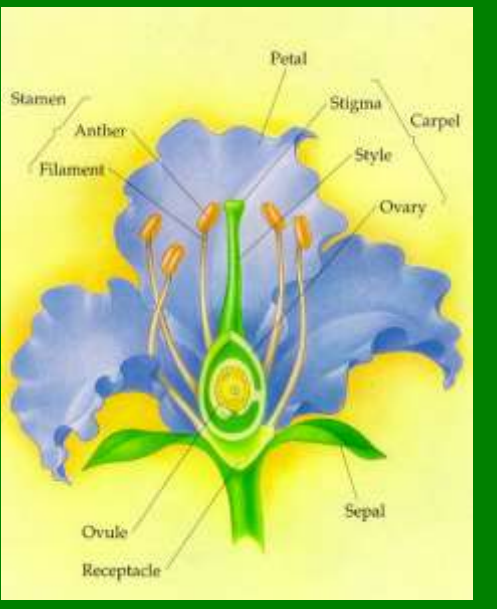

## Outline

- Importance of Pollinators
- Bees as Primary Pollinators
- Plant Selection for Pollinators
- Best Native Plants for Pollinators
- Virtual Tour of Pollinator Paradise Garden
- Web Resources

# Pollination

- More than 80% of all flowering plant species need the help of animals to move their heavy pollen grains from plant to plant for fertilization
- Adequate pollination ensures that a plant will produce full-bodied fruit and a full set of fertile seeds




# Pollination

- Worldwide, approximately 1,000 plants grown for food, beverages, fiber, spices, and medicines need to be pollinated by animals in order to produce the goods on which we depend.

Cacao flowers are pollinated by a tiny midge

Source: www.digitalphotography.org

Coffee flowers are pollinated by bees

Photos by Debbie Roos

95% of photos taken in Chatham Mills Pollinator Garden

## Pollinators: Who's Who

## Pollinators

- Most pollinators (~ 200,000 species) are beneficial insects such as flies, beetles, wasps, ants, butterflies, moths, and bees.

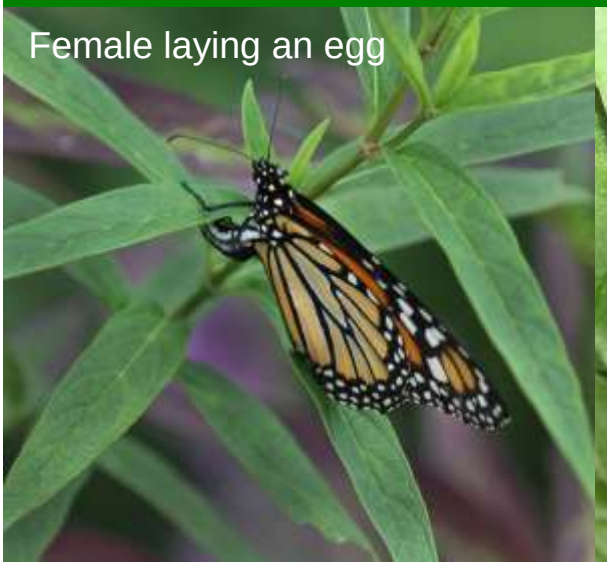

Bumble Bee on Joe-pye Weed


Hairstreak on Goldenrod


Great black wasp on buckwheat


Monarch on Blazing Star

# Monarch on Milkweed






Bumble Bee on Red Milkweed


American
Snout Butterfly


Cecropia Caterpillar on Sassafras


Hickory Horned Devil


Tiger Swallowtails on Joe-pye Weed


Honey Bee on Silverbell

Syrphid Fly on Mexican Sunflower

Syrphid Flies on Spiderwort


Leafcutter Bee on Wild Indigo


Ambush Bug on Spotted Horsemint


Purple Hairstreak on Globe Amaranth


Soldier Beetle on Blanketflower


Black Swallowtail Caterpillars on Fennel


Flower Scarab Beetle on Barbara's Buttons

# Pollinators

- A small percentage of pollinators are vertebrates such as hummingbirds, bats and small mammals.

