





Over 20,000 species of bees in the world  
Nearly 400 species recorded in Michigan



Bees come in a wide diversity of sizes and forms





## Pollination is a valuable ecosystem service

### Pollination is essential for Michigan agriculture


Crop	Acres	Value (million \$\$)	Pollination dependence
Apple	44,000	120	0.9
Blueberry	22,000	130	1.0
Grape	14,000	22	0
Cherry	9,000	78	0.9
Peaches	5,000	26	0.6
Strawberries	1,000	5	0.4






## Honey bees

- Most important bee worldwide.
- First brought by European settlers in 1600s for honey and wax production.
- Feral colonies once abundant.
- Provides crop pollination worth \$14.6 billion in US annually.



## Declining US honey bee colonies?



Average losses in 2010-11 were 38% per beekeeper

Compares to 42% in 2009-10

\*USDA and Apiary Inspector of America survey of 5,572 bee keepers managing 15% of US colonies

USDA-NASS reports



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# PLIGHT OF THE BUMBLEBEES

North American Bee Population Plummet, Risking Human Food Production

A close-up photograph of a bumblebee on a yellow flower. The bee is positioned on the left side of the frame, facing right. The flower's center is filled with numerous yellow stamens, and the petals are a vibrant yellow. The background is a soft, out-of-focus blue.





## Benefits of Gardening for Bees

Help slow bee declines

Support biodiversity

Teach kids about ecology and food

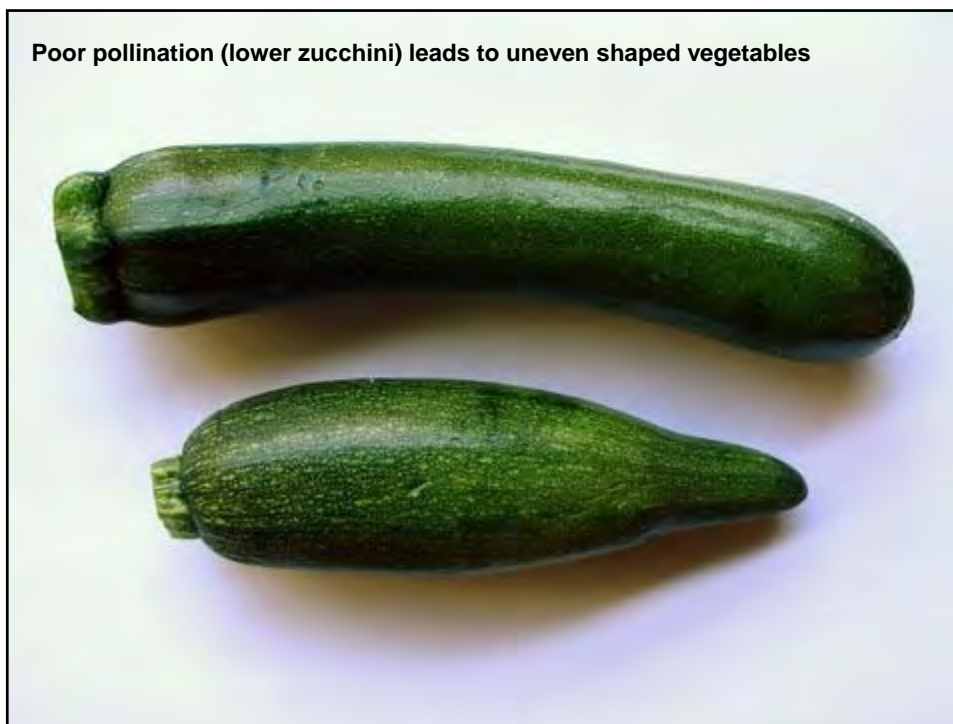
Enjoy wildlife in your own yard

Improve fruit, vegetable, herb,  
and seed yields and quality



Pollination is worth €485 million/year to the French economy.  
17.1% of the value is from gardens.

