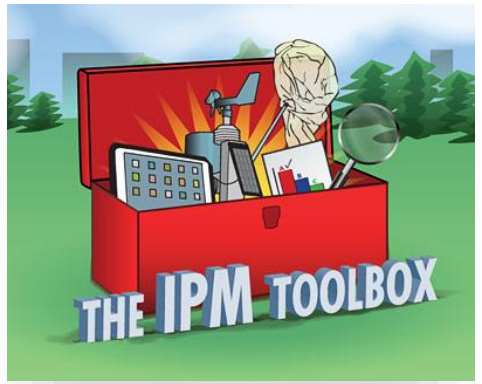
The use of IPM in beekeeping to control parasitic varroa mites

Robyn Underwood
Penn State Extension



Northeastern IPM Center

March 11, 2024

USDA United States Department of Agriculture National Institute of Food and Agriculture

PennState Extension

Webinar Details

Live Transcription

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

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

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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.

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Webinar Presenter

Robyn Underwood

Penn State Extension Educator - Apiculture

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Some Questions for You

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The use of IPM in beekeeping to control parasitic varroa mites

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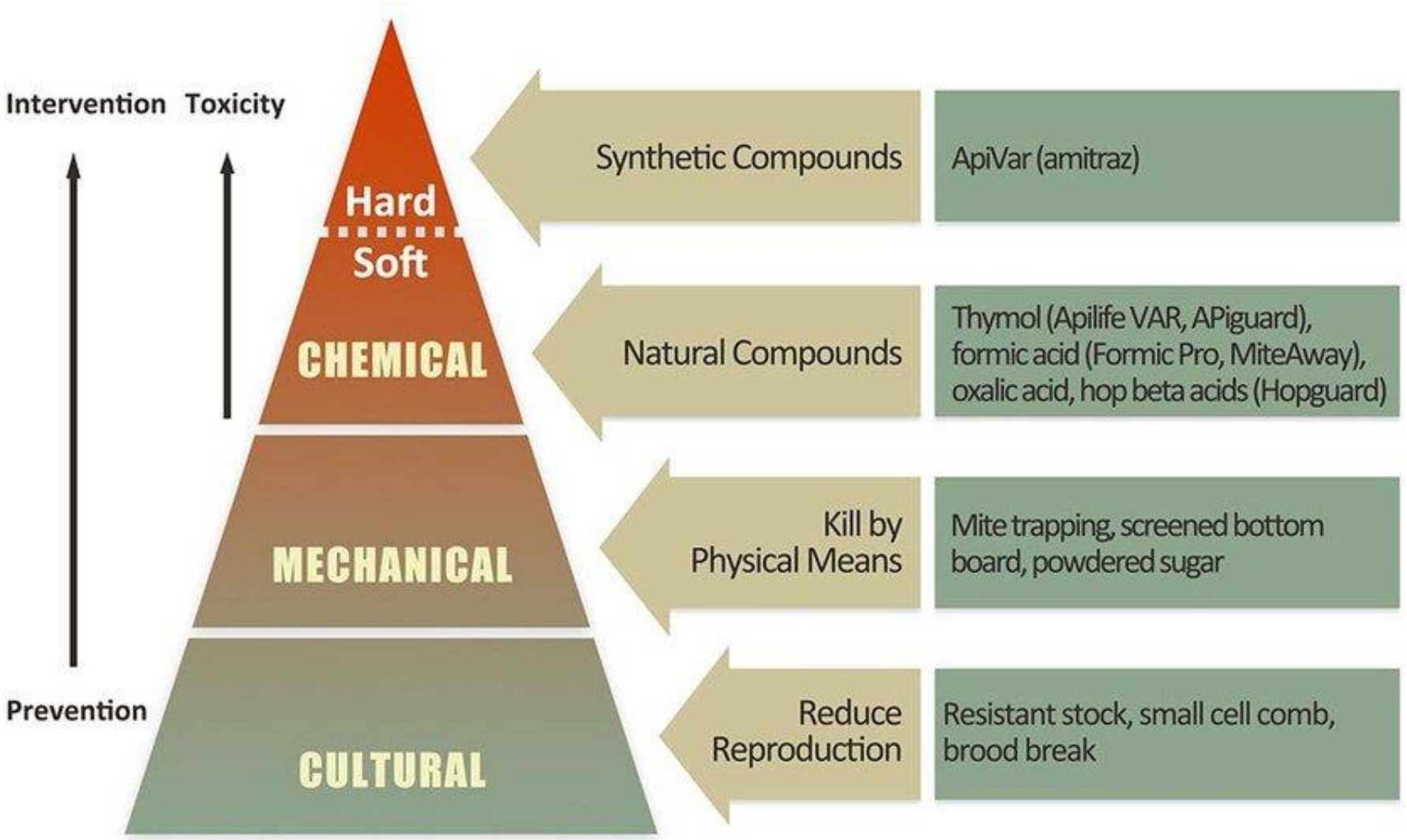
What Is IPM?