# Pollinators Make Tequila!


Photo: tequilasource.com

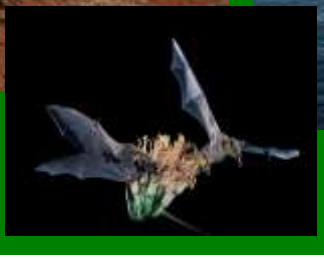
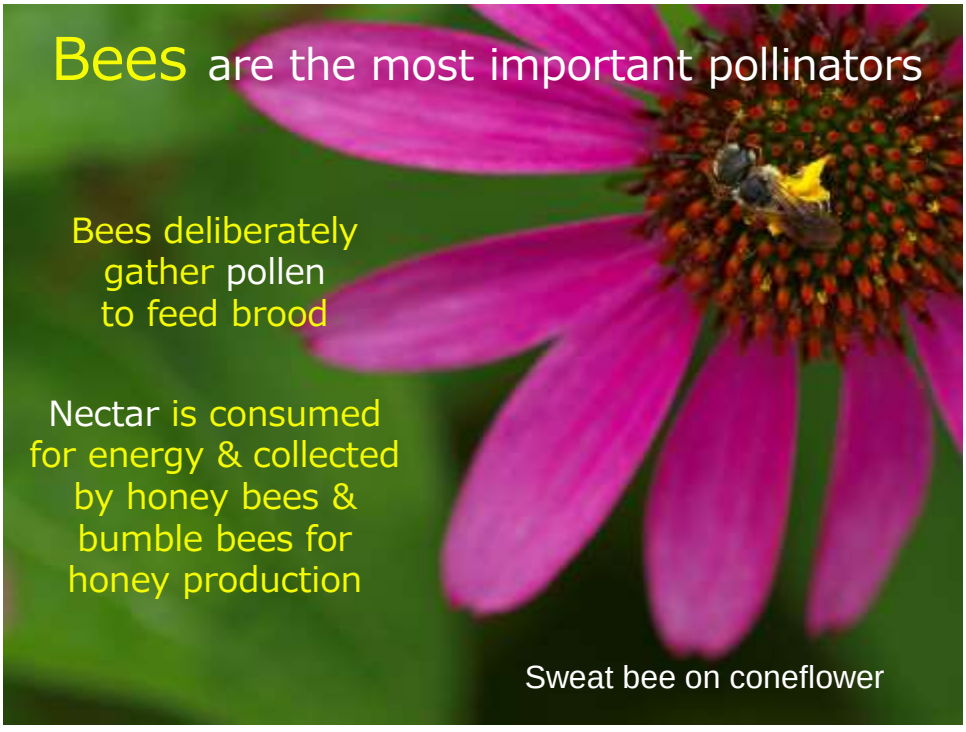
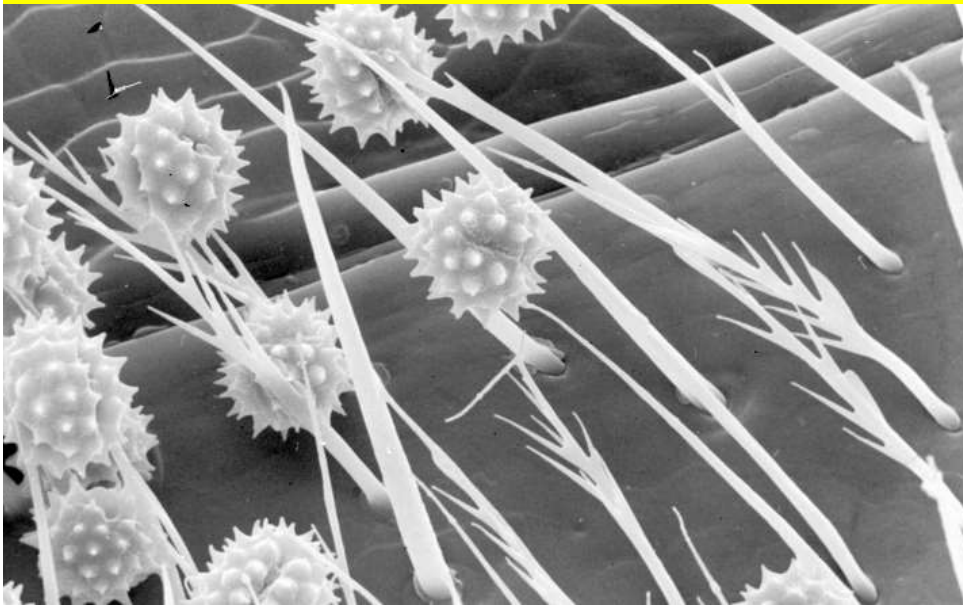


