The Managed Mentoring Program on getting started in beekeeping.

Managed Mentoring

Managed Mentoring

Varroa Mites and Beekeeping

Lesson | Varroa Mites

What is Covered in this Module

- Introduction to Varroa Mites
- Mite Population Dynamic
- Mite Population Impacts
- Supreme Colonies
- The Perfect Storm

Impact to the Population

❑ Wounds and Viruses to Adults and Developing Bees

- *Adult Bees –Mite injuring developing bees*
  - The nurse or drone bee host is wounded from the physical bite of the mite
  - In the process they can be inflicted with viruses through the wound site
    - Mites will often be found on adult drone bees,
    - They will switch to workers in abundance when drones are no longer produced.
- *Larva*
  - Mites also enter cells with developing bees
  - They prefer developing drones, but will also enter and injure developing workers

Managing Varroa – Mite Dynamics

- **Varroa Mites are always there**
  - *They feed off the fat body and hemolymph (blood fluid)*
    - Researchers indicate that the mites are converting the egg yolk pre-cursor to make their egg – they do not produce this and it is necessary for reproduction
- **5th Stage of Development**
  - *Varroa mite generally enter the cell and hide in the brood food during the 5th stage of larval development (just before capping)*

Larval Choice

- **Varroa Mites Prefer Drones**
  - Varroa mites will favor development in developing drone larva
    - *Biologically they are attracted to developing drones*
    - *This is bad for us as drones have a longer gestation period and therefore varroa mites have more time to generate additional offspring*
    - *It is not out of the realm of possibility that they can enter developing queen cells also*
  - You can often see varroa in capped drone larva
    - *Peel back the capping and if a colony is infested, you will see varroa*


Introduction to Varroa Mites

You will not see this.

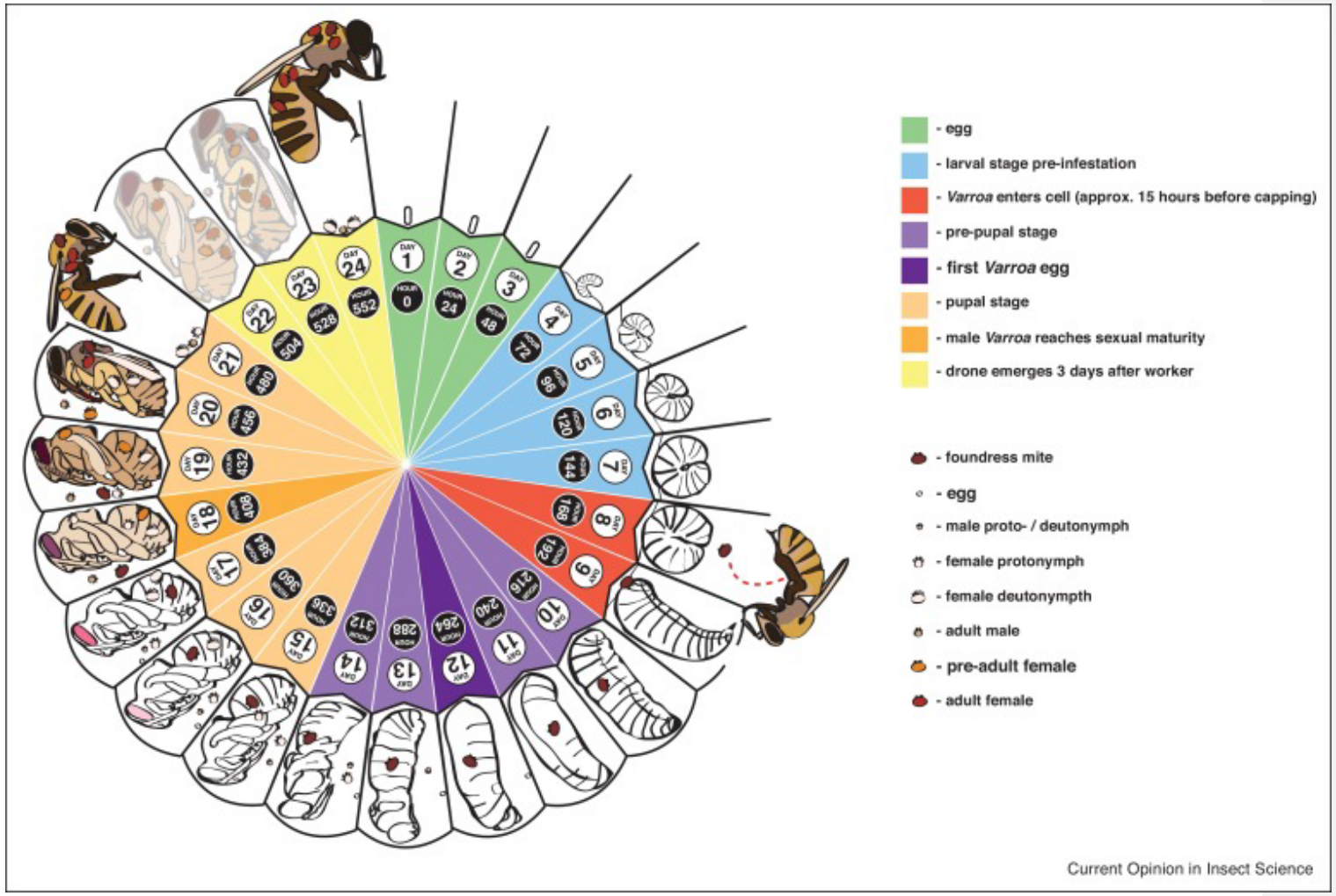
It is atypical for mites to be visible on the bees

