Red River Apiarists' Association

Bee Cause

Volume Issue 5 September 1999

Its time to treat the pests!

Meeting Location

River Heights Community Centre

1370 Grosvenor St.
(intersection of Oak & Grosvenor)

Meeting Date

Sept. 27th

7:30 PM in the upstairs meeting room

Guest speaker(s):
?

Topic(s):
-Discussion panel on how to prepare for the honey show.
-Rent increase from $35 to $50 for meeting room rental.

Guests are always welcome and coffee will be served as usual, byob&b's :)

RRAA Website URL:

http://www.blazeinet.com/rwayne/RRAA.html

The ***Bee Cause*** newsletter is published by the ***Red River Apiarsts' Association*** eight times per year (monthly excluding June, July, August and December).

Membership in the ***Red River Apiarists' Association*** is $20.00 per year and includes a subscription to the ***Bee Cause.***

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Editor's note:

Ah, geezee the newsletter is late again! Sorry, after the 3 month lull I have to figure out all over again how to create it eh and I was pretty busy in the old honey house to boot. ☺

Well another season of honey production comes to a close. In a lot of ways I'm sorry to see it come and in other ways I'm glad the harvesting work has come to a close, my back is killing me. Those loaded honey supers seem to get heavier every year, don't know if the bees are getting better at what they do or I can't toss them around like I use to. ☺

The regular meeting has been postponed to September 27th so as not to interfere with Apimondia'99.

I hope you all had an exceptional beekeeping season and I look forward to hearing some of the stories at the next meeting.

Later Ron

Are Some Bees Able to Control Varroa Populations In the Hive?

by Ron Rudiak

From time to time I forget to follow through on what I was doing. Like forgetting whether I have turned the thermostat down on the honey sump for the night or neglecting to fill a customers containers when I return from a day in the extracting room. When I was doing the required checks for varroa mites this spring, I placed the sticky boards in several hives but neglected to put the Apistan strip up top. Next day, realizing my error, I put in the strips, removed the sticky boards and replaced them with clean ones because the bees had dropped a lot of debris on them in 24 hours.

A week or so passed before I got around to cleaning up the first set of boards. While cleaning them I looked closely to see what was stuck to them. There was a lot of wax particles, some unidentifiable material that looked like just plain dirt and one or two varroa mites. The last board had two mites that almost did not look like mites at first. I saved these two mites and later brought them home to examine more closely using a Radio Shack pocket microscope. They looked as though they had sustained quite a bit of damage. The mites appeared dull in color and had legs missing. About this time I was wishing that I knew which hive that sticky board was taken from because it appeared that those bees did not like mites in the least. I will repeat this test periodically using only the sticky board without any miticide to look for damaged mites.

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For the last three seasons we have treated all of our bees with Apistan strips in the spring. Early spring treatment has kept them productive throughout the summer and by the end of August the mite levels are still at low levels making further treatment unnecessary. In past seasons I have sampled only a representative number of hives and based my Apsitan applications on these few hives.

Once varroa is discovered in a beekeepers outfit it remains there at some low level even when the recommended treatment with formic acid or Apistan strips is followed.

This fall I will be numbering each hive and testing each one individually to determine whether treatment is required. Instead of treating all hives at the same time I will treat only those with more than the economic thresholds. By keeping records of the mite levels found in each hive twice each year, in the spring and fall, and the number and time of treatments I am confident that there could be differences between them.

Treating only those hives which actually require it may result in a cost saving by reducing the number of strips used and reduce the chance of contaminating the honey and wax with fluvalinate.

It would be advantageous to breed queens from hives that require only minimal treatment to keep mite levels below economic thresholds. Productivity, gentleness and winter survival will be high on the list of requirements for queen breeding as well.

If you wish to try this procedure be sure to follow the charts on Page 18 and 19 of the Spring '99 *Manitoba Beekeeper*. Copies of this chart are available from Provincial Apiarist Don Dixon or Rhéal Lafrenière. Use the latest information for recommended application of formic acid or Apistan in your hives.

A guy hears a knocking on his door. He opens it up, and no one is there. He looks all around and he finally sees a little snail sitting on the doormat. He picks it up and throws it across the street into a field.

Ten years go by, and one day he hears a knocking on his door. He opens it up and no one is there. He looks all around, and he finally sees a little snail sitting on the doormat.

The snail says, "What the heck was that all about?"

