

Integrated Pest Management

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Meaning

Seek to control pest using a variety of strategies that are safe, effective and economical and will lead to a sustainable level of control.

Meaning

It coordinates the use of pest biology, environmental information and available technology to prevent unacceptable risk to people, property, resources and the environment.

IPM Principles

1. Acceptable pest levels

How to keep the pest population down below the economic threshold

2. Preventive cultural and regulatory practices

Burning AFB Hives

Treating to prevent AFB

Restriction of bees from other countries

Quarantine apiary

IPM Principles

3. Monitoring

Monitor Varroa mite population in hives through the active season (April – November)

Wax moths life cycle during the year changes allow to monitor and take action when wax moths may be more destructive

Small Hive beetle (SHB)- monitor strength of hive. It is a subtropical insect so less likely to be a problem in colder weather

IPM Principles

4. Genetic Control

Finding breeds of honey bee that are resistant to Varroa mites (Russian, Varroa Sensitive hygienic/VSH, Purdue mite biters)

Minnesota hygienic bees for AFB

5. Mechanical Control

SHB- hand smashing them, trapping

Varroa mites- screened bottom boards, cutting out drone brood, caging queen to disrupt mite cycle

IPM Principles

6. Physical Control

Use heat, cold, light, humidity and ventilation to control a pest

Freezing comb to kill SHB and wax moth eggs

Storing supers off hives in a room that has less than 50% humidity and below 50 degrees will control SHB and most likely wax moths

Light and ventilation will work on SHB and wax moths

Keep honey house clean to control SHB

IPM Principles

7. Biological Control

Soil nematodes for SHB – kills the larvae of SHB as they enter the soil

Testing to see if a fungus will kill Varroa mites

IPM Principles

8. Chemical Control

Should not be the only control to be used

Synthetic or organic pesticides used to control Varroa mites

Use of Antibiotics Terramycin or Tylan for the control of American foulbrood and/or European foulbrood

Use of fumigilin B for control of Nosema

Control Means:

**Includes Prevention, Control
and Treatment**

IPM of Brood Diseases

- ❑ Learn to ID the diseases
- ❑ Inspect every frame in colony at least spring and fall. From top to bottom!
- ❑ Think about removing 2- 3 frames each year from each brood box. This is to decrease disease spore build up on frames and comb.

IPM for Brood Diseases

- ❑ Could try Minnesota Hygienic bees
- ❑ Use Antibiotics as a preventative
 - ❑ Will need to get a prescription from a Veterinarian
- ❑ Use fumigilin B for Nosema disease

IPM for Brood Diseases

- ❑ Replace queen
- ❑ Hive manipulation-
 - ❑ move hive to better location
 - ❑ Combine weak hives- only diseased free hives
 - ❑ remove frames
 - ❑ collapse hive down
- ❑ Treat with antibiotic if necessary

Do Your Bees need Antibiotics?

- ❑ If you have used it as a preventative for AFB
Yes you will need to continue
Or change your practices
- ❑ If you never used it
May not need to worry about getting
Know a veterinarian in case may need for EFB

Brood Diseases

Comparing Brood Diseases of Honey Bees

	American foulbrood (bacteria)	European foulbrood (bacteria)	Sacbrood (virus)	Chalk brood (fungus)
Age infected	1-3 day old larvae	2-5 day old larvae	1-5 day old larvae	4 day old larvae
Age that brood dies at	older sealed larvae or young pupae	young unsealed larvae (5-8 day old larvae)	older larvae, fail to pupate	older larvae, unsealed
Position of dead brood in cell	lengthwise in cell	typically coiled in cell	lengthwise in cell, forms a sac	lengthwise on cell, mummy fills up cell.
Color of dead brood	Dull white turning carmel brown to dark brown then black	Dull white to yellowish white turning brown to dark brown then black	Dull white or gray turning to straw color to dark brown. Head is black	chalk white- to gray to dark gray.
Consistency of dead brood	Soft, becoming sticky to ropy. Ropes out!	Watery, rarely sticky or ropy. Comes out in clumps	Watery and granular tough skin forms a sac.	pasty/chalky
Appearance of cappings	Capping sunken and may have a puncture hole in it. Capping may be greasy looking	Most time the cell has not been capped. If died in late larvae stage capping may be present	Capping may be present. Usually see 2 holes in capping.	no capping
Scale characteristic	Lies uniformly on lower side of cell, Adheres tightly to cell wall. Fine tongue of dead pupae may be present. Black in color	Usually twisted in cell, does not adhere to cell wall, rubbery, black in color.	Head is curled toward center of cell. Does not adhere to cell wall, Brittle, and black in color.	Mummified. Does not adhere to cell wall, easy to pull out. Chalky white to gray in color.
Odor of dead brood	Slight to pronounced putrid odor	May have sour odor	None or slightly sour odor	Yeast like odor
Action beekeeper needs to take	Quarantine hive. Send sample to USDA Beltsville to verify. If positive, kill bees and destroy hive.	Requeen, feed until nectar flow starts. May also want to treat for varroa mites.	Requeen, feed until nectar flow starts.	Move hives to sunny & dry location. May need to requeen.

