

Honey Bee Diseases And Parasites



Colony Collapse

- Colony collapse is not a specific disease or pest. Rather it is a result of a combination of complex factors compounded, to bring about the loss of thousands of colonies.
- It is usually defined as a dead colony devoid of adult bees, maybe with a queen and small number of nurse bees.



Honey Bee Health

- Four areas threatening Bee Health
 - Parasites
 - Pathogens
 - Sub Lethal Exposure to Pesticides
 - Poor Nutrition



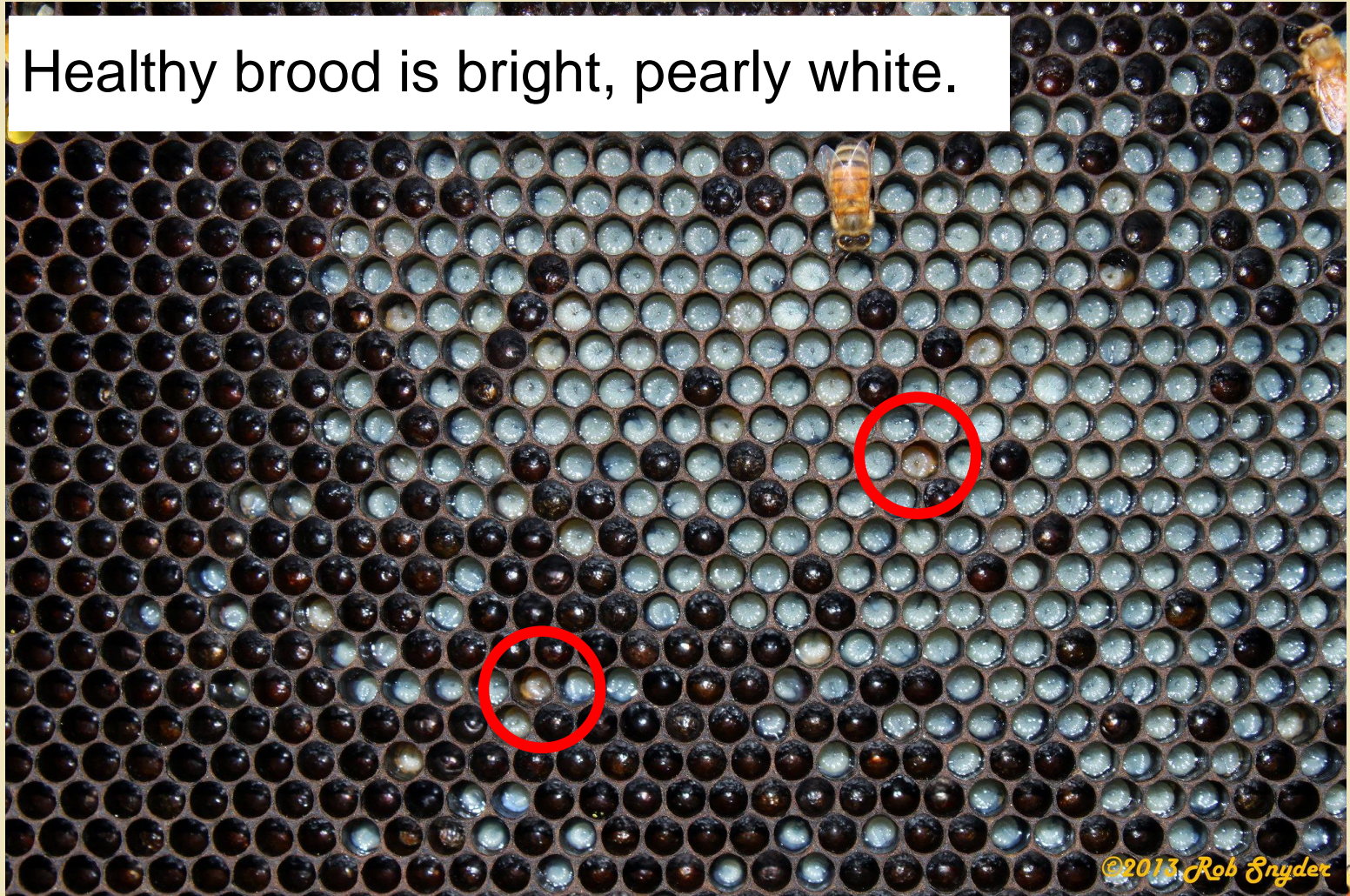
Identifying a Sick Colony

- Brood-struggling and dying brood
- Behavior of bees
 - Dead bees in hive and in front
 - Bees not moving properly
 - Bees don't look healthy or there are signs of sick bees such as deformed wings
- Shifts in amount of brood and strength of bees caring for brood



