

# IPM in Beekeeping



- ◆ A vital element of successful beekeeping is constant monitoring for:
  - Colony Strength
  - Pests
  - Parasites
  - Diseases
- ◆ Brood diseases lay in *dormant form* in virtually every beehive.
- ◆ Pest and Parasites can enter All hives - with weak or strong colonies.
- ◆ When a colony weakens, everything can become an issue.
- ◆ A strong vigorous colony is not as easily affected.
- ◆ Be Proactive - Not Reactive!



# Integrated Pest Management

IPM is a system that focuses on long-term prevention of pests, and diseases using one or more of the following Controls:

## Biological Control

Use of natural enemies to pests and parasites affecting bee colonies.

## Cultural Control

Practices that reduce pest establishment, reproduction, dispersal, disturbs their life cycle and survival rate.

## Mechanical / Physical Control

Kill pests directly or manually whenever possible, make environment unsuitable for pests/diseases to thrive.

## Chemical Control

In IPM, approved pesticides are used only when needed, as directed by manufacturer, and in combination with other approaches for more effective, long term control. (More is not better). Chemicals/pesticides can have a residual effect and accumulate over time in comb, weakening bees.

While each situation is different, five major components are common to all IPM programs:

1. Pest identification
2. Monitoring and assessing pest numbers and damage
3. Guidelines for when management action is needed
4. Preventing pest problems
5. Using a combination of biological, cultural, mechanical/physical and chemical management tools to achieve healthy and sustainable environments for bee colonies to thrive in.

# Identify It!

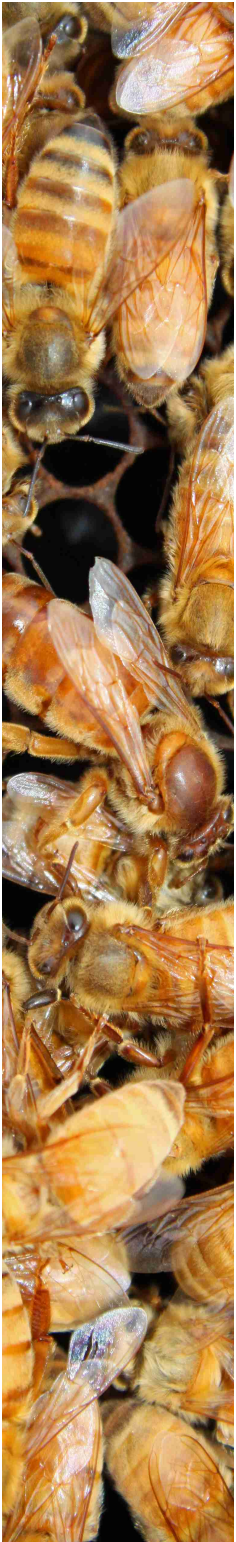
- ◆ Recognize intruders in all stages of development and problems they cause:

- ◆ Small Hive Beetle
- ◆ Wax Moth
- ◆ Varroa Mite
- ◆ Tracheal Mite
- ◆ Animals - Skunks, Raccoons, Bears, etc

These intruders often carry viruses, bacteria and spores that cause disease and illness in bee colonies.

- ◆ Recognize Diseases and what actions to take for remedy.

- ◆ DWV - Deformed Wing Virus
- ◆ Nosema - Ceranis or Apis
- ◆ Chalkbrood
- ◆ Stonebrood
- ◆ American or European Foul Brood

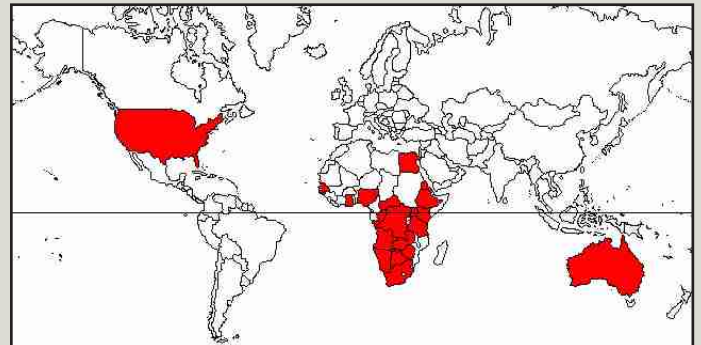




# Small Hive Beetle (SHB)



- ◆ Newly emerged larva are cream colored with protuberances (spikes) all over surface, rubbery
- ◆ 3 pair prolegs near head
- ◆ Larva cause destruction by eating comb, honey and bee brood
- ◆ Larva seek soil to pupate to become flying adult
- ◆ Flying adult beetles 1/4 inch long, hard shell
- ◆ Reddish brown to black
- ◆ Detect hive/bee odors from unknown distances



