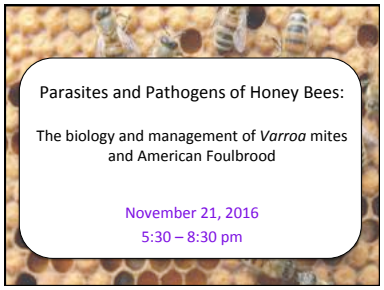
Appendix 2: Slides from Pest & Pathogen Workshop in Jefferson County



Overview

- 5:30 – 5:45 Introductions
- 5:45 – 6:20 *Varroa* mite biology and impacts on bee health
- 6:20 – 7:00 How to monitor and control *Varroa* mites in New York
- 7:00-7:15 *Varroa* management Activity
- 7:15 – 7:25 Break
- 7:25 – 8:10 AFB identification and control
- 8:10 – 8:30 Questions & Discussion

About this workshop

- Targeted toward people with 0-3 years experience, or for those who simply want a refresher
- Focusing on the most prevalent and destructive parasite (*Varroa* mite) and the most infectious bacterial disease (*American Foulbrood*)
- This workshop is funded by the Northern New York Agricultural Development Program

General Info

- Bathroom locations
- Snacks & refreshments
- Workshop materials
- Have questions after the workshop is over? Contact Emma Mullen
  - ekm75@cornell.edu
  - (607) 379-7798

Introductions

- Tell us a bit about you. Who are you and how long have you been beekeeping?

Varroa Mites

Biology and impacts on bee health

Emma Mullen
Cornell University
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What are *Varroa* mites?

- Small ectoparasites present on the bodies of brood and adults
- Scientific name: *Varroa destructor*
- Enter bee hives by hitching a ride on the backs of drifting & robbing bees
- They feed on the haemolymph of bees, shorting their lifespan and transmitting viruses

Where did they come from?

- The original host for Varroa mites is the Asian honey bee (*Apis cerana*)
- About 70 years ago, the Western honey bee (*Apis mellifera*) was brought to the native range of the Asian honey bee and the mite switched hosts
- They've been distributed throughout the world by natural and commercial transportation
- First appeared in New York in the mid 1990s

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Distribution of Varroa mites

- Ubiquitous nearly worldwide
- Not present in…
  - Australia (one case reported this summer and destroyed)
  - Newfoundland, Canada
  - The Arctic!
- Be prepared: plan you Integrated Pest Management protocol in advance if you keep bees in an area with mites

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Life Cycle of *Varroa*

- There are two stages:

1. Reproductive stage
   – Inside the brood cell, reproducing

2. Phoretic stage
   – On the adult bee, feeding
   – May transfer from bee to bee, transmitting viruses

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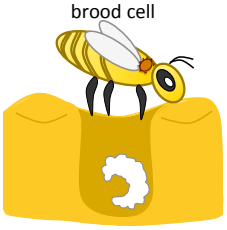
1. Adult mite enters an open brood cell



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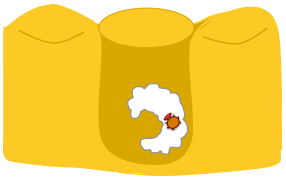
2. After the brood is capped, the adult mite feeds on larva



Viruses transmitted through open wounds from bite marks

12

3. Three days after capping, the adult mite lays her first egg

- She first lays one unfertilized egg (male). She next lays 3-6 fertilized eggs (female)
- Once they hatch, the females feed on the pupa and mate with the male
- The mated females that survive exit the cell on the bee's body as it emerges
- Male mites die in the cells
- When the bee emerges, the mites come out with it

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Lots of mites in brood!

- It is estimated that on average 80% of *Varroa* mites in a colony are in the brood cells and only 20% are phoretic
- *What this means:* You can't judge the severity of your infestation by visually inspecting, because you don't often see the phoretic mites. The ones you do see are a small fraction of what's in the colony

Mites prefer feeding on nurse bees

- Nurses are in close proximity to brood and are feeding and inspecting larvae often
- Nurses provide good nutrition to mites
  – Mites that feed on nurses have more offspring than mites that feed on foragers

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Mites prefer reproducing in drone cells

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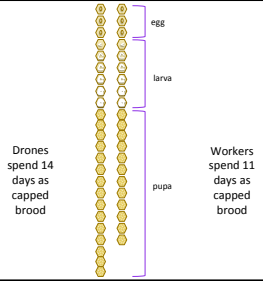

