



**Bee City USA is a volunteer-run 501c3 organization
in Asheville, North Carolina,
home to 1st Bee City USA affiliate in nation**

Outline

1. INTRODUCTION: What is pollination and who are the pollinators?
2. THE PROBLEM: Pollinator decline
3. Why do we need pollinators?
4. SOLUTION: Let's live together!
5. Bee City/Campus USA philosophy, application process, commitments & benefits
6. Creating pollinator habitat: Plant it & they will come

INTRODUCTION: POLLINATION & POLLINATORS

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ANTHECOLOGY (pollination biology)



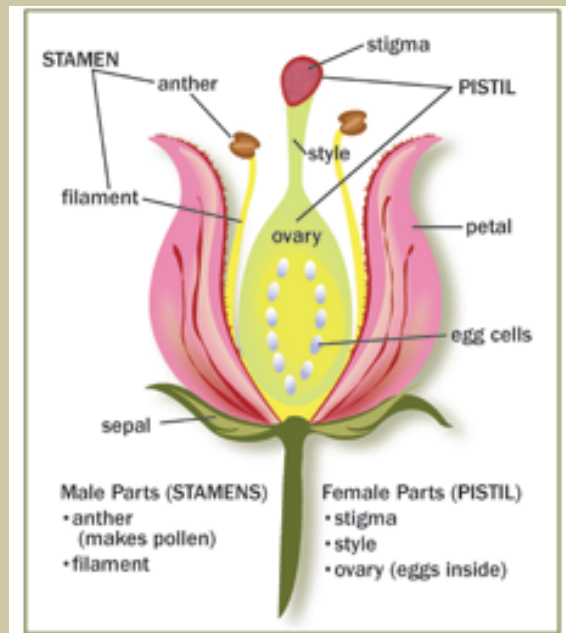
Cartoon used with permission of Scott Hilburn

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Flowers
produce
pollinator bait—
nectar!

Pollination:

Moving male part
of flower
(pollen on anthers)
to female part of
flower (stigma)
to produce seeds/
fruit



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7 Major Groups of Pollinators
(Many, but not all, species
in any of these groups pollinate)

BETTER:
Oldest
known
pollinator



BEES:
Only 7 of
20K species
are
"honey"
bees



FLIES:
They
pollinate
chocolate!



MOTHS:
Mostly
nocturnal



BUTTERFLIES



HUMMINGBIRDS:
Only found in Western
Hemisphere



BATS:
This bat
is not
really
yellow!



Many butterflies, hummingbirds and bats migrate for food and surviving winter

POLLINATOR DECLINE

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**Colony Collapse Disorder Finally Brought Attention to
Pollinators in 2007**


Mystery Bee Disappearances Sweeping U.S.
National Geographic, February 23, 2007

What's Wrong With The Bees?