Mite Development

Females Mites Generate Offspring

- *Female mites will lay eggs, and mate, with the eggs during the bee's larval development*
  - Given drones take longer to gestate, the mites can make more offspring because the developing mite have more time to grow to a viable adult
- *The ratio of mites to bee larva is in favor of the mites*
  - Stated another way, because mites create multiple mites in contrast to the honeybees, their population will over a period overwhelm the colony

Mite Population Dynamics



- The Varroa reproduction rate for mites in the cell is a ratio of **1.3 to 2.6 females per every bee that emerges.**
- In time, this population dynamic will build enough mites to out pace the population.
- Especially as the bees slow down when the nectar flow declines.

Representative Example

Zac Lamas Data

- *Researcher Zac Lamas is at the forefront of this research*
- *His work is showing that early in the season the varroa mites are often on the drones (male bees)*

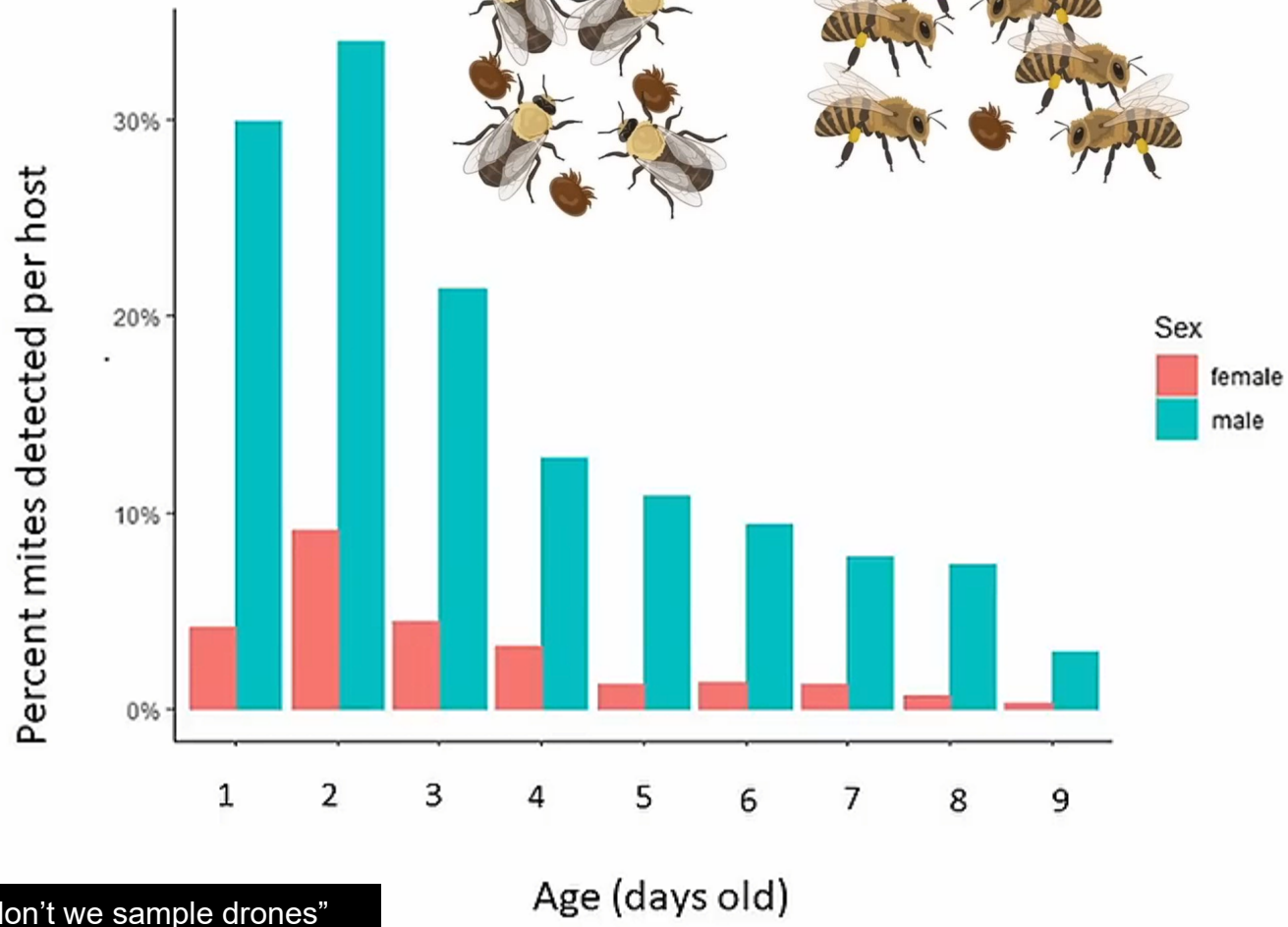
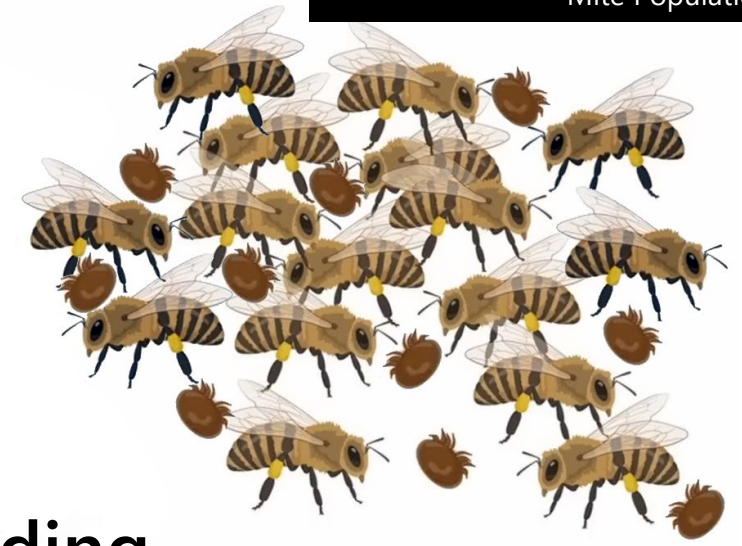


Image Credit: Dr. Zac Lamas – SGMI MEDIA “Why don’t we sample drones”

When Drones Disappear



Early Season Mite Samples are misleading

- *When mites are with drones, it is not going to show up in sampling*
  - When you sample for varroa mites, traditionally you sample for varroa mites using worker brood frames for sampling
  - Since the mites are in developing drone brood, and on drones, mite sampling is masking the true mite population in the hive
- *When the season changes, and drones are no longer there…*
  - You will see a spike in varroa mites in the sampling because they are now with the workers

For the Long Run

- **Colonies that are infested will implode**
  - *If mites, not found through typical sampling, jump to workers when drones taper off, the impact to the hive population will be severe*
- **Timing**
  - *Cessation of Drones corresponds with the window of bees building winter bees.* ***So Net Net – If you treat late, your hives die.***

Virus Transmission

Definition

Trophallaxis: the transfer of food or other fluids among members of a community through mouth-to-mouth

❑ Vectored by Mites

- *When the mite wounds the bees, it transmits viruses to the bees during its feeding*

❑ Virus Transmission through Contact

- *Bees will remove infected developing bees.*
  - Virus transmissions can be transmitted through the contact and passed on to the workers coming into contact to clean up the detected / damaged larva
    - In certain periods of need, bees will cannibalize the larva which also plays a role in transmission throughout the colony. One pathway is via worker trophallaxis.