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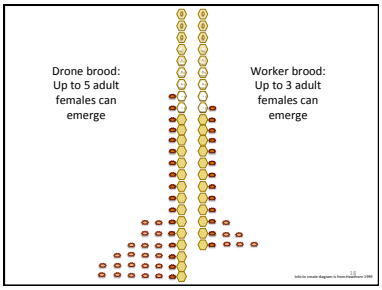
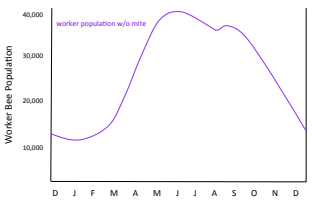


How do *Varroa* mites impact a honey bee colony?

19

Population dynamics in an untreated colony



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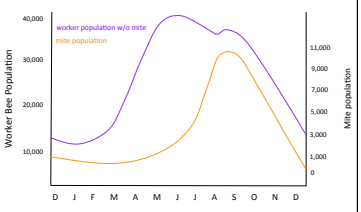

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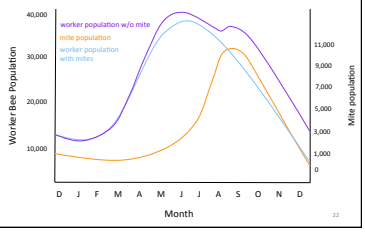

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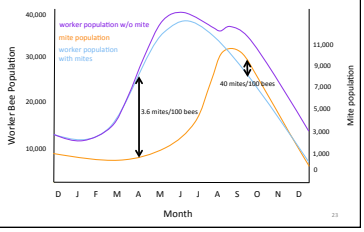
Population dynamics in an untreated colony



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End Stage: Parasitic Mite Syndrome

Adult symptoms

- Visible mites on bees
- Population eventually dwindles away
- Deformed Wing Virus

Brood symptoms

- Spotty brood
- Uncapped brood cells
- Mites visible in brood
- White larvae and pupae are chewed down
- Supersedure cells may be present
- Dead brood of different ages. Starts out white in color but turns darker as it decays
- Dead bees upon emergence with proboscis extended

24

Adult symptoms

Visible mites on adults

25

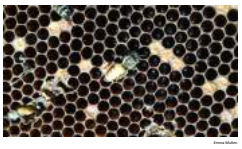
Adult symptoms

Deformed Wing Virus

26

Adult symptoms

- Can impact every caste
- Look for crawling workers on the ground



Deformed Wing Virus

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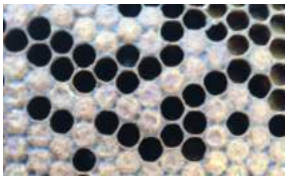
Adult symptoms

Population dwindles

28

Brood symptoms



Spotty

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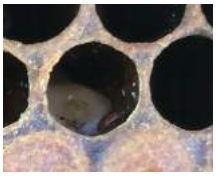
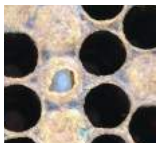
Brood symptoms

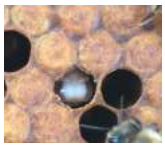


Mites in cells

30

Brood symptoms

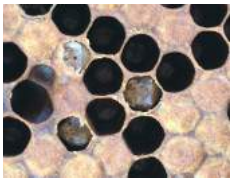




Uncapped cells – hygienic behavior

31

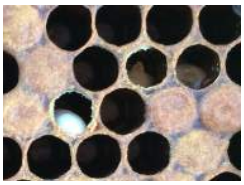
Brood symptoms



Chewed down brood – hygienic behavior

32

Brood symptoms



Dead brood of different ages

33

Brood symptoms

Dead adults upon emergence

34

Brood symptoms

Supersedure Cells

35

So you didn't realize your mite levels were high going into winter…

…come spring your colony is dead! How do you know if *Varroa* was the culprit?

