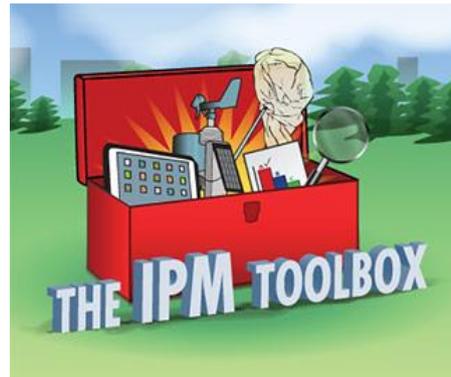




## Varroa Mite IPM Series

### Part 1: Varroa mite biology and life history



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Department of  
Agriculture

National Institute  
of Food and  
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# Webinar Details

Welcome

A recording of this webinar will be available  
within a week at

<http://www.neipmc.org/go/ipmtoolbox>

# We Welcome Your Questions

Please submit a question **at any time** using the Q&A feature to your right at any time

If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

## Webinar Presenters



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*Chief Inspector*  
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# Some Questions for You

# Outline

Honey Bee Health

Maine

Massachusetts

Varroa Mites

Biology

Viruses

Seasonal growth

Death diagnosis

Future Webinars



# HONEY BEE HEALTH



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# Varroa Mite IPM: Part 1

## Varroa mite biology and life history



**Northeastern**  
**IPM**  
**Center**

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# ME Losses 2018/2019

2018/2019 Loss: 45.2%  
Summer: 6.2%  
Winter: 39.0%

2017/2018 Loss: 43.4%  
Summer: 7.0%  
Winter: 36.4%

2016/2017 Loss: 45.0 %  
Summer: 5.9%  
Winter: 39.1%

County	N	Summer Loss (%)	Winter Loss (%)	Total Loss (%)
Androscoggin	13	3.1	85.5	88.7
Aroostook	7	12.2	65.3	77.6
Cumberland	94	8.1	46.5	54.6
Franklin	4	14.3	57.1	71.4
Hancock	16	3.0	23.0	25.9
Kennebec	26	2.9	27.5	30.4
Knox	20	18.4	19.7	38.2
Lincoln	34	4.0	22.2	26.2
Oxford	21	8.8	43.4	52.2
Penobscot	36	2.2	28.8	31.0
Piscataquis	4	11.1	33.3	44.4
Sagadahoc	10	6.4	21.3	27.7
Somerset	13	0.0	36.4	36.4
Waldo	15	7.0	16.9	23.9
Washington	9	10.0	50.0	60.0
York	38	6.6	32.0	38.6

# ME Losses 2018/2019: 45.2%

Summer (6.2%)  
Queen loss/failure (11.9%)  
Varroa mites/viruses (8.6%)  
Unknown (7.2%) ←  
Environmental factors (4.2%)

68.9% no summer loss

Winter (39%)  
Varroa mites/viruses (26.7%)  
Unknown (19.4%) ←  
Environmental factors (18.3%)  
Queen loss/failure (13.1%)

31.9% no winter loss

# MDAR HB Health Survey [2018-19]

673 beekeepers; 13 counties; 3,186 colonies

Annual Reported Colony Losses = **33%**

• Losses attributed to:

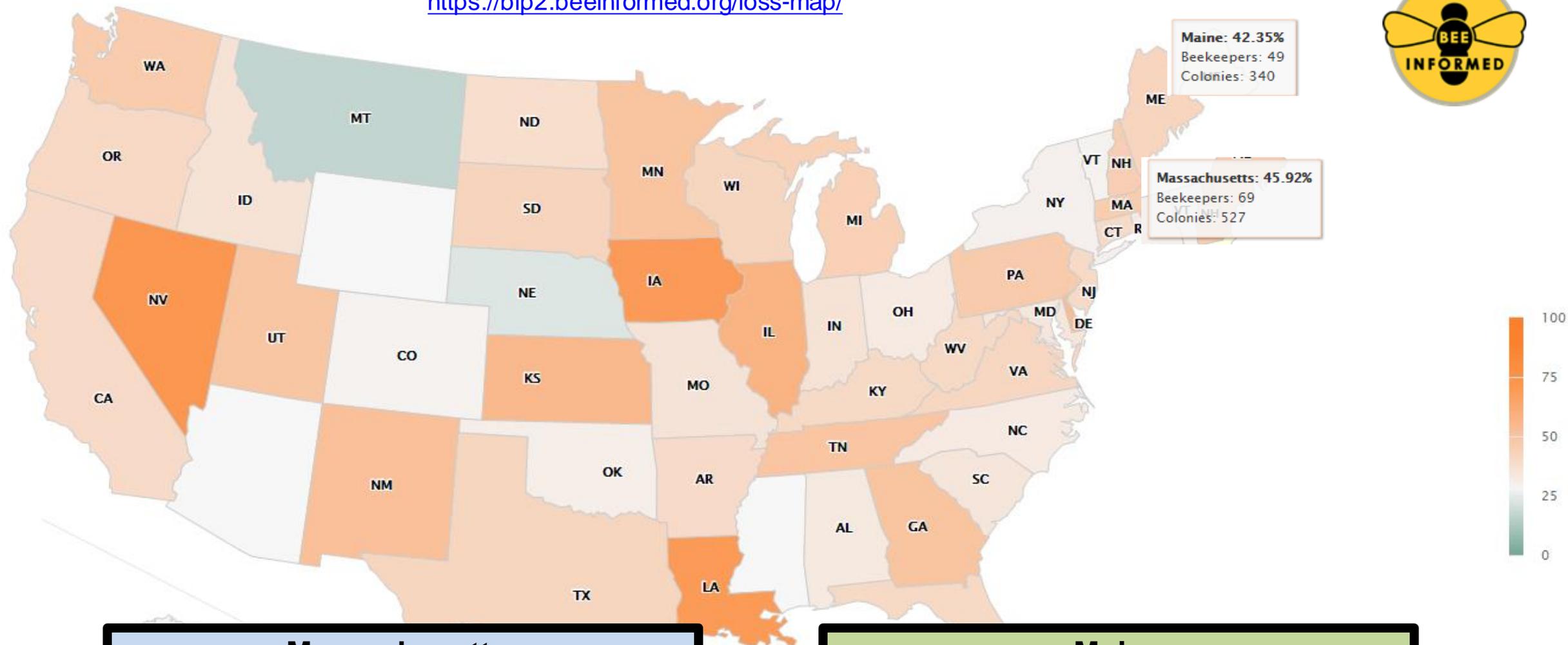
- **Varroa mites (30%)**, Viruses (6%), CCD (6%), Nosema (2%)
- **Starvation (19%)**, Queen issues (18%)
- **Environmental factors (21%)**, Natural disaster (5%), Pesticides (6%)



Beekeepers reported the single greatest threat affecting MA honey bees are **Varroa mites (54%)**, **Pesticides (17%)** and **Environmental factors (9%)**

# 2018/19 Total Annual All Colony Loss

<https://bip2.beeinformed.org/loss-map/>



**Massachusetts:**

- Winter Loss: 25.6% (#36 in US)
- Summer Loss: 13.3% (#32 in US)
- Highest in New England
- 16-65% reported losses since 2010/11

**Maine**

- Winter Loss: 35.2% (#19 in US)
- Summer Loss: 9.71% (#44 in US)
- 3rd highest in Northeast
- 23-87% reported losses since 2010/11

# Inspector reported causes of death

25% queen loss, starvation, poor winter moisture, cold snaps, etc.

