

# Creating a Pollinator Paradise: Part 1



Debbie Roos  
North Carolina Cooperative Extension  
[www.protectpollinators.org](http://www.protectpollinators.org)

Photos by Debbie Roos

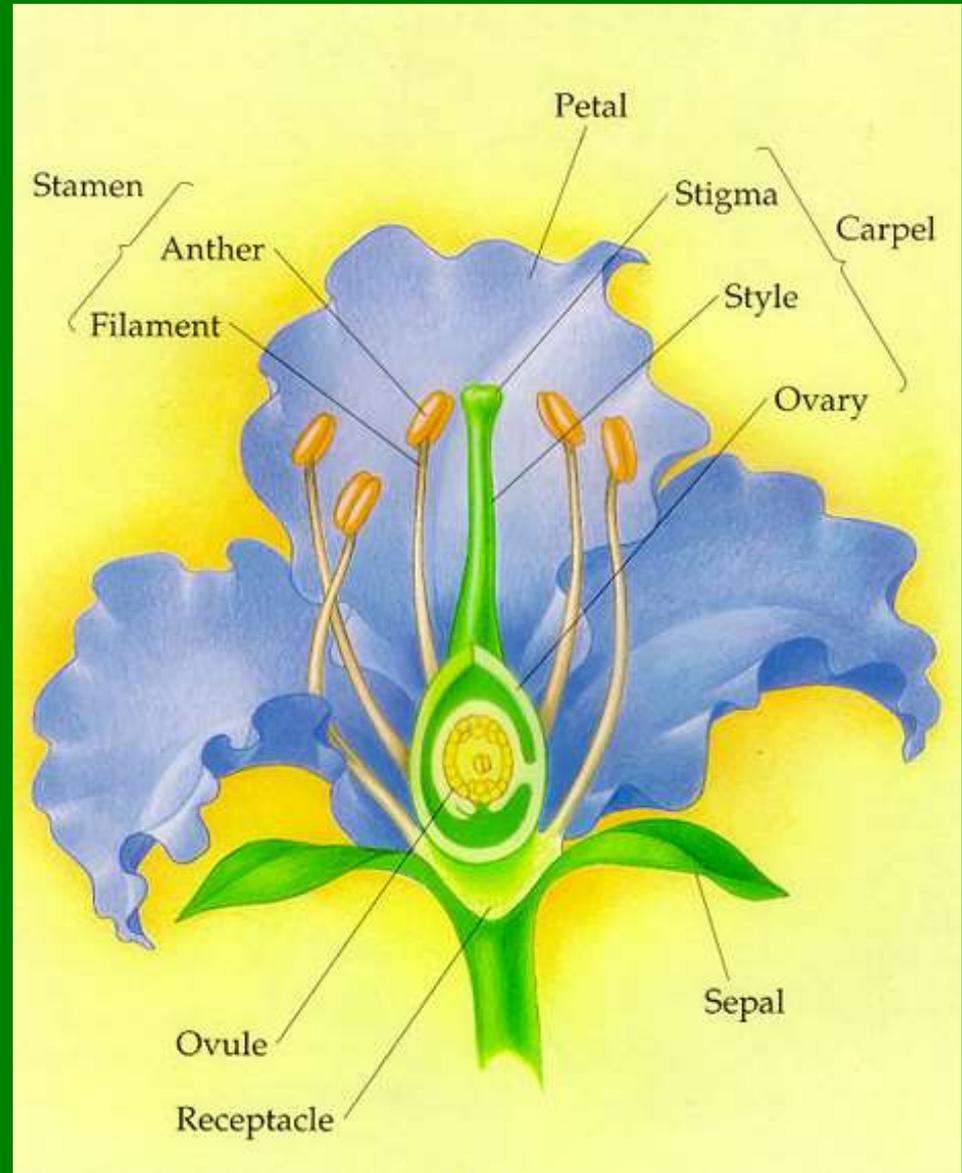
95% of photos taken in  
Chatham Mills  
Pollinator Garden

