

# Pollinators in the Garden

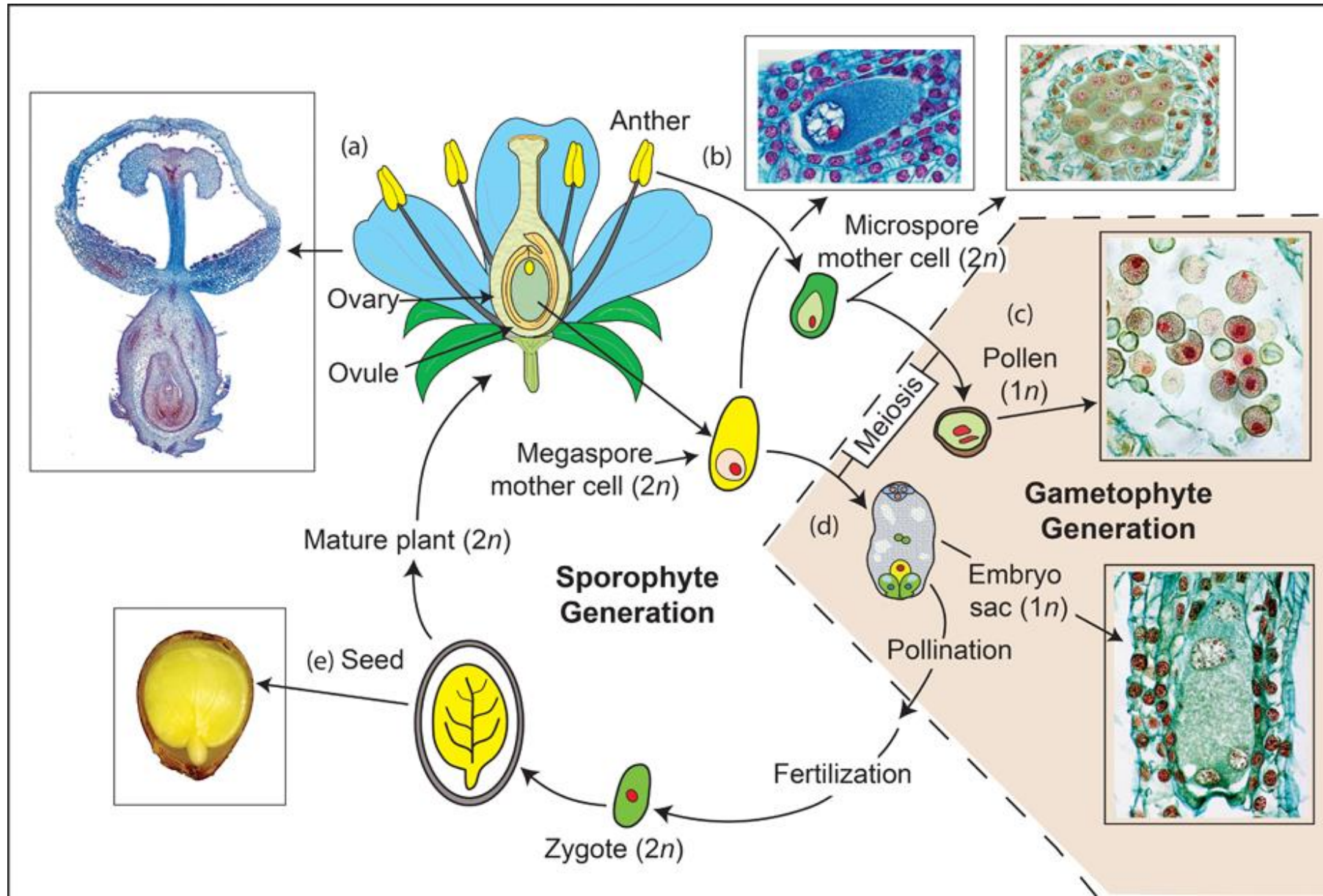
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# What is Pollination?



# Categories of Pollination

## ◎ Cross-pollinated

- ◎ **Self-incompatible** (genetic incompatibility and/or dichogamy)
- ◎ **Monoecious** (SEPARATE male & female flowers on SAME plant)
- ◎ **Dioecious** (Male & female flowers on SEPARATE plants)
- ◎ Rely on **pollinators** (wind, bees, moths, etc.)

