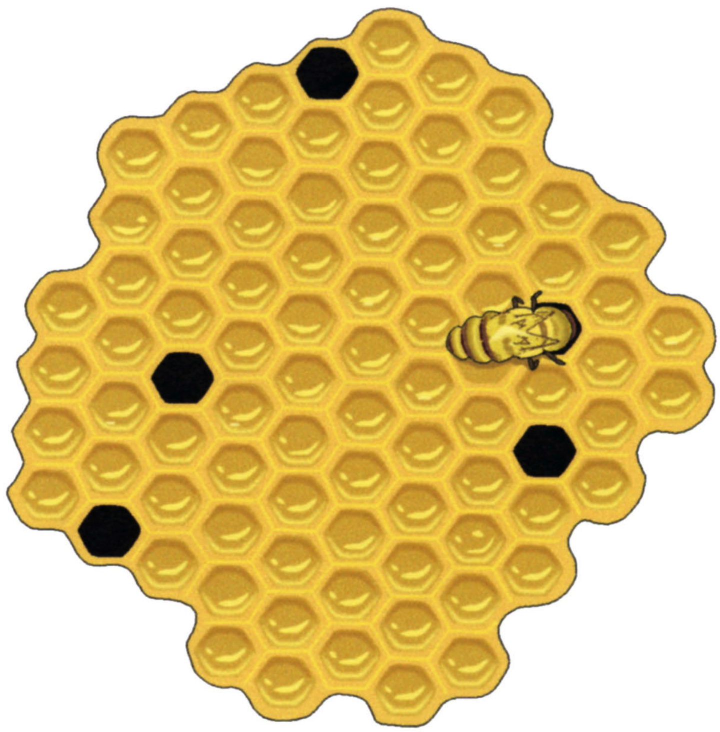
Guide to Beekeeping in West Virginia



West Virginia Department of Agriculture
Marketing & Development Division
Apiary Registration & Inspection Program
1900 Kanawha Blvd., East
Charleston, WV 25305
304-558-2210

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American Foulbrood Cause, Detection and Prevention

American foulbrood (AFB) is a honey bee disease, which infects the brood while it is in the larval and pupa stages. The bacterium which causes AFB is Bacillus larvae. AFB occurs in two forms; vegetative (rod-shaped bacterial cells) and spores. The spore stage is unique and may persist in a dormant state for many decades. AFB can be detected by examining the appearance of the brood. Dark, sunken or punctured cells with a spotty brood pattern is a tell tale sign of infection. Healthy brood should be white and curved completely in the bottom of the cell while in the uncapped or larval stage. After the cells are capped (pupal stage), the brood cappings should be of a uniform color with a slightly dome shape. Any variations should be investigated further. To test a punctured cell for AFB, insert a small stick (about the size of a match) into the cell and gently stir the sample. If, when the stick is removed, the sample has a stringy consistency, you should contact the West Virginia Department of Agriculture's Apiary Program immediately.

COMMON MISCONCEPTIONS

1. It can't be American foulbrood, because it has no odor.
2. My equipment hasn't been used for years; there couldn't be any danger in using it now.
3. I can put new bees back into my equipment. I didn't look to see what killed them, but it must have been the mites.
4. Using Terramycin in grease patties is just as good as using it in powdered sugar and a lot easier.
5. My colony has too many bees to have American foulbrood.
6. My colony made too much honey to have American foulbrood.

These are things we hear in the field on a regular basis, and unfortunately they are all incorrect. AFB-infected hives do not have any unpleasant odors as long as the colony has a large population of bees to ventilate it. Only after the colony is devoid of living bees is a smell present. After a colony has been dead for a few weeks, the mucus dries into a tar-like substance, known as scale. At this point, it again no longer emits an odor. The spores, as scale and in the woodenware, can exist for long periods of time, even after all visible signs of the disease are gone. Since the arrival of the Varroa and honey bee tracheal mites, it seems that every colony that has died mysteriously has been killed by the mites. This may or may not be the case.

Brood disease, in areas where equipment sharing takes place, is more common than we all would like. Combs belonging to dead out colonies should be carefully checked for scale before introducing new bees back into the hive. This can be done by tilting the bottom of the frame away from your body and allowing sunlight to shine into the cells. If scale is present, it will appear on the lower side of the cells. If you suspect that scale is present, take a thin bladed knife and carefully scrape a portion of the scale off. Smear the sample on top of a frame. If it is AFB, it will retain a tar-like consistency, instead of being dry and crumbly.

Terramycin "oxytetracycline" is a very effective antibiotic approved for use in honeybees on most strains of AFB, if used properly. The appropriate method is to mix one part Terramycin to seven parts powdered sugar. Colonies should be treated both spring and fall for three consecutive weeks with three tablespoons of the above mixture each week. The beekeeper must apply medication only on the end bars and the first and tenth frames. Terramycin can kill uncapped brood, if it comes into direct contact with it. All treatments should be administered six weeks prior to a supered honey flow and after all surplus honey supers have been removed.

The problem with using a medicated grease patty is that bees do not eat or otherwise use grease. Over time, grease patties will slowly disappear from a strong hive. However, it is merely being discarded as waste material by the house bees. To be effective, the antibiotic must enter their food chain either directly or through stored honey and wax in the brood nest area.

A large number of field bees is not necessarily a sign of a healthy colony. It is more accurately a sign of good health during the previous brood cycles. Strong hives are more likely to come in contact with dead or dying AFB colonies. Through the process of robbing honey from the weakened or dead colony, they carry the AFB spores back to their colonies and infect their young. Likewise, a large honey crop is the sign of a successful spring build up, but has nothing to do with the current health of the brood.

There are several honey bee problems that can be mistaken for AFB. The WVDA's Apiary Program has personnel trained to identify AFB and other honey bee disorders. A goal of the Apiary Program in the next year will be one of prevention. During the winter months we intend to sterilize as much unused equipment around the state as possible. This is a free service, which the WVDA offers. We urge you to participate and help us get the AFB problem eliminated, as much as possible.

Crop Insurance Available for Beekeepers

The Noninsured Crop Disaster Assistance Program (NAP) provides financial assistance to eligible farmers (including beekeepers) whose crops (such as honey) have been affected by adverse weather conditions and other natural disasters. An eligible natural disaster is defined as any of the following: drought, excessive moisture, hurricane, earthquake, flooding, excessive heat, or insect infestation.

Like any insurance, the NAP coverage is to protect the insured against future losses. To apply for coverage, beekeepers must go to their local Farm Service Agency (FSA) office and complete Form CCC-471. There is a fee of $100.00 per year, per county where the honey crop is harvested. When filing for coverage, the beekeeper must supply documentation supporting their income from the insured crop (honey) for a minimum of four years. Your approved yield may be calculated using substantially reduced yield data, if you report less than four years worth of income.

This insurance covers all crop loss above 50% of expected crop. Your coverage begins 30 days after the premium is paid and stays in effect until harvest time. Limited resource farmers are exempt from the service fees, if their annual gross income does not exceed $20,000 from all sources (including spouse's income) for a two-year period. Unlike most other crops, insuring a honey crop does not require the filing of an acreage report. The beekeeper must, however, supply the number of colonies and their location, or locations, if they are to be moved during the production season.

If an insured honey crop is lost due to a natural disaster, you must complete part B, Notice of Loss, on form CCC-576 within 15 calendar days of the loss or normal harvest date. Form CCC-576 requires you to provide evidence of production and note whether the crop was marketable, unmarketable, salvaged or used differently than intended.

For further information on the NAP program and other Farm Service Agency programs, contact your local FSA office, or go on line at www.fsa.usda.gov.

Determining Pesticide Resistance in Varroa Mites

The detection of fluvalinate (Apistan) resistant varroa mites in 1997 and coumaphos (Check-mite+) resistant varroa mites in 2001 makes resistance monitoring an important aspect of protecting bees from these parasites. The USDA-ARS developed a screening method in 1997 for the detection of varroa mites resistant to Apistan. The method has been modified for use in the detection of varroa mite resistance to Check-Mite+.

In 2001, it was determined that the majority of the honey bee colonies in West Virginia that were infested with varroa mites contained mites resistant to Apistan. That year, the West Virginia Department of Agriculture (WVDA) Beekeeper Assistance Program switched from Apistan to Check-Mite+ for distribution to those beekeepers participating in the Program. Although no resistance to the Check-Mite+ has been found in West Virginia at this time, the WVDA suggests that beekeepers begin testing their colonies each year, during the fall, for resistance to Apistan and Check-Mite+.

During fall, varroa mite levels are at their highest and colonies should be tested before any decision is made to treat for the mites. Beekeepers will need to know when varroa mites are susceptible to fluvalinate and when they become resistant to Check-Mite+. This will help us set up a rotation of pesticides. At present, the beekeeper has two choices to make during the fall regarding varroa mite control. The first is to decide whether or not mite populations are high enough to warrant the use of a pesticide. If the beekeeper decides to treat with a pesticide, then a decision has to be made whether to use Apistan or Check-Mite+. The test described below will help in making that decision.

A minimum of six bee colonies, each containing high numbers of varroa mites, will be needed to achieve the most accurate results. However, if you have less than six colonies, you can still conduct the test.

Materials needed to assay six colonies for Check-Mite+ and Apistan resistant varroa mites:

- 6 pieces of Apistan, 3/8 of an inch long by 1 inch wide,
- 6 pieces of Check-Mite+, 3/8 of an inch long by 1 inch wide,
- 12 one pint mason jars,
- #8 mesh hardware cloth, cut to fit the jar lids
- One dozen 3 by 5 inch paper index cards,
- A quarter-cup measuring scoop for measuring bees (125-150 bees needed)
- 1 cardboard box to shake bees in, preferably 10 inches by 11 inches by 11 inches with flaps taped down,
- 1 pair of rubber gloves
- 1 colander #8 to #12 mesh (8 to 12 squares per inch), and
- 1 white cloth to collect mites that pass through the colander.

Wearing rubber gloves for your protection, cut six 3/8-inch strips of Apistan and six 3/8-inch strips of Check-Mite+. Staple one strip to each index card. Number the cards 1-6 for the Apistan and 1-6 for the Check-Mite+. Place one card in each jar. Select six colonies in your apiary with the highest numbers of mites and number the hives 1-6. Use these colonies to collect your bees for the test. You will collect two samples from each colony. One sample will test Apistan resistance and the other will test Check-Mite+ resistance. If brood rearing is still present in your colonies, select a comb from the brood area that has plenty of young bees. Be sure that the queen is not on the frame. Shake the bees off the comb and into the cardboard box. Fill the quarter measuring cup with bees from the box, transferring them into the jars with the numbered Apistan or Check-Mite+ cards. As you fill each jar, place the lid with the screen onto the jar to prevent any bees from escaping. Dump the bees that remain in the cardboard box back into the hives.

The samples should be kept in a warm room and out of the sunlight for six hours. After the six hours has passed, begin the sampling by shaking the varroa mites from one jar onto a white piece of paper. Count the number of varroa mites on the paper and record this number, making sure you correctly record the sample number. The bees in the jar will need to be washed in order to collect the remaining varroa mites. To do this, place a small amount of dishwashing detergent into the jar through the screen and add water to the jar. Place a white cloth under the colander and then pour the contents of the jar into the colander. The colander will catch the bees, but allow the varroa mites to pass onto the cloth. Rinse the bees thoroughly with water to collect any additional varroa mites and pour all rinses through the colander.

Add up all the varroa mites killed by the Apistan in jars 1-6, and then add up all the varroa mites that were found when you washed the bees in the 106 Apistan jars. If the number of mites in the washed sample is higher than the number of mites killed by the Apistan, then the varroa mites are resistant to the Apistan. The six Check-Mite+ jars are compared in the same way to determine resistance. After you have completed two separate tests, one for Apistant and one for Check-Mite+, you can decide which product will provide the best control of varroa mites in your colonies.

Fall Management of Honey Bees

Fall is the time to prepare your honey bee colonies for the winter months ahead. More colonies are lost during the winter than at any other time, largely due to poor management decisions. The condition of the colony in the fall will determine its ability to survive until spring. In preparation for the winter, beekeepers should examine their colonies for sufficient bee population, adequate food stores, brood disease, parasitic mites, proper ventilation and a vigorous queen.

In the fall, and before any mite treatments are applied to a hive of bees, all supers used to produce honey for human consumption need to be removed. Do not leave any empty supers on the colony above the food chamber. If a queen excluder is used during honey production, it should also be removed from the colony and properly stored. If the queen excluder is left on in the winter, the colony runs the risk of having the cluster move through the excluder leaving the queen below to freeze to death.

One of the most difficult problems that a beekeeper faces is determining the number or bees in a colony. Perhaps the quickest and easiest method is to simply open the hive at a time when the bees are all clustered together, which will happen when the temperature drops to around 50 degrees, and examine the size of the cluster. The number of bees in the colony can be roughly determined by knowing the number of bees in the cluster. A colony that has formed a cluster covering the equivalent of eight deep brood frames, from the top to the bottom, will have over 40,000 bees. A strong colony should contain about 40,000 to 50,000 bees in the fall in order to survive the winter. A weak colony, one containing 20,000 bees or less, should be combined with another colony.

A strong colony of bees will need 40 to 70 pounds of honey to survive the winter and build its population in the spring. In some areas of West Virginia, honey produced from flowers blooming in April will allow you to overwinter colonies with as little as 40 pounds of honey. In other areas, abundant nectar sources will not come until the end of May. Bees kept in these areas will need the additional food storages in order to prevent starvation. If you use a medium-depth super (6 5/8) for your food chamber, it should be completely full of honey. This will provide the bees with about 45 pounds of honey. If a full-depth super (9 5/8) is used for the food chamber, and it is full, it will contain between 70 and 90 pounds of honey.