You want a Good Laying Pattern



Look for Eggs- Healthy Queen



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Look for Healthy Larvae



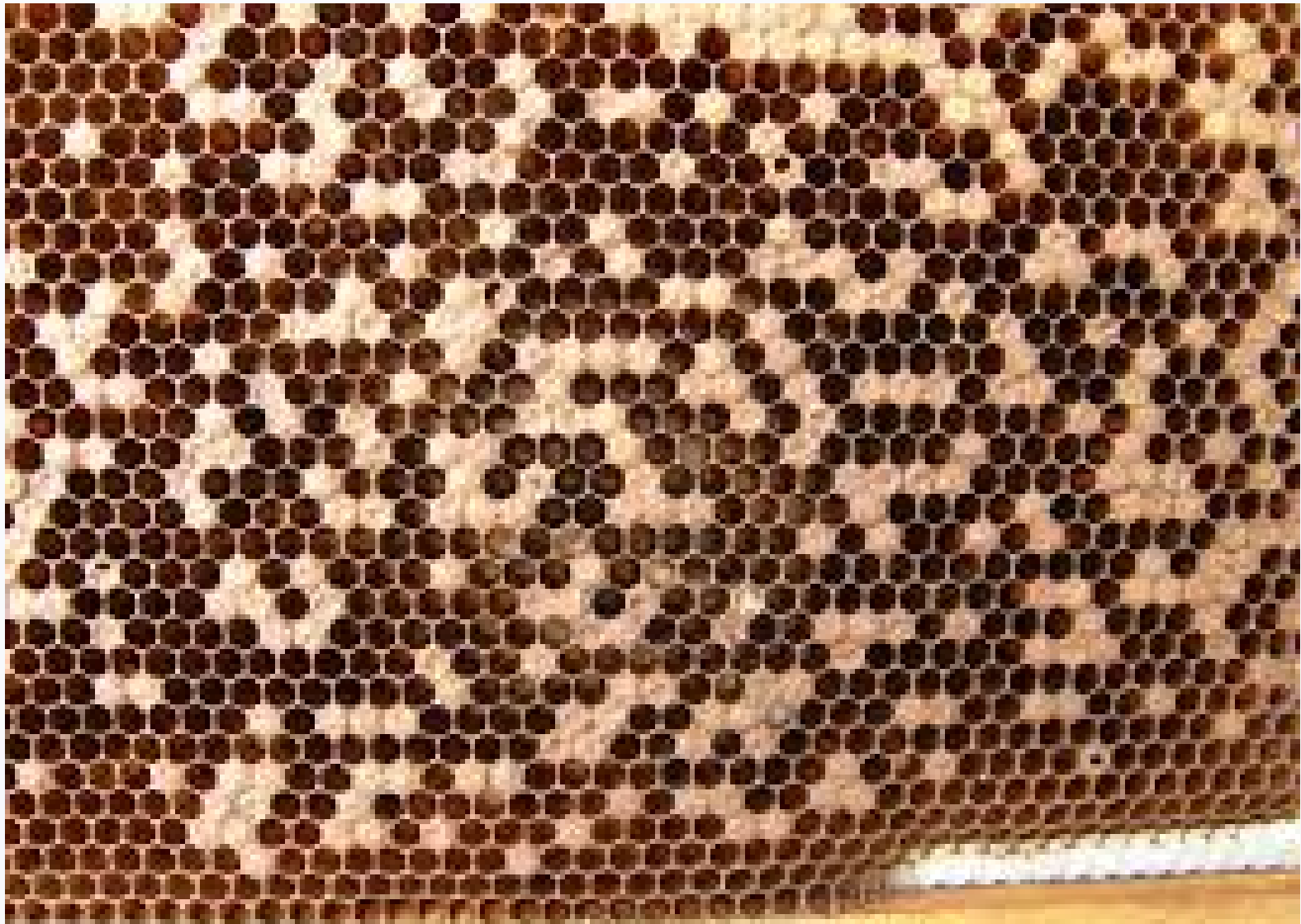
Check Open Cells



Check this Frame Closely



Check Very Closely



Check Unhealthy Larvae



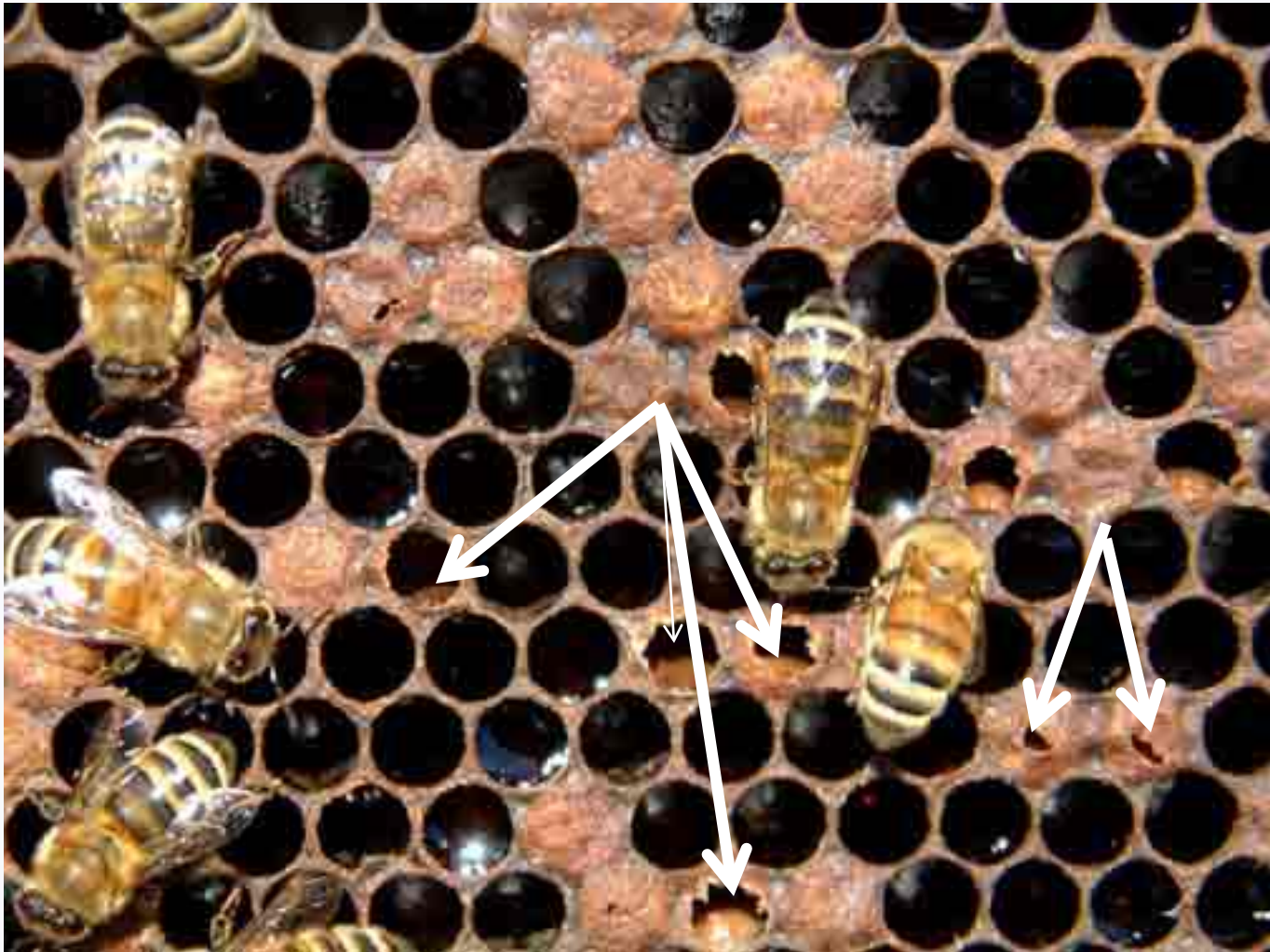
Check Cells with Holes



Test Kits for AFB & EFB if suspect



ID American Foulbrood

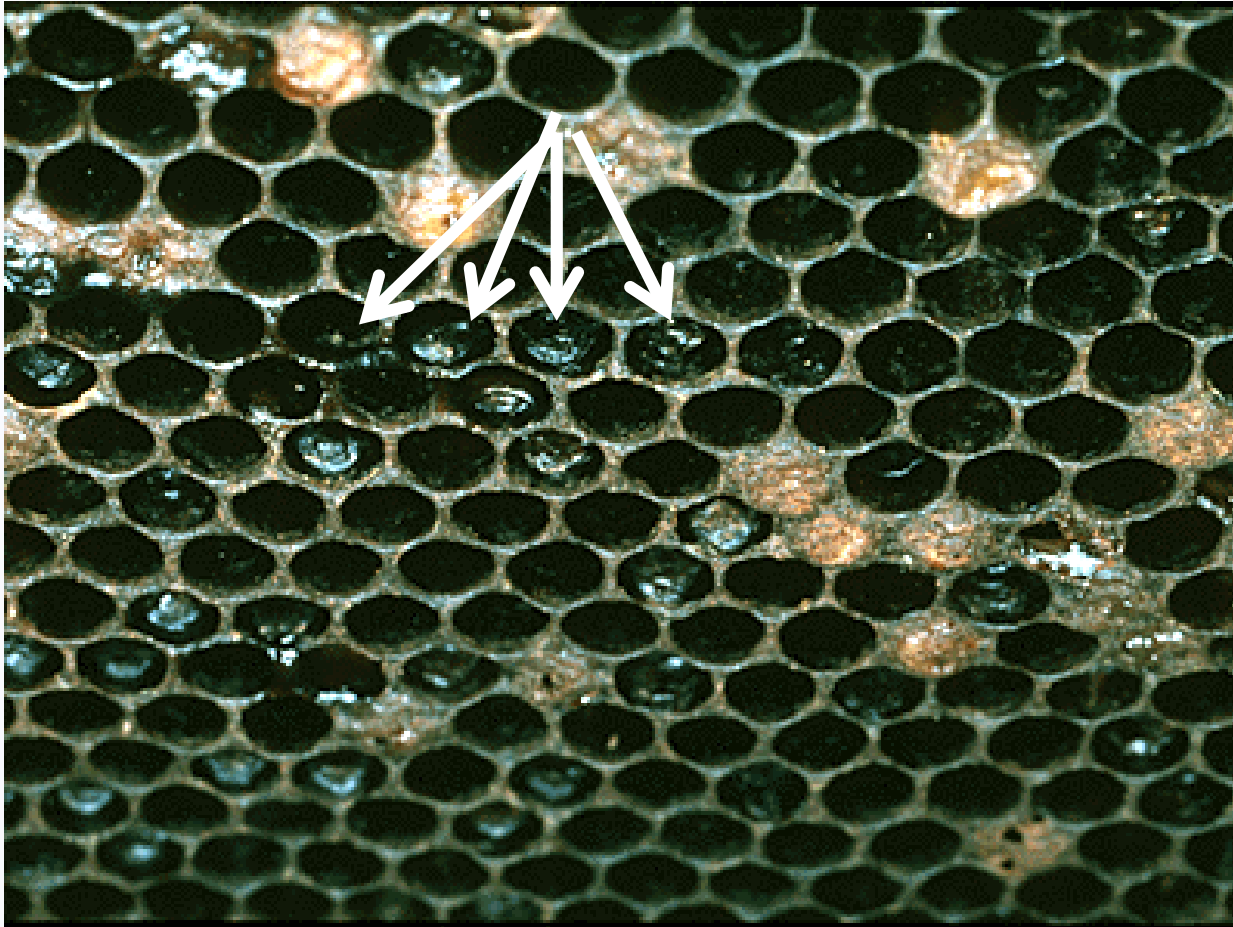


AFB Larvae Rope Test

