Beginning Beekeeping

Honeybee Pests and Control
Part 1

Northwest Arkansas
Beekeepers Association
www.nwabeekeepers.com

Arkansas State Plant Board

- Colonies must have a current health inspection certificate from the Arkansas State Plant Board to be transported legally
- ***plantboard.arkansas****.gov/*
- Telephone: 501-225-1598
- Fax: 501-225-3590
  - Apiary Manager – Mark Stoll
  - Apiary Secretary – Emily Rodriguez
- Inspectors:
  - Danny Brewer – North half of state
  - Daniel Plyler – South half of state

Arkansas State Plant Board

- YOU are your first bee inspector and the first line of defense
- Learn what a healthy hive looks like and be able to recognize a problem if it occurs

Arkansas State Plant Board

- Inspections are mandatory for giving away, selling, or moving bees
  - Within state – valid for 6 months
  - Out of state sales or transport – valid for 90 days
  - Moving between registered locations – valid for 12 months
  - Certificate of health issued if found free of American Foulbrood and other diseases
  - Inspections are free

Arkansas State Plant Board

- Movable frames are required
  - Must permit inspection of every brood comb
  - Outlaws skeps
  - Outlaws bee gums
- If transporting bees to a location not previously approved by Plant Board
  - Apiary Section must be notified 20 days prior to move
  - If move is from fire or disaster, notice must be given within 5 days of the move

Honeybee Parasites

- Parasitic mites
  - Varroa mites
  - Tracheal mites
- Imported from Asia in late 1980s
- Spread rapidly by
  - Package bees
  - Mobile pollinator colonies
- Decimated feral bee populations
- Increased the cost of managing bees
- Resulted in fewer beekeepers
- Increased need for mobile pollinators

Honeybee Parasites – Varroa Mite

- Varroa mite – *Varroa destructor*
  - #1 enemy of the honeybee
  - External parasite similar to a tick on people
  - It is large and can be seen without magnification
    - It is roughly 1/16 inch across (1.5 mm)
  - Feeds on bee blood
    - Damages developing pupae
    - Weakens bees
    - Acts as a vector to transmit viruses

Honeybee Parasites – Varroa Mite

- Varroa mites do not have eyes
- Gets around by recognizing chemicals in the air
  - Knows where it is by smell
  - Gets a chemical signal from the bees when they invade cells and lay eggs

Honeybee Parasites – Varroa Mite

- Original host of the varroa mite was the Asian bee (*Apis cerana*)
  - Has a certain tolerance for varroa
  - Grooms heavily
  - Small and darker bee

Honeybee Parasites – Varroa Mite

- European honey bee (Apis mellifura) has only recently been exposed to varroa mites
  - Has very little tolerance and has never co-existed with varroa mites
  - Little grooming
  - Larger than Apis cerana
  - Has less hair for protection

Honeybee Parasites – Varroa Mite

- Varroa mite's life cycle is tied to the life cycle of the bee
- Understanding the life cycle is key to controlling them

Honeybee Parasites – Varroa Mite

- What does the varroa mite do?
  - Reproduces in capped brood cells
  - Female mites leave the brood cells with emerging bees and find new cells to lay eggs
  - Colony weakens and becomes debilitated as the number of varroa mites increase
  - Viral diseases finish off the hive as it becomes too weak to survive

Honeybee Parasites – Varroa Mite

- What is the life cycle of the varroa mite?
  - Phermone signal tells nurse bees that a larvae is ready for pupation
  - This is at 9 days after the egg has been laid
  - Varroa mites use this signal to locate hosts
  - Female mite hides in the food provisions in the brood cell while workers seal the larvae with a wax capping
  - Female mite (now hidden inside sealed cell) feeds on the hemolymph of the larvae

Honeybee Parasites – Varroa Mite

- What is the life cycle of the varroa mite?
  - About 60 hours after the cell is sealed, the female mite starts to lay eggs. An egg will be laid about every 30 hours
  - The first egg will be male
  - Each subsequent egg will be female
  - As mite nymphs emerge, they feed on the bee pupae, grow, and molt
  - Male varroa mature in 5 to 6 days
  - Female varroa mature in 7 to 8 days

