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Ohio Department of Agriculture
Plant Health/Apiary
8995 East Main St
Reynoldsburg OH 43068

"SUGAR ROLL TO DETECT VARROA"

The sugar roll is a procedure to detect Varroa mites within honey bee colonies.

Equipment: Wide mouth canning jar (pint or quart) with two piece lid
8 mesh hardware cloth
Powdered sugar
Window screen or any fine mesh screen that will let powdered sugar to pass through but not Varroa

Procedure: Retain the metal ring that comes with the two-piece lid. Cut a circle out of the 8 mesh hardware cloth to fit inside the ring. The hardware cloth may be secured to the metal ring lid, so the ring and hardware cloth become one piece.

Collect about 200-300 bees within the jar by scooping them off the frames. Once collected, quickly replace the screen lid. Through the hardware cloth add between 1 teaspoon to 1 tablespoon of powdered sugar. The amount of sugar will vary depending on the number of bees collected. Roll the bees and sugar within the jar until they appear to be coated (about 1 minute) and let stand for a short time.

The window screen should be placed on a solid surface protected from any wind. Invert the jar and shake to recover the mites. If mites are present the mites will fall through the jar's 8 mesh hardware cloth onto the window screen. Any extra powdered sugar will fall through the window screen. However, the mites will not and can be counted on top of the window screen or dump them onto a clean sheet of paper to count.

Results:
1. It is an efficient procedure with about 70-90% mites recovery as compared to about 50% with ether roll.
2. Bees are not killed with very few being damaged, if any.
3. Sugar coating induces bees to groom themselves.
4. Sugar coating induces mites to release from adult bees.
5. Bees can be returned to the original colony.

Adapting this detection method to your own field conditions may necessitate that you change the amount of powdered sugar added, the time length the bees are rolled and where the bees will be shaken.

Reference:
Dr. Marion D. Ellis, Extension, University of Nebraska, presented this detection method to the AIA on 1/20/2000

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"SHB FACTS AND OBSERVATIONS"

- Small Hive Beetles (SHB) was named this because in South Africa there is a large hive beetle.
- Majority of SHB was found to pupate in sandy soil at 1-10 cm (1/2-4 in) depth and within 30 cm (12 in) from the hive entrance.
- Adults (SHB) are the overwintering stage and can be found in the bee cluster.
- Adults can survive for up to 5 days without food or water.
- Mature larvae crawl from the hive and into the soil to pupate.
- Beekeepers could break the life cycle by moving colonies or by soil treatments.
- Temperature and humidity are key components regarding the percent of SHB eggs that hatch and adults emerge. (Higher temperatures and humidity result in increased percentages of egg hatch and emergence.)
- When SHB larval slime trails are observed on hive bodies – colony can be considered as infested.
- Temperatures determines where you look for the SHB in a colony. (Cooler – top, hot – bottom.)
- SHB will try to avoid light when looking in a hive.
- Ground drench works well if hive has one entrance.
- Larvae are attracted to light in the honey house.
- Soil around the honey house can be treated for SHB.
- Honey houses should be kept clean and honey extracted ASAP.
- Research indicated about 80% to the SHB were found under or in close proximity to the hive entrance (less than 30 cm or 12 in).
- No SHB's were found at 180 cm (6 feet) from the hive.

Resources: Dr. Jeff Pettis, USDA Beltsville 2/2000

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Apistan® (fluvalinate) and/or Checkmite+™ (coumaphos) Resistance Testing

This test can be used to determine possible mite resistance when a particular chemical does not appear to control Varroa mites. The test uses Apistan® and/or Checkmite+™ strips and may be conducted simultaneously on the same group of colonies. The test needs to be done **before** treating your colonies!

Critical Issues for the Success of the Resistance Test:

- Prescreen the hives using the ether roll test (250-300 bees) and test only those hives yielding 5 or more mites. The test gives meaningful results only when used on colonies with sufficient mite loads. Do not expect resistance to be the same in all test colonies. The test is not designed to identify individual colonies showing resistance but rather an apiary average.
- Perform the test as described: jar size, size of strip pieces, and temperature are important.
- Ensure that the bees are mobile in the jars so they may contact the strips.
- **DO NOT** reuse strip pieces or index cards. Wash jars between tests.
- **DO NOT** expose the jars with chemical strips to sunlight for any length of time.
- Sample bees from the brood combs.
- Use a measuring scoop, do not scrape the bees directly into the jar. This will avoid injury to the bees.
- Remember this is intended only to screen for resistant mites and is not intended to indicate the exact level of resistance.

Supplies Needed:

- 2 or 3 wide mouth pint canning jars
- 2 pieces 8 mesh hardware cloth – cut to fit snuggly inside the metal jar ring
- index card and stapler
- 3/8" x 1" piece of new Apistan® and/or Checkmite+™ strip
- ¼ cup measure
- 25% alcohol or windshield washing fluid
- starting fluid (ether)
- straining cloth and rubber band or clothes pins
- protective gloves
- small plastic bucket or similar container
- sheet or white paper

Step 1:
Using one of the jars and the ether, perform an ether roll test to determine if sufficient mites are present to perform resistance test.

Step 2:
Staple a 3/8" x 1" piece of Apistan® or Checkmite+™ to the center of an index card. Be sure to handle these with gloves. Place the card in a jar with the strip section facing inward. Place the wire mesh screen in the jar ring.

Step 3:
Shake bees from one or two brood combs (remember to avoid the queen) into an up-turned outer cover, a bucket or a box. Scoop up ¼ cup of bees (~150 bees) and place them into each jar with the index card. Be careful not to damage the bees. Screw the lids with the wire mesh onto the jars to stop the bees from escaping.

Step 4:
Place the jars in a warm room (~86°F) in the dark for 6 hours. Make sure the lids are uncovered so air gets to the bees.

Step 5:
After 6 hours, hold the jar about 4 inches above the piece of white paper and turn it so the mesh lid is facing down. Hit the bottom of the jar three times with the palm of your hand. Count the number of mites that fall on the paper. This will be the number of mites killed by either the Apistan® or the Checkmite+™.

Step 6:
Turn the jar upright. Knock the bees to the bottom of the jar. Remove the lid and remove the index card, replace the lid to prevent bee escape. Fill the jar about half-way with the alcohol or washer fluid. Place the original solid lid on the jar. Shake the jar vigorously for 5 minutes.

Step 7:
Remove the solid lid and replace it with the mesh lid. Pour the liquid into the straining cloth that has been secured to the bucket. Refill the jar with liquid and swirl the bees around, pour the liquid through the strainer again.

Step 8:
Count the number of mites on the cloth. If the total number of mites collected in both samples is less than five, the results should be discarded.

Step 9:
To calculate the percentage of mites killed by the chemical, divide the number of mites that fell on the white paper by the total number of mites collected (fall plus wash) and then multiply this number by 100.

Example: 40 mites fell from the strip, 13 were washed off
40 divided by 53 = .754 multiplied by 100 = 75%

If more than 50% of the mites were killed by the chemical strip after six hours, the mites should be susceptible and adequate mite control can be expected. If less than 50% are killed after 6 hours, the mites may be resistant to the chemical tested.

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INSTALLING PACKAGE BEES

Package bees are sold by various bee supply companies and commercial bee producers. Orders should be placed early, so that the bees can be delivered during April and the first half of May (fruit and dandelion bloom). A three pound package with queen should be ordered if you are going to introduce the bees to foundation. The following steps should be observed to avoid problems with installation.

1. When packages arrive, place in a cool dark room; ideal temperature is about 65°-70° F.
2. Feed bees by brushing or sprinkling sugar syrup (1:1 ratio of sugar to water) over the screen surface.
3. A one story hive (bottom board, deep hive body, 10 frames, inner cover and outer cover) must be ready before the installation of the bees.
4. Install bees in the late afternoon so they will settle down and not drift.
5. Reduce the hive entrance with an entrance reducer or lightly stuff green grass in the entrance.
6. Shake the cage vigorously so that the clustered bees will fall to the floor of the cage.
7. Remove the wooden cover of the cage.
8. The feeder can will then be exposed; remove this can.
9. Remove the queen cage and check the queen to make sure she is alive.
10. Using a nail, puncture the candy in the queen cage, so the queen can be released easier by the workers.
11. Half of the ten frames should be removed leaving five frames in the hive. Place the queen cage with the candy end up between two frames in the hive – the cage screen should be exposed to the bees.
12. Briskly shake the bees into the empty area of the hive (where frames were removed).
13. Replace the frames which were removed so that there is a total of ten frames.
14. Then the package bee cage can be placed in front of the hive entrance so the few remaining bees will crawl into the hive.

15. Next, provide the bees with a gallon can or large jar of sugar syrup.

16. Place an empty hive body on top of the new hive.

17. The syrup can is then placed inside the hive body resting on the top bars of the frames.

18. The feeder can should be checked in about five days and refilled if empty. (It is very important to provide sufficient food to the bees.)