The full-depth super (brood chamber) setting on the bottom board should not contain more than two frames of honey, which are the outer frames. When bees cluster in cold weather they can only survive on empty combs. If they cluster on combs of honey, they will freeze. Bees store their food in the top of the hive. During the winter the cluster of bees will feed in an upward direction only. Honey will often be found beneath clusters, which have starved.

Diseases can adversely affect a colony of bees and reduce its chance of surviving the winter. One such disorder is Nosema disease, often called the silent killer. Nosema disease is caused by a spore-forming protozoan, which infects adult bees. A colony infected with Nosema disease will appear strong and healthy in the fall, but will either weaken or die from the disease in late-winter or early spring. Nosema disease appears to disappear in the summer and causes no problems after a spring honey flow. A microscopic examination is the only positive way this disease can be identified. Fumidil-B is the only product labeled for control and prevention of Nosema disease.

Brood diseases, those that affect developing bees, include American foulbrood (AFB), European foulbrood (EFB), chalkbrood and sacbrood. AFB and EFB are bacterial infections that can cause serious problems for a beekeeper during any season. If you suspect that you have AFB or EFB in your colony, contact the West Virginia Department of Agriculture (WVDA) for assistance. Chalkbrood, which is caused by a fungus, can be cleared up by re-queening the colony and increasing ventilation. Re-queening is necessary, because the queen in an infected colony carries the fungus on her body and deposits it into the cells as she lays eggs. Sacbrood is caused by a virus and is often related to poor hive ventilation or poor apiary placement.

Ventilation in bee hives is very important at all times, but more so in the winter when cold temperatures keep the colony confined. Make sure air can enter the hive from the top and bottom, thereby allowing oxygen to flow in and carbon dioxide to flow out. Also, hives should be protected from the wind and never placed in low lying areas where fog tends to collect or the humidity is high. Remember, 40,000 bees must be able to breathe and get rid of the moisture that their bodies will produce while clustering.

Adequate control of the parasitic honey bee tracheal mite (HBTM), *Acarapis woodi*, is also important for a bee colony's winter survival. Mite-A-Thol is a registered treatment for the control of HBTM and works like a fumigant. Mite-A-Thol works well when applied between August 1 and 15, possibly the last time for the year that the temperatures will be high enough, for a sufficient period of time, to turn the menthol crystals into a gaseous state. The use of a queen resistant to the HBTM, such as the West Virginia Queen, Buckfast queen or Russian queen, will make this treatment unnecessary.

The varroa mite, *Varroa destructor*, considered by many to be the most serious pest of honey bees, can weaken a colony in late-summer, decreasing its ability to survive the winter. The colony is weakened by the Varroa mites feeding on the blood of adult bees, their larvae and pupae. Apistan and Check-Mite+ are registered to combat the Varroa mite. Much of the Varroa mite population in West Virginia has become resistant to Apistan, and the USDA Lab in Beltsville Maryland has reported that the mites are becoming resistant to the Check-Mite+ in some states. The West Virginia Department of Agriculture (WVDA) has been operating under a special use permit in order to provide CheckMite+ to registered beekeepers who participate in the WVDA Beekeeper Assistance Program. Field observations by WVDA Apiary Program personnel indicate that both Check-Mite+ and Apistan work best after brood rearing has stopped. An Apistan/CheckMite+ resistance test should be run on colonies that need to be treated for Varroa mites in order to decide which product will work best. A program designed to rotate pesticides should also be considered in order to slow the Varroa mite's ability to develop and maintain resistance.

When using any pesticide, always read and follow the label directions and precautions. If you need assistance with a honey bee problem, contact the WVDA Apiary Program at (304) 558-2210, or e-mail your inquiry to: gclutter@ag.state.wv.us.

Honey Sanitation

Honey-consists of 41% levulose, 34% dextrose, 1.9% sucrose, 17% water and 6.1% matter (iron, lime, sodium sulphur, magnesium, potassium, manganese, phosphoric acid, pollen grains, etc.). Honey is produced from nectar that the bees gather from flowers. The bees will reduce the water content of the nectar and add enzymes to produce honey. Honey will vary in color and flavor depending on the flower that the bees gathered the nectar from to produce the honey.

Honey Pasteurizing-Honey contains yeast that should be killed through pasteurizing or it may cause fermentation. Microscopic yeast cells that belong to the Genus *Zygosaccharomyces* are found in all nectars. These are called osmophilic yeast and can grow only in rich sugar solutions containing about 30 to 80% sugar. To kill the yeast, heat the honey to 140 degrees F for 30 minutes or 150 degrees F for one minute. Honey can only be heated in a double boiler where the water temperature does not exceed 180 degrees F. Honey that comes in direct contact with a hot surface will become scorched, which would give it a bad flavor. Heating the honey can destroy the enzymes, pollen and other matter. Some beekeepers prefer not to heat honey to prevent destroying these valuable nutrients. Honey that is not heat processed is called raw honey.

Honey and Botulism- Honey can contain *Clostridium botulinum* spores. These spores are often found in plants and animals as well as in the soil. The bacteria can be killed by heat. The spores on the other hand are very resistant to heat. We probably ingest them daily, without any harm to the adult digestive tract. Babies under six months of age are found to be subjective to toxicoinfection, in which the spores of the *C. botulinum,* ingested by the baby, germinate and produce the toxic material and illness.

The National Honey Board encourages those who package honey to place an infant warning label on honey indicating that honey should not be fed to children under the age of one year. At present, there are no laws that require this label.

Honey Fermentation-is caused when the moisture in the honey is above 18.4%. Bees will normally evaporate honey to around 17%, and then seal the honey with a wax capping. This however does not stop the honey from absorbing moisture from the air, which is called hygroscopicity. The hygroscopicity in honey is largely due to its levulose. Honey that has been removed from the bee hive will need to be stored in a room where the humidity is lower that 50% to avoid hygroscopicity. A dehumidifier or a fan with constant airflow through the stored honey combs will prevent hygroscopicity. Fermentation will give honey a bad taste, and will also increase the amount of bacteria.

Refractometer- is used to measure the moisture percentage in honey. The normal range of moisture in honey ranges from 16% to 18.4%. Honey that has a moisture level higher than 18.4% will begin to ferment.

Extracted Honey-is honey that is pressed, squeezed, or removed from comb(s) with a centrifugal force machine.

Comb Honey- is honey that is has been left in the comb and packaged.

Chunk Honey-is the term given to a piece of honey comb that has been placed in a jar and liquid honey has been poured over it to finish filling the container.

Metals and Honey-Honey is an acid food with a pH range from 3 to 4.5. Due to its acidity, stainless steel is the only material that should be used for processing. The stainless steel should contain 18% chromium and 8% nickel. The most popular finish is #4. It does not show scratches and is easy to clean. Most of the honey processing equipment made before 1980 was constructed of galvanized steel. There is still a lot of this equipment being used today. To bring this equipment into a more suitable condition for use in honey processing, the equipment can be painted with epoxy paint that has a hard surface and resists acidic materials. It should also be a food grade paint. One of the bee supply companies (Walter T. Kelley Co. Inc.) carries an epoxy product for this purpose.

Honey Crystallization-Honey contains two primary sugars, glucose and fructose. When honey granulates only the glucose crystallizes, while the fructose remains liquid. Some beekeepers have learned how to take advantage of this crystallization to produce a product called creamed honey. By using the Dyce Process (named after its discoverer Professor Eldon J. Dyce), honey can be forced to granulate into a very fine granule that cannot be detected by the tongue. Honey that is to be used to produce creamed honey must first be processed to kill the yeast cells. When honey granulates and the yeast cells have not been killed fermentation will begin. The first step of the Dyce Process is to heat the honey to 150 degrees F for one minute then allow the honey to cool to between 70 and 80 degrees F. Add a starter crystal in the amount of 10% to the honey. Place the product in its containers and store at 57 degrees F until completely granulated. This usually takes about 10 days.

USDA Grades- the U.S. Department of Agriculture has instructions for grading 155 agriculture products. The grades for extracted honey can be found in an 11-page brochure entitled *United States Standards for Grades of Extracted Honey Effective May 23, 1985* and are available from the Chief, Processed Products Branch, Fruit and Vegetable Division. The brochure begins with definitions of terms followed by a table listing the seven color designations for liquid honey. Grades A and B must be honey with 81.4% or more of solids (moisture content of 18.6% or less). Grade C honey may contain 20% or less water. Grade D is substandard and has more moisture. There are no grades for crystallized honey though crystallized and partially crystallized are defined. The grades for honey in the comb are contained in a nine page brochure entitled *United States Standards for Grades of Comb Honey Effective May 24, 1967.* These standards are available from the same address above. Comb honey falls into five categories according to the USDA system. Comb section honey, shallow frame honey, wrapped cut-comb honey, chunk or bulk comb honey, and unclassified chunk or bulk comb honey-packed in glass.

How to Protect Honeybees From Pesticides

A Guide for Beekeepers and Pesticide Applicators

Practically every agricultural crop has insect pests that sometimes require treatment. Unfortunately, beneficial insects such as honeybees are also susceptible to many pesticides. The purpose of this bulletin is to emphasize ways to control pests while maintaining the survival of honeybees, which through pollination contribute an estimated $20 billion annually by increased production of U.S. crops.

The West Virginia Department of Agriculture is the state agency responsible for enforcing pesticide regulations. Pesticide users are required by law to comply with all pesticide label instructions and directions. For those pesticides toxic to bees, label language designed by the Environmental Protection Agency to protect honeybees varies from vague statements to the specific: "Do not apply while bees are actively foraging."

Where the pesticide label prohibits application, pesticide applicators may be subject to civil penalties when there is strong evidence that honeybees were foraging in the treatment area at the time of application. Investigations of bee kill incidents take into consideration environmental conditions, typical bee behavior, precautions taken (or not taken) by the applicator, samples of dead or dying bees and the relative volume of blooming plants in the treatment (or drift impacted) area. Losses of honeybees often can be reduced by colony management, by changes in the way pesticides are applied, or by both.

BEEKEEPER METHODS that may reduce bee losses include:

- identification to farmers and pesticide applicators of hive locations,
- confining bees to the colony and
- relocating colonies.

APPLICATOR PRACTICES that reduce colony losses include:

- spraying in early morning or late evening,
- using pesticides with a short residual life,
- reducing the number of treatments,
- mowing where blooming weeds and orchard cover crops exist, and
- applying materials with low toxicity to honeybees.

Precautions for beekeepers

Inform farmers and other pesticide applicators in the area of the location of your bees to avoid unintentional poisonings. Identify each colony location with your name, address and telephone number.

Be prepared to remove the bees from the area if you are notified that a hazardous material is likely to be applied. Hives placed near fruits, vegetables and other crops for pollination services should be removed as soon as pollination is completed.

Cover colonies with wet burlap during application and for 1-2 hours following treatment. Burlap should be re-wet each hour.

Know the pesticides commonly used in your area, the hazard to bees and the spray schedules. When possible, do not place colonies near fields that are routinely treated with pesticides, such as apples or peaches.

Relocate the colonies if they are likely to be exposed to hazardous pesticides. Even moving hives a short distance of ¼ mile from the treated area usually significantly reduces injury to bees. Moving bees one mile away from the treated field reduces bee kills by 60 percent. Keep in mind that a strong nectar or pollen source may attract bees from several miles away. Providing internal water, pollen feeders and shading colonies from the sun also lessens injury to colonies.

Learn as much as you can about the value of pollinating insects to crops as well as to wild flowers, ornamentals and forests. Pass this information along to farmers and others in your area. In this way, they learn about the value of bees as pollinators and will be encouraged to protect your bees.

Precautions for applicators

Inform beekeepers in advance of when crops are scheduled for spraying.

Be aware of the hazards of pesticide application to bees. Choose the least toxic and shortest residual pesticide.

Remove blooming weeds and cover crops from the area to be treated.

Make as few treatments as possible, as repeated applications greatly increase the damage to colonies.

Make applications as late as possible, when bees are in their hives and out of danger from pesticide contact. As summer temperatures increase, bees forage earlier in the morning and increasingly later in the evening.

Do not treat an entire field or area if local spot treatments will control the harmful pests.

Avoid dust formulations, as these are more hazardous to honeybees.

Keep in mind that wettable powders are more hazardous to honeybees than emulsifiable concentrates, due to a longer residual period.

Use granular formulations whenever possible as these are the least likely to harm bees.