Honeybee Parasites – Varroa Mite

- What is the life cycle of the varroa mite?
  - The male mite is fully developed when the first female reaches maturity
  - The male mite will mate with each female as she matures or until the adult bee emerges from the cell
  - When the adult emerges, it chews a hole in the capping and exits, releasing the original female mite and her daughters

Honeybee Parasites – Varroa Mite

- What is the life cycle of the varroa mite?
  - The number of mature offspring is limited by the length of the bee's pupal time
  - Mites reproducing in drone cells have greater reproductive potential (by 3 days)
  - The male varroa mite and immature females do not leave the cell. They die and are removed by housecleaning bees preparing the cell for a new egg

Honeybee Parasites – Varroa Mite

- What is the life cycle of the varroa mite?
  - Mites move to a new host to feed for several days
  - Occasionally change hosts
  - By staying on nurse bees, mites have easy access to larvae
  - While mites are feeding on adult bees, they are exposed and at their most vulnerable

Honeybee Parasites – Varroa Mite

- If you don’t check your hives for varroa and do a mite count, you have no way of knowing the extent of problems
- How do you check the mite load?

Honeybee Parasites – Varroa Mite

- Bottom sticky board method
  - Use the corrugated plastic insert on a screened bottom board
  - Coat the insert with a sticky substance such as a vegetable oil spray
  - Count mites for a 24 hour to 48 hour period
  - Repeat for 1 or 2 days to have a good sample
  - There will be more activity on hot days and more of a mite drop compared to wet or cool days

Honeybee Parasites – Varroa Mite

- Bottom sticky board method
  - Allows you to count mites whether there is a laying queen
  - Can see if there are small hive beetles
  - Can see if there are wax moths in the hive
  - Activity in the hive is indicated by how dirty the board is (e.g., chewed wax cappings)
  - Non-invasive – you don’t go into the hive
  - Doesn’t kill any bees

Honeybee Parasites – Varroa Mite

- Bottom sticky board method
  - How many mites do you have?
    - Calculate number of mites by drop per day times 50
    - 80% of mites are in brood cells
    - Example – 100 mites per day yields roughly 5000 mites in hive
    - On a one day basis:
      - low = less than 5
      - Medium = 10 to 20
      - High = Greater than 50

Honeybee Parasites – Varroa Mite

- Another method is sugar roll method
  - Put about 300 bees in a jar with powdered sugar
  - The powdered sugar will cause the mites to lose their grip on the bees
  - Shake the bee and sugar mix and dump out
  - Count the mites in the sugar (they will appear dark against the sugar)

Honeybee Parasites – Varroa Mite

- Sugar roll method
  - The surviving bees will clean themselves up
  - 12 to 25 mites on 300 bees is a threshold
- This method can be used with ether rather than sugar
  - This does kill the bees, but you are not dependent on the mites losing their grip and may give a more accurate count

Honeybee Parasites – Varroa Mite

- Get in the habit of periodically checking for mites during the season
- Record your count results for each hive
- This will allow you to see when mite load becomes heavy and to evaluate the effectiveness of any treatment

Honeybee Parasites – Varroa Mite

- What is the threshold for treatment of varroa?
  - Consider treatment if:
  - Powdered sugar sample
    - Spring – count of 2 to 3 mites
    - Fall – count of 10 to 15 mites
  - Sticky board count
    - Spring – count of 5 to 10 mites per day
    - Fall – count of 50 to 75 mites per day

Honeybee Parasites – Varroa Mite

- What to do about varroa mites?
  - 007 Method – Live and let die
    - Don’t do anything about varroa
    - Expect to lose some hives
    - Nationally, hive loses are around 45%
    - If you have 2 hives and lose one, you have had a 50% loss

