The Latest Bee News

Cory A. Vorel
CAPS Coordinator
USU Cooperative Extension

A Little about Me

- B. S. in Zoology, Weber State University, 2004
- Ph.D. in Biology, Utah State University, 2010
  - Research at USDA-ARS Logan Bee Lab
  - "Learning Ability and Factors Influencing Nest Establishment of the Solitary Bees *Osmia lignaria* and *Megachile rotundata* (Hymenoptera: Megachilidae)"
- Cooperative Agricultural Pest Survey (CAPS) Coordinator
  - Coordinate and conduct surveys, along with Clint Burfitt
  - Extension duties (presentations, publications, etc.)
  - Ongoing research with blue orchard bees

CAPS 2010

- Exotic moth survey
  - 3 species: old world boll worm, Egyptian cottonworm, silver Y moth
  - Corn fields & importation facilities
  - Alfalfa fields
- Bark/woodboring beetle survey
  - Importation facilities
  - Some forest sites
- Spotted Wing Drosophila
  - Cherry orchards

Today's Topics

- Blue Orchard Bees
- Bumble Bees
- Honey Bees

Blue Orchard Bees

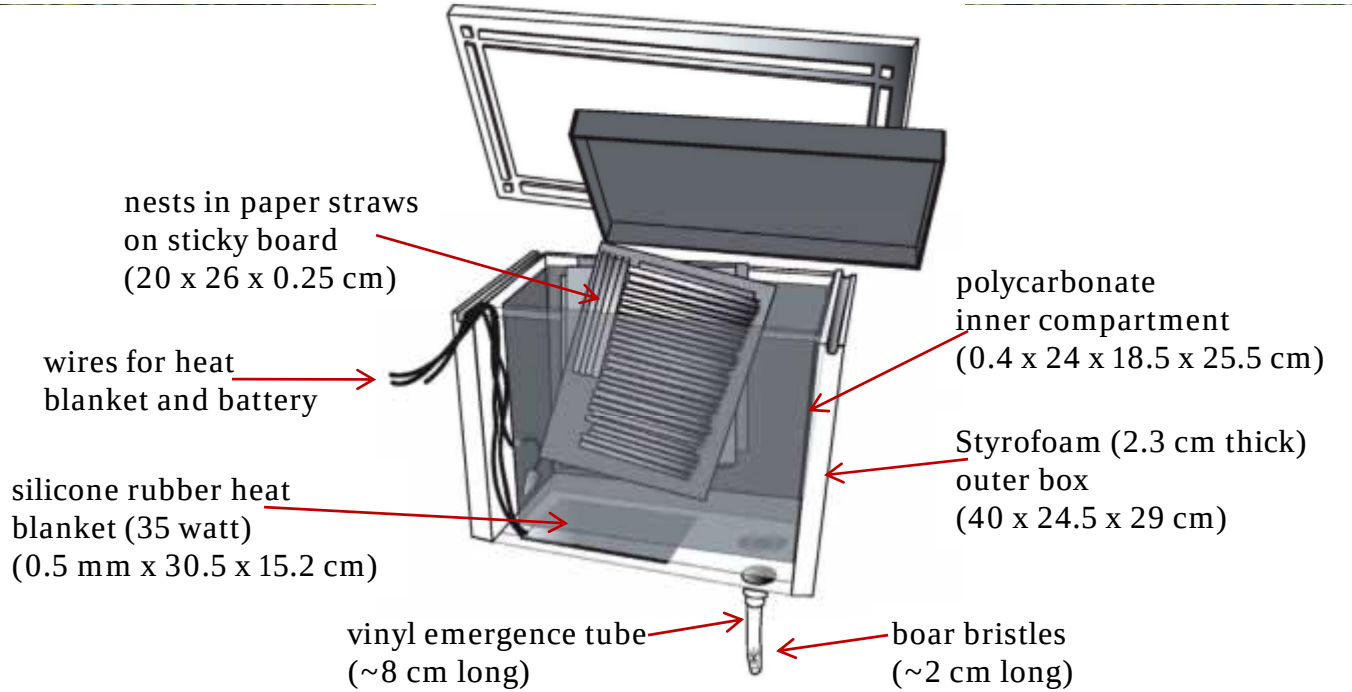
- Huge industry expansion
  - Private research focusing on management techniques
    - Three regions: CA, WA, UT
- USDA-ARS Logan Bee Lab
  - On-site demos
  - New post-doc
    - Stocking density
    - Shelter placement
    - Effects of pesticides

Blue Orchard Bee Biology

- Overwinter as adults, emerging in April.
- Construct nests as linear series of cells.
- Females live ~20 days.
  - construct 2-4 nests (normally with 5-8 cells each)
- Offspring develop throughout summer.
  - Adults by late August – early September