## ◎ Self-fertile (genetically self-compatible)

- ◎ Rely on **pollinators** (wind, bees, moths, etc.)

## ◎ Self-pollinating

- ✓ Genetically self-compatible
- ✓ **AND** structurally self-compatible

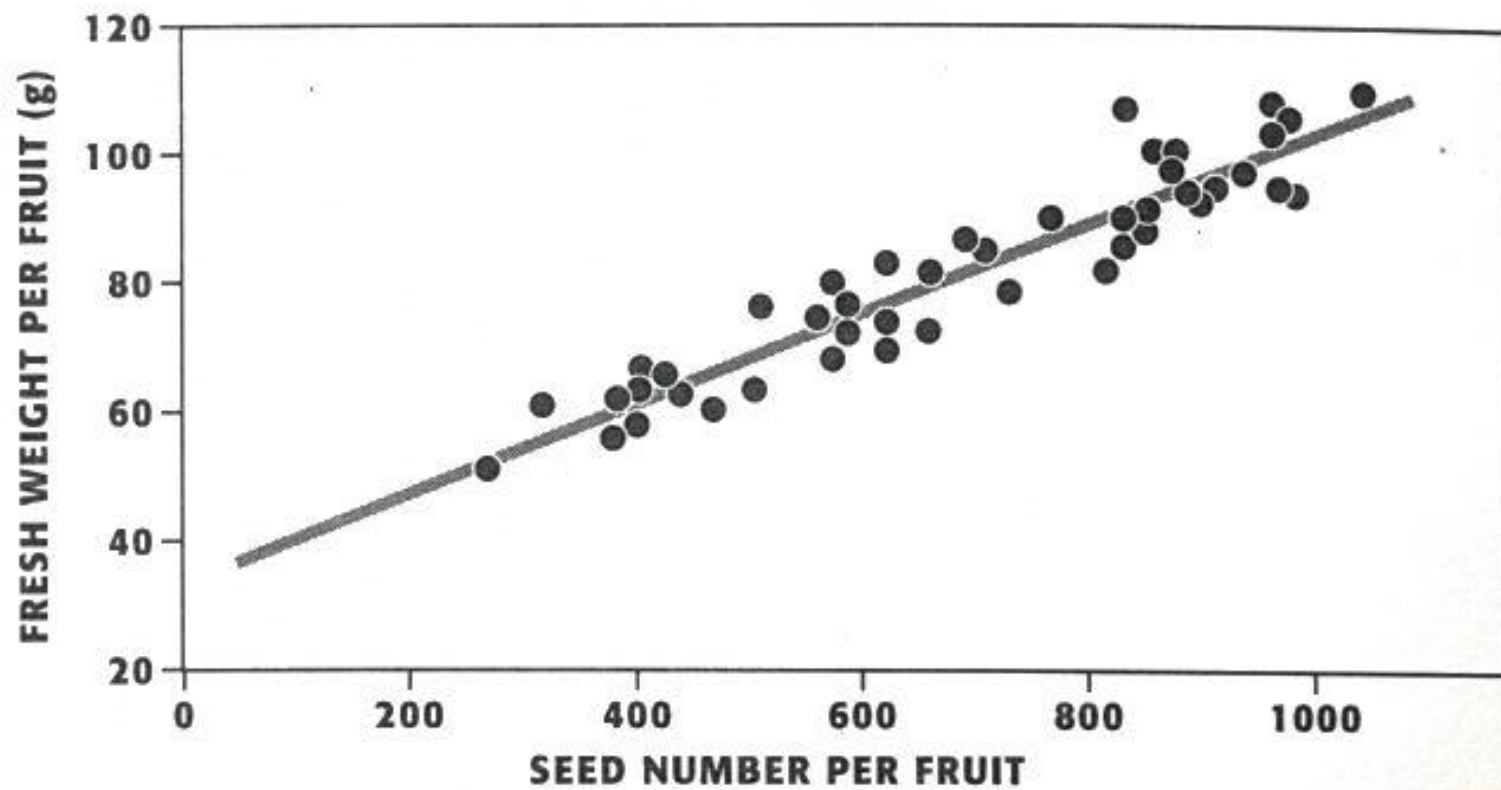






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**Fig. 6.4. Fruit fresh weight and seed number are closely correlated.**