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Symptoms of colony death from *Varroa* mites

- The colony population was high in late summer, but now the cluster is very small (grapefruit-sized or smaller)
- Not many dead bees found in the bottom of the hive
- Some spotty capped brood and uncapped brood
- Honey remains above the cluster
- Guanine crystals (*Varroa* poop) along the bottom of the cells
- Strong populations have lots of brood for mites to reproduce in. Winter bees emerging in fall when mites are peaking are fed upon and sick with viruses. They won't live the entire winter
- Virus-infected bees will fly away, bees that take cleansing flights may be too weak to return, and undertaking bees can remove some bodies before it gets too cold
- Brood dies at many ages, including as capped pupae that never emerge. Uncapped brood is from the adults performing hygienic behavior
- The colony died in late fall or early winter before the bees needed to consume much of their food stores
- *Varroa* mites defecate in the cells. Easy to see in empty colonies

37

Small amount of spotty & uncapped brood

38

Remaining cluster is small

39

Honey remains

40

Guanine crystals

41

Viruses associated with Varroa

- Honey bees are susceptible to at least 19 viruses, 4 are confirmed to be transmitted by *Varroa*
  - *Deformed Wing Virus*
  - *Varroa Destructor Virus-1*
  - *Kashmir Bee Virus*
  - *Acute Paralysis Virus*
- Deformed Wing Virus is the most common
  - Bees infected with DWV with no mites are usually asymptomatic. The combination of mites and viruses is more harmful to bee health than either is alone
  - Two strains of the virus have been identified in Great Britain this year. Strain A is the historic strain, Strain B is the emerging strain that is more harmful

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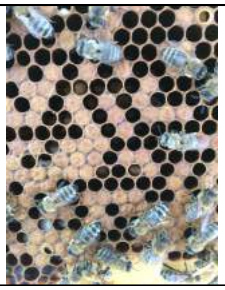
Managing *Varroa*-associated Viruses

- There are no treatments for viruses
  - Antibiotics only treat bacterial infections
- Only way to manage viruses is to…
  1. Consistently keep *Varroa* levels low all year. If you only mange once at the end of August, your colony likely has high virus levels that will remain after the mites are gone
  2. Maintain optimal health (nutrition, propolis)

43

What symptoms do you see in these pictures?

44



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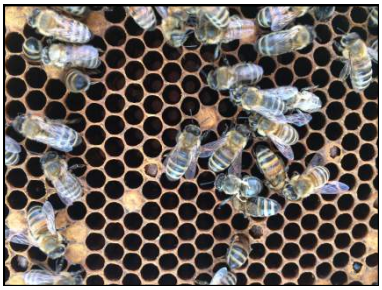


Varroa Mites

How to monitor & control mites in New York

Emma Mullen
Cornell University

Controlling *Varroa* with an Integrated Pest Management Approach

- IPM: a strategy for maintaining a pest population below its economic threshold through the coordinated use of one or more methods
- Economic threshold: the pest density at which one should expect economic damage if treatment is not applied

IPM is not organic farming

- IPM programs use synthetic pesticides and antibiotics when needed
- IPM programs do seek to minimize the use of pesticides and antibiotics and to eliminate their use when possible
  - –Ensure purity of hive products and health of consumers
  - –Prolong the time it takes for *Varroa* to develop resistance
  - –Limit potential negative impacts on the environment

The I in IPM stands for 'integrated'

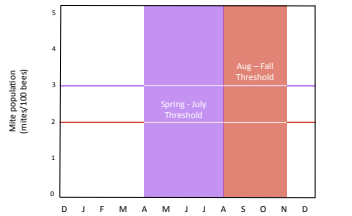
- Use multiple methods to manage *Varroa* populations

Method	Example
Genetic	Resistant/tolerant stocks of bees
Cultural	Drone comb, screen bottom boards, breaking the brood cycle
Soft chemicals	organic acids, essential oils
Synthetic chemicals	Synthetic pesticides

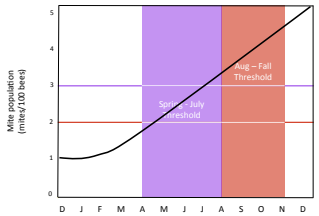
An IPM Approach to Varroa

1. Implement genetic and cultural methods regularly
2. Monitor for *Varroa* levels to determine if you need to intervene further
3. If economic threshold is exceeded, try a soft chemical
4. Monitor *Varroa* levels for efficacy
5. If the soft chemical was ineffective, try another one or try a synthetic chemical

