

Diseases, Parasites, and Pests of Honey Bees



Deformed Wing Virus

University of Florida

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Honey Bee Diseases and Pests: Gloom, Despair, and Agony!

<https://www.youtube.com/watch?v=ZAAKPJEq1Ew>

- It's not all sweetness and honey.
- We'll present the diseases and pest problems that all beekeepers face...
- And offer solutions!



<http://www.deviantart.com/art/Dead-Bumblebees-104469698>

Parasites and Pests

- Varroa mite
- Tracheal mite
- Small hive beetle
- Wax moth (greater and lesser)
- Zombie (Phorid) flies
- Ants
- Bears, raccoons, skunks, mice

Diseases

- Fungi
 - Chalkbrood
 - Stonebrood
 - Nosema
- Bacteria
 - American foulbrood
 - European foulbrood
- Virus <http://articles.extension.org/pages/28844/honey-bee-nutrition>
 - Sacbrood
 - Deformed wing virus
 - Black queen cell virus
 - And a host of others!
- Nutritional (<http://articles.extension.org/pages/28844/honey-bee-nutrition>)
- Environmental contaminants (e.g. pesticides, industrial chemicals)

What do these have in common?



Royal Caribbean
Explorer of the Seas
4,000 passengers

Your Bee Yard
~40,000 bees per hive



Springtime Management - NOW

Before honey supers are on the hive

- Early spring sanitation and feeding
- Varroa Mite: covered in this presentation
 - Medications
 - Cultural controls
- Tracheal Mite
 - Menthol crystals
 - Grease patties
 - Some varroa medications are also effective against tracheal mites

Springtime Management - NOW

Before honey supers are on the hive

- “Beekeeping for Dummies” recommends...
 - Nosema: Fumigilin-B, 1 rounded tsp/gal in sugar syrup, 2 gal/hive
 - Foulbrood: Terramycin and TYLAN®

BUT...