Ropes out an inch or more



American Foulbrood Scale



What to do with AFB Hives

BURN DISEASED HIVES



STERILIZE EQUIPMENT

IOTRON

4394 E. Park 30 Drive

Columbia City, IN

Tel: 260-212-1722

\$500.00 minimum

AFB Found

- ❑ Close up hives fast
 - ❑ Some will burn ASAP
- ❑ Clean hive tool-
 - ❑ put in smoker and let get hot and stick in ground to clear off debris
 - ❑ Take comet and clean off all debris left
 - ❑ Sterilize again in hot smoker
- ❑ Leather gloves- toss- can not clean
- ❑ Smoker scrub down parts touched

Control of AFB- if found in a hive

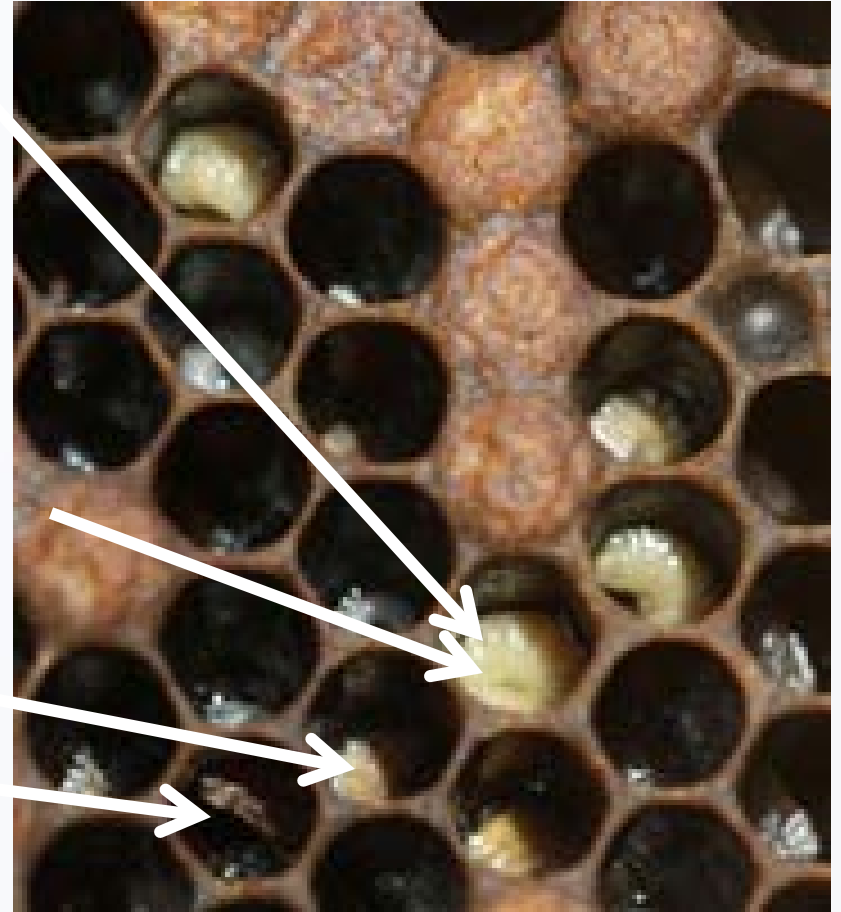
- ❑ Treat the other hives in that apiary
 - ❑ Terramycin- can be use spring and fall
 - ❑ Tylan- use only in the fall only for AFB
 - ❑ Need an veterinarian prescription now
- ❑ Quarantine the apiary for at least 18 months-
 - ❑ what goes in that apiary stays in that apiary
 - ❑ This includes all honey supers and frames