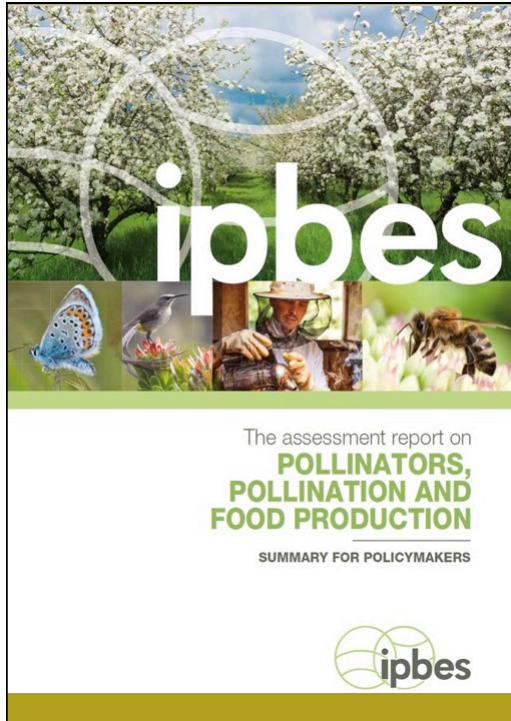
CBS News, October 25, 2007

Suddenly, the bees are simply vanishing
LA Times, June 10, 2007


Mystery Ailment Strikes Honeybees
The Associated Press, February 11, 2007

Deserted beehives, starving young stun scientists
USATODAY.com, April 30, 2007

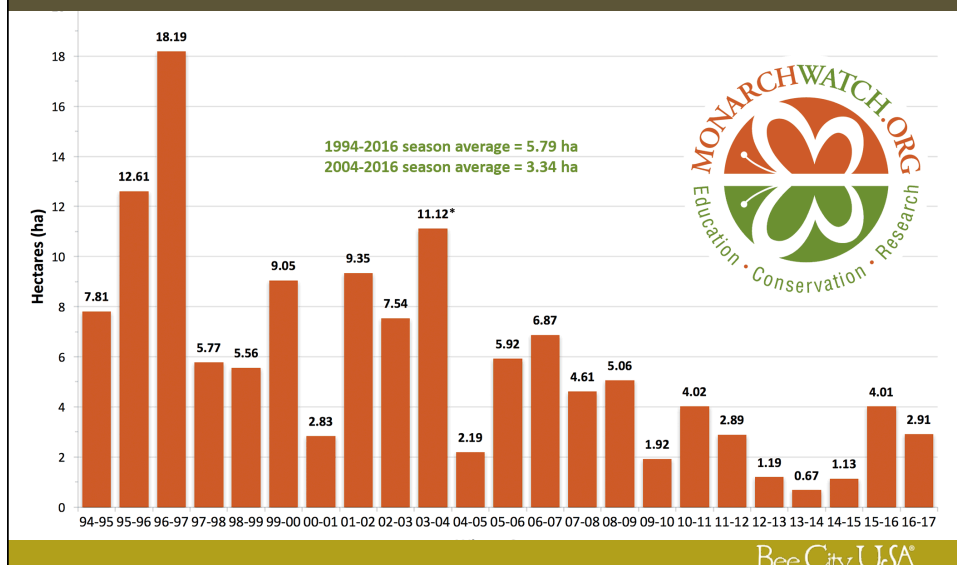
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UN's 2016 report says 40% of pollinator species are at risk of extinction

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Monarchs have declined by as much as 90% in last 2 decades (based on area covered in Mexican overwintering locations)



Why are honey bees, monarch butterflies & other pollinators declining?

- Habitat loss (due to agriculture, development, invasive/exotic plant species) causing poor nutrition (quantity & quality) +
- Pesticides (insecticides, fungicides, herbicides)+
- Parasites (esp. Varroa mite) & Disease+
- Climate change+

Robin Stickney

Per capita, Americans average using 3.5 pounds of pesticides/year

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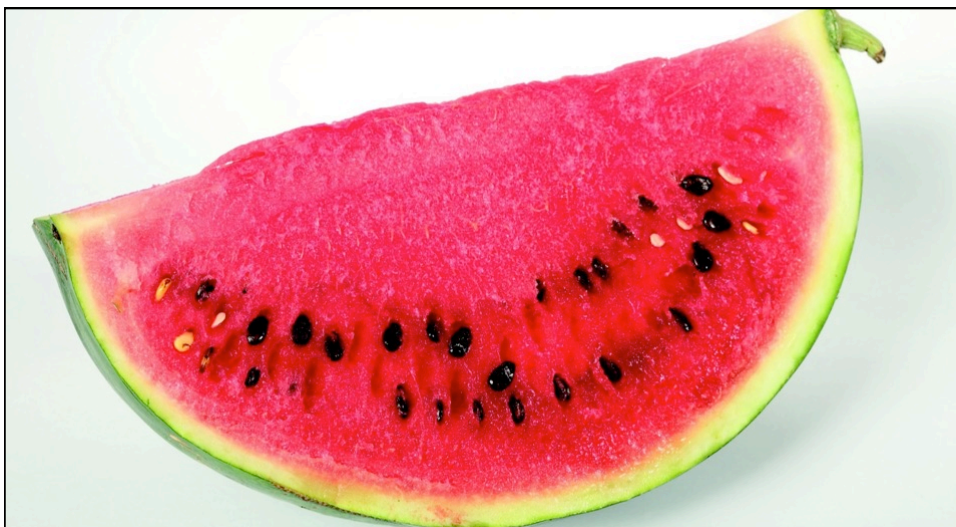
Is the
honey bee the
canary in the
world's
coalmine,
warning us of
grave danger?



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WHY DO WE NEED POLLINATORS?