19. In about a week, inspect the colony for eggs and larvae.

20. Remove the empty queen cage.

21. If the queen fails, a new queen should be introduced immediately; if not, unite the package with another colony or package.

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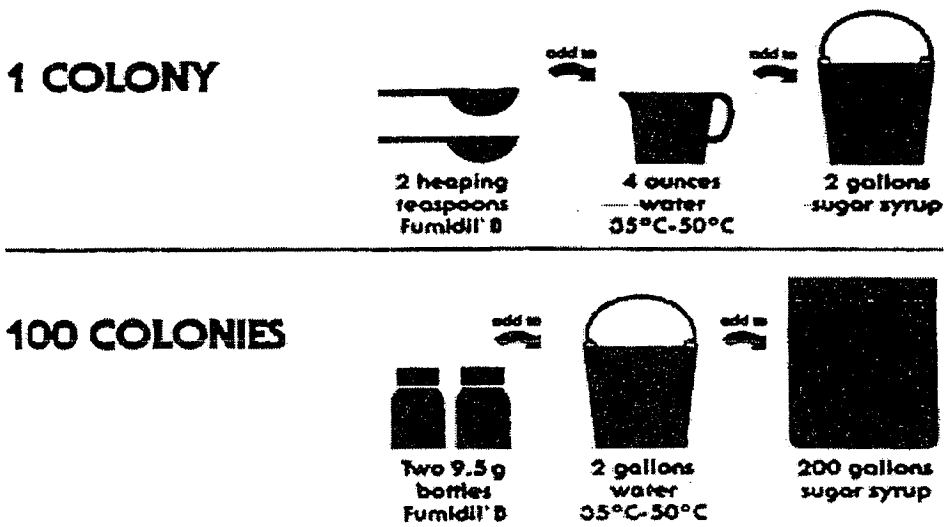
NOSEMA DISEASE

Nosema disease is an infection of the adult bee's digestive organs caused by a single celled protozoan called Nosema apis. This disease is often confused with a colony condition called dysentery, where the bees defecate within the hive and around the entrance. Dysentery may result from the bees' consumption of honey with a high moisture content. If nosema disease is present with dysentery, the nosema spores may spread to other bees.

Although a beekeeper cannot see the disease spores, he/she can notice when the adult bee population of a wintered or package colony is dwindling, a symptom common in late winter and early spring. Also, queenlessness, supersedure and reduced honey yields may exit from nosema infection.

The only reliable diagnosis for nosema is microscopic examination from an adult bee sample. About 25 to 50 bees should be collected from the hive and preserved in 70% alcohol or frozen. The examination requires the bees to be ground with a small amount of water. A drop of the resultant liquid is examined under a microscope at 400X for nosema spores.

Treatment for the disease is with an antibiotic called funagillin. These are some formulas for mixing fumagillin to feed from 1 to 100 colonies.



CAUTION: Should not be mixed in hot syrup; antibiotic will break down. (Fumidil B is the trade name for fumagillin.)

When feeding established colonies it is important the medicated syrup is fed early enough in the fall, so the bees can remove excess moisture. Package bees should be fed as soon as they are installed, usually about one gallon of medicated syrup per colony.

Do not use antibiotic during honey flow.

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EUROPEAN FOULBROOD – EFB

Cause: A bacteria known as Melissococcus pluton. All castes are susceptible to EFB.

Effect: European foulbrood is most common in the spring and early summer, but it occasionally stays active through summer and fall. A good nectar flow hastens recovery. In severe cases, colonies are seriously weakened or killed. Usually the worker bees removed dead brood, but in some weak colonies it will accumulate.

Symptoms: European foulbrood infected larvae lose their plumpness and white color. They become a dull white (gray). A faint yellow might also appear on the larvae before death.

Most larvae die while coiled on the bottom of open cells. Many also die at the age when they would normally be spinning their cocoons. Few larvae die while fully extended. Larvae dead of European foulbrood, therefore, are usually coiled on the bottom of the cells, but may be irregularly twisted or fully extended.

The appearance of the dead larvae changes gradually during decay and drying. The gray and the yellow color deepen during decay, but the depth of color in scales varies considerably. Larvae that die before the cells are sealed dry rapidly, and decay is soon stopped; hence these scales are usually light colored. Larvae that die after the cells are sealed usually become dark brown or nearly black.

For a short time after death, larvae can be removed from the cells without tearing the skin. Within a few days the skin and other tissues become soft. The larvae settle against the lower wall of the cells and appear moist, melting, and flattened. At this stage of decay they are somewhat translucent and watery and cannot be removed whole. Upon drying, they become pasty and finally rubbery. Scales with European foulbrood usually do not cling closely to the cell walls and are easy to remove.

Larvae that die of European foulbrood in sealed cells may sometimes become ropy and resemble larvae dead of American foulbrood. Since the bees remove dead brood from open cells first, it sometimes happens after disease ceases to be active that the brood which died in sealed cells is all that remains in the combs. When this happens, it may be difficult to tell whether American foulbrood or European foulbrood or both of these diseases are present.

The odors of European foulbrood are slight in recently dead larvae. A sour odor is sometimes present in partially decayed larvae. Larvae that die after they have straightened out and the cells are sealed, develop a putrid odor resembling that of decayed meat.

Spread: The organism Melissococcus pluton become mixed with the food fed to the young larvae by the nurse bees, multiplies rapidly within the gut of the larvae, and can cause death within about 4 days after egg hatch. House bees cleaning out the dead larvae from the cells distribute the organism throughout the hive. Since the honey of infected colonies and the beekeeper's equipment are undoubtedly contaminated, subsequent spread of the disease is accomplished by robber bees, exposure of contaminated honey by the beekeeper, interchange of contaminated equipment among colonies, and perhaps to some extent, by drifting bees.

Control: Colony stresses can be factors in the disease's appearance. Management to ensure strong, healthy colonies may help prevent EFB.

Use Terramycin per label directions. Requeening colonies may also help.

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COLONY CONDITIONS

Starvation: Starvation can occur in a colony if there is a lack of honey or the bees are unable to reach the honey in extremely cold temperatures. The larvae are removed by the nurse bees if short of food. When colonies are found during the spring to have died in cluster, head first in the cells, a diagnosis of starvation can be determined.

Dysentery: Dysentery is not a disease but a condition where the bees are unable to eliminate themselves away from the hive, and therefore defecate on the frames and combs or on the outside of the supers, appearing as dark spots and streaks. The lack of elimination flights and consumption of high moisture honey can cause the problem.

Chilled Brood: Chilled brood is a condition which occurs mostly in April and May, when the weather is unusually warm and there is a sudden cold snap. The outer edges of the brood pattern are chilled and die, because there was more brood than the bees could keep warm during the inclement weather. Both larvae and pupae are killed by the cold. The dead larvae many times are removed by the bees very quickly. The chilled brood's color appearance is often yellowish-white, tinged with black. The texture can be dry, greasy or watery, but never ropy. The odor is faint and can be sour.

Drone Layer: When a queen is unable to lay fertilized eggs either because of not mating or her lack of sufficient spermatozoa, she is considered to be a drone layer. Drones are produced in worker sized cells, with the cappings being more pronounced, extending out from the comb surface. The colony usually tries to replace queens by supersedure.

Laying Worker: If a colony has been queenless and unable to requeen itself, a worker bee can begin to lay eggs. The worker's egg laying pattern many times, is scattered and several eggs are placed in one cell. Since the worker's abdomen is considerably shorter than a queen's the eggs are usually deposited on the sides of the cell instead of the base. It is impossible to introduce a new queen, unless frames of unsealed brood with bees are added and all the frames where the worker has layed are moved.

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MANIPULATING BEES

Stings should be avoided in the manipulation of the colony, since the odor of the venom greatly irritates other bees. However, a beekeeper handling bees must expect to receive an occasional sting.

A bee does not sting at random but in an effort to protect the colony. A bee away from the colony usually will not sting unless provoked. A honey bee colony is generally "cross" on cool, cloudy days when the bees are unable to fly and gather nectar. Bees dislike jarring of their nest and respond to sudden movements of unfamiliar objects.

Darker clothing, rough, wooly, suede or leather, horsehide or any type of hair seem to irritate bees and should not be worn when inspecting a colony. A veil should be worn to protect the head. Bees dislike animal odors. Pets should not be handled before bee inspections. It is advisable to also remove a ring or wristwatch since these objects excite guard bees to sting around them. The proper use of the smoker and the gentle handling of hive parts are the beekeeper's best means of protection against stings. Smoke disorganizes guard bees and causes the bees to gorge themselves with honey in preparation to leave their "burning" nest. Gorged bees are less apt to sting.

Smoke is used at the entrance and over the combs to subdue the bees. Extra supers are removed and stacked upon the upturned hive cover to avoid crushing bees and dripping honey (possible spread of disease). Combs to be examined are carefully removed as to not roll or crush the bees. The combs are leaned upright when temporarily placed outside the hive body. The comb on which a queen is located is <u>not</u> placed outside.