Varroa Jacobsoni

(From Diagnosis of Honey Bee Diseases - USDA)

The mite Varroa jacobsoni can be found on adult bees, on the brood, and in hive debris. The most severe parasitism occurs on the older larvae and pupae, with drone brood being preferred to worker brood (Ritter and Ruttner 1980). In heavy infestations, pupae may not develop into adult bees. The adults that do emerge may have shortened abdomens, misshapen wings, and deformed legs and may weigh less than healthy bees (De Jong et al. 1982).

The adult female mite is oval and flat, about 1.1 mm long and 1.5 mm wide, and pale to reddish brown; it can easily be seen with the unaided eye. The mites attach to the adult bee between the abdominal segments or between body regions (head, thorax, abdomen) and are therefore difficult to detect. However, they can be easily recognized against the white surface of pupae. Male mites are considerably smaller and are pale to light tan (Delfinado-Baker 1984).

It is important to note that the bee-louse, Braula coeca, resembles Varroa jacobsoni in size and color. However, Braula, being an insect, has six legs that extend to the side. Varroa, an arachnid, has eight legs that extend forward.

When sampling, remember that the number and location of mites in a colony vary according to time of year. The number of mites is lowest in spring, increases during summer, and is highest in fall. During spring and summer, most mites are found on the brood (especially drone brood). In late fall and winter, most mites are attached to adult worker bees.

Methods of Examining Adult Honey Bees

For a sample of adult honey bees, 500 to 1000 bees should be collected. This can be done by brushing honey bees off the comb through a large-mouthed funnel (of paper or cardboard, etc.) into a container or by using a modified portable car vacuum cleaner. Individual honey bees can be examined with or without the aid of a hand lens or a dissecting microscope. When the mites are moving about on a bee, they are fairly easy to detect; but once they attach themselves between segments, they are difficult to find. Mites can be detected and collected by three methods, as follows:

Shaking Method

Varroa jacobsoni can be dislodged by shaking the bees in liquids such as hot water, alcohol, detergent solution, hexane, gasoline, or diesel fuel. We recommend 70% alcohol (ethyl or

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isopropyl) because some of the other materials are dangerous or difficult to use. The alcohol kills and preserves the bees for other purposes, such as examination for Acarapis woodi. De Jong et al. (1982) found that hand-shaking bees in alcohol for 1 minute dislodged about 90% of the mites and that mechanical shaking on a rotary shaker for 30 minutes removed 100% of the mites. The mites are collected by passing the bees and alcohol through a wire screen (8- to 12- mesh) to remove the bees and then sieving the alcohol through a 50-mesh screen or cotton cloth. The screen or cloth is then examined for mites.

Ether Method

This technique is a rapid and efficient detection method in the field and avoids the handling, shipping, and time-consuming procedures associated with shaking adult bees in alcohol or other solvents. The bees (500-1,000) are collected in a jar and anesthetized with ether delivered from an aerosol can (this aerosol product is sold in auto-parts stores as an aid to start engines). A 1- to 2-second burst of material is adequate. The bees are then rotated in the jar for about 10 seconds. The majority of mites will have dislodged from their hosts and should be adhering to the inside wall of the jar. To complete the process, the bee sample is deposited on a white surface and spread around. This should cause any remaining mites to fall onto the white substrate. The bees should be examined immediately after the application of ether because the mites tend to stick to the bees if left in the jar for more than a few minutes. Alternatively, the bees can be left in the jar to which alcohol is added for laboratory shaking and preservation.

Heating Method

Live adult honey bees can be shaken into a wire-based cage and placed in an oven over white paper. The bees are heated for 10-15 minutes at 46 degrees - 47 degrees C. Then Varroa jacobsoni, if present, can be observed on the white paper (Crane 1978).

Methods of Examining Brood

To look for mites on brood, the pupae (preferably drone) are examined. Varroa jacobsoni can be easily seen against the white surface of worker or drone pupae after they are removed from their cells. It is suggested that a minimum of 100 drone pupae per colony be examined. The pupae can be collected by one of the following methods:

* The classic method of pupal collection is to uncap each cell and then remove the pupae with forceps or a hive tool.

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* Groups of pupae can be quickly and easily removed from their cells by inserting a capping scratcher at an angle through the cappings and lifting the brood and cappings upward (Szabo 1989).

* With a long-bladed knife, the caps are sliced off an area of brood 4-6 square inches. The comb (frame) is then sharply jarred on a hard, flat, white surface such as a hive top. The brood will fall onto the white surface, and the mites can be easily observed.