Photo: US Fish & Wildlife Service

# Farmers, Gardeners, and Eaters Rely on Bees!




**Scanning electron micrograph of honey bee head covered with pollen**



## Bees * Bees * Bees

- Honey bees – native to Europe
- Native bees - ~ 4,000 species of bees native to the U.S.
- ~ 500 native bee species in NC

## Honey Bees

- 50% decline in managed hives since 1950
- >70% decline in feral colonies
- Causes for decline: pests, diseases, poor nutrition, weak queens, pesticides...


Varroa
Mites


## Native Bees are Efficient Pollinators

- ~250 mason bees are required to pollinate an acre of apples compared to two hives of honey bees
- Many species of native bees are more active in cold, wet conditions & low light
- Bumble bees and other native bees practice buzz pollination
- Some native bees specialize in one type of flower
- Pollen gathered by native bees is very accessible

# Native Bees

- Most species are solitary so not aggressive and don't sting
- 70% of native bees nest in the ground
- Most of the rest are cavity nesters (bumble bees, leafcutter bees, mason bees, etc.)

Bumble bee nest

Leafcutter bee (www.lbnature.co.uk)

# Ground Nesting Mining Bees


Ground Nesting Colletid Bees
Also called cellophane bees
or polyester bees


Colletid Bee


Ground-nesting Chimney Bees


Chimney Bees


## Role of Native Bees as Crop Pollinators

- If enough natural habitat is nearby to support them, native bees can provide much or even all the pollination services for crops
- Over 50 species of native bees visit watermelon, sunflower, or tomato crops in CA
- Over 80 species of bees pollinate berry crops in MN and MA
- Native pollinators have been shown to nearly triple the production of cherry tomatoes in CA


Diversity of
Native Bees
Sweat Bee
& Bumble Bee


Bumble Bee


## Leafcutter Bee Nests


Hibiscus Bee


Sweat Bee on Coneflower


Cuckoo-leafcutter Bee
on Oxeye Daisy


Sunflower Bee on Blazing Star


Carpenter Bees on Passionflower


Carpenter Bee on Coneflower

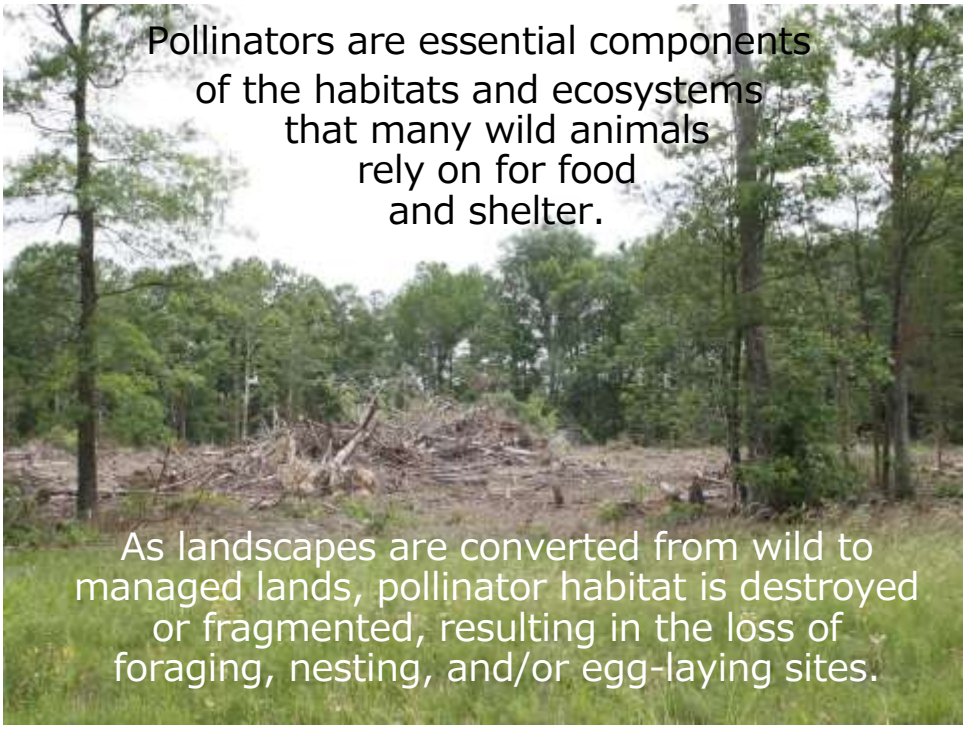

Carpenter-mimic Leafcutter Bee
on Butterfly Weed


Two-spotted Longhorned Bee on Zinnia


Sweat Bee on Joe-pye Weed


Sweat Bee
Bat-faced Cuphea


So what can you do to protect and enhance pollinator populations?