Current Research Highlights
Emergence Box

- Enhances bee emergence & synchrony
- Does not increase mortality
- Prevents bees from re-nesting in old nests

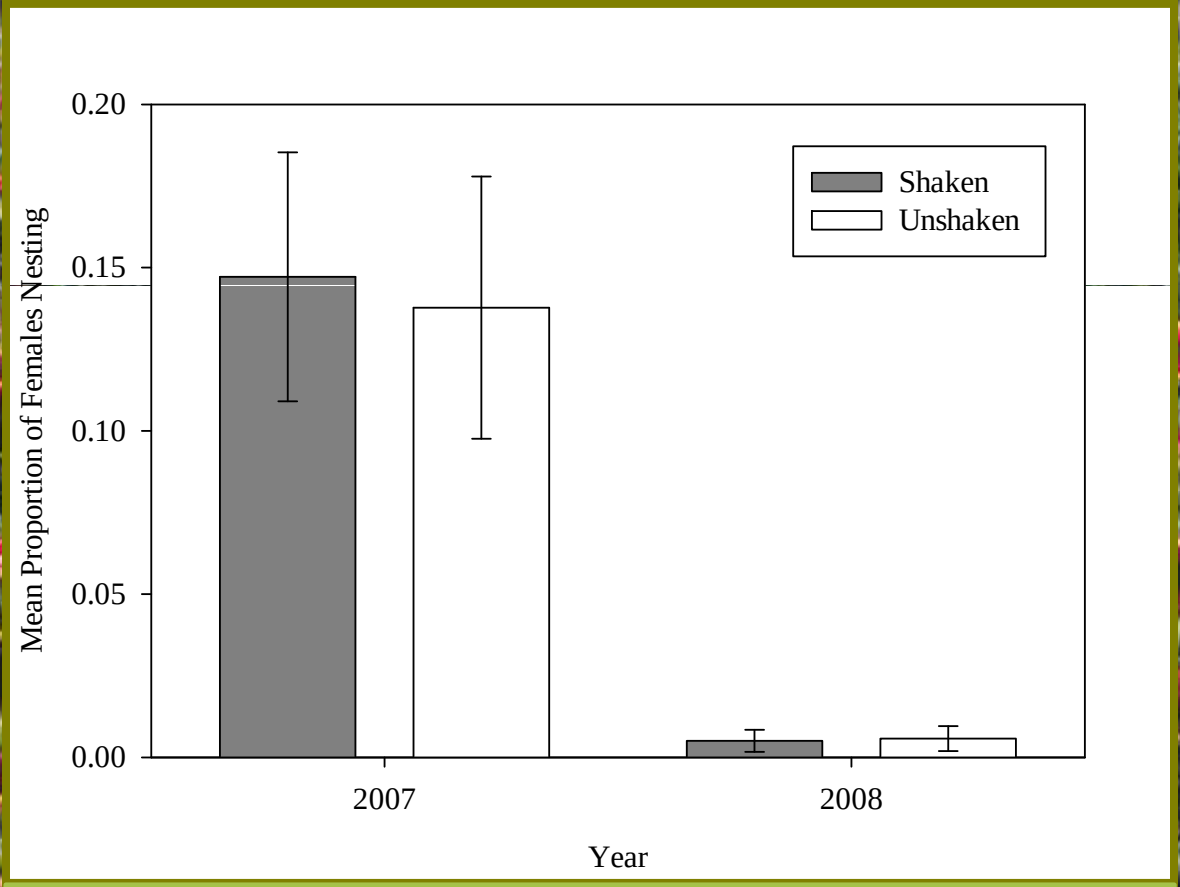


Pitts-Singer, T. L., J. Bosch, W. P. Kemp, and G. E. Trostle. (2008) Field use of an incubation box for improved emergence timing of *Osmia lignaria populations used for orchard* pollination. Apidologie 39: 235-246.

Current Research Highlights
Effects of Rough Handling

- Fewer females establish when released from loose cocoons.
- Hypothesis: Rough handling decreases establishment (dispersal and/or mortality).
- Bees shaken 250 rpm for 2 min, 10 days & 3 days before release.

Current Research Highlights
Effects of Rough Handling



The mean proportion (±SE) of shaken and unshaken paint-marked *Osmia lignaria* females that nested at the shelter from which they were released in an apple orchard in 2007 and 2008.