Relative Toxicity of Pesticides to Honeybees

Highly toxic
acephate, Orthene
avermectin
azinphos-methyl, Guthion
bifenthrin, Brigade, Capture
bioethenomethrin
carbaryl, Sevin 80 S
carbofuran, Furadan
chlorpyrifos, Dursban, Lorsban
cyfluthrin, Baythroid
cyhalothrin, Karate
cypermethrin, Ammo, Cymbush
decamethrin, Decis
DDVP, dichlorovos, Vapona
diazinon, D-Z-N
dicrotophos, Bidrin
dimethoate, Cygon, De-Fend
diphenothrin, Sumithrin
EPN
fenitrothion, Sumithion
fenpropathrin, Tame, Danitol
fensulfothion, Dasanit
fenthion, Baytex
lindane
malathion,Cythion
methamidophos, Monitor, Tamaron
methidathion, Supracide
methiocarb, Mesurol
methomyl, Lannate
methylparathion, Penncap-M
mevinphos, Phosdrin
mexacarbate, Zectran
naled, Dibrom
parathion
permethrin, Ambush, Pounce
phosmet, Imidan
phosphamidon, Dimecron
prallethrin, ETOC
propoxur, Baygon
pyrazophos, Afugan
resmethrin, Synthrin
sulprofos, Bolstar
tetrachlorvinphos, Appex, Gardona
tralomethrin, Scout

Moderately toxic
Bacillius thuringiensis, thuringiensis, Di-Beta
carbaryl, Sevin 4 Oil
chloridazon, Pyramet
crotoxyphos, Ciodrin
demeton, Systox
disulfoton, Di-Syston
endosulfan, Thiodan
ethoprop, Mocap
fluvalinate, Mavrik
fonofos, Dyfonate

formetanate, Carzol
oxamyl, Vydate
oxydemeton-methyl, Metasystox,R
phorate, Thimet
phosalone, Zolone
promecarb, Carbamult
sabadilla, Veratrin-D
thiodicarb, Larvin
trichlorfon, Dylox

Relatively nontoxic

aldoxycarb, Standak
allethrin
amitraz, Mitac
azadirachtin, Margosan-O
Bacillus thuringiensis, Kurstaki, Javelin, Dipel4L
Bacillus thuringiensis, tenebrionis
baculovirus heliothis
chlordimeform, Fundal**,** Galecron
chlorobenzilate, Acaraben**,** Folbex
clofentizine, Apollo
cryolite, Kryocide
cymiazle, Apitol
cyromazine, Trigard
dicofol, Kelthane
diflubenzuron, Dimilin
dinobuton, Dessin
esfenvalerate, Asana
fenbutatin-oxide, Vendox
heliothis polyhedrosis virus
malathion, low concentrate
methoprene, Altocid
methoxychlor, Marlate
mutimethylalkenols, Stirrup
nicotine
ovex
oxythioquinox, Morestan
propargite, Comite, Omite
pyrethrins
rotenone
ryania, Rynodine
sulfur
tetradifon, Tedion

Other Relatively Nontoxic Pesticides

Fungicides

anilazine, Dyrene**,** Kemate
benomyl, Benlate
bordeaux mixture
captafol, Difolatan
captan, Orthocide
copper oxychloride sulfate
copper 8-quinolinate
coppersulfate (monohydrated)
cuprous oxide
dazomet, Mylone
diniconazole, Spotless
dinocap, Karathane
dithianon, Thynon
dodine, Cyprex
fenaminosulf, Lesan
folpet, Phaltan
glyodin, Glyoxide
maneb
nabam, Parzate
Polyphase P-100, Troysan
prochloraz
prochloraz/carbendazin, Sportac
sulfur
thiram
triforine, Funginex
triphenyltin hydroxide, Du-Ter
ziram, Zerlate

Herbicides, Defoliants, Desiccants & PGRs

alachlor, Lasso
amitrole
atrazine, Aatrex
bentazon, Basagran
bromacil, Hyvar
butifos, DEF
chlorbromuron, Maloran
chloroxuron, Tenoran
cyanazine, Bladex
dalapon
DEF
dicamba, Banvel
dichlobenil, Casoron
diquat
diuron, Karmex
EPTC, Eptam
ethalfluralin, Sonalan
etephon, Ethrel
EXD, Herbisan
fluometuron, Cotoran
fluridone, BRAKE, Sonar
hydrogen cyanamide, Dormex
imadagylin, Arsenal
linuron, Lorox
MCPA, Mapica
metaldehyde
methazole, Probe
metribuzin, Lexone, Sencor
monuron
naptalam, Alanap, (cloproxydim), Select
nitrofen, TOK
norflurazon, Zorial
paraquat
phenmedipham, Betanal

picloram, Tordon
prometryn, Caparol
pronamide, Kerb
propanil, Stam F-34
propazine, Milogard
propham, IPC, Ban-Hoe
quinchlorac, FACET
simizine, Princep
sodium chlorate, KNOCK ‘UM OFF
terbacil, Sinbar
terbutryn
thiadiazuron, DROPP
tribuphos, Folex 6EC
Uniconazole-P
2,3,6-TBA
2,4-D, 2,4-D
2,4-DB, Butoxon, ButyracPyrethroids are synthetic pyrethrums.

Pyrethrums are naturally occurring botanical pesticides and are relatively nontoxic to bees. The pyrethroids are toxic to bees; however, the rate at which they are applied is at such low dosages that they are safe to use around bees when the bees are not foraging. Pyrethroids are safer to bees than most organophosphates and carbamates. Mevinphos, naled and tepp have such a short residual that they kill bees during treatment or shortly thereafter and are not safe to use around colonies.

Adapted from material produced by the Clemson University Department of Pesticide Regulation, taken from E.L. Atkins, and J.M. Graham. 1992. The Hive and the Honeybee, University of California.

Installing Breeding NUCs

A queen breeding nuc, or nuc hive, is any smaller-than-normal hive that is used for the sole purpose of providing a temporary home for a queen honey bee during the maturing and mating process. The queen stands less chance of harm from the bees in a smaller hive than she does in a full-size hive (more bees mean more chances that the queen will be attacked and killed). Five-frame, full-depth hives are a popular choice as nuc hives among beekeepers, because they often already have this equipment on hand for catching and moving swarms. There are three basic problems with this type of nuc. First, a nuc this large tends to grow quickly and will soon swarm out, leaving your nuc without a queen. Secondly, too much material (five deep frames) is used to produce the same results as a smaller box. Finally, a queen can be more difficult to locate among five frames of bees.

An Illinois "6 5/8 depth" super can be divided into three sections, allowing each section to have two frames of brood and a division board feeder or frame of honey. The super should be set on a solid bottom. One lid may be used, but three small inner covers will work better so that one nuc at a time may be examined. The entrance hole for the center nuc should be in the front and the holes for the other nucs should be on either side. Holes should not be any larger than ¾ of an inch. Each side should be painted a different color to help the queen find the correct entrance when she returns from her mating flights. The drawback to this type of nuc is that the bees often abscond (leave or abandon) their space when they discover that other bees are living so close. Three-frame 6 5/8 nucs in a separate box can be a simple and effective alternative. Brood should be periodically removed from these boxes because it, too, can grow quickly enough to produce a swarm.

Mini-mating nucs are usually no larger than three frames, half the length of a 6¼ frame. In a nuc of this size, the population build-up is slower and swarming is less of a problem. The queen is easier to find and less resources are used to get the queen mated. The drawback to this type of hive is that the bees often abscond the hive, leaving the brood behind, when the queen runs out of empty cells in which to lay eggs. To prevent this, you must cage the queen after she begins to lay. The cage should be placed in the hive until used. If storage beyond 21 days is required, the entrance should be closed and the queen released for three days, allowing her to lay the cells full of eggs. At the end of three days, the queen should be used or re-caged.

When stocking a nuc with shaken bees only, they must be confined to the nuc with the queen cell for a minimum of three days. If they are allowed immediate free flight they will leave and not return. When stocking a colony using brood, no confinement is required.

All types of breeder nucs should be well ventilated, supplied with feed and placed in a shady area at least 30 yards from your main apiary. If a queen is forced to fly across the flight path of a mature hive, she will often be knocked out of the air and killed on the ground. Keeping the bees as comfortable as possible will help keep them working in their nucs for the entire season.

Migratory Beekeeping and Honey Production

For thousands of years, honey bee colonies were moved around in the Old World to produce honey. Since no native honey bees existed in North America when the first settlers arrived here, bees had to be transported across the Atlantic Ocean by ship to what is now the United States for the purpose of producing honey. As this country grew and production agriculture became more important, the value of pollination by honey bees on a large scale, in addition to their honey production, was recognized and also grew in importance. Beekeepers began the practice of moving their hives from one geographic area to another and renting them to growers. By 1930, migratory beekeeping had become a flourishing business in the U.S., with growers of such crops as almonds, apples, blueberries, and alfalfa renting honey bees to pollinate their crops. Today, a rented colony of honey bees can bring from $30.00 to $65.00 for a beekeeper, depending on the crop to be pollinated and the strength of the colony.

Shenandoah Valley Bee Company, located in Gerrardstown (Berkeley County) is one of the state's largest pollinating companies. Each year, they, along with other companies, rent thousands of colonies of honey bees to fruit producers in Berkeley, Jefferson, Hampshire, and Morgan Counties for the purpose of pollinating apple trees. The apples produced provide an income for the fruit growers as well as jobs for hundreds of employees at companies like Knouse Foods , National Fruit, the Inwood Farmers Market and many others. Beekeepers in West Virginia also rent thousands of colonies to fruit and vegetable growers in Maryland, New Jersey, and Virginia each season to pollinate crops such as cranberries, blueberries, melons and cucumbers.

When colonies of bees are moved from West Virginia to another state (interstate movement), they must be accompanied by a certificate of inspection from the West Virginia Department of Agriculture (WVDA) stating that the bees are in good health and free from pests. The same applies to bees transported into West Virginia. The West Virginia Apiary Law of 2003 requires bees and used beekeeping equipment to be accompanied by a certificate of inspection verifying that the bees and/or equipment had been inspected and are absent of honey bee pests. The staff of the WVDA Apiary Program provides interstate movement inspection service for West Virginia beekeepers and the enforcement of interstate movement regulations for bees coming into the state. This is one way that apiary inspection services help slow the spread of deadly honey bee pests.

With regard to honey production, West Virginia beekeepers have an excellent opportunity to increase the amount and types of honey produced each year by moving their bees from one nectar source to another. Major honey producing plants will start blooming in lower elevations as much as two to four weeks before they start blooming in the highlands. Knowing when and where to move bees for maximum honey production is a challenge, since not every major honey producing plant will bloom every year, or they may bloom, but not yield any nectar because of weather or soil conditions. A major honey flow will usually last two to three weeks and, from mid-April until mid-September, one can almost always be found somewhere in West Virginia. Not moving your bees will usually limit you to two major honey flows each season. A beekeeper that moves 20 colonies three or four times could easily obtain much more honey than one with 100 stationary colonies.

Following are descriptions of the major nectar sources in West Virginia that you may want to consider moving your colonies around for to increase your honey production.

An important early nectar producing plant is autumn olive (Elaeagnus umbellata), which is a noxious weed in 23 counties. Autumn olive begins to bloom in early April in the lower elevations of West Virginia. It produces a light colored and very uniquely flavored honey that tastes like the aroma of autumn olive blossoms.

The next major nectar source to bloom in West Virginia is black locust (Robinia pseudoacacia). It flowers in late April in lower elevations. Locust honey is light in color and said to be the “gourmet of all honeys”.

Tulip popular (Liriodendron tulipifera) blooms about one week after locust begins to bloom, which is usually the beginning of the largest honey flow in the state. Tulip popular honey is often mixed with locust honey, since the flowering periods of both trees overlap. Tulip popular honey is dark red and has a very rich and delicious flavor. This honey has been steadily gaining in popularity across the state for several years.

Sumac (Rhus spp.) blooms at several different times during the growing season because there are several species. The earliest species to flower will start blooming in early June, with the other species blooming in July. Sumac honey has good flavor, but it varies in quality. Its color ranges from amber to dark amber.

Two species of basswood, American linden (Tilia americana) and white basswood (T. heterophylla), begin blooming in late June. Basswood honey is light in color and has a mild, slightly minty flavor. West Virginia is well known for its basswood comb honey, which is often called “LINN” honey by many beekeepers.

Blooming at about the same time as basswood is a plant called star thistle (Centaurea solstitialis). Star thistle honey has a smooth, mild flavor and is light in color.

Japanese knotweed (Polygonum cuspidatum) is a non-native, invasive plant that has spread throughout much of the state. However, over the last 10 years, it has become an important nectar source for honey bees. It blooms in early-to-late July. The honey produced from Japanese knotweed has a very dark, ruby red color and a good flavor.

Our last major nectar sources of the season are goldenrod (Solidago spp.) and aster (Aster spp.). There are over two dozen species of each and they all bloom at about the same time. Some of the heaviest honey flows from goldenrod have been recorded in the Canaan Valley area and some parts of Preston County. Several beekeepers take advantage of these hot spots and move colonies of bees to Canaan Valley each year. Goldenrod honey is light yellow in color and has a good flavor, but is very quick to granulate.

West Virginia has a very large number of plants (too numerous to mention) that serve as minor sources of nectar for honey bees. Beekeepers often call the honey produced from these plants “wild flower honey”. It will often require a combination of several types of “wildflowers” blooming at once over a large area to make it worthwhile for you to move your colonies in an effort to get enough surplus honey to harvest.

Moving Honey Bees

Moving honey bee colonies to increase honey production or for pollination purposes can be very rewarding unless something goes wrong and a bunch of angry bees get loose. If the latter should happen, it can quickly turn into a lawsuit or a stinging incident you'll never forget.

There are a number of ways to move a colony of bees. The bees can be confined within the colony or they can be confined to the bed of a truck or trailer by covering the entire structure with netting. Confining the bees within the colony is the best method. A net could then be used as a precaution, in case any bees escape the hive.

To prepare a standard colony of honey bees for moving, you should first remove all surplus honey and empty supers to make the colony as light as possible. Check the bottom board and all exterior hive components for holes that could allow bees to escape and repair them with calking or duct tape. The inner cover should be replaced with a screened, inner cover made of eighth-inch hardware cloth with a three-quarter-inch bee space for top ventilation. Window screen should not be used to make the screened, inner cover, because the bees will quickly propolize the small holes in the screen rendering the device useless. If the lid must be left on the colony when it's moved, place two three-eighths-inch spacers on the top of each side of the screen to hold the lid up and allow air to circulate.

