



IPM Elements for Honey Bees in the Mid-Atlantic States

The purpose of this document is to consolidate current integrated approaches to honey bee pest management in the mid-Atlantic region. The goals are: 1) to form a general working definition of Integrated Pest Management (IPM) for honey bee management, and 2) to develop a system of assessing how well apiarists adopt IPM guidelines, and if their operations have implemented enough core practices to qualify them as "IPM Practitioners" under these guidelines.

Beekeepers should use this document and its sub-headings as a checklist of possible IPM practices. Apiarists should count only the activities they perform in their honey bee pest management practices and aim to be compliant with 80% of the activities listed below.

This document is intended to help beekeepers identify areas in their operations that possess strong IPM qualities and also point out areas for improvement. Beekeepers should attempt to incorporate the majority of these specific techniques into their usual production and maintenance practices, especially in areas where they fall short of the 80% goal.

Major Diseases, Pests, and Disorders of Mid-Atlantic Honey Bees

DISEASES	ARTHROPODS	VERTEBRATES/OTHER
<p style="text-align: center;"><u>Primary Diseases:</u> American Foulbrood Bee Paralysis Viruses Deformed Wing Viruses Nosema</p> <p style="text-align: center;"><u>Minor Diseases:</u> Black Queen Cell Virus Chalkbrood European Foulbrood Kashmir Bee Virus Sacbrood Stonebrood</p>	<p style="text-align: center;"><u>Primary Pests:</u> Varroa Mites Wax Moths Small Hive Beetles</p> <p style="text-align: center;"><u>Minor Pests:</u> Ants Bee Lice Cockroaches Dragonflies Earwigs Wasps (Yellow Jackets & Hornets) Robber Flies Termites Tracheal & External Mites</p>	<p style="text-align: center;"><u>Primary Pests:</u> Bears Mice Skunks</p> <p style="text-align: center;"><u>Minor Pests:</u> Birds Opossums Raccoons</p> <p style="text-align: center;"><u>Health-Related Disorders:</u> Colony Collapse Disorder</p>

	Check if done
I. SITE SELECTION/MAINTENANCE & HIVE PREPARATION:	
1. Choose a well-drained, sloped apiary site that is sunny, protected from the wind, easily accessible year-round, relatively hidden, and within a quarter mile of a clean water source (or provide a water source).	
2. Utilize hive stands to elevate hives and tilt them forward slightly to ensure water drainage. Orient colonies to face south or southeast.	
3. Use local package bees or nucs. Queens should be local and/or from disease/pest resistant-strains.	
4. Keep grass mowed around hives, or if using herbicides be sure to follow all label recommendations. (See Section V. Pesticide Safety and Efficacy.)	
II. HIVE MANAGEMENT PRACTICES: Timing of recommendations will vary with the state or region. Consult an Extension Agent or Apiary Specialist for more information.	
a. Spring Evaluation/Management: (3 to 5 colony checks in the spring)	
1. First exam (Late Winter) – Conduct a quick, visual evaluation of honey stores to determine if they are sufficient. Initiate supplementary feeding of pollen substitute between mid-January and early February; this can help improve colony health and population buildup.	

2. Second exam (Early March) – Evaluate food stores, queen condition, and colony strength.	
3. Third exam (Late March) – In late spring, inspect brood, assess queen, identify disease, implement swarm-prevention measures.	
4. Fourth exam (Mid-April) – Continue swarm prevention practices (see http://maarec.psu.edu/pdfs/Swarm_Prev_Control_PM.pdf for further information) and provide space as needed.	
5. Fifth exam (Late April / early May) – Add honey supers and reverse hive bodies, if necessary. (Avoid disturbing colonies during major nectar flows, except for quick inspections or to add additional hive bodies, if necessary.)	
b. Summer Evaluation/Management: (1 to 2 colony checks in the summer)	
1. Assess overall performance, e.g., honey production, tendency to rear brood and adjust rearing to nectar flows, and gentleness.	
2. Remove and process honey. (Quick processing of honey helps prevent problems with small hive beetles.)	
3. Inspect for diseases and evaluate mite population levels via sampling in late summer. Administer appropriate control methods, but only if treatment thresholds have been reached, and only after honey stores have been removed to avoid contamination issues. In particular, treatments for tracheal mites are no longer recommended unless population levels are high. Varroa mites should be treated according to threshold guidelines for your particular region (e.g., in Virginia, treat when 50-60 mites / 24 hours are counted using sticky boards).	
4. Evaluate queen condition. Good queens produce a solid brood pattern, similar-aged brood, and appear healthy.	
5. Requeen colonies, if necessary, between late-August and September. Plan to requeen at least every other year.	
c. Fall Evaluation/Management: (At least 2 colony checks during the fall)	
1. Evaluate colony strength (e.g., are there at least 30,000 individuals, 40 to 60 lbs. honey, and the equivalent of 3 to 5 frames of pollen). Supplement food stores or combine smaller colonies, if necessary.	
2. Identify presence of diseases or other pests. Implement disease-management strategies, if necessary.	
3. Make final winter preparations by reducing the lower hive entrance, adding an upper entrance, and placing a layer of absorbent material (e.g., newspaper) over the inner cover.	
4. Avoid colony inspections if poor weather conditions exist (e.g., periods of wet weather and/or when daytime temperatures are below 60°F).	
d. Winter Management: (One late-winter colony check is advisable)	
1. Check the colony periodically during the winter to ensure hive integrity (e.g., the hive cover is on securely and the hive entrance is unobstructed).	
2. Make a quick internal inspection of the colony in mid-January to assess its condition, but avoid leaving the hive open for an extended period because it causes stress to the bees.	
3. Initiate colony buildup and survival by adding supplementary pollen substitute in late January. (See Section IIa. Spring Evaluation/Management.)	