Healthy Brood

Healthy brood is bright, pearly white.

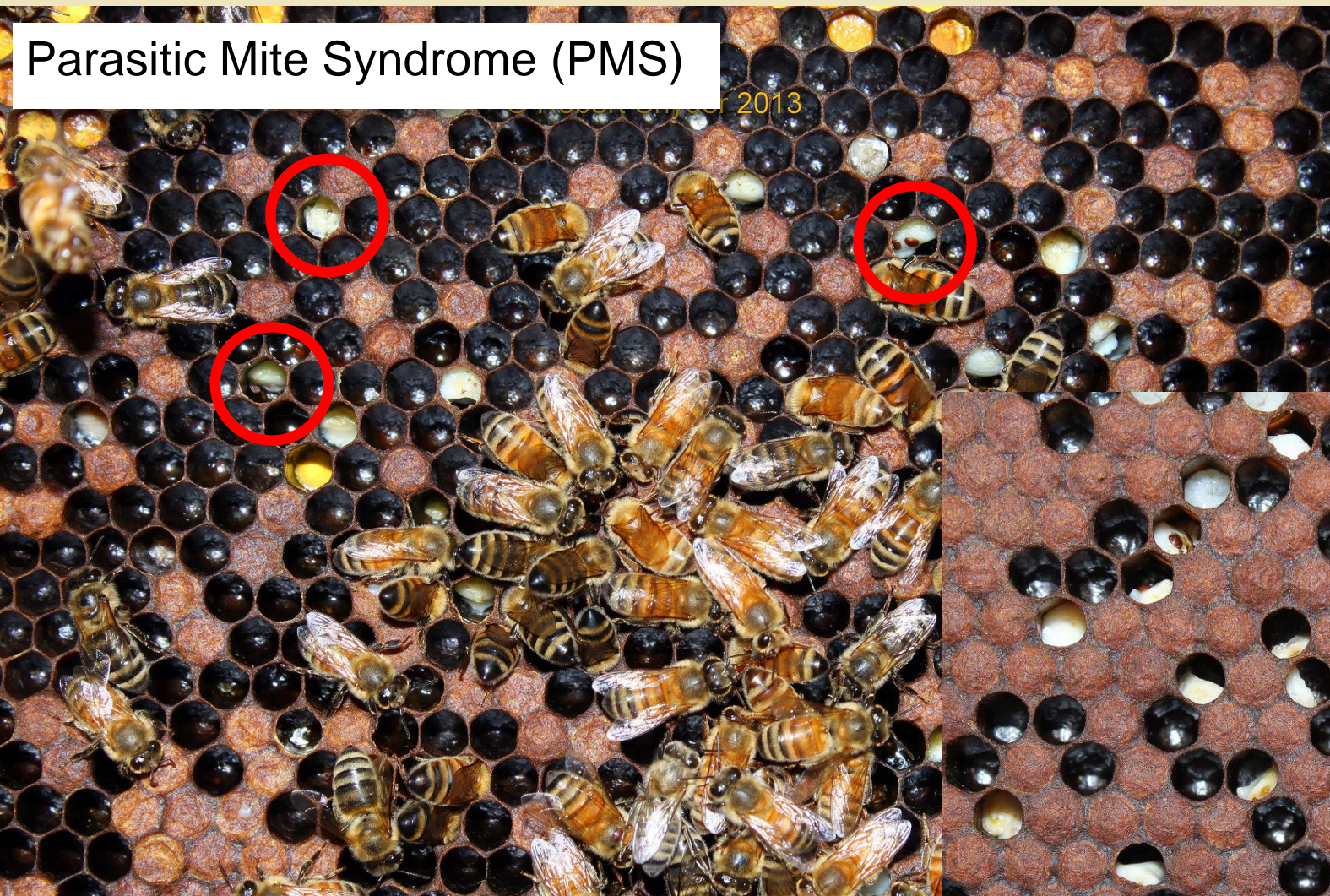


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Brood-struggling and Dying Brood

