Please Feed the Bees: Creating a Successful Garden for Honey Bees

UCCE San Diego

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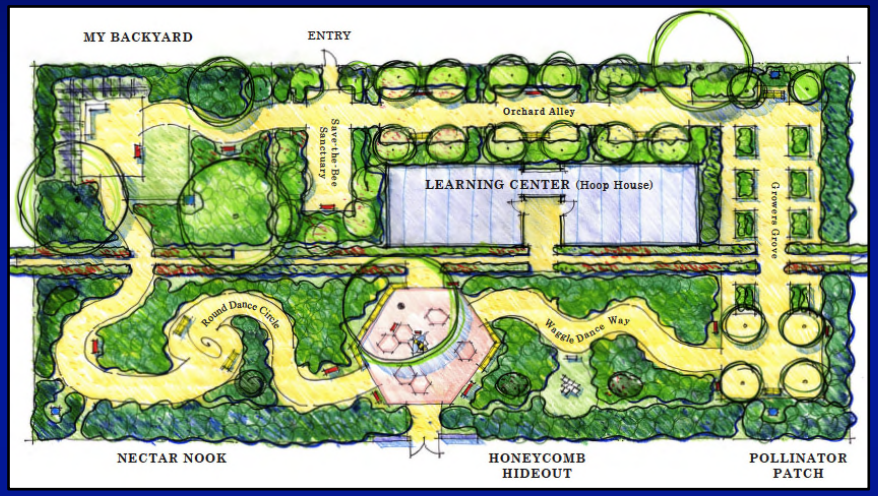
Häagen-Dazs Honey Bee Haven

The Häagen-Dazs Honey Bee Haven

- Planted Fall 2009 based on a design competition with major funding from Häagen-Dazs



- Information and inspiration for the urban bee gardener
- Undergraduate classes and internships
- K-12 school groups and youth outreach
- Research projects and forage for research facility bees

Acknowledgements

Häagen-Dazs

Wells Fargo

Daughters of the American Revolution
California State Chapter

Whole Foods

Palm Bay International

Davis Rotary

Davis Boy Scouts Troop 111

Individual donors

Volunteers!

Bees…Did You Know?

- 20,000 species worldwide
- 4000 species native to North America
- 1600 species native to California
- Only female bees sting
- About 70% of flowering plants are pollinated by bees
- About 1/3 of our food is animal-pollinated

Bees…Did You Know?

- Most crop pollination is performed by honey bees. They are not always the most efficient pollinator, but they are the easiest to move from farm to farm.

Bees in urban gardens

Bees can be diverse and abundant in urban settings, especially if floral diversity is present.

Carper et al. 2014

Fortel et al. 2014

Everaars et al. 2011

Wojcik and McBride 2011

Fetridge et al. 2008

Matteson et al. 2008

Wojcik et al. 2007

Frankie et al. 2005

Goulson et al. 2001

Bees at the Haven (since 2008):