# Feijoa (pineapple guava)

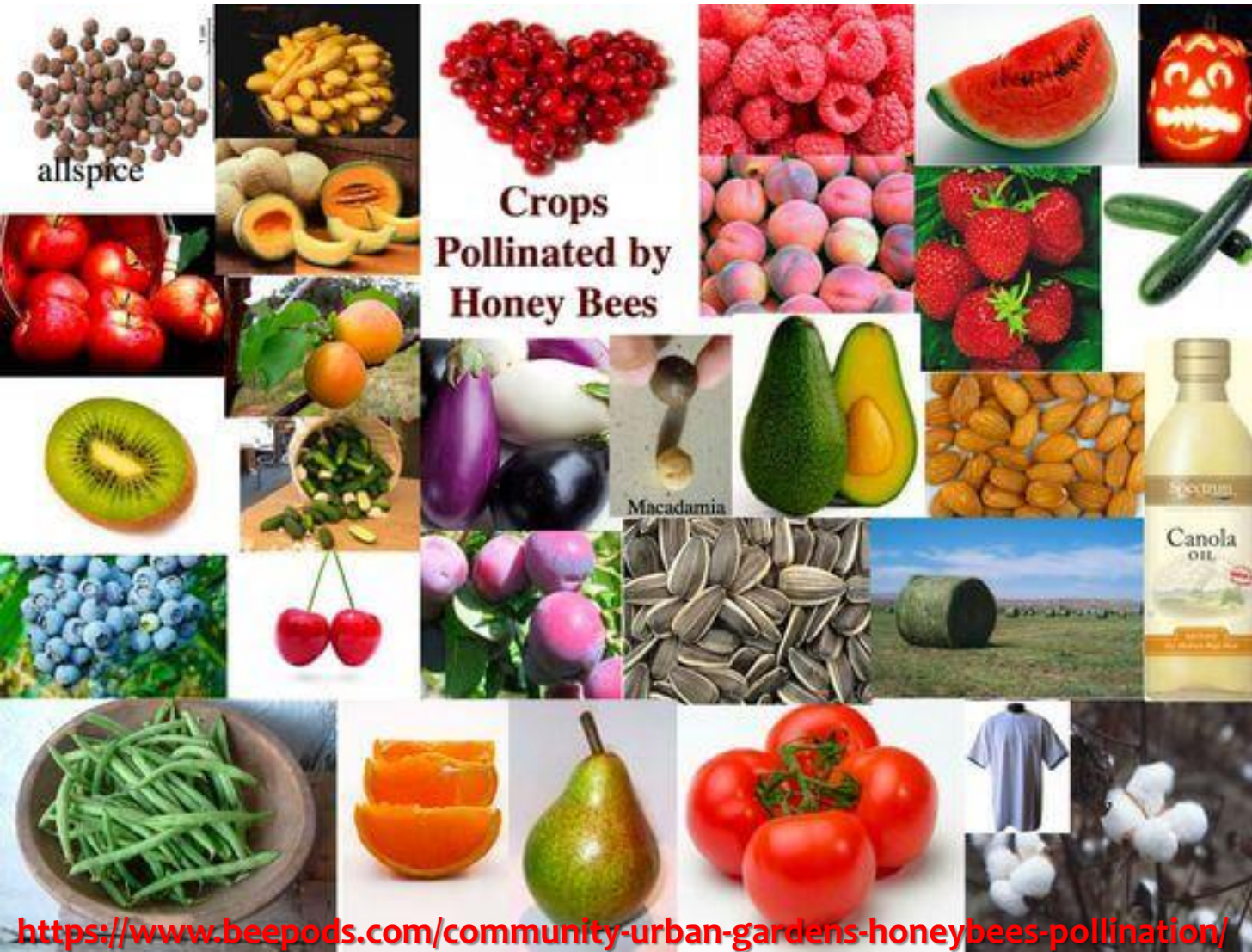








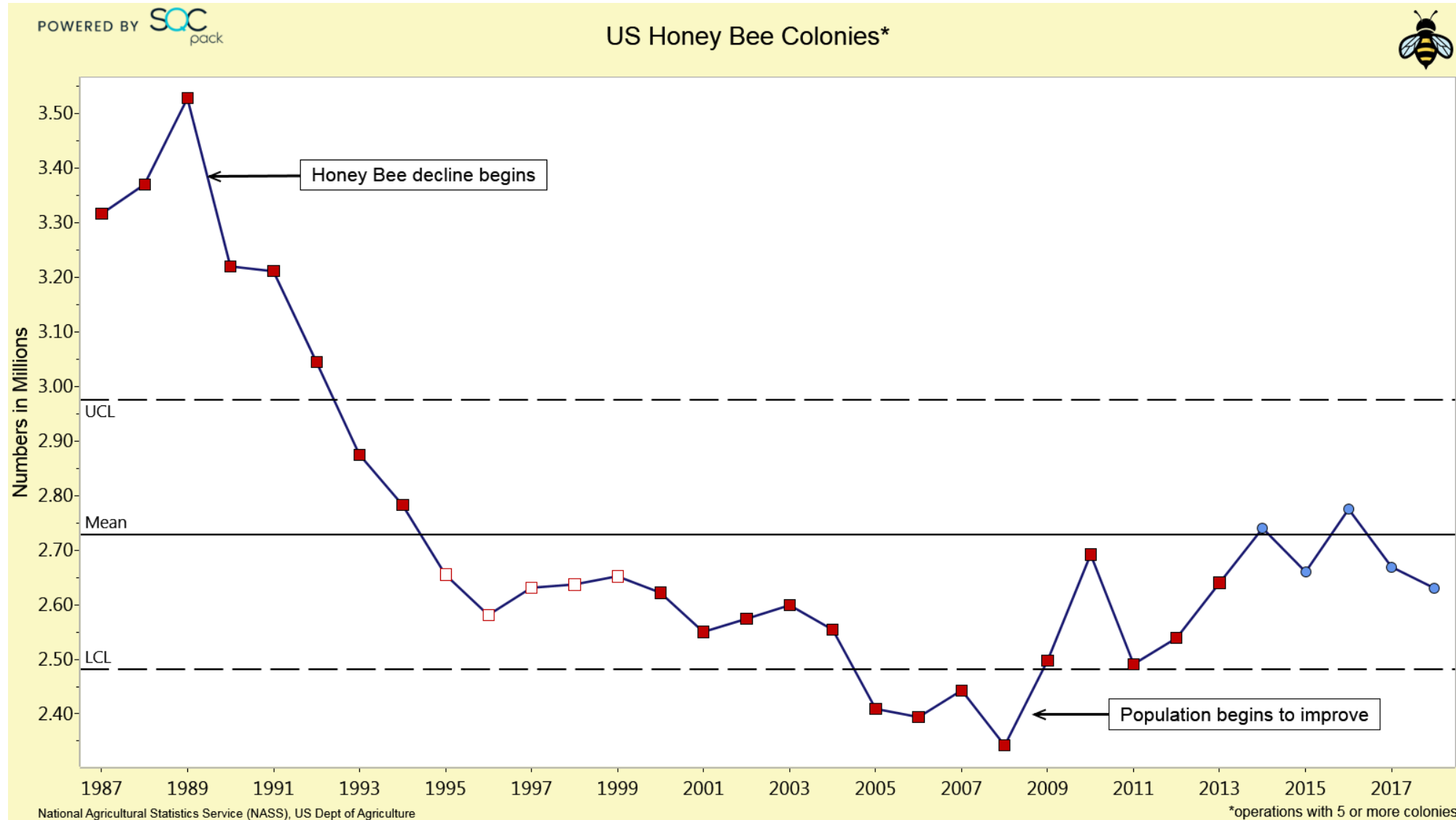
# *Apis mellifera*: \$18 Billion value (USDA)



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EXTENSION



# Where are all the bees going?



Source: National Agricultural Statistics Service (NASS), US Dept. of Agriculture



# Alternative Pollinator Species

## BACKYARD BEES OF NORTH AMERICA



# Native Texas bees

- ◉ Generally more effective & efficient
- ◉ Natural pollinators of native plant species
- ◉ Also effective pollinators for commercial crops
- ◉ Bumblebees (*Bombus spp.*)
- ◉ Carpenter bees (*Xylocopa spp.*)
- ◉ Mason bees (*Osmia spp.*)
- ◉ Leaf-cutter bees (*Megachile spp.*)



Mason bee. Jessica Womack.

