

Report on the Progress Toward
The Recommendations of the

Study of the Plight of Virginia's Beekeepers

Submitted to:

Senate Committee on Finance
Senate Committee on Agriculture, Conservation, and Natural Resources

House of Delegates Committee on Appropriations
House of Delegates Committee on Agriculture, Chesapeake and
Natural Resources

Submitted by:

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Executive Summary

Funds provided by the General Assembly to Virginia Tech through Cooperative Extension have been used to initiate implementation of the recommendations contained in the Study of the Plight of Virginia Beekeepers (Virginia Senate Document Number 20). Four initiatives were identified in the document and recommended for funding; the development of a pest management program for colony management, the development of a queen breeding program, the development of an Africanized honey bee response program, and the development of a pollination program. This report describes the progress made in each of the four areas during the first year. Program development and implementation has been a collaborative effort of Virginia Polytechnic Institute and State University/Virginia Cooperative Extension (VT) and the Virginia Department of Agriculture and Consumer Services (VDACS).

Background

The beekeeping industry in Virginia has declined significantly over the past twenty years. The number of bee hives and the number of beekeepers in the Commonwealth has decreased by over 50% since the mid 1980's. This decline has resulted largely from the introduction of exotic bee pests and diseases, however other problems have also impacted the industry. In 2006 Senate Joint Resolution Number 38 requested the Virginia Department of Agriculture and Consumer Services to study the plight of the beekeepers and to identify possible remedies to the problems identified in the study. The resulting document, Virginia Senate Document 20, The Study of the Plight of Virginia Beekeepers, detailed the major problems faced by the industry and identified initiatives in four areas that would help stimulate recovery of the beekeeping industry. In 2007 the General Assembly appropriated \$250,000 to fund the initiatives recommended in the Study. This year the General Assembly passed legislation to protect the unused funds and allow for their continued use during the 2008-2009 fiscal year. Governor Kaine signed the request on April 11, 2008 to protect the unused funds allocated in 2007.

The initiatives identified in the Study of the Plight of the Virginia Beekeepers included the following areas:

1. Development of an integrated pest management program that is tailored specifically for Virginia to address pest and disease problems affecting honey bees, particularly with regard to the occurrence of *Varroa* mites in bee hives.
2. Support a multi-regional queen rearing program for the production and distribution of a pest and disease resistant line of honey bees that is productive, sustainable and free from the aggressive behavior by bees contaminated by Africanized Honey Bees (AHB).
3. Implement programs to (i) assess the risk, monitor the occurrence, and reduce the adverse impact of AHB; and (ii), educate the public as to the importance of honey bees to agriculture, environment, and the economy.

4. Promote the use of honey bees by farmers to increase crop production and quality, and encourage pollination services of beekeepers so as to eliminate Virginia's reliance on the import of honey bee hives from other states.

The progress in each of these four areas is presented in the following sections.

Integrated Pest Management

The development of effective pest management programs for Virginia beekeepers involved five separate initiatives. These included the initiation of research studies on IPM and best management practices, the establishment of regional apiaries for research and extension outreach, the development and distribution of training programs for Extension, the development of a Master Beekeeper Program, and the development of management protocols for beekeepers.

Research Studies on IPM Best Management Practices

Annual colony losses for Virginia beekeepers have averaged over 30% for the past five years. A number of factors contribute to these losses, but colony health has been a major factor in colony decline. Problems with *Varroa* mite parasites, diseases, poor nutrition and colony collapse all contribute to the colony health problems faced by the beekeeper. The recent discovery of two new honey bee disease pathogens in the U.S. (Israel Acute Paralysis Virus [IAPV] and *Nosema ceranae*, a microsporidian) has further complicated the issues of colony health. In addition an over-reliance on chemical miticides for *Varroa* control has increased colony stress and exacerbated other health related problems.

Improvements in colony health are critical to the beekeeping industry and require the development and implementation of better management practices, especially with regard to the control of *Varroa* mites. In response we have initiated several studies on *Varroa* management. Half of the colonies at three of the newly established research apiaries (see below) have been placed on screen bottom boards (as opposed to solid bottom boards) to test their effectiveness in reducing mite levels and to determine if screen bottom boards affect brood production and / or winter survival. These colonies will be monitored over the next 12 months. We have also initiated a research study at the Virginia Tech apiary to examine intra-hive mite distribution with regard to brood distribution, and the potential for manipulating mite populations for better control without the use of chemical miticides.

