

What is Happening to Our Honey Bees?



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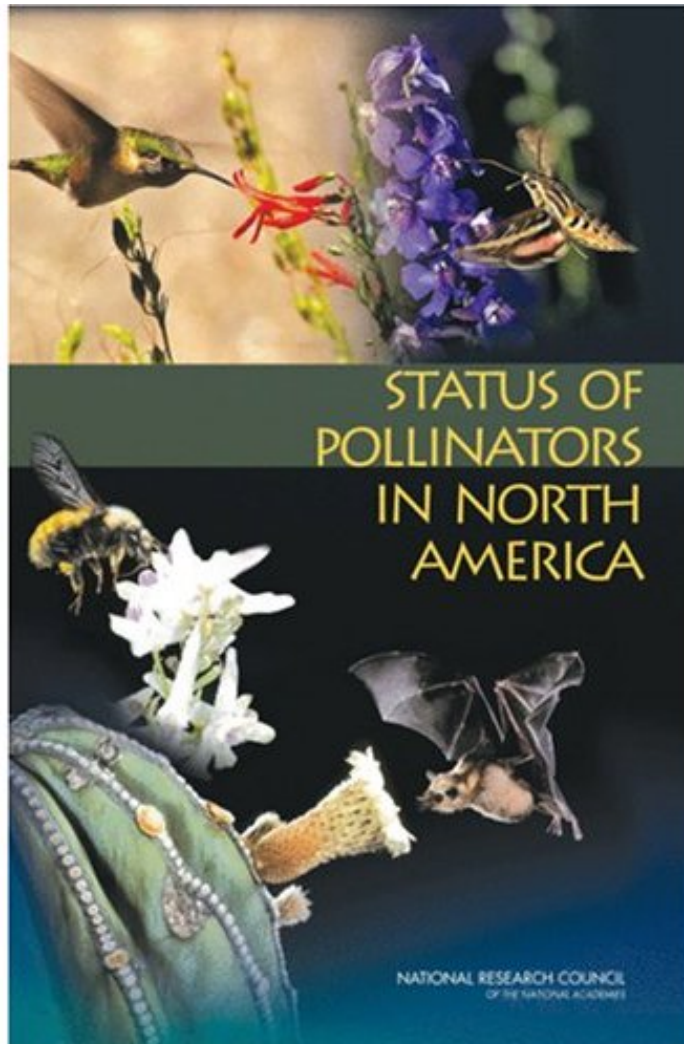
National Pollinator Week

June 24-30, 2007



Committee on the Status of Pollinators in North America, National Research Council