Integrated Pest Management

- Sustainable, science-based decision making
- Integrate knowledge about the pest
- Monitor pest populations
- Avoid harm, reduce pesticide use, maintain health
- Rotate chemicals

Integrated Varroa Mite Management



https://extension.psu.edu/methods-to-control-varroa-mites-an-integrated-pest-management-approach

Recordkeeping

Each hive needs a unique identifier

Permanent tags are best

E.g. Cattle ear tags or tree tags

www.cattletags.com

https://www.forestry-suppliers.com/

One sheet per apiary

Location:		Date:								
		Brood			Queen					
Hive number	Assessor	Eggs	Larvae	Capped	Q spotted	Sup cells	Swarm cells	Varroa in wash	Temp	Comments
211/345										
212/585										
213/405										
214/465										
215/528										
216/348										
217/586										

I use this like a map. Top down is left to right in the line of hives.

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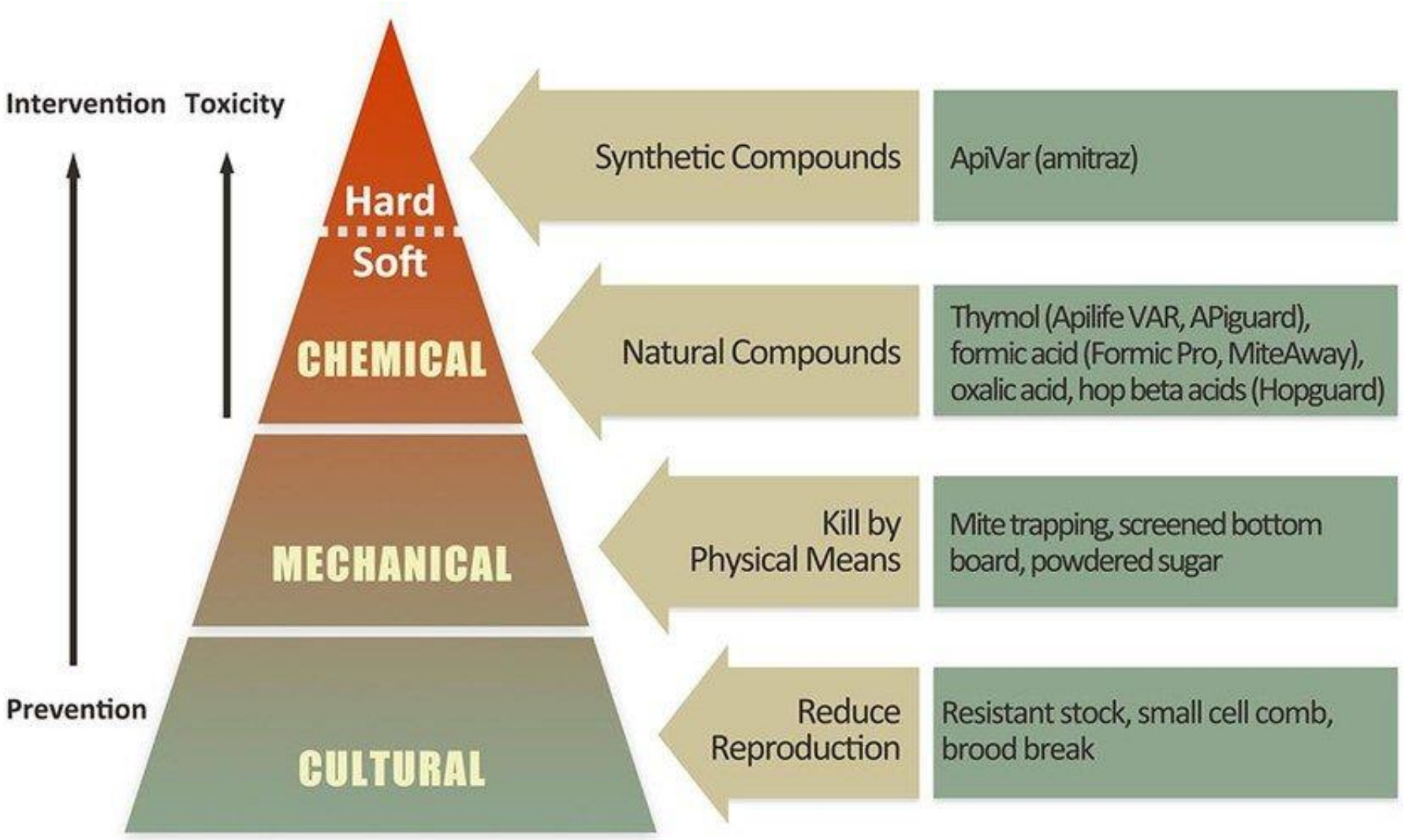
Ongoing data by colony