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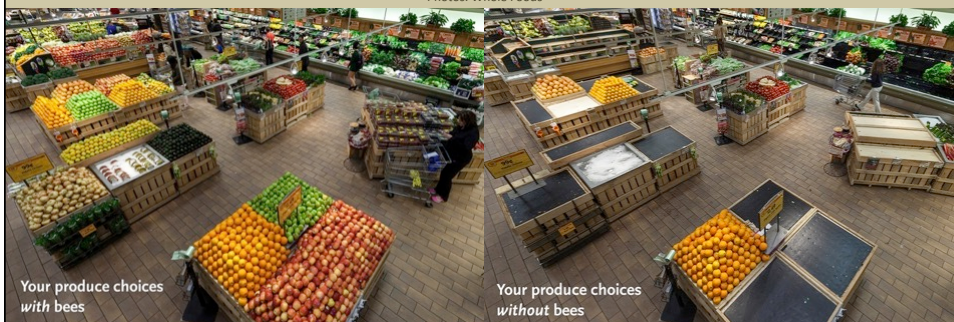


1 in 3 bites of food we eat
(including major sources of micronutrients &
antioxidants) rely on pollinators

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What's missing in this Whole Foods produce section after staff removed products that required bees' help? Apples, avocados, bok choy, broccoli, broccoli rabe, cantaloupe, carrots, cauliflower, celery, cucumbers, eggplant, green onions, honeydew, kale, leeks, lemons, limes, mangos, mustard greens, onions, summer squash and zucchini (52% of produce).

Photos: Whole Foods



75% of crops rely on pollinators
for seed/fruit set and/or
improved quality or increased yield

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Agricultural Economic Impacts

- Total value of pollination worldwide estimated at \$235-\$577 billion
- Well pollinated crops look better, taste better, & have longer shelf-life.
- Volume of production of pollinator-dependent crops has increased by 300% over last 5 decades, making livelihoods increasingly dependent upon pollinators

From UN Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Thematic Assessment of Pollinators, Pollination and Food Production Report: Summary for Policy Makers, 2016

Photo: By Louisa Hooven/Oregon State University (Flickr) [CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0/>)], via Wikimedia Commons

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Our generation could be last to
witness great monarch migration



Kim Bailey

Bee City USA®



Kim Bailey

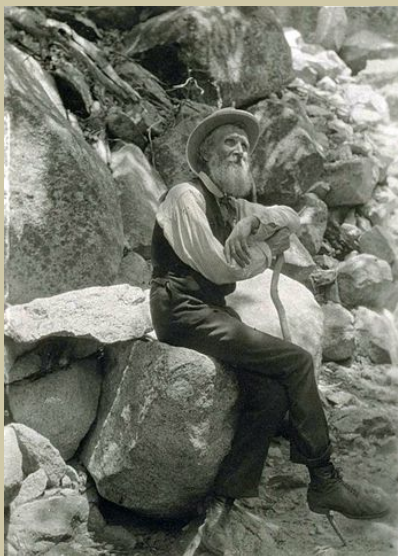
90% of wild plant species
rely on pollinators for reproduction,
and many other species rely on those plants
for food and shelter

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Biodiversity

- More pollinators = more plants
- More plant species = more species wildlife & greater chance surviving diseases/pests
- More well adapted plants = more stored carbon & water filtered into soil vs. damaging run-off

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*"When we try to
pick out anything
by itself, we find it
hitched to
everything else in
the Universe."*

John Muir

By Francis M. Fritz - <http://content.cdlib.org/ark:/13030/tf2r29p09b&brand=calisphere>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=266893>

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While bumble bees are experts at buzz pollination--required by tomatoes and some other plants, vibrators sometimes replace bees in greenhouses pollinating one flower at a time. (Tuning forks work, too.)



LSU AgCenter, Winter 2005, Louisiana Ag Magazine, Page 21

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“Bees underline the reality that we are more, not less, dependent on nature’s services in a world of close to 7 billion people.”

U.N. Environment Program Executive Director Achim Steiner and U.N. undersecretary-general, 2011

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SOLUTION: LET'S LIVE TOGETHER!