- Prophylactic treatments in the spring are not always recommended

Tracheal mite *Acarapis woodi*

Tracheal mites live
inside the tracheae –
They are TINY

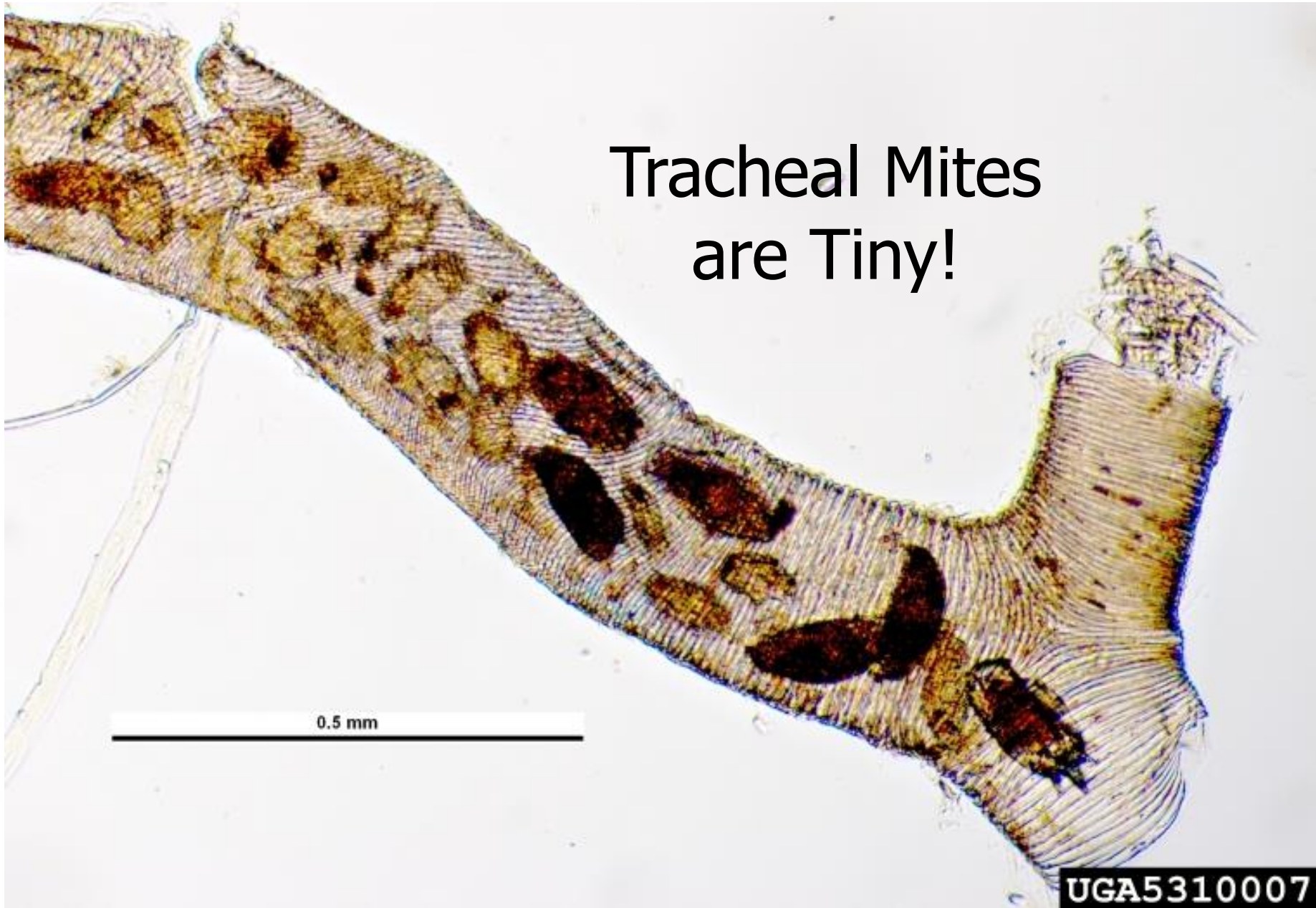


Charles Heatherly
(from Keith S. Delaplane,
First Lessons in Beekeeping)
<http://www.wakecountybeekeepers.org/wp-content/uploads/2013/03/Enemies-of-the-Hive.pdf>

Tracheal Mites are Tiny!

0.5 mm

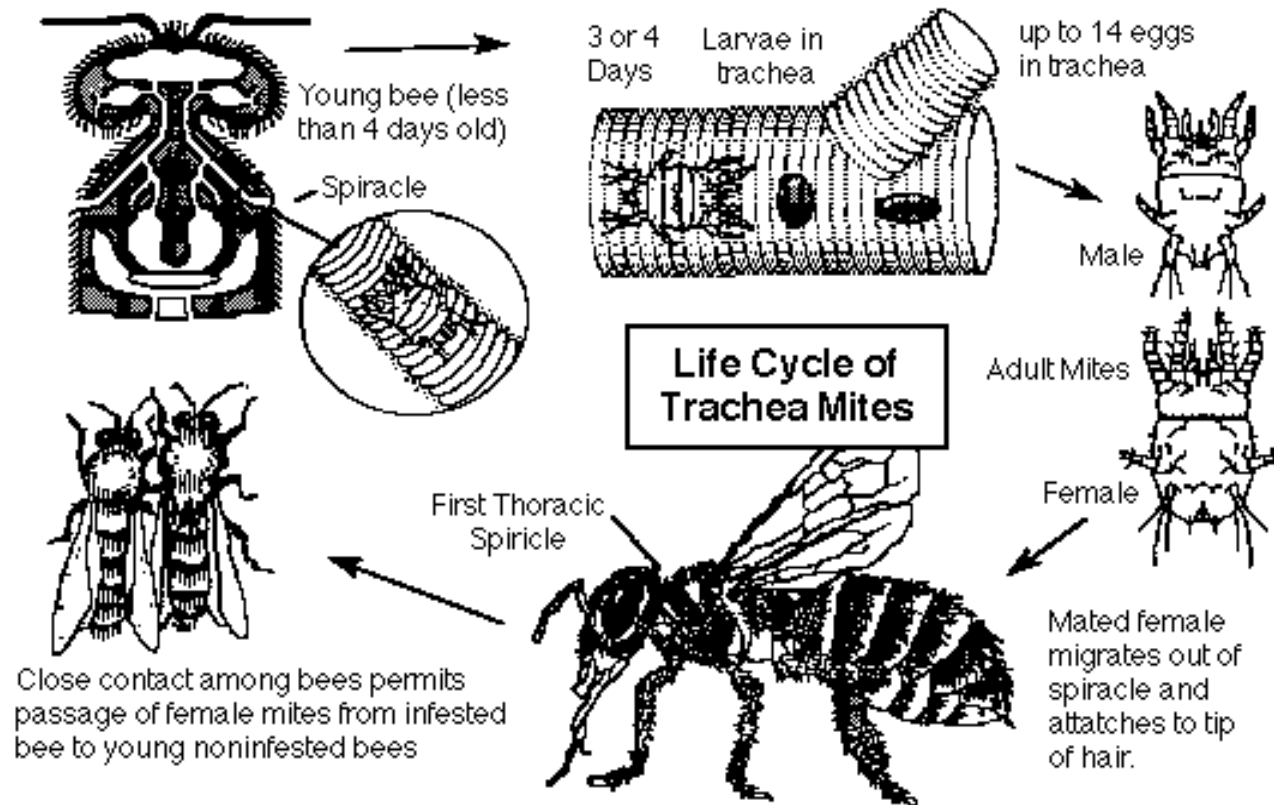
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Tracheal Mite *Acarapis woodi*

- Has been around for more than a century
- First detected in NC in 1984
- Immature mites pass from a parent bee to a newly emerged house bee
- A study on OBX, NC – mites rapidly spread between hives, and without treatment, all hives collapsed in 2-3 years

Tracheal Mite - *Acarapis woodi*



Symptoms of Tracheal Mites

- Large numbers of bees crawling in grass near hive entrance
- K-wing syndrome
- Cannot form an effective winter cluster
- Too Late Symptom:
An empty hive



Treatment of Tracheal Mite

- Menthol crystals



- Mite-Away II, an absorbent pad with formic acid (also used for varroa)



- Grease patties – disrupts mite and is harmless to environment, beekeeper

Tracheal Mites IPM

– Tracheal Mite Resistant Bees

Some bees have a natural resistance

– Grease patties:

A mix of vegetable shortening and sugar (2:1).