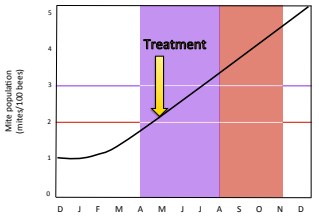
Economic thresholds throughout the year



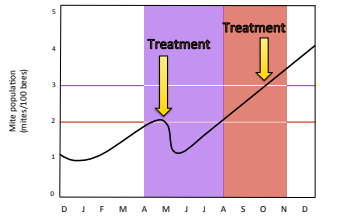
Varroa mites will exceed the threshold with no intervention



Intervene when the mites exceed the economic threshold



Intervene when the mites exceed the economic threshold



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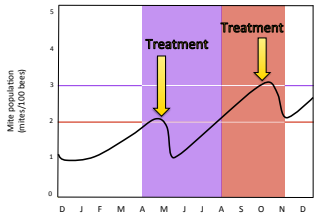
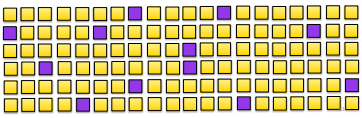


How do I know when the mites have exceeded the threshold?

- Monitor every month!
  - April, May, June, July, Aug, Sept, Oct, Nov
- If you regularly super in the summer, monitor before the supers go on and every month after they come off
  - April, May, Sept, Oct, Nov

How many colonies do I need to monitor?

- <50 colonies, monitor all of them
- If you have more, monitor *at least* 10%
  - Do a random representation
- Monitor every yard



If at least one colony in your yard is above the threshold, treat all the colonies in that yard

- How come it is good practice to do this?
- Treat all colonies in one yard at the same time and with the same method
- Why not just treat regardless of monitoring?
- *Always* monitor again after treatment to see if it was effective

How do I monitor?

- 3 ways

- Measurements are recorded in mites/100 bees

Shake bees into a tub

- Find a frame with nurse bees
  - Ideally with not a lot of open nectar. It makes the bees sticky
- Check to make sure the queen isn't on the frame!
- Shake them into a tub

64

Scoop ½ cup of bees

- ½ cup = approx. 300 bees
- Put them in a mason jar

65

66

Powdered Sugar Shake

67

Powdered sugar method

1. Add a 1/8 inch wire mesh lid to the jar
2. Add 2 tablespoons of powdered sugar
3. Roll the bees to cover them in sugar
4. Sit the jar in the shade for 1 minute and allow bees to dislodge the mites through fanning
5. Shake vigorously for 2 minutes into a white bucket
6. Pour some water in the bucket to see the mites

68

Count the mites and divide by 3 to get mites/100 bees

69

Alcohol Wash

70

Alcohol wash method

1. Add rubbing alcohol to the mason jar so it is 2 cm above the bees
2. Add a lid to the jar
3. Shake the bees vigorously for 2 minutes
4. Switch the lid to a 1/8 inch mesh lid
5. Dump into a white bucket
6. Count mites & divide by 3

71

Ether Roll

72

Ether roll method

1. Take the mason jar with bees 10 yds. away from the hive, as ether agitates bees
2. Spray three quick sprays of engine starter fluid onto bees and put on lid. Too much starter fluid makes it difficult for mites to remain stuck to the jar wall
3. Shake bees for one minute
4. Count the varroa bees stuck to the side of the jar, rotating the jar slowly to make sure to see them all. Draw a vertical line as a starting point to keep track of where you started
5. Divide this number by 3 to get an average mite count per 100 bees

Unreliable methods

Mite drop on sticky board

Uncapping drone pupae

Visually inspecting bees

Genetic methods

Stock	Method	Developed by	Phoretic or reproductive mites?
Varroa-sensitive hygienic bees	• Uncap & remove or chew infested pupae. Immature mites die	• USDA Bee Breeding Laboratory in Baton Rouge, LA • Minnesota Hygienic Line, University of Minnesota	
Grooming behavior bees	• Removes mites off their bodies • Also has VSH behavior	• Clemson University SC (still in development)	
Ankle Biter Bees	• Removes mites off their bodies and bites their legs off. Mites can no longer attach onto bees	• Purdue University	
Russian Bees	• Introduced to mites nearly a century ago; have had longer to develop tolerance. They have increased VSH behavior and cease brood production in times of food shortage	• Imported by the USDA Bee Breeding Laboratory in Baton Rouge, LA	

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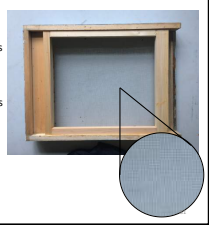
Cultural Methods: Drone Comb

- Insert drone comb in the brood nest, 2 or 3 position
  - Mites found 5-12x as often in drone brood as in worker brood
  - Mites produce ~2x as many offspring on drone brood compared to worker brood
- After egg is laid, it takes 10 days to become capped
- Remove the frame while drones are capped and before they emerge, between day 10 and day 24
- Freeze the frame for 24 hours
- Put back in colony and repeat until October
- Drones are produced most in spring and less in summer and autumn

Don't forget to remove the frame or you can accidentally make mites worse!