70% varroa mites and viruses

5% everything else

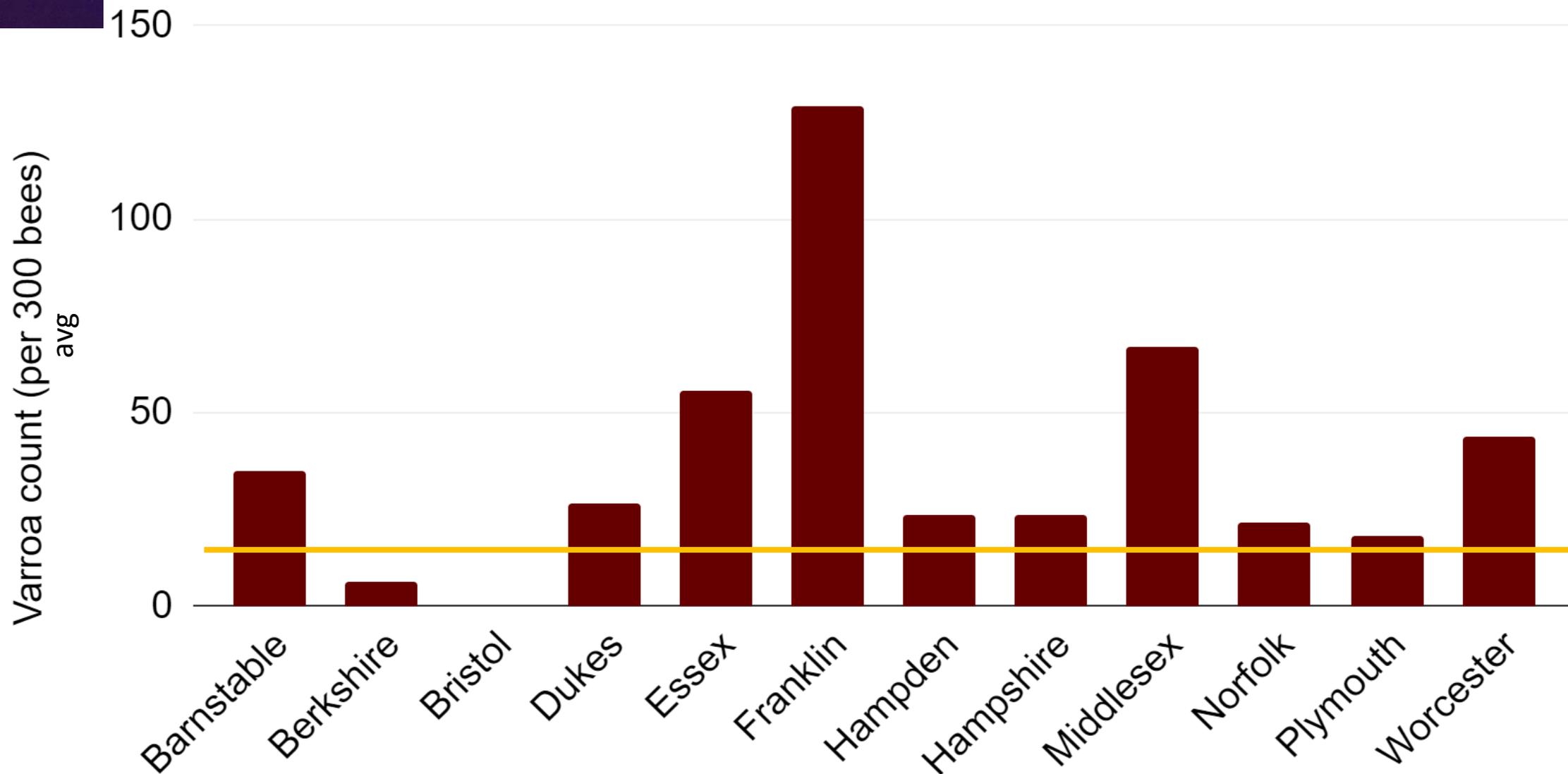
foulbrood, noseema, vertebrates, insect pests, etc.





# 2019 Dead-Out Hive Evaluation

(N=74 hives)



# Questions



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# VARROA MITE BIOLOGY



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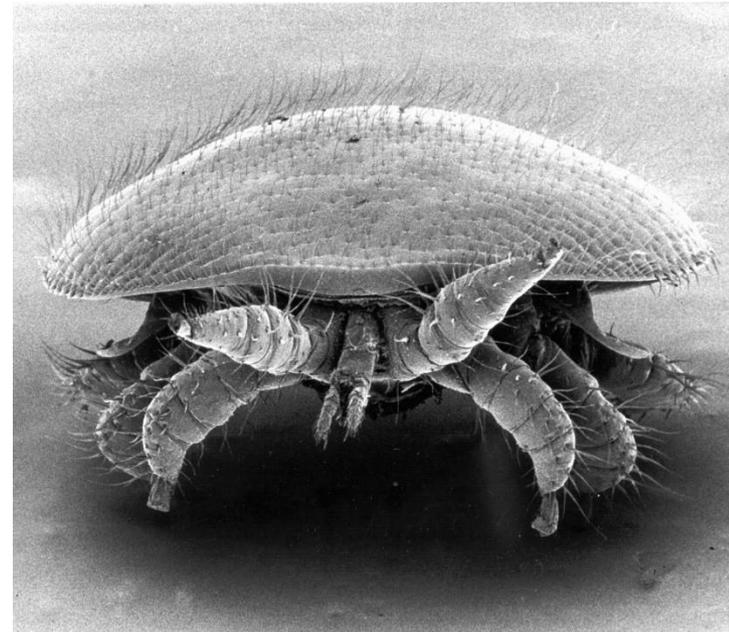
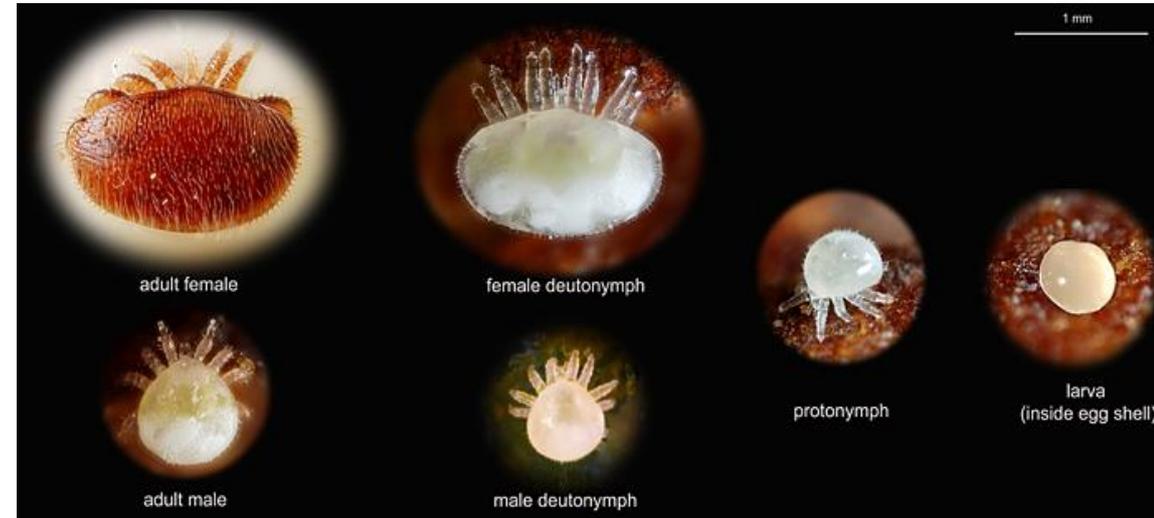
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\*\*\*Number 1 cause of fall/winter deaths in the Northeast\*\*\*