Shown to have a moderate effect.



Varroa Mite

- Class: *Arachnida*
- Subclass: *Acari*
- Order: *Parasitiformes*
- Suborder: *Mesostigmata*
- Family: *Varroidae*
- Genus: *Varroa*
- Species: *Varroa destructor*
Anderson and Trueman 2000
 - Native to: East of a line from the Urals to Afghanistan
 - 1st report in US – Sep 1987, Saukville, WI
 - Widespread in US by 1989





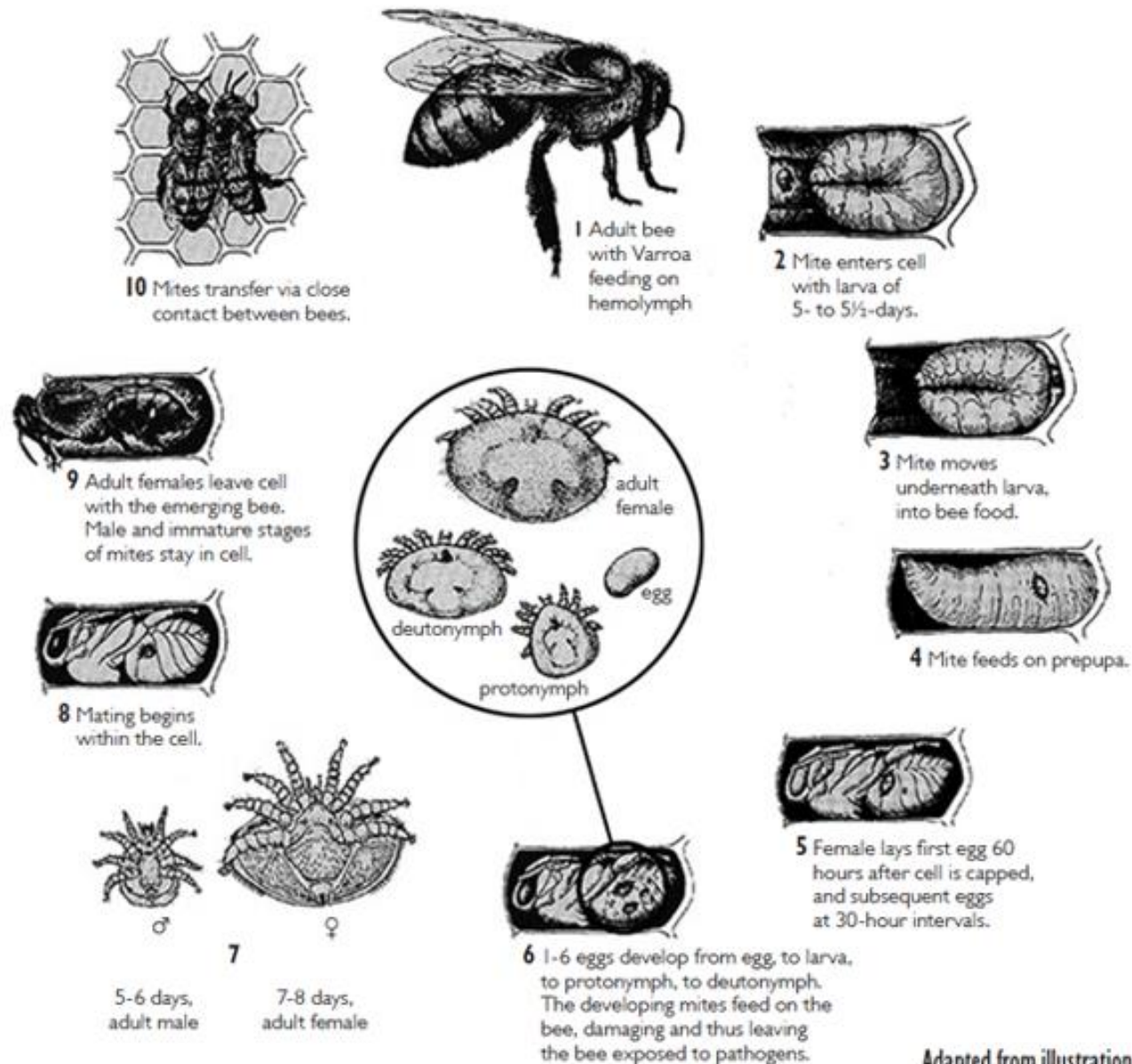
Fig. 2. Mature, immature females and mature males of Varroa. Clockwise from top left: mature daughter mite, mother mite, two mature males and an immature (deutonymph) daughter. A younger stage (protonymph) of female is not in this photo.