- ◉ Mining bees (*Andrena spp.*)
- ◉ Squash bees (*Peponapis spp.*)
- ◉ Sunflower bees (*Diadasia spp.*)
- ◉ Sweat bees (*Agapostemon spp.*)



# Habitat Needs for Native Pollinators

- ⦿ Food sources for adults (nectar and pollen)
- ⦿ Food sources (foliage) for immature stage/larvae
- ⦿ Host plants for egg-laying (Lepidopterans)
- ⦿ Nesting sites (bees and wasps)
  - ⦿ Bare and thatch-covered soil (bumble bees, mining bees)
  - ⦿ Dead trees/branches/logs (carpenter bees, social species)
- ⦿ Water source (certain species such as bees/wasps)



Ground-nesting solitary bee emerging from nest. Michael Warriner.



# Selecting TX Plants for Pollinators

- ✓ Include a mixture of plant-use types
  - ✓ Perennials and grasses
  - ✓ Annuals/forbs
  - ✓ Shrubs, trees, woody vines
- ✓ Plan for long and staggered flowering season!
- ✓ Incorporate a broad offering of [regionally] native plants
- ✓ Minimize the extensive use of single-species turf





# Recommended native species for East Central Plains

- ◉ American basket-flower (*Centaurea americana*)
- ◉ Cockspur hawthorn (*Crataegus crus-galli*)
- ◉ Common prickly pear (*Opuntia marcorhiza*)
- ◉ **Pale purple coneflower (*Echinacea pallida*)**
- ◉ **Firewheel (*Gaillardia pulchella*)**
- ◉ **Mexican hat / prairie coneflower (*Ratibida columnifera*)**
- ◉ Rattlesnake master (*Eryngium yuccifolium*)
- ◉ Smooth sumac (*Rhus glabra*)
- ◉ Partridge pea (*Chamoescrista fasciculata*)
- ◉ White prairie clover (*Dalea candida*)
- ◉ Whorled milkweed (*Asclepias verticillata*)





# Recommended native species for East Central Plains

- ◉ **Mealycup sage (*Salvia farinacea*)**
- ◉ Compact prairie clover (*Dalea compacta*)
- ◉ Prairie spiderwort (*Tradescantia occidentalis*)
- ◉ Roundhead prairie clover (*Dalea multiflora*)
- ◉ **Buttonbush (*Cephalanthus occidentalis*)**
- ◉ Green milkweed (*Asclepias viridaflora*)
- ◉ Woolly ironweed (*Vernonia lindheimeri*)
- ◉ **Black-eyed Susan (*Rudbeckia hirta*)**
- ◉ Common sunflower (*Helianthus annuus*)
- ◉ Narrow-leaf gayfeather (*Liatris mucronata*)
- ◉ Pink-scale gayfeather (*Liatris elegans*)





# Recommended native species for East Central Plains

- ◉ Frostweed (*Verbesina virginica*)
- ◉ Hairy sunflower (*Helianthus hirsutus*)
- ◉ **Maximilian sunflower (*Helianthus maximiliani*)**
- ◉ Prairie blazing star (*Liatris pycnostachya*)
- ◉ Big blue sage (*Salvia azurea*)
- ◉ White boneset (*Eupatorium serotinum*)
- ◉ Swamp sunflower (*Helianthus angustifolia*)
- ◉ Creek plum (*Prunus rivularis*)
- ◉ **Mexican plum (*Prunus mexicana*)**





# Recommended native species for East Central Plains

- ◉ Chickasaw plum (*Prunus angustifolia*)
- ◉ **Pink evening primrose (*Oenothera speciosa*)**
- ◉ Green hawthorn (*Crataegus viridis*)
- ◉ New Jersey tea (*Ceanothus americanus*)
- ◉ **Eastern redbud (*Cercis canadensis* var. *canadensis*)**
- ◉ Giant spiderwort (*Tradescantia gigantea*)
- ◉ Sandyland bluebonnet (*Lupinus subcarnosus*)
- ◉ **Texas redbud (*Cercis canadensis* var. *texensis*)**
- ◉ Oklahoma plum (*Prunus gracilis*)
- ◉ **Possumhaw (*Ilex deidua*)**