Pollinators are essential components of the habitats and ecosystems that many wild animals rely on for food and shelter.
As landscapes are converted from wild to managed lands, pollinator habitat is destroyed or fragmented, resulting in the loss of foraging, nesting, and/or egg-laying sites.

## Assess your Existing Bee Habitat

- Nesting sites: ~70% of native bees nest in the ground!
- Forage

## Adapt Existing Management Practices to Minimize Negative Impacts on Bees

- Minimize tillage
- Stagger planting dates to extend bloom period
- Leave areas supporting native bees alone: identify and protect nesting sites!
- Minimize potential for pesticide poisoning

# Planting Bee Forage

# Identify Dearth Times in Bloom Calendar

- Try and identify the dearth times in the natural bloom calendar in your area – which bee plants are already present and when do they bloom?
- Identify bee plants that bloom during these dearth times
- Have plants flowering throughout the growing season, early spring-late fall, with overlapping bloom periods

# Include Early & Late Bloomers

- Flowers that bloom in the very early spring provide critical resources for early emerging bees such as bumble bee queens, mining bees, mason bees...
- Help increase reproductive success

Late blooming plants ensure bumble queens are strong going into winter hibernation

# Plant Selection

- Use mostly perennials as these tend to have richer nectar sources and provide a dependable food source
- Important to have a diversity of flower size, shape, and color to attract a diversity of pollinators
- Aim for 10-20 different species with at least three species blooming in each season from spring-fall
- Include native bunch grasses for nesting habitat and larval host plants

## Plant Selection: Flower Diversity

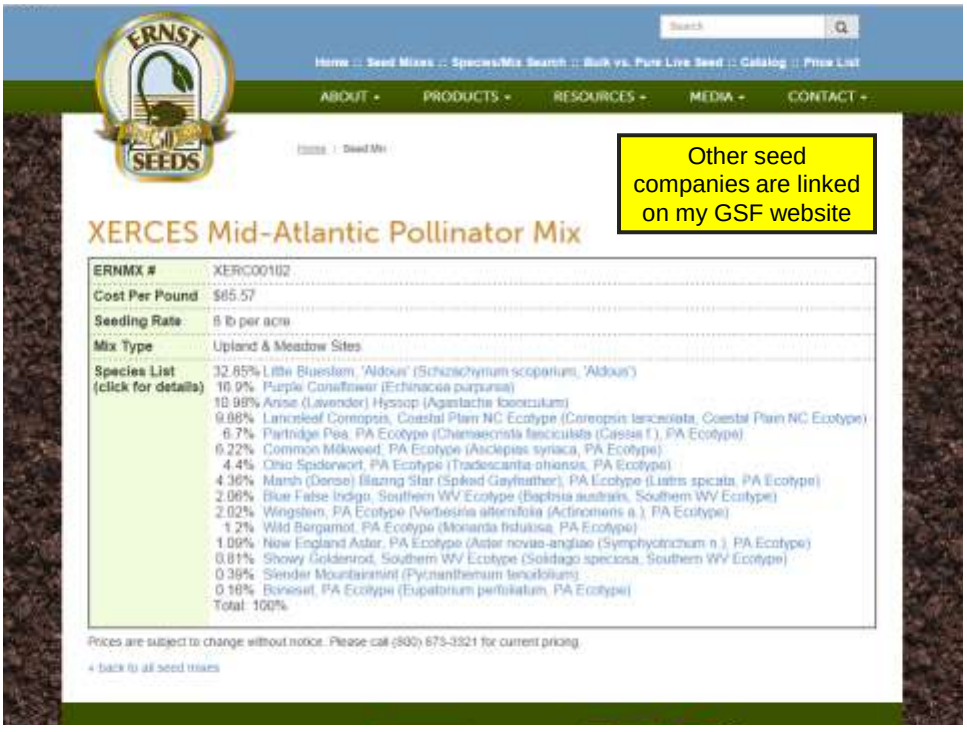
# Plant Selection

- Emphasize local native plants: research has shown that *native plants are 4 times more likely than non-native plants to attract native bees*
- Native plant genera support 3 times as many species of butterflies and moths as introduced plants
- Ex.: joe-pye weed and butterfly bush both attract butterflies but only the native joe-pye weed supports over 3 dozen species of Lepidopterans