III. DISEASE MANAGEMENT:	
1. Develop and initiate a comb rotation practice, gradually replacing old comb with new comb. Each year, provide bees with a few frames of new comb so that over the course of 3 to 5 years all comb is replaced. This will help reduce disease prevalence.	
2. Use clean equipment and tools; transfer bees to clean equipment with new frames and foundation.	
3. Requeen with a different and/or hygienic honey bee variety.	
4. Learn to recognize and identify honey bee diseases, particularly brood diseases.	
5. Correctly identify and regularly monitor diseases BEFORE attempting chemical controls.	
6. American Foulbrood – Practice good management and sanitation techniques. Bees from infected colonies will usually recover after being shaken into clean equipment with new foundation. Always use clean hive tools and equipment to avoid disease transmission between colonies. Do not use prophylactic applications of antibiotics.	
7. Bee Paralysis Viruses – Requeen using a different honey bee strain. Add a frame of sealed brood from a healthy colony. Control varroa mites, which vector viruses.	
8. Deformed Wing Virus – Control varroa mites, which vector this virus.	
9. Nosema Disease – Practice good management and sanitation techniques. Sample colonies for Nosema, especially in summer. Treat with fumagilin B, if necessary. Limit colony stress by selecting good apiary sites. Always use clean hive tools and equipment to avoid disease transmission between colonies.	
IV. PEST MANAGEMENT: Be sure to correctly identify and regularly monitor pest populations BEFORE attempting chemical controls.	
a. Arthropod Management:	
1. Requeen colonies and/or use resistant honey bee varieties.	
2. Varroa mites – Utilize sampling procedures to determine mite infestation levels and implement cultural control practices, such as requeening or trapping mites in drone comb. Tolerant honey bee stocks exist. Chemicals should ONLY be used if mite population samples exceed the treatment thresholds for your region.	
3. Tracheal mites – Treatment is typically unnecessary unless sampling indicates otherwise. Resistant honey bee stocks are available.	
4. Wax moths – During winter, store equipment in a dry, non-insulated, unheated room with good air flow to avoid moth problems. Comb honey should be stored in the freezer. In summer, hive bodies with comb can be stored in a well-lit area and stacked on end to prevent wax moth infestation. PDB (paradichlorobenzene) is not recommended unless absolutely necessary.	
5. Small hive beetles – Store honey properly and do not leave supers containing honey open and vulnerable for any length of time before extraction. Comb should be kept in a location with low relative humidity (<50% RH) to keep beetle eggs from hatching. Use traps, freeze honey, or install hot lights in honey	