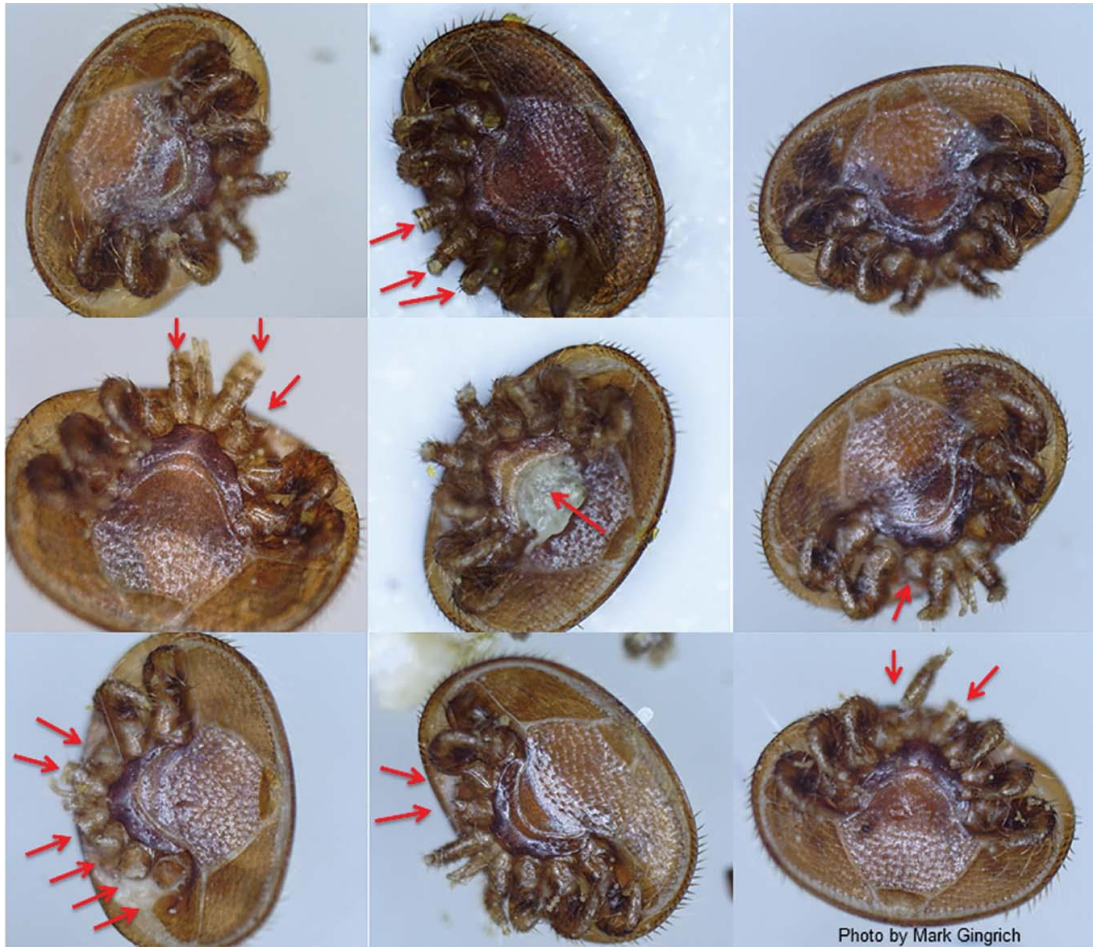
Hive	Date	Q color	All stages	Comments	varroa	Treatment
211	7-Apr-2022		yes			
211	22-Apr-2022		yes	Capped swarm cells. Took Q, brood, food for split	4	
211	9-May-2022			NOT checked, requeening		OA 2g vapor-repeat 14&19 May
211	24-May-2022	blue	no	Eggs and young larvae. Q marked blue.		
211	10-Jun-2022		yes	Super added		
211	24-Jun-2022	blue	yes	Super added	1	
211	9-Jul-2022	blue	yes			
211	23-Jul-2022		yes		3	
211	7-Aug-2022		yes	2 boxes honey removed		
211	21-Aug-2022		yes		12	Formic Pro 2 pads
211	5-Sep-2022		yes	Few eggs and larvae.		
211	18-Sep-2022		yes	Fed 2 gallons prosweet	4	
211	17-Oct-2022	blue	no			