Combs containing brood should be returned to the broodnest after inspection to prevent prolonged exposure. This is especially important if the brood is unsealed. Combs should be replaced in their original positions unless there is a specific reason for not doing so.

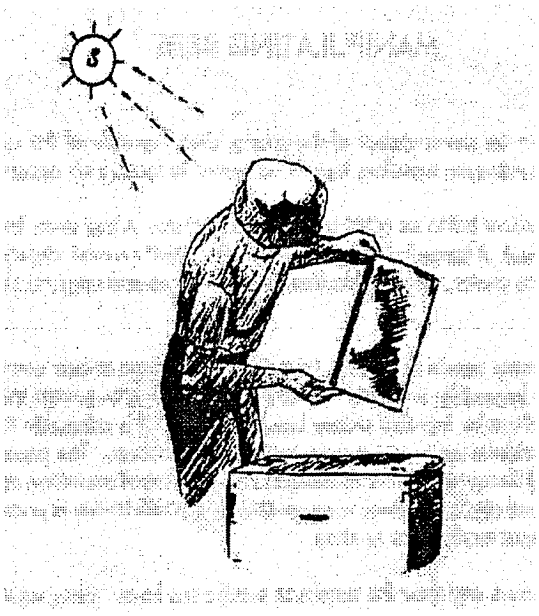
INSPECTING A FRAME OF BROOD

A comb being inspected for disease should be directed so that the sunlight illuminates the lower side walls and bottoms of the cells. This makes it possible to see any disease "scales" which might be present.

If no dead brood is found in open or uncapped cells, sunken, discolored or punctured cappings should be removed and the cell contents examined. Capped cells found scattered in an area from which young bees have recently emerged should also be uncapped and examined.

When dead brood is inspected, the following points should be noted:

1) Age of the brood when death occurred.
2) Appearance of cappings.
3) Position of dead brood in cell
4) Color of the dead brood.
5) Consistency of the dead brood at various stages of decay.
6) Type of scales, if any.
7) Odor of the decaying brood.
8) Type of brood affected.



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HONEY BEE COLONY

A colony of honey bees during the active season is composed of a queen, several hundred drones, 30,000-80,000 workers and brood in all stages of development. Honey bees have become so highly specialized in their functions that no individual bee, including the queen, is capable of establishing a new colony alone.

Queen bee: The queen is the only member of the colony capable of laying eggs which have been fertilized by spermatozoa. A prolific queen is essential to have a strong colony. She will lay up to 1,500 eggs during a 24 hour period. A young queen normally takes one or more mating flights within 4 to 12 days after emerging from her cell. Queen bees may live 6-7 years, but are of the most productive value during the first two seasons of their life. Her sting resembles a wasp's, being relatively smooth, and is used to destroy rival queens.

Drone bee: The drone's sole function is to furnish spermatozoa. Mating takes place outside the nest in the air and the drone dies after the act. Drones range 8 miles or more in their flights and are welcomed into any colony, provided there is an abundance of nectar and pollen.

Worker bee: The worker bee is a nonreproductive female (no spermatozoa). Her sting is used only as a defensive weapon. It can be thrust into other insects. However, when the sting pierces the skin, barbs on the sting cause it to be torn from the bee.

Normally, young worker bees perform hive duties while older bees forage in the field. The length of the worker's life depends on her wings. They last only 6 weeks or less during the peak season. Workers which emerge in fall generally live through the winter, but die during the spring.

Brood: All castes of the honey bee pass through four stages in the development: egg, larva, pupa and adult. The bee larva is a legless grub. At the end of the feeding period, attendant bees seal the mature larva in its cell by means of a porous wax capping. After the capping is in place, the larva spins a cocoon lining the inside of its cell. During its growth, the larva sheds its skin (molts) five times. The last molt produces the pupa which molts once before the adult bee emerges from the cell.

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VALUE OF BEE POLLINATION TO OHIO AGRICULTURE

The pollination mechanisms for some Ohio crops are poorly understood, particularly hybrids and new varieties. A few crops have been investigated and the pollination requirements are well known. An example is the pickling cucumber. In this case, bees provide nearly 100% of the pollination. The amount bees contribute to the pollination of other crops is sometimes less. Strawberries vary in their need for bee pollination. The "average" variety requires about 24% insect pollination for complete seed set. The remainder is due to self-pollination. Strawberry growers usually have a crop of berries, but without bee pollination, the quality is sometimes inferior to a crop produced with the aid of bee pollination. With apples, bees are essential for cross-pollination. New varieties and cultural planting methods add new questions as to how apples are pollinated.

UNMEASURED POLLINATION BENEFITS

There are areas where it is almost impossible to place a dollar value on bee pollination. One is the contribution that pollination of plants makes to wildlife food production. Another is the natural beauty resulting from pollination of wildflowers. Many shrubs and countless annual plants reproduce by bee pollinated berries and seed, which provide food for birds and other animals. Ornithologists may suggest that humans "feed the birds in the winter," but the birds also depend upon naturally grown seed and fruit resulting from bee pollination.

The beekeeper with a small scale operation is very valuable in providing honey bees for this unmeasured contribution to pollination, because there are many Ohio hobbyist beekeepers spread through the state that increase food production for wildlife.

POLLINATION AND SOME AGRICULTURAL CROPS

Pumpkins and squash – Because the anthers are in one flower and the stigma is in another, transfer of pollen is essential to fruit set. Observations indicate that pollination is most effective in the early morning.

The value of bees has been shown in terms of fruit produced. Wolfenbarger (1962) showed the correlation between colonies/acre and increased production in baskets of squash/acre:

no colonies -- 148 baskets	two colonies -- 168 baskets
½ colony -- 155 baskets	three colonies -- 173 baskets
One colony -- 161 baskets	

Concrete data is scarce, however, evidence shows pumpkins and squash must be pollinated and honey bees are the chief pollinators. Recommendations are 1 to 3 colonies/acre. If yields are low, consider 3 colonies/acre. Colonies placed nearby are most effective.

Melons (cantaloupes, all cultivars of muskmelons) – The followers open sometimes after sunup, depending upon the sunlight, temperature and humidity. When the temperature is low, the humidity is high or the day cloudy, opening is delayed. Bee activity begins on the flower shortly after it opens, reaches a peak at about 11:00 a.m. and ceases about 5:00 p.m. (McGregor & Todd 1952) Collection of pollen by bees usually ends before noon, but nectar collection continues into the late afternoon.

A high correlation exists between the number of seeds in a muskmelon and its size. The more seeds, the larger the fruit. Increased bee visitation is associated with a greater number of seeds.

Honey bees visit muskmelon flowers as soon as the flowers open. They collect both nectar and pollen, move freely from flower to flower and plant to plant, and continue visiting the flowers until late afternoon. McGregor et al (1965) showed that a honey bee visit to each flower about every 15 minutes is desirable for maximum fruit set. Whitaker and Bohn (1952) showed that variations in visits by honey bees occur between plants sometimes only a few feet apart if there is a variation in the microclimate around the plants. This means that many flowers must receive more visits than necessary if all are to receive the optimum number.

When there is heavy bee activity, a heavy crown set results. (Rosa 1924, Whitner 1960) Such fruits are sweeter (McGregor & Todd 1952) and usually more oval. Taylor (1955) studied 37 muskmelon fields in relation to proximity to honey bee colonies. In 20 fields with an average of ½ colony per acre within a mile, production was 1.06 melons per plant and 242 crates per acre. In 17 fields with no hives of bees in visible vicinity, production was only .67 melon per plant and 161 crates per acre.

Recommendations by (McGregor & Todd 1952) suggest 1 colony/acre. Sims (1960) suggested 1 good strong colony/acre, the colony filling 2 deep hive bodies. Most research has been done on cantaloupes, however pollination requirements are the same for all muskmelon cultivars.

Cucumbers – The need for insect pollination of cukes has been known for years. Before the turn of the century honey bees were used to pollinate cukes grown under glass. More recent tests have verified the need for bees. The best time of the day for effective cucumber pollination was from 10:00 a.m. to 3:00 p.m. (Connor-Michigan 1969). A cucumber flower should be visited 8 to 10 times for satisfactory fruit set. Viability in pollen grains decreases with increased bee travel distances.

Depending on if you have monecious or gyneocious hybrids, the pollination requirements vary from 1 colony per acre to 2 to 3 colonies per acre (Hughes 1971). If you walk into the cuke field on a clear day and cannot count 30 to 40 bees within a 30 ft. diameter or cannot hear a noticeable hum, you probably need to bring in more bees.

Apples – The apple flower produces both nectar and pollen and is important to the colonies' spring buildup.

Usually the more seeds that develop in the apple, the larger the fruit (Schowenget 1935). About 6 or 7 seeds are necessary for good fruit set (Hartman & Howlett 1954). The average blossoming period for apples is about 9 days. However, cool weather lengthens and warm or dry windy weather shortens this period (Morris 1921).