Parasitic Mite Syndrome (PMS)



Brood-struggling and Dying Brood

Bald Brood



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Brood-struggling and Dying Brood

Perforated Brood



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Brood-struggling and Dying Brood



Sacbrood Virus

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Healthy Bee Behavior

- Bees foraging for nectar and bringing in pollen
- Comb and hive cleaning
- Strong queen laying pattern
- Few dead bees in front of hive
- No bees wandering around in front of hive
- Healthy looking bees



Population Shifts

- Decrease in colony bee numbers
- Inspection of hive and mite testing
 - High mite counts cause hives to dwindle very quickly.



Visible Signs of Sick Bees

- Watch for signs for dysentery
- Bees look dull
- Bees are not working and moving around on comb
- Bees wander aimlessly in front of hive on the ground
- Bees could be missing wings



Enemy #1 Varroa Destructor



Enemy #1 Varroa Destructor

- The reproduction cycle of the mite takes place inside the brood cells.
- Female mites (foundresses) enter the brood cells during the last stages of larvae development -- just prior to the cells being capped. There they will deposit five to six eggs while feeding on the hemolymph of the larvae/pupae of the developing brood.
- They escape the cell as the bee emerges.



Enemy #1 Varroa Destructor



The right photo is an image showing a cross section of a *varroa* mite feeding on a honey bee's abdominal cavity. It is one of several ARS microscopy images changing what we know about how mites damage honey bees.



Enemy #1 Varroa Destructor

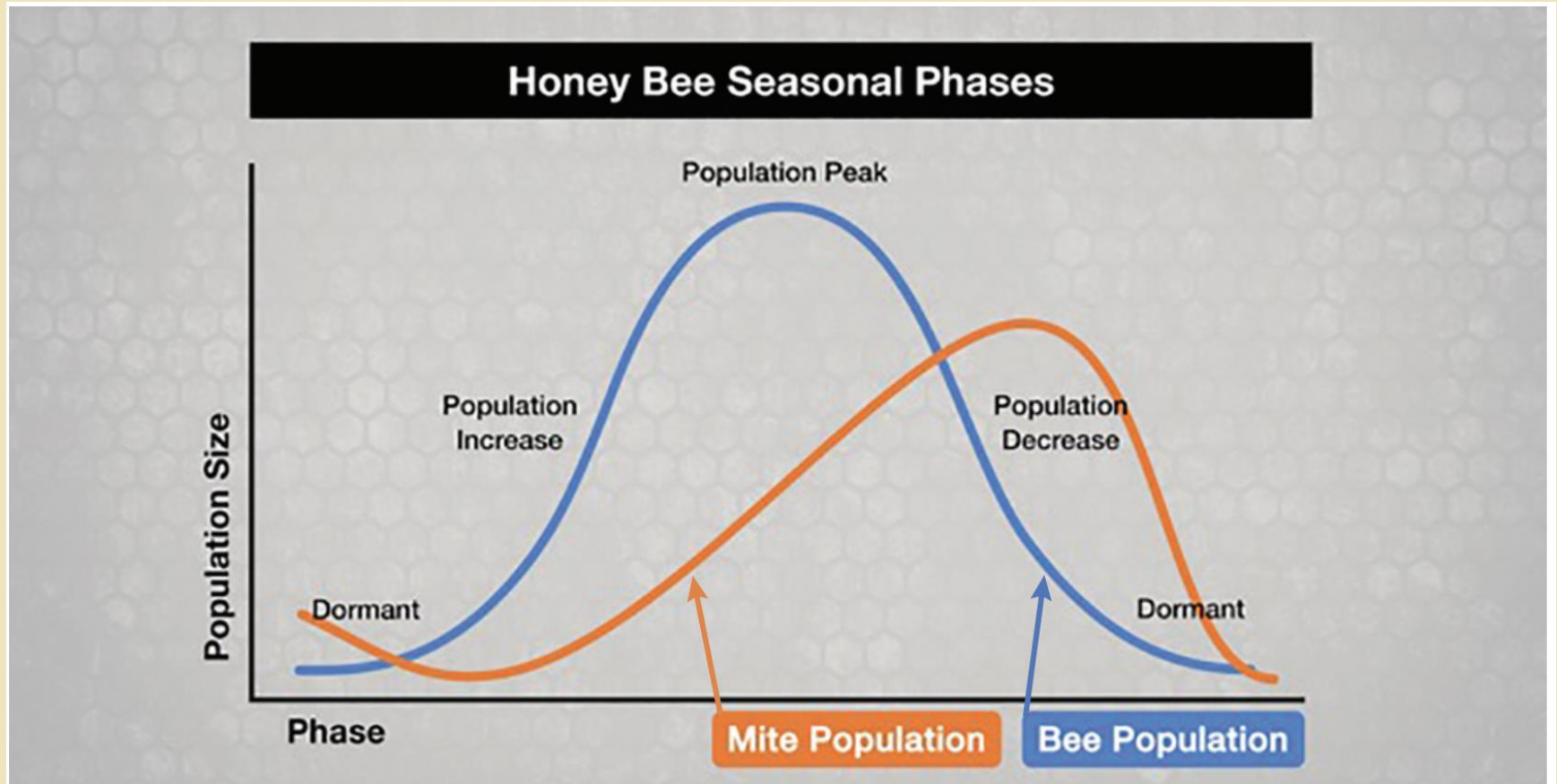
- Now that we know that the fat body is varroa's target, this connection is much more obvious. Losing fat body tissue impairs a bee's ability to detoxify pesticides and robs them of vital food stores.
- In addition to breaking down toxins and storing nutrients, honey bee fat bodies produce antioxidants and help to manage the immune system.
- The fatty organs also play an important role in the process of metamorphosis, regulating the timing and activity of key hormones.
- Fat bodies also produce the wax that covers parts of bees' exoskeletons, keeping water in and diseases out.