# Varroa Mites

- *Varroa destructor*
- Discovered in the United States in 1987, from SE Asia
- Small, red to brown, triangular
- Feed off the body fluids of adult, pupal and larval bees
- One of the largest ectoparasite to host relationship







Research.msu.edu



Nzgeo.com

# Varroa Mite – Dispersal Phase

- Female mites pass from bee to bee as they walk past one another
- Move to un-infested colonies by drift
- Mites feed between the abdominal segments
- Puncture exoskeleton and feed on bee fat bodies
- Mites occasionally found on thorax or top of bee – looking for new host
- If there is no brood can live feeding on adult bees for five to six months





# Varroa Parasitism Effects

- Shortens worker lifespan
- Impairs foraging ability - flight behavior, orientation
- Increases worker drift & robbing
- Increases queen supersedure
- Reduces sperm production in drones
- Reduces colony-level honey production
- Reduces colony-level winter survival
- Increases likelihood of virus transmission



# Questions



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# VARROA MITE VIRUSES



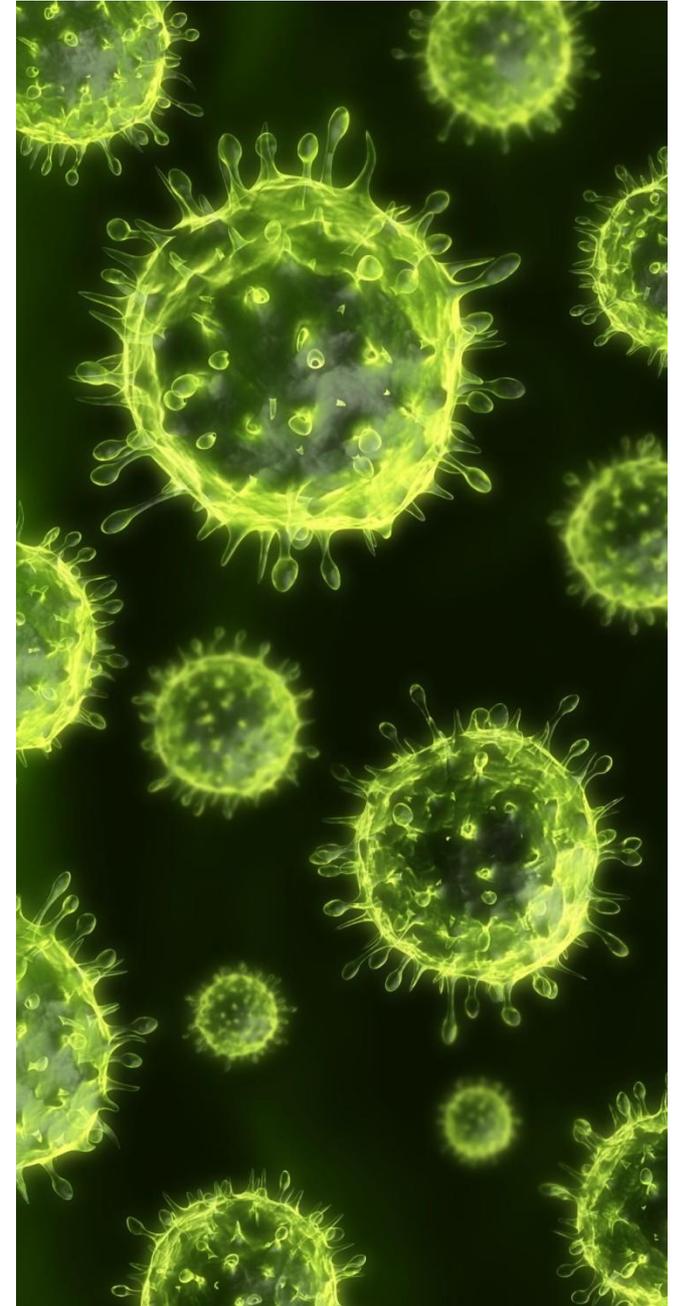
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# Viruses

- 20+ viruses of honey bees have been identified
- Spread venereally, horizontally, and vertically
- Mostly persist naturally in colonies at low levels with no symptoms
- Most symptoms are generic
- Many have varroa mites associations



# Viruses

- No treatments for viruses
- Maintain healthy/strong colonies
- Control varroa mites



# Deformed Wing Virus

- Found worldwide, early 90s
  - Several co-variants
  - Worse with varroa
- 
- Symptoms
    - Twisted and wrinkled wings
    - Crawling on the ground in front of the hive
    - Small and discolored abdomens
    - Die in 3 days



Bee\_health.extension.org



University of Florida



Txbeeinspection.tamu.edu

# Generic Adult Viral Symptoms

- Trembling
- Paralysis
- Darkened bodies
- Greasy looking
- Hairless
- Small size
- Decreased longevity



# Varroa Mites

- CONSIDERED ONE OF THE BIGGEST PROBLEMS FACING HONEY BEES!!
- Can carry and spread viruses
- If left unchecked varroa mite will kill your hives
- Most problematic
  - when bee numbers are reduced in preparation for winter
  - poor or late spring/summer forage



# Questions



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# VARROA MITE SEASONAL GROWTH