The Pollination recommendations are that honey bees be placed near or distributed with the orchard. Colony numbers are from 1 to 3 per ace, being fairly strong and not weak. Removal of all colonies is important at the conclusion of pollination to avoid spray damage.

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USING APISTAN STRIPS TO CONTROL VARROA MITES

The Apistan™ Strip is an impregnated PVC resin formulation for the control of Varroa mites in honey bee colonies. The active ingredient in the strip is 10% fluvalinate. These plastic strips are of light golden color and of low odor, measuring 250mm in length, 30mm in width and 1mm thick. The dispersal of the fluvalinate chemical within the colony is by contact with the bee and subsequently with the mite. It has a low toxicity to honey bees; however, it disrupts the central and peripheral nervous systems of the mites.

RECOMMENDATION FOR USE

Two strips per colony placed between the frames in the center of the brood provide best results. Hang one strip between frames 3 and 4 and the second strip between frames 7 and 8. Hang with a thumbtack, staple, small nail or other suitable hanging device. Strips should hang freely between the frames rather than resting against the combs. An early spring treatment before the honey flow and a fall application after the honey flow provides for safe control.

PRECAUTIONS

If the strips are introduced when honey supers are on the hives, the supers must be removed first. If not removed any stored surplus honey can become contaminated by this chemical (fluvalinate). Contaminated honey is not a healthy pure food product. Currently EPA allows no fluvalinate residues to be present in honey. If any honey is contaminated with this chemical it will be seized and destroyed.

DON'TS

Don't allow strips in the hive during honey flows.
Don't allow strips to remain in the hive for more than 6-8 weeks to reduce chances of mite resistance.
Don't reuse strips.
Don't expose honey intended for human consumption to the strips.
Don't get the strips in your mouth; harmful if swallowed.
Don't use strips without wearing protective gloves.

ALWAYS READ THE LABEL CAREFULLY!

Resource: Zoecon Corp. technical bulletin

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ANTIBIOTICS FOR AMERICAN AND EUROPEAN FOULBROOD DISEASE

Feeding antibiotics to honey bee colonies is the Ohio beekeeper's management decision. The only F.D.A. approved antibiotic is "Terramycin", the trade name for oxytetracycline manufactured by Pfizer. Beekeepers can feed in a preventive manner and also as a disease control. Preventive feeding implies that antibiotics are applied to apparently healthy colonies. This is done in the early spring and late fall to avoid any possible honey contamination. As a disease control beekeepers have the option to feed antibiotics or they may dispose of the disease by burning.

What about Terramycin™

- It prevents bacterial spore germination or delays germination beyond the time bee larvae can be harmed.
- Allows the colony to clear out dead brood so symptoms disappear.
- Antibiotics must be present constantly while larvae are being fed so as to prevent spore germination in healthy larvae or prevent bacterial growth.
- The use of antibiotics (Terramycin) must always be accompanied by good management.

Important considerations

- Feed only the recommended dosages of Terramycin.
- Terramycin loses effectiveness more rapidly when exposed to sunlight.
- Store Terramycin in a dry, dark refrigerator until used.
- Do not mix Terramycin into hot syrup. The antibiotic will lose much of its effectiveness.
- A diseased colony must have sufficient numbers of nurse bees available if the antibiotic (Terramycin) is to be effective.
- Terramycin should not be fed during a honey flow and all surplus supers must be removed.
- Prepare Terramycin mixture only as needed and not in advance.

The preferred Terramycin feeding method is to dust the hive frames, using a mixture of the antibiotic and powdered sugar. A method of dissolving Terramycin in syrup and then feeding colonies is used by beekeepers. However, it is not recommended because of Terramycin's breakdown when in solution and when exposed to light.

The following formulas are suggested for beekeepers choosing to feed Terramycin. Terramycin is readily available at most bee supply dealers.

6.4 oz foil packet

6.4 oz packet TM } Mix well
1-1/2 pounds powdered sugar }

Use 2 tablespoons or 1/8 cup per feeding.

Feeds about 50 colonies one feeding.

For feeding 1 colony, mix 1 teaspoon of TM plus 5 teaspoon of powdered sugar.

TM 25

1 pound of TM 25 } Mix well
3-3/4 pounds powdered sugar }

Use 2 tablespoons or 1/8 cup per feeding.

Feeds about 125 colonies one feeding.

TM 50D

1 pound of TM 50 } Mix well
7-1/2 pounds powdered sugar }

Use 2 tablespoons or 1/8 cup per feeding.

Feeds about 250 colonies one feeding.

USE ONLY PRODUCTS LABELED FOR BEES!!

Usually 3 dustings at 4-5 day intervals are required in the spring and fall. Use at least 4 weeks before the main honey flow to prevent contamination of marketable honey. Dusting should be directed on the outside edge of the frame top bars in the brood area, avoiding direct contact between the brood and the Terramycin mixture.

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PESTS OF HONEY BEES

MICE

Problem: Mice cause damage to both stored combs and active bee colonies. Mice enter the hive in late fall to build nests before the winter season. In building the nest, mice will chew holes into several combs thus destroying them. In a good honey flow, bees will replace the combs. However, it usually will be drone comb, which is undesirable in the brood chamber.

Control: Reduce the colony entrance to about 3/8 inch before late fall. This can be done by using a standard wooden entrance reducer of hardware cloth of three wires to the inch. On stacks of stored equipment, using excluders or tight covers will help keep equipment free of mice. In addition, traps can be placed around the stored equipment.

SKUNKS

Problem: Skunks feed on bees at night by scratching at the hive entrance and eating the bees that come out. Paint is scraped from the hive, vegetation is destroyed at the entrance and dirt is sometimes seen on the bottom boards. Skunks can severely reduce bee populations and the bees many times, become very aggressive due to the skunks' disturbances.

Control: There are many suggested control measures. Some of these are as follows:

1. Using various types of traps (odors possible).
2. Use rodent bait, placed in six inch tile to protect other animals.
3. Place paradichlorobenzene (month crystals) in jars with perforated lids around the apiary.
4. Sprinkling the skunk's path with lye.
5. Shooting.
6. Extend a screen outward from the entrance to prohibit scratching.
7. Place chicken wire in front of the colonies.

8. Secure tackless carpet strip on bottom board at hive entrance.

ANTS

Problem: Two species, small black ants and carpenter ants are frequently seen in Ohio and sometimes nest in hives. While the small black ant does not cause serious damage, they are very annoying to the beekeeper during colony manipulation. Carpenter ants however, burrow into the wooden hive parts and can cause structural damage.

Control: It is difficult to control ants once they have strongly infested a beehive. Control measures should start before there is a problem.

1. Remove brush, rotten wood and cut grass in the apiary to decrease nesting sites.

2. Place all colonies on hive stands and put axle grease in containers so the ants will have to cross the grease to get to the hive itself.

3. Leave the inner cover hole open and keep the hive clean of wax and propolis buildup.

4. If ants are present, ground nesting sites can be treated with an approved insecticide. Some insecticides recommended are: diazinon, lindane, dursban and/or baygon. Insecticides should not be used in the colony. Extreme care must be taken in their use.

5. When carpenter ants have damaged hive parts, the replacement of these parts is usually necessary.

GREATER WAX MOTH

Problem: Most destruction is to storage combs, especially in warm, dark and poorly ventilated places. Strong colonies defend themselves. However, weak, diseased, starved or otherwise abnormal colonies are easy prey by wax moths.

Control: Use paradichlorobenzene in dosages of 3 ounces or 6 tablespoons per stack of 5-6 hive bodies or supers. Do not use in conjunction with food use (honey). Only use when storing empty combs.

Cold treatment is excellent especially when keeping comb honey. If kept frozen comb honey will never be subject to wax moth infestation. Cold can be used for both food and non-food use.

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HONEY BEE TRACHEAL MITE

Cause: A tiny endoparasitic mite, Acarapis woodi, (Rennie) which is not visible to the naked eye.

Identification: A positive mite diagnosis should be made in the laboratory with the aid of a microscope. The presence of the mite can be observed through the large thoracic trachea. A bee's respiratory system consists of trachea and spiracles (breathing holes).

The tracheas are branching tubes which lead from the spiracles to all parts of the body. Spiracles are located on the thorax and on the abdomen. Oxygen is transported directly to the cells by these tubes and carbon dioxide is eliminated in the same manner.

The appearance of an uninfested trachea is glistening white in color. Light mite infestations will cause the trachea to appear translucent. Severe infestations will show bronze or black spotted areas on the trachea. Many times adult mites and eggs are visible in the infested trachea.

The female mites measure from .004 - .007 inches long and the males, .003 - .005 inches long. The eggs are large, often exceeding the size of the adult male.

Spread: The spread of the mites can occur from: 1) drifting of workers and drones between colonies; 2) robbing; 3) transferring bees; 4) sale of bees; 5) swarming. The most serious of these is robbing. Colonies heavily infested by mites become weak and subject to robbing. The colonies doing the robbing can become heavily infested.