The discovery of IAPV and a new *Nosema* pathogen in the U.S. has further complicated the problems of colony health and the development of best management practices. Both of these pathogens have been associated with Colony Collapse Disorder and have become a major concern for the beekeeping industry. However, a major difficulty in this regard is the fact that we do not know whether the virus or this *Nosema* is present in Virginia. This problem is further complicated by difficulties of diagnosis, since identification requires the utilization of molecular biology techniques. In an effort to develop the capabilities for diagnosis we have initiated a research program that will allow us to identify the presence of IAPV in bee samples

collected from around the state. We are working in conjunction with virologists in the Department of Entomology to develop Real Time PCR techniques. We have developed the primers and an RNA template for IAPV identification using RT-PCR. Initial testing indicates the assay should be effective, but further testing is needed. In addition we have initiated a sampling program for *Nosema ceranae*. At this time we are sampling bees and looking for the presence of *Nosema* spores. Molecular techniques will be used for a confirmatory diagnosis if potentially problematic infestations are discovered in the state.

Establishment of Regional Apiaries

Apiaries were established at four locations around the state for use in research and extension programs. Equipment for the hives was purchased from local supply dealers and then assembled and painted with the assistance of local beekeeping associations. Bees for the hives were obtained from Virginia producers. Apiaries have been established at the Alson H. Smith Jr. Agriculture Research and Extension Center in Winchester, the Hampton Roads AREC in Virginia Beach, the Virginia State University Randolph Farm in Ettrick, and at the Virginia Tech Kentland Research Farm in Blacksburg. The apiaries provide sites for the development and evaluation of colony management techniques, as well as colonies for instructional use in outreach programs. The apiary at the Randolph Farm is being maintained by VDACS staff with assistance from local beekeepers. It is anticipated that both research and maintenance of the Randolph apiary will involve VSU students and augment outreach programs for minority farmers.

The hives located at these locations will also be used as sentinel colonies for monitoring bee diseases (such as the newly introduced Israel Acute Paralysis Virus). Research projects to evaluate management techniques are currently being conducted at all four sites (see above).

Apiculture Training Programs for Cooperative Extension Agents

Three regional programs were organized and presented to a combined group of 52 extension agents during the spring of 2008. The in-service training programs were offered in Harrisonburg (Northern and Northwest Districts), Virginia Beach (Southeast District) and Abingdon (Southwest District). The daylong programs consisted of four hours of classroom training on honey bee colony biology and organization, yearly management practices, major problems facing the bee industry, diseases and pests, and the management of mite parasites. The afternoon sessions were devoted to hands-on field demonstrations and included instruction on colony inspection and evaluation, management practices and techniques for sampling and treating colonies for mites. Agents were also provided with a manual and basic equipment for colony inspection.

In addition to the agent training program, we are promoting beekeeping as a 4-H program under Plants, Soils and Entomology. Forty hive units were purchased for distribution to 4-H programs for the establishment of youth beekeeping clubs. Currently, extension agents in 4 localities have been provided with equipment to establish new beekeeping clubs.

Development of a Master Beekeeper Program

A Master Beekeeper Program for Virginia has been developed and implementation is underway. The initial program was developed by Dr. Fell at Virginia Tech in collaboration with Keith Tignor, the Virginia State Apiarist at VDACS. The program draft was presented to the Virginia State Beekeepers Association at the annual Fall meeting in November 2007 and placed on the Association webpage for feedback and input. A revised program was placed on the Association webpage in February, incorporating changes in response to beekeeper input. The Master Beekeeper program consists of three levels, Qualified Beekeeper, Certified Beekeeper and Master Beekeeper. A set of requirements has been developed for each level and study guides for the levels have been written and posted on the Association website. Each level of the program includes education requirements, knowledge requirements, and experience in hive management. Certification for each level requires both a written and practical test. A testing schedule is being developed with the first tests to be offered in early July of 2008.