Integrated Varroa Mite Management



Resistant Stock

Grooming behavior/mite biting



https://extension.entm.purdue.edu/beehive/our-breeding-program/

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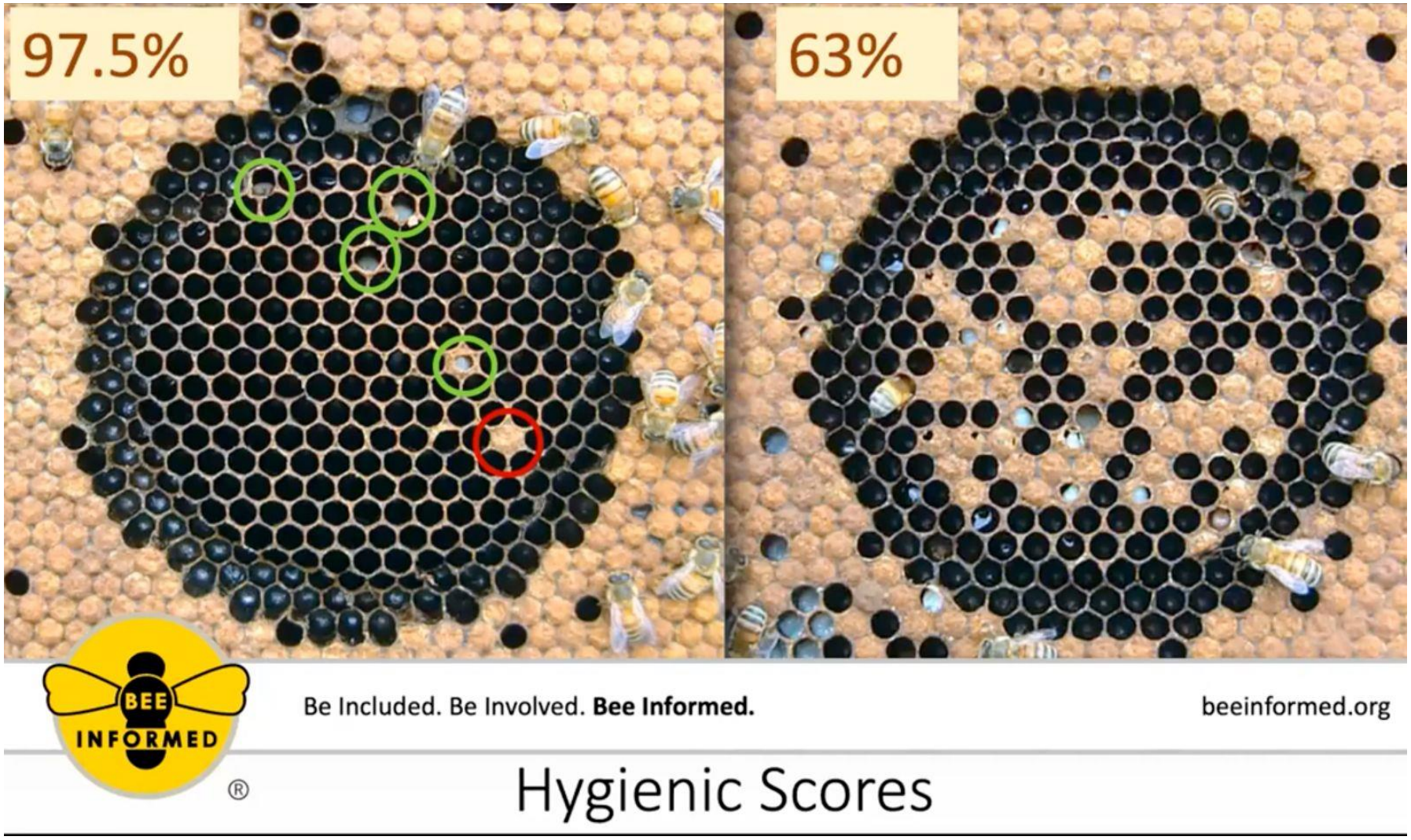
Resistant Stock

Hygienic (freeze killed brood assay)