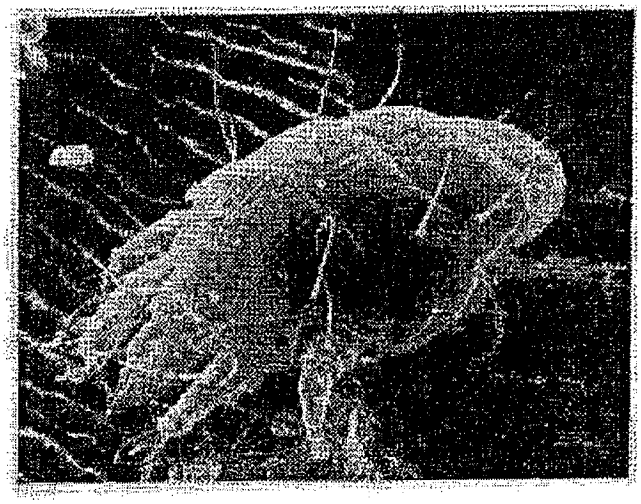
Infestation can begin with a female mite which has mated and has left the trachea of the host bee. The mite crawls out of the trachea on a bee hair, where it waits to make contact with another bee. Once contact is made, the mite moves to the spiracle, then enters the trachea to lay 5 to 10 eggs. The mites breed and migrate all year. Mites usually die within 24 hours if removed from the bee.

Effects: Workers, queens and drones can all be invaded by the mite. This invasion of the trachea shortens the life of the bee and weakens the bee so it is unable to fly. Bees will die in the field and also can be found crawling in front of the hive. Pollination benefits a honey yields from infested colonies are reduced because of the shortened life of the worker bee.

Tracheal mites could persist in a colony for years causing little damage, but combined with other diseases, unfavorable conditions, scarcity of pollen, and/or a poor foraging season, the disease could significantly increase the mortality of colonies in the winter.

Control: Menthol crystals have shown to be effective in controlling the mites. Experiments have indicated approximately 2oz. of the crystals killed 85% of the adult mites in only three days times. In four weeks all adults were apparently dead. The menthol is placed in packets. Remove all honey supers before any treatment. Always follow label directions.

Menthol can be obtained from most bee supply dealers.



Acarapis woodi in feeding position
(X500) photo: Baker & Styer

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VARROA MITE

Cause: The Varroa mite, Varroa jacobsoni is an external parasite of honey bees that attacks adult bees and their developing brood.

Identification: In the life cycle female mites lay up to 12 eggs in a bee brood cell. Preference is for drone cells. However, mite eggs are soon laid in worker brood cells. Nymphal stages of the mite feed on immature bees. After the mites mature, females are fertilized and the males die. Female mites may then attach themselves to adult bees. Older female mites may move from one brood cell to another, continually feeding and laying eggs. The mites are dark red-brown and measure .04-.08 inches wide, about the size of a pinhead and shaped like a tiny clam shell.

Spread: Varroa was originally confined to tropical Asia. Since 1950 the mite has been found on Apis mellifera in Europe, Africa and South America. South American infestations were thought to be a result of imported queens. In 1987 the mites were first diagnosed in Ohio.

During their life span, adult female mites continue to feed on adult bees. The female mites eventually migrate to bee larvae in brood cells that are about to be sealed. There, the mites lay eggs and renew the life cycle.

In summer, female mites can live for about two months. Later in the year they can live for up to eight months, surviving the winter with clustered bees.

Effect: The mites feed on adult larvae and pupae, weakening the bees and causing disfigurement or death to developing brood. Some bees emerge crippled or with their wings incompletely formed. Heavily infested colonies may show very reduced bee populations.

Detection: Two methods are currently being employed. They are ether roll method and Apistan (fluvalinate) method.

First the ether roll method is a quick and simple diagnostic examination for Varroa mite infestation. It consists of a three part process.

1) Examine young bees.
2) Uncap brood.
3) Use either roll test.

Examine bees: When a frame is removed from the brood chamber, closely examine the adult bees. Sometimes the mites can be seen crawling on the bees' thorax or abdomen. However, don't count on a visual exam only; many times the mites will be hidden within the abdominal segments. It is not necessary to spend excessive time examining adult bees.

Uncap brood: The varroa mites develop within the brood and feed on larvae and pupae. Therefore, it is important to uncap brood, looking at both drone and worker. You might want to remove cell contents from the comb to examine closely. Uncap approximately ten to fifteen cells.

Use Ether Roll Test: When doing the ether roll test a clean jar (pint or quart) and carburetor starter spray (aerosol) are needed equipment. Procedures to follow:

1) Collect bee sample from brood combs. Fill jar about 1/3 full of bees.
2) Sample should be from a minimum of 20% of the colonies.
3) Give bees a short burst of either. Result: inside of jar is slightly moist with all bees down.
4) Cover jar and roll bees for about 20-30 seconds.
5) Examine side of jar for mites.
6) Dump remaining bees from jar and clean before next test.

The apistan detection method is probably the most effective. A plastic strip impregnated with the pesticide fluvalinate is used to detect the mites. Fluvalinate kills mites, but does not harm bees. Two strips are hung between the frames in a beehive's brood chamber. If mites are present, they fall onto a white sheet of sticky cardboard placed in the bottom of the hive, where they can be seen.

Control: Presently fluvalinate is recommended to beekeepers for varroa control, trademark being "Apistan" Strip. All honey supers are removed before treatment, however, they can be replaced after treatment. Follow label directions carefully. Other controls are currently being tested for possible use. Apistan can be obtained from most bee supply dealers.

Pupae with varroa mites on abdomen

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CHALKBROOD DISEASE

Cause: Ascosphaera apis is the fungus that causes chalkbrood disease. It was first confirmed during 1974 in Ohio in the counties of Ottawa and Erie.

Effect: Honey bee brood is affected, causing the larvae to become mummified. Infected larvae ingest spores of A. apis within their food when they are about three to four days old.

Symptoms: Chalkbrood disease is relatively easy to diagnose from the other bee diseases if you know what the disease looks like. The infected larvae are uncapped by the bees and can be easily removed from the cells. At first the larvae (mummies) are spongelike but as they dry they become hard and "chalklike" in appearance. The dried mummies will either remain whitish or turn a gray/black color. They are often seen in the cells of the brood comb. However, if the bees remove the larvae they can also be on the bottom board or in front of the hive.

Spread: The spores of A. apis are quite resistant and can remain viable for at least 15 years. Disease spores can pass from bee to bee during food exchange and queen bees can transmit the disease (DeJong & Morse, 1976).

Drifting of bees from infected colonies spreads the disease, also when contaminated tools and combs are interchanged between infected and healthy colonies (Barthel, 1971).

Inbred lines of honey bees seem to be particularly susceptible to infection (Moeller & Williams, 1976).

Control: Chalkbrood is not considered to be a serious disease, however, in severe cases bee populations are reduced resulting in lost honey crops. Currently, there is no chemical registered for use against this disease. Beekeepers, however, can do the following:

1) Combs containing large numbers of mummies can be destroyed.
2) Add bees and brood to badly weakened colonies (make sure disease free).
3) Requeening with a stock that is less susceptible or possesses better cleaning behavior.
4) Using good management practices to keep the colonies strong.

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MENTHOL FOR TRACHEAL MITE CONTROL

ACTIVE INGREDIENT:
Menthol crystals – food grade with a purity of 98%+.

RATES:
Treat each 2 story colony with 1.8 oz or 50 grams of menthol.

METHODS OF TREATMENT:
Prepackaged menthol can be obtained in 50 gr. packets making preparation and handling easier.

Bulk menthol also should be placed in 50 gr. packages. A possible package would be to place the menthol in aluminum foil and fold the foil over a wire mesh screen, forming a screened package.

A menthol/grease mix can be prepared by using equal weights of menthol and vegetable shortening. Heat the shortening to 65°c or 149°F and add the menthol. Then immerse corregated cardboard (size: 12"x12") until saturated. Remove and let cool, storing in an airtight container, in a cool place. Put one sheet on the bottom board of each colony.

APPLICATION:
When there is no surplus honey flow, during daytime temperatures of at least 60°F.

Place menthol packet on the top bars or on the bottom board. If the temperature is below 80°F, place on the top bars and if above 80°F place on the bottom board.

The menthol should remain in the hive for about 2 weeks. It can be reapplied as long as there is not a honey flow.

Remove all menthol from the colonies at least one month before the surplus honey flow to prevent contamination of marketable honey.

SAFETY AND CAUTION:
Menthol should be handled in a well ventilated area and avoid any eye contact. If there is skin contact, wash with soap and water. If ingested induce vomiting and consult a physician.

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3 POINT VARROA EXAM

This is a quick, simple and effective diagnostic examination for Varroa mite infestation. It should be conducted at each apiary.