# Recommended native species for East Central Plains

- ◉ **Texas bluebonnet (*Lupinus texensis*)**
- ◉ Wild hyacinth (*Camassia scilloides*)
- ◉ **Black cherry (*Prunus serotina*)**
- ◉ Lyreleaf sage (*Salvia lyrata*)
- ◉ **Winecup (*Callihoe involucrata*)**
- ◉ Ohio spiderwort (*Tradescantia ohiensis*)
- ◉ Zizotes milkweed (*Asclepias oenotheroides*)
- ◉ Spicebush (*Lindera bezoin*)
- ◉ Prairie penstemon (*Penstemon cobaea*)
- ◉ **Berlandier's sundrops (*Calylophus berlandieri*)**
- ◉ Fragrant sumac (*Rhus aromatica*)













# Recommended native species for East Central Plains

- ◉ Indigo bush (*Amorpha fruticosa*)
- ◉ **Golden tickseed (*Coreopsis tinctoria*)**
- ◉ Roughleaf dogwood (*Cornus drummondii*)
- ◉ White Barbara's-buttons (*Marshallia caespitosa*)
- ◉ Chokecherry (*Prunus virginiana*)
- ◉ Claspig coneflower (*Dracopis amplexicaulis*)
- ◉ Prickly pear cactus (*Opuntia engelmannii* var. *engelmannii*)
- ◉ Rose gentian (*Sabatia campestris*)
- ◉ Green milkweed (*Asclepias viridis*)
- ◉ Texas thistle (*Cirsium texanum*)
- ◉ Antelopehorns milkweed (*Asclepias asperula*)





# **Other pollinator plants for landscapes**

# Firebush

*Hamelia patens*

- ◉ USDA: 8b to 11 (summer annual elsewhere)
- ◉ Full sun to partial sun
- ◉ Herbaceous perennial (small shrub in tropics)
- ◉ 3 to 5 feet spread, to 8 feet in the tropics
- ◉ Dense green foliage with red blush
- ◉ Brilliant red to yellow-orange tubular flowers
- ◉ Great for hummingbird / butterfly gardens
- ◉ Extremely heat-tolerant; best in middle of summer
- ◉ Tolerant of drought, salinity, and alkaline soils





# Mexican Bush Sage

## *Salvia leucantha*

- ◉ USDA 8 to 10 (sometimes hardy to 7, annual elsewhere)
- ◉ Full sun
- ◉ Handsome silvery foliage, up to 3 to 5 feet in height
- ◉ Mostly pink / purple flowers in late summer through fall
- ◉ Drought and heat tolerant native





# Autumn Sage

*Salvia greggii*





# Gregg's mistflower

*Conoclinium greggii*



# Turk's Cap

*Malvaviscus arboreus*





# Guara

*Guara lindheimeri*





# Possumhaw

*Ilex decidua*

- ⦿ USDA 4 to 9
- ⦿ Full sun to almost full shade
- ⦿ Max. spread: 8'-12' tall x 6'-10' wide
- ⦿ Texas native that is tolerant of heat, drought, and heavy soils
- ⦿ Deciduous foliage gives way to red berries persistent through fall and winter
- ⦿ Best to plant named female clones





# Mexican Plum

*Prunus mexicana*

- ⦿ Small 15' to 20' deciduous tree
- ⦿ USDA 7 to 9
- ⦿ Full sun to part shade
- ⦿ Drooping leaves, white flowers, and edible fruit
- ⦿ Attractive peeling bark and nice winter form
- ⦿ Tolerant of alkaline soils and cotton root rot
- ⦿ Needs good drainage



# Cross Vine

*Bignonia capreolata*

- ◉ USDA 6a to 10 (Bignoniaceae)
- ◉ Full sun to partial shade
- ◉ Woody, evergreen vine native to E. Texas
- ◉ Yellow to orange trumpet-shape blooms
- ◉ Early spring, sporadically throughout summer
- ◉ Tolerates heat, drought, and range of soils







# Earth-Kind®

Landscaping



<http://earthkind.tamu.edu>

1/7 Earth-Kind Introduction



Introduction

Earth-Kind Landscaping uses research-proven techniques to provide maximum garden and landscape enjoyment while preserving and protecting the environment. The objective of Earth-Kind Landscaping is to combine the best of organic and traditional gardening and landscaping principles to create a horticultural system based on real world effectiveness and environmental responsibility. Earth-Kind Landscaping Encourages:

- [Landscape Water conservation](#)
- [Reduction of fertilizer and pesticide use](#)
- [Landscaping for energy conservation](#)
- [Reduction of landscape wastes entering landfills](#)

Individuals using Earth-Kind landscaping principles and practices can create beautiful, easy-care landscapes, while conserving and protecting natural resources and the environment.