A word on Viruses

- **The list is long**
  - *Of the 18 known honeybee viruses, six are of primary concern:*
    - Deformed Wing Virus (DWV)
      - the most frequently observed of these viruses
    - Black queen cell virus (BQCV)
    - Sac brood virus (SBV)
    - Kashmir bee virus (KBV)
    - Acute bee paralysis virus (ABPV)
    - Chronic bee paralysis virus (CBPV)

[1]Varroa mite Biology and Feeding Damage Virginia Tech Department of Entomology

Without Mite Management

Healthy colonies implode

- *When the ratio goes out of balance, the colony cannot cope.*
  - Colonies that are thriving often hit the wall in early summer if they are carrying a mite load.
  - More than anything, these colonies especially need to be monitored
- *When monitoring indicates – colonies must be treated early to prevent an overwhelming impact from Varroa Mites*
  - This is the most important dynamic to understand today if you want any chance of succeeding as a beekeeper in these times

Supreme Colonies

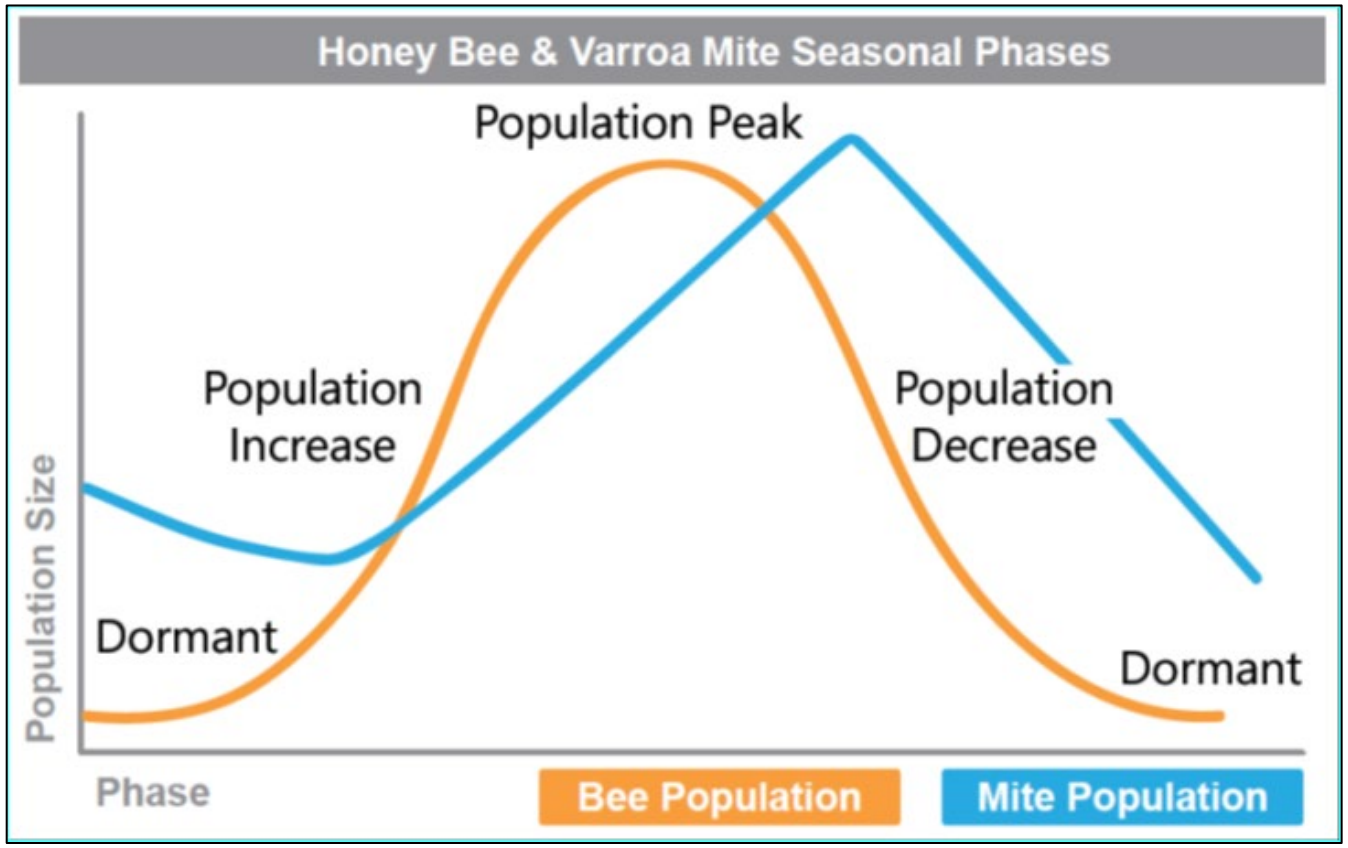
Large Colonies are Mite Factories

- *They have all the right elements*
  - Large colonies produce more brood – and given the ratio, more mites
  - Large colonies have an abundance of drones
  - Large colonies bring in abundant resources; With abundant resources colonies can produce brood longer
    - The queen will keep working as long as indicators can sustain colony growth
- *Philosophically, we do not advocate for massive colonies*
  - At a later stage in the lessons, we will explore this dynamic and have recommendations

Mite Populations

Mite populations correlate with the bee population

- 4 seasonal phases
  - *Dormant*
  - *Population Increase*
  - *Population Peak*
  - *Population Decrease*
    - Return to Dormant



Principle – Start Low

Starting with a low mite threshold

- *Colonies that begin a season with a low mite threshold, can sustain health longer into the season*
  - Incidentally, packages and Nucs fit this category (if sourced properly) and therefore mites have not been a concern up until this point
- *Starting with a low threshold allows you to keep mites at bay*
  - One key principle is start low and keep the mites from overwhelming the colony at any point.