*Harris et al. 2011*





# Bees in the garden



## Kinds of bees in the garden









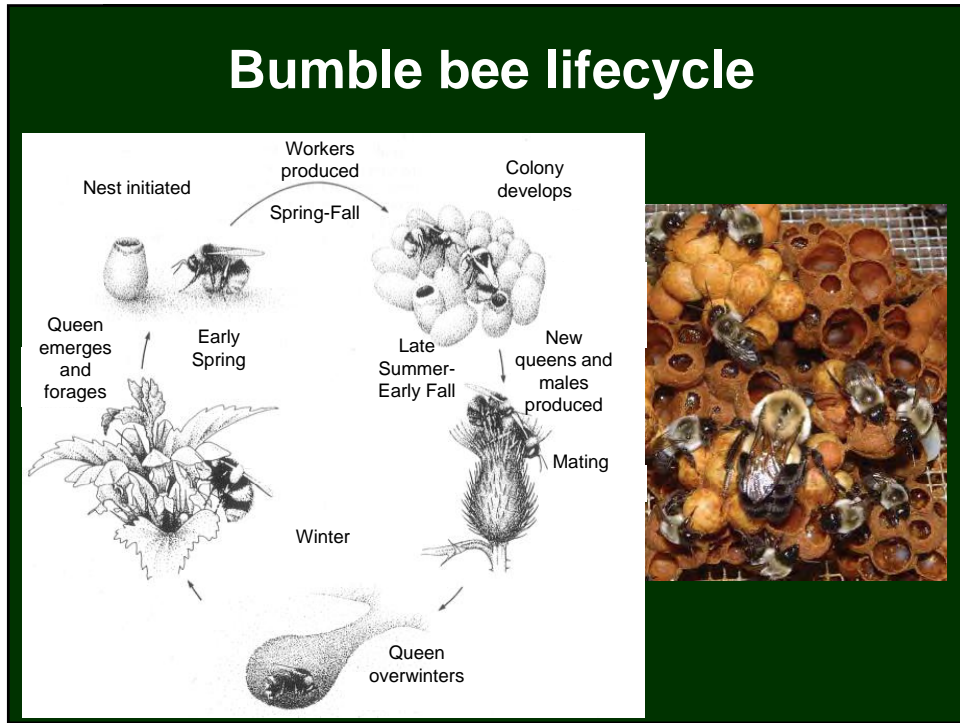
- honey bees
- ground nesting bees
  - bumble bees
  - miner/digger
  - long-horn bees
  - sweat bees
- wood nesting bees
  - carpenter bees
- cavity nesting bees
  - mason bees
  - leafcutter bees
  - yellow-faced bees
- cuckoo bees



### Common bumble bee species

*differentiated by the amount of yellow abdominal hair*

 <p><i>Bombus citrinus</i> abdomen all black</p>	 <p><i>Bombus impatiens</i> first segment yellow</p>	 <p><i>Bombus bimaculatus</i> 1<sup>st</sup> segment all yellow, 2<sup>nd</sup> segment partial yellow</p>
 <p><i>Bombus griseocollis</i> 1<sup>st</sup> segment all yellow, 2<sup>nd</sup> segment partial yellow</p>	 <p><i>Bombus vagans</i> 1<sup>st</sup> &amp; 2<sup>nd</sup> segments all yellow</p>	 <p><i>Bombus fervidus</i> all but the last segment yellow</p>



## Two bumble bees that have become rare

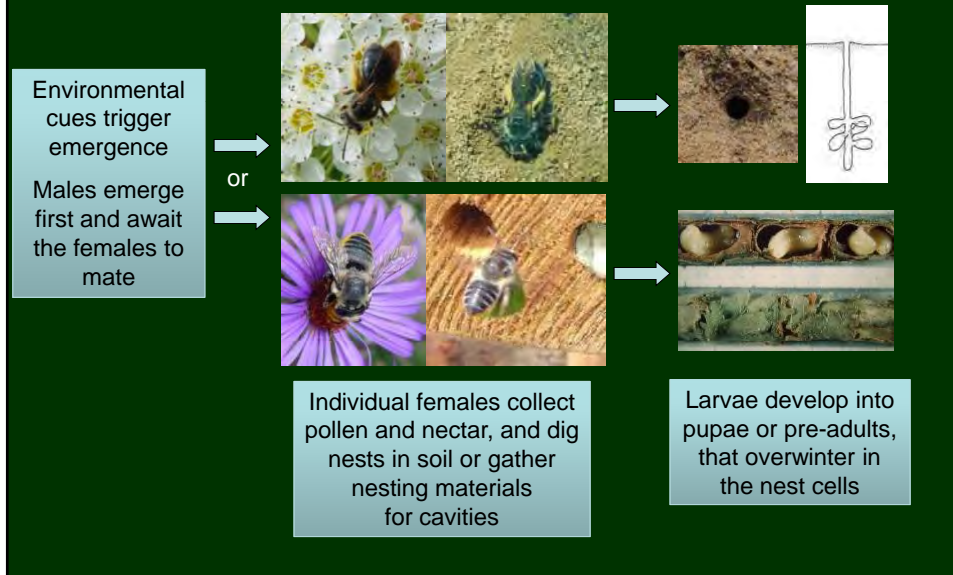
- *Bombus affinis* (rusty patch bumble bee)  
orange patch in the middle of the 2<sup>nd</sup> segment