Each colony will need to be held together during the move. Two-inch-wide hive staples (available from bee supply dealers) can be used for fastening the bottom board to the deep super and for fastening the deep super to the medium super. One staple is used on each corner of the colony. The screen can be held on with nails or wood screws. Hive staples can cause damage to your equipment and are not the only way to hold a colony together, so you may want to opt for one of the alternatives. A ratchet strap could be placed around the center of the colony, or one strap near the front and one near the rear. The hives can also be banded with plastic strapping using one strap in the middle, or one near the front and one near the rear. If straps are used to secure a colony, always be careful when the colony is scooted, as the bottom board could catch on something and separate from the deep super.

Move bees only when they are all in the colony. A piece of aluminum window screen placed over the front entrance of the colony will keep the bees inside the hive and provide ventilation. Also, colonies should be moved in early morning before foraging begins or just before dark when foraging is over and the bees return to their colony. If they are moved during the day while foraging bees are still out, the foraging bees will return and begin stinging anything within 30 yards of where the colony had been sitting. The loss of the field bees will also mean lower honey production and poor pollination service.

After the colony is placed in its new location, puff some smoke into the hive entrance with a bee smoker and remove the screen that covers the entrance. If the bees were not confined to the colony when it was moved, but the colony was simply covered with some netting, use smoke before removing the net and unloading the hive.

At night, bees will fly to any light source. Turning on the headlights of an automobile and standing in front of them will help to remove bees from your clothing. Also at night, bees will crawl on your clothing until they can find a hole to enter or a place where the clothing is touching your skin and then they will sting. Clothing that provides protection during the day may not work at night.

A final piece of advice if you do choose to move your bees, make sure your vehicle has enough gas to make the trip without stopping. Bees that are left at a gas station can cause a stinging hazard and a possible lawsuit. If you should have an accident in an area where there is the danger of others getting stung, use liquid soap and water to kill the bees that escape the colony.

New Era in Beekeeping

Before the late 1980s, beekeeping in West Virginia was quite simple. Beekeepers strived to keep pesticides out of their colonies and seldom lost more than 5% of their colonies during the winter. This changed when the varroa mite, Varroa destructor, and the honey bee tracheal mite (HBTM), Acarpis woodi, were discovered in the United States and eventually West Virginia. Beekeepers in West Virginia were forced into doing something they never dreamed they would have to do, they had to use pesticides to control the parasitic mites that had invaded their hives.

In an effort to help beekeepers deal with their new pest problem, the Environmental Protection Agency (EPA) and the Food & Drug Administration quickly approved two pesticides for use in controlling parasitic mites on honey bees. Mite-A-Thol was approved for the control of the HBTM and Apistan was approved for the control of the varroa mite.

The search for other ways of combating parasitic mites on honey bees has led to the breeding of honey bees that are resistant to the HBTM, thereby eliminating the need to use Mite-A-Thol. These include the well-known Buckfast strain and Buckfast hybrids, such as the West Virginia Queen. While the West Virginia Queen was rated higher in varroa mite resistance than the Russian Queen (a strain that the United States Department of Agriculture's Agricultural Research Service introduced from Russia), it is still not resistant enough to allow beekeepers to completely abstain from chemical treatment for varroa mite control.

The need to find a truly varroa-resistant bee has become an important challenge because, in many areas, the varroa mite has developed resistance to Apistan. To help counter this resistance, a relatively new product, CheckMite+, has been granted a special emergency use designation by the EPA, allowing use to treat honey bees for varroa mites. Beekeepers in West Virginia were able to obtain this product in the spring of 2001 from bee supply companies. In late July 2001, the West Virginia Department of Agriculture's (WVDA) Beekeeper Assistance Program provided registered beekeepers with a sufficient amount of CheckMite+ for each colony registered with the agency.

When varroa mites first arrived in West Virginia, there were no methods for determining economic threshold levels for varroa mite treatment, that is, the level of mite infestation that a bee colony can sustain before the health of the colony begins to decline. We now have methods for determining the number of varroa mites in our colonies and what the economic thresholds are. The screened bottom board that is used for reducing the number of varroa mites in the hive can also be used for monitoring the population of mites in the hive during the brood-rearing season. Varroa mites that fall through the screened bottom board can be caught on a sticky insert that is placed in the hive for 24 hours. When the number of mites trapped in a 24-hour period reaches 43, the beekeeper should remove all frames of honey from the hive (to prevent the contamination of honey meant for human consumption) and apply the proper pesticide to bring the varroa mites under control. A visual observation can also be added to the trapping method. You should always watch for bees that have deformed wings and brood that begins dying in the larval or pupal stages of the life cycle.

At the end of the honey production season, after all brood rearing has stopped, a second test can be used to determine a more precise number of varroa mites in the bee colony. Collect about two-to-three hundred bees from your bee colony and place them in a pint jar with a 1/8 inch screened lid. Fill the jar with water mixed with some dishwashing detergent and "wash" the bees. Then pour the contents of the jar through a strainer that is lined with a fine cloth. The soapy water will dislodge the mites from the bees and they can be counted. The number of mites collected in the strainer should be divided by the exact number of bees in the jar, and that number multiplied by one hundred. For example; 50 mites divided by 200 bees equals .25, multiplied by 100 equals 25%. If the percentage of mites is less than 17%, no pesticide will be needed for this season.

Beekeepers need to apply this knowledge to their mite control strategies so that they do not overuse the same material to control varroa mites, lest the mites develop resistance to it. In areas of the country where CheckMite + has been used repeatedly, resistance to the product is already starting to appear.

Apiary inspections conducted by the WVDA last year indicate that those beekeepers that had used CheckMite+ last spring showed very low varroa mite populations during the summer. Each colony treated during the spring received one strip of CheckMite+ per five frames of bees, as the label instructs. The colonies were monitored for mites during the summer and fall, until after the time when brood rearing ended. It was found that no pesticides were needed in any of the over four hundred colonies monitored for varroa mites during the year. The percentage of varroa mites in the apiaries was less that 2%, with most colonies having less than 1%.

By withholding mite treatments until the economic threshold of the mite infestation is reached, colonies showing apparent mite resistance can be found and used for breeding purposes. This will bring beekeepers closer to being able to, once again, keep their hives pesticide free.

The WVDA provides an integrated pest management (IPM) information sheet that explains how beekeepers can reduce the amount of pesticides needed to maintain healthy bee colonies. For additional information contact: The West Virginia Department of Agriculture, Apiary Program, Marketing and Development Division, 1900 Kanawha Boulevard, East, Charleston, WV 25305, or telephone: (304) 558-2210.

Nosema Disease

Nosema is a disease of honey bees that is caused by the spore-forming, microscopic organism Nosema apis. It is the most widespread disease of honey bees in the world and one of the most difficult for the beekeeper to diagnose. There are many conditions to be found in the hive that can be easily confused with Nosema, such as pesticide poisoning, tracheal mites, starvation, bee paralysis, and dysentery, to name a few.

Nosema affects adult honey bees by shortening their life span by 10 to 40%. This, in turn, will cause poor colony buildup in the spring and smaller honey crops. Most experts agree that a 30 to 50% reduction in a honey crop can be expected from colonies infected with Nosema. A high rate of queen supercedure can also be expected in infected colonies, particularly in colonies started from package bees.

The spores of Nosema enter the bee's body through its mouth. They germinate in the gut, and then travel to the mid-gut where they quickly multiply in the digestive cells that line the mid-gut. The developing parasite uses the cells as food until reproduction is complete. The cells then rupture and release new spores, which travel down the small intestine and are excreted with other fecal matter. The Nosema spores become mixed with and contaminate food and water in the hive, creating conditions that allow the cycle of infection to continue.

Nosema spores can remain viable for many months in dried material on the combs. This explains why the disease accelerates during the spring, as honey bee populations build up and the bees are active cleaning up the hive. As summer progresses, the disease seems to disappear, because infected adults die in the field away from the colony. Because of the high turnover rate during periods of honey production, Nosema is seldom detected at the end of the season. Due to the low rate of infection during the honey flow, Nosema spores are not present in the honey. Honey bee colonies do not become infected with Nosema through foraging or watering activities. The spores are easily killed in water that is exposed to sunlight, making it difficult for them to survive outside the hive.

Here is a simple field test to detect possible Nosema:

1. Hold the thorax (mid-section) of a suspect bee with one hand and remove the head.
2. Grasp the tip of the abdomen with tweezers.
3. Gently pull, withdrawing the intestinal tract.

When Nosema is present in the mid-gut, the intestine will be swollen and have a dull grayish color. In a healthy bee, the intestine will be thin and have a yellow, brownish-to-red color. However, Nosema can only be positively identified through a microscopic investigation. If you believe your colonies may be suffering from Nosema disease, a sample of bees can be sent in alcohol to:

Attn: Bee Disease Diagnosis
Bee Research Lab
Building 476, BARC – East
Beltsville, MD 20705

Fumagillin, sold under the trade name of Fumidil- B, has been shown to suppress Nosema in honey bee colonies. However, Fumidil-B only suppresses the vegetative stage of Nosema and will not kill the disease in the spore stage. Nosema may return if chemical treatment alone is used to combat the parasite. Only heat has proven to be an effective and inexpensive method of destroying the infective spores. Beekeepers sometimes receive package bees that are infected with Nosema. The practice of treating package bees with Fumidil-B before they are placed in clean (new or heat-treated) equipment will generally help get the colony off to a good start, free of Nosema.

As with any pesticide, be sure to read and follow the label directions before using Fumidil-B. The Fumidil-B label requires that one teaspoon of Fumidil-B be mixed in one gallon of sugar syrup (made by mixing two parts sugar with one part water). This should be fed to the bees in the fall. Do not overfeed this mixture, as excessive amounts have been proven to be toxic to honey bees. As with any medication, do not feed honey bees during, or less than 6 weeks prior to, a supered honey flow.

Beekeepers who want to have beekeeping equipment sterilized should contact: Apiary Program, Plant Industries Division, West Virginia Department of Agriculture, 1900 Kanawha Blvd., East, Charleston, WV 25305, or telephone (304) 558-2210.

Pollen

Pollen is the term used to describe the powdery, microscopic grains that comprise the male reproductive cells of seed-producing plants. It consists of a variety of compounds, such as essential amino acids, protein, fatty acids, and sugar, in amounts that vary from one species of plant to another. Because it contains so many important building blocks of life, pollen has been referred to as “nature’s perfect food”. Pollen is not only healthy for human consumption, it also is the main source of protein in the diet of honey bees.

Statements referring to pollen as nature’s perfect food have helped to create a market for pollen collected by honey bees, as consumers continue to seek healthier foods. These statements have also led some beekeepers and “health food” companies to make misleading claims about the health aspects of pollen. It is very important that medicinal claims for bee pollen be both truthful and well documented. Beekeepers have faced costly lawsuits where their claims have proven to be unsubstantiated through accredited studies. Your local pharmacist or family doctor may be able to answer your questions about the health benefits of bee pollen.

Foraging bees collect pollen on the minute hairs that cover much of their body. The bee will stick out its tongue, called the proboscis, and regurgitate nectar that is then wiped by the forelegs. The nectar coated forelegs brush the head and the front of the thorax and the pollen grains get stuck there. The middle legs collect the pollen grains from the remainder of the thorax, and the back legs collect it from the abdomen. The pollen is passed to a joint in the back legs where the pasty mass is pressed into the pollen basket or corbicula.

A device called a pollen trap is used by beekeepers to collect pollen at the beehive. There are a variety of pollen traps available, but all use the same principle. The pollen trap is placed in the hive so that foraging bees, carrying pollen into the hive, must pass through it. The pollen is pulled or scraped from the pollen basket as the bees pass through one or more #6 mesh wire screens. It then falls through a lower #8 mesh wire screen (too small for the bees to pass through) and lands in a collection tray. Pollen traps that are placed on the bottom of the hive will often collect debris that falls from within the hive and may require more effort to clean the pollen prior to using it. Pollen traps placed at the front entrance of the hive will collect pollen that is cleaner. However, entrance traps usually collect less pollen than the bottom traps and the pollen usually contains higher moisture levels.

Pollen must be removed from the pollen trap every day and cleaned and dried to prevent molding. One method of drying pollen is to spread it into a thin layer and place it in the sun. Pollen can also be dried in an oven or food dehydrator, but care should be taken not to over dry it. Moving air is used to remove debris and other unwanted material from collected pollen and to separate the pollen grains that are to be used as food for human consumption.

Honey bees will increase their pollen collection activities when a pollen trap is in use, because less pollen makes it into the brood nest where it is used to feed their young, so the bees work harder to offset their losses. Pollen traps should not be used for extended periods of time, because brood production will decrease and the strength of the colony will decline.

Predators of the Honey Bee Hive

Beekeepers in West Virginia have three major predators to contend with that can damage beekeeping equipment. The best known of these is the black bear. A common misconception about bears and honey bees is that bears raid hives only for the honey. Actually, the bear is interested in the hive because of the protein that is in the brood and the bees themselves. While a marauding bear will consume some honey, it is clear from examining a site (see photo) where a bear has destroyed colonies of bees that honey was not their primary interest.

West Virginia's black bears were once confined primarily to the eastern mountains of the state. However, in recent years, the number of bears, as well as the size of their range, has increased dramatically. Bear damage is usually more prevalent in the spring when bears are emerging from their overwintering sites and their physical condition is at its worst. Bear damage in the summer or fall is not as common, except in times of food shortages caused by late freezes or drought.

