

# Beekeeping in West Virginia



**West Virginia Department of Agriculture**

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**Register on-line @**  
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*Revised April 2020*

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"Package" means any container or wrappings in which a product is enclosed for use in the delivery or display of that product to retail purchasers.  
"Person" means any individual, firm, corporation, association or any other group of people or business unit whether or not they are incorporated.

*§19-2D-2. Labeling.*

(a) No person shall manufacture, package, label, sell, keep for sale, expose or offer for sale, any article or product represented to be honey or to contain honey unless the product ingredient is honey, as defined in this article.  
(b) No person shall sell, expose or offer for sale any product, compound or mixture of sugars labeled as or for honey, with or without honey as a constituent ingredient, unless the product, compound or mixture of sugars is labeled "imitation honey" with the word "imitation" appearing in letters equal in size to the letters used to spell "honey."

*§19-2D-3. Penalties.*

Any person who violates any of the provisions of this article shall be guilty of a misdemeanor, and, upon conviction thereof, shall, for the first offense, be fined not more than one hundred dollars, and upon conviction for each subsequent offense be fined not more than five hundred dollars.

**West Virginia Department of Agriculture**  
Apiary Inspection and Registration Program  
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equipment has been abandoned, he or she shall notify, in writing, the owner or operator that the apiary or bee equipment has been declared abandoned. The owner or operator has thirty days from the date of notice to enclose, dispose of or destroy the abandoned apiary or bee equipment in a manner approved by the commissioner. If the owner or operator of the abandoned apiary or bee equipment cannot be located after reasonable inquiry, notice shall be provided to the owner of the real property on which the apiary or bee equipment is located. If the apiary or bee equipment continues to be abandoned for a period of thirty days thereafter, the commissioner may seize the apiary or bee equipment and take such action as is necessary to dispose of or to destroy the apiary or bee equipment as conditions warrant.

**§19-13-7. Bees brought into state to carry inspection certificate; Commissioner to be notified; interstate movement of bees.**

- (a) It shall be unlawful for any person to transport bees, used bee equipment or used appliances into West Virginia, unless accompanied by a certificate of inspection signed by an authorized state or federal inspection official verifying the actual inspection of the bees, used bee equipment or used appliances within thirty days preceding the date of shipment and certifying the absence of honeybee pests.
- (b) Prior to the movement of any bees, used bee equipment or used appliances into West Virginia, and as a prerequisite to the issuance of a permit of entry, the commissioner shall be furnished by the owner, transporter, or operator the following:
- (1) The exact location or destination of the bees, used bee equipment or used appliances.
  - (2) Name and address of the owner of the property where the bees, used bee equipment or used appliances will be located.
  - (3) The exact number of colonies or amount of used bee equipment or used appliances in the shipment.
  - (4) A copy of the inspection certificate issued by the state or federal inspector.
- The Commissioner shall issue a temporary or permanent permit of entry. A temporary permit may not exceed sixty days.

If the Commissioner denies the request for an entry permit, he or she shall notify the owner, operator or transporter of the denial and the reasons there for.

**§19-13-8.** Repealed. Acts, 2003 Reg. Sess., Ch. 8.

## IMITATION HONEY PRODUCT LAW

**§19-2D-1. Definitions**

"Honey" means the nectar and saccharine exudation of plants as gathered, modified and stored in comb by honeybees. "Imitation honey" means any mixture of sugars with or without honey as one of the constituent ingredients, which has been manufactured to represent honey.

"Label" means all written, printed or graphic information upon, attached to or accompanying product containers or wrappers.

# Introduction

Honeybees produce wax and a nutritious sweet food. They have a history of being managed since the domestication of animals. Beekeeping in West Virginia began with individuals keeping bees in log hives often called gums. Some bees were managed in hives made out of rough sawed lumber and they were called box hives. Records show that these honeybee colonies produced from 14 to 24 pounds of honey on average each year.

In the late 1800s a beekeeper, Lorenzo Langstroth, discovered that honeybees maintained a  $\frac{3}{16}$ -inch space in which they could move about. Areas greater than that would cause the bees to build comb while areas less than  $\frac{5}{16}$  inches would be sealed with



**Beekeeping in 1912.**

wax and propolis. With the onset of this discovery he was able to design the 10-frame hive now called the Langstroth hive. This has become the standard for beekeepers in America and many other countries. Being able to remove the frames from the colony without destroying the comb had many advantages. Beekeeping was revolutionized with the ability to produce over 100 pounds of honey per colony with the Langstroth hive. An individual was now able to make a modest living derived solely from beekeeping. Commercial beekeeping was established with migratory beekeeping for the production of honey and pollination. An industry of queen rearing and package bee business was developed in the southern states which allowed beekeepers in the northern states to replace colonies that had died during the winter.

Today the package bee industry continues to change since Africanized Honeybees (AHB) are established in some southern states. Beekeepers in West Virginia are starting to produce their own nucleus bee colonies and queens for replacement and for sale to prevent the spread of this undesirable strain of bee into West Virginia.

With the ability to move bees and used equipment around easily, American Foulbrood disease also increased, therefore West Virginia began writing regulations to prevent the spread of honeybee disease. West Virginia implemented The Best Management Practices to protect beekeepers from frivolous law suits and the public from nuisance bee stings. This program is voluntary for beekeepers in West Virginia.

WVDA's Agribusiness Division provides assistance with labeling for honey and all food products produced in West Virginia. This Division has a West Virginia Grown logo that can be purchased for use on products produced in West Virginia.

established by this section does not apply to intentional tortious conduct or acts or omissions constituting gross negligence.

(d) The commissioner shall promulgate legislative rules in accordance with article three, chapter twenty-nine-a of this code regarding the best management standards for the operation of apiaries. The limitation on liability contained in subsection (c) shall not take effect until legislative rules are promulgated in accordance with article three, chapter twenty-nine-a of this code.

**§19-13-5. Right of entry; apiary inspections; quarantines.**

(a) During reasonable working hours, the Commissioner may enter upon any premises to access any apiary for the purpose of inspecting or sampling. No person shall obstruct or hinder the commissioner in the discharge of his or her duties.

(b) The Commissioner shall inspect, as practicable, all colonies of honeybees domiciled within the State of West Virginia. If any honeybee pest is found in the apiary, the Commissioner shall immediately notify, in writing, the owner or operator stating the type of honeybee pest and whether it may be successfully treated or not.

In cases where the honeybee pest is subject to treatment, the Commissioner shall specify and direct the necessary treatment, which will be administered by the owner or operator, within fourteen days of the date of notice. If not treated, the colonies contained in the apiary in which the honeybee pests are found shall be depopulated without remuneration to the owner. All bee hives and related bee equipment found in any diseased apiary shall be destroyed, sterilized or treated in a manner approved by and under the direction of the commissioner.

(c) All apiaries producing queens, packaged bees or nuclei colonies for distribution shall be inspected each year. If honeybee pests are found in the apiary, the Commissioner shall immediately notify, in writing, the owner or operator, and thereafter it shall be unlawful for the owner or operator to ship, sell or give away any queen bees, appliances, packaged bees, full colonies or nuclei colonies from the apiary until the honeybee pests have been controlled to the satisfaction of the commissioner.

(d) The Commissioner shall quarantine all apiaries, bees, bee equipment, bee products, appliances and premises infected by honeybee pests. The notice of quarantine shall specify the name of the honeybee pest, the premises or apiary quarantined, bee equipment, bee products and appliances regulated and all conditions governing movement. The Commissioner may adopt other orders to prevent the introduction of or to contain the spread of honeybee pests that are capable of being transported by bees, appliances or bee equipment.

The order shall set forth the conditions governing the movement of the regulated items.

The Commissioner shall rescind, in writing, quarantines and other orders when he or she determines the need no longer exists.

**§19-13-6. Abandoned apiaries and equipment; notice.**

It shall be unlawful for a person to knowingly maintain an abandoned apiary or bee equipment. When the Commissioner determines that an apiary or bee

period of enforced isolation to contain and prevent the spread of honeybee pests. (18) "Sterilized or sterilization" means to treat and neutralize honeybee pests by means of steam autoclave, pit incineration, or by any other acceptable method which the commissioner determines effective for control of honeybee pests.

**§19-13-3. Commissioner's powers and duties; rule-making authority; apiary education; cooperation with governmental agencies; seizure of infected bees and bee equipment.**

(a) The Commissioner may propose rules for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code: (1) To effectively eradicate, suppress or control honeybee pests as far as may be practical; (2) to regulate the keeping and maintaining of bees, bee equipment, queen breeding equipment, apiaries and appliances; (3) to regulate treatments, re-treatments, and fees for the services; and (4) any other rules necessary to effectuate the enforcement of this article.

(b) The Commissioner is authorized to conduct apiary education in a manner which advances and promotes bee culture in West Virginia.

(c) The Commissioner is authorized to cooperate with the federal government and its agencies, departments and instrumentalities; other West Virginia agencies, departments, divisions, or political subdivisions; and any other state or commonwealth and its agencies, departments or political subdivisions, in order to carry out the effective administration of this article.

(d) The Commissioner is authorized to stop the delivery of, to seize, to destroy, to treat or to order returned to point of origin, at the owner's expense, all appliances, bees, bee equipment, bee products or hives transported into or within this state, found to be infected with honeybee pests regardless of whether a valid certificate of inspection is attached.

**§19-13-4. Registration of bees; identification of apiaries.**

(a) All persons keeping bees in this state shall apply for a certificate of registration for bee keeping from the Commissioner, within ten days of the date that bees are acquired, by notifying the Commissioner, in writing, of the number and location of colonies they own or rent, or which they keep for someone else, whether the bees are located on their own property or someone else's property. All apiary certificates of registration expire on the 30th day of June of each year and must be renewed annually.

(b) All persons owning or operating an apiary which is not located on their own property must post the name and address of the owner or operator in a conspicuous place in the apiary.

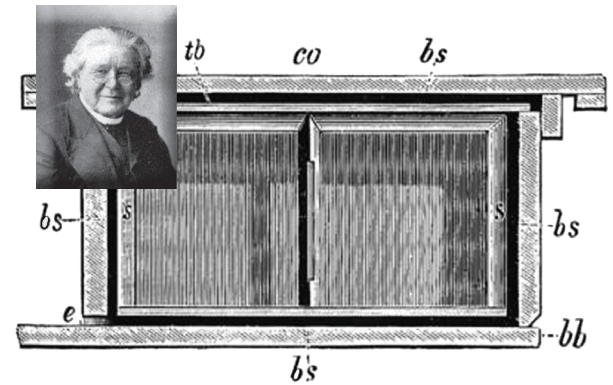
(c) A person who:

(1) Owns and operates an apiary;

(2) Is registered with the commissioner; and

(3) Operates the apiary in a reasonable manner and in conformance with the West Virginia Department of Agriculture's written best management practices provided by rule, is not liable for any personal injury or property damage that occurs in connection with the keeping and maintaining of bees, bee equipment, queen breeding equipment, apiaries and appliances. The limitation of liability

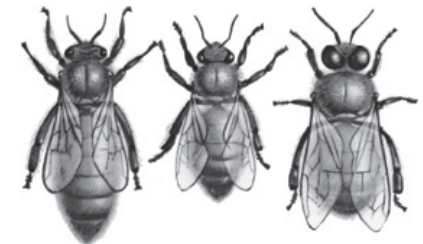
In the late 1800s a beekeeper, Lorenzo Langstroth (see photo at right), discovered that honeybees maintained a 3/8 inch space in which they could move about. Areas greater than that would cause the bees to build comb while areas less than 5/16 inch would be sealed with wax and propolis. With the onset of this discovery he was able designed the 10-frame hive now called the Langstroth hive.