# Outline

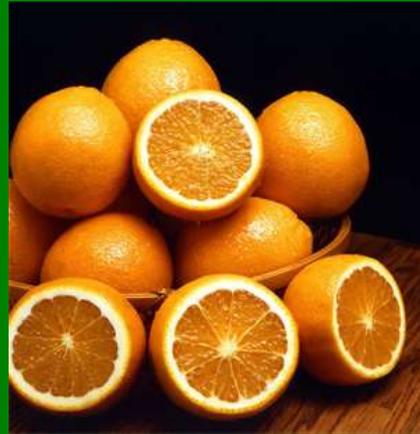
- Primary Pollinators
- All about Bees
- Principles of Planting a Bee Garden
- Demonstration Pollinator Gardens
- Top 25 Pollinator Plants
- Web Resources

# 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](http://www.digitalphotography.org)

Coffee flowers  
are pollinated  
by bees



# Pollinators: Who's Who



# Pollinators

- Most pollinators ( $\sim 200,000$  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

Female laying an egg



Lady beetle larva eating monarch egg



# Sulphur on Mexican Flame Vine





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



# Anole on Joe-pye Weed



# 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!



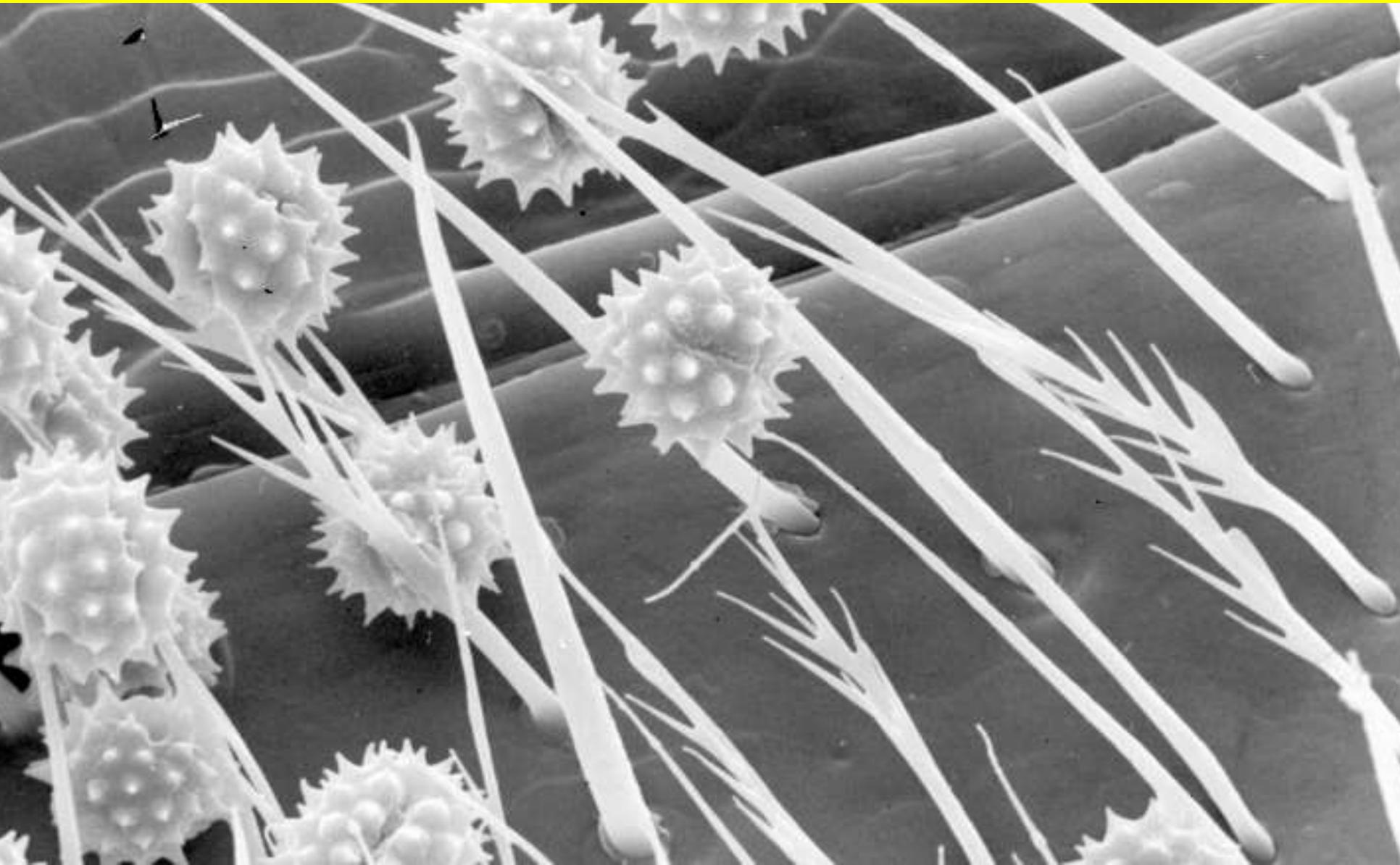
**Bees** are the most important pollinators