<http://articles.extension.org/pages/65450/varroa-mite-reproductive-biology>

Varroa destructor - Varroosis

- Mite attaches to bee and weakens the bee by sucking its hemolymph (blood)
- Mite also transmits several viruses (e.g. deformed wing virus)
- Untreated bee colonies will DIE in late autumn through early spring
- Varroa is the MAIN FACTOR for colony failure in the USA

Varroa Life Cycle



Adapted from illustration
by B. Alexander

Varroa – A Species Complex

Varroa jacobsoni

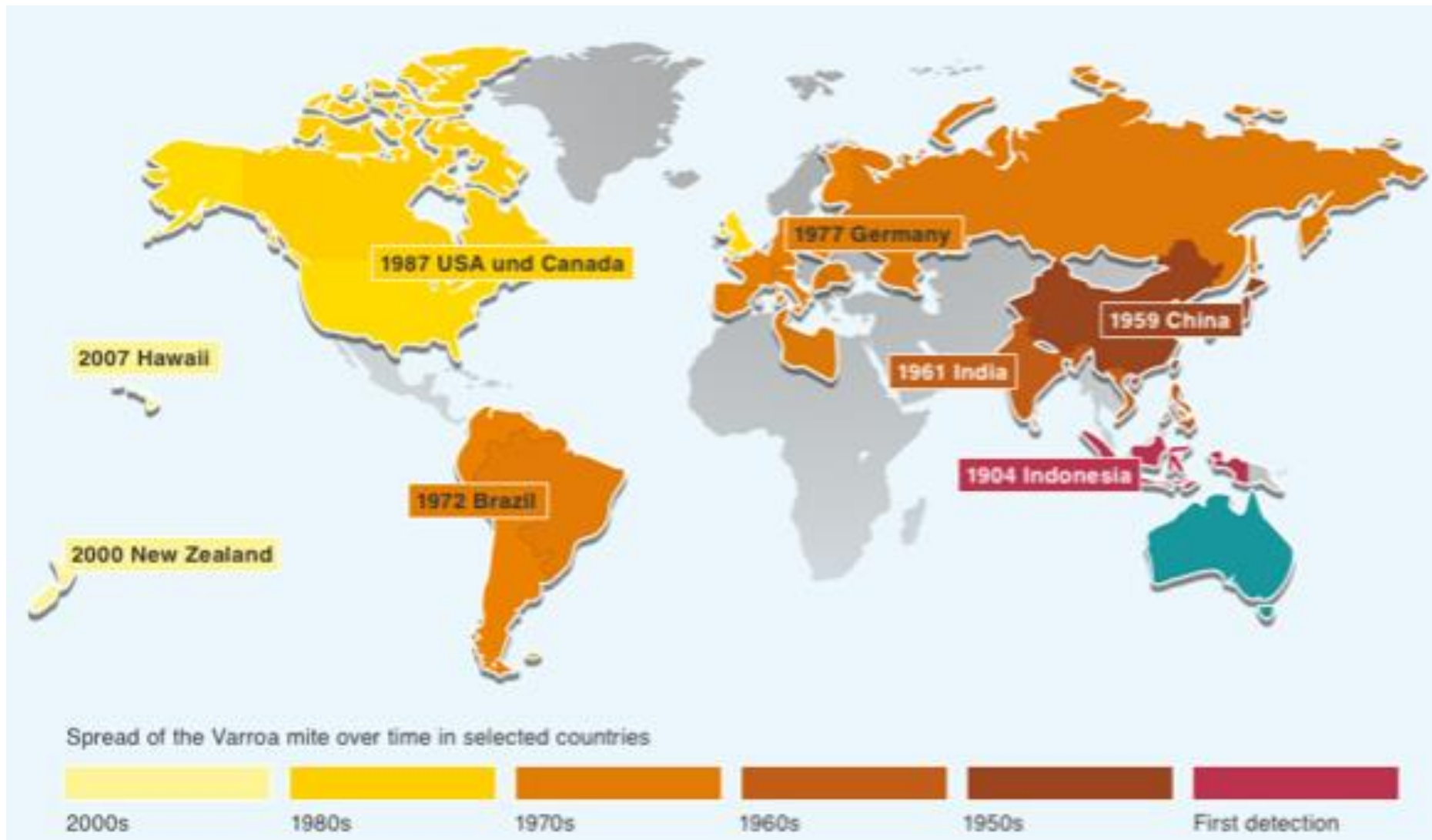
- First described in 1904 on *Apis cerana* from Java
- 18 different genetic variants
- 2-5 different species

Varroa destructor

- Early records of varroa attacking *Apis mellifera* (samples sent to USDA, Beltsville)
- 1962 – Hong Kong
- 1963 – Philippines

<https://www.ars.usda.gov/northeast-area/beltsville-md/beltsville-agricultural-research-center/bee-research-laboratory/docs/emvarroa-destructorem/>