Honeybee Parasites – Varroa Mite

- What to do about varroa mites?
  - Cultural controls
    - Use of screened bottom boards
      - Allows varroa mites to fall to the ground below the hive if they lose their grip on the bee
      - A mite outside of the hive can't get to a new host
    - Resistant queen stock
      - No 100% resistant stock has been developed
      - Hygienic bees bite the varroa mites with their mandibles
      - Dependent on a mechanical method for control

Honeybee Parasites – Varroa Mite

- What to do about varroa mites?
  - Alternative controls
    - Powdered sugar
      - Shake powdered sugar over your frames and bees
      - Bees knock mites loose while they are grooming themselves
      - Labor intensive and is a mechanical method
      - Must repeat treatment weekly for 5 to 7 weeks at a minimum
      - Count mites before and after treatment to evaluate success
    - Freezing drone brood comb for 72 hours

Honeybee Parasites – Varroa Mite

- What to do about varroa mites?
  - Soft chemical treatment
    - organic acids
    - Formic acid – active ingredient in ant stings
    - Thymol – essential oil is sold as red thyme
    - Oxalic acid – plant based acid from sorrels
    - Formic acid and oxalic acid are naturally present at a low level in honey
    - Use is temperature dependent

Honeybee Parasites – Varroa Mite

- Soft chemicals
  - Formic Acid – Mite Away Quick Strips
    - 46% Formic Acid strips
    - Use 2 strips per hive (2 brood boxes)
    - Cost for 2 hives $14; 20 strips = $50
    - Place on top of frame bars
    - Effectiveness is temperature dependent
    - Active ingredient dissipates in 3 days and hive must be left alone for 7 days
    - Bottom entrance is left open (no sticky board for 7 days)
    - Highly toxic chemical to breathe or get on you; use caution and follow instructions with the product

Honeybee Parasites – Varroa Mite

- Soft chemicals
  - Thymol – Apiguard
    - Slow release thymol gel
    - 50 gram aluminum trays. 10 trays are $47
    - Two 50 gram treatments, 14 days apart
    - Close screened bottom boards
    - Needs spacer of at least ¼ inch
    - Best results between 60°F and 105°F
    - Also treats tracheal mites

Honeybee Parasites – Varroa Mite

- Soft chemicals
  - Oxalic acid
    - Potent vaporized acid
    - No or little brood can be present – late fall or early spring treatment
    - Do NOT use with supers on the hive
    - Capped cells will still have varroa mites
    - 35 grams treats 35 brood boxes with vaporizer
    - Acid vaporizer runs off of a car battery – Cost $125
    - Cost of 35 grams - $6

Honeybee Parasites – Varroa Mite

- Soft chemicals – some advantages
  - No resistance and low contamination
  - Vapors can penetrate capped cells
  - May be used during honey flow
  - Queen losses and brood damage limited
  - Weather dependent – shouldn’t use over 90°F
  - Controls tracheal mites
  - Repels small hive beetles
  - Reduces nosema and chalkbrood
  - **Pay attention to the instructions with the product**

Honeybee Parasites – Varroa Mite

- Hard chemicals - miticides
  - Lipophilic – chemicals are absorbed by fat and lipids
  - Resistance has developed in mites from prolonged use
  - Chronic exposure to low doses over a long time affects bee health
  - Cannot be used during the honey flow
  - **Pay attention to the instructions with the product**

Honeybee Parasites – Varroa Mite

- Hard chemicals - miticides
  - Check Mite+
    - 10% Coumaphos – organophosphate insecticide
    - Mite resistance has developed from overuse
    - Effective against small hive beetles
    - Can’t use supers until 14 days after treatment
    - Best to have no or little brood present
    - Use 2 strips per brood box for 42 to 45 days

Honeybee Parasites – Varroa Mite

- Hard chemicals - miticides
  - Apivar
    - Amitraz
    - Use 2 strips in center of each brood box
    - Application is 99% effective
    - Remove strips after 42 days
    - Do NOT use with supers on the hive
    - Very early spring and late summer treatment
    - 10 strips per package - $40