  - Healthier, well provisioned colonies are a path to overwintering

Treat in the Right Time Frame

- **Treat when Drones are tapering off**
  - *You need to get the timing right*
    - It is imperative to monitor and treat **early** to prevent impact
    - When drone production ramps down, you will see mite percentages in samples go up.
      - Some seasons do not have high mite populations – no rhyme or reason to this
      - Sometimes you sample (instructions provided in the next lesson) and percentages are low
      - Other times, you see the spike and you treat to get the mite population numbers down

Bee Population Dynamic (Refresh Cycle)

During Population Growth, Bees are Refreshed

- *The lifespan of a worker is in high rotation when the colony is at peak production*
  - Old bees are replaced at a fast rate and the replenishment of new healthy bees keeps thing chugging right along. It somewhat negates the impact of the mites
- *When the nectar flow slows down, the queen stops laying*
  - Population of workers created tapers off and the bees in the hive are present for longer periods
  - Bees in play for longer periods have more susceptibility to varroa impacts.

Thwart the Perfect Storm

- **Late Spring, Early Summer**
  - *The drones taper off, mites are at an all time high, and the queen is not refreshing the working population with as much fervor as earlier*
- **Change the balance**
  - *The longer this dynamic is allowed to persist, the more foothold the mites have in taking the upper hand*
  - *Monitor and treat early; June/ early July is customary If you wait until Aug/Sept to treat….* ***The fight is all but over.***

Closing Comments

- **Customary Close**
  - Where we stand, where we are going…
    - *This module sets the stage for knowing how varroa mites impact a colony*
    - *Our next lessons review*
      - How to monitor (sample) for varroa mites
      - Treatment Options and Methods for Varroa
      - And a primer on Small Hive Beetles

Q&A

- **What Questions did we not anticipate?**
  - If you have feedback, you can leave a constructive comment; but be nice.
  - You could also send an email to comments@managedmentoring.com
    - *Please refer to this video in the subject so we know what the reference is.*