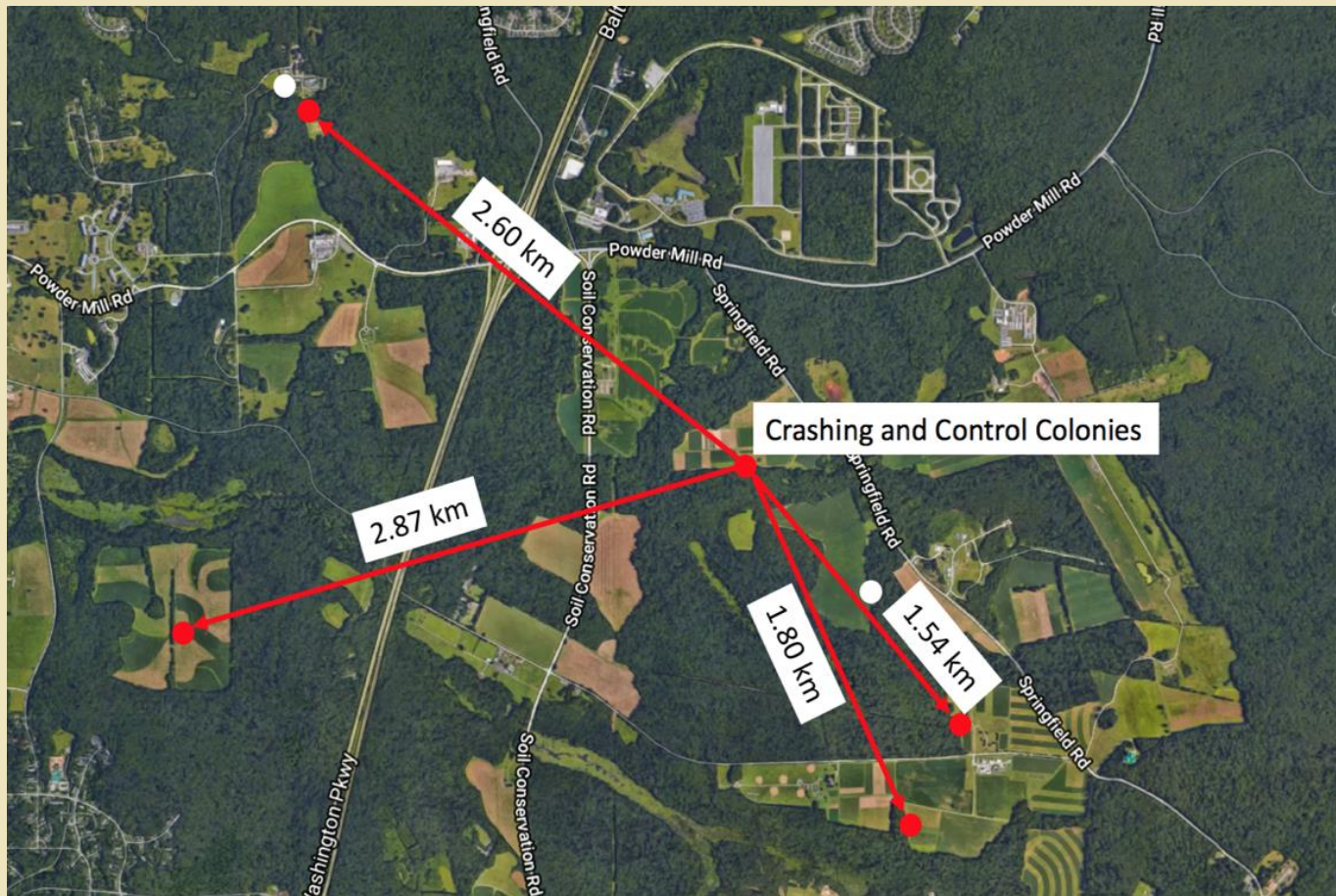
Varroa Life Cycle



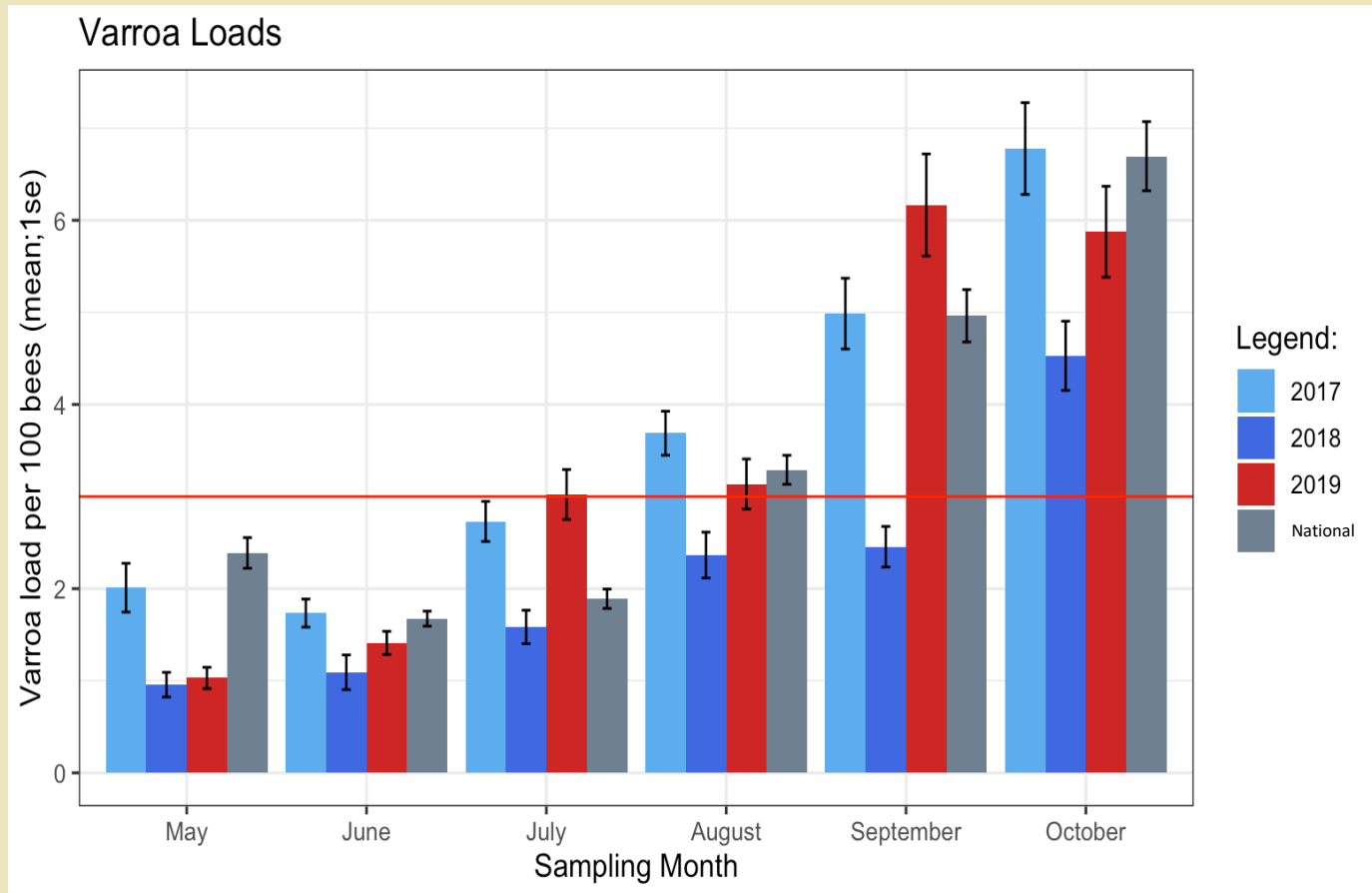
Enemy #1 Varroa Destructor



Inter-Apiary Varroa Transmission



Varroa Loads 2017-2019



Takeaways

- Mite levels require regular monitoring. We recommend using the Alcohol Wash Method.

We teach the use of the Easy Check in field days 2 and 3.



Takeaways

- Check out the different methods of treating for mites because you *will* have them.

These are the most used:

- Apivar- Amitraz-Hard Chemical
- Formic Pro-Formic Acid-Soft Chemical
- Oxalic Acid-Oxalic Acid-Soft Chemical
- Apiguard-Thymol-Soft Chemical
- Hopgard-Hops-Soft Chemical



Family	Virus	Target stage/caste of bees
Dicistroviridae	Acute bee paralysis virus (ABPV)	Brood, workers, drones
	Israeli acute bee paralysis virus/Kashmir bee virus (IAPV/KBV)	Eggs, larvae, pupae, workers, drones, queens