# IPM Control of Small Hive Beetle

## In Apiary

- ◆ Raise hygienic stock - NW Carniolan, Russian, Minnesota Hygienic, etc
- ◆ Requeen with hygienic stock when possible
- ◆ Reduce hive stress by careful observation / treatment for diseases, parasites and other pests
- ◆ Manually kill beetles during hive check -  
1 Fertile Female = 1000 Eggs
- ◆ Your reflexes will get better with practice!
- ◆ Check bar racks, crevices, bottom corners
- ◆ Setup hives where in sunlight most of day
- ◆ Soil-dwelling nematodes under/around hives
- ◆ Rock salt under/around hives
- ◆ Diatomaceous Earth under/around hives
- ◆ In-Hive Traps (at your discretion) - Attractant and Killing Agent
- ◆ GuardStar and CheckMite chemicals used as directed



## Extraction / Storage Areas

- ◆ Clean up honey, extra bits of wax, store in sealed containers
- ◆ Reduce relative humidity in areas where honey is stored to 50%

# Wax Moth



- ◆ Larva are cream colored soft, fleshy and segmented
- ◆ 3 pair prolegs near head and more sets of legs down body
- ◆ Larva cause destruction by burrowing through comb, leaving webbing
- ◆ Make cocoons all over hive
- ◆ Adult moths excavate into wood frames and hive bodies
- ◆ Greater and lesser wax moth create similar damage

# IPM Control of Wax Moths

## In Apiary

- ◆ **Keep hives strong, combine weak hives with others**
- ◆ **Reduce hive stress by careful observation/treatment for diseases, parasites and other pests**
- ◆ **Manually kill wax moths during hive check**
- ◆ **Look carefully at open brood cells for larva**
- ◆ **Wax moths are nocturnal, set hives in sunlight most of day**
- ◆ **Prevent brood production in honey supers**
- ◆ **Do not over super hives - enough bees to cover frames**
- ◆ **Clean bottom boards annually**
- ◆ **Clean and rotate equipment in bee yard**
- ◆ **Replace part of frames/hive bodies every 2-3 years**
- ◆ **Bees cannot clean comb as well when wax is old.**

## Extraction / Storage Areas

- ◆ **Do not store honey-extracted comb in dark, warm or poorly vented places**
- ◆ **Do not bag extracted comb unless frozen for 24 hours, thawed in moth free area, and then Tightly bagged**
- ◆ **Store supers, hive bodies and frames in using moth crystals**
- ◆ **Allow 3 days to air out before using with bees**
- ◆ **Do Not use moth balls**