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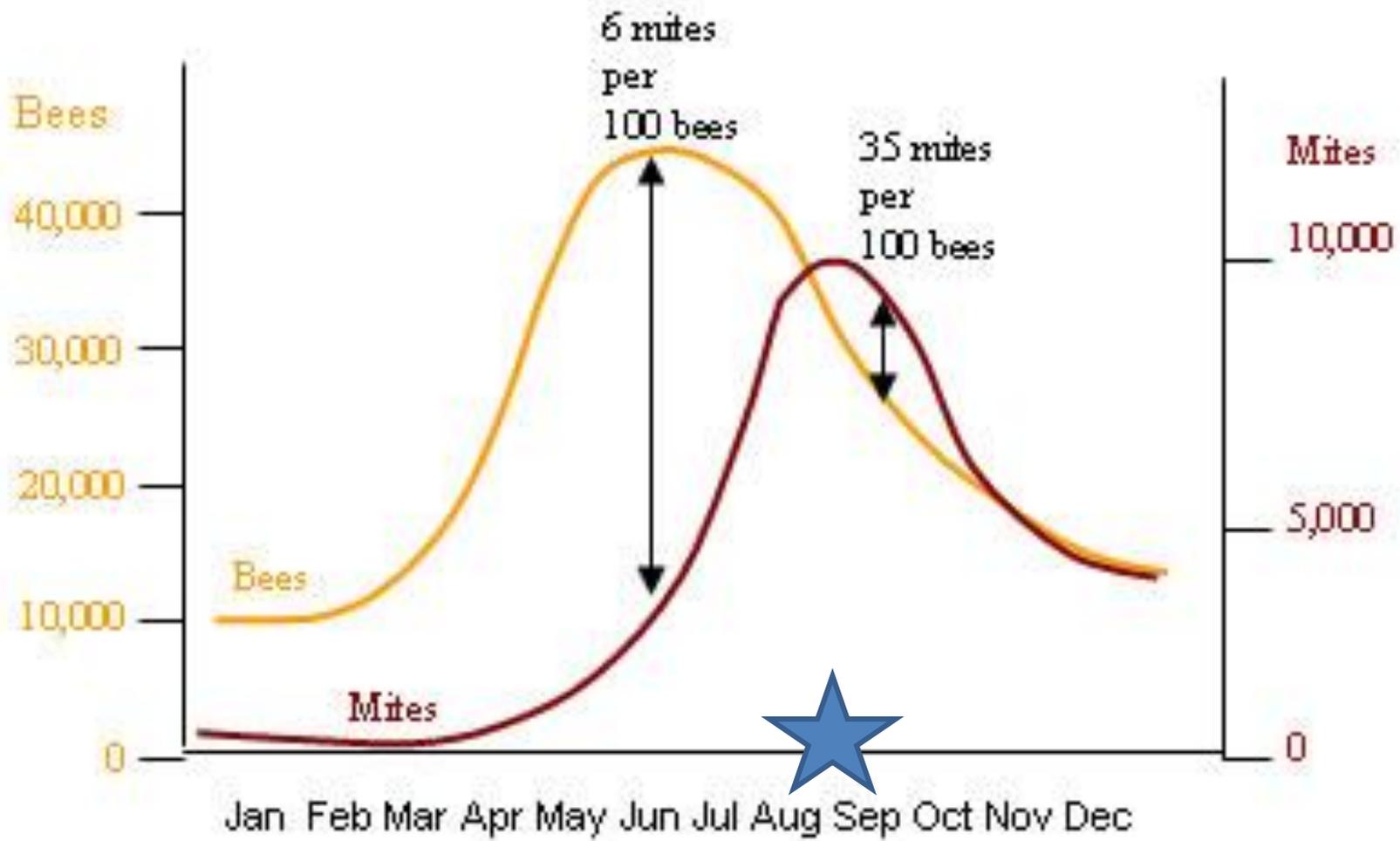


Figure 1. Simplified bee and mite population growth curves for a temperate climate. The mite growth curve lags behind the bee curve. Note how the number of mites per hundred bees greatly increases in fall. A colony is unlikely to survive a fall infestation rate this high.



# VARROA MITE DEATH/DIAGNOSIS



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**How do I know if my hive died from  
Varroa?**