houses to minimize the risk of infestation.	
b. Vertebrate Management:	
1. Follow all wildlife management laws.	
2. Use physical barriers, exclusion fencing, traps, and other deterrents to repel vertebrate pests. Chicken wire placed in front of hives will discourage skunks.	
3. Avoid establishing bee yards in areas where vertebrate pests are more likely to occur (e.g., within bear home ranges).	
V. PESTICIDE SAFETY & EFFICACY:	
1. Correctly identify and regularly monitor pest populations BEFORE attempting chemical controls.	
2. When pesticides are to be utilized, choose one based on efficacy, reasonable cost, and safety to applicator, bees, natural enemies, and the environment. Avoid pesticide use around hives unless it is specifically necessary for control.	
3. Purchase chemicals from a reputable dealer and utilize only those that are registered for treating honey bees infested with the target pest or disease. Do not use homemade preparations made from field-use pesticide formulations.	
4. Follow all pesticide labeling explicitly, including the use of appropriate personal protective equipment (PPE). Simple latex gloves are affordable, readily available, disposable, and quite effective in limiting exposure to chemicals as well as repelling bee stings. Furthermore, disease transmission between hives can be reduced by changing your gloves frequently.	
5. Apply pesticides in accordance with resistance management guidelines when resistance development is an issue.	
6. Develop and initiate a comb rotation practice, gradually replacing old comb with new comb. Each year, provide bees with a few frames of new comb so that over the course of 3 to 5 years all comb is replaced. This will help reduce miticide buildup in the comb and potential sublethal effects on the bees or humans who consume honey.	
7. Maintain accurate and complete pesticide application records.	
8. Follow proper storage and disposal guidelines. Store pesticides where they will be protected from the elements, but preferably not in your home. Contact your local Extension Agent if you have waste pesticides and are unsure how to safely dispose of them.	
9. Discuss with a local Extension Agent your legal obligations as they pertain to pesticide usage.	
10. Attend specialized training prior to using any fumigants (e.g., programs given by Degesch America, Inc. or local Extension offices).	
VI. BEEKEEPER EDUCATION: Join local beekeeper association(s) and cultivate relationships with Cooperative Extension Agents.	
1. Attend local and regional beekeeper meetings each year.	
2. Obtain current fact sheets and guides for honey bee colony management from sources such as MAAREC or your local beekeeping association.	
3. Participate in local extension projects, short courses on honey production and pest ID/management.	

4. Earn a pesticide applicator license and regularly attend Pesticide Applicator Recertification Conferences.	
5. Read online newsletters produced by sources such as MAAREC or your local beekeeping association.	
6. Implement IPM practices not currently used in your honey bee pest management program on a limited number of colonies and gauge their success.	
7. Participate in your local Master Beekeeper Program, where available.	

FOR FURTHER INFORMATION:

- Mid-Atlantic Apiculture Research and Extension Consortium, <http://maarec.cas.psu.edu/>
- Virginia State Beekeepers' Association, <http://www.virginiabeekeepers.org/>
- North Carolina State Beekeepers' Association, <http://www.ncbeekeepers.org/>
- Delaware Beekeeping Contacts, <http://maarec.cas.psu.edu/TFGroups/DEgroups.html>
- Maryland State Beekeepers' Association, <http://www.msbeea.org/main/home.html>
- New Jersey Beekeepers' Association, <http://www.njbeekeepers.org/index.htm>
- Pennsylvania State Beekeepers' Association, <http://www.pastatebeekeepers.org/>
- West Virginia Beekeepers' Association, <http://www.wvbeekeepers.org/>
- South Carolina Beekeepers' Association, <http://www.scstatebeekeepers.org/>
- Virginia Tech Pesticide Programs, <http://www.vtpp.org>
- Southern Region IPM Center, <http://www.sripmc.org>
- Pest Management Strategic Plan for Honey Bees in the Mid-Atlantic States, <http://www.ipmcenters.org/pmsp/pdf/MidAtlanticHoneyBeePMSP.pdf>
- Virginia Honey Crop Profile, <http://www.ipmcenters.org/cropprofiles/docs/VAhoneybees.pdf>

WRITTEN AND DEVELOPED BY:

Rick Fell	rfell@vt.edu	Professor, Virginia Tech Dept. of Entomology 324 Price Hall, MC 0319 Blacksburg, VA 24061
Holly Gatton	hgatton@vt.edu	Project Manager, Virginia Tech Pesticide Programs Dept. of Entomology 303 Agnew Hall, MC 0409 Blacksburg, VA 24061
David Tarpy	david_tarpy@ncsu.edu	Extension Apiculturist, North Carolina State Univ. Dept. of Entomology Campus Box 7613 Raleigh, NC 27695-7613
Steve Toth	steve_toth@ncsu.edu	Associate Director, Southern Region IPM Center Campus Box 7613 Raleigh, NC 27695-7613
Mike Weaver	mweaver@vt.edu	Director, Virginia Tech Pesticide Programs Dept. of Entomology 304 Agnew Hall, MC 0409 Blacksburg, VA 24061