
Honey Bees and Colony Evaluation – An Online Learning Program

Project No.: 11.POLL8.Mueller

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Project Cooperators and Personnel:

Mike Poe and Leigh Dragoon, UC ANR Communication Services
Eric Mussen' and Kathy Kettle Garvey, Entomology, UC Davis
and numerous beekeepers and apiary inspectors who generously
shared their time and expertise.

Objectives:

The objective of the **Online Learning Program** is to provide easily accessible information about honey bees and colony evaluation which can be viewed at any time with the click of a web link. The goal is to improve the target audience's understanding of

- basic honey bee biology,
- recommended colony strength evaluation practices, and
- recognition of important diseases, pests, and parasites that impact honey bees.

The target audience includes apiary inspectors (with County Ag Commissioner's offices as well as private contractors), beekeepers, and commodity producers who rely on honey bees for pollination. The Online Learning Program may also be of interest to individuals who are curious and desire to learn more about bees.

Interpretive Summary:

Honey bees are essential for pollination of California's almond crop and many other fruit, nut, vegetable, and seed crops. Concerns about the quality and availability of honey bee colonies for pollination have increased in recent years because of the impact of Colony Collapse Disorder (CCD) as well as greater pressure and difficulty managing pests, parasites, and diseases. The result has been a significant increase in pollination fees, particularly for almond pollination, which requires tremendous numbers of bees from throughout the US to meet the demand.

Almond producers want to make sure they are getting what they pay for in terms of numbers of colonies at a strength specified in the pollination contract. Beekeepers want to be compensated for their additional expense in providing quality hives for spring pollination. As a result, apiary inspectors have seen greater demand for colony strength inspections in recent years. In addition to colony strength inspections, inspections for pests, parasites, and diseases, including CCD, are being requested. In many cases, there aren't enough qualified apiary inspectors to meet the need.

Apiary inspectors must understand honey bee biology and behavior, use accepted colony strength inspection procedures, and be able to identify a variety of important pests, parasites, and diseases. Recognizing the need for training, a workshop for Fresno area apiary inspectors was developed in 2009. The success of that workshop led to additional training events in other locations. Although participants reported that the trainings were extremely helpful, they struggled with the amount of information they needed to absorb in a short period of time. Building on this experience, the concept of an **Online Learning Program** was proposed, organized by specific topics, which can be accessed at any time with the click of a web link.

Individuals and organizations can take advantage of the training at their convenience. The modular approach requires short blocks of time for each section and the viewer can proceed at their own pace. Training modules can be re-visited as necessary and it is easy to update the existing information or add additional topics at any time. However, there are some disadvantages to online learning. The group discussion that occurs during a more traditional lecture format, which adds to the richness of the experience, is lost in online learning. In addition, the hands-on component offered during traditional training programs is not possible.

The online learning program will be available on the UC ANR Online Learning Site - <http://class.ucanr.org/>. We expect the site to go live just prior to the 2012 Almond Conference and there will be workshops on honey bee colony evaluation at the conference.

Materials and Methods:

The **Honey Bee and Colony Evaluation Online Learning Program** began in spring 2010. Initially, the focus was on colony strength evaluation. However, as a result of observations made at workshops for apiary inspectors, the need to provide background information on honey bees as well as clear, consistent recommendations for apiary inspection that could be agreed upon by both commodity producers and beekeepers became apparent. When the outline was reviewed by industry and regulatory representatives, additional suggestions were incorporated and the project expanded to include the modules listed below.

- Introduction
- Bee biology
- The hive and hive organization
- Inspection recommendations
 - Preventing cross-contamination
- Proper clothing and equipment for hive inspection
 - Video showing how to tie a bee veil
- How to use a bee smoker
- Colony strength evaluation
 - Random vs. Systematic sampling
 - How to generate random numbers
 - Colony Strength inspection procedures (includes videos)
 - Individual frame evaluation
 - Cluster count method
 - Influence of time and temperature, accounting for bees in the field, adjustments

based on size of equipment

- Pests, parasites, diseases, and other problems
 - Brood and adult bee diseases
 - Parasites
 - Pests
 - Africanized Honey Bees
 - Poisoning – Plants, Pesticides
- Other things you might see in a hive or apiary (and why)

For each module, I completed narrated PowerPoint presentations which were sent to UC Agricultural and Natural Resources (ANR) Communication Services (CS) to integrate into the Learning Management System (LMS). Videos and interactive slide sequences allowing for skills practice are incorporated into some of the learning modules. Currently, there are skills practice sets for estimating brood area, frames of bees, and cluster count. Non-punitive quizzes are part of each module so participants can check for understanding, and a final exam will be created to allow for either certification or continuing education credit.

As each module was prepared by CS, it was sent to a group of reviewers (26) that includes beekeepers, apiary inspectors, researchers, industry representatives, and regulatory personnel. The status of each module as of September 24, 2012 is indicated in the table below. In order to complete many of the modules, a final trip to Davis is needed to record the narration updates suggested by reviewers. For the Colony Strength Inspection module, I also plan to record videos to illustrate the key points involved in the two methods of strength evaluation.

Module Topic	Sent to CS	Sent to Reviewers	9/24/2012 Status
Introduction	√	√	Complete
Bee Biology	√	√	Complete
The Hive and Hive Organization	√	√	Complete
Inspection Recommendations	√		Complete
Proper Clothing and Equipment for Hive Inspection (Bee Suit Basics)	√	√	Complete
How to Use a Bee Smoker	√		Complete
Random vs. Systematic Sampling	√	√	Complete
How to Use a Random Number Generator	√		Complete
Colony Strength Inspection Procedures	√	√	Need video and final narration
Pests, Parasites, Diseases, and Other Problems			
Other Things You Might See in a Hive or Apiary (and Why)	√	√	Complete
Skills Practice – Brood Area, Frames of Bees, Cluster Count Quizzes	√		
Appendix – Contracts, inspection requests, data collection forms, strength certificates, random number tables (2)			

Results and Discussion:

Learning modules created from narrated slide sets and videos, skills practice (brood area, frames of bees, cluster count); quizzes, and a final exam are in the final stages of development. The ***Honey Bee and Colony Strength Online Learning Program*** can be offered at no charge to interested parties thanks to the support provided by the Almond Board of California and Project *Apis m*.

Research Effort Recent Publications:

A poster and abstract describing this project were presented at the 2011 Almond Board Conference. The project was also described in a presentation at the 2011 CA State Beekeepers Association Convention and the 2012 Northern San Joaquin Valley Almond Day.

As noted above, we expect the site to go live just prior to the 2012 Almond Conference and there will be workshops on honey bee colony evaluation at the conference. The online learning program will be available on the UC ANR Online Learning Site - <http://class.ucanr.org/>.

References Cited:

None