Cultural Methods: Screened Bottom Board

- Sits under the hive
- Catches mites that fall off bees and prevents them from crawling back up onto bees
- Not effective at reducing mites on its own
- Best when used in combination with hygienic bees or grooming behavior bees



Cultural Methods: Breaking the brood cycle

- Since mites require bee brood to reproduce, short periods without brood cause a break in mite reproduction. This break will lower mite levels on its own, but also allows an opportunity to effectively treat phoretic mites
- Swarming gives both the parent and new colony a period without brood
- Splitting a colony and allowing the new colony to rear its own queen gives the new colony a period without brood
- Requeening your colony. Remove your old queen and add a new queen after 3 weeks. Destroy any queen cells that are made along the way. Common in July before mite levels peak in Aug & Sept
- Caging the queen for 21 days – not common here but used in Europe

82

Natural/soft chemical treatments

83

Read and follow the label for all chemicals, natural and synthetic

The label is the law

84

5 Registered in NY

Soft Chemicals Registered in NY

Chemical	Active Ingredient	Mode of Action	Potential harm to colony
Apiguard®	Thymol	Fumigant	Can kill brood and adults, can reduce egg-laying by queen
Api Life Var®	Thymol, eucalyptor, menthol, camphor	Fumigant	Irritability
Mite-Away Quick Strips®	Formic acid	Fumigant. Can penetrate brood cap	Can kill queen, brood, and adults
Oxalic Acid	Oxalic acid dehydrate	Contact (dribble), Fumigant (vaporizer)	Can kill some adults, Dribble can chill adult cluster if cold
Hop Guard II®	Hops beta acids	Contact	Can kill some adults that come in contact with strip, irritability

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Application Method & Supering

Chemical	Method	Outside Temp	Treatment time	Use when supers are on?	How long do you have to wait after treatment ends before you super?
Apiguard®	Tray with gel sits on brood frames	59 - 105°F	4 weeks (two treatments at 2 weeks each)	No	Can super immediately after treatment ends
Api Life Var®	Tablets placed on the corners of the brood nest	65 - 85°F	21-30 days (three times at 7-10 day intervals)	No	1 month
Mite-Away Quick Strips®	Pads placed on brood nest	50 - 92°F	7 days	Yes	N/A
Oxalic Acid	Dribble brood nest or vaporize entrance	N/A	10 minutes	No	2 weeks
Hop Guard II®	Strips inserted in brood nest	N/A	28 days	Yes	N/A

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Synthetic Chemicals

2 Registered in New York

CheckMite+® is no longer registered in New York.

Widespread resistance, harmful to queen and drone reproduction, build up in wax and honey

88

Synthetic Chemicals Registered in NY

Chemical	Active Ingredient	Mode of Action	Potential harm to colony
Apivar®	Amitraz	Contact	Can kill adults that come in contact with strip
Apistan®	*Tau*-fluvalinate (pyrethroid)	Contact	Can kill adults that come in contact with strip, can kill brood, can reduce queen and drone reproduction, widespread resistance documented

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Application Method & Supering

Chemical	Method	Outside Temp	Treatment time	Use when supers are on?	How long do you have to wait after treatment ends before you super?
Apivar®	Insert strips into brood nest	N/A	42-56 days	No	2 weeks
Apistan®	Insert strips into brood nest	>50°F	42 days	No	Can super immediately after treatment ends

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Is Treatment-free Beekeeping Possible?