# What time of year is it and when was the last time you saw the hive alive?

Summer: queen, brood, or food issues

Fall: varroa and their viral complex

Winter: varroa mites/viruses, bad winter, or starvation

\*\*\*When was the last time you saw the hive active\*\*\*

# Plenty of honey in the hive



Inadequate stores could mean starvation



# No signs of queen issues

## Signs of queen issues

no queen in dead bees

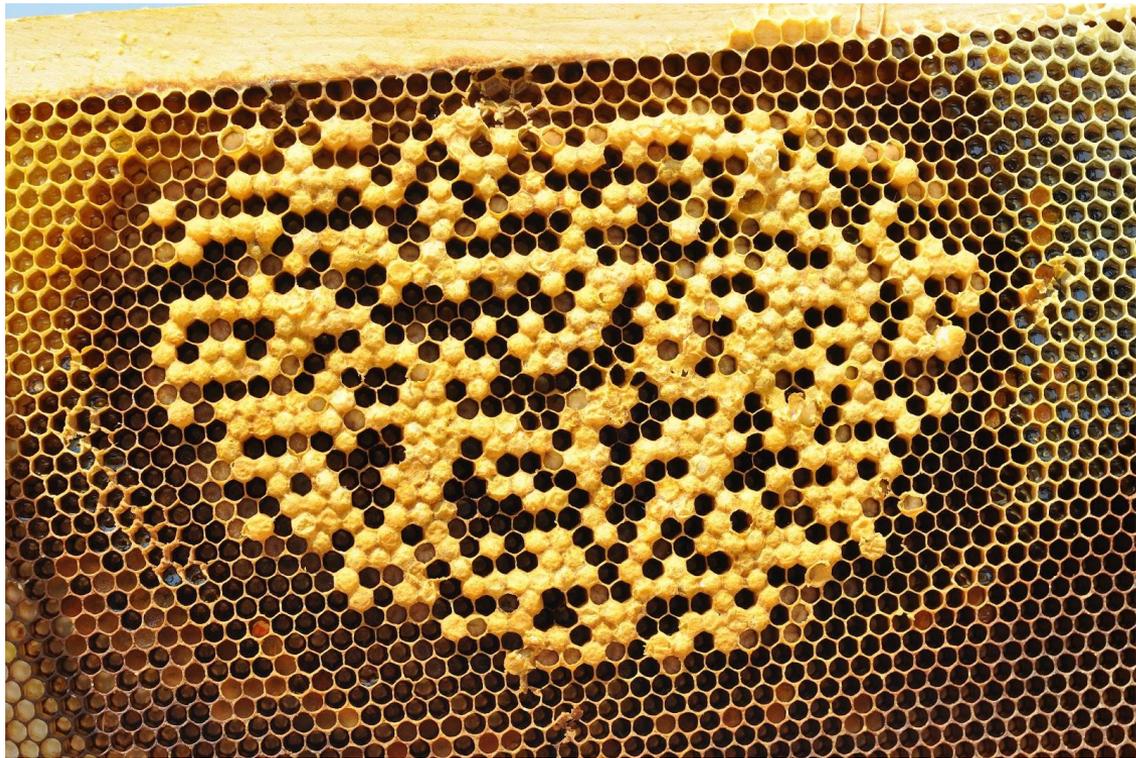
no eggs or brood

lots of drones

many emergency queen

cups or cells





# Fall/early winter: Only a handful of bees, brood and the queen remaining in what was once a strong hive.

Virus makes the adult bees feel sick

If the weather is warm they leave and die somewhere else

Cluster size decreases until it is too small to stay warm



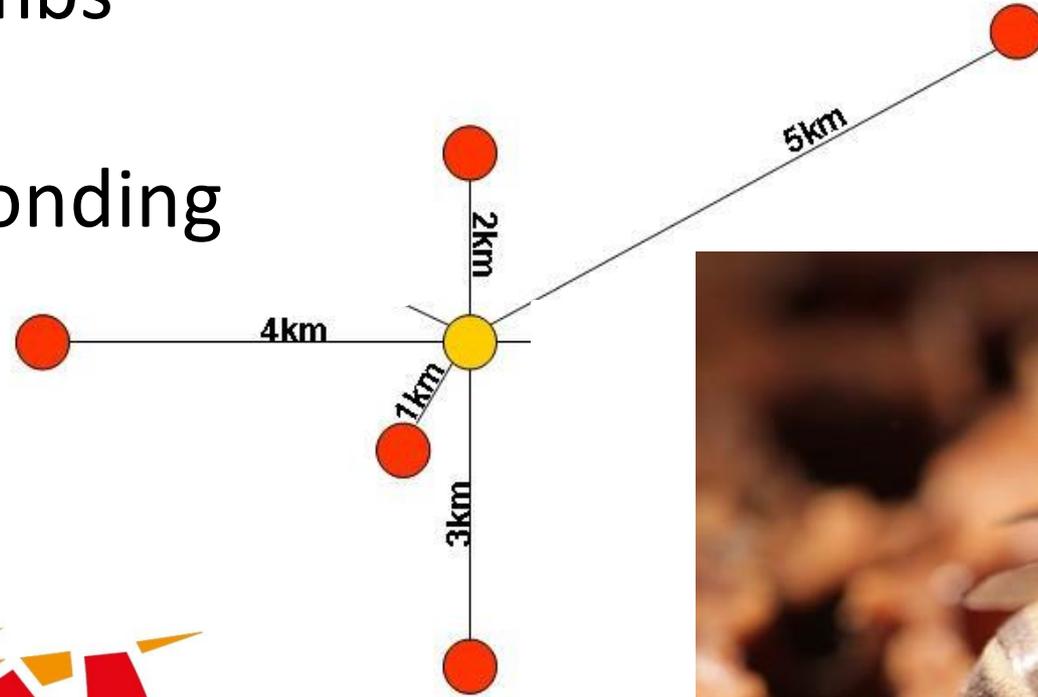




# Mite Bombs

Late fall/early winter deaths can become “mite bombs”

Can look like absconding



# Late winter death: Lots of dead bees on the bottom board, small dead cluster on face of frame

Bees die over time until cluster is too small to keep warm

Look for mites on dead cluster or on bottom board





# The dead adult bees are abnormal

## Deformities:

- short abdomens
- stubby wings
- hairless
- greasy
- black

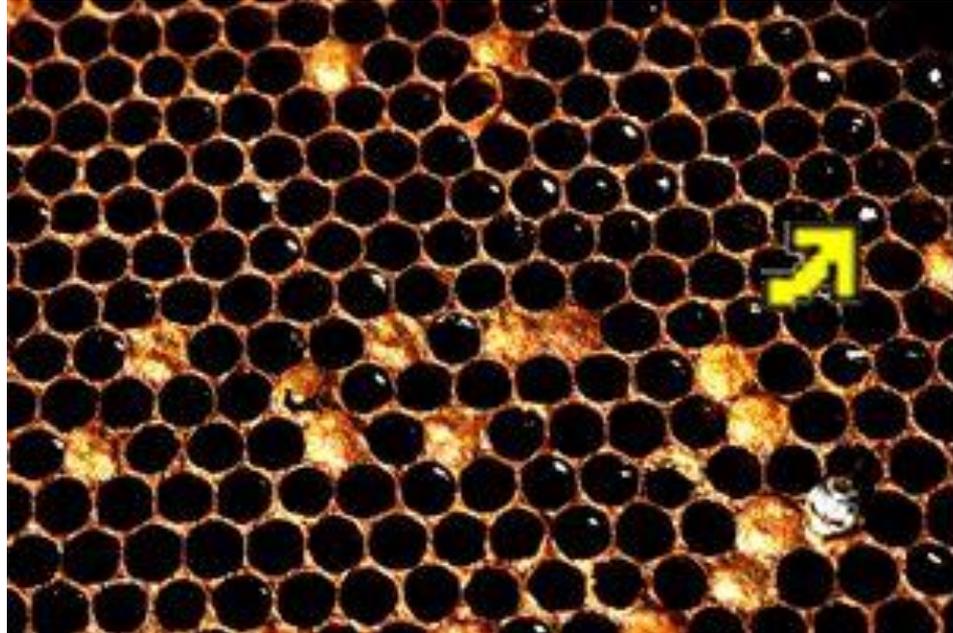
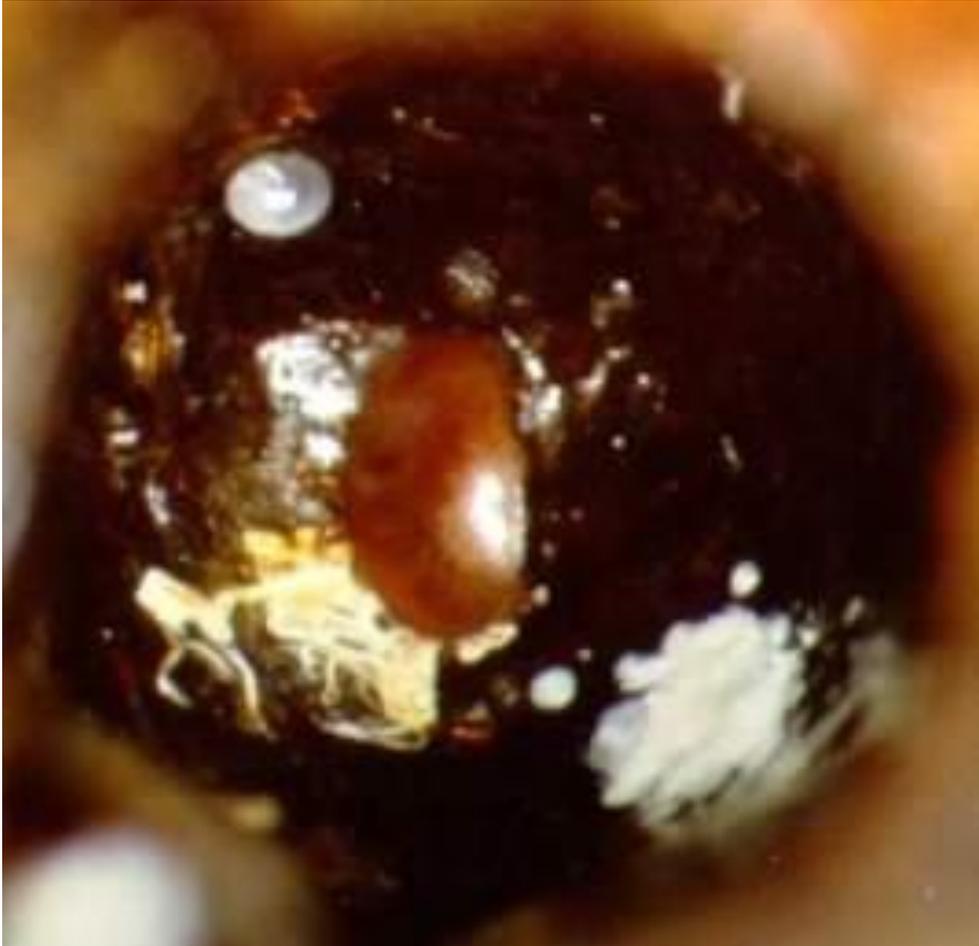