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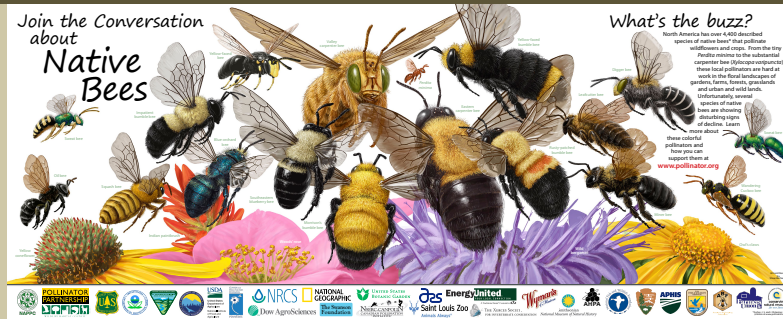
**1 African elephant may need up to 2.7 million acres
(4,219 square miles)
to live in the wild**

By P.J. KAPDostie (Own work) [CC
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creativecommons.org/licenses/by-
sa/3.0/](https://creativecommons.org/licenses/by-sa/3.0/))], via Wikimedia Commons

**An African
elephant can
eat up to 50
pounds of
food/day**

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BUT, most bees (& other insect pollinators) live out their entire lives within few 100 yards of where they were born



- Bees only eat pollen (protein) and nectar (carbohydrate) from flowers (Pollen is bees' only source of protein)
- Unlike most other pollinators, bees collect pollen intentionally
- 20,000+ bee species in the world (3,600 in USA)
- 70% of bees nest in ground
- All but honey bees & bumble bees are "solitary" vs. "social" (They don't have a nest to defend by stinging and will not harm humans!)

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Large or Small, Animal Conservation Starts With HABITAT

- Food (Plant or prey)
- Water
- Cover & shelter throughout changing seasons (for protection and for warmth or cooling)
- Mates
- Society (in some cases)

Honey bee is most famous animal that needs society to exist

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Thanks to Dr. Doug Tallamy for this conservation success story:
How landscaping industry accidentally saved species!



Monarch Math

In **4 generations** over the course of **1 year**,
if half were females & all survived to adulthood & reproduced,
1 monarch butterfly's offspring of **300** could multiply to

1,012,500,000

Currently, only 1-10% of monarch
eggs survive to adulthood.

Monarch life cycle by Tom Fanslow



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We're mobilizing & equipping
growing national army of pollinator
advocates to raise awareness & enhance
habitat on public & private land



What's causing honey bee, butterfly, native bees' and other pollinator declines?

- Habitat loss (due to agriculture, development, exotic/invasive plant species) causing poor nutrition (quantity & quality) +
- Pesticides (insecticides, fungicides, herbicides) +
- Parasites (esp. Varroa mite) & Disease +
- Climate change +

Bee City USA & Bee Campus USA focus on what communities & individuals CAN do

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Instead of pointing fingers at:

- Real estate developers,
- big ag,
- pesticide industry,
- lawn care industry,
- commercial beekeepers....

we ask what **each of us** can do to reverse pollinator decline.

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BEE CITY USA PHILOSOPHY, COMMITMENTS, APPLICATION PROCESS & BENEFITS

Bee City USA MISSION

To galvanize communities to sustain pollinators, by providing them with healthy habitat, rich in a variety of native plants and free to nearly free of pesticides.



Leafcutter bee by Celeste Ets-Hokin

Leafcutter bees and mason bees carry their pollen under their abdomen rather than their back legs like most bees.

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Certified Bee City USA Affiliates (launched 2012)		
ARKANSAS Eureka Springs, Mountain View CALIFORNIA Fort Bragg, Orland, Redding, San Francisco, Thousand Oaks DISTRICT OF COLUMBIA Washington FLORIDA Webster GEORGIA Atlanta, Canon, Decatur, Jefferson, Rome IDAHO Garden City IOWA Mount Vernon KENTUCKY Clarkson MARYLAND Anne Arundel County +Annapolis+Highland Beach Partnership	MICHIGAN Ann Arbor, Charter Township of Ypsilanti, Ypsilanti MISSOURI Crestwood, Forsyth NEW HAMPSHIRE Durham NEW JERSEY Ridgewood NEW MEXICO Albuquerque NORTH CAROLINA Asheville, Bethania, Carrboro, Davidson, Durham, Hayesville, Hendersonville, Hillsborough, Matthews, Raleigh, Tabor City, Whiteville, Wilmington	OHIO Gahanna, Vandalia, Wright-Patterson Air Force Base OREGON Ashland, Gold Hill, Phoenix, Talent, Wilsonville SOUTH CAROLINA Greenwood, Lake City TENNESSEE Bell Buckle, Lookout Mountain TEXAS Beeville, Denton VIRGINIA Scottsville WASHINGTON Puyallup, Seattle WISCONSIN Hales Corners, Madison, Mequon WYOMING Gillette
60 communities (tiny, medium, large) in 24 states as of 11/11/17		
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Bee City/Campus USA Application Process

Individual municipalities, counties or municipality-county partnerships are invited to apply.