SECTION OF LANGSTROTH'S ORIGINAL HIVE AND FRAME  
co, Cover; bb, Bottom Board; and e, Entrance to Hive; bs, Bee-space;  
tb, Top Bar; and s, Sides of Frames.

**The Honeybee Colony Cast & Development**

Honeybees are social insects living and working together in the colony. There are three casts making up the colony with each having a well defined duty. They are the queen, the workers and the drones. Together, they make up a population of 30,000 to 50,000 bees.



QUEEN BEE      WORKER BEE      DRONE BEE

Each colony will have only one queen, and she is identified as having a long extended abdomen with the ability to lay fertile or unfertile eggs. At eight days after emerging from her cell, the queen bee will begin a series of flights, weather permitting. The first are orientation flights followed by a mating flight or flights. These flights are usually concluded by the twelfth day of her life. The only other time that she may leave the colony would be during swarming. Laying eggs is her primary function in the colony, of which she may lay up to 2,500 in one day. This number is generally determined by the amount of food being brought into the colony daily. She will use her back legs to determine the cell size and make the decision as to whether to lay a fertilized or unfertilized egg. Worker cells are smaller than drone cells. Fertilized eggs are destined to become worker bees, but if the colony loses its queen or they prepare to swarm, the fertilized egg can become a queen bee. Unfertilized eggs will only become drones. The queen bee has a stinger which is smooth without barbs so that she can sting repeatedly without it becoming dislodged. She used to live up to eight years. It is recommended that apiarists replace the queen every 1-2 years.

**QUEEN** – Each colony has one queen, and she is identified as having a long extended abdomen with the ability to lay fertile or unfertile eggs.

**WORKERS** – Most of the colonies population is made up of workers, which are undeveloped females. They are the smallest bees in the colony. Their duties change with age.

**DRONES** – The drone is the largest of the bees in the colony. He has one main purpose and that is to find a queen bee and mate with her. He will mate only once in life and then he will die.

The queen develops in the shortest amount of time and this is important as a colony cannot survive long without her. It is very important to have a laying queen to replace workers whose life is very short during the foraging season. In order to produce a queen, a fertilized egg is laid in a cell. If the colony is preparing to swarm, the cell will be hanging vertical in the colony. An egg that is laid in a worker cell, which is horizontal, can also become a queen. This type of queen cell, called a supersedure cell will start out horizontal and be drawn into a vertical cell.

It will take both fertilized and unfertilized eggs three days to develop before they hatch. During this time the developing larvae will feed on the egg's yolk. After hatching, the fertilized egg destined to become a queen will be fed an exclusive diet of royal jelly produced by the worker bees until her cell is capped over. By feeding only royal jelly to the larvae, her ovaries will fully develop and this will destine her to become a queen bee. The queen cell will be capped at around 7½ days. The larva will become a pupa by day 11 and the fully developed queen will emerge at 15½-16 days. After hatching she will begin orientation flights at 8 days and will complete her mating at 12 days weather permitting. She will then begin her life as the queen and will not leave the colony to mate again.

Most of the colony's population is made up of workers, which are unfertilized females. They are the smallest bees in the colony. Their duties change with age. After first emerging from their cells they become house bees, cleaning out cells in the colony. Within a few days they become nurse bees feeding and caring for the brood in the colony. This is followed by food storage and guarding the colony. Worker bees have a barbed stinger which is often left in the attacker after she stings them. At last she becomes a forager, gathering nectar and pollen until her wings wear out and she is unable to make the trip back home. Her life span can range from six weeks in the summer to six months during the winter time in West Virginia. There are many diseases that will shorten the honeybee's life also. A beekeeper will need to manage these if the worker is to remain healthy. After the colony has remained dormant during the winter a worker can return to do some of her old duties like cleaning the colony and feeding the brood.

A worker, which is developed from a fertilized egg, hatches in three days after it is laid. After hatching it feeds on a diet of royal jelly produced by the worker bees for the first 2½ to 3 days and then it is fed only honey and pollen. The cell is capped at 9 days and the larva will have changed into a pupa by day 12. Starting from an egg the fully developed adult worker will emerge in 21 days from the cell.

The drone is the largest of the bees in the colony. He has one main purpose and that is to find a queen bee and mate with her. He will mate only once in life and then he will die. Prior to searching for a mate, he will remain on the brood combs providing heat while waiting to become mature. After reaching his maturity he will be found resting on the outer combs in the colony before taking flights to drone congregating areas in search of a mate.

The drone is reared from an unfertile egg laid by the queen in a horizontal cell which is much larger than a worker cell. The egg hatches at three days and is capped at 10 days. By the 13th day, the larva has changed into a pupa. Starting from an egg the fully developed drone will emerge at 24 days from the cell.

- (1) "Abandoned apiary" means any apiary in which twenty-five percent or more of the colonies are dead or diseased, or the death or disarray of the colonies exposes them to robbing, or diseased or potentially diseased abandoned bee equipment which may jeopardize the welfare of neighboring colonies.
- (2) "Apiary" means any place where one or more colonies or nuclei of bees are kept or where bee equipment is stored.
- (3) "Appliances" means any apparatus, tool, machine or other device, used in the handling and manipulating of bees, honey, wax and hives. It also means any container of honey and wax that may be used in any apiary or in transporting bees and their products and apiary supplies.
- (4) "Bees" means any stage of the common hive or honeybee (*Apis mellifera*), or other species of the genus *Apis*.
- (5) "Bee equipment" means hives, supers, frames, veils, gloves or any other appliances.
- (6) "Bee products" means honey, bees wax, pollen, propolis and royal jelly.
- (7) "Colony" means the hive and includes bees, comb, honey and bee equipment.
- (8) "Commissioner" means the Commissioner of the Department of Agriculture of the State of West Virginia or a duly authorized employee.
- (9) "Control agents or control mechanisms" means any method of chemical or mechanical control to suppress or eradicate an apiary disease, pest, or parasitic infestation in an apiary or the colonies contained therein.
- (10) "Department" means the Department of Agriculture of the State of West Virginia.
- (11) "Hive" means a frame hive, box hive, box, barrel, log, gum, skep or any other receptacle or container, natural or artificial, or any part thereof, which may be used or employed as a domicile for bees.
- (12) "Honeybee pest" means American foulbrood (*Bacillus larvae*), European foulbrood (*Melissococcus pluton*), Varroa mite (*Varroa destructor*), honeybee tracheal mite (*Acarapis woodi*), or any other virus or infectious or parasitic organism determined by the commissioner to be transmissible to other bee colonies and that represents a threat to beekeeping in West Virginia.
- (13) "Nuclei" means the removal of a split portion or division of any colony of honeybees for the express purpose of creating a numerical increase in colonies for honey production, pollination service or monetary gain through sale of honeybees.
- (14) "Packaged bees" means bees shipped in combless packages accompanied by a valid certificate of health from an authorized state or federal agency verifying the absence or presence of any infectious or communicable diseases or parasitic infestations, and further providing that no honey has been used for food while in transit or that any honey used as food in transit was properly sterilized.
- (15) "Person" means corporations, partnerships, associations, societies, individuals or group of individuals or any employee, servant or agent acting for or employed by any person.
- (16) "Premises" means any parcel of real estate and structures in which bee equipment, bees, bee products and bee appliances are or may be utilized for storage purposes.
- (17) "Quarantine" means a declaration by the Commissioner which specifies a



4.2.d.(3) Shall not keep an apiary within 50 feet of an established animal that is tethered, kennelled or otherwise prevented from escaping a stinging incident;

4.2.d.(4) Should avoid opening colonies for inspection or manipulation when neighbors are present or in the immediate vicinity;

4.2.d.(5) Should avoid purchasing queens and honeybees from areas that are documented as having been designated as an established Africanized Honeybee (AHB) zone;

4.2.d.(6) Shall manage all colonies to minimize swarming;

4.2.d.(7) Shall replace queens in colonies exhibiting defensive behaviour that may be injurious to the general public or domesticated animals as determined by Department's apiary staff.

4.2.e. A collection site for holding colonies prior to shipment, or a staging area, shall have undeveloped property surrounded by a natural barrier and shall be marked with a honeybee caution sign.

4.2.f. Anyone transporting colonies shall secure the load and screen entrances or place a net over the colonies to prevent bees from escaping.

4.2.g. West Virginia Beekeepers shall properly discard all pesticides and other control agents after use according to label directions.

4.2.h. Honeybees used for public demonstrations, entertainment or educational purposes shall be enclosed so as to avoid the release of honeybees to the public.

4.2.i. In the event that Africanized Honeybee (AHB) infestation is determined to be established in West Virginia by the Department, additional rules promulgated by the Commissioner of Agriculture will be followed.

## THE WEST VIRGINIA APIARY ACT

### ARTICLE 13. INSPECTION AND PROTECTION OF APICULTURE.

#### §19-13-1. Short title.

This article may be cited as "The West Virginia Apiary Act."

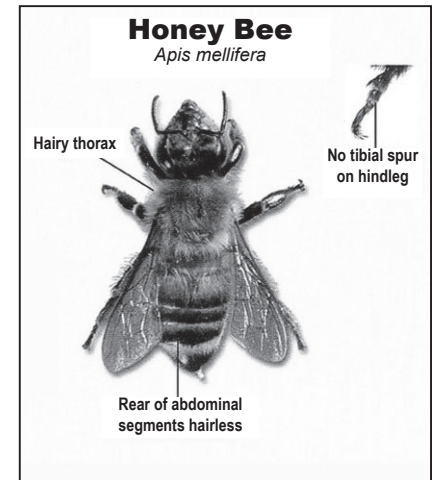
#### §19-13-2. Definitions.

For the purpose of this article, the term:

## Races of Bees in the United States

In the United States there is only one species of honeybee, *Apis mellifera* (see right). There are several races

which are subdivisions of the species. There are a total of four species of honeybees of which three do not exist in the United States. The races that are present in the United States are the Italian honeybees (*A.m. ligusta*), Caucasian honeybees (*A.m. caucasica*), Carniolan honeybees (*A.m. carnica*), Western European honeybees (*A.m. mellifera*) and the African honeybees (*A.m. scutellata*). There are also hybrids of these races such as Buckfast honeybees, Cordovan honeybees, and Russian honeybees. These are the most commonly available honeybees that beekeepers use.