	Apis dicistrovirus (ADV)	Workers, drones
	Aphid lethal paralysis virus (ALPV)	Workers, drones
	Big Sioux River Virus (BSRV)	Workers, drones
	Black queen cell virus (BQCV)	Larvae, pupae, workers, drones, queens
Unclassified	Chronic bee paralysis virus (CBPV)	Workers, drones, queens
Iflaviridae	Deformed wing virus (DWW) (A,B and C)	Eggs, larvae, pupae, workers, drones, queens
	Sacbrood virus (SBV)	Brood, workers, drones
	Slow bee paralysis virus (SBPV)	Larvae, workers, drones
Unclassified	Lake Sinai virus (LSV)	Workers, drones
Tymoviridae	Bee macula-like virus (BeeMLV)	Pupae, workers
	Bee macula-like virus-2 (BeeMLV-2)	Pupae, workers
	Varroa tymo-like virus (VTLV)	Workers, drones
Unclassified	Cloudy wing virus (CWV)	Workers, drones
Nodaviridae	Apis noda-like virus	Workers, drones
Noraviridae	Apis nora virus (ANV)	Workers
Rhabdoviridae	Apis rhabdovirus -1/ Bee rhabdovirus-1 (ARV1/ BRV-1)	Workers, drones
	Apis rhabdovirus -2 (ARV-2)	Workers, drones
Bunyaviridae	Apis bunya virus-1 (ABV-1)	Workers, drones
	Apis bunya virus-2 (ABV-2)	
Flaviviridae	Apis flavivirus (AFV)	Workers, drones
Picorna-like	Berkeley bee picorna -like virus (BBPV)	Workers, drones
Secoviridae	Tobacco ring spot Virus (TRSV)	Workers, drones
Secoviridae	Seco-like virus	Workers
Iflaviridae	Moku virus	Workers
Orthomyxoviridae	Varroa Oorthomyxovirus-1 (VOV-1)	Workers
Partitiviridae	Partiti-like virus	Workers
Unclassified	Bee Y virus	Workers, drones
Unclassified	Bee X virus	Workers, drones
Unclassified	Egypt bee virus	Workers, drones
Unclassified	Arkansas Bee virus (ABV)	Workers, drones
Iridoviridae	Apis iridovirus (AIV)	Workers, drones
Unclassified	Apis mellifera filamentous virus (AmMFV)	Workers, drones
Circoviridae	Circo-1	Workers
	Circo-2	