IPM for AFB - Prevent it

- ❑ Have Minnesota Hygienic stock
- ❑ Use new equipment only
- ❑ Know who you get Nucs from
- ❑ Check hives spring and fall for present
- ❑ Check any dead hives for AFB
- ❑ Rotate out frames to keep spore counts low
- ❑ Supers in that apiary came from that apiary could even mark hive they came from

European Foulbrood

- ❑ Kills larvae in the coiled stage
- ❑ Infested larvae turns yellowish first then light brown to dark brown

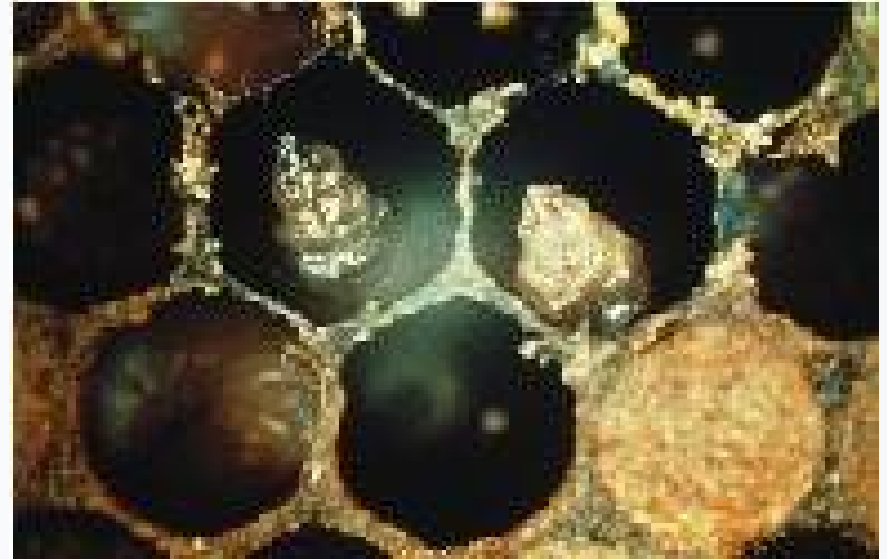


IPM for EFB

- ❑ Requeen
- ❑ Move hives to a better honey flow or a place with mixed flowering plants
- ❑ Pull frames that have many EFB cells
- ❑ Feed Terramycin
 - ❑ Need Veterinary prescription to get now
 - ❑ Follow labels!

Sacbrood Symptoms

- ❑ Larvae turns yellow-gray then blackish
- ❑ Head changes first to black color
- ❑ Note head raised in the cell



IPM for Sacbrood

- ❑ There is no treatment for Sacbrood
- ❑ Will diminish when stress subsides or foraging improves
- ❑ Requeen the hive
- ❑ Most common during the spring

Chalkbrood Mummies

pulled out of cell



Chalkbrood on Entrance Board



IPM for Chalkbrood

- ❑ No treatments are available
- ❑ Increase ventilation
- ❑ Move to sunny & dry location
- ❑ Eliminate the stress- get hives on a better location or supplement feed
- ❑ Requeen if you have many dead larvae

Nosema



Test for Spores

- ❑ Need a 400X microscope , counting chamber, mortar and pestle, and clean water to look at it yourself
- ❑ Could send in samples to USDA Beltsville lab. Send in swap of fecal material also

IPM for Nosema

- ❑ **Fumigilin- B** is approved for Nosema control
- ❑ The spores may lose their viability within a few days in water exposed to direct sunlight
- ❑ Replace frames that have bee feces on them
- ❑ Freeze frames to kill Nosema ceranae
- ❑ Fumigation (Ethylene Oxide) & Irradiation

Viruses

- ❑ Around 24 viruses have been identified
- ❑ Increase in virus problems since varroa mites
- ❑ One cause of CCD