Africanized Honeybees (AHB) are listed above, but are not kept by beekeepers in the United States. Their defensive traits are so bad it makes them difficult to manage without an overwhelming number of stings. This trait is acceptable in their native country, but is considered a dangerous health risk in the United States. It is against the law to try and manage this race of bee in West Virginia and other states. If you have reason to suspect that AHB have colonized on or near your property please contact the WVDA's apiary staff for assistance.

## Working a Colony of Bees

Honeybees have been managed for as long as we have records. Smoke has been applied in order to reduce the colony's defensive behavior. When smoke is properly applied to a colony of bees, they will remain docile and can be manipulated easily. The only exception is the Africanized Honeybee (AHB).

A beekeeper introduces 2-3 puffs of smoke into the entrance of the colony then moves to the back of the hive and gently lifts the lid and applies a puff of smoke. As you progress into the colony, smoke is applied under the inner cover at the moment it is raised and a short pause at this time will allow the smoke to disperse throughout the colony as it is removed. It is possible to use too much smoke and cause the bees to begin running out of the hive, so never blow smoke continually down into the hive. It will take practice and experience in determining what the right amount is. Having an experienced beekeeper to help is the best way to learn by observing his/her actions. Always remember to remove one of the outer two frames first when working in an area that the queen may occupy. As frames are removed, use a frame holder or place them on the ground on edge leaning against the hive entrance. Never leave frames of honey outside the hive for very long as this will cause the bees to start robbing the honey from the frame. When a super is removed puff smoke between the two before you completely remove the top one to continue to keep the bees calm. If the bees get out of control, it is not possible to

stop this so the hive should be reassembled and worked on another day. Bees will react differently as conditions, such as nectar flows and weather changes.

When examining the brood frames the outside temperature should be above 50°F, sunny and the wind should be calm. Keep the amount of time that you are working in the hive as short as possible.

If your colony does not remain calm when it is smoked you may need to replace the queen with a gentler breed or stock. It will take time to determine if you have a defensive colony or if it is a reaction to the way you are working through them.



**Use smoke when working with a colony of bees to keep them calm.**

## Stings

When a person takes up the art of beekeeping, eventually they will get stung and any person who is subject to get near the hive will have the same risk. Before starting into beekeeping a person should determine if they are able to physically tolerate stinging from the honeybees. Some individuals can have a reaction to bee stings that require medical attention. When a person is stung by a honeybee, the venom sac is dislodged from the bee and will remain in the person's skin. The amount of

time that the venom sac has to pump venom into a person, who tolerates stings without a severe reaction, will have an effect on the amount of swelling and pain involved in the sting. To sum this up, it is best to remove the stinger as quickly as possible without compressing venom from the sac into the flesh. Beekeepers normally will use their hive tool to scrap out the stinger as this works very well. A normal reaction is swelling and redness in the area of the sting. If swelling or a rash occurs in other parts of the body this is not a normal reaction. If a person experiences difficulty in breathing or a swelling of the throat they should seek immediate medical attention. A person who will come into contact with honeybees and has the potential of getting stung should talk to their physicians about how to take precautions in the event of anaphylactic shock.

## Honey Plants in WV

Most of West Virginia's beekeepers produce the majority of the state's honey from Locust, Tulip Poplar and Basswood blossoms. These are considered to be the state's major honey plants. Due to our diverse terrain many other varietal honey crops can also be produced, but in lesser quantities. Sources such as blackberry, aster,

**Locust, Tulip Poplar (seen at right) and Basswood blossoms are considered to be the state's major honey plants.**



## WVDA BEST MANAGEMENT PRACTICES

The WVDA works to protect the public as well as the general beekeeper. In doing so we have produced The West Virginia Honeybee Best Management Practices guidelines. This is a voluntary program in which WV registered beekeepers can receive limits on liability by signing a written agreement. Beekeepers must agree to follow §61-2-4 as describe under Limits of Liability.

§61-2-4. Limits on Liability.

4.1. A beekeeper may obtain limits on liability who:

4.1.a. Signs a Honeybee Best Management Practices compliance agreement to be kept on file at the West Virginia Department of Agriculture headquarters; and

4.1.b. Voluntarily conforms with Honeybee Best Management Practices contained in subsection 4.2. of this rule.

4.2. West Virginia Honeybee Best Management Practices (HBBMP):

4.2.a. West Virginia Beekeepers shall post a honeybee caution sign in or near the apiary.

4.2.b. West Virginia Beekeepers shall limit the number of hives in relation to property lot size in accordance with the following:

4.2.b.(1) Less than 1/2 acre - 4 colonies (1/2 acre = 21,780 sq. ft., roughly 100 ft. x 218 ft.)

4.2.b.(2) More than 1/2 acre, less than 1 acre - 6 colonies (1 acre = 43,560 sq. ft., roughly 150 ft. x 290 ft.); and

4.2.b.(3) 1 acre or more - 8 colonies (1 acre = 43,560 sq. ft., roughly 150 ft. x 290 ft.)

4.2.c. Regardless of lot size: If all hives are situated at least 200 feet in any direction from all property lines of the lot on which the apiary is situated, or as long as all adjoining property that falls within a 200-foot radius of any hive is undeveloped property, there are no limit on the number of hives.

4.2.d. West Virginia beekeepers:

4.2.d.(1) Shall have hive entrances face away from neighboring property and in such a direction that bees fly across the beekeeper's property a sufficient distance to gain a height of six feet. If bordering property is within a distance of 50 feet, the beekeeper shall use barriers (hedges, shrubs or fencing six feet high) to redirect the bees' flight pathway and establish bee flight pathways above head height;

4.2.d.(2) Shall maintain a water source near the colonies at a distance less than the nearest unnatural water supply;

can be greatly impacted. Other climatic conditions such as a nectar dearth will cause stress. If this occurs prior to winter the colony survival rate is decreased. See Feeding in this book on how to correct this problem. Honeybees strive to maintain a clean environment in the colony. When a bee becomes sick and is going to die it will fly away from the colony so that the disease or pest will not remain a threat to the rest of the bee population. Also, when larvae or pupae die they are quickly removed and discarded a good distance from the colony. With the presence of parasitic mites, brood death is not uncommon. When a population of Varroa mites is detected at more than 3-10 mites per 100 bees, this can cause damage. According to USDA, colonies exceeding this threshold should be treated to reduce Varroa mite loads as soon as possible. As Varroa mite populations increase to threshold limits during the summer, adult bees will hatch from their cells with deformed wings; brood will die in large numbers and have the appearance of AFB and EFB. This condition is called Parasitic Mite Syndrome. It has also been called by USDA as snotty brood, because of its appearance. This is a common problem observed by WVDA apiary staff during July and into fall when mite populations were not properly controlled during the previous fall or during the spring. See also Varroa & tracheal mites in this book.

We will only mention that there are many viruses that affect the health of the honeybee. Most of the time viruses go undetected until the colony becomes stressed by heavy mite loads or a combination of food shortage and mites.

Most common problems have been presented throughout this book with information on both prevention and the actions needed to correct them. We did not cover colony collapse disorder as this diagnosis has not been confirmed here in West Virginia. Investigation into colony death has usually been caused from improper treatments, no treatment or ineffective treatments due to resistance. Also colony death frequently comes from a lost queen, which results in a laying worker. When a problem occurs and you are unable to diagnosis you can contact a WVDA apiary inspector for assistance.

## Insurance for Beekeepers

Insurance is available for beekeepers through the Farm Service Agency. Beekeepers should contact their local agency to find out how to apply as this service is a government service and can change each year and will have different applications for different situations.



goldenrod, sumac, sourwood, maple, redbud, autumn olive, Japanese knotweed, Spanish needle, dandelion, buckwheat, alfalfa, sweet clover, and thistle are some of the minor sources of nectars available for honeybees to produce a surplus for harvest. While WV beekeepers may have the opportunity to produce a good variety of different honey, only the first three mentioned enable colonies to produce an average of 80 to over 100 pounds each during a good honey season. Fortunately for beekeepers, Tulip Poplar and locust which bloom in the spring are found in most areas. Basswood is only found in the steep mountainous areas. It provides colonies with a food source during early July, a time when colonies in most areas of the state are unable to find food with good nutrition. A honey flow of Goldenrod and aster beginning in mid-August will help colonies build populations of bees for winter and have excellent food stores.

## Necessary Equipment

A beekeeper will need personal equipment to protect them from being stung by the bees, equipment to house the bees and equipment with which to work the bees. All of these will vary from beekeeper to beekeeper as to exactly what is needed. We will provide only the basics for these three necessities.

Personal protection for eyes and ears is essential. Getting stung in these areas could cause serious loss of either. A bee veil, purchased from a bee supply company, will provide the protection needed for the entire head. The styles vary from veils that fit over a hat to jackets or coverall with veils. It will be the decision of the individual as to what is used, but protection for the head is very important. Gloves are often used by beginners until they achieve confidence and the ability to work with the bees without disturbing them into stinging their hands.

As described in the introduction, a standard hive size is commonly used by beekeepers. Some will drift away to some of the different styles, but usually will find that the standard Langstroth hive is unbeatable when it comes to management for pollination and honey production. Hives that force bees to work horizontal instead of vertical should not be used for over wintering bees in West Virginia. Bees must be able to move to the honey during the winter and this is easy for them if the honey is above the cluster. Bees will store food in summer starting at the top and begin working down, and will then feed upwards during the winter. When food stores are to the side, the cluster of bees will often starve as they are unable to break cluster to find these stores of food.

The equipment boxes, which are all called supers, will need to have an outside dimension of 16 $\frac{1}{4}$  inches by 19 $\frac{7}{8}$  inches. Supers are given names according to their size. The deep super is 9 $\frac{5}{8}$  inches high, the medium is 6 $\frac{5}{8}$  inches high, the shallow is 5 $\frac{11}{16}$  inches high and the extra shallow, which is used for comb honey production is 4 $\frac{3}{4}$  inches high. Generally, the deep super is used for brood production and may also be called the hive body. A second super is used on top of the deep to store the bees' winter food. It may be a deep or a medium super, depending on the beekeeper's preference. Some beekeepers call a medium super an Illinois super. The shallow and extra shallow supers are used for the production of honey for the beekeeper mostly due to the weight of the larger supers when filled with honey.

All supers will need to have frames installed with a sheet of foundation. The size of the frame will depend on the size of the super in which they are placed.

The frame will rest on grooves in the short sides of the super and be 3/16 of an inch below the top of the super. The space from the bottom of the frame to the bottom of the super will also be 3/16 of an inch. By having a 3/16 inch space above and below the frames, will allow a 3/8-inch bee space between frames when the supers are stacked on top of each other. When nailing the frames together be sure to use the manufactures suggestions for nail size and placement. If the frame is not properly assembled it may come apart when it is removed from the super.