1. Examine young bees.
2. Uncap brood.
3. Use ether roll test.

EXAMINE BEES

When a frame is removed from the brood chamber, closely examine the adult bees. Sometimes the mites can be seen crawling on the bees' thorax or abdomen. However, don't count on a visual exam only; many times the mites will be hidden within the abdominal segments. It is not necessary to spend excessive time examining adult bees. However, if mites are found you can determine the colony is infested and any additional examination is not necessary.

UNCAP BROOD

The Varroa mites develop within the brood and feed on larvae and pupae. Therefore, it is important to uncap brood, looking at both drone and worker. You might want to remove cell contents from the comb to examine closely. Uncap approximately ten to fifteen cells.

ETHER ROLL TEST

Equipment needed: clean jar (carry extra jars – pint or quart), carburetor starter spray (aerosol).

1) Collect bee sample from brood combs. Fill jar about 1/3 full of bees.
2) Sample should be from a minimum of 20% of the colonies.
3) Give bees a short burst of ether. Result: inside of jar is slightly moist with all bees down.
4) Cover jar and roll bees for at least 30 seconds. This agitation should dislodge any mites from the bees.
5) Examine the side of the jar for the reddish colored mites.
6) Dump remaining bees from jar and clean well before next test.

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MOVING BEES

You will probably find it necessary to move your bee colonies if you keep bees for any length of time.

The reasons to move might be to relocate an apiary, to pollinate a specific crop or because you are establishing new apiaries. Whatever the reason you should be aware of the importance to plan your move and observe some safety precautions. The following steps should be seriously considered when moving bees.

1. Plan your travel route in advance, avoiding extremely rough roads or areas where construction can cause extended travel delay. The smother the ride the less disturbing it is for the bees.

2. Know exactly how many bee colonies are being moved and your destination address.

3. Contact your apiary inspector in advance for a colony inspection. A certificate of inspection signed by the state apiarist should be obtained before entering another state.

4. If moving bees within Ohio make sure the new apiary is registered. If not under quarantine they can be moved without an inspection or permit.

5. Prepare to cleat, staple or band each hive to hold hive bodies and parts together. Do this a day or so in advance of the move. Sometimes during hot weather the outer and inner covers can be replaced with a screened cover to impove ventilation.

6. Plan to move bees after they have stopped foraging, about dusk or on a cool, rainy day as long as they are not flying.

7. To close the hive entrance wire screening can be pushed into the entrance opening, prohibiting the bees from leaving and allowing easy removal once at your destination. This screen insertion should be done just before loading up the hives.

8. Any other hive openings should be sealed or plugged; many times a sticky tape works well.

9. Often large numbers of hives are moved with their entrances left open. However, a bee tight net screening is used to cover the entire truckload of hives.

10. Movement on the highway can also be conducted at night to reduce bee loss.

11. Smokers should be filled with fuel and be producing a cool smoke.

12. Use the smoker very liberally on each hive before loading. This will keep the bees under control. Also, smoke the hive entrances before screening the hives.

13. Keep the smoker handy at all times and never hesitate to smoke the bees if they are coming out.

14. Avoid using flashlights and turn vehicle headlights off. Engine vibration tends to calm the bees, so keep the motor running.

15. Always secure the hives by properly tying them down. A little extra time spend can avoid a major problem if the bee hives are upset.

Although beekeepers may have their own particular methods of moving colonies, the goal is to accomplish the move with a minimal amount of bee loss. Today anyone moving bees should be especially cautious, because of the introduction into Ohio of Varroa and Tracheal mites. It is important to recognize that increased mite distribution may occur if bee movement is poorly planned.

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PURCHASING QUEENS AND PACKAGE BEES

Invariably beekeepers always ask the question, "Where do I purchase bees?" Until recently it was recognized that purchases from queen and bee producers were satisfactory, if they supplied you with productive bees at the time requested. However, this opinion has changed drastically with the introduction of Varroa and Tracheal mites, and Africanized honey bees. It is now time for beekeepers to ask some specific questions regarding the bees they plan to purchase.

The following are some possible questions to ask.

1. Have the colonies in your operation been regularly inspected by your state apiary inspector? (Proof of inspection results may be available.)

2. Have your colonies been inspected for Varroa and Tracheal mites and what were the findings?

3. If mite positive, are controls used?
   (" Apistan" for the control of Varroa mites; "Menthol" for the control of Tracheal mites.)

4. Are "Apistan" package bee strips used in the packages?

5. Do your queens have "Apistan" Queen tabs in the shipping cages?
   (These strips have proven to be an excellent control for Varroa.)

Being inquisitive by asking a few simple questions may help avoid future problems. The adage "Let the buyer beware" is now especially true for beekeepers.

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AMERICAN FOULBROOD – AFB

Cause: It is caused by a spore forming bacteria known as Paenibacillus larvae. Only the spore stage is infectious to honey bees. All castes of honey bees are susceptible to the disease, but worker larvae are particularly susceptible. However, larvae become immune to the disease about 3 days after the egg hatches.

Effect: The strength of a recently infected colony will not be noticeably affected, and only one or a few dead larvae or pupae will be seen. Occasionally enough larvae become infected to weaken or kill the colony the first season. On the other hand, the disease may not develop to a critical stage until the following year.

Symptoms: Death occurs rather uniformly after the larvae have been capped over, have spun their cocoons, and are fully extended on the floor of the cell. Also death can occur after the pupa has formed but before the body is pigmented.

Soon after death the glistening white or formerly healthy larvae and pupae changes to dull white. About 2 weeks after death they become light brown and the well-rounded appearance is lost. The dead brood gradually sink in the cells during decay and become darker, changing from a light coffee brown to dark chocolate brown by the end of the fourth week. Scales are very dark brown or nearly black. The decay and drying of dead brood ordinarily require a month or more. Scales are difficult to distinguish in old brood comb, since they are about the same color as the comb, but in new comb they are easily identified.

During the early stages of decay, the body wall is easily ruptured and the tissues are soft and watery. Occasionally, the body divisions of the dead larvae are more clearly marked than are those in healthy ones. The consistency of dead brood becomes characteristically gluelike about 3 weeks after death. When a toothpick is thrust into a decayed larvae and withdrawn, the decaying mass adheres and can be drawn out an inch or more in a gluelike thread (rope test). Decayed larvae finally become dry, brittle scales.

These scales lie extended along the lower side wall, with their posterior end curved in the bottom of the cells. A small raised swelling may occur near the head of the scale, but it is rarely prominent. In advanced cases, rows of cells contain scales uniformly in this position.

Occasionally, cross markings, which represent the segmentation of the larvae, can be seen on the scales. When completely dried, the scale adheres to tightly to the cell walls that it is difficult to remove without breaking. When death occurs after pupation has started, the form of the pupa can be recognized. The mouth parts of the dead pupa may protrude from the head and appear as a fine thread slanting slightly backward into the cell and at times adhering to the upper wall.

In the first stages of decay, while the remains are still white, practically no odor is detectable. When the remains begin to turn brown and become ropy, an odor develops. In later stages, when the dead brood is brown and decidedly ropy, the odor is always present (gluepot odor); but it practically disappears when the scales are completely dry. In advanced cases, when much decaying brood is present, the odor can be detected even a foot or more from the combs.

Spread:

1. Nurse bees transmit bacillus spores to young larvae.
2. Honey stored in cells that once contained diseased larvae.
3. Bees are exposed to contaminated honey.
4. The same equipment is used for both diseased and healthy colonies.

Nurse bees can inadvertently feed bacillus spores to young larvae. Soon after the larva has been sealed in its cell or just after it changes to a pupa, the spores will germinate in the gut of the larva and multiply rapidly, causing death. New spores will form by the time the larva dies. When the house bees clean out the cell containing the dead larva, spores will be distributed throughout the hive, thus infecting more larvae.

Honey stored in cells that once contained diseased brood becomes contaminated and may be fed to susceptible larvae. As the infection weakens a colony, the colony cannot defend itself from robber bees from strong colonies. The robber bees take the contaminated honey to their own colony and repeat the cycle of infection and robbing.

When bees are exposed to contaminated honey, or the same equipment is used for diseased and healthy colonies, there can be a danger of disease spread. Therefore, it is extremely important that diseases are detected in their early stages, and that equipment is free from disease organisms.

Control: The beekeeper has the following control options:

1. Feed antibiotics (Terramycin) per label.
2. Destroy diseased colonies by burning.
3. A combination, both 1 and 2.

Many times the degree of infection will determine your control option. Therefore, it is important to choose the correct control for best results.

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FALL AND WINTER MANAGEMENT

Management during the fall and winter is very important because it is the starting point in providing strong colonies for the next year. The beekeeper should consider the following management practices:

A. Requeening colonies in early fall if weak or recently queenless.

B. Very weak colonies should be united with stronger colonies.
   1. Use newspaper method by placing a sheet of newspaper between the two colonies being united and puncture about six (6) small holes in the paper.