* The brood comb can be incubated at 37 degrees C, followed by examination of all the emerged bees and remaining brood.

Methods of Inspecting Hive Debris

Debris in a hive (such as wax particles, pollen, dead bees and brood, and mites) normally falls to the hive floor and is removed by house-cleaning bees during warm weather. This material can be collected and examined for the presence of Varroa jacobsoni as follows:

* The collection of hive debris can be facilitated by white construction paper on the hive floor. The paper is stapled under a wood (1/4-inch) and wire (8- to 12-mesh) frame, which protects the paper and debris from the bees. The paper is examined for mites, which can be easily seen against the white background. A magnifying glass or dissecting microscope can be helpful in locating the mites in the debris. Sticky boards or shelf paper (with the adhesive surface exposed) instead of construction paper will help hold the debris.

* The acaricides used to treat mite infestations can also be applied to bee colonies in combination with the paper method to detect Varroa jacobsoni. Apistan is currently approved and available for this purpose. After treatment, the mites drop to the paper and can be easily detected. It is important that the paper have a sticky surface (see previous paragraph) to hold any recovering mites.

* A flotation method can be used to examine debris for Varroa jacobsoni. Hive debris is placed in a jar or pan and covered with 98% alcohol. The mites float to the surface while the heavier debris sinks (Ritter and Ruttner 1980).

* Mites can sometimes be collected in dead bee or pollen traps attached to the colonies.

Honey Bee Tracheal Mite (Acarapis woodi)

(From Diagnosis of Honey Bee Diseases - USDA)

The female Acarapis woodi, or honey bee tracheal mite, is 143-174 μm long and the male 125-1 36 μm. The body is oval; widest between the second and third pair of legs; and whitish or pearly white with shining, smooth cuticle. A few long hairs are present on the body and legs. This mite has an elongate, beaklike gnathosoma with long, bladelike styles (mouthparts) for feeding on the host.

The population of Acarapis woodi may vary seasonally. During the period of maximum bee population, the number of bees with mites is reduced. The likelihood of detecting tracheal mites is highest in the fall. In sampling for this mite, one should try to collect either moribund bees that may be crawling near the hive entrance or bees at the entrance as they are leaving or returning to the hive. These bees should be placed in 70% ethyl or methyl alcohol as soon as they are collected. One should not collect bees that have been dead for an unknown period because they are less than ideal for the diagnosis of tracheal mites.

No one symptom characterizes this disease. An affected bee could have disjointed wings and be unable to fly, or have a distended abdomen, or both. Absence of these symptoms does not necessarily indicate freedom from mites. Positive diagnosis can be made only by microscopic examination of the tracheae; since only Acarapis woodi is found in the bee tracheae, this is an important diagnostic feature.

A healthy trachea appears cream color or white. The trachea of a severely infested bee has brown or black blotches with crustlike lesions and is obstructed by many mites in different stages of development. The trachea must be examined carefully for the presence of mites. The trachea may not always be discolored when mites are present, and a cloudy or discolored trachea does not always contain mites.

Methods for diagnosing Acarapis woodi are listed below. Each of these methods has its advantages and disadvantages.

Method 1

Pin the bee on its back and remove the head and first pair of legs by pushing them off with a scalpel or razor blade in a downward and forward motion. Using a dissecting microscope, remove the first ring of the thorax (tergite of prothorax) with forceps. This exposes the tracheal trunks in the mesothorax. When the infestation is light, it is necessary to remove the trachea. Place the trachea in a drop of lactic acid on a glass slide for clearing, and cover with a cover glass for examination at X 40-100 on a compound microscope.

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Method 2

Grasp the bee between your thumb and forefinger and remove the head and first pair of legs. Then with a scapel, razor blade, or fine pair of scissors, cut a thin transverse section from the anterior face of the thorax in such a way as to obtain a disk. Place the disk on a microscope slide and add a few drops of lactic acid. This makes the material more transparent and also helps to separate the muscle. With the aid of dissecting microscope, carefully separate the muscles, remove the trachea, and examine the preparations as in method 1. This is recommended for quick examination of a few bees.

Method 3

Cut a few thoracic disks as described in method 2, place them on a slide, and add a few drops of 10% potassium hydroxide (KOH). Heat the slide gently for 1-2 minutes (do not boil), cover with a cover glass, crush the disks lightly, and examine microscopically. This procedure is advantageous when the bees have been dead for some time.