- It is possible, but requires the same level of management or more
  - Use genetic stock
  - Break the brood cycle (splitting, allowing swarming, requeening)
  - Removing drone comb
  - Monitoring mite levels monthly
- Unfortunately sugar dusting, even at weekly intervals, doesn't reduce mites significantly

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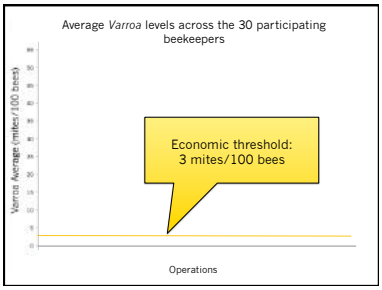

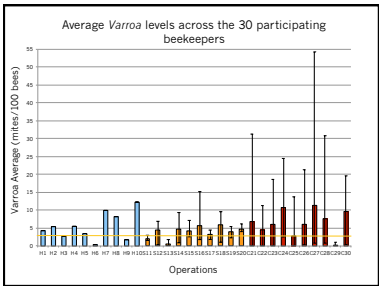

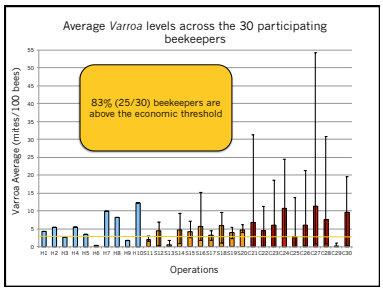

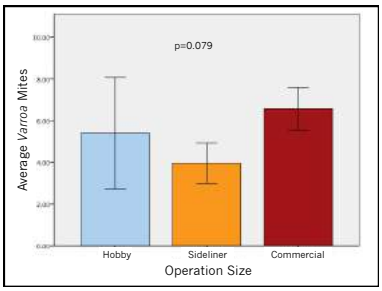

10 Minute Assignment

Consider which management practices you could use for *Varroa* mites in the following 3 circumstances…

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Scenario 1

It's April 15th and it's been an unusually warm April so far. The forecast this week is around 68°F. You have been preparing your favorite colony for queen breeding by feeding pollen patties and sugar water since the end of February. Your colony is starting to have a bustling population, but you won't be supering until mid June (about 60 days later). You do a sugar shake and find 8 mites in your ½ cup of bees.

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Do you need to deal with *Varroa*? If so, what is your management strategy?

Things to consider	Genetic methods	Cultural methods	Good treatment choices	Bad treatment choices
• 2.7 mites/100 bee → above the threshold for spring • Temperature is 68 • Especially don't want to harm queen reproduction • Brood is present	• You have a breeder queen so it is your stock of choice. Can be VSH, Russian, or Ankle Biter queen if that is your interest to breed	• Drone comb is a good idea at this time of year • Screen bottom board • Not going to break the brood cycle because we want her to continue laying for queen rearing	• Api Life Var • Hop Guard II • Apivar, if you don't plan on consuming honey that is produced (Good temp and time window, but treatment time can take up to 56 days + 2 weeks before supering)	• Apiguard: good temp and time window, but can reduce queen reproduction • Mite-Away Quick Strips can kill queen and brood • Apistan: Can reduce queen reproduction • Oxalic acid: Lots of brood around

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Scenario 2

It's July 5th and the nectar is flowing! You've got supers on all five of your hives and brood of all ages. Your goal is to produce a lot of honey this summer. The temperature this week is around 83°F. Here is a page from your record book today:

Hive #	Date Monitored	Monitoring Method	Mites/300 bees	Mites/100 bees
1	July 5	Ether Roll	3	1
2	July 5	Ether Roll	9	3
3	July 5	Ether Roll	3	1
4	July 5	Ether Roll	15	5
5	July 5	Ether Roll	12	4

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Do you need to deal with *Varroa*? If so, what is your management strategy?

Things to consider	Genetic methods	Cultural methods	Good treatment choices	Bad treatment choices
• At least one of the colonies is over the mite threshold of 2 mites/100 bees. All colonies need to be managed • You have supers on and don't intend to remove them! • It's 83 degrees	• VSH, Russian, or Ankle Biter queen	• Drone comb, some drones are still produced at this time of year • Screen bottom board • We could break the brood cycle but it may hinder honey production a bit. Depends on your motivation	• Mite-Away Quick Strips – good with brood and honey supers on, good temperature • Hop Guard II – good with honey, no tamp requirement	• Apivar • Apistan • Apiguard • Api Life Var • Oxalic Acid None of these can be used with honey supers on

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Scenario 3

It's November 13th and you are finally getting around to wrapping up your colony now that the cool weather is here. Last week, when it was 59°F, you did an alcohol wash and you found 5 mites/100 bees. You had to run to pick out your Thanksgiving turkey from the store so you didn't have a chance to manage your colony then and there. Today it is 45°F and the whole week will be getting cooler. Your queen has ceased brood production and the colony is ready to hunker down for winter.