C. Check honey reserves.
   1. Each colony should have about 60 pounds (a deep super).
   2. Fall feeding of sugar syrup is provided in a 2 to 1 ratio (sugar to water). Syrup can be supplied to the bees inside of the hive by:
      a. Friction-top pail – placed on top bars within an empty hive body. Punch 20-30 holes in syrup container with 3 penny nail or drill with 1/16 inch drill.
      b. Division board feeder – container that replaces a comb in the brood nest.

D. Inspect colonies for any diseases before wintering. Mites can be controlled once honey is removed.

E. Reduce hive entrance to prevent field mice from entering.

F. Provide upward ventilation such as:
   1. Drilling 5/8 – ¾ inch hole in top super just under hand hold.
   2. Raising inner cover by placing nails under front edge of cover. This provides only about 1/8 inch gap. However, it allows moisture to escape.

G. Remove queen excluders if used.

H. Provide wind protection for the winter.
   1. Shrubs, fences can provide windbreaks.
   2. Colonies should be placed where cold air flows away (high ground) and the hives should receive sunshine (southern exposure).

I. Paint and clean up equipment to be used in the spring.

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SPRING MANAGEMENT

Management is the key to successful beekeeping. Spring is an ideal time for beekeepers to check colonies for honey and pollen reserves, to clean equipment, practice swarm prevention and establish new colonies.

A. Check colonies for honey and pollen reserves.

1. Briefly check honey reserves in late winter-early spring; temperatures can be 40° - 50° F. and sunny.

2. Honey should be on both sides of the cluster with at least a 10-20 pound reserve or 2-3 well filled combs.

3. If feeding is necessary, it can be done by:
   a. exchange of honey combs from another colony (only if disease free)
   b. sugar syrup poured directly into combs – 1:1 ratio
   c. sugar syrup poured in division board feeders or feeder pails
   d. feeding dry sugar.

4. Some areas may need pollen substitute and supplement feeding more than in other areas. Pollen substitute can be purchased from bee supply dealers.

5. A thorough colony examination should be conducted when temperatures reach 60° -65° F. Then the brood and queen can be checked more extensively. However, colonies can be examined in temperatures below 60° F. if done quickly so that the brood is not chilled. (Recognize disease symptoms.)

B. Replacing and cleaning up equipment.

1. If colonies are packed, they should be unpacked.

2. Equipment (bottom boards, top covers, hive bodies) should be repaired and painted if needed.

3. Hive bodies should be scraped of wax and propolis and bottom boards cleaned, which will be littered with dead bees and other debris.

4. Remove old combs, especially from lowest hive body, before being refilled with brood and honey. Replace with foundation or drawn comb, free of drone cells.

C. Swarm prevention should be a concern to the beekeeper once the colonies have survived the winter and bee populations start increasing.

1. Reversing is accomplished by exchanging the position of the top and bottom hive bodies during April and May, weather conditions permitting.

2. Adding supers also provides a means to relieve congestion. However, just adding supers might not be enough. It is better to reverse and add supers.

3. If the colony is very strong, remove sealed brook and add to weaker colonies. (Make sure colonies appear disease free.)

D. Establish new colonies.

1. Package bees – should be ordered in January if possible, so that arrival will be during early fruit and dandelion bloom. If introducing bees to drawn comb, a two pound package with queen can be purchased. When using all foundation, a three pound pack is better. Feeding sugar syrup is especially important for bees introduced to foundation.

2. Dividing colonies provides new colonies to replace losses or to make increases. It is also a means to control swarming. One method is to divide the bees, brood and honey in equal parts, then give the queenless colony a queen.

E. Colony inspection for any disease symptoms or mites.

1. Examine brood for American foulbrood.

2. Examine adult bees, brood and possible conduct an ether roll test for Varroa mites.

3. Take an adult bee sample for Tracheal mite examination.

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VEGETABLE SHORTENING PATTIES TO CONTROL TRACHEAL MITES

Using vegetable shortening and sugar patties, to treat colonies infested with tracheal mites, appears to cause a disruption in the mites' life cycle. Treatment is most effective when colonies are known to have lower mite levels. Studies conducted at the Ohio State University showed the continuous presence of a shortening patty, with or without Terramycin, helped lower tracheal mite populations and increased colony survivorships.

The following are guidelines for the preparation of shortening patties with and without Terramycin:

SHORTENING-SUGAR PATTY

- Use shortening that is considered to be a vegetable shortening, such as (the solid white) Crisco.
- Sugar should be white granulated, however, powdered sugar has been used.
- Shortening to sugar ratio is 1:2 (ex. 1 lb. of shortening to 2 lbs. of sugar.)
- Patty placement should be on top bars in the broodnest of the colony, where bees are forced to eat.
- Patty size should be about ½-1 lb.
- Additional patties can be given to the colonies if consumed.
- Continuous exposure to the shortening can help reduce mite populations.

SHORTENING-SUGAR-TERRAMYCIN PATTY

- Use shortening that is considered to be a vegetable shortening, such as (the solid white) Crisco.
- Use TSP, terramycin soluble powder.
- In contrast to the shortening-sugar patties, terramycin patties should **NOT** be used during a nectar flow. Also, remaining patties should be removed.
- Make sure terramycin is distributed uniformly throughout patties.
- Ingredient ratios are as follows:

6.4 oz Terramycin Packet	to	vegetable shortening (Crisco)	to	sugar
1 packet	to	4.6 lbs	to	9.1 lbs

- Number of colonies treated with mixture is approximately 14.
- Patty placement should be on top bars in the broodnest, where bees are forced to eat.

Good management practices in combination with these shortening treatments may significantly suppress tracheal mite populations.

Reference:

D. Sammataro, S. Colbey, B.H. Smith, G.R. Needham 1994. Controlling Tracheal Mites in Honey Bees with Vegetable Oil. J. Econ. Ent.

K.S. Delaplane, L.F. Lozano April 1994. Using Terramycin in Honey Bee Colonies. A.B.J.

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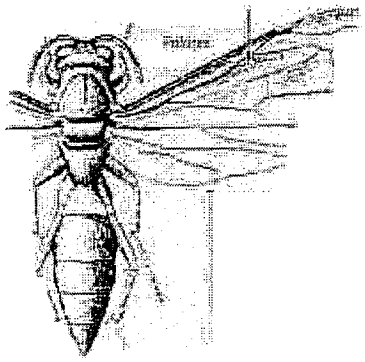
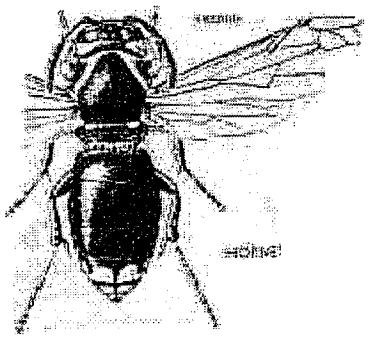
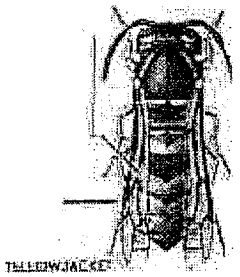
"WHAT ARE THEY BEES, WASPS, HORNETS?"

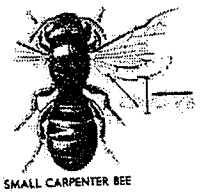






Paper-nest Wasp, Hornet and Yellow Jacket nests are an annual event, with only impregnated females surviving winter. Adult food consists of sugary solutions many times coming from the juices of fruits; discarded food and beverage also provides a food source in urban areas. Nests are of papery material, made by chewing old twigs or boards and mixing with their saliva. Approximate sizes are: 15-20mm (3/4in.) Hornets, 25mm (1in.) Paper Wasps, 15-20mm (3/4 in.) Yellow Jackets.

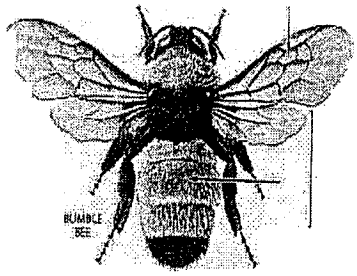
Yellow Jackets nest in the ground and are commonly referred to as bees. Actually they are classified as wasps. These wasps many times are a nuisance to homeowners, campers and picnickers, especially during the months of August and September. Their abdomens are banded with yellow and black color markings.