- *Bombus terricola* (yellow-banded bumble bee)  
2<sup>nd</sup> & 3<sup>rd</sup> segments yellow



## Solitary bee lifecycle



### Cavity nesting bees *mason and leafcutter bees*

*Osmia lignaria*  
orchard mason bee

*Megachile* spp.  
leafcutter bees

Photo: S. Bambara

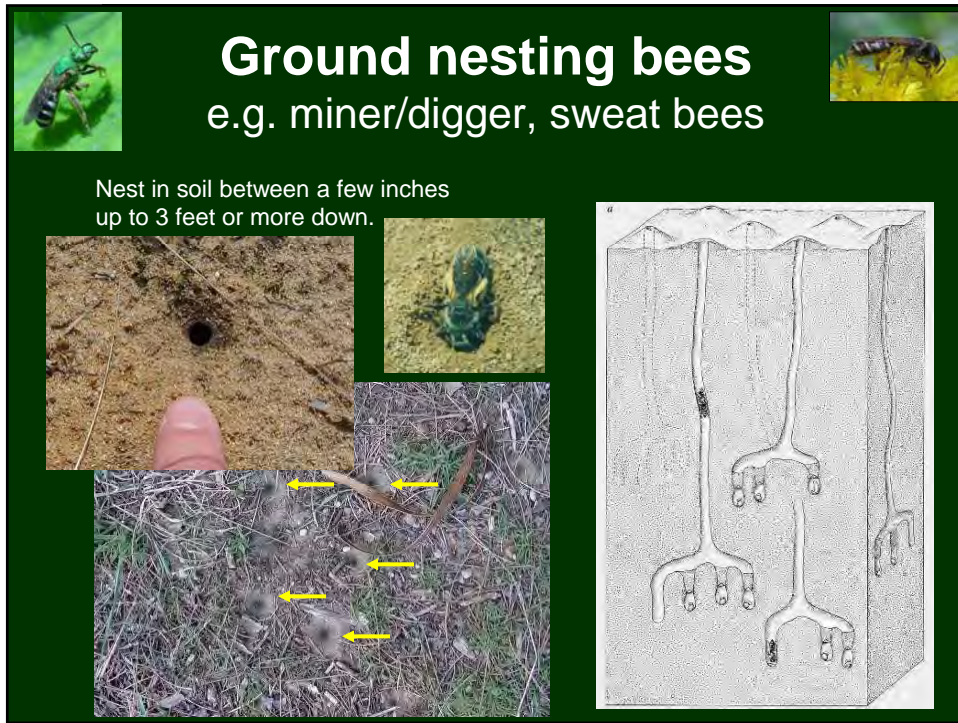




## Ground nesting bees

e.g. miner/digger, sweat bees

Nest in soil between a few inches up to 3 feet or more down.



The collage features several images: a green bee on a leaf in the top left; a bee on a yellow flower in the top right; a close-up of a hole in the soil with a finger for scale in the middle left; a bee on a green leaf in the middle top right; a photograph of a nest entrance in a field with yellow arrows pointing to it in the middle bottom; and a technical diagram of a bee's nest structure showing vertical tunnels and horizontal chambers on the right.





**Start small, and grow your bee-friendly garden**

**Food - diversity of flowering plants**  
trees, shrubs, and herbaceous plants  
different flower colors and shapes  
blooms throughout the growing season  
native plants from local suppliers  
plant flowers in clumps of the same species

**Homes - diversity of nesting materials**  
undisturbed soil without mulch for nesting  
damp soil for nest material  
nest boxes for bumble bees, mason bees, leafcutters