Varroa Spread



<https://www.research.bayer.com/en/bees.aspx>

Varroa – A Species Complex

- Purdue Ag News, Nov. 17, 2016
<http://www.purdue.edu/newsroom/releases/2016/Q4/another-species-of-varroa-mite-threatens-european-honeybees.html>
- New varroa strain attacks *A. mellifera*
- Recently discovered in Papua New Guinea

***We can't make the same mistakes, and
introduce yet another honey bee parasite into
N. America***

Mississippi State Bee Lab

Jeff Harris Video



<https://www.youtube.com/watch?v=a2vg59Snt6c>

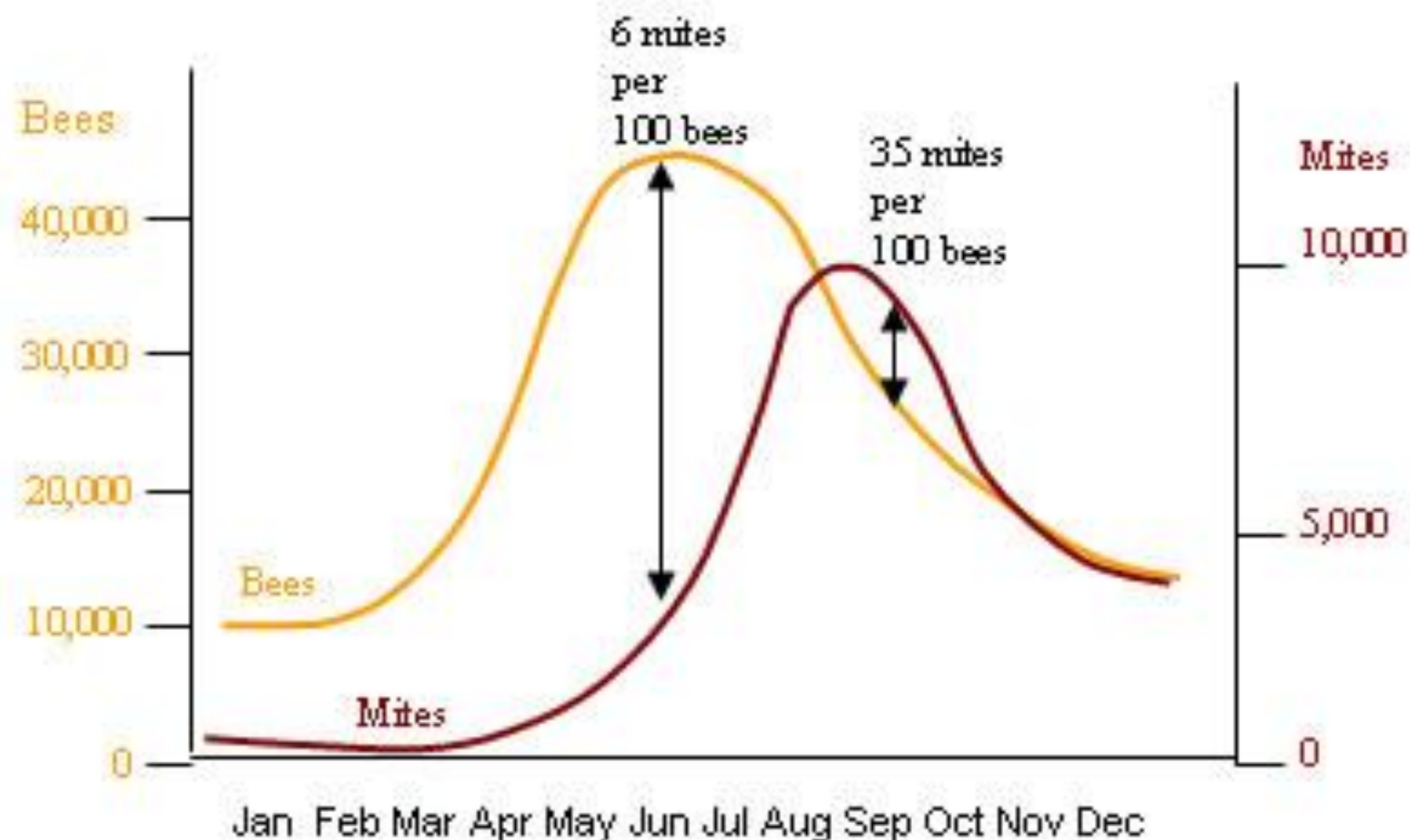


Figure 1. Simplified bee and mite population growth curves for a temperate climate. The mite growth curve lags behind the bee curve. Note how the number of mites per hundred bees greatly increases in fall. A colony is unlikely to survive a fall infestation rate this high.

Monitoring for Varroa

- Varroa can be difficult to directly observe on bees. If you can easily observe them, then you can be sure you have lots of them!
- Jar sugar shake or alcohol wash
- IPM Board (with hive sugar shake)
- <http://www.omafra.gov.on.ca/english/food/inspection/bees/varroa-sampling.htm>



Dadant & Sons

March 29 at 10:26am · 🌐

Using the Varroa EasyCheck system allows bee keepers of every skill level to quickly and accurately estimate the numbers of mites in a colony.