Queen Breeding Program

Establishment of a Queen Production Program; Beekeeper Education and Training Programs on Queen Production

A decline in honey bee queen productivity and longevity has been a concern for Virginia beekeepers over the past several years. The quality of queens obtained from commercial queen breeders has been poor and many of our beekeepers have had to replace queens in as little as 3-6 months. Previously queens were expected to be productive for at least two years. We are also concerned about the potential problem of introducing Africanized honey bees through the importation of queens. Many of the commercial queen producers now live in areas where AHB have become established. In response to these problems we have initiated a program to increase queen production to provide local sources of replacement queens. As part of this effort, six one-day short course programs on queen honey bee production were organized and presented to beekeeper groups around the state from July 2007 through June 2008. Each program consisted of four hours of classroom instruction, followed by 3-4 hours of field sessions in which queen production and replacement practices were demonstrated. The programs were attended by 138 beekeepers (an average of 23 per short course). Participants in the program were provided with equipment and manuals for producing quality queens, and some equipment to help encourage them to initiate queen production for their own use and for sale to other beekeepers. Follow up surveys are planned to evaluate program success and determine not only the number of beekeepers involved, but also the quality of queens produced. Overall response to the training programs has been excellent and we have received additional requests to present similar programs in other areas of the state. We plan to continue the program with the development of a selective breeding program designed to provide quality queens that are adapted to Virginia conditions.

Africanized Honey Bee Response

The occurrence of AHB in Florida and other Gulf Coast states has increased the potential for its accidental introduction into Virginia. This pest is not only a threat to honey bees, but also to domesticated animals and the general public. VDACS staff developed a new protocol to survey areas for presence of bee colonies. Previous sampling techniques were shown to be inadequate when competing resources were available. The changes in protocol resulted in improved detection of honey bees in a given area and the determination of hive locations. In addition the VDACS AHB trapping program was expanded to include truck stops and additional highway rest stops. These locations are likely points of entry of AHB swarms carried on vehicles traveling interstate highways from Gulf Coast states.

Response Guidelines were drafted for emergency responders and the general public. The guidelines include equipment and training requirements for individuals and agencies responding to incidents involving victims of honey bee stings. The guidelines are intended for use with AHB incidents. However, the recommendations provide assistance to emergency management personnel in handling other stinging insect situations. Revision of the VDACS AHB Action and Bee Spill Action Plans was completed to incorporate results of AHB response programs in infested states.

VDACS staff obtained advanced training from the U.S. Department of Agriculture (USDA) in the identification of AHB, and other honey bees pests and diseases. Laboratory equipment for the diagnosis of pests and diseases of the honey bee was obtained for each Plant and Pest Services regional office and subunit through a USDA Specialty Crop Grant awarded to VDACS. Beekeepers were encouraged to provide honey bee specimens from hives exhibiting unusual or unexplained defensive behavior, a characteristic of AHB. The overall response resulted in an increase in samples for AHB analysis. All samples were determined to be of European honey bee origin, indicating a continued absence of AHB in Virginia's hives and feral population.

Pollination Program

Research on Hive Number and Quality for Pollinating Virginia Crops

The decline in the number of honey bee colonies in Virginia has reduced the hives available for crop pollination. Fruits and vegetable producers have had an increasingly difficult time in obtaining the honey bees they need for the pollination of their crops. In addition a general decline in pollinator abundance has increased the problems faced by Virginia growers. In response we have initiated studies on the number and diversity of bee pollinators in several different cropping systems to get a better understanding of the extent of these problems, and to provide data that can serve as a baseline for the development of new recommendations for the pollination of specific crops. These studies will continue through the summer of 2008. Programs to increase beekeeper interest in pollination and the development of educational programs to promote pollination will be continued.

Promotion of Beekeeping to Increase Hive Numbers in Virginia

Beekeeping activities were extensively promoted throughout the past year to increase educational opportunities for beginning beekeepers. Classes and workshops were sponsored by local beekeeping groups, private entities, and public agencies. The promotion efforts resulted in a 3-fold increase in the number of beekeeping classes (22 total) offered in the spring of 2008 with a total audience of more than 600 people. VDACS staff and the VT Extension specialist participated in many of the beekeeping classes and workshops as instructors.

A total of 250 basic hive units were purchased for distribution to participants in beekeeping training programs across the state. The hive units were offered to participants in the beginner beekeeping classes. Equipment provided in this program is a cost sharing incentive to increase the number of beekeepers and beehives in the State. Recipients are anticipated to invest a minimum of \$200 in the purchase of additional beekeeping equipment, honey bees, and supplies for the maintenance of each of these hive units.

The information in this report was provided through Virginia Cooperative Extension in collaboration with the Virginia Department of Agriculture and Consumer Services.