When selecting a location for an apiary, the beekeeper should take into consideration the fact that bears travel close to wooded areas and along fence lines. While one site may seem to be a convenient "out-of-the-way" location for the landowner, it may be in the travel path of a bear. Apiaries located in areas where bear sightings are common should be surrounded by an electric fence. Electrified bear fencing works best when the wires are about seven inches apart. When a bear tries to get through a fence of this design, it will be more likely to get shocked on the face, and will not be as likely to lunge forward and ground out the fence. Bears can use trees in and around the bee yard to gain access to the fenced-in hives, so any obvious problem trees should be removed. A bear's nose is much more sensitive than that of a bloodhound, so the beekeeper should take care not to leave any food or hive scrapings on the ground that could attract animals. These morsels that bears are accustomed to finding at camping areas could lead them to your colonies.

If, despite all your efforts, bears wreck your hives, you should immediately contact your local Division of Natural Resources (DNR) office. Do not disturb the site until after the DNR has examined it. After the DNR visits the scene, they will give you a set of claim forms for use in estimating the value of the damaged property. These forms must be completed and signed by three people, preferably beekeepers, and returned to the DNR office within 30 days. Failure to adhere to this procedure can invalidate your claim, so follow these instructions in a timely manner. The DNR uses monies collected through the sale of bear damage stamps to bear hunters to reimburse beekeepers for the replacement cost of colonies and equipment they lose from marauding bears.

Skunks can also be a real problem to West Virginia honey bees. More subtle than that caused by bears, skunk damage can often go unnoticed until a colony becomes too weak to produce honey or even survive the winter. Skunks will visit a honey bee colony any time of the year, day or night. The most obvious signs of damage are claw marks or muddy tracks on the front of the hive body, or a bare, muddy patch on the ground at the entrance to the hive. Like bears, skunks are most interested in eating the bees.

Damage caused by skunks can be prevented if honey bee colonies are raised at least 18 inches off the ground. Skunks do not like to stand on their hind legs and expose their belly when raiding a bee hive. The fur on their stomach is not as thick as it is on their backs and provides little protection from stings.

The last predator that beekeepers have to protect their hives from is the field mouse. We may not immediately think of this tiny rodent as a predator, but it can cause serious damage to colonies and stored equipment just the same. In the winter, when the bees are clustered together, mice can enter the hive and are free to eat honey, wax and pollen. They may even build a nest. When it warms up enough to allow free movement of the bees, the mice will leave. The bees will clean out the nest and repair the damaged comb but, because their natural instinct is to maintain a high drone population, they will build back only drone comb (in a managed colony, where we use full sheets of wired foundation, we force the colony to produce more workers than they do in nature so our honey crop will be potentially larger).

Mice can be prevented from entering the hive in three ways. When new bottom boards are built, the top lip can be reduced in height to 3/8 of an inch, the size that Rev. L. L. Langsthroth originally intended them to be when he designed the modern beehive. This leaves the bees with enough room to move in and out of the hive freely, but not enough space for mice to pass through. In the fall, an entrance reducer can be placed on the colony to achieve the same result, although the reducer may cause ventilation problems. A good alternative, one that allows free air and bee movement while protecting your colony from mice, is to staple ½-inch mesh wire hardware cloth over the entrance. The wire need not be removed from the hive in the spring, unless you intend to move the hive and need to close the entrance entirely.

Preparations for Winter Survival of Honey Bee Colonies

Mid-summer is a time when beekeepers need to begin preparing their colonies for winter survival. A colony will need several things if it is to survive a severe winter involving extended periods of confinement. Among the most important components of a successful hive is a large population of young bees in the fall. To achieve this, a beekeeper must make certain that each colony's queen is young, vigorous and properly stimulated by pollen and nectar entering the hive. If an adequate number of worker bees are not hatched in August and September, the chances of the colony surviving a hard winter are slim. Each colony should be checked throughout the summer for diseases and parasites and any problem found should be promptly addressed. An infestation will likely reduce the number of young that are successfully reared to maturity. If the bees are too old in the fall, they will die in January or February leaving a cluster so small that they cannot stay warm and will quickly freeze out. A healthy colony with an adequate number of honey bees will be able to maintain a winter cluster temperature of 90 to 94 degrees.

A normal size colony will require 60-70 pounds of stored food to last the winter. The healthiest food for bees in the winter is darker honey, such as tulip poplar. This type of honey will granulate more slowly and will be more readily usable by the winter cluster. While sugar water and corn syrup are suitable emergency feed, these feeds can quickly granulate and will make poor winter food stores. No liquid feed should be fed to the honey bees during cold temperatures, as this will lead to dysentery and increased colony losses. Care should also be taken to ensure that colonies do not store too much honey in their brood nest. Honey bees need to have open drawn comb in the brood nest so they can cluster properly. Honey bees will freeze to death if the combs are full of honey and there is no room for the bees to cluster.

Later in the fall, colonies need to be protected against mice by placing a piece of ½-inch square wire mesh (hardware cloth) over the entrance. An upper entrance should be added at this time as well. An entrance in the top brood chamber will decrease humidity in the hive, add more potential flying days for the bees in the winter and reduce dysentery. Dysentery may also be reduced through the use of a screen bottom board. When bees are forced to defecate within the hive, due to unusually long winter confinement, their excrement will drop through the screen and the bees will not be forced to crawl through it. Honey bees that are able to remain clean and dry will normally develop less dysentery.

When selecting an apiary location, avoid areas where moisture laden air stratifies. Try to locate hives where the snow tends to melt first. This would tend to indicate that the area is quick to warm up, something that will benefit honey bees. The area should also be carefully examined for a winter windbreak. A good windbreak may consist of a group of trees, a building or ridge. If a natural windbreak does not exist, one should be provided by the beekeeper.

Processing Honey

Honey is a sweet fluid, which honeybees produce from the nectar they collect from various flowers. Bees gather the nectar in their honey stomach and transport it back to the hive, where it is ripened and stored in the comb for use as food. The color of West Virginia honey varies from nearly clear to a dark-red. There is also a wide range of honey flavors, because of the many different floral sources to be found in West Virginia. Some of the most useful nectar sources in our state are: autumn olive, basswood, clover, goldenrod, Japanese knotweed, locust, sourwood, sumac, various species of thistle, and tulip popular.

There are primarily three ways in which honey is packaged: in the comb, liquid and crystallized (creamed). If honey is properly handled, it will have a long shelf life and maintain its good flavor and nutritional value. Here are some helpful tips on preparing and processing your honey crop.

After removing your honey crop from the hive, it will need to be stored in a room where the relative humidity is 58% or less. Honey is hydroscopic, meaning it will absorb moisture from its surroundings, and will spoil if stored improperly. The moisture content of the honey should be checked with a honey refractometer. If the level of moisture is greater than 18.4%, the honey can begin a process of fermentation, where yeast converts sugar into alcohol. Fermentation can be stopped if the honey is extracted from the comb and pasteurized immediately. To process honey with a moisture level higher than 18.4%, heat the honey in a stainless steel double boiler to 140° F for 30 minutes, or 150° F for one minute. This will kill the yeast that causes fermentation. The honey should then be sealed in clean containers while it is still hot. Canning is not necessary. Any honey that has a moisture level greater than 20% should be placed back on the hive.

Honey with a moisture content lower than 18.4 % can be processed without the need to first heat it. Honey that has been extracted from the combs and has not been heated above 120° can be classified as raw honey. After it has been filtered to remove any wax particles and other debris, raw honey should be sealed in clean containers to prevent the absorption of moisture.

Heating honey to 120° F will not destroy the pollen, enzymes and other valuable nutrients, but it will retard crystallization. All honey crystallizes (granulates) over a period of time, with some types, like goldenrod, crystallizing within a short period of time. Crystallization is not spoilage, but a natural change honey goes through with the passage of time. To re-liquefy crystallized honey, place the container of honey in a pan of warm water. If the container is labeled, and you want to keep the label from coming lose in the warm water, place the container in a small box with a heat source, such as a light bulb, and leave the light on overnight. This will achieve the same result as the hot water bath, but it takes a little longer. Be careful not to create a fire hazard by allowing the hot light bulb to come in contact with a flammable material.

Comb honey is usually produced from light colored honey of a mild flavor. The moisture in comb honey is not normally of any concern, if all cells are sealed over and the honey is stored in an area where the relative humidity is less than 58%. The first sign of a high moisture problem in comb honey is the joining of honey to the wax that seals the honey cell. The term “water cappings” is given to the comb honey when this condition appears. Small droplets of honey will appear on the surface of the comb honey that has been stored improperly. These drops mean that the honey is fermenting and will soon develop a bad flavor. Comb honey should be cut from the frame and placed in clean, see-through containers. Freezing the comb will destroy any eggs from wax moths, which are undetectable, and will also help to retard granulation.

Crystallized honey, or " creamed honey" as it is called when the process is controlled, is a spreadable honey. To produce creamed honey, a procedure called the "Dyce process" is used. This process was named after Dr. E. J. Dyce, a professor of Apiculture at Cornell University. A 10 % starter crystal (honey previously creamed) is used along with honey that has been processed to destroy any existing crystals and yeast. The starter crystal is added to honey that is below 80° F and mixed well, being careful not to incorporate any air. The product is then sealed in clean containers and refrigerated at 57°F until granulation is complete. Honey with a moisture content higher than 18.4% should not be used for making creamed honey. The high moisture content will lead to fermentation and cause the product to develop a bad taste.

The diverse flora of West Virginia provides beekeepers with an opportunity to produce some of the world's finest honey, but this honey must be processed properly in order to maintain its high quality. Never process honey in a microwave or conventional oven. Never place honey in any processing container other than one made of stainless steel or one treated with a food-grade epoxy. Honey should never be put in direct contact with high heat.

Pure honey is well known as an all-natural, "healthy" product. Honey does, however, contain *Clostridium botulinum* spores. This naturally occurring bacterium can be found associated with many kinds of plants and animals, as well as the soil, and adults probably ingest the spores daily without any harm. However, babies under six months of age have been found to be subject to a condition called toxicoinfection, in which the spores of the *C. botulinum*, when ingested by the baby, germinate and produce illness. The National Honey Board encourages those who package honey to place an infant warning label on honey, indicating that honey should not be fed to children under the age of one year. At present, there are no laws that require this labeling.

No matter how good your honey looks, smells and tastes, if pesticides were used improperly during the production season your honey may be contaminated. The first step in producing a good, healthy product begins with reading, understanding and following all pesticide labeling instructions.

Producing your own Queen Honey Bees

Producing your own queen honey bees can increase the level of pride and profitability in any beekeeping operation. With the ever-increasing cost of queens and postage, queen production is quickly becoming a necessity for commercial and hobbyist beekeepers alike.

In April and May natural queen cells called swarm cells can be found in nearly every vigorous hive. Cells should only be harvested from the best hives in your operations The old saying “the apple doesn’t fall far from the tree” is particularly true in the case of the queen honey bee. Natural cells should not be the sole source of your new queens, because doing this over several years could lead to colonies that are more prone to swarming.

Taking one-day-old larva from the worker brood and placing it in an artificial queen cell cup is called grafting. The tool that is used for this procedure is called a grafting needle. Grafting needles, both mechanical and non-mechanical are available in nearly all bee supply catalogues. The young larva will be curled in a C shape. The grafting needle should be rolled underneath the larva from the backside of the C. Care should be given not to roll the larva over. If a larva is rolled over both sides of its body will become wet with the royal jelly the bees feed future queens and will cause drowning. With a little practice and patience nearly anyone can become a skilled grafter.

Queen cell cups can also be purchased from bee supply catalogues. Pure wax cell cups can be made using a 3/8 dowel rod that has been rounded on the end and soaked in water. When dipped in hot bees wax cups can be formed. The wax will pull off easily since it will not stick to wet wood. Natural cell cups can be collected from hives and used as well. Plastic cell cups are a cheap and convenient alternative with less risk of damage to the developing queens during handling. Cell cups can be attached to the cell bas by using drops of wax from a burning candle. The larva are grafted into the cell cups after they have been attached to the cell bar. A cell bar is usually a deep frame with multiple removable cross bars. These cell bars should be left in the cell-building colony over night prior to grafting to be warmed by the colony as well as take on it’s sent.

A cell -building colony is a strong colony with a lot of emerging brood. The queen in this colony should be captured and caged four days prior to placing the cell bar in the colony. It is important that the caged queen remain in the colony so the colony will not make a replacement queen. She is placed in a cage so she cannot lay any eggs guaranteeing that the larva you place in the colony when the caged queen is removed is the only larva in the colony that is of the correct age to make into a queen. During the four days the queen is caged the colony should be fed heavily, if you are not in a hard honey flow. The colony needs a lot of extra wax at this time and will only produce it if the bees have their honey stomachs full. The wax used to build the queen cells should be of a light color. Darker wax indicates that wax has been stripped for elsewhere in the colony and not produced fresh indicating that the colony has not been properly fed. Improperly fed colonies do not produce high quality queens. At the end of eight days from the time of grafting the fully drawn, ripe queen cells are ready to be placed in the queen breeding NUCs or the colony to be re-queened.

Requeening A Honey Bee Colony

Requeening is the practice of removing the old queen and replacing her with another. By requeening a colony, a beekeeper can reduce the chances of swarming. In addition, young queens produce more eggs that generate more bees that increase the potential for producing a better honey crop. Requeening a colony with stock that is tolerant to parasitic mites, specifically the honeybee tracheal mite (HBTM), is now a crucial part of honeybee integrated pest management, eliminating the use of menthol for tracheal mite control.

Finding the Queen

The following technique is one that is commonly used and can be altered to fit most any beekeeping operation.