1. Applicant builds stakeholder group
2. Applicant emails draft application & resolution (city only) to Bee City USA for approval
3. Applicant signs application, elected council adopts resolution (city only)
4. Applicant emails final signed application & adopted resolution & mails application fee to Bee City USA
5. Bee City USA certifies applicant via congratulatory email

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Bee City USA Commitments

1. Adopt **resolution & apply** with modest application fee
2. Standing **committee** empowered by city to speak for pollinators, sponsored by city department with liaison to committee
3. **Publicity & Information:** Bee City USA street sign (at least one) & webpage
4. **Education/Outreach:** Host at least 1 annual awareness event
5. **Habitat:** Develop Pollinator Habitat Plan with Recommended native plant species list & Least toxic IPM plan & integrate into city master/comprehensive plans identifying target property to be enhanced for pollinator habitat
6. **Renew annually** with report of habitat & awareness-raising accomplishments, & renewal fee

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BEE CAMPUS USA COMMITMENTS, APPLICATION PROCESS & BENEFITS

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Certified Bee Campus USA Affiliates (Launched 2015)

Arkansas

University of Arkansas (Fayetteville)

California

College of San Mateo (San Mateo)

Connecticut

University of Connecticut (Storrs)

Georgia

Georgia Tech (Atlanta); East Georgia State College (Swainsboro)

Kentucky

Morehead State University (Morehead)

Illinois

University of Illinois at Chicago (Chicago)

Indiana

Goshen College (Goshen); Indiana University-Purdue University Indianapolis (Indianapolis)

Missouri

Mineral Area College (Park Hill); University of Missouri (Columbia)

Nebraska

Central Community College (Grand Island)

New Jersey

Raritan Valley Community College (Branchburg)

New York

SUNY Cortland (Cortland)

North Carolina

Blue Ridge Community College (Flat Rock); Nash Community College (Rocky Mount); NC Arboretum (Asheville); Surry Community College (Dobson); UNC Asheville (Asheville); Warren Wilson College (Asheville)

Oregon

Portland Community College (Portland); Portland State University (Portland); Southern Oregon University (Ashland)

South Carolina

Medical University of South Carolina (Charleston)

Texas

Abilene Christian University (Abilene); Coastal Bend College (Beeville); University of North Texas (Denton)

Vermont

Saint Michael's College (Colchester); University of Vermont (Burlington)

Virginia

Randolph College (Lynchburg)

Washington

Gonzaga University (Spokane)

31 in 18 states as of 11/11/17

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Bee Campus USA Commitments

LIKE BEE CITY USA:

1. **Committee** (grounds staff, students, faculty, administrators) to create & uphold **Pollinator Habitat Plan** (Recommended native plant species list, least toxic IPM plan)
2. **Annual awareness event(s)**
3. **Webpage**
4. **Annual renewal** and report on achievements with modest initial & annual certification fee

PLUS:

5. **Curriculum:** Include in at least 1 course/workshop every 2 years
6. **Service learning**
7. **Signage** about pollinators

Southern Oregon University - 1st Bee Campus USA!



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Benefits of Affiliation with Bee City/Campus USA

Generally:

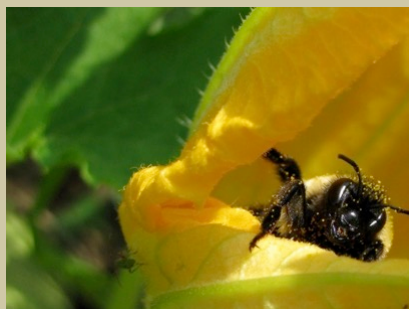
1. Helps ensure **survival of “ecological keystone species”** (i.e. pollinators provide critical resources for a wide range of species)
2. Raises community awareness of **dangers of non-native invasive plants & least toxic ways to deal with home & garden pest problems**
3. Raises community awareness of **how our food grows & improves local food production through expanded pollination**
4. Supports **local honey, and seed and plant nursery companies**
5. Engenders community **pride** and may **increase tourism**

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Benefits of Affiliation with Bee City/Campus USA

Directly:

1. **Whole is greater than sum of its parts:** Being part of national network, enhances credibility for local efforts & offers opportunities to influence state/national policies & initiatives
2. **Accountability** for achieving pollinator conservation results each year--shared with network & public through annual reporting
3. Access to online tools & documents, as well as **shared resources** for program promotion:
 - posters
 - brochure templates
 - T-shirt designs
 - bee decals