**Minimize insecticide use**  
use IPM techniques  
use bee-safe insecticides

**Bees need food**

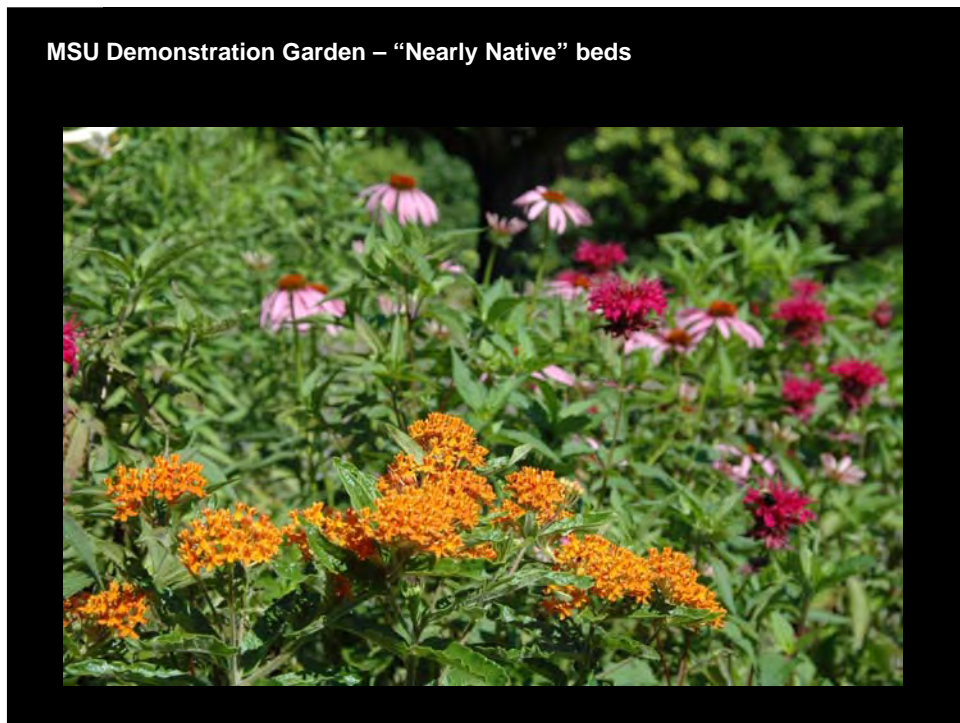


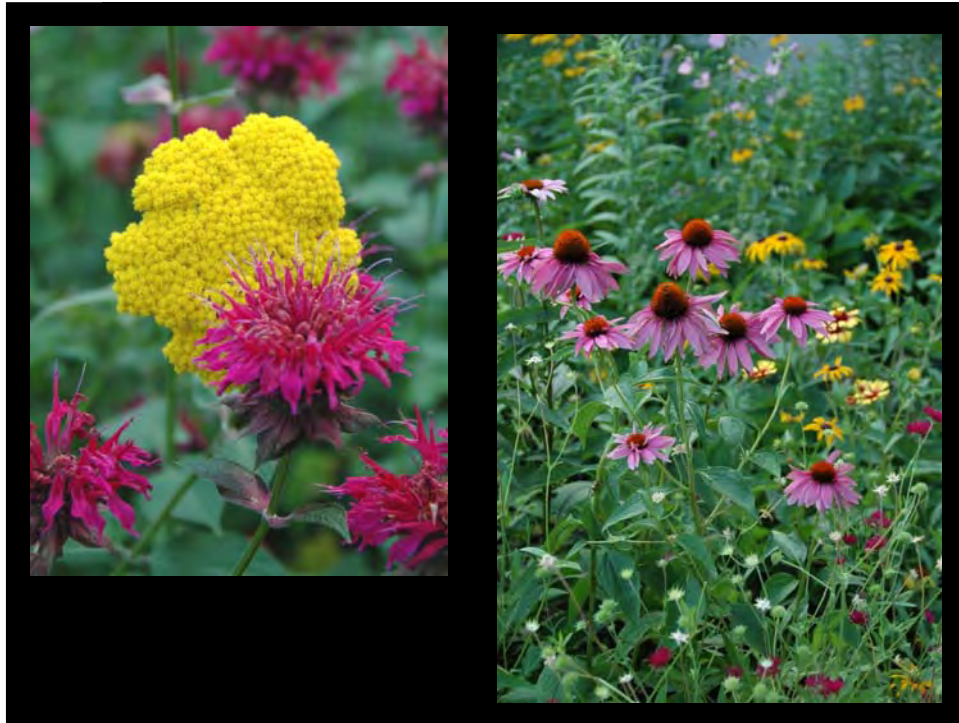
The image shows a vibrant mural of a bee on the side of a food truck. The truck is orange and yellow, with a large, colorful bee illustration. Two people are standing near the truck. Below the truck are two smaller images: a bee on a yellow flower and a close-up of a bee on a white flower.