- 85 species
- 26 genera
- 5 families

Bees in urban gardens

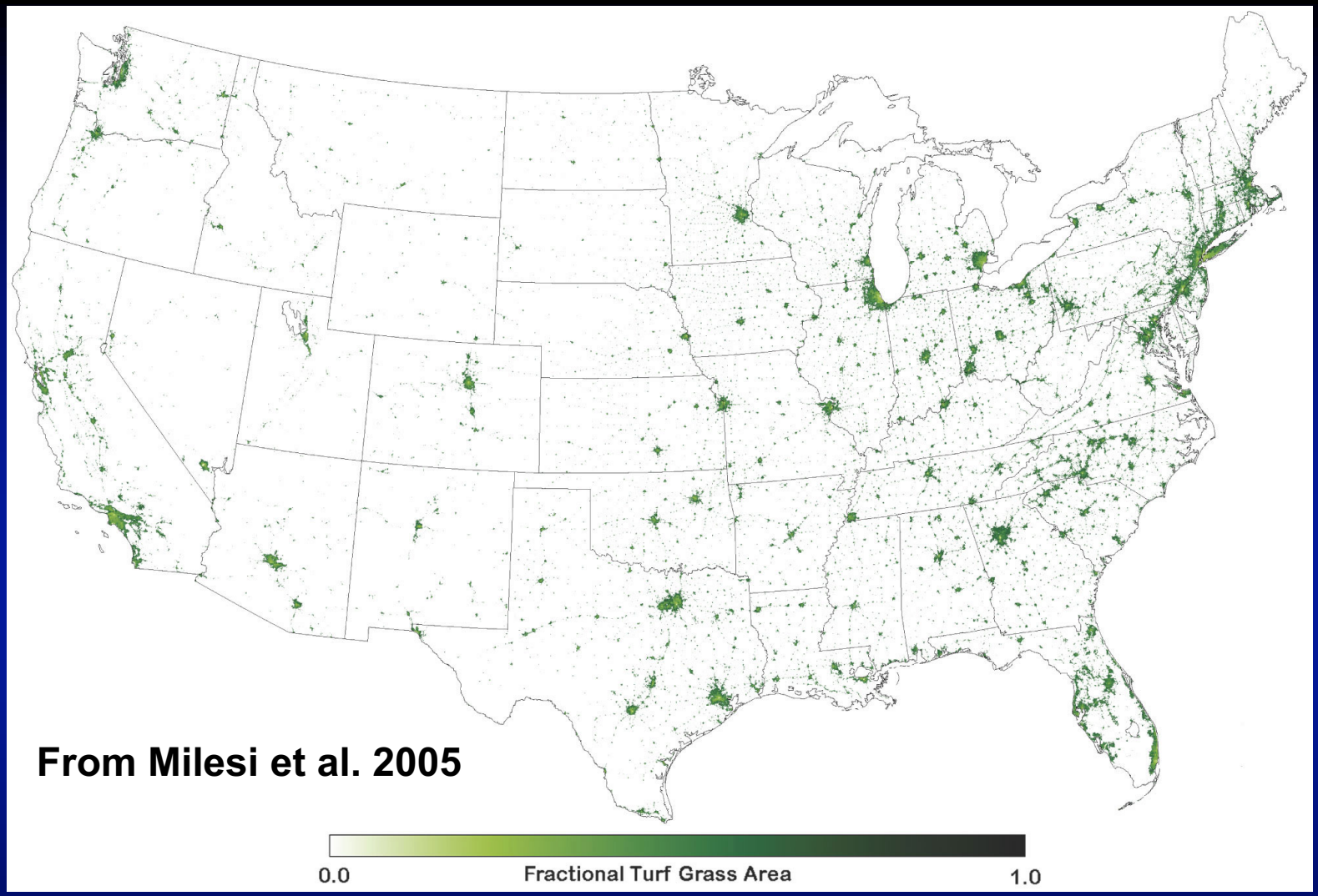
Pollination service to home food production:

- 42 million US households have food gardens (National Gardening Association 2014)
- Value/household = $25/week @ 26 weeks = $650/year x 80% relies on pollination = $520/yr
- 42 million x $520/yr = $21.8 billion/yr

Pollination service to agricultural crops:

- Honey bees: $14.6 billion/yr (Morse and Calderone 2000)
- Native bees: $3 billion/yr (Losey and Vaughan 2006)

Bees in urban gardens: resource for adjacent agriculture



US turf area = 163,812 km^2 (40.5 million acres)

CA turf area = 11,159 km^2 (2.8 million acres)