Foundation is necessary to prevent the bees from constructing combs that can't be removed from the super. The foundation must be secure in the center of the frame to produce proper bee space from one comb to the other. When the foundation bows out from the center the cells will be shallow on one side and to deep on the other side. We recommend using the standard cell size for foundation.

A deep super will need to be placed on a bottom board which is 16¼ inches wide and 22 inches long. The bottom board will have a ¾ inch rim on the top side and a 3/8-inch rim on the bottom side with one end open. The ¾ inch side is generally on top and the hive body is placed on this. Another deep or medium super is set on the first deep box and always remains for the colony to store its winter food. Three to five medium supers will be needed for the colony to store the surplus honey that can be produced from a healthy colony in a good season.

An inner cover is used on the top super with a 3/8-inch rim on the top for proper bee space and 3/16 inch on the bottom. Some beekeepers will use screen tops as inner covers and screen bottom boards to provide extra ventilation and to help reduce mite populations in the colony. These can have some negative effects on the hive if improperly used. We recommend that a person start with a wooden inner cover and solid bottom board hive before using screened tops and bottoms. An inner cover with a small ½-inch notch will provide good winter ventilation. Screen tops will allow for excess heat loss from the cluster.

A queen excluder is an optional piece of equipment used to prevent the queen from venturing up into the supers used for food consumption. Metal queen excluders seem to work best and worker bees do not hesitate to pass through when drawn comb is placed above them. Proper management is the key to success when they are used.

A beekeeper has the choice of two styles of lid for the hive. One is migratory and the other is called a telescoping cover. The migratory lid provides a beekeeper the ability to better load and secure hives for moving. Both will need to repel water from entering the hive. The telescoping cover provides the best protection from rain.



**The equipment boxes, which are all called supers, will need to have an outside dimension of 16¼ inches by 19⅞ inches.**

on the bottom board. Screen bottoms need closed off to prevent air movement on the clustering bees and to conserve heat. Wind breaks are useful in protecting hives during cold weather. Small trees, shrubs or a hedgerow make good wind breaks. Colonies can be wrapped to prevent wind chilling but if too much insulation is used it may not warm up on days after a cold night to allow the bees to fly. A hive that is wrapped in black material like builders felt paper will benefit from the extra care given.

## Moving Bees

Established honeybee colonies can only be moved when the foraging bees have all returned to the colony. Unless a summer storm has prevented this, all foraging bees will return at dark. The colony will need to be moved a distance greater than three miles to prevent them from returning to the original location. A hive that needs to be moved a short distance can be moved about 1½ to 2 feet at a time once a week. If they need to be moved a greater distance on the same property they will need to be moved away for two weeks or more and then moved to the desired location. Winter confines the bees for four to six weeks sometimes and the hive can be moved a short distance if it is moved before the bees have had a chance to fly.

When moving the colony in warm or hot weather make sure that it will have plenty of ventilation to keep it from overheating. A top screen and an entrance screen are necessary. If the bees are bearded outside the hive do not force them in with smoke as this crowded condition will likely cause the hive to overheat. The colony should be divided on the day it is to be moved and joined back together on the day after it is moved. If the colony is jarred or banged around during the move, the bees will need several days to calm down before it can be worked without them trying to sting. Try and be as gentle as possible when loading and unloading in order to keep the colony calm. Try to avoid banging, dropping or jarring the colony. This will be important to the person who is opening the colony at the new location. Always use smoke before closing, during loading and when opening the screened entrance of the hive.

## Common Problems in a Honeybee Colony

Honeybees are living creatures and due to climatic changes, the introduction of parasitic mites, pesticides, brood diseases, predators and potential loss of the queen, a colony of bees is pretty much in need of assistance. Although honeybees do not have feelings like humans, there are many factors that can cause the colony to become stressed and begin to die. A colony should be checked no less than once a month to determine if a problem has occurred. There are also problems that beekeepers, apiary inspectors and researchers together are unable to answer like colony collapse disorder (CCD).

The first condition is climate. Honeybees are tropical insects that have developed the ability to live in northern climates, but winter is one of the first stress factors that can be seen in healthy colonies, as they progress from winter to spring. The stress will cause some bees to die in the colony during winter while others will simply fly out and not return. The population will suffer very little as this loss is minimal. When other conditions are brought about, the population

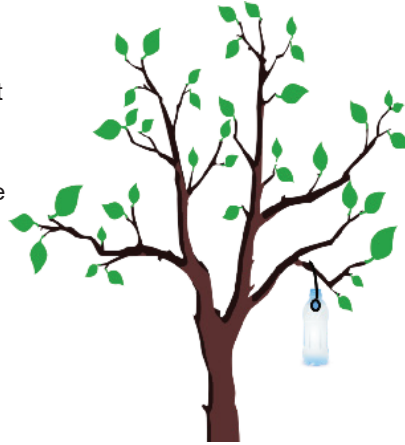
### Yellow Jackets

Yellow Jackets become more plentiful during the fall of the year and will sometimes constantly try and enter a colony to steal stored food. Fighting at the entrance of the hive can be observed especially if the colony is being fed syrup. Keep the entrance reduced down during the fall to help the honeybees protect their food stores.

### How to Make A Non-Toxic Wasp Trap (For Hornets, Wax Moths, & Yellow Jackets, too!)

Take a clear 2-liter, plastic bottle and cut a small, nickel-sized hole near the top.

Drill a small hole in the center of the bottle cap and insert a string through the hole, to hang the bottle in a tree (as shown in the picture).



### RECIPE

- 1 cup Hot Water
- 1 cup Apple Vinegar Cider
- 1/2 cup Sugar
- 1 Banana Peel, Darkened

Mix water and sugar until dissolved. Add apple cider vinegar and darkened banana peel to sugar mixture. Place mixture in bottle and hang in tree, shrub or old building.

## Fall & Winter Management

Due to parasitic mites causing high numbers of colony mortality during the winter, beekeepers should start treatments to ensure a healthy colony no later than the middle of August. More information on this can be found under the title of Parasitic Bee Mites in this book. We recommend that all colonies be treated Varroa mites.

During the summer season the colony should prepare for the winter months by collecting and storing honey and pollen. In late fall the bees will finish collecting the fall asters nectar and pollen and the time for winter preparation will come to an end with the first killing frost. The hive should now contain approximately 50 to 60 pounds of honey and a couple frames of pollen. A good queen with a lot of recently hatched brood, free from parasites and diseases should insure winter survival and a great start next spring. With the first frost approaching, the entrance should be reduced to 3/8-inch high and about four inches wide. Hardware cloth with an opening of 1/2 inch will also prevent mice from entering during cold weather. Ventilation is also required to let moisture escape the cluster. A small notch cut into the inner cover works very well. Hives that have solid bottoms should be checked with a level and tilted forward to prevent water from pooling

## Location of Apiary

When choosing a location to place your new apiary you will need to review the WVDA Best Management Practices found in this book. This will enable you to comply with the beekeeping immunity law which will give you protection from unwanted lawsuits. It will also provide protection to your neighbors from unwanted bee stings.

When positioning your hive entrance, it should point east to receive early morning sun or south which is also good. Make sure your location is above flood plain and away from drains and ditches that could wash away your colony. Look for large trees and overhanging branches that could fall on your hives. Afternoon or evening shade is ok in the summer, but during the winter the more sun exposure the colony receives the better it will survive.

When constructing hive stands on which to place your colonies, build them to support the weight which could be 200 pounds or more per colony. Hive stands need to be slightly lower on the hive entrance side to prevent water from creating a pool inside the hive when it rains. Remember that rain soaked ground could cause a hive stand to sink causing the hives to fall off. Keep the hive entrance 15 to 18 inches above the ground to prevent skunks from eating your bees at night. To help protect your apiary an electric fence may be necessary if it is located near foraging livestock or if black bears are known to live in the vicinity.

Make the right choice first because bees will orient to the exact location of the colony. Moving five or more feet will disrupt or cause the bees to lose the location of their colony. This can lead to a stinging incident for anyone who comes in contact with the confused bees.

## Obtaining Bees

Beekeepers have the option of purchasing established colonies, package bees or a nucleus colony. Swarms that have issued from a colony can be captured as a source of bees. To locate a source for bees a person can also check with local beekeeping associations and the West Virginia *Market Bulletin* under apiary listing. Bees and related equipment sold or given away in West Virginia must have an inspection certificate from the West Virginia Department of Agriculture. West Virginia is fortunate to have a group of beekeepers who produce queens locally. Although they are not available early in the season, they are valu-



able in that they should be better adapted to our climatic region.

Established colonies will usually consist of drawn combs in a deep and medium super. It will also have the lid, inner cover and bottom board. The bee population will need to be determined as well as the health of the colony plus the condition of the wood to best establish a price. We mention these things to prevent beekeepers from being taken advantage of when purchasing established colonies.

Package bees usually come from southern states where the climate is warmed earlier, allowing for their production. They are sold by the pound and range from two to five pounds. Three pounds are the normal size purchased in WV for our season. Packages will need a health certificate showing that they have been inspected and are free from American foulbrood. You must order packages in early January for installation in mid April to mid May at the latest. Packages may be shipped to your address by mail or a local beekeeper may purchase a large quantity of package bees and transport them from the supplier back to West Virginia for sale.

Swarms are unpredictable, unreliable and can come in various amounts or sizes. A beekeeper may collect a swarm on Monday only to find that it has left a few hours later or the next day. The West Virginia Department of Agriculture has a swarm list that you may request having your name added on to receive calls about swarms in your county. Setting out bait hives is probably the least likely way of getting a swarm, but it does work sometimes. In place of pheromone bait you can use a hive that bees have previously occupied. When collecting swarms use caution for Africanized genes displayed in a defensive behavior. If the swarm is from an unknown source, monitor them closely for six to eight weeks. If they begin to show any defensive behavior, the queen should be replaced immediately. Monitor hived swarms closely for any evidence of disease.

Nucleus colonies have an advantage over swarms and packages since they have an established queen, drawn comb, brood of various stages and food stores. Depending on the size started, they can become populated with enough bees to produce a surplus of honey for the beekeeper. A nucleus can consist of any size frame and any number of frames containing honey, pollen, bees, brood and a queen. Most nucleus colonies used to produce a full size colony will start with 3-5 deep frames.

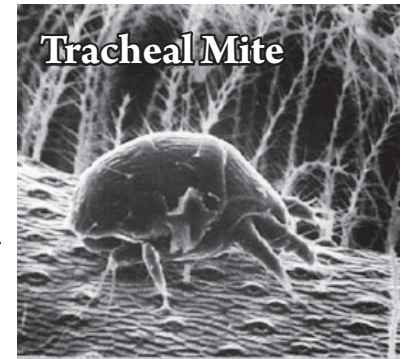
## Installation of Package Bees & Nucleus Colonies

Package bees are one means of starting a new colony or replacing a colony that has died. Beekeepers who worry about pesticides in used combs will often purchase a package of bees. While this might seem to be a good selling point for package bees, a 3-frame nucleus colony with an established queen will always produce a population of bees faster than a 3 pound package. A 4 or 5 frame nucleus colony started in early April can build up a population that can produce a crop of honey in the right area. Also, nucleus colonies are very easy to install, while package bees tend to drift when establishing more than one.