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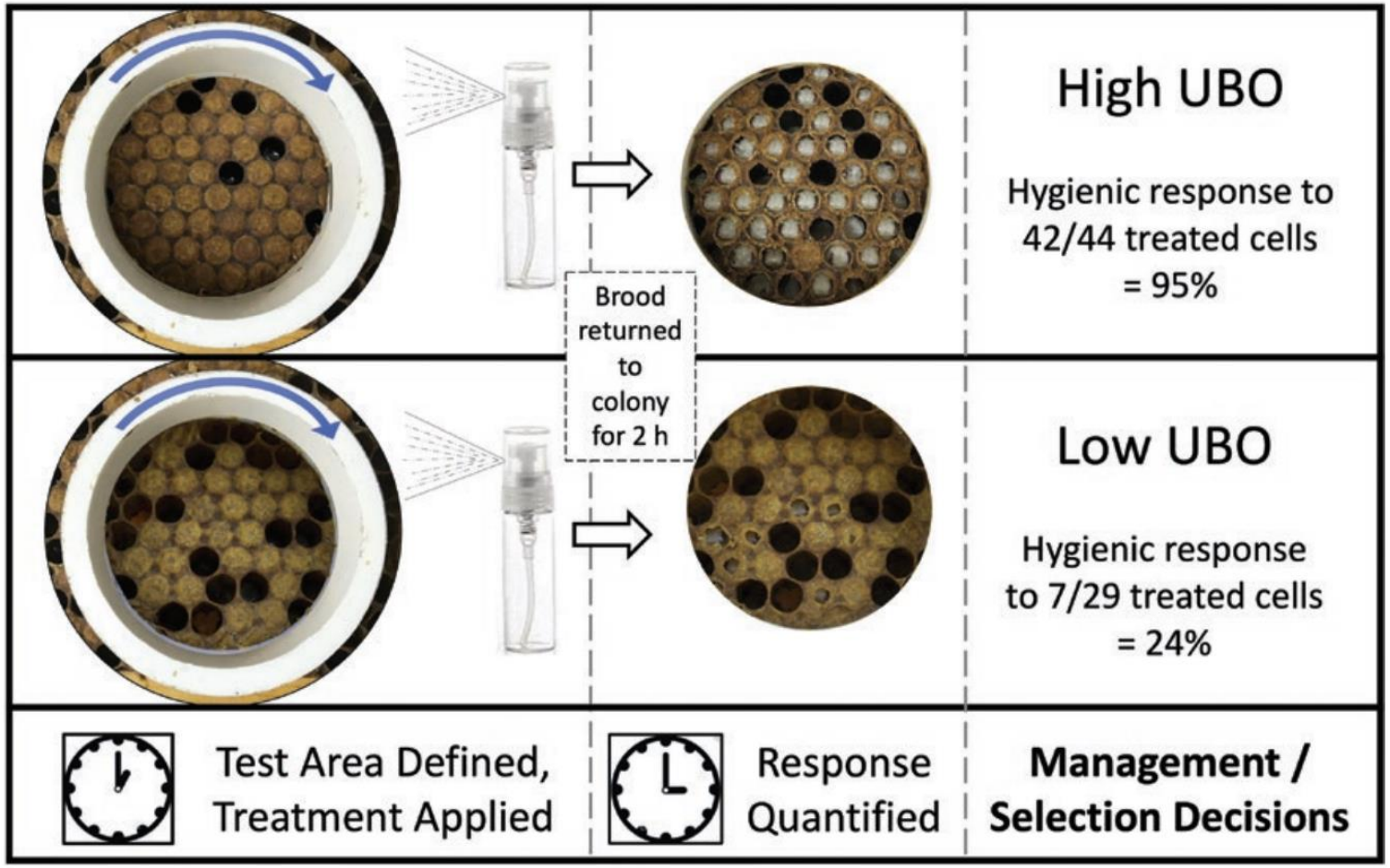
Resistant Stock