Soil and irrigation

Soil

- Perform jar and drainage tests to confirm soil type and drainage

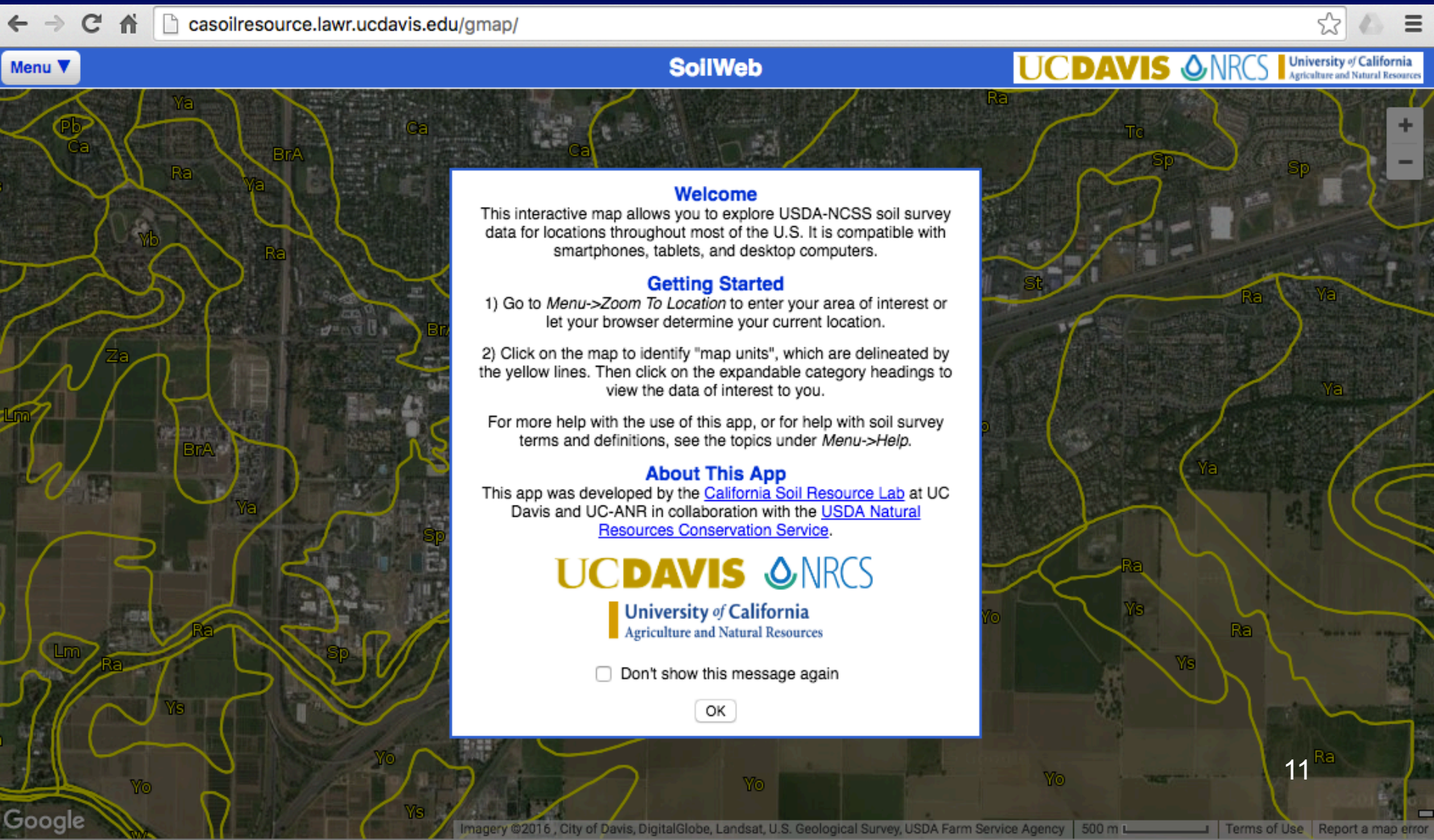
Clay -- none

Silt

Sand

= sandy loam

UC Davis SoilWeb



Soil and irrigation

- Drip: most efficient; delivers small amount of water with little waste. Best for plants that need regular moisture.
- Micro-sprinklers: middle efficiency
- Hand watering with sprinklers: delivers large amount of water with most waste. Useful for CA native plants as soil can dry between watering.