Viruses

Abbreviation	Name	In INW
ABPV	Acute Bee Paralysis Virus	WA-Minor
BQCV	Black Queen Cell Virus	Visual
CBPV	Chronic Bee Paralysis Virus	WA-minor
DWV-A,B,C	Deformed Wing Virus	INW-Visual
IAPV	Israeli Acute Paralysis Virus	WA-minor
KBV	Kashmir Bee Virus	WA-minor
LSV2	Lake Sinai Virus Similar to ABPV	INW (3) Visual
SBPV	Slow Bee Paralysis Virus	Visual
SBV	Sacbrood Virus	Visual



Deformed Wing Virus (DWV)



Deformed Wing Virus

- Varroa mites are the primary cause of DWV. This parasite is both a vector and an activator of the virus. DWV can be deadly for individual bees, but often also the entire colony.
- By feeding on bees and brood, the mites impair their immunity, which allows the virus to multiply freely.



Deformed Wing Virus

- There are many variants of the virus that differ in virulence (the ability to penetrate, multiply in and damage cells, and in consequence, tissues).
- The coexistence of mites and highly virulent viral strains leads to colony deaths.
- Regardless of the viral strain, the longer the mites stay on adult bees, the more often it leads to emergence of crippled bees from brood cells that the mites entered. The more mites in the colony, the more crippled bees emerge.



Deformed Wing Virus

- DWV can be transmitted through royal jelly and sperm (from drones to queen), from queen to egg, and from mite to brood and bees.
- The symptomatic infection takes many forms -- from brood death to emergence of crippled bees.
 - Those bees usually have poorly developed wings (from gray to brown in color, deformed, and shortened), shortened abdomens, movement and orientation impairments.
 - Usually, they don't live past 67 hours. They are removed from the colony earlier and die outside.



Chronic Bee Paralysis

CHRONIC BEE PARALYSIS:

- caused by the **chronic bee paralysis virus (CBPV)** and the infected adult may take many days to die .

- Adult bees infected

SYMPTOMS:

- the adults have a bloated abdomen, which is caused by the distension of the honey sac with liquid.
- They do not fly, instead they crawl on the ground, exhibiting an abnormal trembling motion of the wings and bodies.
- They become almost hairless, appearing dark or almost black and shiny.
- Uninfected bees nibble at them and prevent their return to the colony.



Tracheal Mites



Bacterial Diseases

- American Foulbrood
- European Foulbrood



American Foulbrood (AFB)



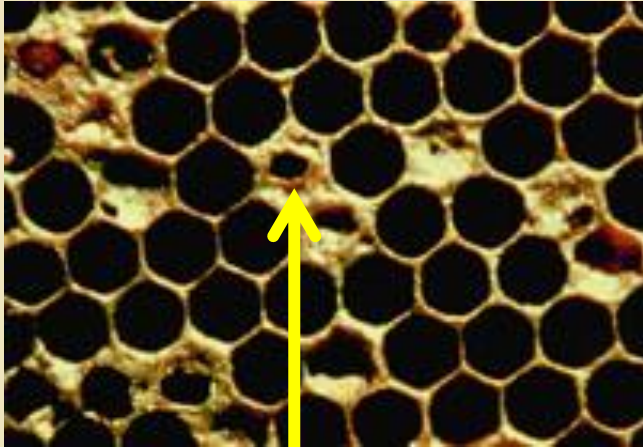
American Foulbrood

- AFB is the most serious bacterial disease of honey bee brood. It is caused by the bacterium *Paenibacillus larvae*.
- The disease is transferred and initiated only by the spore stage of the bacterium. The reason this disease is so serious is that the spores can remain viable and last indefinitely on beekeeping equipment.
- It is extremely contagious and spreads easily on contaminated equipment, hive tools, and beekeeper's hands.

