leucothoe	shrub	native	white	S
<i>Lindera benzoin</i>	Spice-bush	shrub	native	yellow	Sp
<i>Lonicera sempervirens</i>	Coral Honeysuckle	vine ground cover	native	red/yellow	S
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	vine ground cover	native	white	S
<i>Osmanthus americanus</i>	Wild Olive/ Devilwood	shrub	native	white/orange	S
<i>Physocarpus opulifolius</i>	Ninebark	shrub	native	white	S
<i>Prunus caroliniana</i>	Carolina Cherry Laurel	medium tree	native	white/pink	S
<i>Rhus coppalina</i>	Sumac	medium tree	native	yellow	S
<i>Vaccinium</i> spp.	Sparkleberry, Highbush Blueberry, Mayberry	shrub	native	white/pink	Sp
<i>Viburnum</i> spp.	Viburnums, e.g. Blackhaw Viburnum, Swamp-Haw, Arrowwood	shrub	native & non- native species	white	S
<i>Wisteria frutescens</i>	American Wisteria	woody vine	native	lavender	Sp

*For more complete information refer to

A Word About Azaleas...



- Research has shown that Azaleas, native Rhododendrons, & Mountain laurel all have nectar which is toxic to honey bees.



Non-native

paperbush *Edgeworthia chrysantha*





sweetspire *Itea virginica*

N

 sweetshrub
Calycanthus floridus



american beautyberry
Callicarpa americana



buttonbush *Cephalanthus occidentalis*



N

virginia creeper
Parthenocissus
quinquefolia



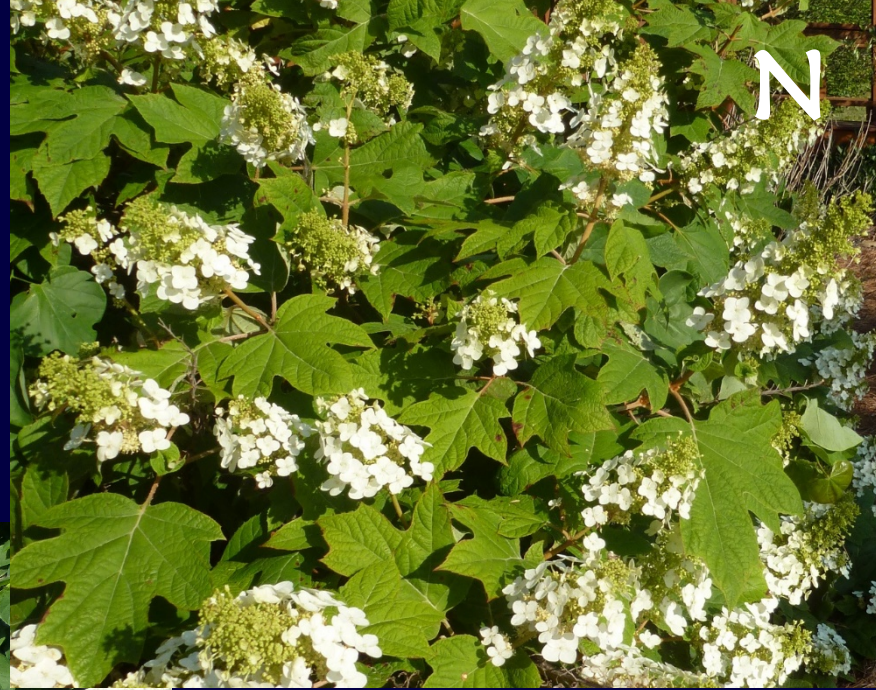
N

Photo credit: Dr. Gary Wade



lacecap hydrangea
Hydrangea macrophylla

Non-native



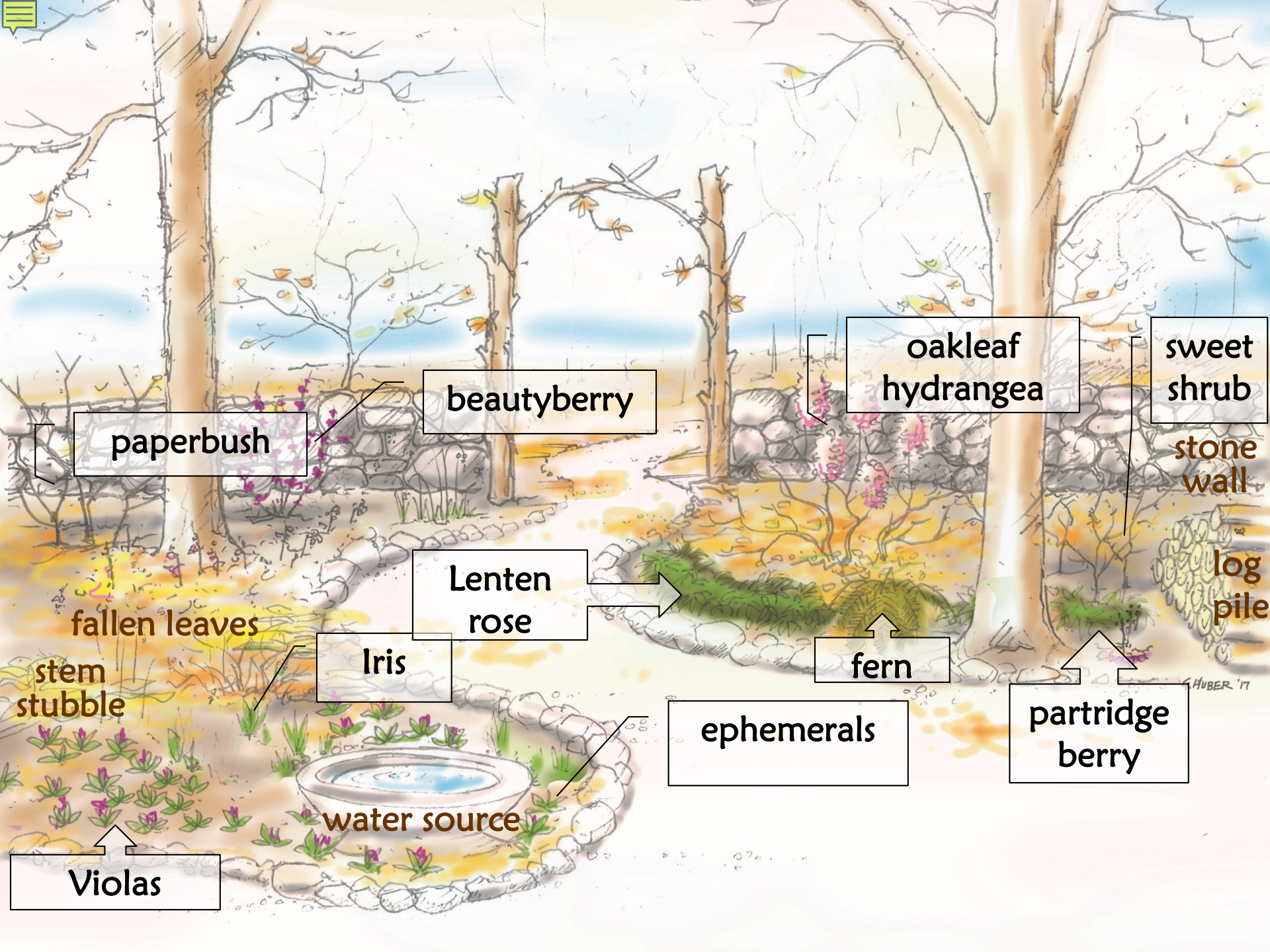
smooth hydrangea
Hydrangea arborescens

oakleaf hydrangea
Hydrangea quercifolia

Hydrangeas



Putting It All Together



paperbush

beautyberry

oakleaf
hydrangea

sweet
shrub

stone
wall

log
pile

fallen leaves

Lenten
rose

Iris

fern

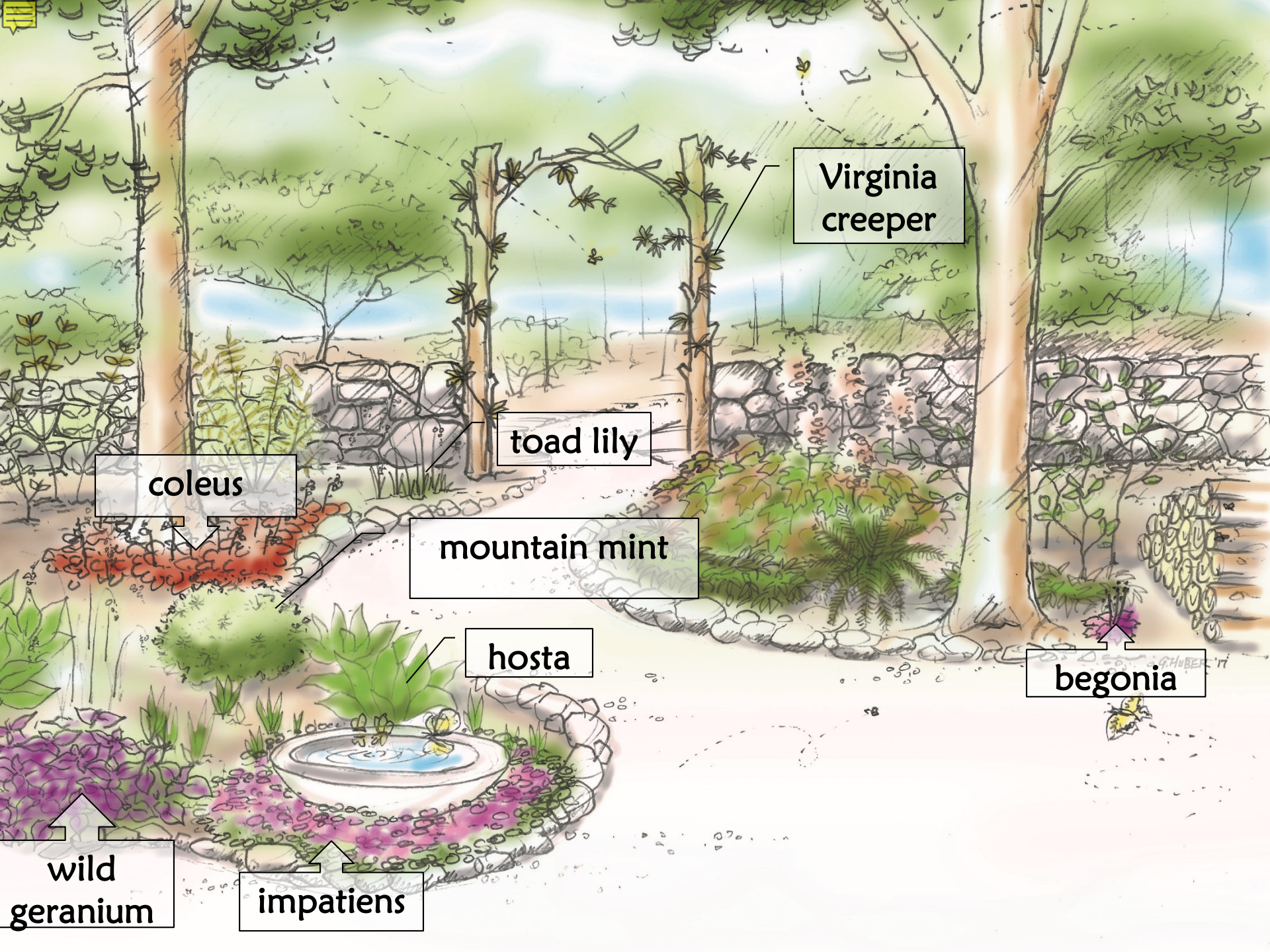
ephemerals

partridge