To install a package of bees into a deep hive body you first remove and store 5 of the 10 frames. Reduce the entrance in the hive so that only 1 or 2 bees can come or go at the same time. Feed the package bees prior to installing as much syrup as they will take. This is usually done by brushing thick sugar syrup onto

### **Mice**

Mice are a nuisance to the colony during cold weather or when new colonies established in early spring are not protected with a mouse guard. By entering the colony through the  $\frac{3}{4}$  inch opening at the hive entrance a mouse can cause damage to combs, build nests and leave fecal matter in the hive. A mouse guard is constructed to fit into entrance and reduce its opening to around  $\frac{3}{8}$  high and about four inches long. This size opening prevents mice from entering.



### **Ants**

Well populated honeybee colonies do a good job of preventing pests from entering the hive. Maintaining hives that have proper bee space and replacing rotting wood will help prevent ants from nesting in the colony. The bee space which is  $\frac{3}{8}$  of an inch is very important to allow bee access to pest. Lids that buckle down from the heavy weight placed on them may reduce this space above the inner cover providing ants a place to live and reproduce. The best practice for deterring ants and other pests is proper space and changing any super that has rotted wood.

## Predators

### **Black Bear**

As black bear populations have increased over the past years in WV the need to protect colonies from predation have become necessary when placed near forested areas in most all counties. Bee brood is part of a black bear's diet in the wild and a colony established by a beekeeper that is rearing brood can become a food source for a foraging black bear. To prevent an attack on managed colonies an electric fence can be used. The wires will need to be close enough to prevent a bear from getting his head through. The height of the fence should be around 4 feet. The fence should be powered by an electric fencer with a voltage greater than 2,000 volts to work as a deterrent.

### **Skunks**

Skunks are foragers of insects and will feed on adult bees at the hive entrance every night if the hive is not properly set up to prevent this. A height of 15 to 18 inches is needed to prevent foraging skunks from feeding on adult honeybees. This should be kept in mind when setting up a new colony. A woven wire fence can also be used around the hive to prevent skunks from feeding.

### **European Hornets**

Although European Hornets are not generally a serious problem in our state. Some years they are more numerous and can be more destructive to colonies. They will often catch bees at the entrance of the hive and fly off with them as a food source.

## Pests

### *Wax Moth*

Wax Moth doesn't present a threat to strong, established colonies. They do present a problem to combs that are dark or have pollen stores in them when no bees are present to prevent the moth from laying egg, which hatch into larva and consume the unprotected combs. Not only will the wax be consumed by the larvae leaving behind a trail of webbing and fecal matter, but they will also spin a cocoon that will cause damage to the wooden frames and boxes. When processing honey for human consumption in the comb, the product can be frozen in order to kill any eggs that may be present. See the Honey Processing section of this book for additional information.

Beekeepers can use one of several methods to prevent wax moth damage from occurring when storing empty combs. The combs may be frozen but caution must be used in storing the combs after they are removed from freezing. Para-Moth is a registered pesticide that can be used on stored combs. Be sure to read the label and only use a registered pesticide as other forms of moth crystals will cause problems and are not legal. For beekeepers that are unable to freeze their combs and do not want to use a pesticide, combs can be stored using light and air movement. Wax Moth won't damage combs that are stored where plenty of air and light can pass through them. New combs that have not had brood reared in them are the easiest to store using this method. They can be stacked outside with screen on the top and bottom to prevent rodents from entering and a shelter to prevent rain damage. Combs that contain pollen or are darkened from brood rearing will be more difficult to prevent damage when stored this way. They should be placed on their sides with a screen on each end and the combs may even need to be separated to allow additional air movement and light.

### *Small Hive Beetle*

The small hive beetle (SHB) is not a native pest of honeybees in West Virginia. Just like with the wax moth, it was assumed if a colony is well populated this pest would not present a problem. However, SHB have shown they can overwhelm even strong colonies. SHB larvae feed on honey, pollen, and bee brood, leaving a slimy mess. Once the larvae have completed feeding they will migrate out of the bee colony and pupate in the soil near the colony. When the adult SHB emerges from its pupal phase, it returns to the honeybee colony to start the life cycle over again.

Combs that are to be stored will need protection from this pest. Storing combs in an area with less than 50% humidity is one way to protect the combs. Freezing combs is another option, as is providing light and good ventilation in the storage area. If a colony should die and small hive beetle larvae migrate to the soil a registered pesticide called Guard Star can be purchased and used for control. Check Mite is also approved for in hive use but we do not recommend this treatment because of pesticide residues in comb. Combs that have been slimed by SHB can be washed with detergent using a light spray and rinsed with water the same way, then air dried in the shade and reused in the colony. A variety of traps are available to the beekeepers who wish to catch the SHB that enter into the colony.

the sides of the cage. This is an optional step, but will help keep the bees from drifting if installing more than one package in the apiary. The best time to install a package is in the evening, about one hour before sunset. Gently bump the package cage on the ground a few times to cause the bees to fall to the bottom of the cage. Smoking the bees is not necessary as they will become disoriented during this process of installation. Use a hive tool to remove the cover on the package of bees. Remove the queen cage and place the cover back over the hole to prevent bees from escaping. Remove the cork from the end of the cage that has the candy and hang the cage candy side up between two of the frames. Bump the package of bees once again on the ground to dislodge them from the top. Remove the cover and then remove the syrup can. Shake one fourth to one third of the bees in the package over the queen cage that was placed between the frames and then set the package with the remaining bees in the empty space where you removed the five frames. If desired, all the bees can be removed from the package by shaking them into the space where the five frames were removed and the frames can be put back at this time. Additional drifting of the bees will often occur when this is done with more than one package being installed close by. Begin feeding the bees immediately. See section on "Feeding Bees" for methods.

If several packages are installed in the same apiary, drifting is almost always a problem. Drifting is when bees that were installed in one hive, fly out but return to a different hive in the apiary. The day after installing the packages is the time to correct this problem. Check all colonies into which packages were installed. If one appears to have more bees, then move the amount needed to equalize them by exchanging a frame with adhering bees from the one with too many to the one that has less. This is also the time to remove the empty package that the bees came in. All of the bees should be out at this time. If it still has a few bees in it, then shake them into the space with the missing frames and place it near the front of the hive with the hole on top for the remaining bees to fly out. Replace the 5 frames that were removed back into the hive and reassemble it. Continue feeding sugar syrup as long as the bees are drawing comb on the foundation.

Four days after you installed the package you should be able to remove the queen cage. If the queen is still in the cage remove the cork from the other end and place the cage back into the hive. The queen will sometimes come out immediately or it may take a few minutes. After she is out remove the cage and make sure that the bees are not building comb between the frames. You only want comb to be built on the foundation.

A nucleus colony may be easily installed in a regular hive. Smoke the nucleus colony just as you would if working a full size colony and place the frames into the hive from the nucleus box. You can shake the remaining bees from the sides of the nucleus box into the hive or set it so that the bees can climb out the top and onto the hive bottom board and go into the hive entrance. Make sure that the queen is placed into the hive when moving the frames. Begin feeding and continue until all combs are drawn.

## Installing a Queen

Queens sometimes need replaced because of age, performance, or undesirable traits. In this section, information will be provided on how to introduce a queen using different methods for the different situations described. It is important to know that a colony in a honey flow or one that is being fed a sugar-water

syrup in abundance will be more receptive of a new queen.

The queen in the colony lays all the eggs and is responsible for the traits that are viewed in her daughters, traits such as gentleness, honey production, and good health. The brood pattern in the combs where she has been busy laying eggs will help a beekeeper determine if she is able to continue performing well or needs replaced. An area that has very few cells without brood on several full depth combs in the spring shows that the queen is capable of good brood production. If this pattern is spotty it is time to consider replacing her. If multiple eggs are seen in the cells as described above the colony may have a laying worker. The comb surface becomes different when unfertile eggs are laid in worker cells. The surface of normal cells are even across the comb while unfertile egg laying in worker cells will cause the surface to have cells extending out, very uneven in a bullet like shape.

Replacing a queen in a colony can be challenging for any beekeeper because she must be found and removed before a new queen can be successfully introduced. There is one exception and it is described below. This is used to introduce a queen into a colony that has a laying worker. It is a good idea to restrict the queen to just one super using a queen excluder in order to reduce the area of the search. The queen excluders are put into place. After three days, the super where the queen excluder was placed is checked for eggs. The super containing eggs will be the one in which to search for the queen. Once the queen that is to be replaced is found and removed the introduction of the new queen can begin.

The cork is removed from the candy end of the queen cage and the candy is checked for its firmness. If it is too soft, the queen will be released quickly which may not give her time to be accepted into the colony. The bees in the colony must accept and distribute her pheromone throughout the colony before the bees eat through the candy. Being released too early is not at all safe for the queen as the workers will attack her and try and kill her. If the candy is soft a piece of masking tape can be used to cover two thirds of the candy hole. This will slow the bee's ability to release her. Some beekeepers will leave the cork in the end with the candy and return to release the new queen after four or five days. If the candy is too hard she may need to be released by the beekeeper if the bees have not freed her after four to five days. About nine days after the queen has been released from her cage, the colony will need to be checked for newly laid eggs. This will be the indication that the queen was accepted. An additional inspection one month later to examine the brood and to make sure that the newly introduced queen was not later killed is necessary.

As mentioned, there is one exception to introduce a queen into a colony that already has a laying queen. This would be to make the colony function with two queens by introducing the new queen in an established nucleus colony and then joining the two together. The old queen is kept in the lower supers and a queen excluder is placed on top of them. An empty super is placed on the queen excluder with a full sheet of newspaper placed on it and an additional queen excluder is placed on the newspaper. A few tears can be put into the paper which will help the bees to chew through better. The queen in the established nucleus is placed on top of the newspaper which has the queen excluder on it. An upper entrance is used until the bees have become joined. Generally the colony will have two queens for a period of time before one of the two is killed. Usually the queen on the bottom is killed by the older field bees and the one on the top is spared. This

which in turn lowers mite population. In other cases, the colony's excessive swarming disrupted the Varroa mite which enabled the colony to survive.

Treatments for Varroa mites will continue to change as new products are developed and old products may be discontinued. At the time of printing of this book these pesticides were registered for use to control Varroa mites in WV. Apistan, Check Mite+, Api life Var, Apiguard, Mite Away Quick Strips and Hop Guard. WVDA apiary staff does not recommend the use of the first two as they have been found to leave pesticide residue in the combs of the colony. Caution must be used when applying Api Life Var and Apiguard as to the location of placement and temperature to ensure mite control without brood kill and absconding of the colony. Hop Guard should only be used when all brood in the colony has hatched or in newly established swarms before brood rearing begins and in newly established packages also before brood is present.