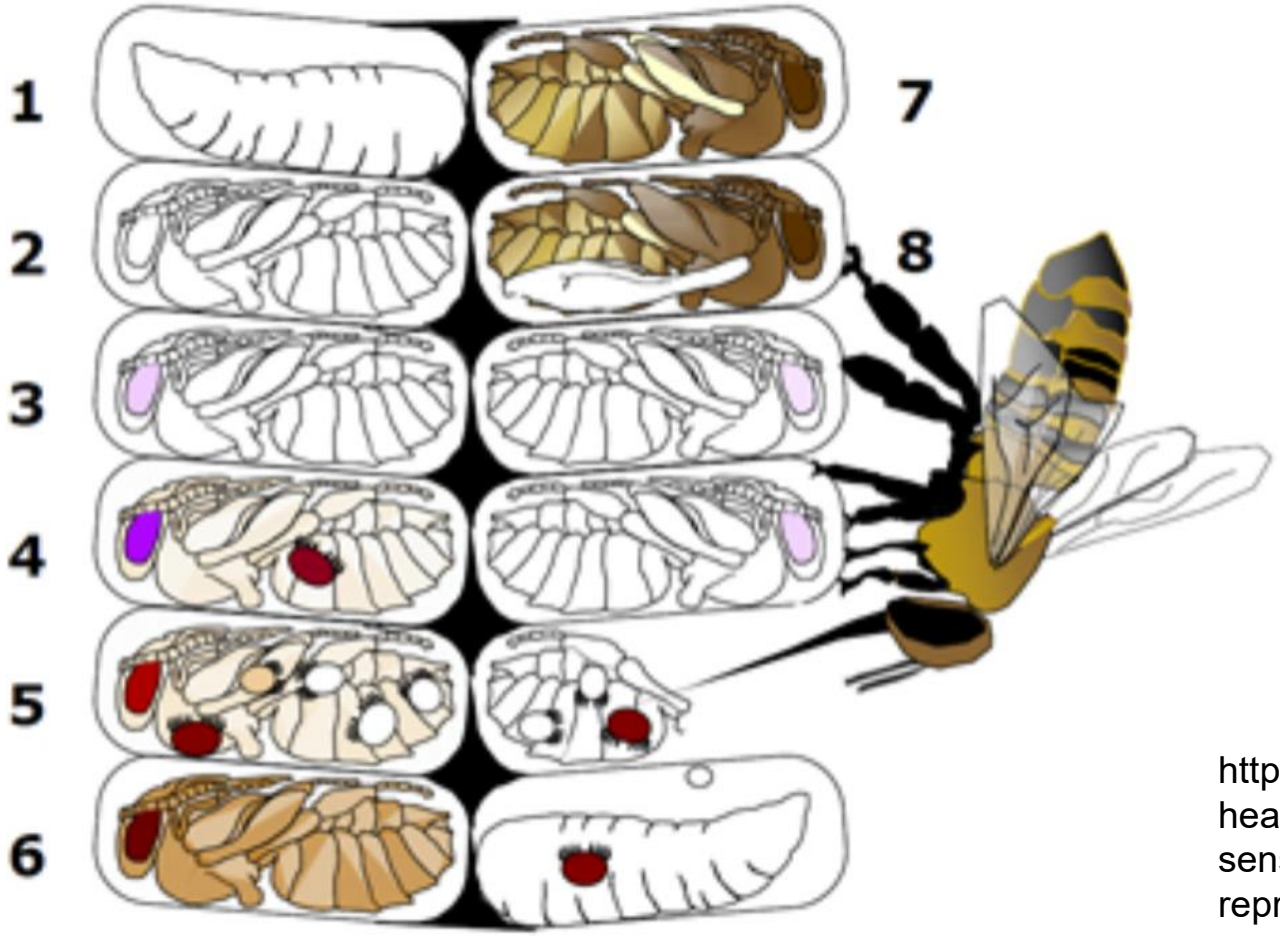
Unhealthy Brood Odor (UBO)



Wagoner, K., Millar, J. G., Keller, J., Bello, J., Waiker, P., Schal, C., Spivak, M., & Rueppell, O. (2021). Hygiene-Eliciting Brood Semiochemicals as a Tool for Assaying Honey Bee (Hymenoptera: Apidae) Colony Resistance to Varroa (Mesostigmata: Varroidae). Journal of Insect Science, 21(6). https://doi.org/10.1093/jisesa/ieab064

Resistant Stock

Varroa Sensitive Hygiene (VSH): use Harbo assay



https://bee-health.extension.org/varroa-sensitive-hygiene-and-mite-reproduction/

https://www.harbobeeco.com/measure-vsh/

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Questions

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Alcohol Washes

½ cup
≅ 300
bees

Walmart.com

Robyn Underwood

Robyn Underwood

Shea Singley

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Alcohol wash

Diluted ethanol (>70%) or isopropyl alcohol

Soapy water (1-2 Tbsp/gallon)

https://www.blog-veto-pharma.com

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https://www.beeculture.com/ask-phil-monitoring-varroa-swarm-prevention-or-not/

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Wash details

For step-by-step instructions, see:

https://extension.psu.edu/alcohol-wash-for-varroa-mite-monitoring

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For alcohol wash or sugar shake

Treatment Thresholds by Phase (%=Number of mites/100 adult bees)		
Colony Phase	**Acceptable** Further control not needed	**Danger** Control promptly
Dormant with brood	<1%	>2%
Dormant without brood	<1%	>3%
Population Increase	<1%	>2-3%
Peak Population	<2%	>3%
Population Decrease	<2%	>2-3%

Acceptable: Current mite populations are not an immediate threat.
Danger: Colony loss is likely unless the beekeeper controls Varroa immediately.

https://honeybeehealthcoalition.org/wp-content/uploads/2019/01/HBHC_Hive_BMPs_v1.0_reduced.pdf