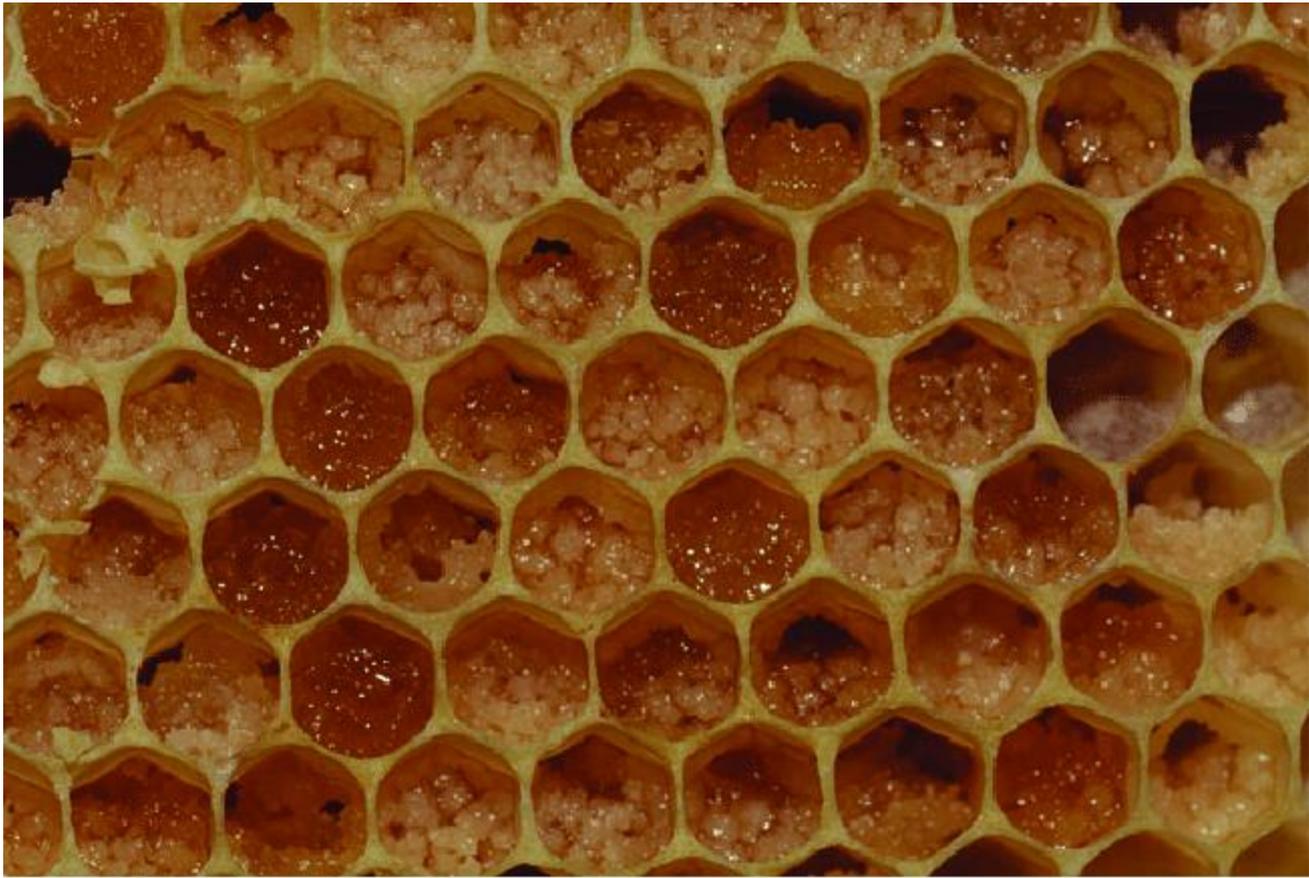
## Signs of viruses

Many viruses are associated with high varroa mite levels

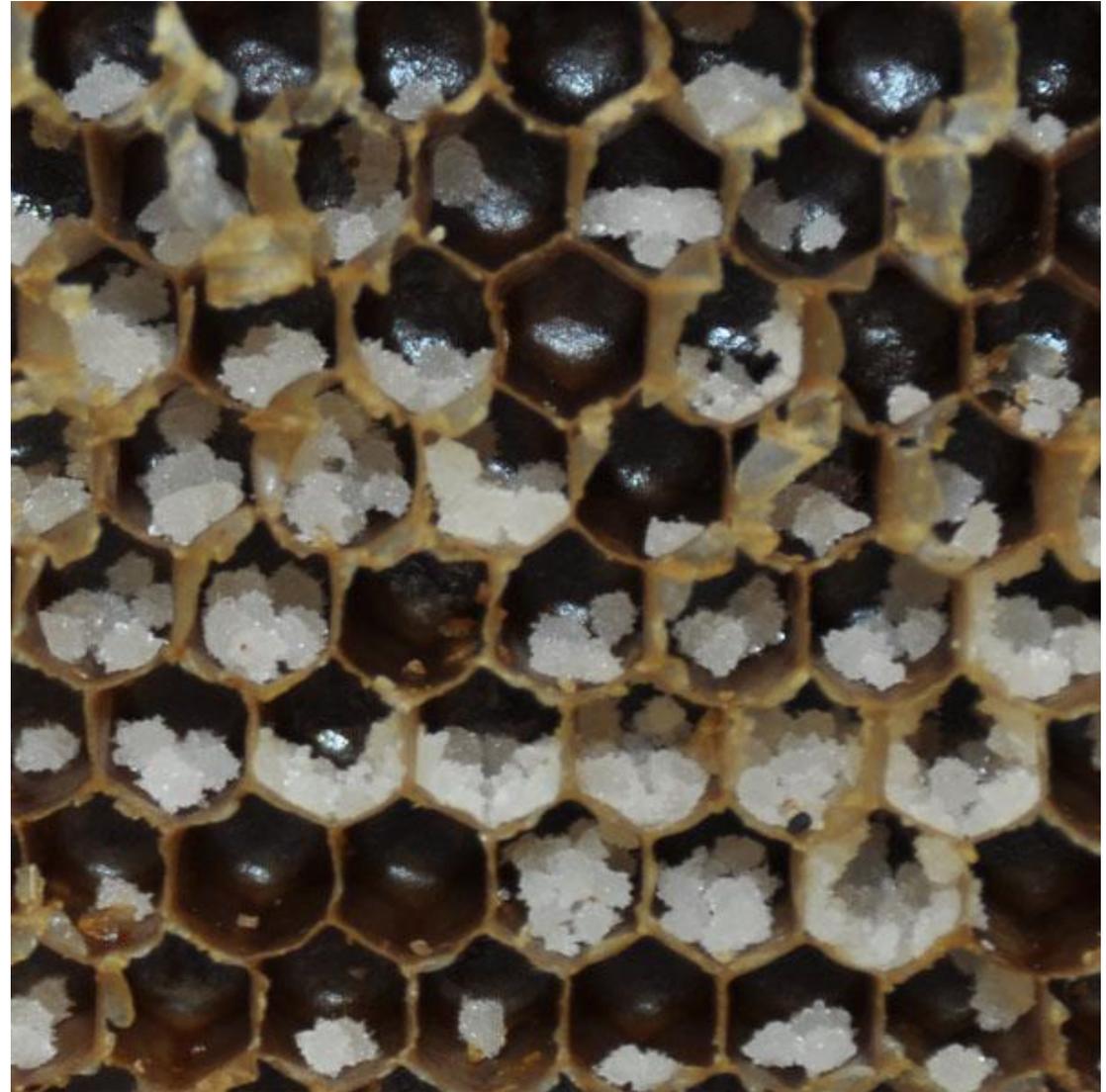


**There are white crystals stuck to the cell walls of empty comb**





**Normal crystallization and fermentation**



# Remaining brood looks “sick”

A spotty brood pattern common in failing hives

Could be due to a brood disease  
check for symptoms of AFB, EFB, etc.