Future Research

- Which components of old nests are most attractive to nest-seeking females?
  - Development of lures
  - Increase nest establishment
- Does fungicide exposure cause learning deficiencies or memory loss?
  - Curtail pollination deficiencies and pollinator loss

Bumble Bee Decline

- Late 1990's, bumble bee declines noted
  - Western bumble bee (*Bombus occidentalis*)
  - Rusty-patched bumble bee (*B. affinis*)
  - Yellow-banded bumble bee (*B. terricola*)
  - Franklin's bumble bee (*B. franklini*)
- Feb. 2010, coalition of 60 scientists asks APHIS for regulations protecting wild bumble bees from commercial bumble bees.

Bumble Bees as Commercial Pollinators

- Domesticated Bumble Bees
  - *Bombus terrestris*, Europe
  - *B. impatiens*
- New possibilities (Jamie Strange, USDA-ARS Logan Bee Lab)
  - *B. huntii*
  - *B. vosnesenskii*

Honey Bee Losses

- Parasitic mites
  - Varroa
  - Tracheal
- Queen failure
- Diseases
  - *Nosema apis* and *N. ceranae* (microsporidia)
  - Viruses
    - Deformed Wing Virus (DWV)
    - Israeli Acute Paralysis Virus (IAPV)
  - American foulbrood
- Nutrition problems
- Pesticide exposure
- Poor hive management
- **Colony Collapse Disorder**

Varroa mite on honey bee

Feces streaks on the outside of the hive are a sign of *Nosema*.

Honey Bee Losses

- Since 1869, 18 discrete episodes of unusually high colony mortality documented internationally
- Colonies in decline since 1940's
- Losses have increased since introduction of tracheal and Varroa mites in 1980's
- Colony Collapse Disorder first recognized in 2006-2007
  - 1/3 losses attributed to Colony Collapse Disorder
- Managed and feral colonies affected

Current Research Highlights
CCD Descriptive Study

- CCD is either contagious or results from exposure to a common risk factor.

- Secondary co-infections, high virus loads
  - Either exposed to more pathogens or immunodeficient
- *N. ceraneae* not a major contributor.
- IAPV not highly correlated with CCD.

vanEngelsdorp D, Evans JD, Saegerman C, Mullin C, Haubruge E, et al. (2009) Colony Collapse Disorder: A Descriptive Study. PLoS ONE 4(8): e6481.doi:10.1371/journal.pone.0006481

Honey Bee Losses
CCD Steering Committee Report

- *Topic I: Survey and (Sample) Data Collection*
  - Baseline data
    - Better defined symptoms
    - Document increasing losses
    - Document increased pathogen and pesticide levels

Honey Bee Losses
CCD Steering Committee Report

- *Topic II: Analysis of Existing Samples*
  - Higher number of viruses/pathogens, pesticides, & parasites in CCD colonies
  - Combination of stress factors weakens colony

Honey Bee Losses
CCD Steering Committee Report

- *Topic III: Research to Identify Factors Affecting Honey Bee Health, Including Attempts to Recreate CCD Symptomology*
  - Sublethal effects of two common miticides (fluvinate, coumaphos)
  - Synergistic effect of pesticides (neonicotinoids, fungicides, surfactants, miticides)
  - Confirmed links between poor colony health and inadequate diet and long distance transportation

Honey Bee Losses
CCD Steering Committee Report

- *Topic IV: Mitigative and Preventative Measures*
  - ARS Area-wide Project on Honey Bee Health
  - CSREES-funded Cooperative Agricultural Project (CAP)
  - Key accomplishments to date:
    - Varroa mite resistant bee stocks
    - Comb irradiation to reduce pathogen levels
    - Alternative pollinators
  - Progress being made toward:
    - New pest and pathogen detection capabilities
    - IPM strategies for controlling Varroa mites
    - Comprehensive Best Management Practices for beekeepers

Resources

- Bee Health Community at eXtension.org
  - www.extension.org/bee%20health
- Colony Collapse Disorder Progress Report, CCD Steering Committee, June 2009
  - www.extension.org/mediawiki/files/c/c7/CCDReport2009.pdf
- Managed Pollinator Coordinated Agricultural Project
  - www.beeccdcap.uga.edu/
- USDA National Agricultural Library
  - riley.nal.usda.gov/nal_display/index.php?info_center=8&tax_level=1&tax_subject=7&want_id=1322&topic_id=0&placement_default=0

Resources

- The Xerces Society
  - www.xerces.org/bumblebees
- USDA-ARS Bee Biology & Systematics Laboratory
  - www.loganbeelab.usu.edu
- *How to Manage the Blue Orchard Bee as an Orchard Pollinator* – Bosch and Kemp, 2001
  - http://www.ars.usda.gov/SP2UserFiles/Place/54280500/Bosch2001.pdf

Questions?

Cory.Vorel@usu.edu

801-388-5433

VSB 317