101

Do you need to deal with *Varroa*? If so, what is your management strategy?

Things to consider	Genetic methods	Cultural methods	Good treatment choices	Bad treatment choices
• Broodless • Cold outside, 45 • Don't want to open the colony later to remove treatment strips and expose the cluster to the cold	• Requeened with VSH, Russian, or Ankle Biter queen in the spring or fall	• No drone comb, no drones at this time of year • Screen bottom board – some have success in mild winters (especially with ventilation), while some don't have success when it's a cold winter	• Oxalic acid vaporizer	• Everything else. Don't want to leave strips/ trays/pads in colonies otherwise it can promote resistance • Many of the treatments are too cold to use

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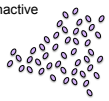
American Foulbrood

Identification & Control in NY

Emma Mullen
Cornell University

What is it?

- Bacterial disease (*Paenibacillus larvae)* that infects larvae
  - Vegetative state: active infection
  - Reproductive/spore state: inactive
- The disease is spread through the spores



Vegetative state: rod shaped

Reproductive state: small spores

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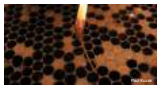
Who is susceptible and when?

- Worker, drone, and queen larvae are susceptible within the first 3 days after egg hatching
- Spread to young larvae by feeding nurses
- Only one spore is needed to infect a 1-day-old larva. As larvae age, they are less susceptible to AFB

105

What happens?

- After a larva ingests a spore, the AFB becomes vegetative (active) and starts replicating in the midgut one day later
- The infection continues to multiply as it gains its nutrition from the larva
- After the cell is sealed, the larva dies from sepsis
- It becomes a brown mucusy substance that eventually dries into black scale



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What does it look like?

In the earlier stage of infection…

- Beige or coffee-colored larvae
- Larvae laying flat on the lower cell wall with a mucous-like consistency
- Larvae will string out into about 1 inch 'ropes'
- If death occurs in the pupal stage, some may have their tongues sticking out
- Spotty brood pattern with sunken, concave, or perforated cappings (workers detect something is wrong and uncap them/remove them)

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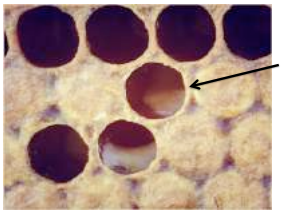

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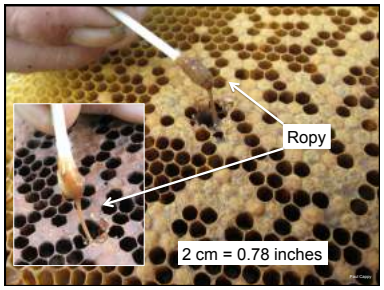

What does it look like?

In the later stage of infection…

- Larvae at this stage will not be 'ropy'
- Larvae become a thin dark scale along the lower cell wall. This scale does not pick out if you scrape it
- Distinctive foul odor in some cases (old gym socks)
- Toward the end of the colony's life, there are few adult bees present

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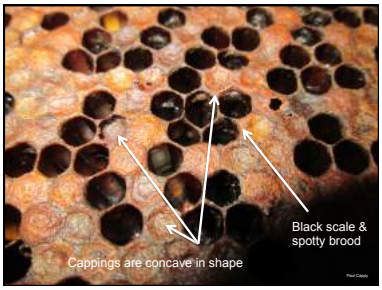

How do colonies die?

- As infection spreads within the hive, adults are no longer being replaced as they naturally die out
  - Colonies dwindle away and die
  - Weak colonies get robbed of their resources and die → this spreads the infection

112

Quick Questions

- What is its distribution?
  - Present in every continent that bees are kept
- How common is it in NYS?
  - Less than 5% incidence
- What time of the year can it strike?
  - Spores are present all year round
  - Vegetative bacteria when larvae are present
- How long does it take before symptoms show?
  - Time from spores being fed to symptoms ranges from 12.5 days – 3 months
- Why is it such a big deal?
  - Highly infectious
  - The spores remain alive (and able to vegetate) for over forty years
  - Resistant to extreme temperatures and many bactericides

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How do you diagnose it?