Method 4

Prepare transverse-section disks from the thoraces of 50 honey bees as described in method 2, place them in 5% KOH, and incubate at 37?C for 16-24 hours. The KOH dissolves the muscle and fat tissue, leaving the trachea exposed. Then examine the disk-trachea suspension under a dissecting microscope. Remove suspicious tracheae from the disks and examine the tracheae microscopically (X 40-100). This procedure is recommended for large samples of bees.

Method 5

Remove the heads, abdomens, wings, and legs from 20-200 thoraces and place them in a homogenizing jar with 25 mL of water. Homogenize three times for several seconds at 10,000 rpm, using just enough water to rinse the inside of the jar. Then strain the suspension through a 0.8-mesh sieve and rinse with water. The final volume of the filtrate should be about 50 mL. Centrifuge the filtrate at about 1,500 g for 5 minutes and discard the supernatant. Then add a few drops of lactic acid to the preparation, and allow it to stand for 10 minutes. Finally, place the sediment on a slide for examination. In this method, a microscope with an oil immersion objective is required to correctly identify Acarapis woodi because other mites associated with honey bees are morphologically similar. This technique is described by Cohn et al. (1979).

Method 6

cleanest preparations, remove the head, wings, legs, and abdomen (saving only the thoraxes) of recently killed bees. This removal is easily done using one's fingers when the bees are frozen. Place 25-100 bees in a household blender with enough water added to cover the blades. Blend the preparation for no more than 15 seconds, just until the thoraces are broken apart. (Blending for longer periods will pulverize the tracheae.) Pour the resulting mixture into a series of test tubes (2-3 cm in diame-

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ter). Most of the denser muscle fibers and cuticular fragments fall to the bottom while the tracheae and air sacs float, forming a thin whitish layer on the surface of the water. Suction off this layer with a pipette, place on one or more slides, and cover with cover slips. Examine the slides under a compound microscope at X 100-250. Examine the slide in a systematic manner for darkened, blotchy, and discolored tracheae and for undamaged tracheae that may also contain mites and eggs. In the flotation method (Camazine 1985), bees cannot be stored or killed in alcohol.

Method 7

In the modified methylene blue staining technique (Peng and Nasr 1985), prepare transverse-section disks from the thoraces of 50 bees as described in method 2. Place the disks in a beaker of 8% KOH solution, and heat to boiling with continuous gentle stirring of the disks. Remove the solution from the heat and continue stirring until the soft tissues inside the disks are dissolved and cleared (about 10 minutes). Excessive stirring and heating will damage the specimens and subsequently reduce the color intensity of the mites. Recover the disks from the KOH by filtration through a perforated Tissue-Tek processing capsule. After filtration, cover the processing capsule with a lid, place in a beaker, and wash with tap water to remove the remaining KOH. After washing, transfer the processing capsule to a modified methylene blue staining solution (prepared by first dissolving 1% aqueous methylene blue and then adding sodium chloride to make a 0.85% sodium chloride solution). Immerse the capsule in that solution for 5 minutes and then in distilled water for 2-5 minutes; finally, rinse the capsule with 70% ethyl alcohol. Examine the disks for stained mites within the tracheae under a dissecting microscope at X 10-25.

Method 8

Differentiation of live mites from dead mites (Eischen et al. 1986) is the method of choice for evaluating chemicals used to control tracheal mites. Anesthetize live bees with carbon dioxide and remove the abdomens with a scalpel to prevent being stung during examination. Remove the head and first pair of legs of each bee by holding the bee on its back and gently pushing this section off with a downward and forward motion. Place each bee, held in this position, under a dissecting microscope, and remove the first ring of the thorax with fine forceps. This exposes the tracheal attachment to the thoracic wall, which is often the only location of mites in a light infestation. Remove tracheae that appear abnormal with tweezers and transfer to a glass slide containing a thin film of glycerol. Then dissect the tracheae using a pair of fine needle probes. Mites are considered dead if they do not move; also, dead mites often appear discolored and desiccated. Living mites have a translucent gray or pearl color and move within a few seconds after dissection.

Method 9

For serodiagnosis, Ragsdale and Furgala (1987) produced an antiserum against extracts of Acarapis woodi-infested tracheae to be used as the primary antibody in a direct enzyme-linked immunosorbent assay (ELISA). Ragsdale and Kjer (1989) improved the ELISA technique, making it as reliable as dissection for the detection of A. woodi. Their ELISA is accurate, sensitive, reproducible, cost effective, rapid, and easy to use.