One of the latest approved mite treatments is oxalic acid. This treatment can be applied as a vapor or dribble solution. A vaporizer is used to convert the oxalic acid crystal into a gas inside the hive to contact phoretic mites during brood less periods for best results. The dribble method is used in warm weather and also only works on phoretic mites. As with any treatment, read instructions, and safety recommendations before using.



### **Tracheal Mite**

Tracheal mites infest the adult honeybee respiratory system and reproduce there. This mite is responsible for causing acarine disease or acariosis. The honeybee tracheal mite was first detected in the United States on July 3, 1984, in a commercial beekeeping operation in Weslaco, Texas. Acarine disease has little noticeable effects during the summer in honeybee colonies. During the fall tracheal mite populations will increase, shortening the adult bees life. The colony will usually have a sudden drop in bee population in late January or early February due to the infestation. The small number of bees left will often freeze as winter continues in WV.

Some stocks of bees are able to resist infestation through auto grooming. Auto grooming is trait where the bee uses its legs to remove tracheal mites before they are able to enter the bee trachea. Mites generally infest adult bees between the ages of 1 to 9 days old. Colonies that are not resistant to this mite will usually die during the winter in the north but can usually survive in the south.

A microscope is used to determine the percentage of infestation in a colony. Mite populations can go undetected during the summer and increase rapidly in late fall or early winter. It will be too late to treat the colony if the mite population is found to be too high in late fall. Tracheal mites have not been a major problem in recent years. Routine treatment is not recommended at this time.



capped. She can successfully produce one to two daughters in a capped worker cell and three to five daughters in a capped drone cell.

There are several techniques used to determine the number of mites in a colony. The results from these techniques vary so that we do not recommend them to be used by new beekeepers until they have had several years to perfect one or more. Only with time and experience could a beekeeper master determining mite thresholds. We will mention them but will not go into detail, as the best practice that we have witnessed is to treat in both spring and fall to ensure a healthy colony for overwintering, pollination and honey production. With pesticides that dissipate entirely from the colony and with some that are safe enough to be used in conjunction with honey production, a regular regiment of treatments makes sense until a method of accurate sampling can be achieved by the beekeeper. We do not try to discourage beekeepers from searching for traits of resistance, but do wish to help prevent beekeepers from losses that create discouragement from beekeeping and financial hardship. Remember that our focus is on healthy productive colonies. Allowing animals like honeybees to become infected with viruses and parasites that cripple them is inhumane.

The results from the methods listed here will vary with the amount of brood rearing, the experience of the person sampling, the location of the sample and the time of year at which the sample is taken. This and many other things must be taken into consideration when collecting mites.

The first method requires a collection of 200 to 300 bees from the brood area of the colony. This sample is washed in either hot water, alcohol, or a detergent. This method can achieve the removal of about 90% of the mites from the adult bees. As mentioned above you may be able to closely determine the number of mites on the adult bees but will have no way of knowing how many mites are in the capped brood. This method will work well during brood-less periods. Another technique is ether roll and powdered sugar-shake. The number of mites from an ether roll always varies with the person who does the test. The powdered sugar shake also varies with the person who does the test, but the bees can be spared from death and placed back in the hive after completion. Other methods include removing and examining a minimum of 100 pupae and counting mites. The last method is to use a sticky board and count the number of mites in 24- or 48-hour period. While these techniques may be useful in the search for resistant traits, most beekeepers are unable to successfully maintain healthy colonies using these methods. All beekeepers should learn one or more of these methods and practice until a level of accuracy is established.

If a beekeeper is interested in finding colonies that are Varroa mite resistant without sacrificing the bees they can collect and count all the mites with a sticky board each time the colony is treated with a pesticide that targets the Varroa mite. Colonies with consistently low numbers will be resistant. We have observed that most colonies managed by beekeepers that go 2 or 3 years without being treated usually die on the third or fourth year and the resistant trait dies with it. If the beekeeper would have treated the resistant colony would have lived to perpetuate this resistant trait.

Although it sounds good that a colony can survive for several years without treatment, the colony seldom produces surplus honey in its weakened state. Untreated colonies that survive the winter often have a small population of bees

method also works on colonies that have a laying worker. In the case of a laying worker you will not need the two queen excluders or the additional super. Only the nucleus with the established queen and the newspaper are needed. When beekeepers join bees and queens together with paper it is called the newspaper method.

In the spring, nucleus colonies are made up by taking brood from one or more colonies with a frame of honey. Care is taken so that a queen is not moved



accidentally into the nucleus. A caged queen is introduced or a queen cell is used. Once the caged queen is accepted or the queen in the cell has become mated and laying, the nucleus can be grown into a new hive or it can be used in situations as described above.

## Feeding Bees

**The queen in the colony lays all the eggs and is responsible for the traits that are viewed in her daughters, traits such as gentleness, honey production and good health. Her brood pattern in the combs where she has been busy laying eggs will help a beekeeper determine if she is able to continue performing well or needs replaced.**

At some point, a beekeeper will find that feeding is necessary. Honeybees utilize two types of food for their diet. Pollen is a source of protein and honey is the carbohydrate needed. Newly established colonies will always need supplemental feeding in order to help get a good start with comb building and brood rearing. A dearth in nectar could

occur from a freeze, or a drought preventing flowers from blooming or producing nectar and pollen. In most areas within our state during mid-summer there is a lack of food to maintain a colony's health. In the fall colonies must have enough honey stored to sustain them in the winter and into the spring build up. Once a major honey flow begins, the colony is safe from starvation for a period of time. In West Virginia colonies should have 50 to 60 pounds of honey stored by fall for winter. The amount that is used will always vary depending on the winter conditions, colony strength and amount of available food during spring buildup.

The most common food for replacing honey are sugar syrup. Pollen can be replaced with one of the many substitutes available through honeybee supply catalogues. In colonies that do not have any disease, natural pollen can be trapped, frozen or dried for storage and fed during a shortage. It can also be added to a substitute to make a supplement.

The most common food for replacing honey is sugar syrup. For building up honey stores, sugar syrup of two parts sugar and one part hot water should be prepared. Sugar syrup will granulate in cold temperatures. To slow down this process, cream of tartar can be used at a rate of one teaspoonful to 20 pounds of sugar.

Many types of feeders are used to feed bees syrups. Feeding a colony with a Boardman Entrance Feeder can encourage other honeybees to rob the colony of both the feed being administered and food that is stored, and cause fighting that may lead to the colonies death or loss of population. The Boardman entrance feeder uses small holes punched into the lid to release the feed. The holes in the lid are small enough that they won't release the syrup when inverted upside down, but the bees can insert their proboscis to remove the syrup from the container. This type of feeding is also called friction feeding and can be administered on top of the inner cover with an empty super enclosing the feed. A variety of container styles can be used when feeding above the inner cover. Friction top feeding done properly is the safest way to feed bees without drowning. When using a Boardman entrance feeder on the front of the hive, place it on one side of the entrance and block the remaining entrance across to the other side and allow the bees in the colony to enter and exit there. Entrance feeders can also attract ants, yellow jackets, raccoons or even bears to your hive. During cool weather the colony will not be able to forage at the feeder. Using inside feeders and friction feeders is the best choice to protect from robbing and allow feeding during cool weather. There are a variety of hive top feeders available. There are also several varieties of feeders that replace one or more frames inside the hive.

During the spring, bees will only feed on a pollen substitute when natural pollen is not available. Pollen that was harvested during the spring or a substitute can be used during the summer and fall when a lack of natural pollen is unavailable for the bees or is of poor quality. Pollen substitute can be fed dry or mixed with syrup to a consistency of peanut butter. When feeding dry pollen use a box that will provide access by the bees but protect it from rain and blowing wind. Commercially designed pollen feeders are available. Pollen substitute or supplement patties are prepared and placed between wax paper to prevent drying out and fed on top of the frames over the brood and in contact with clustering bees. Natural pollen can be fed this same way or added to a substitute.

## Spring Management

Beekeepers should inspect colonies in late winter or early spring when temperatures are above 50°F for honey and pollen stores and colony strength to begin the new season. As daylight increases and temperatures become warmer, nectar and pollen become abundant for foraging bees. This stimulates an increase in brood production for the colony. Most beekeepers keep bees in supers that vary in size. For example, they may use two deep supers, one deep super & one medium super or one deep super and one shallow super for the brood and food storage for the colony. Other hive arrangements are possible but are seldom used. During the winter the colony will consume most of the food stores in the bottom deep super and will be rearing brood in it by early spring. A process called reversing is sometimes used to help the colonies build up faster and to decrease the risk of swarming in colonies that have not consumed enough of the honey in the upper super. When using this technique, don't separate the brood so as to have brood next to the bottom board with empty combs or combs containing honey between the remaining brood above. This separation of brood will often create a shortage of bees with the ability to warm and feed both areas. Bees in

## Honeybees and the Veterinary Feed Directive

The FDA changed the rules for food producing animals in January 2017. This rule change was implemented to prevent antibiotic residues in the human food chain and the development of antibiotic resistance in important human antibiotics. Now beekeepers must obtain veterinary feed directive or prescription from their veterinarian to treat their colonies for European Foulbrood with antibiotics. The veterinarian has to establish a veterinarian-patient-client relationship, VPCR, just like for any other animal needing antibiotic treatment.

In April 2019, the West Virginia Board of Veterinary Medicine approved a plan submitted by the WVDA Apiary Program Manager to allow a VPCR to be established under 3 conditions. The beekeeper must bring the following 3 things to the veterinarian during an office call.

- 1- The positive Vita European Foulbrood test performed by a WVDA Apiary inspector.
- 2- A copy of the Apiary Inspection Report with the diagnosis of European Foulbrood on it.
- 3- A frame of EFB infected brood placed in a large ZipLock bag for the veterinarian to examine.

West Virginia veterinarians were emailed information on European Foulbrood and the Vita EFB test so they would have access to information about honey bees and EFB. The veterinarian can confirm the diagnosis of EFB during an office call, rather than require a farm call to establish the VPCR. The beekeeper is responsible for the cost of the office call, which is more economical than a farm call.

West Virginia beekeepers are the first in the country to have this type of medical care available for their honey bees!

## Parasitic Bee Mites

### *Varroa*

The Varroa mite can cause severe damage to a bee colony's health as their population increases. Viruses and other pathogens are spread by this mite weakening and shortening the adult bee's life. Bees are sometimes born deformed because of mites feeding on them during the larva and pupa stages of life. Some larvae will die before emerging. Bees that are fed upon by mites may have shortened abdomens and weigh less than healthy bees. Heavily infested colonies produce very little honey and seldom will survive the winter in WV. The mite is not a natural host of *Apis mellifera* so our bees don't have a defense that will protect them. Varroa mites have the ability to go undetected in the colony by feeding between the bee's abdominal segments or in capped brood cells making it difficult to determine the number of mites infesting the colony.