Bees deliberately  
gather pollen  
to feed brood

Nectar is consumed  
for energy & collected  
by honey bees &  
bumble bees for  
honey production

Sweat bee on coneflower

# 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 can be  
an insurance policy  
against honey  
bee losses

Bumble bee on  
downy wood mint



# 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](http://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



# Chimney Bees



# Importance 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
- If more than 30% of the area within 1.2 km of a field is natural habitat, native bees can deliver full pollination of watermelons in CA's Central Valley.



# Diversity of Native Bees

Sweat Bee  
& Bumble Bee

Bumble bee  
collecting  
pollen on  
bee balm



# Leafcutter Bee



# Leafcutter Bee Nests



# Hibiscus Bee





Sweat Bee on Coneflower



Cuckoo-leafcutter Bee  
on Oxeye Daisy



Sunflower Bee on Blazing Star



Shaggy Fuzzyfoot Bee  
on Mexican Hat

# 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
- Allow crops to bolt
- Stagger planting dates to extend bloom period
- Leave areas supporting native bees alone: identify and protect nesting sites!

# Adapt Existing Management Practices to Minimize Negative Impacts on Bees

- Minimize potential for pesticide poisoning
  - Use products non-toxic to bees when possible
  - Avoid applying pesticides when plants are blooming and bees are foraging (morning)
- Neonicotinoids
  - Systemic chemicals that are absorbed by the plant and present in leaves, pollen, nectar, etc; very widely used and toxic to pollinators

# 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

# Design Considerations

- Evaluate the site to assess light, soil, moisture, temperatures, wind, microclimates, existing vegetation & structures
- Consider maintenance – available time for maintenance helps determine size, style, and type of plants
- **Lower maintenance** = long-lived, minimal pruning, minimal division, minimal fertilizer, drought-tolerant, minimal pest problems – native plants are great!

# Design Considerations

- Locate garden in sunny area – optimal for nectar production & pollinators
- Plant in clumps or drifts when possible - group plants together instead of planting one of each
- Aim for a minimum 3-4' diameter of each plant or group of plants to increase foraging efficiency

# 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 pollinators of different sizes
- As the diversity of nectar- and pollen-producing plants increases, so does the diversity of bees
- Include native bunch **grasses** for nesting habitat and winter interest

# Plant Selection: Flower Diversity



# Bumble Bee on Hyssop



# 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

# Plant Selection

- To design a flower bed, consider bloom/foilage color and texture, bloom period, plant height and shape, winter structure...
- Inspirations for pleasing plant combinations: other gardens, magazines, Pinterest...
- Design for constant color and interest and forage!









# Planting the Garden

- Do site prep to remove weeds/turf and improve soil; incorporate 3-6" of compost before planting
- Optimal pH for perennial flower bed is 6.2-6.8
- Fall is the best time for planting but can do it year-round
- Apply 4" of mulch after planting
- Need to make sure garden gets sufficient irrigation the first year after planting until established

# Maintaining the Garden

- Plant annuals at the edges (spring and fall)
- Stay on top of weeds year-round!
- Deadhead flowers to prolong blooming (coneflower, blanketflower, lavender, bee balm, sneezeweed, ornamental basil, etc.) or to improve appearance but make sure and leave some seed for the birds!
- Divide plants when needed (e.g., goldenrod, yarrow, ornamental oregano, Rudbeckia, asters, etc.)
- Relocate or replace plants when needed
- Cut back plants before spring growth begins
- Replenish mulch annually in the spring

# Deadheading Example: Gaillardia

BEFORE



AFTER



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

160 Unique species...  
85% native to the NC piedmont!

Garden is managed **organically**

# Pollinator Paradise Garden Before



# Pollinator Paradise Garden After





























End of Part 1...

Click on Link on Website  
to See Part 2 of this  
Presentation