# Varroa Mite

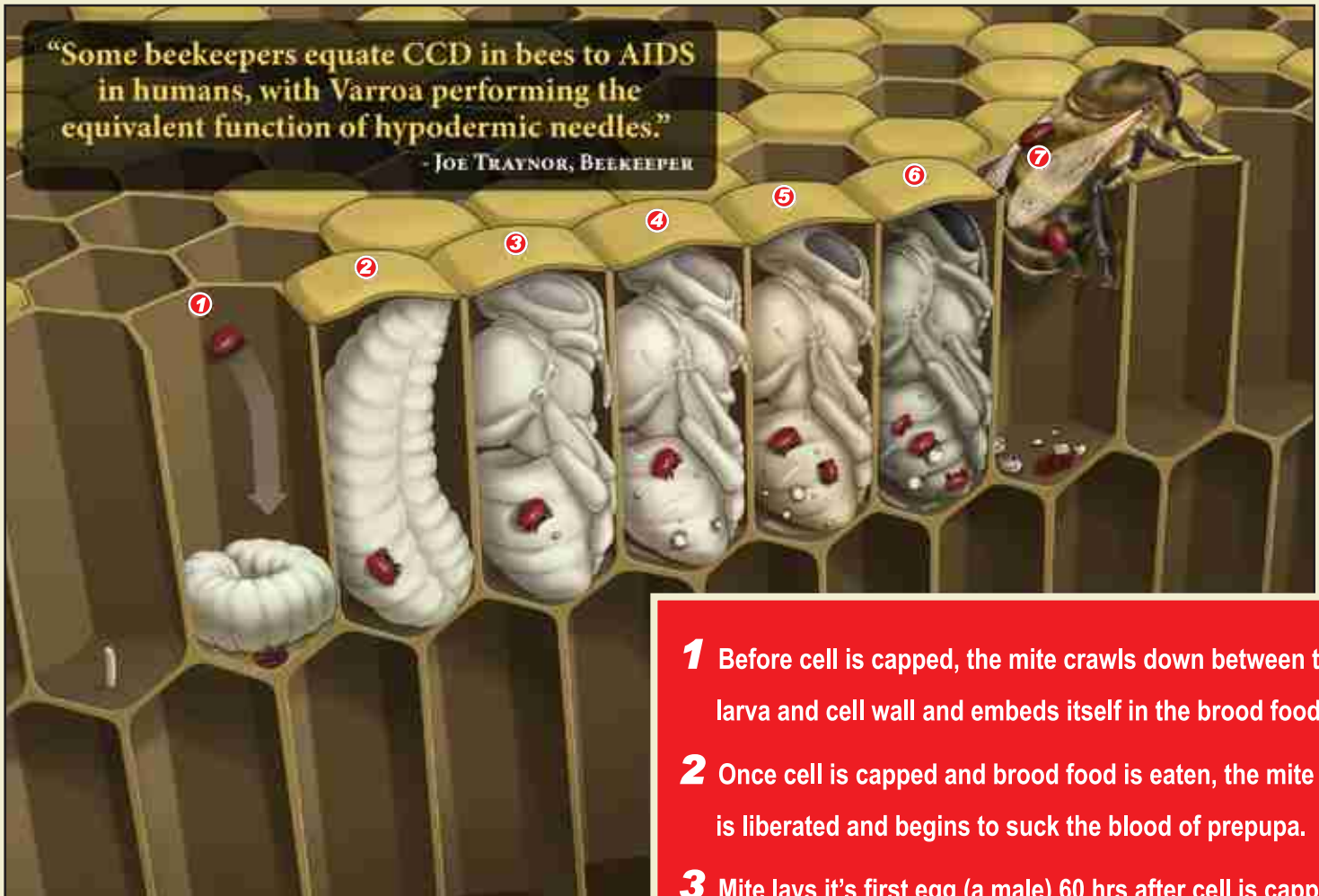


- ◆ Carry bacteria, viruses and spores
- ◆ Responsible for DWV
- ◆ Reddish brown, flat, oval, 8 legs
- ◆ Size of head of pin
- ◆ Piercing sucking mouth parts
- ◆ Suck on blood of bee host
- ◆ Prefer to utilize drone cells for reproduction
- ◆ Bees do not develop properly
- ◆ Heavy infestation can be fatal
- ◆ Live only few days w/o blood meal
- ◆ Can hide under abdominal segments undetected
- ◆ Do not fly
- ◆ Heavy infestation during heavy brood rearing season -  
Mid summer to early fall
- ◆ Spread from bee to bee contact,  
crawling from one host to another,  
bees drifting from colony to colony



“Some beekeepers equate CCD in bees to AIDS in humans, with Varroa performing the equivalent function of hypodermic needles.”

- JOE TRAYNOR, BEEKEEPER



# Life Cycle of Varroa Mites

- 1** Before cell is capped, the mite crawls down between the larva and cell wall and embeds itself in the brood food.
- 2** Once cell is capped and brood food is eaten, the mite is liberated and begins to suck the blood of prepupa.
- 3** Mite lays its first egg (a male) 60 hrs after cell is capped and then lays subsequent females egg every 30 hours.
- 4** Mite feces begin to build up in cell.
- 5** Mite continues to develop while feeding on bee and transferring viruses.
- 6** Mating begins within the cell, between siblings.
- 7** Adult female mites leave cell with emerging bee while male mite and immature varroa mites die in cell.

# IPM Control of Varroa Mite

## In Apiary

- ◆ Raise hygienic stock - NW Carniolan, Russian, Minnesota Hygienic, etc
- ◆ Requeen with hygienic stock when possible
- ◆ Reduce hive stress by careful observation / treatment for diseases, parasites and other pests
- ◆ Use Detection Methods:
  - Look for DWV - malformed wings during hive check
  - Brood examination done with regular hive check
  - Sugar, ether, or soapy water roll - late summer or fall
  - Tacky paper/mite fall examination/grid count
- ◆ Removal and destruction of infested brood/drone brood
- ◆ Confining queen in cage inside hive to break brood cycle
- ◆ Organic or essential oils - thymol, neem, and canola
- ◆ Most chemicals cannot be used during honey flow
- HopGuard II just came out - says improved product