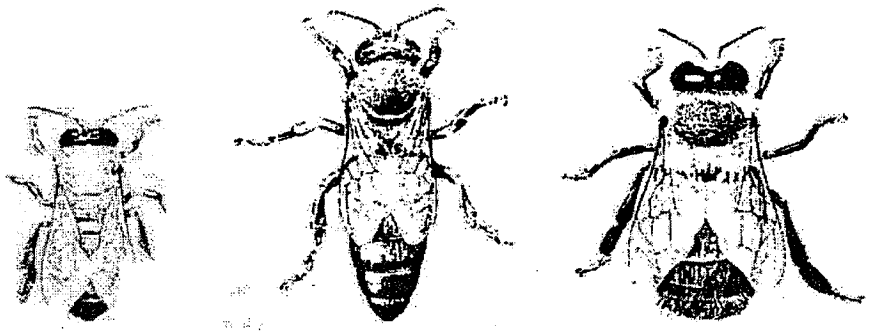
Large Carpenter Bees have hairy bodies and tunnel into solid wood excavating galleries. They feed their young mostly pollen. These bees are about one inch in length, and are similar looking in appearance to bumble bees. Approximate size: 25mm (1 in.)

Small Carpenter Bees are 6-10mm (1/4-3/8 in.) long, nests are made in soft twigs and brambles. Their color is black or metallic blue-green with almost no markings.

Mud Daubers construct nests of mud and place insects, especially spiders into them. The nests are commonly found on ceilings or walls of old buildings or garages. Two species are most common, they are blackish-brown with yellow spots, yellow legs and the other is a metallic blue color with bluish wings. Approximate size: 20-25mm (3/4-1 in.)



Bumble Bees can be recognized by their large roundish shape and black and yellow coloration. Most of them are approximately 15-25mm (3/4-1 in.) in length. They are important pollinators, using their body hairs to distribute the pollen. Most nest in the ground, sometimes in a deserted mouse nest. However during winter only the fertilized queens survive.



Honey Bees can be recognized by their golden brown coloration and shape. Unlike many other bees and wasps, the honey bee queen is unable to live alone or start a colony by herself. The entire colony (queen and workers) are able to survive the winter. Many times these bees are confused with wasps, specifically yellow jackets. However, honey bees basically are not an aggressive insect unless provoked. They feed only on nectar and pollen. Their nesting areas may be a beekeeper's hive, a hollow tree, or some cavity providing protection. They never nest in the ground. A honey bee can only sting you once, the stinger remains in your skin, then the bee soon dies; unlike wasps and yellow jackets who can inflict multiple stings.

Most people only associate honey bees as a producer of honey and beeswax; actually their most important role is pollination to many fruits, vegetables and seeds. Many of these fruits, vegetables and seeds would not exist if not for honey bees.

Pictures obtained from: A field Guide to the Insects, Borror & White

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"PARASITIC MITE SYNDROME (PMS)"

Upon examination of your honey bee colonies' brood, you observe symptoms that might resemble EFB, AFB and/or Sacbrood disease. However, you are not sure what the problem is, because they are not the characteristic disease symptoms with respect to each disease; they may be a combination of symptoms from all three brood diseases. Also, the colony is infested with the Varroa and/or Tracheal mites.

The USDA, Bee Research Laboratory in Beltsville, Maryland calls this condition "parasitic mite syndrome" (PMS). PMS is thought to be caused by a secondary infection as a result of the mite infestation. Presently no known pathogen has been found to be predominant. The following are adult and brood symptoms that may be observed in the colony.

Adult Symptoms

1) Varroa mite present
2) Bee population reduction
3) Crawling adult bees
4) Queen supersedure
5) Tracheal mite may or may not be present

Brood Symptoms

1) Varroa mite present
2) Spotty brood pattern
3) Affected brood from the "C" stage larva to the prepupa stage
4) Larva may be twisted and light brown in color – no ropiness
5) Scales observed, but are not brittle and difficult to remove like AFB
6) An odor is not evident

When determining if a colony has PMS, comb samples should be taken in preference to a smear. The Bee Research Lab recommends sending a piece of comb about 2 x 2 inches, loosely wrapped in paper, and send also about 100 adult bees from the same colony.

Reference:
H. Shimanuki, N.W. Calderone and D.A. Knox 1994, Parasitic Mite Syndrome: The Symptoms, A.B.J.

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WHAT THE FARMER/GROWER SHOULD KNOW ABOUT HONEY BEES

I. Outside the bee hive:

A. Size of the hive is not always important. Counting the number of supers (boxes) does not always equal colony strength.
B. Watch for bee flight. On a warm and clear day dozens of bees should be flying in and out of the hive.

II. Inside the bee hive:

A. The best indicator is to view the colony population, usually with the help of the beekeeper.
B. The brood area must have developing young and adult bees.
C. Serious honey bee diseases should be controlled or eradicated.
D. Colony strength guidelines:
    1. Strong single story colony (1 deep hive body)
        a. When opened, bees should cover tops of frames.
        b. 4 to 6 frames of brood.
        c. When a frame is lifted out, bees cover most frames.
    2. Strong two-story colony (2 deep hive bodies)
        a. Numerous bees on top when cover is removed.
        b. When hive bodies divided, a blanket of bees should be seen.
        c. 6 to 10 frames of brood.
    3. Strong three-story colony (3 deep hive bodies)
        a. 8 to 12 frames of brood in lower and central hive bodies.
        b. When cover lifted, a few bees seen on top.
        c. The top super removed, bees should blanket top of middle super.

III. Costs:

A. Varies significantly depending on the strength and condition of the bees.
B. Rates may range from: $25.00 to $75.00/colony.

IV. Don'ts to prevent stings:

A. Don't bump, jar or disturb hive.
B. Don't swat or slap a bee.
C. Don't wear fuzzy, woolly or suede clothing.
D. Don't wear hair oils or perfumes.
E. Don't directly block the bees' entrance to the hive.

V. Colonies per acre:

A. Generally, at least one strong colony per acre is recommended for many crops. Colony strength will determine numbers needed.
B. Visual observations within the field many times will tell the farmer/grower if honey bees are pollinating.

CONSIDERATIONS FOR POLLINATION AGREEMENTS/CONTRACTS

A. Identification of parties
   1) landowner/grower, address and phone number
   2) beekeeper, address and phone number

B. Rental price
   1) how much based on colony strength
   2) form of payment – check, cash, etc.
   3) when payment is due

C. Time of delivery of colonies
   1) dates
   2) adverse weather causing alternative dates

D. Number of colonies

E. Strength of colonies
   1) number of frames of brood
   2) number of frames of bees

F. Placement of colonies
   1) easily accessible to beekeeper
   2) away from public and animals

G. Protection of colonies from pesticides
   1) grower's spray program
   2) when beekeeper should be notified
   3) any penalty if colony damage occurs

H. Removal dates of colonies

I. Penalties or rewards for:
   1) prompt payment
   2) stronger colonies
   3) late delivery
   4) weak colonies
   5) failure to remove bees

J. Open lines of communication
   1) both parties must be easily contacted

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"SWARM PEVENTION AND CONTROL"

When honey bees swarm it is a natural process where the colonies divide. In essence, it is nature's way of trying to increase bee colony populations. Beekeepers can not stop all swarming. However, swarm prevention should be incorporated into a beekeeper's management program, if he/she is interested in obtaining a good honey crop.

The following are some things that can be done to reduce swarming.

1) Colonies should be requeened every 2 to 3 years. This can be done in the spring or fall, after a honey flow or as conditions dictate.

2) Clipping the wings on a new queen is another attempt to prevent swarming. This procedure slows down swarming, but may result in the colony swarming anyway with a virgin queen.

3) Reversing the hive bodies in the spring results in having an empty hive body being placed above the brood chamber, thus providing more room for queen laying, pollen and honey storage. This procedure may be done several times in the spring.

4) Colonies can be split. This entails dividing the colony population in half to make up 2 hives. This is an effective method in swarm control.

5) Cutting queen cells is a method many beekeepers use. However, the bees usually win out. Once the queen cells are eliminated the bees will produce more queen cells.

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KEEPING BEES IN A SUBURBAN OR URBAN AREA

Ohio has many areas within or near cities and towns where honey bees can obtain an abundance of nectar and pollen. Ornamental trees and shrubs many times can provide early forage for bees. However, beekeepers must always keep in mind; many people are frightened by the sight of a bee hive. As a result beekeepers need to position, keep and manage their bees to avoid any problems.

Property lines should be an important consideration. In confined locations, placing the colonies on or near the property line in clear view by neighbors is not recommended. The bee hives should be concealed by hiding them behind a solid fence or dense shrubbery. In urban areas hives can even be placed on a flat roof away from public view and above pedestrian traffic. The hive placement should be made so the bees normal flight pattern does not interfere with a busy street, sidewalk or clothesline.

Good management practices by beekeepers are also important. Knowing when and how to manage correctly can make beekeeping acceptable to your neighbors. Beekeepers should observe the following:

1) Practice swarm control.

2) Provide bees with a constant water supply.

3) Do not overpopulate an apiary location. Consider your location and available forage sources. Usually a suburban or urban apiary can support from two to six colonies.

4) Inspect and manipulate your bee hives when the bees are foraging. This will cause less disturbance and be more acceptable by neighbors.

5) Keep colonies with good behavior characteristics. This may require requeening.

6) Register annually with Ohio Department of Agriculture and abide by the Ohio Revised Code and its rules. Contact the apiary section if you have question or need assistance.