Check out our latest Learning Center article from Dadant & Sons, for advice and step-by-step instructions for using the Varroa EasyCheck.

<https://www.dadant.com/learn/check-varroa-mites/>



How to Check for Varroa Mites | Beekeeping Learning Center | Dadant & Sons 1863

The Varroa EasyCheck system is a simple and effective tool that allows bee keepers to quickly assess the levels of Varroa mites in a honey bee hive.

DADANT.COM

<https://www.dadant.com/learn/check-varroa-mites/>

Collecting Bees for a Sample

- ½ cup of bees collected from 3 brood chamber frames (approx. 300)
- WARNING: Locate and cage the queen first
- Scoop bees from a collecting pan, or gently scrape off the frame
- Cover with powdered sugar, or alcohol, or soapy water, window washer fluid
- Shake vigorously (for 2 min)

Collecting Bees for a Sample



300 bees \sim $\frac{1}{2}$ cup



Alcohol Wash



Table 2. When to treat for varroa mites

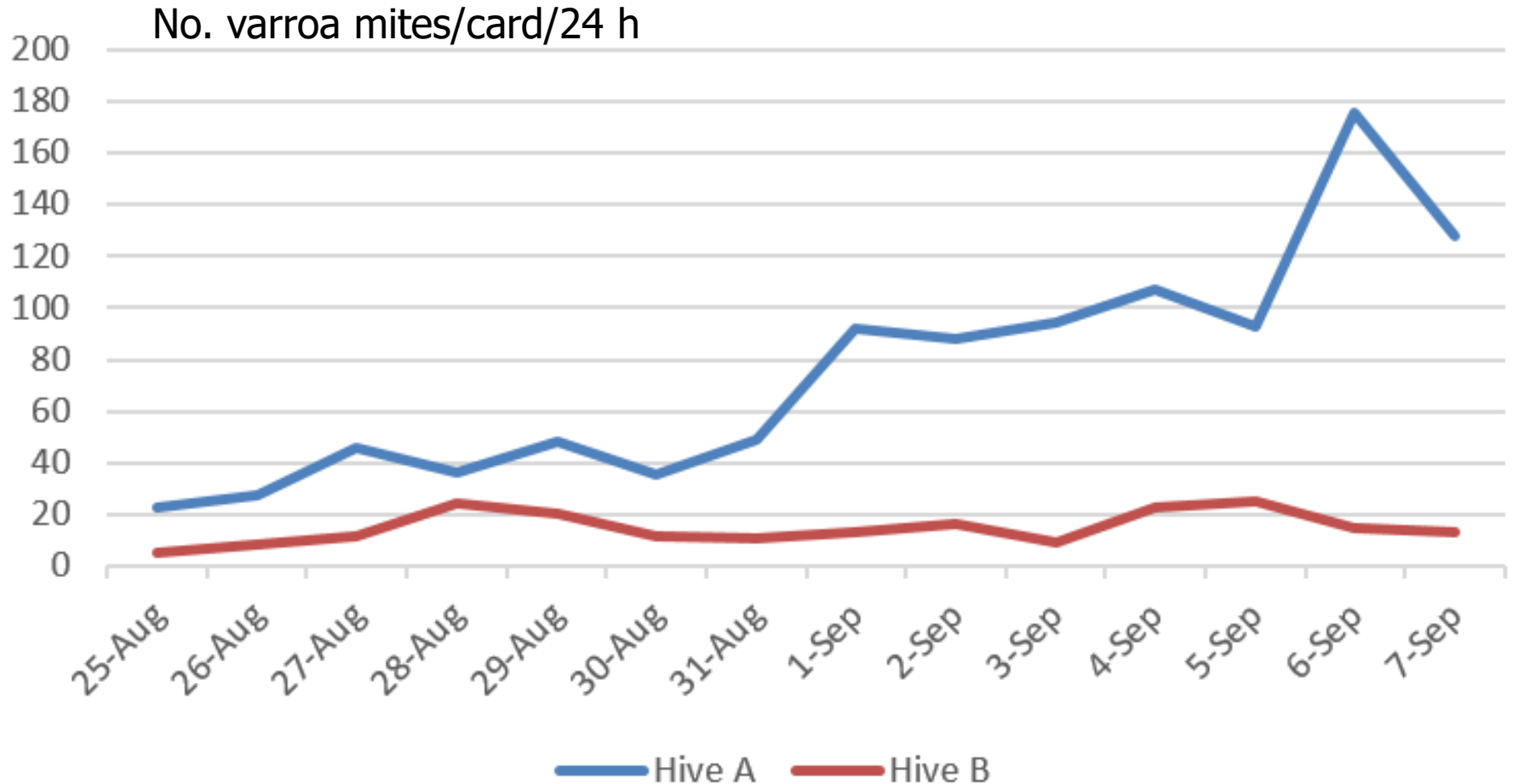
Monitoring Method	Number of Varroa Mites in May	Number of Varroa Mites in August
Ether Roll	1 mite / 100 bees	2 mites / 100 bees
Alcohol Wash	2 mites / 100 bees	3 mites / 100 bees
Sticky Board	9 mites / 24 hr drop	12 mites / 24 hr drop