### Perennial native plants to support bees

[www.nativeplants.msu.edu](http://www.nativeplants.msu.edu)

Native plant	Approximate Bloom Period						
	Apr	May	Jun	Jul	Aug	Sep	Oct
willow, <i>Salix</i> spp.							
black chokecherry, <i>Aronia melanocarpa</i>							
wild cherry, <i>Prunus</i> spp.							
American elder, <i>Sambucus canadensis</i>							
silky dogwood, <i>Cornus amomum</i>							
golden Alexanders, <i>Zizia aurea</i>							
common ninebark, <i>Physocarpus opulifolius</i>							
beardtongue, <i>Penstemon hirsutus</i>							
late figwort, <i>Scrophularia marilandica</i>							
swamp milkweed, <i>Asclepias incarnata</i>							
Culver's root, <i>Veronicastrum virginicum</i>							
yellow coneflower, <i>Ratibida pinnata</i>							
nodding wild onion, <i>Allium cernuum</i>							
meadowsweet, <i>Spiraea alba</i>							
yellow giant hyssop, <i>Agastache nepetoides</i>							
horsemint/spotted beebalm, <i>Monarda punctata</i>							
Missouri ironweed, <i>Vernonia missurica</i>							
cup plant, <i>Siphium perfoliatum</i>							
pale Indian plantain, <i>Cacalia atriplicifolia</i>							
boneset, <i>Eupatorium perfoliatum</i>							
blue lobelia, <i>Lobelia siphilitica</i>							
pale-leaved sunflower, <i>Helianthus strumosus</i>							
Riddell's goldenrod, <i>Solidago riddellii</i>							
New England aster, <i>Aster novae-angliae</i>							
smooth aster, <i>Aster laevis</i>							









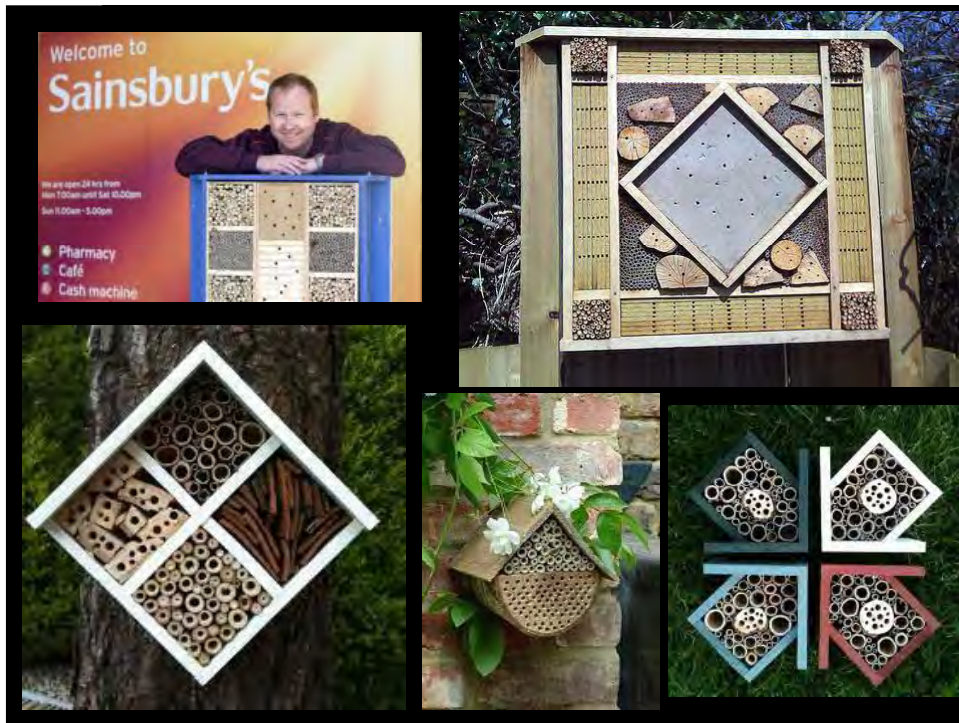


## Homes for leafcutter and mason bees

Provide nesting materials in sheltered spots around the garden.









### Soil nesting habitat: bee spirals









## The 2012 Bee Wall Challenge



- We have a big, long, bare fence.
- It needs bee nests!!
- Calling all amateur carpenters, artists, and bee lovers to make a bee hotel for our wall.
- No design rules, just use your imagination!
- Weather-proof and attachable
- Follow guidelines on the Xerces Society website
- Late March 2012 Bee Wall Day



## Benefits of Gardening for Bees

- Help slow bee declines
- Support biodiversity
- Enjoy wildlife in your own yard
- Teach kids about ecology and food
- Improve fruit, vegetable, herb, and seed yields and quality

## For more information...

- Native Plants for Bees  
[www.nativeplants.msu.edu](http://www.nativeplants.msu.edu)
- Native Plant Producers  
[www.mnppa.org](http://www.mnppa.org)
- Pollinator Partnership  
[www.pollinator.org](http://www.pollinator.org)
- Xerces Society  
[www.xerces.org](http://www.xerces.org)
  - *Attracting Native Pollinators*
  - *Managing Native Bees*
  - *Plant and planting guides*

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