Female Varroa mites have eight legs, are a reddish brown color and the body is oval shaped and flat. Male mites are pale to light brown and do not live long after development. The male's life will consist of mating inside the capped cell and then they die. The female can have from three to eight reproductive cycles in her life time. The female mite invades the brood cell about 18 hours before it is

be open or capped. When stirred with a match stick it the consistency is watery. If you suspect EFB contact the WVDAs apiary staff to set up an inspection appointment.

EFB can be treated with the antibiotic Terramycin. A prescription or Veterinary Feed Directive from your regular veterinarian is required to treat this disease.

### **Sacbrood**

Sacbrood is a viral infection that is not of serious concern due to its nature in the colony. Most cases will clear up without intervention from the beekeeper. It is good knowledge for a beekeeper to be able to identify this disease as it can look similar to AFB. The larvae usually die in the capped stage. Infected cells will have sunken and punctured caps over the cell similar to AFB. The color of the dying larva is gray and eventually turning black. When the dying larva is stirred with a match stick the consistency is watery. Once the dead larva is dried up the scale becomes brittle but can be removed without sticking to the cell.

### **Chalkbrood**

Chalkbrood is fungal disease which causes the infected larva to die and resemble the appearance of a small piece of chalk. It is only of serious concern when the colony is heavily infected. The recommendation for treatment is to replace the queen with a more resistant stock.

### **Nosema**

There are two strains of Nosema disease found in the U.S., *Nosema apis* and *Nosema ceranae*. Both have the same affect on adult honeybees, shortening their life span. Colonies that are infected with *Nosema* produce less honey and do not survive the winter season well. The queen in the colony is often replaced (superseded) due to the disease.

Spores of *Nosema* enter the bee's body through its mouth. Once inside the bee they germinate and multiply in the digestive cells, lining the mid-intestines. Eventually the cell ruptures and releases the spores. Some will infect other cells in the intestine, while some will travel down the small intestine and are excreted with other fecal matter. When bees are confined for long periods during cold weather the disease can cause them to defecate in the colony contaminating the hive with spores, creating a condition that allows other bees to become infected as they are cleaning the colony. This allows the cycle of infection to continue in the colony and spread throughout the year. Spores can also be transferred from one adult bee to another during the exchanging of food. As summer progresses *Nosema apis* spore counts become low and can sometimes not be detected. *Nosema ceranae* is different as spores will continue to be present and can increase during the summer.

Adult bees can be treated with Fumagilin-B when the disease is present. The only way to correctly diagnosis this disease is by collecting a sample of adult bees and examining the intestines with a microscope. This procedure can be done by WVDA's apiary staff when the disease is suspected. A prescription or Veterinary Feed Directive from a veterinarian is required to treat this disease. However, in a strong colony, this disease is normally self-limiting and does not require treatment.

cool or cold temperatures will cluster on the upper brood and abandon the lower brood leaving it to die from starvation and chilling. The queen can also become isolated with the lower brood and could also perish with the brood. An inspection inside the hive will determine if reversing will benefit the colony or cause harm. The best rule to follow is if you are nearing the end of the last frost date and your upper super is filled with honey and no brood then you should reverse the upper and lower super.

During the spring, an abundance of flowers start blooming, which causes the colony to begin increasing its work force in preparation for swarming. Keep extra empty combs for honey storage on each colony at this time to reduce hive congestion. Managing the brood area is also important in colonies that have a good queen. If all of the brood rearing area is filled with brood, honey and pollen and the queen can't find cells to lay her eggs in she will begin producing queen cells. Queen cell cup development is a sign of swarm preparation. These cell cups are found on the bottom of the frames and in damaged areas of the combs. When these are present, a beekeeper must begin swarm management.

One beekeeping practice for swarm control is called the Demaree method. This involves moving brood frames from the deep brood super on the bottom board, to above a queen excluder on the hive and replacing them with drawn comb frames for the queen to continue to lay brood in. This method works well for swarm prevention.

The colony should be checked once a week to see if the queen has started laying eggs in the queen cell cups. When queen cells are found there are several options to choose from. Nucleus colonies can be made for queen rearing or increasing the number of colonies in the apiary. You can add brood to weaker colonies to build up their population. These are a few of the techniques that could be used to help a beekeepers manage for swarm control, honey production, queen rearing, and colony increases.

In the spring, colonies that are rearing large amounts of brood can consume all of the surplus food that was stored from the previous year. This can cause a colony to destroy the brood in an attempt to survive if it runs out of honey stores. This situation usually occurs when weather conditions prevent the colony from foraging for four or more days in a row. Monitoring food storages is a year round task of the beekeeper and supplementing at some point is always necessary. In apiaries with several colonies that have no disease present, combs can be exchanged to help balance out food stores. Only when a colony is in a honey flow is it safe for a period of time from starvation.

## **Swarming**

Swarming is a term used when honeybees leave their hive to perpetuate their species. The parent queen or one and sometimes several of her daughter queens along with the older workers depart in massive numbers swirling about in the air before settling into a large cluster. Swarms can be found clustering in

***In West Virginia colonies should have 50 to 60 pounds of honey stored by fall for winter.***

trees, on shrubs and also on manmade structures such as homes, buildings, cars, and fences. This is a natural occurrence in the honeybee colony, but can be prevented by the apiary owner with proper management. Swarming decreases honey production within the parent colony. One method to reduce swarming is to add empty supers to your hives to reduce congestion and give the bees room to store honey and raise brood. Young queens can also decrease the chance of swarming by producing strong pheromones in the hive. Inspect your colonies for queen cells and available space in supers weekly during honey flows. These methods have been presented under "Spring Management."

There are several methods that can be applied to prevent a colony from casting out a swarm. One is to inspect the colony weekly and remove all queen cells. This practice must take place before any of the queen cells reach the pupa stage and the old queen stops laying in preparation to swarm. If one queen cell is missed in the colony when the removal method is used it can still swarm and the parent colony could be without a queen. Another involves making divisions often called splits. One of the divisions is placed in the location of the parent colony with a few frames of brood and the parent queen. The additional divisions are moved three or more miles away to another apiary. Queen cells are placed in them in hopes of establishing new colonies. At the end of the swarming season the colonies can be joined back together by using the newspaper method.

## Honey Flow

Beekeepers use the term "honey flow", to express a period of time when the bees are bringing an abundance of nectar into the colony. Honeybees are able to locate pollen and nectar sources by sight and smell. They will communicate the location of the food source to other bees back at the hive through a dance. A sample of the food is provided during the dance to foragers who will make the trip to locate additional food.

The distance honeybees will forage varies throughout the year and is dependent on the availability of food. During nectar flow periods, the bees will only forage up to 2 miles from the hive. When food becomes scarce they will travel up to 5 miles for both pollen and nectar. In order for the colony to produce a surplus of honey there must be a tremendous amount of flowers within a mile of the colony producing nectar in abundance. A colony with a population of fifty thousand or more bees enables them to store a surplus for the beekeeper to harvest.

Weather conditions throughout the year have an influence on honey production. Freezing temperatures during the winter and spring can damage major producing sources like basswood and tulip poplar. Too much rain or not enough will have an effect on production. Good climate conditions will include warm and humid days when nectar producing flowers are in bloom.

Locations where there are few honey producing floras such as grasslands or trees like oak, beech and conifer are not good areas for honey production. Too much of this type of acreage will decrease honey yields. Some areas in West Virginia will yield only two or three good nectar flows during the year with each lasting only a few weeks.

To sum up what is needed to secure a plentiful crop of honey, the colony will need plenty of nectar producing flowers with good climate conditions and plenty of bees to collect the harvest.



***The wax cappings are removed from each side of the frame using a large knife.***



***The uncapped frames are loaded into the extractor. The extractor is spun and centrifugal force extracts the honey from the frames. The honey collects in the bottom of the extractor and then is poured and strained (below) from the extractor.***



AFB can be detected by examining the appearance of the brood comb when an outbreak occurs. Dark cell caps, sunken or punctured cell caps with scattered empty cells would alert a beekeeper that a disease is present. Healthy brood in the larval stage should be white in the uncapped cell. After the cells are capped (pupal stage), the brood caps should be of a uniform color with a slightly dome shape. Any variations should be investigated further. The dead or dying AFB brood will become at first a dull white, becoming a light brown changing to a dark brown and eventually almost black as it dries in the cell. To test a cell suspected of having AFB, insert a wooden match stick into the cells dying larva and gently stir. When the match stick is removed and the stirred larva does not string or rope out, AFB disease may be ruled out. If the sample has a stringy or ropy consistency it may be AFB disease. A special diagnostic test may be performed by WVDA Apiary Inspectors or the USDA Beltsville Honey Bee laboratory to confirm the diagnosis of AFB. Contact the WVDA for help if you suspect this disease.

The treatment for a colony with American Foulbrood is to dig a hole and burn the entire infected colony in the hole, covering the ashes with dirt once the colony has been burned. The honey bees may be killed with soapy water before the hive is burned. Contact a WVDA Apiary Inspector immediately if you suspect a colony has AFB.

### ***European Foulbrood, Detection and Cure***

European Foulbrood (EFB) is caused by a bacterium called *Melissococcus pluton*. EFB is not as serious as AFB because it doesn't form spores. It can however remain viable in the combs over winter. It will not affect adult bees or humans, but only larva. The appearance of this disease in the larva starts out slightly colored dull white becoming yellowish to a slight brown and then turning almost black. The cell may

be cool enough as to not dissolve the starter crystals. The mixture is placed in containers and then are placed in a cooler at 57°F. For information on producing creamed honey look up the Dyce process for producing creamed honey.

## State Honey Processing Equipment

The WVDA manages a program to assist beekeepers in honey processing and packaging. Eight complete extracting and packaging units have been dispersed throughout the state. Each unit consists of one electric knife, a 9-frame radial extractor, one uncapping knife, one uncapping tub, one strainer, one capping scratcher and a bottling bucket. A log book with each unit helps provide information on beekeeper's use, pounds of honey extracted and location of units. Contact the WVDA Apiary Program at (304) 558-2214 for location of these units around the state.

## Selling Honey & Other Related Products

Direct marketing of honey products is encouraged by the WVDA. Farmers markets, county fairs, and festivals are a great avenue for retail sales. A person selling food products may be subject to collect sales tax. Other laws that pertain to selling food can be found in the WV Code, Chapter 19, Agriculture Article 2D, Imitation Honey Product Law listed in this book.