Main ones looked for:

Sac brood

Black queen virus

Deformed wing virus

Kashmir bee virus

Acute bee virus

Chronic bee Paralysis

Viruses



Viruses





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IPM for Viruses

- ❑ Mite resistant bee stocks
 - VSH
 - Russian
 - Purdue mite biters

- ❑ Keep Varroa mite population down
 - ❑ Treat for Varroa mites when mite count is 3 mites per 100 bees

IPM for Viruses

- ❑ Requeen hive
- ❑ Treat with Antibiotics or Probiotics
- ❑ Feed if not much stored pollen and nectar
 - ❑ Move them to a place with a better nectar flow

Pest of Bees

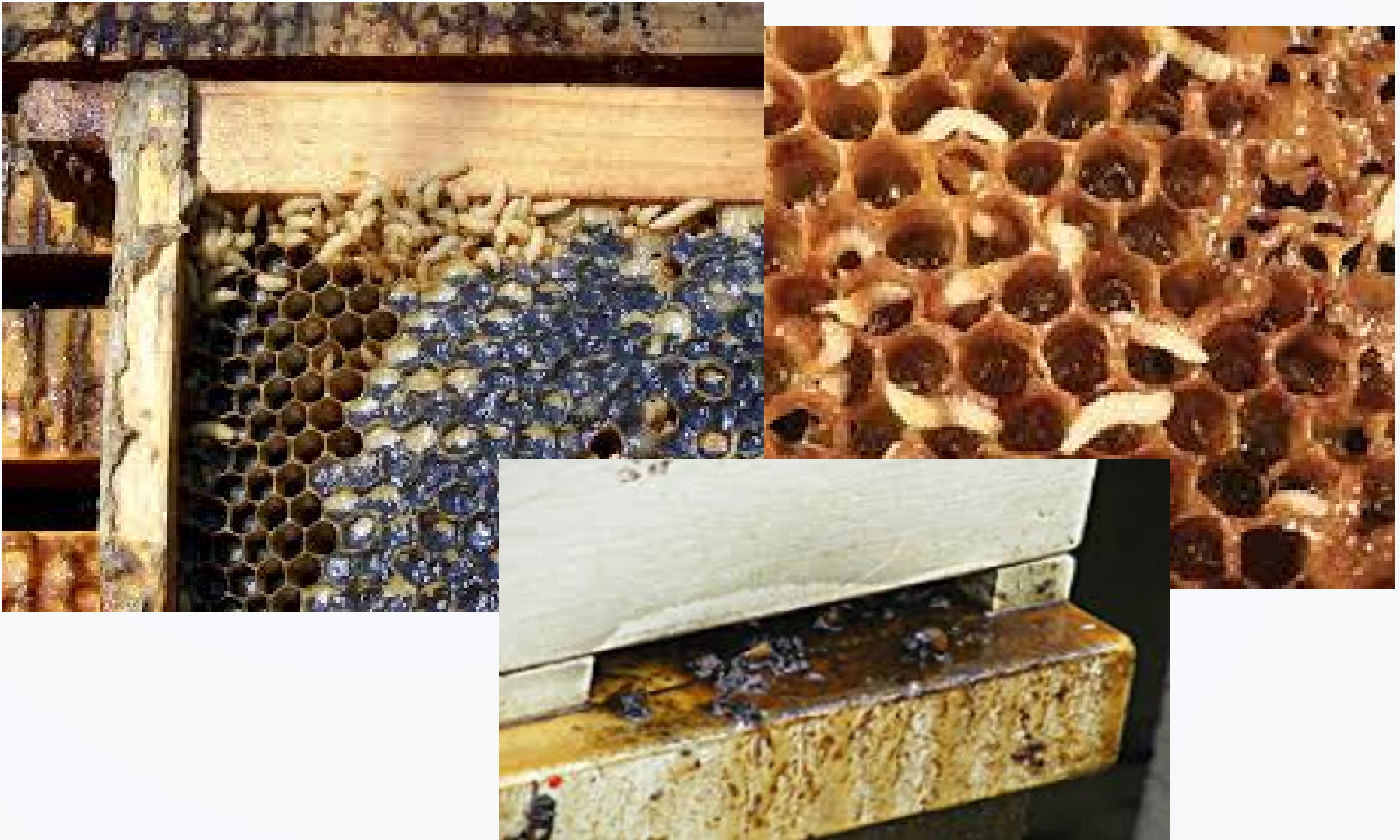
- ❑ Small hive beetles & Wax moths
 - ❑ secondary pests that take over weak hives
 - ❑ Can ruin stored equipment
- ❑ Tracheal mites
- ❑ Varroa mites
 - ❑ Biggest pest/parasite we have
 - ❑ Must control mite population

Small Hive Beetles

- ❑ Hiding from bees in grooves
- ❑ Hide on top of inner cover
- ❑ Running across the frames with few bees on them