Sticky Board Counts

- Easy - Spray board with Pam[®] (washes off easily with soap and water)
- Doesn't kill bees
- Treatment thresholds:
 - 5-10 spring, 50-60 fall/24h (Brushy Mtn.)
 - 40/24h (VA Coop Ext)
- OK for tracking increase/decrease
- Can't get a mites/bee count
- Use washes to calculate mites per 100 bees

Varroa Sticky Board Counts

Austin Pond Apiary 2016



When to Sample for Varroa

- AT LEAST twice/yr – early spring and late summer
- Mid-summer, esp. if colony appears weak
- Before and after a treatment, to determine if the treatment was effective

Products for Varroa Control

Chemical Controls

- Apivar[®] (amitraz)
- Apistan[®] (tau-fluvalinate)
- Checkmite+[®] (coumaphos)

Essential Oils

- Apiguard[®], Thymovar[®] (thymol)
- Api Life Var[®] (thymol+eucalyptol, menthol, camphor)

Acids

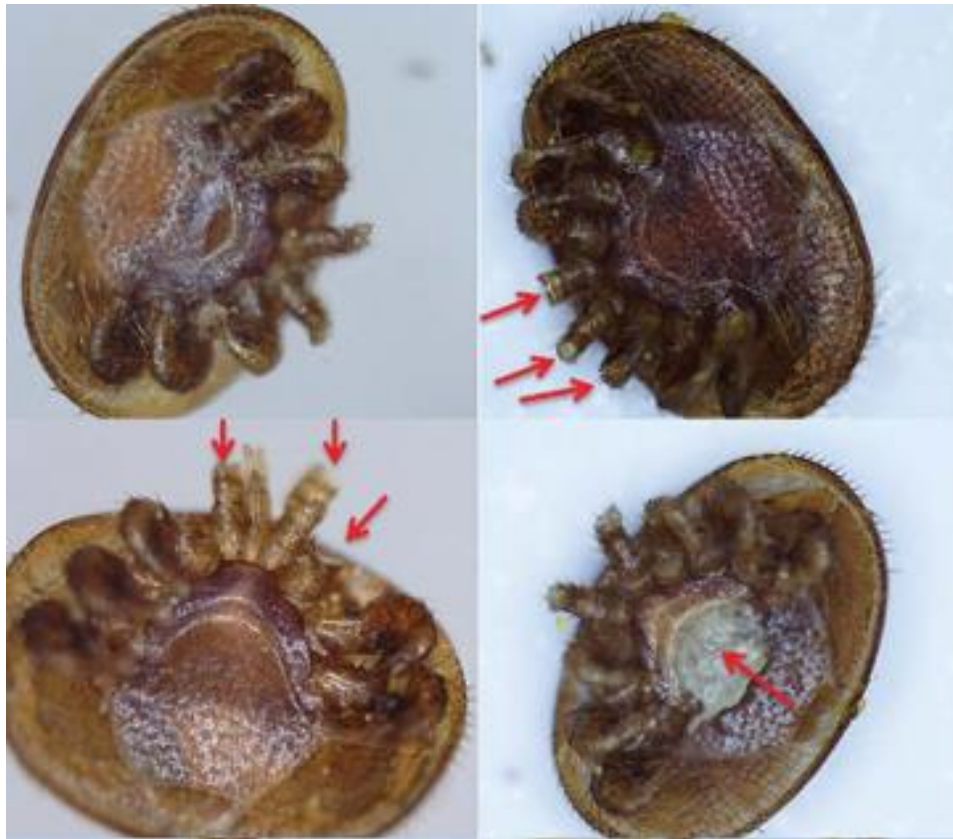
- Mite-Away Quick Strips[®], MAQS[®] (formic acid)
- Oxalic Acid (oxalic acid dyhydrate)
- HopGuard[®] II (hops beta acids)

Non-Chemical (Cultural) Controls

- Screen bottom board
- Sanitation (comb culling/biosecurity)
- Drone brood removal (esp. in spring)
- Brood interruption/requeening
- Requeening with resistant stock
- Powdered sugar
- Small cell sizes? (not conclusive)

“Mite Bitters”

- VSH – varroa sensitive hygiene, bees groom and chew on mites



TOOLS FOR VARROA MANAGEMENT

A GUIDE TO EFFECTIVE VARROA SAMPLING & CONTROL

HEALTHY BEES · HEALTHY PEOPLE · HEALTHY PLANET™



**HONEY BEE
HEALTH
COALITION™**

Spring

Population Increase

Seasonal colony buildup; colony brood population growing rapidly and adult worker population increasing; Varroa mite population usually low but increasing; pre-honey flow supering of colonies.