The first task is, of course, locating the old queen. Gently remove the top cover (lid) and inner cover and place them on the ground near the hive. Lightly smoke the colony as you begin to separate the hive bodies and supers. If a queen excluder is utilized, stack all the supers that are above the excluder on the lid. When completed, place the inner cover on top of the stack to reduce the risk of robbing. Separate the remaining supers and/or hive bodies, remembering to use as little smoke as possible. Begin visually checking the combs in each box for the queen. This is accomplished by removing the outside frame first, closely checking for the queen. When you are satisfied that the queen is not present, place the frame on end beside the hive. With a 10-frame hive, this will leave 9 frames in the box. Slide four frames simultaneously to the empty side, equally dividing the bees. Begin in the middle and work your way across to the outside frame and repeat the procedure with the other half. Do not allow the combs on either of the two halves to come together. Work through each of the boxes until the queen is found. ***Tip***: When fresh eggs are found, focus your search on that box first. Remember, too much smoke can cause the bees and the queen to run excessively, possibly leaving the combs. That will make locating the queen nearly impossible.

Problem Solving

As you search for the queen, check for eggs in the cells by holding the frame in a position that allows sunlight to shine toward the interior base of the cells. Queens usually deposit one egg per cell, so if many cells contain eggs, the hive is considered queen right. However, if multiple eggs are found in one cell, there may be a problem with laying workers and a queenless condition. If no eggs are found after searching the boxes below the queen excluder, you should then focus your attention on the boxes that were above the queen excluder. For various reasons, it may be possible for the queen to be above the queen excluder. If no eggs or brood are found in any of the boxes, the hive may be queenless. In this event, begin checking the combs for queen cells on the sides or bottom of each frame. If cells are found, they may have already produced a queen. Requeening should not be attempted until the new queen is found. The queen must be removed before the introduction of the new queen can begin.

There are several facts that a beekeeper should know before he/she attempts to requeen a colony.

1. Colonies with a low population are easily requeened.
2. Once the old queen has been removed, the pheromone dissipates very rapidly. With no pheromone present, the colony recognizes its queenless condition and begins to prepare queen cells, therefore the new queen should be introduced immediately.
3. If the colony is very strong, leave the cork in the candy end for one day before removing the cork, allowing additional time for the queen pheromone to permeate the hive.

The Queen Cage

Queens are shipped in small cages. The cages are built from wood and screen (sometimes plastic) with three compartments. Two of the compartments will hold the queen and her attendants. The third will contain a sugar candy that is used as feed and as a release mechanism for introducing the queen into a colony. The cage is covered with a screen to prevent the queen from escaping and to allow her pheromone to be spread through the colony. The cage will have a cork placed in the holes that are located at both ends. The cork nearest to the candy will be removed when the cage is installed into the colony. Bees in the colony should penetrate the candy in about three days, depending on the strength. ***Caution:*** Do not remove either the cork from the end opposite the candy or the screen that covers the cage. This will prematurely release the queen, causing her immediate death.

<u>Do not</u>:

1. Smoke the colony heavily at the entrance or across the combs.
2. Pour sugar syrup over the bees.
3. Dunk the queen in honey, sugar syrup or scented oil.
4. Allow the colony to be queenless after removing the old queen.
5. Make a hole in the candy with a nail or anything else.
6. Smash and rub the body of the old queen onto the cage of the new queen.

Installing the Queen Cage

To install the queen cage, you should first remove the cork on the end that contains the candy. The queen cage should always be placed at a location near to developing brood and positioned either vertical or horizontal between two of the frames. If the cage is vertical, the candy end should be at the top. It is also important to install the cage with the screen fully exposed to the worker bees so that they can sense the new queen’s pheromone. To provide additional room for the cage, it may be necessary to remove one of the outside frames that do not contain brood. Gently shake or brush all the bees off the frame and store it for reuse in about four or five days, after requeening has been completed.

Checking for the Queen’s Release

On the fourth day, after the cage has been installed, gently open the hive using as little smoke as possible. Visually check the cage to see if the queen has been released. If the cage is vacant, discard it and replace the frame that had been previously removed. If, for some reason, the queen is still in the cage, gently wiggle a small nail through the sugar candy and immediately replace the cage in its original position. Within a day or two, the queen will be released and the cage can be discarded.

Checking for Queen Acceptance

Seven to eight days after the new queen has been installed, the colony must be checked to see if the queen is laying eggs. This is accomplished by removing frames from the brood nest area and looking for newly deposited eggs. If they are found, the queen has been accepted. However, if no eggs are present, close the colony and check it again in another four to five days. If the queen or her eggs are still not present, approximately fifteen days from the date of introduction, inspect all of the brood frames for queen cells that were started due to the failure. If queen cells are found, they should be destroyed immediately. A new queen should be purchased and introduced upon arrival. New queens should be introduced in the spring, as early as weather permits, because there are fewer bees in the colony and the old queen is easier to find. The colony should also be fed sugar syrup, mixed 1 part warm water to 1 part granulated sugar by volume. The bees will recognize the syrup as a nectar flow, stimulating the queen to lay increasing amounts of eggs.

Resistant Bees Help Foil Parasitic Mite

The honey bee tracheal mite (HBTM), Acarapis woodi, is a microscopic organism that attacks adult honey bees. It lives within the air-conducting passages (tracheae), which perforate the body of the bee, and feeds on the bee's blood. When a high number of these mites prey upon a single bee, the bee is weakened and eventually suffocates. Colony loss generally occurs in mid-to-late winter, while any damage that occurs in the summer is minimal, due to the high turnover rate of bees during their foraging activities.

A good indication that the HBTM is present in a hive of bees is to watch the way in which the bees hold their wings. Bees have four wings, two large wings and two smaller wings. When a bee has several mites in its tracheae, it holds its smaller wings to its sides, possibly in an effort to open the breathing passages as large as possible. This condition, known as "K wing", can also be a sign of other non-mite related problems. The only positive way of identifying HBTM is through microscopic examination.

When the HBTM invaded West Virginia, about a decade ago, it was instrumental in causing the death of roughly half of the state's bee colonies each year. The surviving colonies would usually be weak and unable to produce a crop of honey. The pesticide Mite-A-Thol (which contains menthol as its active ingredient) became the standard treatment for the HBTM. However, early attempts to use the medication met with little success, as beekeepers were applying the menthol too late in the year for temperatures to be high enough to cause the menthol to fume. After several seasons of trial and error, it was determined that the first of August would be the ideal time for treatment. This time period not only provided the necessary temperatures to volatilize the menthol, it also protected the last major brood cycle.

Some genetic lines of honey bees show a high degree of resistance to infestations of the HBTM and are seldom damaged by it. Beekeepers in Europe, for example, no longer treat for the HBTM because most of their bees have developed at least some tolerance to the HBTM, due to long-term exposure to this parasite. Comprehensive research studies in England and Canada have shown that the Buckfast strain of honey bee tends to be one of the most resistant of these strains. The Buckfast has developed a mechanism, called "auto-grooming", that controls the HBTM during the migratory phase of the mite's life cycle. This trait of grooming the mites off their bodies and physically removing them from the hive was also found to be a dominant trait in the Buckfast strain. This dominant trait allows Buckfast queens to be mated with non-resistant drones without losing the auto-grooming trait, at least in the first generation of descendants. Further studies have shown that this trait may possibly be carried to the third generation. Since drones carry only the genetic material of their mothers, they may be capable of spreading this genetic resistance to other non-resistant colonies throughout an area. However, care should be taken to keep the strain as pure as possible.

Initial field observation studies in West Virginia seem to confirm that beekeepers may no longer need to use menthol or other organic solutions to control the HBTM, provided they keep HBTM-resistant stains of honey bees. As with so many other agricultural endeavors, today's beekeeper needs to look for pest resistance when obtaining honey bee stock.

Small Hive Beetle

The small hive beetle (SHB), Aethina tumida, is an introduced pest of honey bees that was probably imported into the southeastern part of the United States several years ago. In June of 1998, the SHB was discovered and identified in the Fort Pierce area of Florida, but it may have been in the country for a longer period of time. The insect most likely came to the United States in colonies of bees or used bee equipment that was illegally brought into the country. In tropical and subtropical southern Africa, where the SHB beetle is native, it is considered a minor pest of bees, about as damaging as the wax moth is in the United States. African beekeepers consider the larger hive beetle, Hyplostoma fuligineus, to be a much more serious threat.

The adult SHB has an oval-shaped body, round head and ranges in color from dark brown to black. It is about 3/16 of an inch long and about 2/3 as broad as it is long, about 1/3 the size of a honey bee. One of the easiest ways to identify it is by the prominent club on its antennae. The SHB has proven to be a strong flier and appears to spread from colony to colony during night flights. Migratory beekeeping has also contributed to its spread, as has the sale of package bees shaken from infested colonies.

In bee hives that are infested with the SHB, the insect can most likely be found in debris on the bottom board or on the inner cover, away from sunlight and bee activity. Using a screen bottom board in conjunction with a solid bottom board could give the beetles a safe haven in the debris that will build up between the two. Using a screen bottom board alone allows debris to fall to the ground, but it may interfere with current control methods by allowing light into the bottom area that would cause the beetle to move away from the pesticide.

The female SHB lays eggs in irregular masses in cracks and crevices within the hive. The eggs are similar to bee eggs, but are about 1/3 shorter. In two to three days, the eggs hatch into cream-colored larvae, which can easily be confused with the larvae of the lesser wax moth. However, the two can be told apart because the beetle larva will be tough and have three pairs of legs at one end of its body. SHB larvae will feed on wax, honey, pollen, wax moth eggs, as well as bee eggs and larvae for the 10-16 days it takes them to mature. At maturity, the larvae will measure about 7/16 of an inch long and about 1/16 of an inch wide. It takes between 38-81 days for the SHB to develop from egg to adult, depending on the availability of food and the temperature.

Damage to the Colony

The larval stage of the SHB is detrimental to bee colonies because the larvae will chew off the cappings of stored honey and tunnel through the combs. As the honey ferments, it bubbles out of the combs as frothy foam that oozes to the bottom board and out the front entrance. The hive at this point is said to have a smell similar to rotting citrus. When an infestation reaches this point, the bees will abscond (abandon the hive). Bees cannot be reintroduced to the SHB-infested equipment until the hive, and all the frames, are washed to remove all traces of the beetles' slime trails. Honey bees are so repulsed by these slime trails that robber bees will not rob material from colonies that have been infested by the SHB until the combs have been washed off.

When SHB larvae mature, they leave the colony to pupate in the ground, within one-to-three feet of the hive and within the top four inches of the soil. They prefer sandy soil and have been known to travel beyond three feet if the desired soil conditions could not be found close to the hive. This is one reason, along with warmer winter temperatures, that this pest has been more of a problem in the South, where it was originally discovered.

The SHB can also be a serious nuisance in the honey house. The beetle is attracted to wet honey surplus supers, wax cappings and stored pollen. Stored comb honey supers can also be ruined leaving the honey unmarketable. All hive products should be processed, and all mess should be cleaned thoroughly as soon as possible. All extracted supers should be returned to strong colonies of bees or stored using para-dichlorobenzene (“Para-Moth”). Any supers that have not been extracted should be stored in an area with a dehumidifier and a fan to circulate the air. Keeping the humidity low seems to be the key in controlling the SHB in the honey house.

Chemical Control

The SHB can be controlled in two ways, depending on the insect’s stage of development. When treating for the adult beetle in the hive, the insecticide CheckMite+ can be used. The pesticide is incorporated into a strip. The beekeeper must staple the CheckMite+ strip to a piece of corrugated plastic and then place the plastic in the bottom of the hive. Corrugated cardboard is a poor substitute for plastic, because the hygienic behavior of the bees will cause them to tear up the cardboard and discard it in a short period of time. CheckMite+ is the only pesticide labeled for SHB adult control inside the hive. For the control of SHB pupae in the ground around the hive, the insecticide Guardstar may be used as a soil drench. While this product is used in much the same way as other soil drenches beekeepers have used in the past for control of ants, Guardstar is the only product specifically labeled for use against the SHB outside the hive. When using these or any other pesticides, remember to read and follow all label instructions.

Spring Management Of Bees

Spring has always been a time of anticipation and preparation for beekeepers. Equipment, as well as colonies, must be prepared for the upcoming season of swarming and honey production. The beekeeper should anticipate how many divisions they will make or how many swarms they will be faced with in the months ahead. Gathering equipment and preparing it with foundation at this time will make the swarming season a much less stressful time.

In early March, colonies need to be stimulated to build a large early population. Spring colony stimulation is the act of tricking both the colony and queen into believing that a nectar flow is on early in the season. This will cause the queen to start laying eggs, which will result in a stronger colony. It takes 21 days for honey bee eggs to hatch and approximately another 21 days until these bees reach the field age stage of their life cycle. If colonies are not stimulated much of the spring honey crop will be lost, because the colonies will not have high enough populations of worker bees to collect all the nectar present.

Colony stimulation can be achieved in three steps. First, colonies that do not contain much honey (light colonies) should be fed sugar syrup made from one-part sugar mixed with one-part water. The syrup needs to be thin to simulate nectar. This step should be skipped if a large amount of honey is left unused after the winter. Too much honey or overfeeding will cause excessive swarming and a reduced honey crop later in the season. Remember, we are not usually feeding at this time for the purpose of putting weight on the colony.

Step number two involves the use of honey stored in the hive. If honey stores are adequate, take a capping scratcher and pluck off some of the cappings that cover the honey cells. Do not overdo this step, because the excess honey may ferment and cause dysentery in the hive.