Bumble bee in squash blossom by Nancy Adamson

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Benefits of Affiliation with Bee City/Campus USA

"Direct benefits" Continued:

4. Optional affiliate **network conference calls & webinars** with experts to promote collaboration & teaching and learning among affiliates
5. **Ongoing affiliate support** to assist with community impact including:
 - timely press release templates to bring local attention to pollinator issues
 - current information about research & national trends in pollinator conservation through:
 - e-newsletters
 - Email blasts
 - Website
 - Facebook page

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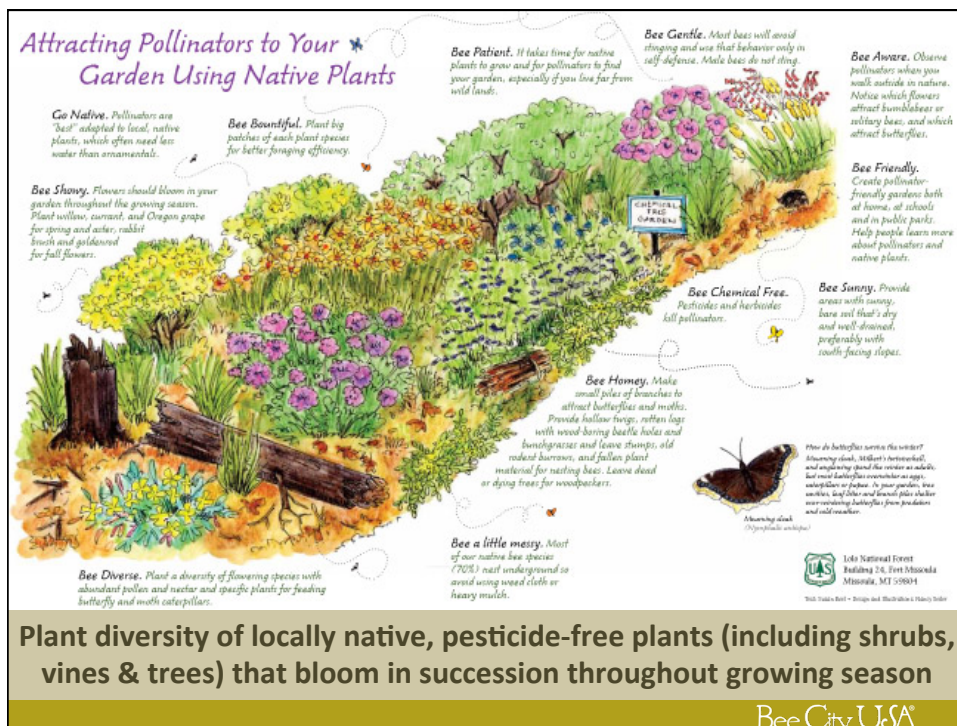
CREATING POLLINATOR HABITAT: PLANT IT & THEY WILL COME

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Wake up! Let's get buzzy!

Nancy Adamson

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Other Pollinator Gardening Principals

1. Avoid pesticides (insecticides, herbicides, fungicides) and enjoy watching plant and animal diversity find balance
2. Plant host plants for butterfly & moth larvae (especially milkweed for monarchs), even if they don't have flowers
3. Plant each species in clusters to reduce pollinators' travel & learning curve in foraging
4. Don't work so hard—LEAVE:
 - sunny, bare patches for ground-nesters
 - fall leaves for insects and bats that overwinter in leaf mold
 - downed trees & limbs, and stumps for wood cavity nesters
 - dead pithy stems for insects that overwinter in them
 - lawn height a little taller to allow dandelion and clover to bloom
5. Plant everywhere—schools, corporate campuses, yards, parks, traffic islands...
6. Install signage to educate passers-by
7. Photo-document your work monthly to appreciate the many pollinators you've sustained!

More Info: www.beecityusa.org/create-habitat

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***“In the end, we will conserve only what we love,
we will love only what we understand, and
we will understand only what we are taught.”***



Photo: Rebecca Sharish

Baba Dioum, Senegalese Forestry Engineer
(From speech at General Assembly of the International
Union for the Conservation of Nature and Natural
Resources in New Delhi, 1968)

Male squash bee on zucchini blossom

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**Educate kids about pollinators!
Bee Campus USA #8 - UNC Asheville welcomes
mason & leafcutter bees as well as summer campers.**

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