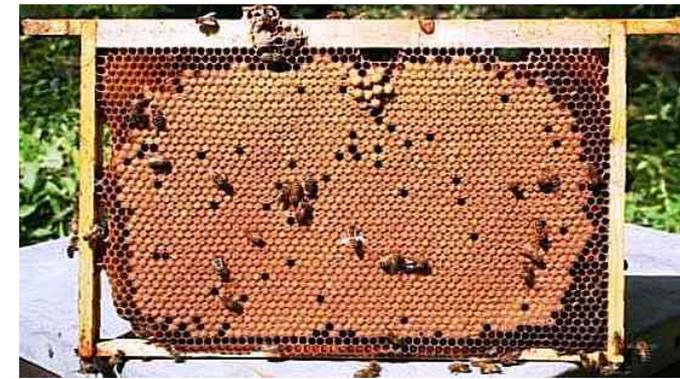
“Normal” dead brood  
gray/white in color  
no roping  
no bad smell (fish, rotting meat, etc.)



# Healthy Brood

- Uniform appearance
- Few interruptions in pattern
- Pearly white
- Cappings convex, not perforated or greasy
- No offensive odor

\*\*When these criteria are not met, needs further inspection and evaluation \*\*











Adventuresinbeeland



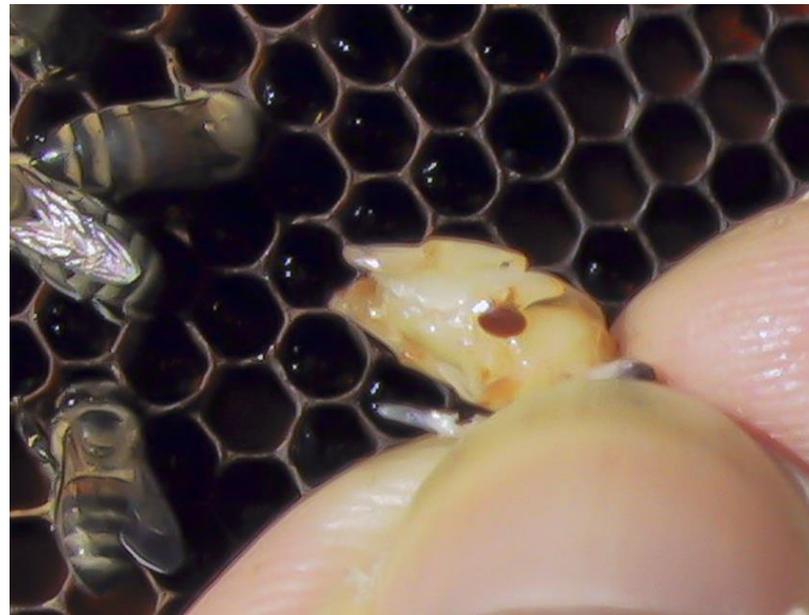
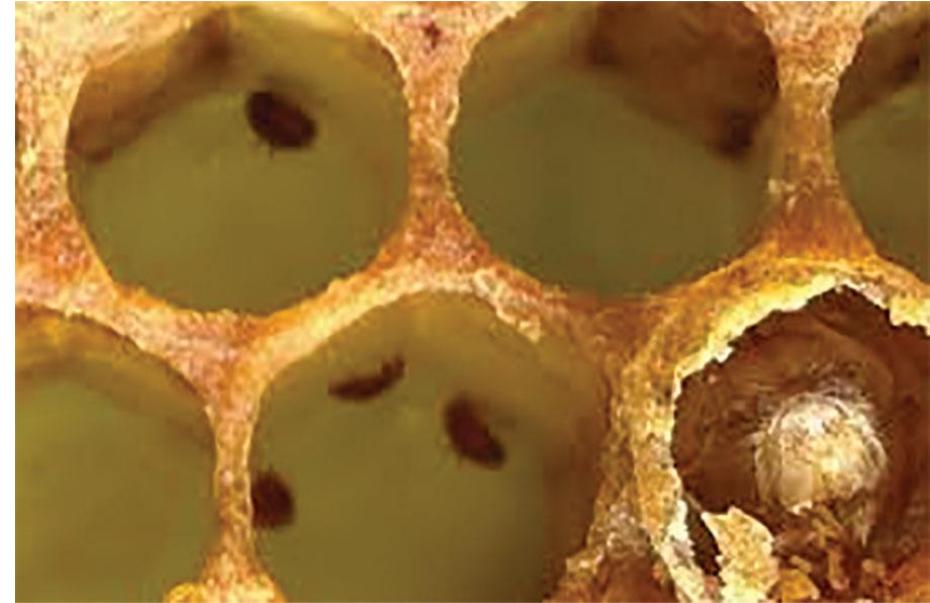
Scientificbeekeeping.com



Scientificbeekeeping.com

# There are varroa on brood/bees removed from cells

Remove dead brood and bees using a toothpick or forceps



# Questions



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# WHERE TO GO FOR MORE INFORMATION



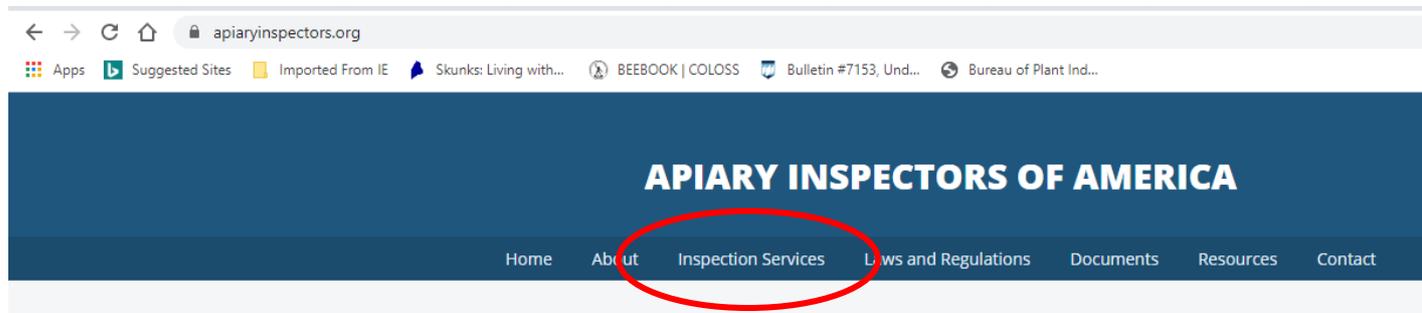
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# Apiary Inspectors

We love talking about bees!



## Welcome to the Apiary Inspectors of America

The Apiary Inspectors of America is a non-profit organization established to promote better beekeeping conditions in North America. Members of the Association, consisting of State Apiarist, business representatives, and individual beekeepers, work collectively to establish more uniform and effective laws and methods for the suppression of honey bee diseases, as well as a mutual understanding and

Search ...

M	T	W
2	3	4
9	10	11
16	17	18





HONEY BEE  
HEALTH  
COALITION

The  
Situation

About the  
Coalition

How We  
Help Bees

How You Can  
Help Bees

Coalition  
Updates

## BEST MANAGEMENT PRACTICES FOR BEE HEALTH

# BEST MANAGEMENT PRACTICES FOR BEE HEALTH

### A Guide for Beekeepers

Every beekeeper should seek to have hives that are healthy and productive. Today, the many threats to bee health — including parasites, pests, disease, pesticides, and inadequate nutrition — make achieving that goal a major challenge. Successful beekeeping means closely monitoring bee health and taking proactive steps to protect them.