In step three, pollen substitute is mixed with syrup to create a paste that has the consistency of peanut butter. One-fourth to one-half pound of this mixture (depending on the current strength of the colony) should be placed between two pieces of wax paper and pressed flat with a rolling pin. Lay the sandwiched cake on a flat surface in the bee yard and remove the top piece of wax paper. The pollen cake is then laid on top of the frames, close to the cluster of bees, with its sticky surface facing the cluster. When the bees notice all three things, nectar coming in, pollen, and uncapped honey, along with the increasing length of daylight, they will realize that it is time to get to work.

While this colony stimulation is going on, the beekeeper also needs to think about the health of their colonies. The most common medication that you need to be concerned with in the spring is oxytetracyclene, or "Terramycin", as it is sold commercially. Terramycin is an antibiotic that beekeepers use as a preventative for both American foulbrood (AFB) and European foulbrood (EFB). As their names suggest, these are diseases that infect the brood. Spring is the peak time for brood production, making it the most important time of the year for applying a Terramycin treatment to honey bees. Terramycin should be mixed with powdered sugar at a rate of one part Terramycin to seven parts powdered sugar. Three tablespoons of this mixture should be fed to the colony each week for three weeks. Care should be given to keep the medicated sugar away from the center of the colony where open larval cells are present. Terramycin will kill uncapped brood if it comes into direct contact with it. Apply the mixture evenly on the first and tenth frames, as well as along the end bars in the brood chamber.

Treating for the Varroa mite in the spring has some merit. Any treatment should be done early before brood rearing begins. Beekeepers should not treat both spring and fall for Varroa mites, because the more often mites are exposed to a particular miticide, the faster they will develop resistance to it. Early spring or late fall treatment seems to work the best, when little or no brood is present. Choose one or the other treatment periods, but not both.

When the first hard nectar flow begins in the spring, strong colonies of honey bees will make preparations to swarm. Nothing is more frustrating to a beekeeper than to see all their time, hard work, and honey crop fly away on the wings of a swarm. This can be largely prevented with swarm control. During swarm season (April and May in most areas of the state), colonies should checked weekly. If swarm cells (queen cells) are found, divisions should be made. Queen cells are usually found at the bottom of the frames or along damaged areas of the comb. Queen cells resemble a one-to-two-inch unshelled peanut.

Divisions are artificial swarms where three-to-five frames of bees and brood are taken from a strong colony to establish a new colony. Any remaining swarm cells in the parent colony must be removed. If a new queen hatches out, your colony will still swarm, leaving a very weak colony. Creating colonies in this manner will conserve your honey crop. In a division, young bees and brood that have not reached field age are taken from the colony. If a colony swarms naturally, the older field age bees leave to establish a new colony taking your honey crop with them. Collecting natural swarms can also be a dangerous activity. Swarms often settle high in trees where the danger of falling is ever present.

The beekeeper needs to make sure that there is adequate space in the hive for honey to be stored. A congested colony will be likely to swarm often during the season. Beekeepers using a double hive body must rotate the brood chambers. This will help to prevent the upper portion of the brood nest from becoming jammed with honey, limiting the space in which the queen can lay eggs.

Bear damage is more likely to occur in the spring. Despite popular belief, the bear is not, primarily, after the honey when it raids a colony of honey bees. Bears are seeking the protein from larvae, pupae, and the bees themselves. Mild winters, where there is less bear mortality, seem to precede a spring where more bear damage occurs. In areas where bears exist, beekeepers should fence bee yards with electric fencing. If, in spite of your efforts to prevent bear damage, a bear gets into your bees, you should contact your local Division of Natural Resources (DNR) officer before disturbing the scene. Destroying evidence of a bear attack may invalidate any bear damage claim you submit to the DNR.

Successful Supering Techniques for Honey Bee Colonies

Winter is the time when a beekeeper needs to make plans for next year's honey crops. How you go about "supering" your hives can have a big influence on the size of those crops, so it pays to plan your strategy for this important management tool before the real work of working your bees begins. Just like adding colonies, changing supering techniques is time consuming and should be taken care of before honey production begins in the spring.

A healthy colony of honey bees has the potential to make much more honey than it will require to sustain itself. Honey is produced in short spurts called "honey flows" and is stored in boxes called "surplus supers", which hold between 35 to 40 pounds of honey each. The main honey flow takes place in May and June, with lesser honey flows in mid-summer and fall and you want to be positioned to maximize your honey production.

Inadequate supering can cause honey bees to swarm. When supering for a spring honey flow, no less than three supers should be placed on a vigorous over-wintered hive between the 1st and 15th of April. This will curb the swarming instinct of the colony and reinforce their instinct to hoard honey. If only one surplus super is placed in the hive at a time, the bees will quickly fill this space and swarm, ending any surplus for that particular honey flow. Ideally, the bees will be able to move from one super to the next, filling as they go, without hitting a ceiling where there is no place to store surplus honey. A new super should be added as soon as bees are found working in the top super. It is not uncommon for a beekeeper to harvest five to six supers of honey from a single hive during a good honey flow on a properly supered colony. While proper surplus supering will curb the swarming instinct, a beekeeper must remember that this alone will not eliminate unwanted swarms.

A queen excluder is a device that has openings large enough to allow worker bees to move through freely, but not the larger queen. The queen excluder is manufactured in two designs; the metal excluder, often with a wooden frame, and the punched-hole type that is made of either zinc or plastic. The metal excluder, while more expensive, is far superior to either the zinc or plastic excluders. If the punched-hole types are not aligned precisely with the brood chamber frames below, it will completely block the worker bees from the surplus supers. The value of this device has been debated since its invention. Some beekeepers would not consider supering their colonies without using a queen excluder, while others refer to this device as a "honey excluder". A queen excluder has its place in beekeeping, but it has its pros and cons and is not always necessary. Honey bee queens are not likely to cross more than four inches of honey to look for empty cells in which to lay eggs. Once there is a full surplus super of honey below some empty supers and above the brood nest, a queen excluder is not necessary, provided excessive smoke is not used while managing the colony.

If extracted honey is what the beekeeper wishes to produce, it makes little difference if the queen lays eggs in the surplus combs. The beekeeper can wait until the production of surplus honey pushes the queen down into the brood nest before the surplus supers are removed. A queen excluder can be placed under surplus supers with brood after all the bees have been removed and placed back on the hive. Within three weeks, all young bees will hatch leaving only honey to be extracted. A queen excluder will nearly stop worker bees from passing through when only undrawn foundation is above. A beekeeper should make sure drawn comb is directly above the queen excluder with any foundation above that.

Use of a queen excluder will almost certainly mean less honey production, but the main benefit of it is that the combs will remain light colored, because no young bees are reared in them. Since wax moths are only attracted to dark combs containing pollen, the light combs are easier to store while not in use. A queen excluder should always be used when comb honey is being produced. Even a few cells where the queen has laid eggs will ruin your product.

The Greater Wax Moth

The greater wax moth (GWM), Galleria mellonella, can be a serious pest of stored combs, comb honey and honey bee colonies that are in a weakened state. A strong colony will seldom be damaged by the insect, because the bees will quickly remove the moths or larvae from the hive before they can do any significant damage. GWM is a pest that West Virginia beekeepers need to know about, because it can be found throughout the state.

The adult GWM is a grayish-brown moth about ¾ of an inch long with a wingspan of between 1 and 1 ½ inches. The males are usually smaller than the females. When the GWM is at rest, it folds its wings in a manner that resembles a tent. An adult female of these night-flying moths can lay between 200 and 250 eggs in clusters. They are usually deposited in cracks between interior hive parts, such as between frames, bottom boards, inner covers, and lids.

GWM eggs hatch in four-to-eight weeks when temperatures are between 75 and 80 degrees Fahrenheit. The newly hatched larvae are white, small and very active. Their rate of development depends on temperature and availability of food. At temperatures of between 85 – 95 degrees Fahrenheit the larval stage may last only 28 days. If the temperature drops below 40 degrees, and food is in short supply, the larvae may go dormant for up to five months.

The larvae of the GWM damage or destroy combs by tunneling through the beeswax cells, eventually making their way to the center rib of the comb where they are relatively safe from any bees left in the hive. They feed on cocoons, cast skins and other impurities in the comb, as well as on pollen. All dark combs "comb that have had young, reared in them" should be stored separately for this reason. Supers and brood chambers containing dark comb should be stood on end, exposing both sides of the combs to sunlight while allowing air to circulate freely. Light stored combs or wax foundation hold no attraction for the moth, so supers can be stacked with a queen excluder on the top and bottom of the stack to keep mice out.

If a dry, sunny, well-ventilated storage area is not available, stored combs can be protected from damage by the GWM by using paradichlorobenzene (PDB) crystals (marketed commercially as PARA-MOTH). PDB produces a heavier-than-air fumigant that repels the moth, but will not kill its larvae or pupae. PDB works best when temperatures are above 70 degrees. PDB is toxic to bees and all beekeeping equipment exposed to it should be aired out thoroughly for a minimum of three (3) days before it is returned to the hive. Always follow the label directions and never use PDB on supers containing honey for human consumption. PDB is not required to protect combs in the fall after the first hard freeze.

To help protect it from damage by the GWM, comb honey should be packaged as soon as possible after it is removed from the hive. Once packaged, comb honey should be frozen overnight to kill any GWM eggs. Comb honey can also be protected by fumigation with a 98% CO2 concentration in an airtight enclosure for a period of four hours at a temperature of 100 degrees Fahrenheit. Temperature alone can be used to preserve comb honey when it drops below 20 degrees Fahrenheit for four and one-half hours, or raised to 115 degrees Fahrenheit for 80 minutes. If the temperature is raised to 120 degrees Fahrenheit or greater the wax in the comb will melt.

Like comb honey, brood combs may also be frozen over night to protect them from GWM, after first placing them in a plastic garbage bag. The bag containing the combs can be removed from the freezer on the second day, but the combs should not be removed from the bag until you are ready to return them to a living colony.

The Varroa Mite

The Varroa mite, Varroa distructor, is an external parasite of honey bees that has gained worldwide importance. The species we find today in the U.S. has evolved into over twenty subspecies. An external parasite, the Varroa mite attacks both the brood and adult bees. While its life cycle is only about 11 days in length, the Varroa mite has become the most destructive and costliest parasite to plague beekeeping to date.

Adult female Varroa mites are reddish-brown (tick-colored), flattened, oval, have eight legs and are approximately one millimeter long by one and 6/10 millimeters wide. This is just about the size of the head of a common pin. The flattened body of the Varroa mite allows it to hide between the honey bee's abdominal segments. Adult male Varroa mites are smaller than the females and have a lighter, white to greenish-yellow, color. They are only found inside the brood cells, where reproduction occurs.

Varroa mites develop underneath the cappings that seal the brood cells. They can feed on both the brood and adult bees. They use their mouthparts to penetrate the bodies of the developing bees (pupae) and drain the body fluids, literally sucking the life out of the infested pupae. Several mites per cell may be capable of killing or deforming the developing pupae. The puncture wounds made by the mites also serve as portals that allow viruses and other disease organisms to enter the bee's circulatory system. Honey bees deformed by Varroa mites are usually small, have only string-like wings, no stinger, and generally appear weak. Those bees that have been fed upon by Varroa mites, but have not been deformed, may still have a shorter lifespan than normal.

Drifting worker bees and drones may carry female Varroa mites from colony to colony. Beekeepers should be careful to limit the number of drones in a colony by maintaining brood combs in good condition. Drones, by their nature, tend to drift on nearly a daily basis, which could speed up the infestation process to include an entire bee yard. Many beekeepers are surprised when a previously strong colony suddenly collapses. A large number of bees in a hive does not necessarily indicate a healthy colony, but more accurately the health of that colony during previous brood cycles.

Sampling a colony of bees for Varroa mites is a relatively quick and simple process. Varroa mites spend about 80 % of their life cycle inside capped brood cells. This makes the brood cells the best place to begin looking for the mites. There is a definite preference by the mites for the drone brood, so check these cells first. Sacrificing a few drone cells will not damage your colony. Normally many more drones are produced in the colony than are needed for breeding purposes. Pupae can be removed from the cells with the corner of a hive tool or a cappings scratcher. When a pupa is plucked from a cell any Varroa mites that are present will be easily seen. Varroa mites may also be observed riding on top of the thorax of an adult bee. Young bees in the brood nest are most likely to carry these hitchhikers. An average brood frame will have about 5,000 cells. If your colony has three full frames of capped brood, approximately 15,000 pupae will be present. If 100 brood cells are sampled and you find 10 mites (10%) you may have 1,500 mites underneath the cappings. If you then add in the 20% mite population that is likely to be on the adult worker bees it will give you the estimated total number of mites in the colony, 1,875 in this example. This procedure is recommended by the University of Tennessee, Agricultural Extension Service.