Ask an Expert

#### Earth-Kind® Home

10 Ways to Make Your Landscape Earth-Kind®

Take the Earth-Kind® Challenge

Planning the Home Landscape – Earth-Kind® Edition

Earth-Kind® Plant Selector

Search the Earth-Kind® Plant Selector

Earth-Kind® Publications

Landscape Publications

Master Gardener On-Line Training

Additional Earth-Kind® Resources

Earth-Kind® Drought Preparedness



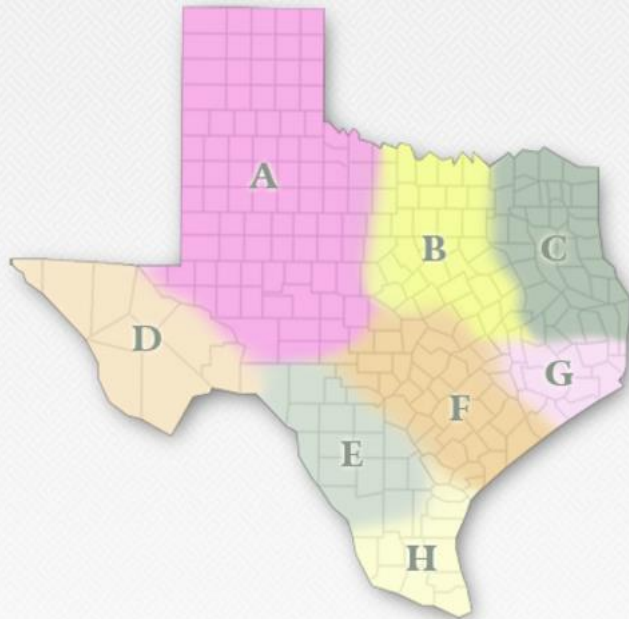
# Earth-Kind® Plant Selector

Select your general region on the map or use the region list. You can also find your region by searching via zip code. The next page will allow you to search for plants by specific characteristics, or view all plants for the particular region.

The Earth-Kind® Plant Selector DOES NOT provide information concerning the potential invasiveness of a plant. A high Earth-Kind® index value will generally indicate a plant is less likely to be invasive. For more information, see [Invasiveness](#).

ekps.tamu.edu

## Regions



## USDA Hardiness Zones



## Find Region by Zip Code

Please enter the Texas zip code for your region

5-Digit Zip Code

## Search by Region

Please select the Texas region

Region

## Search by USDA Hardiness Zone


Select the desired USDA Hardiness Zone(s). Click on the zone(s) to the left for a larger view of the zone.

Hardiness Zone:

6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

## Additional Considerations

- [Using the Plant Selector](#)
- [About Invasiveness](#)

Earth-Kind® Plant Selector




Select Search Type

Considerations

[Using the Plant Selector](#)

[About Invasiveness](#)

[Hardiness Zones](#)





## “Region F - Hill Country and Central Coast”

Fill in the information to refine your search, or select "Show ALL Plants for Region" to see all plants listed for your region/zone. Plants will be ordered by those most well adapted to your region. *Photos are not available for all plants at this time.*

*Your selections will return 28 results*

### Name 🌿

Common Name:

### Scientific Name 🌿

Scientific Name:

### Growth Habit 🌿

Habit or Plant Use:

### Exposure 🌿

Partial sun ☒ Shade ☐ Sun ☐

### Blooming 🌸

Flower Color:

Bloom Period:

Fall ☐ Spring ☐ Summer ☐ Winter ☐

### Leaf Character 🌿

Annual ☐ Deciduous ☐ Evergreen ☐ Herbaceous perennial ☐ Semievergreen ☐

### Firewise Index 🌿

Firewise Index:

### USDA Hardiness Zone 🌿

The dropdown below only lists hardiness zones found in the current region






USDA Hardiness Zone:



Click image for enlarged map of USDA Hardiness Zones

[Search by Above Criteria](#)

[Clear Form](#)

Photo	Common Name	Scientific Name	Exposure	Earth-Kind® Index
	<a href="#"><u>White Sage</u></a>	<i>Artemisia ludoviciana</i>	sun, partial sun	10.00
	<a href="#"><u>Shrimp Plant</u></a>	<i>Justicia brandegeana</i>	sun, partial sun, shade	9.00
No Thumbnail Available	<a href="#"><u>Ice Plants</u></a>	<i>Delosperma spp.</i>	sun, partial sun	8.00
	<a href="#"><u>Rockrose</u></a>	<i>Pavonia lasiopetala</i>	sun, partial sun	8.00
	<a href="#"><u>Cotoneasters</u></a>	<i>Cotoneaster spp.</i>	sun, partial sun	7.20
	<a href="#"><u>Horsetail</u></a>	<i>Equisetum hyemale</i>	sun, partial sun, shade	7.20



◆ **Common Name:**

Rockrose

▲ **Scientific Name:**

*Pavonia lasiopetala*

♣ **Family Name:**

Malvaceae

📖 **Description:**

Rockrose is a small deciduous to semi-evergreen shrub, subshrub, herbaceous perennial or summer annual depending upon the region in which it is grown. Plants have irregularly rounded crowns and look best in masses. The small cordate leaves and pink hibiscus-like flowers add seasonal interest. It works best as summer color, a tall bank or groundcover, in mixed perennial borders, for naturalizing, or low shrub in warmer regions.

🌿 **Plant Habit or Use:**

warm season annual, perennial, groundcover, shrub, small shrub

🌞 **Exposure:**

sun, partial sun

🌸 **Flower Color:**

Pink

🌼 **Blooming Period:**

Spring, summer, fall

🍃 **Fruit Characteristics:**

Schizocarp

📏 **Height:**

1 ft to 5 ft

➡ **Width:**



1 ft to 5 ft

#### — Width:

2 ft to 5 ft

#### 🌍 Earth-Kind® Index:

8.00

[Explanation of the Earth-Kind® Index numerical value](#)

- Heat Tolerance: High Heat Tolerance
- Water Requirements: Low Water Use
- Soil Requirements: Low Soil Requirements
- Pest Tolerance: Medium Pest Resistance
- Fertility Requirements: Medium Fertility Requirements

[Explanation of the Earth-Kind® Index breakdown](#)

#### 🔥 Firewise Index

10.00

[Explanation of the Firewise Index numerical value](#)

#### 🌿 USDA Hardiness Zones:

7, 8, 9, 10, 11

##### Regions that intersect these hardiness zones:

Region A - Panhandle and High Plains • Region B - North and Central Texas • Region C - Northeast and East Texas • Region D - West Texas • Region E - Upper Rio Grande • Region F - Hill Country and Central Coast • Region G - Southeast Texas • Region H - Rio Grande Valley



*Click image for enlarged map of USDA Hardiness Zones*

#### 📄 Additional Comments:

Plants are marginally hardy in USDA zone 7 and are usually subshrubs or herbaceous perennials in zone 8.



# Landscape IPM Strategies

## ◉ Cultural:

- ◉ Plant selection, placement, and spacing
- ◉ Careful fertility management

## ◉ Mechanical and physical:

- ◉ Altering of pest's environment
- ◉ Removal of infected / infested material
- ◉ Physical removal of pests (washing off mites)

## ◉ Biological:

- ◉ Preservation of existing beneficials populations
- ◉ Utilization of native plants and landscape diversity

## ◉ Careful selection of chemicals

- ◉ Avoid using of broad-spectrum products



# Other Resources

- ◎ <https://citybugs.tamu.edu/2014/10/17/powwowin-g-about-pollinators/>
- ◎ <https://wateruniversity.tamu.edu/media/2764/uplantit-pollinator-info-sheet-2020-v3.pdf>
- ◎ [https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/nongame/native-pollinators/media/TPWD-Native-Pollinator-Management.pdf](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/native-pollinators/media/TPWD-Native-Pollinator-Management.pdf)





**Thank You!**  
**Bee kind to your pollinators!**