# Direct-seeded Pollinator Meadows

- Site selection
- Site preparation
- Plant selection
- Planting techniques
- Ongoing management

See Xerces publication
*Establishing Pollinator Meadows from Seed*
*www.xerces.org/establishing-pollinator-meadows-from-seed*




# Top 25 Native Pollinator Plants

# Spring Blooming


Beardtongue


Beardtongue


Wild
indigo


Wild
indigo


Coneflower


Blanketflower
blooms spring-fall


Stoke’s Aster

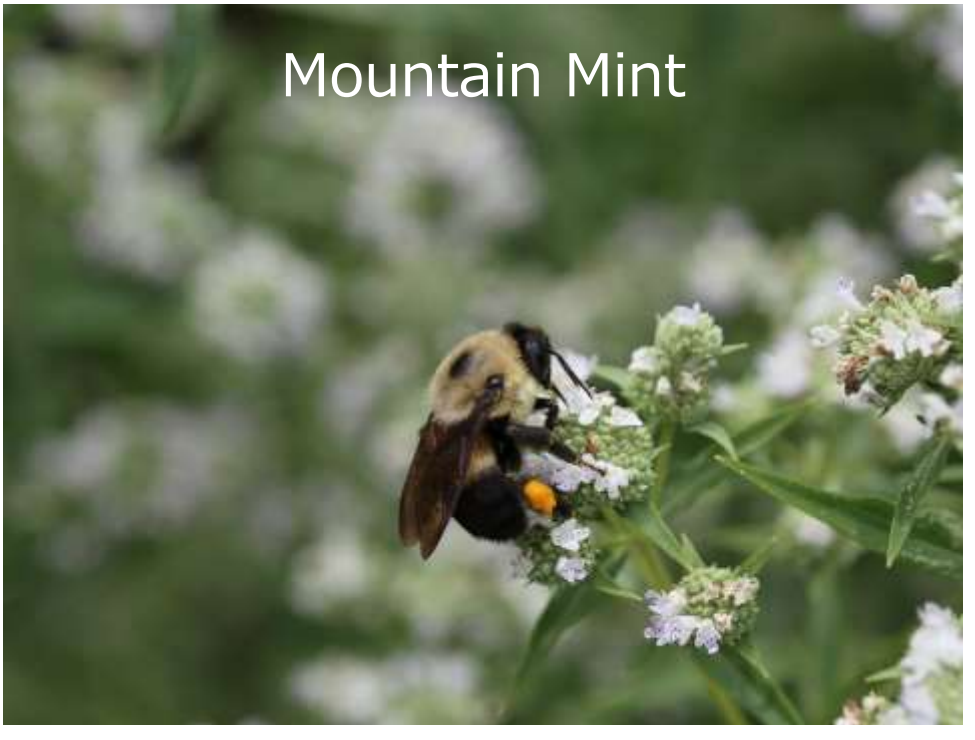

Golden Alexander

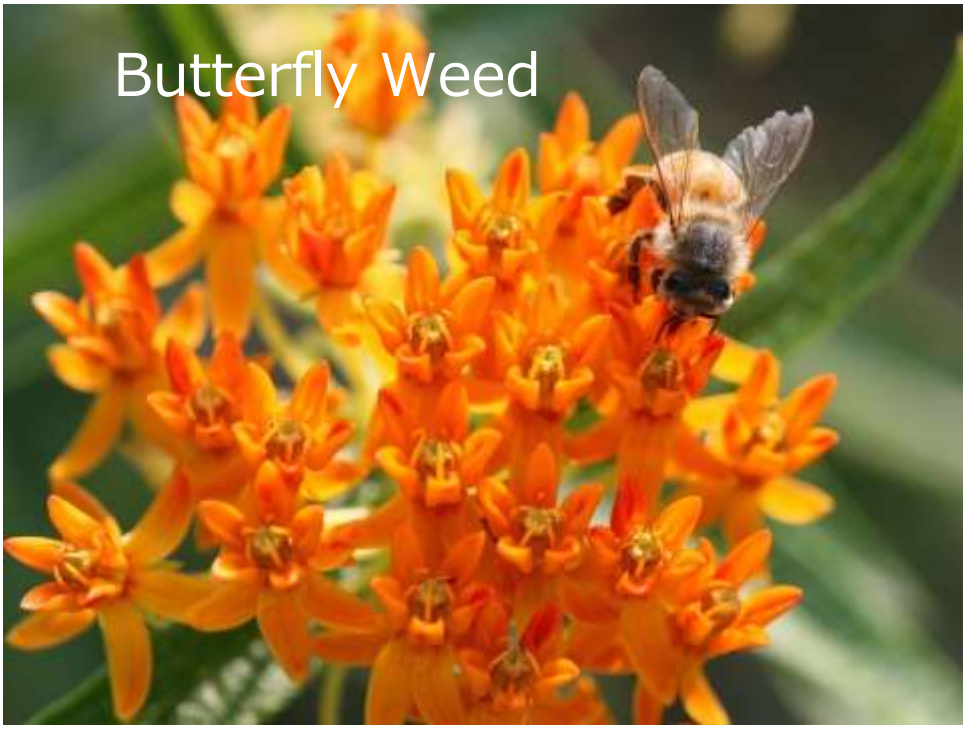