October 18, 2006

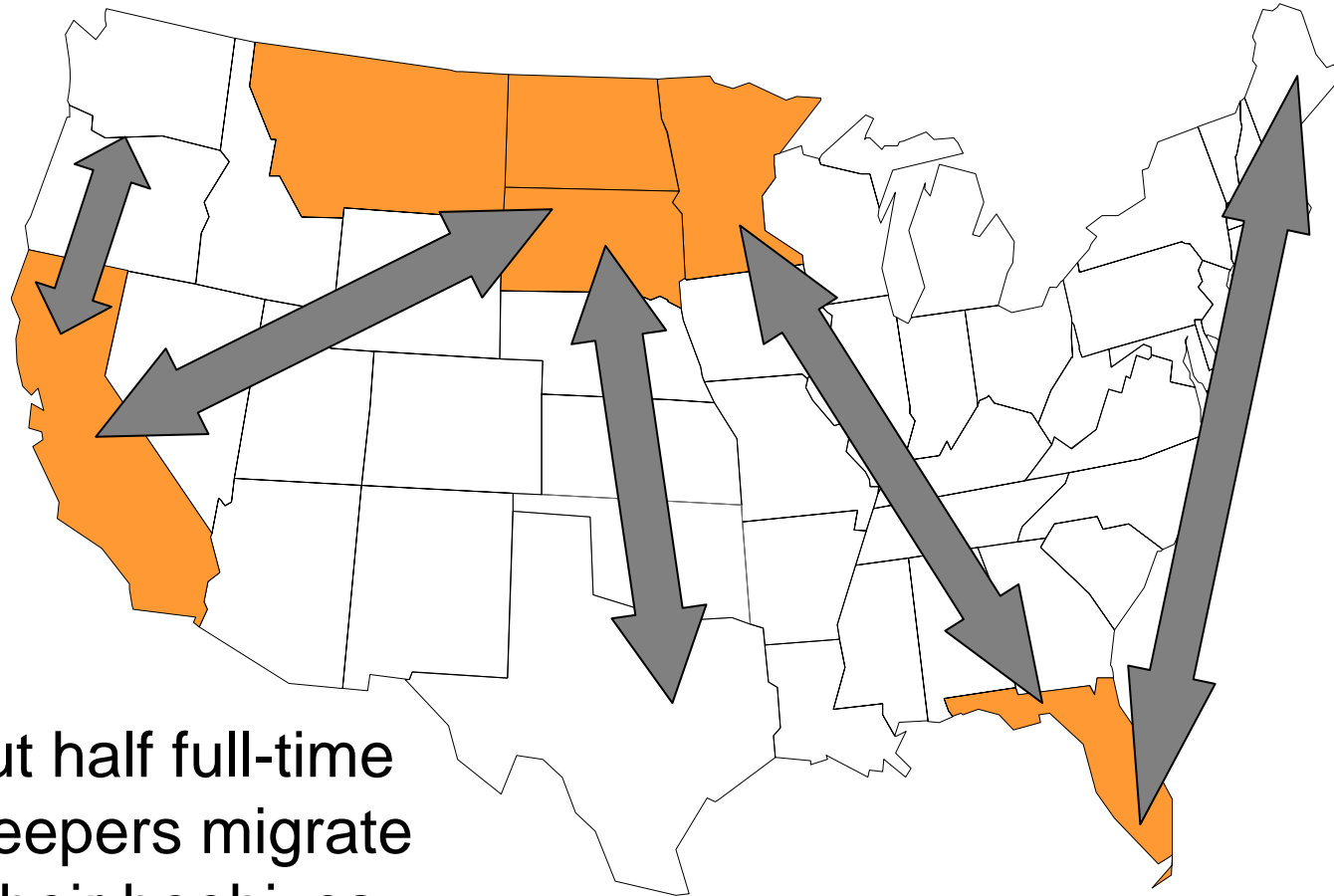


Some Pollinator Populations Declining; Improved Monitoring and More Biological Knowledge Needed to Better Assess Their Status

Why are honey bees important?

- Commercial Pollination — over 100 crops worth \$15 billion
- 2 million colonies rented annually. Almond crop in CA needs 1.3 million alone.
- Honey production — 171 million pounds worth \$272 million
- Flower and vegetable gardens
- Beeswax products — candles to cosmetics

Honey Production & Pollination by State



About half full-time
beekeepers migrate
with their beehives
to provide
pollination services

 Major honey-producing states

Beekeeping nationally

- About 135,000 beekeepers with 2.41 million honey bee colonies in U.S.
- 94% have less than 25 hives
- Decline from 5 million in the 1940s and 28% fewer from just 1981
- Honey bee colony health has also been declining since the 1980s with the advent of new pathogens and pests



Beekeeping in Connecticut

- 3,003 hives and 388 beekeepers
- Hives alone worth minimum of \$720,000
- Most are hobbyists
- 2,200 acres apple orchards \$7,633,000
400 acres peach orchards \$1,620,000
1,000 tons pears \$1,100,000
- Also melons, pumpkins, other curcubits

Common problems

- American foulbrood
- Varroa mites
- Tracheal mites
- Small hive beetle
- Africanized bees (southern states)
- Impact imported honey on prices U.S. producers



Africanized Honey Bee (AHB)

- Unlikely to become established in CT
- Colonies could be brought up from south
- Concern that AHB perceptions or misconceptions could lead to local ordinances restricting beekeeping
- Working with the three CT beekeeper associations, we have produced an AHB Action Plan to handle an instance of AHB in Connecticut

Colony Collapse Disorder

- Reports dramatic losses of honey bee colonies in winter 2006-2007
- Sudden loss (2 d-2 wk) adult worker bees (few dead bees) leaving a laying queen with new workers, brood and food stores that have not been robbed.
- Similar die-offs noted before 1897, 1960s, 1970s

Cases reported from ~34 states
Suspect Cases in Connecticut
Not Confirmed



Bee Alert Technology, Inc.
Missoula, Montana

Some suspects for CCD

- Parasitic mites
- Current, new or unknown pathogens
- Immune-suppressing stress in bees from combination factors:
 - a. Poor nutrition
 - b. Migratory stress long distances
- Exposure to pesticides

Chemicals/Pesticides

- Chemicals used for agricultural and home pest control & for hive for mite control
- Neonicotinioids new class insecticides that are systemic in plants
- Imidacloprid used 140 agricultural products, golf courses, home yards & gardens, structural pests
- Other neonicotinioids also widely used.