Soil and irrigation

ucanr.edu/sites/WUCOLS/

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WUCOLS IV
Water Use Classification of Landscape Species

- **Home Page**
- User Manual
- Plant Search Instructions
- Plant Search Database
- Download WUCOLS IV Plant List
- Download WUCOLS IV User Manual
- Water Requirements for Turfgrasses
- Partners
- Acknowledgements

Home Page

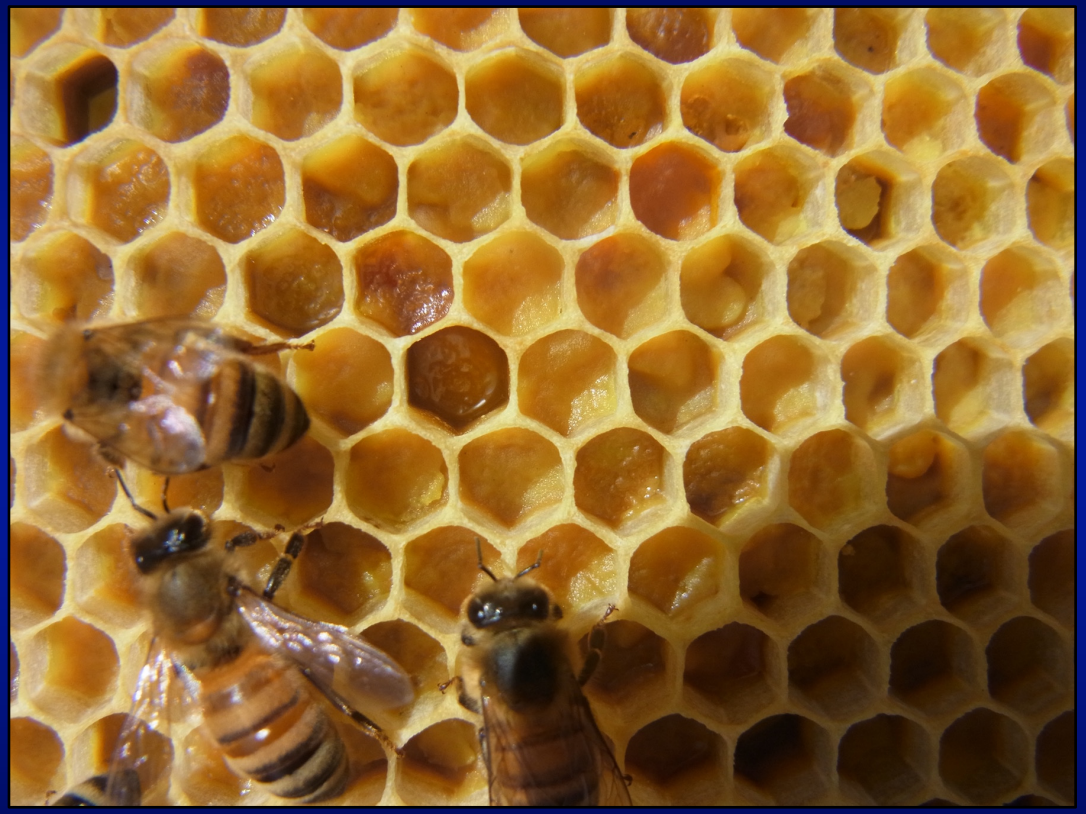
GETTING STARTED

If you are using the WUCOLS list for the first time, it is essential that you read the *User Manual*. The manual contains very important information regarding the evaluation process, categories of water needs, plant types, and climatic regions. It is necessary to know this information to use WUCOLS evaluations and the plant search tool appropriately. To access the *User Manual*, click on the tab (on left) and view specific topics.