## Extraction / Storage Areas

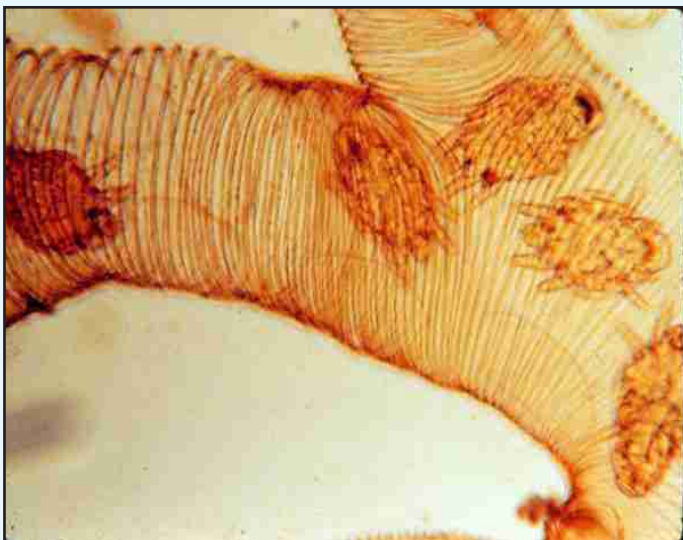
- ◆ Equipment not used in hive for 2 weeks should be mite-free



DWV - looks like wings melted

# Tracheal Mites

- ◆ Full life cycle of mite is in bee trachea
- ◆ Leave only to find new host
- ◆ Detection with microscope
- ◆ Spread by drifting bees, infested swarms, bee contact
- ◆ Shorten life span of bee
- ◆ K-wing, affects flight
- ◆ May have dysentery
- ◆ Mite infestation highest in early spring
- ◆ May not show any symptoms



## IPM for Tracheal Mites

- ◆ Menthol vapor treatment
- ◆ Grease/sugar patty w/ menthol
- ◆ Essential oils of spearmint & lemongrass in sugar water feed
- ◆ Equipment not used for one week is tracheal mite free

# Nosema Apis and Ceranae



- ◆ Parasitic fungi resides in bee's gut
- ◆ Produces spores pass in feces
- ◆ Nosema Apis hits winter & early spring
- ◆ Nosema Ceranae anytime of year
- ◆ Brown spotting on outside/inside hive
- ◆ Rapid colony decline



## Nosema IPM

- ◆ Nosavite used as preventive and treatment
- ◆ Fumigilin-B antibiotic stops fungi from reproducing
- ◆ Proper ventilation during closed up months







## Chalkbrood

- ◆ Mummified brood, covered in white or black/grey mold
- ◆ Spreads when dead larva release millions of spores contaminated by foraging bees drifting, swarming
- ◆ Bee contact, beekeeper



## Stonebrood

- ◆ Mummified brood become stone hard
- ◆ Larva covered in green powdery mold
- ◆ Spreads when dead larva release millions of spores contaminated by drifting, swarming, beekeeper mishandling dead larva

## Chalkbrood/Stonebrood IPM

- ◆ Proper ventilation of hives, set hives in warmer/sunnier location
- ◆ Excessively damaged colonies may need requeening
- ◆ Good beekeeper hygiene when handling hives

# American Foul Brood



- ◆ Spores enter midgut of host bee and feed on them from the inside out
- ◆ Infected pupa may die with tongue sticking out
- ◆ Long ropey larva under caps
- ◆ Irregular brood pattern with sunken caps
- ◆ Spread by drifting bees, unsanitary tools and equipment used by beekeepers
- ◆ Distinctive foul odor, very contagious

# European Foul Brood

- ◆ Malpositioned and discolored larva in cells
- ◆ Irregular capping pattern
- ◆ Larva become flaccid and melt in bottom of cell leaving scale
- ◆ Has unpleasant odor, not as bad as AFB



# American and European Foul Brood IPM

- ◆ **Responsible and sanitary practices of each beekeeper with their personal gear, the equipment and tools they use**
- ◆ **Some very rare mild cases of either disease can be treated, but many states have a mandatory burn laws in effect.**
- ◆ **Hive destruction should be away from other unaffected hives**
- ◆ **Extra care should be taken when burning AFB/EFB to prevent fire hazard**
- ◆ **All parts of hive body, frames, bee colonies, and honey must be destroyed**
- ◆ **In areas where AFB or EFB are prevalent, beekeepers treat healthy colonies with Terramycin powder, an antibiotic, as a preventative and cure**



**Let's Do  
Our Part ...  
and Raise  
Healthy Bees!**