Why Study Neonicotinoids?

- Highly toxic to bees
- Imidacloprid shown harmful to honeybees at low concentrations (1-10 PPB range)
- Imidacloprid reported the most frequent found insecticide in pollen in 2002 survey in France
- May disorient bees, impair short-term memory needed for navigation and impact immune system
- No data on levels of exposure in the U.S.



Bee & Pesticide Research

The Connecticut Agricultural Experiment Station

- Dr. Kimberly Stoner, Entomology
Dr. Brian Eitzer, Analytical Chemistry
Apiary Inspector Ira Kettle, Entomology
- Their goal is to examine pollen, wax, and bees for pesticides residues
- Initial focus check on CCD, on analytical methods and on pollen to determine exposure to pesticides

Inspection & Bee Pollen Collection

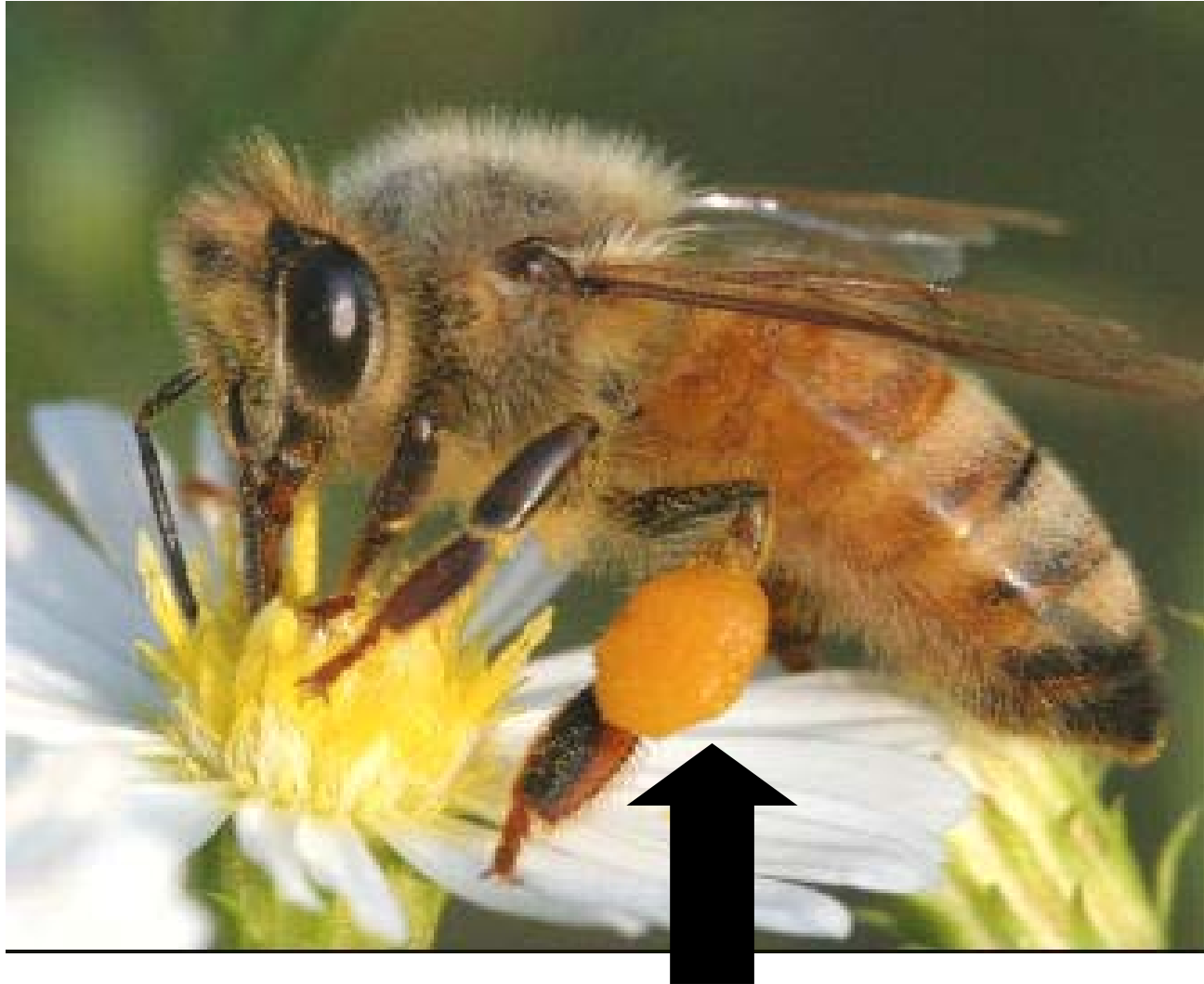
- **Inspect hives possible CCD**
- **Collect pollen at multiple sites**
- **Currently 4**
- **2 at CAES**
Lockwood Farm
Laboratories
New Haven