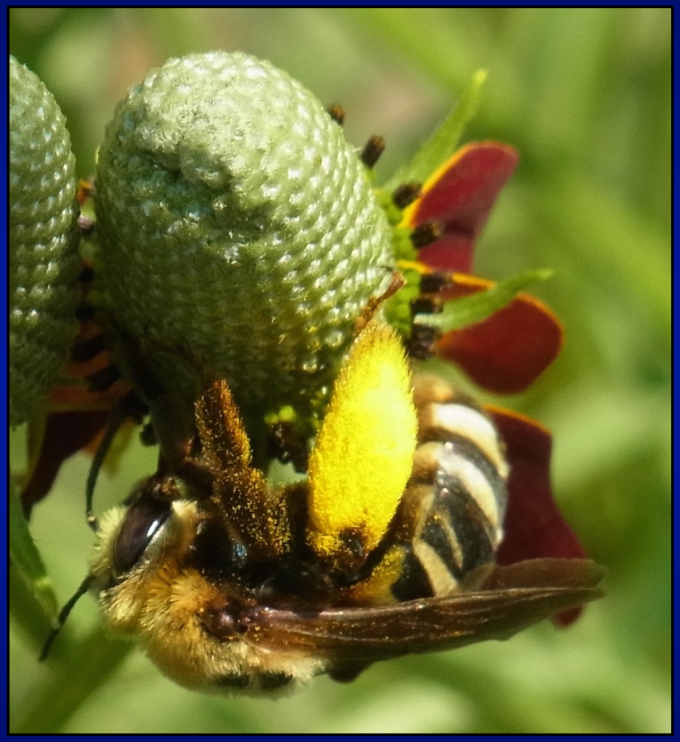
Water conservation is an essential consideration in the design and management of California landscapes. Effective strategies that increase water use efficiency must be identified and implemented. One key strategy to increase efficiency is matching water supply to plant needs. By supplying only the amount of water needed to maintain landscape health and appearance, unnecessary applications that exceed plant needs can be avoided. Doing so, however, requires some knowledge of plant water needs.

Bees and plants

Pollen = protein source. Pollen varies in the amino acids it provides. A mix of pollen is needed for complete nutrition.



Bees and plants



Scopa – pollen is carried dry

Corbicula – pollen is carried moist

Bees and plants

Nectar = carbohydrate source in the field and used to make honey in the hive. Contains a mix of amino acids, sugars, and phytochemicals that impact bee health.

Bees and plants

- **Honey bee foragers will shift their dietary choices to correct for amino acid deficiencies** (Hendriksma and Shafir, Behavioral Ecology and Sociobiology 70:509-517)
- **Honey bees with access to natural forage have fewer diseases than those fed protein supplements** (DeGrandi-Hoffman et al., Apidologie 47: 186-196)

Bees and plants

- **Bees prefer nectar with caffeine and may show addictive behavior** (Hroncova et al., Scientia Agriculturae Bohemica 47:14-17)
- **Plant secondary metabolites can reduce bumble bee parasite infections** (Richardson et al., Proc. Royal Soc. London 282)

Bee garden design: build it and they will come

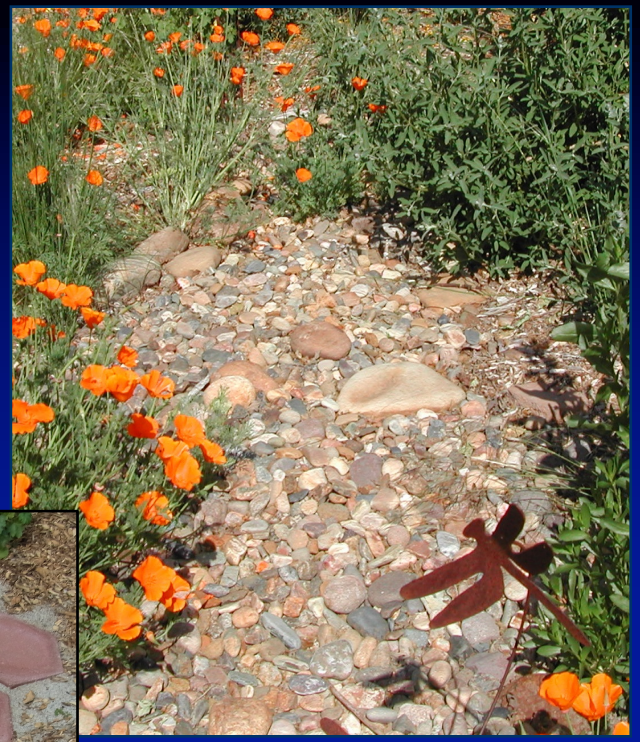
- Provide water, shelter, and food
- Minimize pesticide use
- Use mulch only where needed