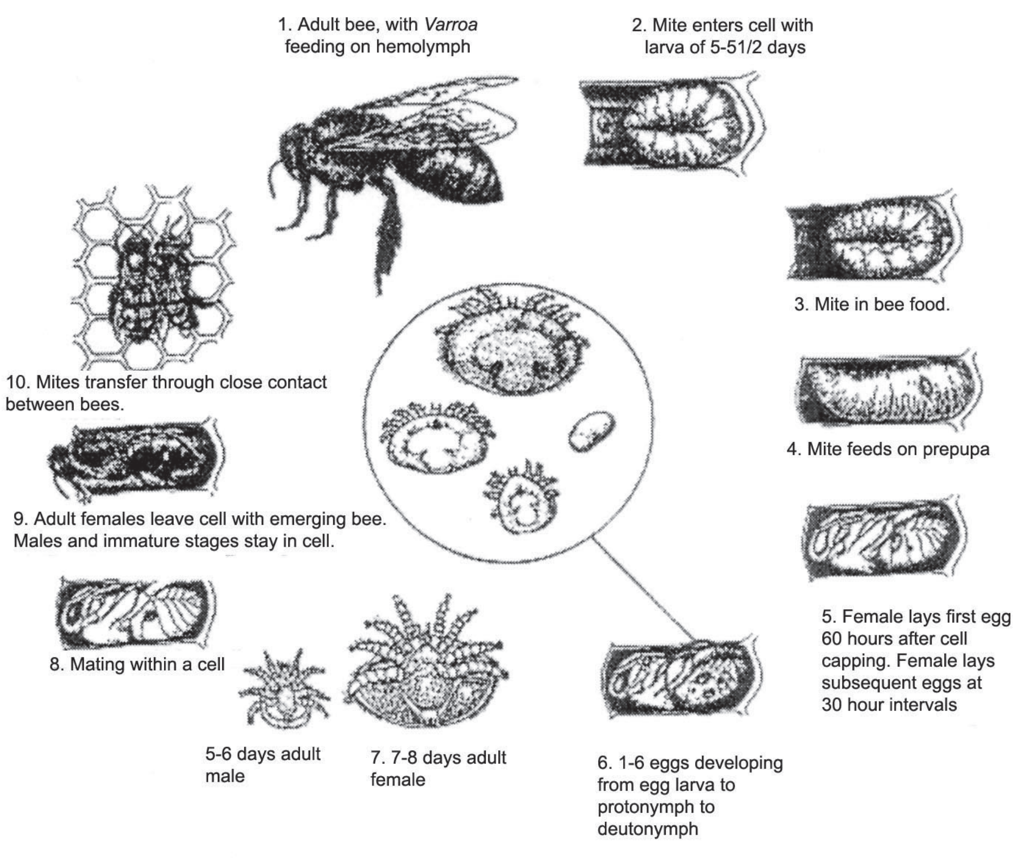
Another method of sampling for Varroa mites is the use of a sticky board underneath a screen bottom board. A sticky board can be purchased through bee supply companies or they can be made from a stiff piece of paper that has been coated on one side with shortening. The sticky board can be used with a regular bottom board, but it is more effective when used in conjunction with a screen bottom board. The sticky board should be placed under the brood frames in the hive and left for a 24-hour period. If the number of mites you find exceeds 43 you will need to remove all honey supers and treat the colony.

A third method of determining Varroa mite populations requires the sacrifice of 150 to 200 bees, or about 1 cup full. Take 1 cup of bees from the brood nest in the fall, when brood rearing has stopped, and place them in a pint container full of soapy water. Shake the container thoroughly, then pour the contents through a screen strainer with a white cloth lining it. Fill the jar with water one more time and again pour the contents through the strainer to remove any Varroa mites that may have stuck to the sides of the jar. Count all the mites, then multiply that number by 100. Divide that number by the exact number of bees you sampled. If this number is less than 17% the colony will not need a miticide treatment.

VARROA MITE TREATMENT

During the early 1990's, the only reliable treatment for the Varroa mite was the Apistan strip. However, since 1998, Varroa mites have been developing resistance to this treatment. This led to the use of Check Mite+ as an alterative control. Similar to its counterpart Apistan, Check Mite+ comes in the form of a plastic strip with a surface coating of chemical coumaphos. It can be purchased from most of the bee supply dealers. As with all pesticides, the applicator must read, understand and follow all labeling instructions. This treatment, like Apistan, will not be the final solution to the Varroa mite problem. The USDA is currently working to develop strains of honey bees that are resistant to the Varroa mite. While it may be some years before they develop a honey bee that is resistant, gentle and a good honey producer, this work offers hope to beekeepers.

Life Cycle of *Varroa*



Transferring Wild Bees to Modern Equipment

Colonies of wild or feral honey bees often take up residence in hollow trees, buildings or other places where their presence is not necessarily appreciated by the landowner. A beekeeper can sometimes increase the size of their beekeeping operation by collecting these colonies.

One antiquated method of collecting wild bees from logs involved cutting the combs out of the log and wiring or rubber-banding them into movable frames. This, however, did not produce good results. The colony was put under a lot of stress and usually did not recover if it was not transferred during a spring nectar flow. Even if this method was successful, and the beekeeper transferred the colony with the queen, the combs produced after the colony was moved tended to be at least partially crossed and produced too many drones.

A better method of removing feral bees from a log is to cut the log off so that the top of the brood nest is exposed, then place a hive body, with wired foundation, on top of the log. When the colony naturally works its way up into the box it will not be long until the colony begins raising young in the movable frames. As soon as the queen is located, a queen excluder should be placed under the hive body, separating the modern equipment from the log. This will prevent the queen from laying any additional eggs in the log. In three weeks time, all of the brood from below the queen excluder will hatch leaving only honey and pollen below. The log can then be moved a few yards away. The bees in the yard will quickly rob the honey and pollen in the log.

It is important, however, to protect the honey that is in the log from exposure if there is no nectar flow. A lack of nectar may start a robbing frenzy that may put your weaker colonies at risk. Applying Terramycin during this process may help to insure that you are not bringing American foulbrood disease into your apiary. Check-Mite+ Bee Hive Pest Control Strips may also be applied to safeguard against Varroa mites. Since the condition of the feral bees inside the log cannot be determined, you really do not know the health of the colony. Therefore, take every precaution to prevent spreading honey bee pests into your healthy hives.

Removing bees from a house or other structure poses a whole different set of problems. Unlike a log, demolition and repair of the structure is usually of great concern. A beekeeper should probably not attempt this unless they are a licensed contractor, or a licensed contractor is available to supervise any demolition necessary and to take responsibility for the repairs. Many a beekeeper has found themselves facing costly lawsuits by disgruntled homeowners who are upset over the damage done to their property during the removal of a bee colony.

Perhaps the safest way to remove bees from any structure is to place a nucleus hive (NUC) beside the opening that the bees are using to enter the structure. A bee escape is placed over the entrance to the structure, allowing bees to leave but not return from their colony. When the bees cannot get back to the colony that they left they will unite with the NUC hive. The colony behind the bee escape will die of starvation, since bees can no longer enter the structure to deliver food. For this method of extracting bees to be successful, all the bees remaining in the structure must be dead. This could take up to several weeks, so watch for any signs of activity in and around the structure. If the queen is still alive within the structure, and the bee escape is removed, the bees that were collected in the NUC hive could possibly return to the structure and the entire procedure will have to be repeated.

When the colony in the structure is dead, the bee escape should be removed to allow the bees in the NUC hive to rob all remaining honey from the structure. If honey is left in the wall or ceiling of the structure, it will cause a large mess when wax moths (a common pest of exposed combs) remove the wax cappings from the honeycomb and the honey is allowed to drip out. After the honey is completely removed, the NUC hive can be removed and the opening in the structure permanently sealed. If the opening is not sealed properly, a new colony of bees may be attracted to this location and take up residence again. This method of removing wild or feral bees from a structure can be labor intensive and provides no real benefit to the beekeeper. Therefore, beekeepers may want to consider charging homeowners for bee removal.

Treatable Brood Diseases

European foulbrood (EFB) is a honey bee disease caused by the bacterium Melissococcus pluton. Honey bees infected with EFB usually die during the first week of development, before their cells are capped. Sometimes, however, the cells do get capped, if the larvae don't die until the last days of their development or in the early stages of their pupal development. If any of the infected cells are capped, they will be discolored, sunken or punctured. Capped cells only occur in advanced cases of EFB and typically the infected larvae will be lying twisted in the cell and have a dull white to yellowish-white color. The infected larvae will also be rather watery or granular in consistency and not ropey as with American foulbrood. Honey bee larvae that have died from EFB will dry into a scale, which takes on a rubbery consistency and will not adhere tightly to the cell wall. A sour, or foul, smell may be present in advanced cases of EFB, where the bee population has dwindled. This odor is why the disease is called "foulbrood".

Beekeepers who believe they may have EFB infected bees should contact the West Virginia Department of Agriculture Apiary Inspection Program so that an accurate diagnosis of the hive can be made. A colony of bees that has been diagnosed with EFB should be treated with Terramycin (oxytetracycline) and re-queened.

Another common, and easily identified, disease that infects developing honey bees is chalkbrood, caused by the fungus Ascosphelra apis. Honey bee larvae that are infected with chalkbrood become overgrown with a cotton-like material and swell to the size of the cell. After the larvae die they will dry up and shrink, going from a pasty consistency to a white, chalk-like mummy. These mummified larvae will vary in color from white to mottled or dark. A dark coloring indicates the presence of a large number of reproductive fungal spores. The mummified larvae that have died from chalkbrood do not adhere to the comb and will easily fall out of it when the comb is shaken. These mummies may be found at the entrance of hives that are heavily infected with chalk brood.

Chalkbrood is more prevalent in colonies that are poorly ventilated and, in most cases, the infection clears up on it's own as the humidity decreases. In extreme cases of chalkbrood, a colony should be re-queened, because the old queen carries the fungus with her as she lays her eggs.

Sacbrood (SAC) is the only common brood disease of honey bees known to be caused by a virus. Death occurs when the larvae are in the upright position, just before pupation. The infected larvae change color from pearly white, to gray, then finally to black.

SAC is found when the honey bee is in the capped stage of development. The head region of the infected larva is usually darker than the rest of the body and is turned slightly upward. When an infected larva is removed from the cell, it will resemble a sac filled with water. The dried scales from SAC are brittle and easily removed.

SAC is commonly confused with a condition known as chilled brood, where the larvae simply die from cold temperatures. SAC infections usually clear up on their own. In extreme cases, the colony should be re-queened.

West Virginia Department of Agriculture
Plant Industries Division
Apiary Inspection and Registration Program
Charleston, WV 25305-0191
(304) 558-2212 Phone
(304) 558-2435 Fax

Application for Apiary Registration

Name ____

Address ____

City ______________ State __________ ZipCode __________ County ______________

Telephone (Home) ______________ (Work) ______________ (Fax) ______________

E-mail ________________________

I am no longer keeping bees, please remove my name from your mailing list ☐

In compliance with the Code of West Virginia, Chapter 19, Article 13, I (we) hereby apply for registration as follows:

Number of Colonies	Location (if different from above)	Comments

Requesting Inspection for: **Interstate Movement** ☐ **Parasite/Disease Problem** ☐
****Sale or Distribution of Queens, Packaged Bees or Nuclei Colonies** ☐ **Beekeeper Information** ☐

If you are requesting assistance, please provide additional directions or a map of the location of your apiaries on the reverse of this form.

______________________ ______________________
Date Signature

05/11/04

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:
(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 honey bee (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) “Honey bee pest” means American foulbrood (Bacillus larvae), European foulbrood (Melissococcus pluton), Varroa mite (Varroa destructor), honey bee 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 honey bees for the express purpose of creating a numerical increase in colonies for honey production, pollination service or monetary gain through sale of honey bees.
(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 period of enforced isolation to contain and prevent the spread of honey bee pests.
(18) “Sterilized or sterilization” means to treat and neutralize honey bee pests by means of steam autoclave, pit incineration, or by any other acceptable method which the commissioner determines effective for control of honey bee 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 honey bee 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, retreatments, 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 honey bee 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 thirty-first day of December 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.

§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 honey bees domiciled within the state of West Virginia. If any honey bee pest is found in the apiary, the commissioner shall immediately notify, in writing, the owner or operator stating the type of honey bee pest and whether it may be successfully treated or not.

In cases where the honey bee 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 honey bee 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 honey bee 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 honey bee 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 honey bee pests. The notice of quarantine shall specify the name of the honey bee 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 honey bee 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 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 honey bee 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 therefor.

§19-13-11. Penalties for violations of article; rules.

(a)(1) Criminal penalties. — Any person violating any provision of this article is guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than one hundred dollars nor more than five hundred dollars for the first offense, and for each subsequent offense, shall be fined not less than five hundred dollars nor more than one thousand dollars, or imprisoned in the county or regional jail not more than six months, or both. Magistrates have concurrent jurisdiction with circuit courts to enforce the provisions of this article.
(2) It shall be the duty of the prosecuting attorney of the county in which the violation occurred to represent the department of agriculture, to institute proceedings, and to prosecute the person charged with such violation.
(b) Civil penalties. —
(1) Any person violating the provisions of this article or rule promulgated pursuant to this article may be assessed a civil penalty by the commissioner. In determining the amount of any civil penalty, the commissioner shall give due consideration to the history of previous violation of any persons, the seriousness of the violation, including any hazards to agriculture in West Virginia and the demonstrated good faith of any person charged in attempting to achieve compliance with this article after written notification of the violation.
(2) The commissioner may assess a penalty of not more than one hundred dollars for the first offense or less serious violation, as determined by the commissioner in accordance with the rules approved in accordance with the provisions of chapter twenty-nine-a of this code, and not more than one thousand dollars for a serious, repeat or intentional violation, as determined by the commissioner in accordance with the approved rules.
(3) The commissioner may negotiate and enter into a settlement agreement for the payment of civil penalties.
(4) The civil penalty is payable to the state of West Virginia and is collectable in any manner authorized by law for the collection of debts. Any person liable to pay a civil penalty and neglecting or refusing to pay it within thirty days of written notice of demand for payment, shall be assessed interest at the rate of ten percent per year from the date the penalty was assessed to the date of payment. The penalty and interest constitute a lien in favor of the state of West Virginia and shall attach on the person’s property when a lien is properly recorded in the county wherein the property is situated. There shall be no cost as a condition precedent to recording.
(5) The commissioner shall propose rules for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code to establish procedures for the assessment and collection of civil penalties as provided in this section.
(6) No state court may allow the recovery of damages for administrative action taken if the court finds that there was probable cause for such action.