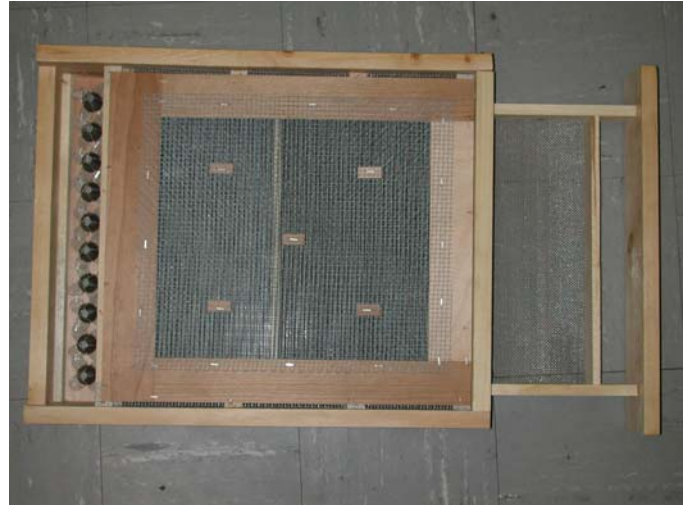
What is Bee Pollen?

- Flower pollen collected by bees combined with enzymes and nectar
- Pollen collected at flowers and packed into sacs on the bees back legs forming little pellets
- Composed of protein (20%), lipids (6%), carotenoids, flavonoids, and phenolics
 - Composition dependant on plant bee pollen collected from

Bee Collecting Pollen



Bottom Placement Pollen Trap

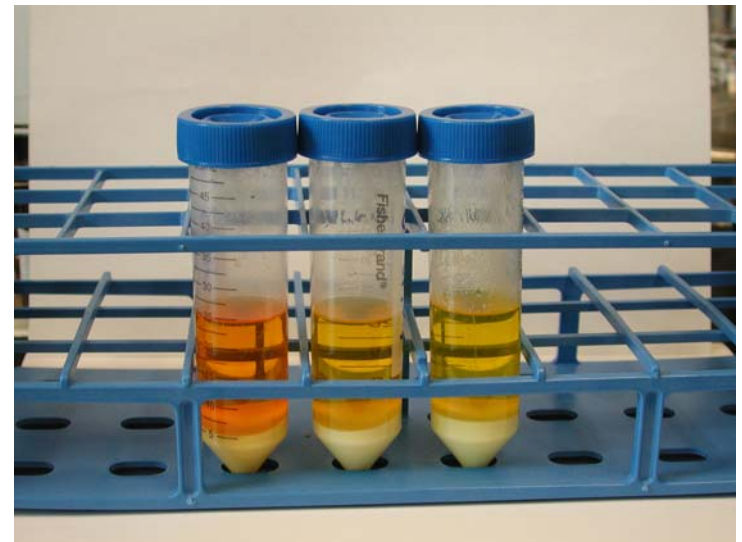


Pollen Samples



Extraction & Testing Pesticides

- Validate extraction methods
- Validate analytical methods and sensitivity limits of detection
- Tests pollen samples from two sites
- 12 samples analyzed



Compounds Monitored

- **Neonicotinoids & Metabolites**

Imidacloprid, Acetamaprid, Dinetofuran,
Thiacloprid, Thiamethoxam, Clothianadin
(thiamethoxam metabolite)

- **Pesticides used to treat beehives**

Coumaphos (Checkmite), Fluvalinate
(Apistan)

- **Other Pesticides**

Conclusions

- Low levels several pesticides have been detected in the 12 samples analyzed
- Observed compounds include: coumaphos, carbaryl, atrazine, chlorpyrifos, myclobutanil, and imidicloprid at < 1 ppb
- Significance of these levels are still unclear

Conclusions

- Methods will be useful for detection parent neonicotinoids at the required detection limits < 1 part per billion
- Alternate extraction technique required for many neonicotinoid metabolites
- Other pesticides can be detected in pollen by Dr. Eitzer's procedures

Beekeeping Basics

- Ira Kettle, Apiary Inspector
- 15-minute demonstration on beekeeping basics twice today at 11:00 am and 2:00 pm
- Technical Demonstration Tent



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