BEST MANAGEMENT PRACTICES FOR HIVE HEALTH  
A GUIDE FOR BEEKEEPERS

HEALTHY BEES · HEALTHY PEOPLE · HEALTHY PLANET™



HONEY BEE  
HEALTH  
COALITION™

First Edition - January 1, 2019

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Varroa Management Decision Tool

Resources



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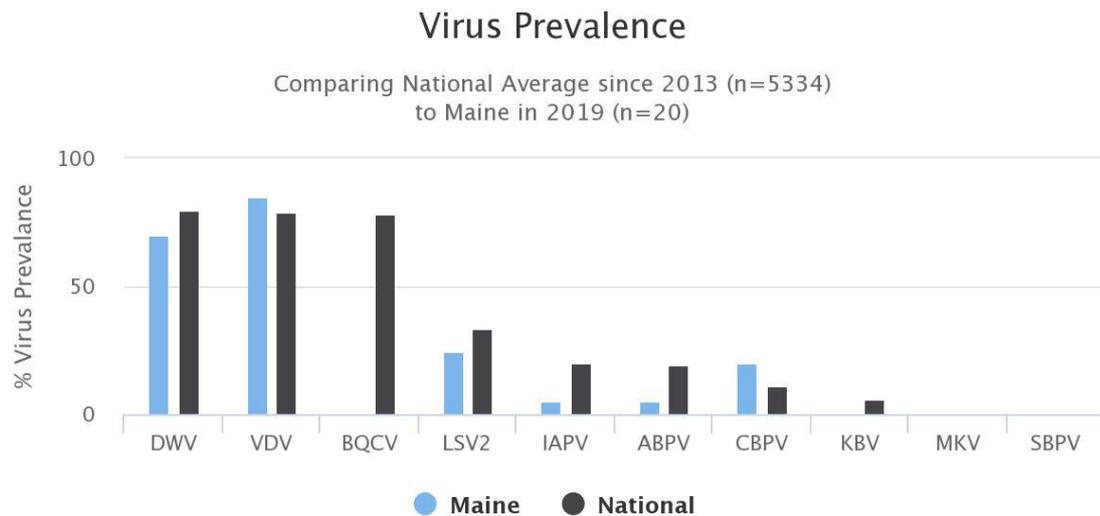
GET STARTED

# Bee Informed Partnership

Be a citizen scientist!!

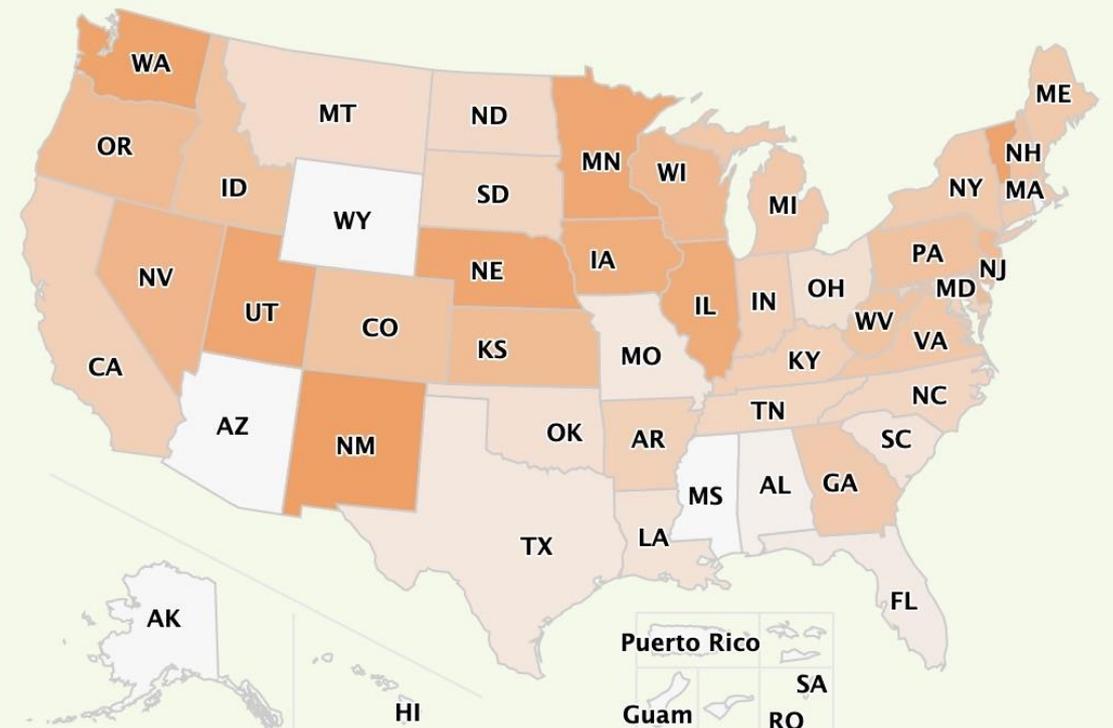


- Loss and Management Survey
- APHIS National Honey Bee Disease Survey:
  - Varroa, Nosema, Virus, Pesticides
- Hive Monitors
  - Weight, temperature, and humidity
- Sentinel Apiary
  - Varroa and Nosema
- MiteCheck
  - Self-reported mite levels



Highcharts.com

## 2018/19 Average Annual Colony Loss



# Local/state/national honey bee organizations

Go to meetings!!

- National and state meeting
  - Learn about the new research
  - Meet other types of beekeepers
- Local meetings are good places to
  - find out how to keep bees in the area
  - 100s of years of experience in the room

Get a mentor/ work with other beekeepers

- Get a chance to look in many different hives
- Pest management is often a community effort



# EAS MAINE

## 2020

*The Art & Science of Beekeeping*

August 3<sup>rd</sup>-7<sup>th</sup> Orono, Maine

# Fight The Mite Workshop for Beekeepers

Saturday May 2<sup>nd</sup> 2020 9am-4pm  
University of Massachusetts  
Fernald Hall, Amherst, MA



COST: \$40

<https://ag.umass.edu/pollinators/events/fight-mite>

Registration Includes:

- Bee-themed T-Shirt
- Sampling jar
- IPM brochure

Chance to win Apiary Diagnostic Kit!



# Questions



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# Join us for the next webinars!!

**Monday, March 23**, 1:00–2:30 p.m. — Mite monitoring and treatment

**Monday, April 6**, 1:00–2:30 p.m. — Creating a varroa mite IPM plan

**Monday, April 20**, 1:00–2:30 p.m. — Demonstration and Q&A

**Northeastern**  
**IPM**  
**Center**

# Some Questions for You

# Find a Colleague

To post a profile about yourself and your work:

<http://neipmc.org/go/APra>

“Find a Colleague” site

<http://neipmc.org/go/colleagues>

# Archive of Today's Webinar

Today's Webinar will be available to view **on demand** in a few business days.

<http://www.neipmc.org/go/ipmtoolbox>

You can watch as often as you like.

# Acknowledgements

## Northeastern IPM Center

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# Thanks for Joining Us!



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