Honeybee Parasites – Varroa Mite

- Hard chemicals - miticides
  - Apistan
    - Taufluvalinate
    - First hard chemical that was available against varroa
    - Works when bees come into contact with the strips
    - Do NOT use with supers on the hive
    - 4 strips per 2 brood boxes
    - Action extends to 8 week period
    - 10 pack costs $30

Honeybee Parasites – Varroa Mite

- Whatever treatment methodology you use:
  - Plan a control program and use it.
  - Be consistent
  - Use mite counts every month to measure mite load
  - Low mite infestation should give a higher honey crop
  - Mite infestations are the key cause of hive losses

Honeybee Parasites – Tracheal Mites

- *Acarapis woodi*
  - Internal parasite living in tracheal tubes
  - Feeds on the bee's blood
  - Breeds in bee's trachea
  - Diminishes the bee's oxygen supple
  - Spreads pathogens
  - Microscopic – needs microscopic diagnosis for positive identification

Honeybee Parasites – Tracheal Mites

- Tracheal mite treatment
  - Thymol and formic acid treatments used on varroa mites
  - Menthol crystals
    - Put a pack in the hive for 28 days
    - Don’t use when temperatures are below 60°F
  - Grease patties of 1:2 ratio of grease to sugar
    - Interferes with mites ability to find host
    - Small hive beetles love the patties
  - Genetic resistance has developed

Honeybee Pests – Small hive beetles

- Small hive beetle – *Aethina tumida*
  - Very small beetles which inhabit the hive and ruin your honey, pollen, and combs
  - Bees will chase them around and try to corner them, but can't kill them
  - SHB will hide in cracks and crevices inside the hive to evade bees
  - Able to fly several miles to find another hive

Honeybee Pests – Small hive beetles

- Small hive beetles can survive and reproduce on grease patties and pollen patties
- Honey contaminated by SHB larvae isn't fit for consumption by bees or humans
- Best defense is a strong hive that hasn't been weakened by varroa mites

Honeybee Pests – Small hive beetles

- Life cycle:
  - Adults invade the hive
  - Hide from the bees
  - Lay eggs in crevices
  - Larvae feed on honey and pollen
  - Ruin your honey
  - Exit hive
  - Pupate in soil
  - Emerge as adults

Honeybee Pests – Small hive beetles

- Small hive beetle treatments:
  - Check Mite+ strips in mechanical traps
  - Soft varroa treatment chemicals repel SHB
  - Soil drench around hive – Permethrin (Gardstar)
    - Highly toxic to bees, apply in evening
  - Nematodes – Southeasterninsectaries.com
    - Applied as soil drench
    - Small business, usually has orders backed up
    - Nematodes attack the SHB pupae in the soil

Honeybee Pests – Small hive beetles

- Mechanical traps:
  - Swiffer pads (use untreated pads)
    - Bees fluff them up and SHB gets tangled and dies
    - You will catch a few bees in it
    - Very inexpensive and effective

Honeybee Pests – Small hive beetles

- Mechanical traps:
  - Diatomaceous Earth
    - Mix with water and spread under hive stands and out 3 feet
    - Scratches exoskeleton of beetle and they dehydrate
    - Works well against cockroaches

Honeybee Pests – Small hive beetles

- Commercial traps
  - Usually require an attractant
  - May use an oil (mineral or vegetable) for beetles to drown
  - Mechanical traps:
    - Beetle Jails
    - Beetle Blasters
    - Hood Trap
    - West Trap
    - Freeman Beetle Trap
    - AJ's Beetle Eater
    - Sonny-Mel Traps
    - USDA Beetle Trap

Honeybee Pests – Small hive beetles

- Beetle attractant
  - 1 cup water
  - ½ cup apple cider vinegar
  - ¼ cup sugar
  - Chopped peel of a ripe banana
  - Allow mix to ferment 1 to 2 days

Honeybee Pests – Small hive beetles

- Recommended reading:
  - Zawislak, Jon, Managing Small Hive Beetles, University of Arkansas Division of Agriculture, FSA7075, 6 pages.
  - Available as free PDF download on Cooperative Extension website