Water

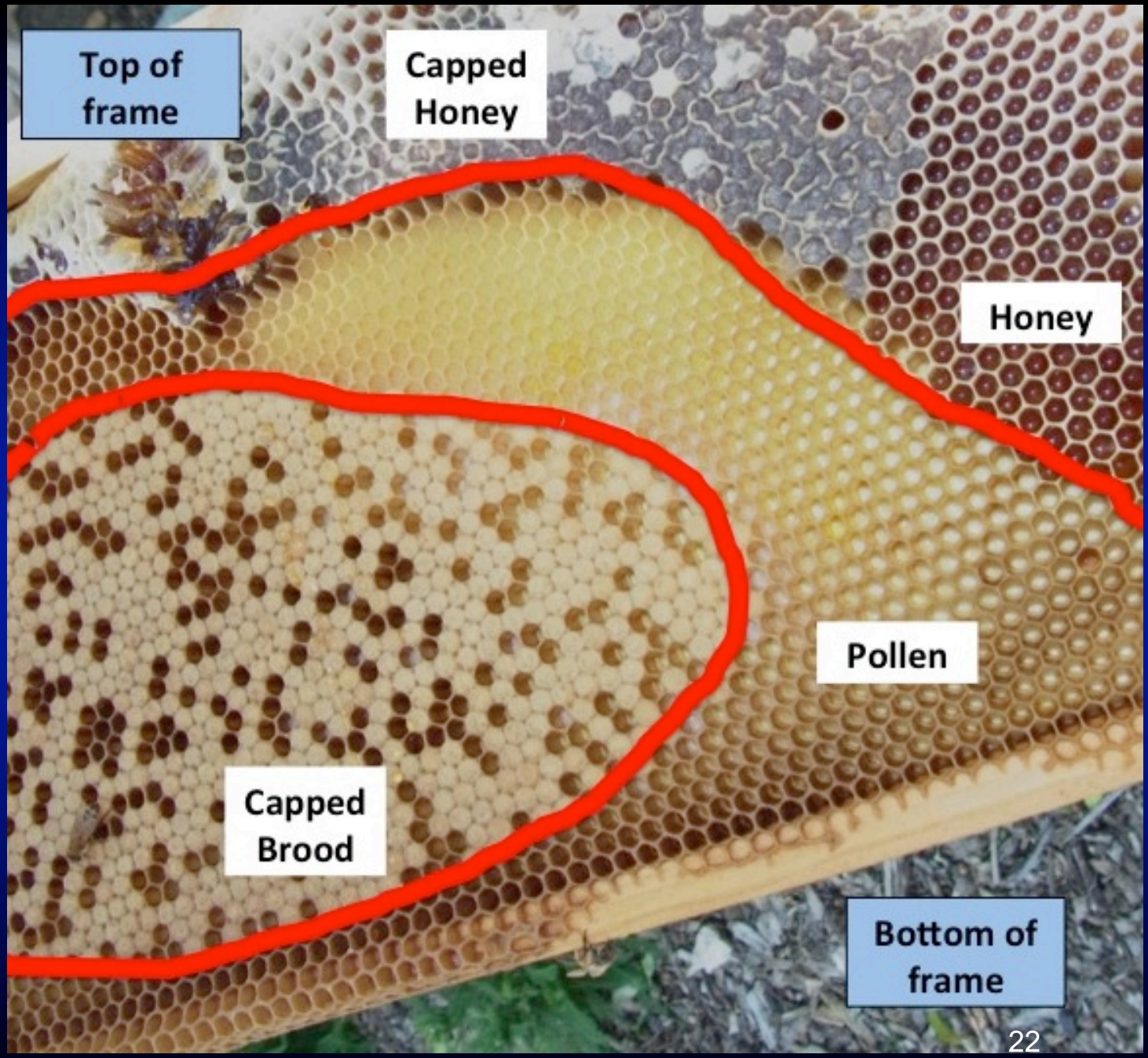
Bees drink water, while most insects derive moisture indirectly from damp soil or their food