Bee Balm

Summer Blooming


Blazing Star


Mountain Mint


Mountain Mint


Butterfly Weed


Swamp Milkweed


Monarch
caterpillar
on
*Asclepias*


Culver's Root


Great Blue Lobelia


Rattlesnake
Master


Rattlesnake Master


Blue Vervain


New Jersey Tea


St. John’s Wort


Fall Blooming


Joe-pye Weed


Aster


Boneset


Goldenrod


Ironweed


Spotted
Horsemint


Climbing Aster


Climbing Aster

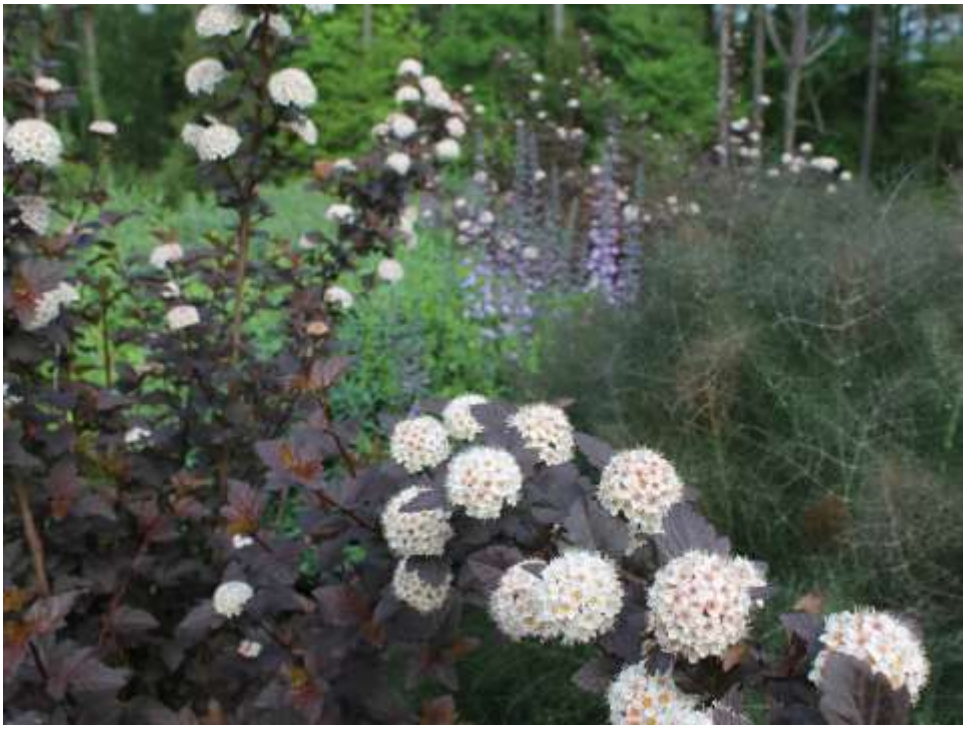
Chatham County
Cooperative Extension's
Demonstration Pollinator Garden
at Chatham Mills