3 ways

- Ropy Test
- Vita Bee Test
- Send a Sample to Beltsville

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Ropy Test

- Insert a toothpick/Q-tip into suspicious brood
- Rotate the toothpick and pull outward
- If it ropes 2 cm (0.78 inches) it is indicative of AFB. Do a Vita test and send a sample to Beltsville

- Do not throw the Q-tip on the ground!

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Vita Diagnostic Test Kit

- Test kit to sample yourself
- Results in 3 minutes
- $13.50 from Mann Lake

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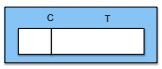
Negative for AFB



Positive for AFB

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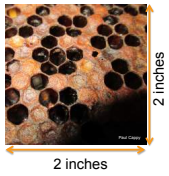
Beltsville Bee Lab

- Send a piece of comb with brood (~2 weeks)
  - Contains as much diseased brood as possible
  - No honey
  - Send loosely wrapped in newspaper, mailed in a cardboard box
  - Do not wrap in plastic, aluminum foil, wax paper, tin or glass, as this promotes the growth of mold
- Send the probe from the ropy test
  - wrap in paper and send in an envelope



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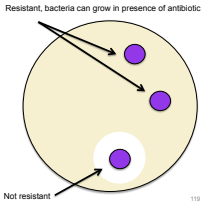
Beltsville Lab

- Always send a sample to Beltsville!
- Keeps records of incidence and notifies the state apiculturist
- Tests for antibiotic resistance



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Sources of infection

- Contaminated equipment
- Unwashed hands after working in an infected colony
- Robbing from contaminated colonies (alive or dead)
- Interchanging frames between contaminated colonies
- Swarms of unknown origin

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When should I look for it?

- Do 3 thorough checks every year
  - Spring, summer and fall
- If you ever see diseased brood that you can't identify, send a sample to Beltsville Lab

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What do I do if I suspect I have it?

- Try a preliminary test: ropy test or Vita test. Send a sample to Beltsville
- Even if the Vita test comes back negative, label the colony for easy identification later in case the Beltsville results come back positive. It is possible to have a false negative result

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What do I do if it has been confirmed that I have it?

- By law, you must report it to me or the state apiculturist
  Paul Cappy
  1 (800) 554-4501
  paul.cappy@agriculture.ny.gov
- An inspector will come to your operation to assess the extent of the outbreak, collect a sample, and oversee the destruction
- The entire colony must be burned with an inspector's oversight

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Disinfecting other equipment

- Hive tools
- Smoker
- Suit
- Gloves

Wash with soap, water & bleach scrub with stainless steel

- Outer cover
- Inner cover
- Bottom board

Scorch with a blow torch

129

Ways you shouldn't treat AFB

- Throw away infected frames
- Treat infected colonies with antibiotics
  - Antibiotics can be used to treat the remaining colonies in your apiary

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What Antibiotics are available in New York State?

1. Terramycin *(oxytetracycline hydrochloride)*
2. Tylan *(Tylosin)*
   - leaves residues for longer than terramycin
3. Lincomix *(Lincomycin hydochloride)*

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Historically

- These antibiotics were used prophylactically in spring and fall to prevent an infection from starting
- Now there's been documented instances of resistance in human bacterial infections and in *P. Larvae*

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New Law from the FDA

- Antibiotics for honey bee bacterial diseases can only be acquired through a prescription starting in January 2017
- If you suspect or have a confirmed case of AFB, call a vet to come to your operation
  - Vet must see the infection & write a prescription
  - Prescription is good for 6 months
- Bee vets can be found on the website www.beevets.com

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Tips for preventing infection

- Only purchase bees and equipment from suppliers with inspection certificates
- Always buy new equipment
- Keep your colonies isolated from your neighbors if possible
- Thoroughly inspect the brood nest before transferring frames or bees
- Don't bring gloves, hive tools, or equipment into someone else's apiary
- Quarantine newly caught swarms and monitor it closely
- Order hygienic stock bees
- Don't feed colonies honey or pollen from another colony
- Rotate 2 of your oldest combs for new combs in each hive body each year

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There are similarities between Parasitic Mite Syndrome, American Foulbrood, and other brood diseases.

If you are unsure of what's affecting your colony, send a sample to Beltsville Bee Lab or contact me

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