Shelter–ground level

- Bare ground
- Rock and stone crevices
- Stumps and logs



Shelter– inside a bee hive



Shelter– plant material

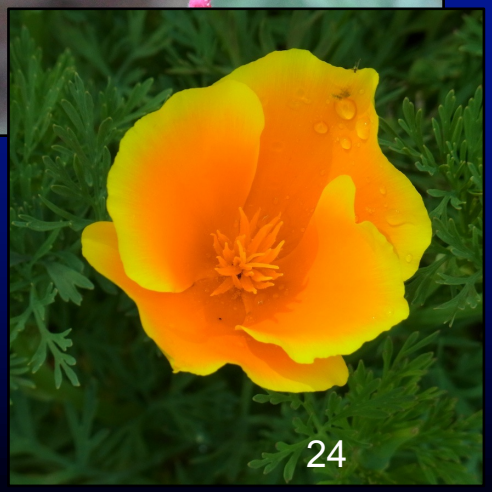
- Propolis: resin used to line nest (native bees) or seal gaps (honeybees)


Coyote bush


Gum plant

Food

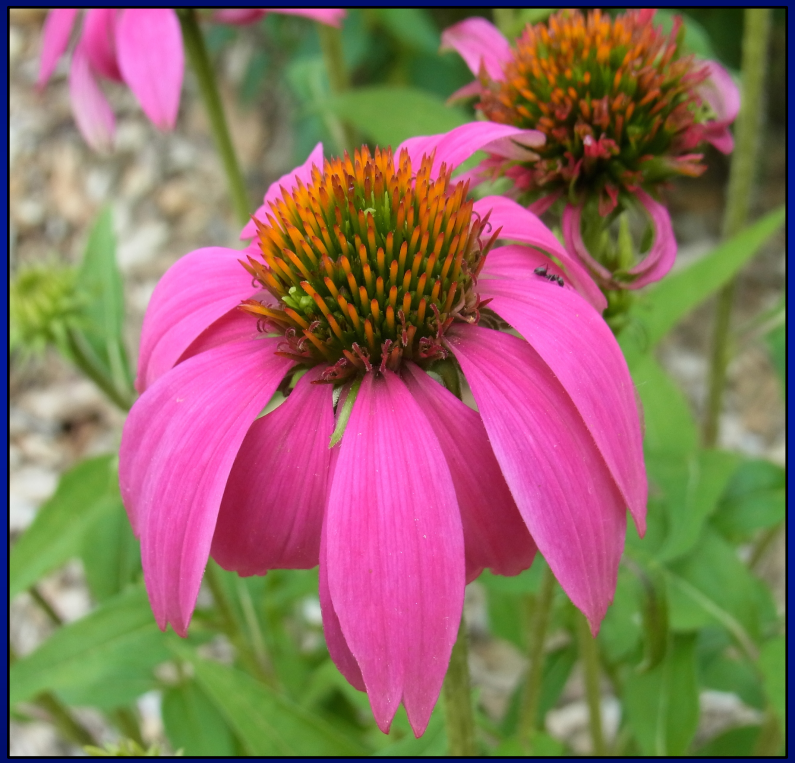
- Many plant families
- Continuous bloom
- Different flower shapes, sizes, and colors
- Plant in drifts



How bees find plants

- Color cues
- Chemical cues
- Honey bees recruit others in the hive and give them directions to good resources via the waggle dance

Species versus cultivars



Echinacea purpurea

Echinacea ‘Hot Papaya’

Patch size

- Aim for 10 ft^2 patches of one species

Bee garden design and maintenance

- Plants are pruned/replaced for maximum flowering
- Plants are irrigated for maximum flowering

Bee garden design and maintenance

Example: Salvia

- Excellent bee plant, but it can become woody and less productive in 3 to 4 years

Cleveland sage with annual tip pruning

Cleveland sage with annual renewal pruning

Bee garden design and maintenance

- Native plants often have mycorrhizae, fungi that live symbiotically with the root system
- Aid in water uptake
- Soil tillage can disrupt, as can digging out established plants

Questions?