178 Unique species…
85% native to the NC piedmont!

Garden is managed organically

## Pollinator Paradise Garden Before


Pollinator Paradise Garden After




Monarch
Black swallowtail

# Pollinator Habitat Supports Natural Enemies

Pollinator habitat also provides resources for beneficial insects:

parasitic wasps, syrphid flies, predators, etc.…


Lady Beetle


Green Lynx
Spider


Scoliid Wasp


Great
Black Wasp

# Potter Wasp

# Sand Wasps Prey on Brown Marmorated Stink Bugs

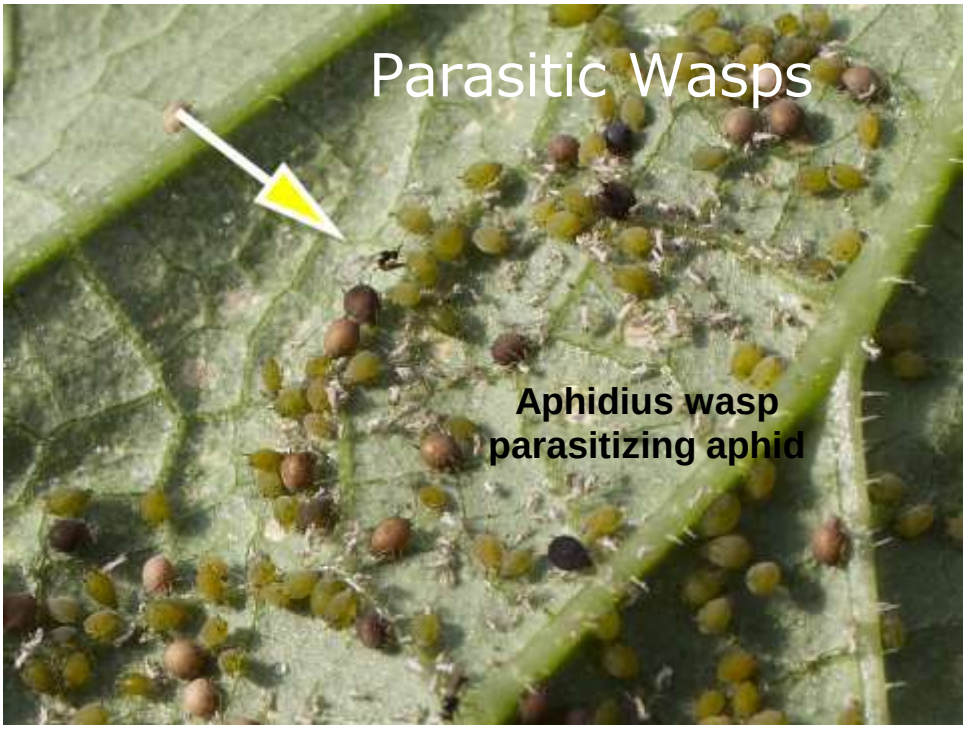
Mountain mint provides nectar for sand wasps

Brown marmorated stink bug


Predatory Stink Bug


Predatory Stink Bug


Predatory Stink Bug Nymphs


Parasitic Wasps
Aphidius wasp
parasitizing aphid


Soldier Beetle


Soldier Beetles


Praying Mantis


Praying Mantis


Carolina Mantid
Egg Case
Chinese Mantid
Egg Case


Assassin Bug


Robber Fly


Robber Fly


Syrphid Fly

# Syrphid Fly Larvae Are Predators!

Photo: BugGuide


Want to Learn More?

## Pollinator Paradise Garden Website
www.carolinapollinatorgarden.org

- Slide Show of Pollinator Garden
- List of Plants in the Garden
- What's in Bloom List with Photos
- Garden Tour Schedule
- My Top 25 Native Pollinator Plants
- Nursery & Seed Suppliers + more!

## Find Me on Social Media!

- Lots of pollinator postings with photos and videos
- www.facebook.com/debbie.roos.nc
- Instagram: Debbie.Roos
- Twitter: @GrowSmallFarms