SHB Larvae does the Damage



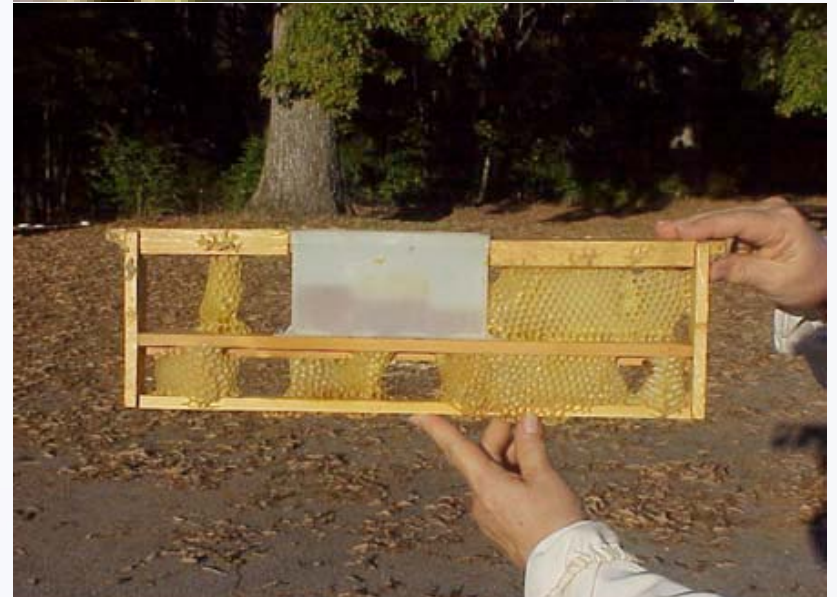
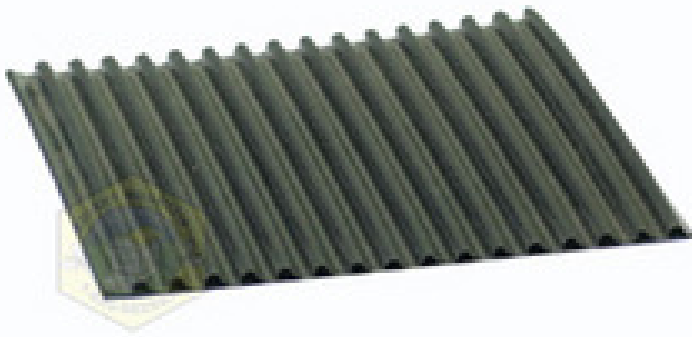
IPM for SHB

- ❑ Put hives in direct sunlight
- ❑ Keep hives strong
 - ❑ Bees covering all frames
 - ❑ Do not put too many honey supers on that bees can not protect the comb
- ❑ Traps to trap adults
- ❑ GardStar –treat ground when have SHB larvae ONLY

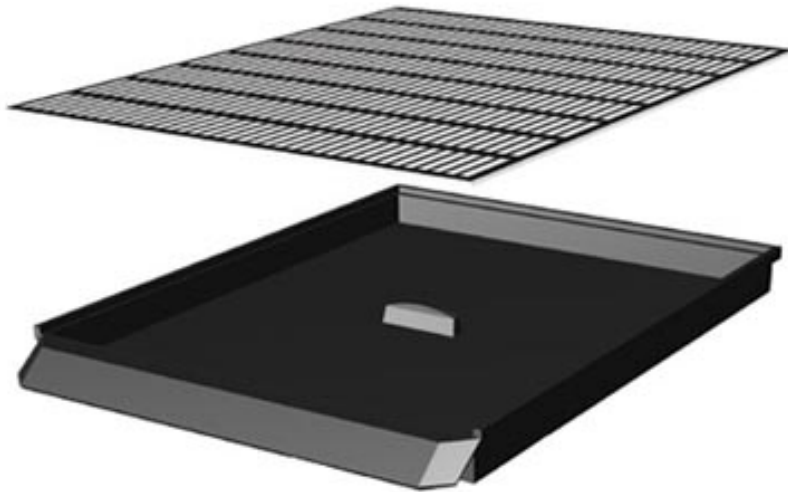
IPM for SHB

- ❑ Keep honey house clean
- ❑ Extract the same day you pull honey
 - ❑ Some say you have 2 -3 days to get it extracted before the SHB larvae gets to it
- ❑ Freeze comb just extracted, or expose it to light and ventilation, or put in room 50% humidity below 50

Several SHB Traps



SHB trays - Bottom of Hive



Wax Moths



IPM for Wax Moth

- ❑ Treat stored equipment with Paradichlorobenzene. Does more damage to equipment off of hives
- ❑ Freeze frames to kill eggs
- ❑ Put in room with humidity below 50% and temps below 50.
- ❑ Keep on eye on weak hives

Tracheal Mites

- ❑ Found in 1984 in the U.S.
- ❑ Lives and reproduces in the trachea of honey bees
- ❑ Hinders the breathing of bees
 - ❑ High infestation of mites, the bees are unable to fly
- ❑ Not a major problem now