All food products must contain a label approved by WVDA Agribusiness Division. The label must contain what is in the container, the amount in both U.S. and metric standards, the address where the product is packaged and the name of the company or individual that packaged the product. Once a company or individual has produced a draft of their label, it should be sent to the WVDA Agribusiness Division for approval before quantity production of the label begins. Labels should be mailed to: West Virginia Department of Agriculture, Agribusiness Division, 1900 Kanawha Boulevard East, Charleston, WV 25305.

## Diseases

### *American Foulbrood, Cause, Detection and Prevention*

American foulbrood (AFB) is a honeybee disease, which infects the brood while it is in the larval and early pupa stages. The bacterium which causes AFB is *Paenibacillus larvae*. This bacteria can be found almost anywhere in the environment, but is not harmful to humans or adult bees. When a larva consumes 28 to 30 AFB spores it succumbs to the disease and dies. The bacterium consumes the entire larvae, multiplying to over two billion spores. During this process it is called the vegetative stage of the disease. The spores can quickly be spread to other cells causing them to die. After the spores dry into the bottom of the cell it is called AFB scale. AFB spores remain viable and capable of causing infection for over 100 years.

## Honey Production

Honey is produced by the bees from nectar that is gathered from flowers. The process is quite complex but in simple terms the water in the nectar is evaporated to a consistency of containing not more than 18.6% moisture. Enzymes are added to the nectar during the process, which takes place in the bees' honey sac and honey comb cells. Once complete, the colony will seal the honey with a wax capping. Not all the honey is capped as the nectar supply coming into the hive may stop before the cell is filled. A honey refractometer is used to determine the moisture content of honey. Honey may be safely harvested when it has a moisture content of 18.6% or less. A quick estimate of suitability for harvest is to hold the unsealed comb on its side and give it a brisk shake two or three times over the open hive to see if any unripened honey can be shaken out. If nectar can be shaken out, the honey is not completely ripe and not ready for harvest.

A beekeeper must have a sufficient population of worker bees in the hive to produce a crop of honey. Supers must be in place in advance of the nectar flow and swarm prevention must be practiced. With these things implemented, the beekeeper will patiently wait until there is abundance of nectar producing flowers with warm and humid conditions.

Different areas of the state will have different types of floral sources for the bees to work which, will create different types of honey. Some honey will be dark and other light in color. Don't be fooled into thinking that light is better. Each will have its own distinct flavor. It will always come down to an individual's personal preference as to which flavor is best.

## Comb Construction

Worker honeybees will build hexagonal cells constructed together from wax which is secreted from glands on the first four segments located on the underside of the abdomen to create honey comb. Propolis is also added to the wax during this construction. In order for a worker bee to produce wax it must have a food source such as nectar or be feed sugar syrup during warm weather. It is estimated that it takes six to seven pounds of honey to produce one pound of beeswax. The wax cells in the honey comb may appear to be horizontal but are actually slightly sloped from the front downward to the back, or center. The cells are constructed on both sides with the center closed. This allows beekeepers to use a thin sheet of wax with the desired cell size as a foundation on which the bees may construct the comb. Wax cells used for brood production will darken as they are used, up to the point of becoming almost black. Darker combs are not an indication of disease. Older queens seem to prefer to lay eggs in these darker cells than in newly constructed cells. Pollen can also influence the color of newly constructed wax.

## Harvesting the Honey Crop

The removal of honey from the hive can be challenging if you have never assisted someone with experience. Honey is generally removed at a time when there is little nectar coming into the colony. Bees are more subject to try and re-

trieve the honey, which is called robbing, as it is removed by the beekeeper from the hive. The work of separating the bees from the honey combs must be done quickly without having honey exposed outside the hive for any length of time.

Sometimes all of the honey in a super may not be capped over. This honey may or may not be ready for the beekeeper to harvest. Using a honey refractometer is the best way to make sure the honey is at a moisture content of 18.6% or lower for harvest.

One method of separating the bees from the combs of honey in a super is to use a bee escape. There are several varieties that can be made or purchased. A bee escape allows the bees the ability to exit the super but not re-enter. The honey super is usually placed on top of the bee escape and the bees exit through a specially designed hole with a maze or springs to prevent the bees from returning. All entrances into the super being removed must be closed with caulking or a good tape to prevent bees from robbing as the bees inside exit through the escape. Bee escapes will usually take up to two or three days for the bees to exit. A few bees sometimes will remain in the super and must be removed in another way.

Several chemicals are registered and can be purchased to drive the bees from the supers. Most of these work well in warm weather, but some do leave an odor that is often not appealing and will sometimes remain with the honey super for several days. Be sure to read and follow the label on the chemicals package to ensure that the honey is not contaminated.

Bees can be removed using a blower with enough force to dislodge them and send them out into the grass in front of the hive. A queen excluder is used beneath the supers that are to be removed to prevent the queen from getting blown out into the grass. If this would happen she will not be able to make it back to the hive. This procedure will involve removing the super from the hive and placing it on end with the frames pointing up. It is turned several times as the bees are removed with the air from the blower. A specially designed collapsible chute can be purchased to place the super on when blowing out the bees also but is not recommended. Once all of the bees are removed it is then protected with a covering to prevent the bees from re-entering.

Bees can also be removed by brushing them off. Have an empty super the same size as the super that is being removed. Place it on top of a surface so that bees are unable to enter. Keep a covering for this box ready. Blow smoke over the top of the super. Take one of the honey frames from the super on the hive and shake as many bees off as possible. Then use the brush to remove the remaining bees. Try to use a flicking action to remove the bees as rolling them with the brush will irritate them. Place the frame in the empty box and cover it to keep the bees out. Repeat this step beginning with the smoke until all the frames have been transferred.

## Honey Processing

Honey that is removed from the hive must be properly handled to ensure that it doesn't begin fermenting, or is damaged by wax moth larvae or small hive beetle larvae. Honey is hygroscopic which means it will absorb moisture. Once honey is removed from the comb it then becomes processed honey. The separation process is called extracting. A centrifuge is used to spin the frame and the honey collects on the outer wall and runs down to a drain. It can still be classified as raw honey since it was only separated from the wax. Honey that is heated to 150°F, which cooks the pollen and destroys the enzymes, is no longer considered raw honey. Honey that is heated between 120 to 130°F is still considered raw. This heating process is used to separate the honey from the pieces of debris that can come from the frames, such as pieces of wood and bits of propolis. Heating to 120 to 130°F will allow the honey to flow through a 200 micron filter with ease. Honey may also be filtered without heating it to remove any debris, like wax, from it. Beekeepers have the option of processing their honey in a manner that they choose.

Comb honey is the easiest product to process. It involves either cutting a piece of comb filled with honey from a frame or is a piece of comb with honey placed by the bees in some type of structure, and placing it in a package. Package comb honey is placed into a freezer for 24 hours. This is to kill any eggs that may be present from wax moths and small hive beetles. Remove the packaged comb honey from the freezer and allow it to thaw before labeling, as the package usually will collect moisture on the outside as it thaws. If the comb honey is to be held unprocessed for more than two days the moisture in the air must be monitored to prevent fermentation in the combs. A dehumidifier is a safe means of preventing this from happening to any honey that is still in the comb and is being held for processing.

When honey comb is placed in a container and liquid honey is poured over it to finish filling the container the product is called chunk honey. The comb in this container will not need to be frozen to kill eggs as they will suffocate from the liquid honey that is poured over the comb.

Another form of processing honey is called creamed honey. It has also been called spun and whipped honey. Creamed honey is a natural process of granulation controlled by the beekeeper to create a smooth, not gritty consistency. Creamed honey is produced by first heating the honey to dissolve any crystals present. Honey that was already creamed is used as a starter. The starter should have a crystal size so small that a person is unable to feel them on their tongue when eating it. Mix one part starter to nine parts honey. The mixture needs to



***The work of separating the bees from the honey combs at harvest time must be done quickly without having honey exposed outside the hive for any length of time. One of the methods of removing the bees from the frames is by brushing.***



WVDA  
 Animal Health Division  
 Website: wvapiary.wvda.us  
 P: (304) 558-2214 F: (304) 558-2231

West Virginia Department of Agriculture  
 Animal Health Division -Apiary Section  
 1900 Kanawha Boulevard, East  
 Charleston, WV 25305



**Register on-line at [wvapiary.wvda.us](http://wvapiary.wvda.us)**

**Annual Application for Apiary Registration**

As required by the Code of West Virginia, Chapter 19, Article 13  
 For the period July 1 - June 30

|                  |        |   |
|------------------|--------|---|
| Apiarist Name:   |        | County where beekeeper resides:   |
| Mailing Address: |        | Address & Counties where apiaries are located:<br><small>(If different from residential. If more room is needed, write on back)</small> |
| City:            | State: | 1   |
| Zip Code:        |        | 2   |
| Phone:           |        | 3   |
| Cell Phone:      |        | 4   |
| Email:           |        | 5   |

**If you are no longer keeping bees, check this box so we can remove you from our mailing list**

|  |                                      |
|--|--------------------------------------|
| Number of Colonies at time of Application: Total _____                       | Number of Apiaries: _____            |
| Number of Colonies Lost During: What Caused Losses? (If known)               | Summer _____                         |
| (enter number of colonies in box): Number of increases (if any) in colonies: | Mites _____                          |
| Honey Produced Last Year: _____  | Starvation _____                     |
|  | Splits _____                         |
|  | Nucs _____                           |
|  | Pounds _____                         |
|  | Variety (Locust, Clover, etc.) _____ |

|                                  |   |                          |   |                          |                          |                      |
|----------------------------------|---|--------------------------|---|--------------------------|--------------------------|----------------------|
| Request an Inspection for: _____ | Interstate Movement<br><small>(to another state)</small>      | <input type="checkbox"/> | Sale of honeybees or queens<br><small>(within WV)</small> | <input type="checkbox"/> | <input type="checkbox"/> | I am a new beekeeper |
|                                  | <small>If you need service, please contact our office</small> |                          |   |                          |                          |                      |

At any time beekeepers needing assistance or those who have detected diseases or pest invasion, can call WVDA Apiary Section at (304) 558-2214 for inspection/assistance. The WVDA is committed to maintaining and promoting healthy colonies in West Virginia for honey production, the sale of bees and pollination.

Date \_\_\_\_\_ Signature \_\_\_\_\_

**SWARM LIST (This section is voluntary)**

*If you wish to be included on a "Swarm List," enter the county(ies) you are interested in:*

Swarm List Only \_\_\_\_\_ Cut-Outs & Swarms \_\_\_\_\_

*Your name, county and telephone number will be made available to the public for the purpose of removing swarms.*

**Honeybee Best Management Practices (This section is voluntary)**

I have read the "West Virginia Honey Bee Best Management Practices" as written in §61-2-4, Limits on Liability, and will adhere to this Voluntary program. For additional information regarding this program visit the WVDA webpage, [agriculture.wv.gov](http://agriculture.wv.gov), Divisions/Animal Health/Apiary and follow the applicable hyperlink.

Yes, I will participate \_\_\_\_\_

Signature \_\_\_\_\_