berry

water source

Violas

stem
stubble



Virginia creeper

toad lily

coleus

mountain mint

hosta

begonia

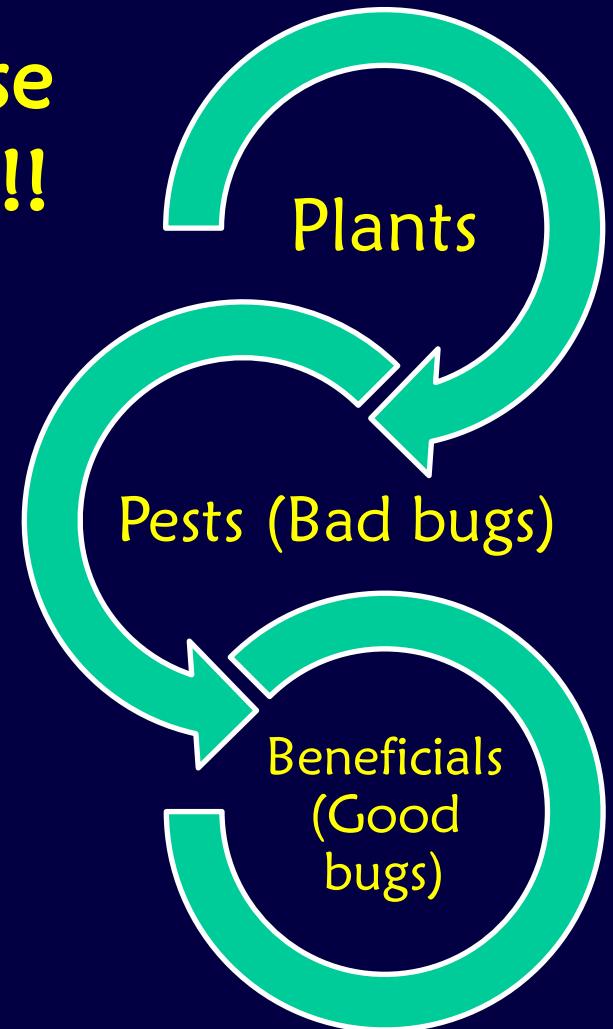
wild geranium

impatiens



Let the Good Bugs Fight for You!

Do not use
pesticides!!



Welcome Other Garden Visitors



assassin bug



wheel bug



damselfly





Take Home Message:

- ✓ Provide habitat conducive to pollinators: water, food, shelter, space.
- ✓ Increase vertical layering between the ground and the tree canopy.
- ✓ Use a variety of shade-tolerant plants to provide nectar, forage sources, & vegetative cover.
- ✓ Plant natives whenever possible and also non-native well-behaved exotics for pollinator benefits.
- ✓ Leave bare patches of soil, log piles, snags, and fallen leaves for habitat enhancement.
- ✓ Place bee boxes for nesting.
- ✓ Eliminate pesticide use to prevent pollinator death.



Questions?



Resources:

Delaplane, Keith Pollination: Plants for Year-round Bee Forage The University of Georgia College of Agricultural & Environmental Sciences Cooperative Extension Service Bulletin 1164

<http://extension.uga.edu/publications/detail.cfm?number=B987> Native Plants for Georgia Part I: Trees, Shrubs and Woody Vines

<http://extension.uga.edu/publications/detail.cfm?number=B987-3> Native Plants for Georgia Part III: Wildflowers

<http://extension.uga.edu/publications/detail.cfm?number=B987-4> Native Plants for Georgia Part IV: Grasses and Sedges

Holm, H. 2017. Bees: An Identification and Native Plant Forage Guide. Pollination Press LLC. Minnetonka, MN

Lee-Mäder, E., J. Fowler, J. Vento, and J. Hopwood. 2016. 100 Plants to Feed the Bees. The Xerces Society. Storey Publishing. North Adams, MA



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