Tracheal Mites



Varroa Mites

- ❑ Found in 1987 in the U.S.
- ❑ The most serious pest of honey bees
- ❑ Feeds on the larva, pupa and adult stages of bees
- ❑ Already resistant to some of the miticides used
- ❑ Vectors viruses of honey bees

Varroa Mites



IPM for Varroa Mites

- ❑ **Monitor mite count**
- ❑ Resistant stock
 - ❑ VSH, Russian or Purdue Mite biters
- ❑ Treat all hives in an apiary at the same time
- ❑ Keep hives strong
 - ❑ Requeen if have to
 - ❑ Good food source or supplement feed
 - ❑ keep disease free

IPM for Varroa Mites

- ❑ Use screened bottom boards
- ❑ Cutting out drone brood or use a green drone brood frame
 - ❑ Do not leave in drone brood frame too long that you are raising Varroa mites
- ❑ Caging queen to disrupt mite cycle
 - ❑ Could treat when you cage the queen so less brood is capped

Always Check for Varroa Mite

- ❑ Winter – dead bees can be checked for varroa mite, tracheal mites and Nosema
- ❑ Spring through fall – know mite counts at all times
 - ❑ over 3 mites per 100 bees you need to treat
- ❑ How to sample:
<http://honeybeehealthcoalition.org/varroa/#videos>

Pesticides for Varroa Mites

- ❑ Apistan & CheckMite- Varroa mites may be resistant to these treatment
- ❑ ApiVar- new synthetic mite strip
- ❑ Apiguard & Apilife Var- Thymol treatments
- ❑ Miteaway Quick strip – Formic Acid
- ❑ Hop Guard- hops
- ❑ Oxalic Acid- vaporization or drizzled

Treat Correctly with Pesticides and Antibiotics

- ❑ Do not administer any drug or antibiotic during honey flow or into honey supers
- ❑ Drugs should never be considered a substitute for Good Beekeeping
- ❑ Follow all Pesticide labels
 - ❑ The way to apply
 - ❑ when and how long to apply
 - ❑ Honey supers off, except for Miteaway quick strips

Internet Information

Varroa mite information:

<http://honeybeehealthcoalition.org/>

<http://honeybeehealthcoalition.org/varroa/>

Small hive beetle Information:

[http://articles.extension.org/sites/default/files/SHB-Mgt-in-MS_2012_Sheridan-Fulton-Zawislak%20\(1\).pdf](http://articles.extension.org/sites/default/files/SHB-Mgt-in-MS_2012_Sheridan-Fulton-Zawislak%20(1).pdf)

<http://www.clemson.edu/psapublishing/Pages/Entom/EB160.pdf>

Good Books on the Diseases & Pests

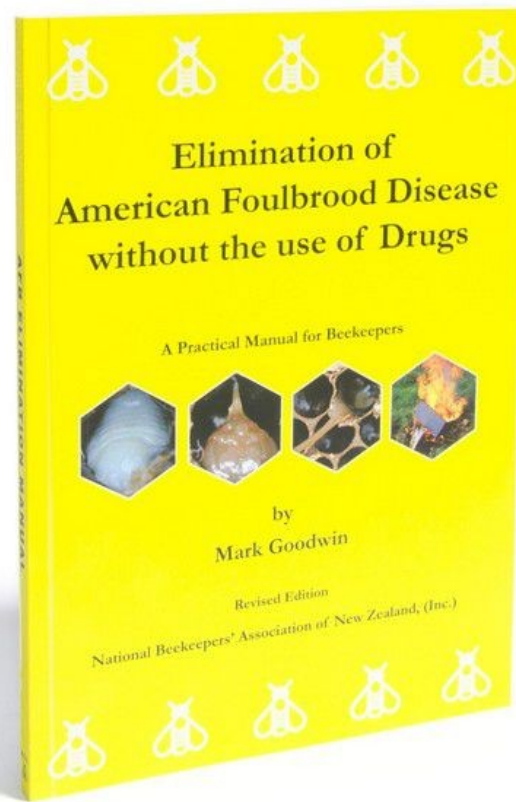
“Honey Bee Diseases & Pests”

By Canadian Association of Professional Apiculturist

“A Field Guide to Honey Bees and their Maladies”

By The Mid-Atlantic Apicultural Research and Extension
Consortium

Another Book to Look for



Testing for Diseases

Diagnosis of honey bee diseases:

<https://www.ars.usda.gov/is/np/honeybeediseases/honeybeediseases.pdf>

Africanized bee testing

<https://www.ars.usda.gov/pacific-west-area/tucson-az/honey-bee-research/docs/morphometrics/>

Nosema:

<https://pollinator.cals.cornell.edu/sites/pollinator.cals.cornell.edu/files/shared/documents/Nosema%20Infosheet.compressed.pdf>

Thank You

Any questions?