A beekeeper's best way to manage AFB is to avoid it.



American Foulbrood



Note the pin hole
in the cell cap.



Pupae is **brown**
rather than white.



Using a stick or nail, stir the brown larva.
If it “strings out” it is AFB.



European Foulbrood (EFB)

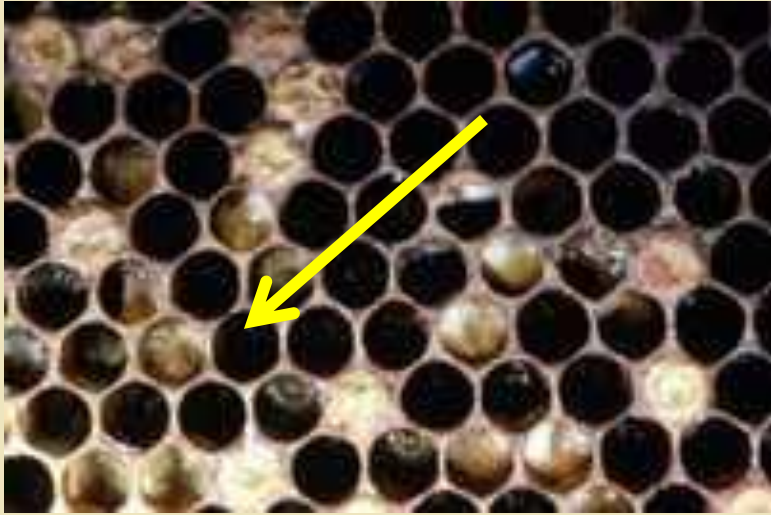


European Foulbrood

- **EFB** is a bacterial disease of honey bee brood. It is considered less virulent than American foulbrood, and colonies sometimes recover from infection.
- Its field symptoms are easily confused with those of **AFB**, but there are important differences. Instead of being a healthy pearly white, larvae with **EFB** appear off-white, progressing to brown, and are twisted in various positions in the cell.
- Larvae with **EFB** usually die before they are capped whereas larvae with **AFB** die after they are capped.



European Foulbrood



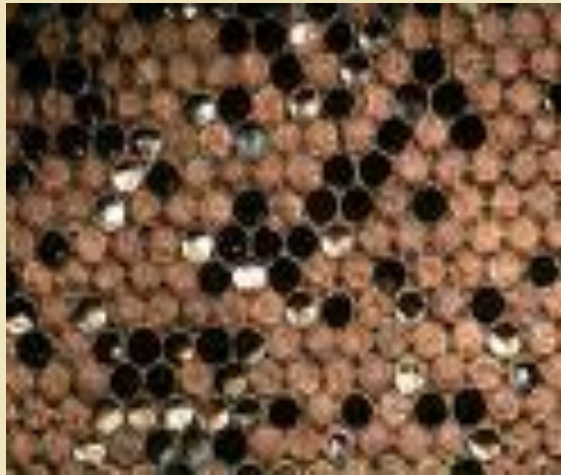
EFB Treatments

- The USDA has banned to use of chemicals (antibiotics) to treat EFB without a written prescription from a local veterinarian.
- If you think your bees have EFB, contact an experienced beekeeper. EFB usually clears up on its own if the bees get healthy.



Chalkbrood

- Chalkbrood is a disease of bee brood caused by a fungus, *Ascosphaera apis*. The larvae must ingest the spores of the fungus for the infection to occur.
- It only infects larvae that are three to four days old.
- There are no chemical treatments for this disease. Instead, it can be controlled by bee breeding and good management.



Questions

Might have the answer never know

