

Title: The California Master Beekeeper Program: Development of a continuous train-the-trainer education effort for CA beekeepers

Honey bees are arguably the most important managed pollinator and are used as the primary pollinator for over 30 crops in California many of which are considered specialty crops such as almonds. Therefore, the food security of our state and our nation depends largely on robust and healthy honey bee populations. However, in recent years, US beekeepers have been reporting annual colony losses of up to 45%^[1]. These losses are attributed to many pathogens and pests associated with bees, as well as pesticide exposure and lack of access to plentiful and diverse forage^[2]. Colony losses have also prompted those who have never kept bees before to try their hand at beekeeping in an effort to help honey bee conservation. Currently, in California there are estimated 11,000 backyard and small-scale beekeepers, with many of them belonging to one of 35 beekeeper associations within the state. While these associations often serve as hubs of information transfer, the information provided is not always accurate or supported by research findings. Considering the importance of California to the US agriculture and the fact that almost 80% of the US colonies start their pollination and honey production routes in almonds, it is clear that there is an urgent need to develop a comprehensive, science-based, and state-wide apiculture curriculum.

Development of these educational opportunities will help minimize potentially disastrous consequences, such as increased pest and pathogen transfer or spread of Africanized bees which are considered a public-health risk, due to lack of understanding of proper honey bee husbandry. To fulfill this need we established the first ever California Master Beekeeper Program which provides California-centric, contemporary, research-based training in apiculture. In 2016, 56 participants have successfully passed the Apprentice Level exams and there are already 46 registrants for the 2017 Apprentice class with anticipated full roster of 75 participants. Here, we seek funding to expand the program curriculum for the intermediate and advanced levels, create partnerships with advisers in UCCE offices throughout the state (we currently have collaborators in Fresno and San Diego), begin creating comprehensive web-based resources such as a library of on-line materials including an on-line classroom, and support the expansion of our educational apiary.

Being the sole Extension Specialist for Apiculture in California, it would be challenging to have frequent communication with all of my stakeholders, which in addition to beekeepers also include growers, PCAs, school groups and the general public. The Master Beekeeper Program will serve as a continuous train-the-trainer effort where those involved will have the opportunity to receive an outstanding apiculture education and keep up-to-date on the latest research findings in a field that is vibrant and constantly evolving, thereby, increasing the UC ANR's extension reach in communities throughout the state. The program is designed to matriculate ambassadors for honey bees and beekeeping with the individual's required level of knowledge corresponding to the level in the program. The program starts by providing science-based, hands-on basic beekeeping curriculum within the Apprentice level, and will continue progressing through two additional levels (Journeyman and Master) of increasing complexity. Enrolled beekeepers will learn from on-line modules and series of workshops offered through UC Davis, as well as via qualified mentors assigned to them through various bee clubs. Exams will be administered once per year at the California State Beekeepers Association Convention, and on additional test dates at UC Davis, Fresno and San Diego County UCCE offices. Upon graduating, these environmental stewards will be able to effectively communicate the importance of honey bees and other pollinators within their communities, they will also be able to serve as mentors for other beekeepers, and will serve as the informational conduit between the beekeeping communities throughout the state and UCCE staff. In fact, once trainees pass the rigorous written and practical exams, in order to retain their active status and proceed to the next level, they must show proof of volunteer service in their communities throughout the year.

Currently, the program is overseen by an advisory committee consisting of UCCE specialists and advisers, Dept. of Entomology and Nematology research staff, RMI and Honey and Pollination Center staff, California beekeepers and other apiculture specialists. Support provided to the program by UC ANR will ensure continued high quality and consistency of the program and the quality of the knowledge of matriculating students. More than 100 current and prospective program members, enrolled with minimal promotion efforts, highlight not only the need for this type of programming produced by UC ANR, but it also shows the desire of beekeepers to provide this service in their communities. This program will promote partnerships with local beekeeper associations and it will allow for further UCCE staff training and engagement with advisers such as Dr. Bethke and Dr. Mueller with who we already have established collaborations. The program will also serve as a training platform for UC students interested in extension careers. Thus far, I have engaged my own graduate and undergraduate students in the Master Beekeeper training workshops and exams. I am also mentoring a student in the Graduate Training in Cooperative Extension Program at UC Berkeley as she is developing a new wild bee module for the Master Beekeeper Program. Finally, the program will allow for creating a solid base of trained leaders in future citizen science projects geared towards developing practical management strategies for backyard and small-scale beekeepers in California. This program will establish UCCE and the Dept. of Entomology and Nematology in partnership with the RMI Honey and Pollination Center at UC Davis as a center of excellence in apiculture. Most importantly, members of the program will serve as knowledgeable ambassadors that will disseminate science-based information about the importance of honey bees, preserving bee health and responsible beekeeping.

Niño Summary – CA Master Beekeeper Program; References: ¹ Seitz, N., et al. *Journal of Apicultural Research* 54.4 (2015): 292-304;

² Meixner, M. D. *Journal of invertebrate pathology* 103 (2010): S80-S95.