Highly Effective Options:

- Apivar®
- Apiguard® or Api Life Var®
- MAQS® (formic acid)
- Drone brood removal

Notes:

- Terminate Apivar® after 42 to 56 days of treatment, at least two weeks prior to adding supers.
- Terminate Apiguard® treatment before adding supers.
- Terminate Api Life Var® after two or three treatments (7-10 days each). Remove Api Life Var® tablets from the hive at least one month before harvesting honey or, if not using the colony for honey production, treat for full treatment period.
- It is legal to use MAQS® when storing honey.
- Strong, populous colonies tolerate drone brood removal two to three times.

Moderately Effective Options:

- HopGuard® II
- Colony division
- Requeening using hygienic stock
- Basic sanitation

Notes:

- The effectiveness of HopGuard® II has not been widely tested.
- Dividing the colony during the Population Increase phase will most likely negatively affect surplus honey production.
- Hygienic queens are not always available.
- Basic sanitation may help reduce other stressors.

Least Effective Options:

- Screen bottom board
- Powdered sugar
- Mineral oil
- Failure to perform managements

Notes:

- A screen bottom board is marginally effective.
- There is little evidence that powdered sugar or mineral oil has any effect on mite populations.

Summer

Population Peak

Period of nectar flow and rental of colonies for pollination services; bee population (both adult & brood) at peak; mite populations increasing, nearing peak; often honey supers on colonies.

Highly Effective Options:

- MAQS®
- Apivar® or Apiguard® or Api Life Var® (Use is permitted only if no supers are present or colonies are not producing honey.)

Notes:

- MAQS®, Apiguard® and Api Life Var® are not suitable for use in all temperatures. See the detailed descriptions of products below for temperature ranges for use of these products.
- Apivar® (amitraz) is highly effective. Be cautious about using it too often to avoid risk of developing resistance.

Moderately Effective Options:

- Requeening with hygienic stock
- Division of colonies
- HopGuard® II
- Oxalic acid drip

Notes:

- Requeening or dividing may negatively affect honey production (if colonies are strong enough to produce surplus). Hygienic or locally selected stock is not widely available.
- The effectiveness of HopGuard® II has not been widely tested.
- Oxalic acid is best used when there is little or no capped brood in the colony during the Dormant Phase or because of queen replacement that interrupts brood rearing.

Least Effective Options:

- Screen bottom board
- Drone brood removal

Notes:

- A screen bottom board removes a small percentage of mites that fall from adult bodies. Use it in combination with other techniques.
- Drone brood removal is restricted in this phase by the absence of sufficient drone brood and the difficulty of accessing the brood nest beneath honey supers.

Autumn

Population Decrease

Post-honey harvest; bee population decreasing; colonies rearing overwintering bees. Varroa mite populations growing, peaking, and then declining until eventually only phoretic mites on adult bees after colonies become broodless

Highly Effective Options:

- Apivar®
- MAQS®
- Apiguard® or Api Life Var®
- HopGuard® II

Notes:

- Apivar® should not be used until surplus honey is removed.
- MAQS®, Apiguard® and Api Life Var® are not suitable for use in all temperatures. See the detailed descriptions of products below for temperature ranges for use of these products.
- HopGuard® II manufacturer's test data supports its effectiveness

Moderately Effective Options:

- Requeening with hygienic bees
- Dividing colonies
- Oxalic acid drip

Notes:

- Hygienic stock is not widely available.
- Requeening and dividing colonies may be difficult.
- Oxalic acid is most effective if there is little to no capped brood present.

Least Effective Options:

- Apistan® or CheckMite+®
- Drone brood removal
- Screen bottom board
- Sanitation

Notes:

- Mite resistance to Apistan® and CheckMite+® is well established.
- Colonies are unlikely to raise drones during this phase.
- Basic sanitation may help relieve stress.

Winter

Dormant Phase

Bees are clustered; no brood in northern locations with reduced brood rearing in southern locations; all or most Varroa mites are phoretic (i.e., on adult worker bodies, as there is little to no developing brood) and both populations are in decline because there is little or no reproduction occurring within the colony.

Highly Effective Options:

- Oxalic acid (fumigation method)
- Winter or broodless period

Notes:

- Oxalic acid is best used when there is no brood.
- Varroa mortality over extended broodless period is high.

Moderately Effective Options:

- HopGuard® II
- In beekeeping regions with brood during this phase, Apiguard, or Api Life Var®, or formic acid (MAQS®) provided temperatures are within optimal ranges.

Notes:

- Little or no independent test results are available for HopGuard® II during the Dormant phase. The formulation has changed each of the last two years.
- The effectiveness of Apiguard®, Api Life Var® and formic acid (MAQS®) during the Dormant phase is unknown.

Least Effective Options:

- Anything that risks colony success through this phase
- Screen bottom board

Notes:

- Screen bottom board removes a small percentage of mites that fall from adult bodies. It is best used in combination with other techniques.

The End?



http://www.salon.com/2014/10/17/epa_bee_killing_pesticides_used_on_soy_crops_dont_even_do_what_theyre_supposed_to/

Not if you take care of your hives!