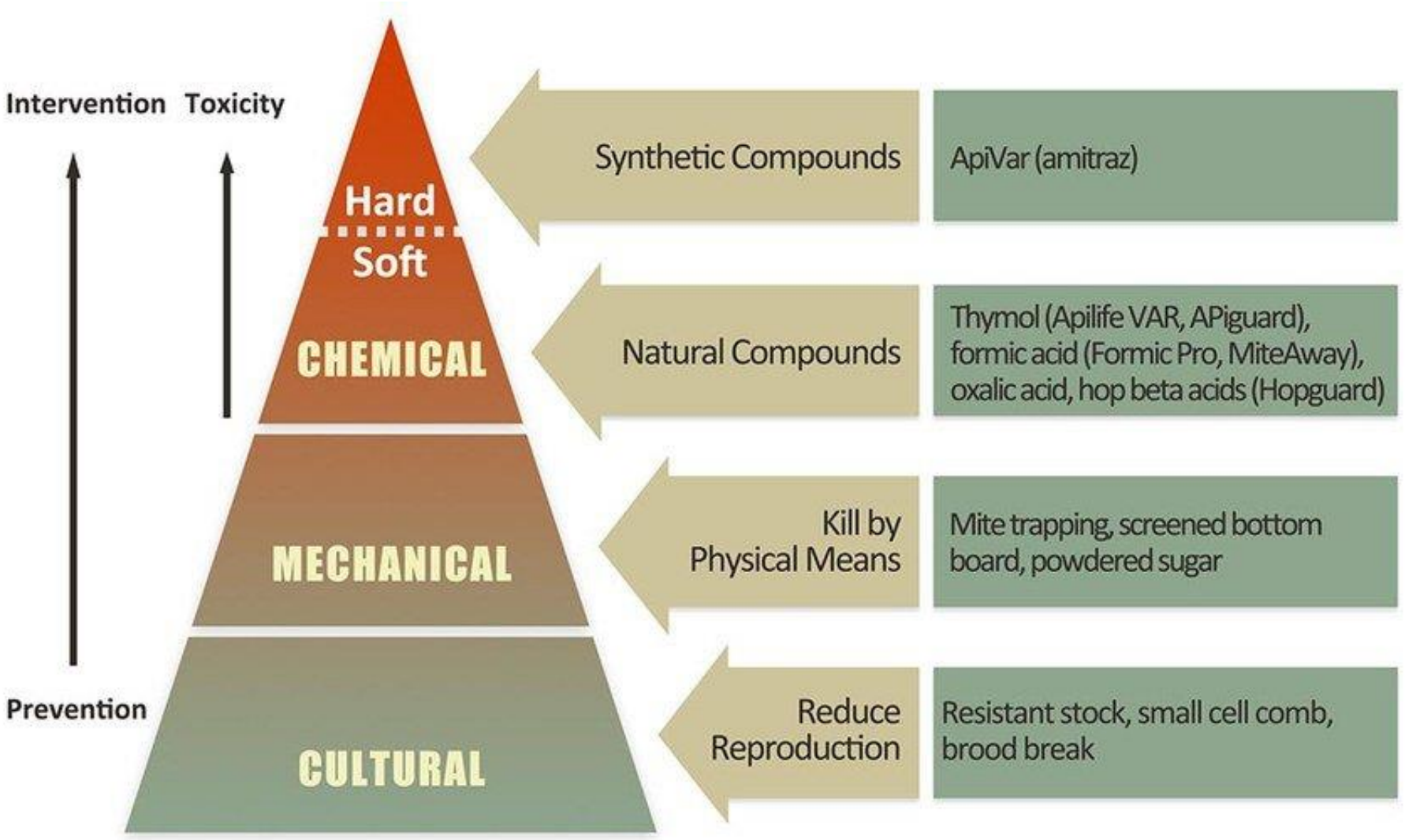
Uncontrolled mite levels

Animal welfare must be considered

High levels of mites =

- High levels of virus in your bees
- Parasitic mite syndrome
- Colony death
- Spillover to wild bees

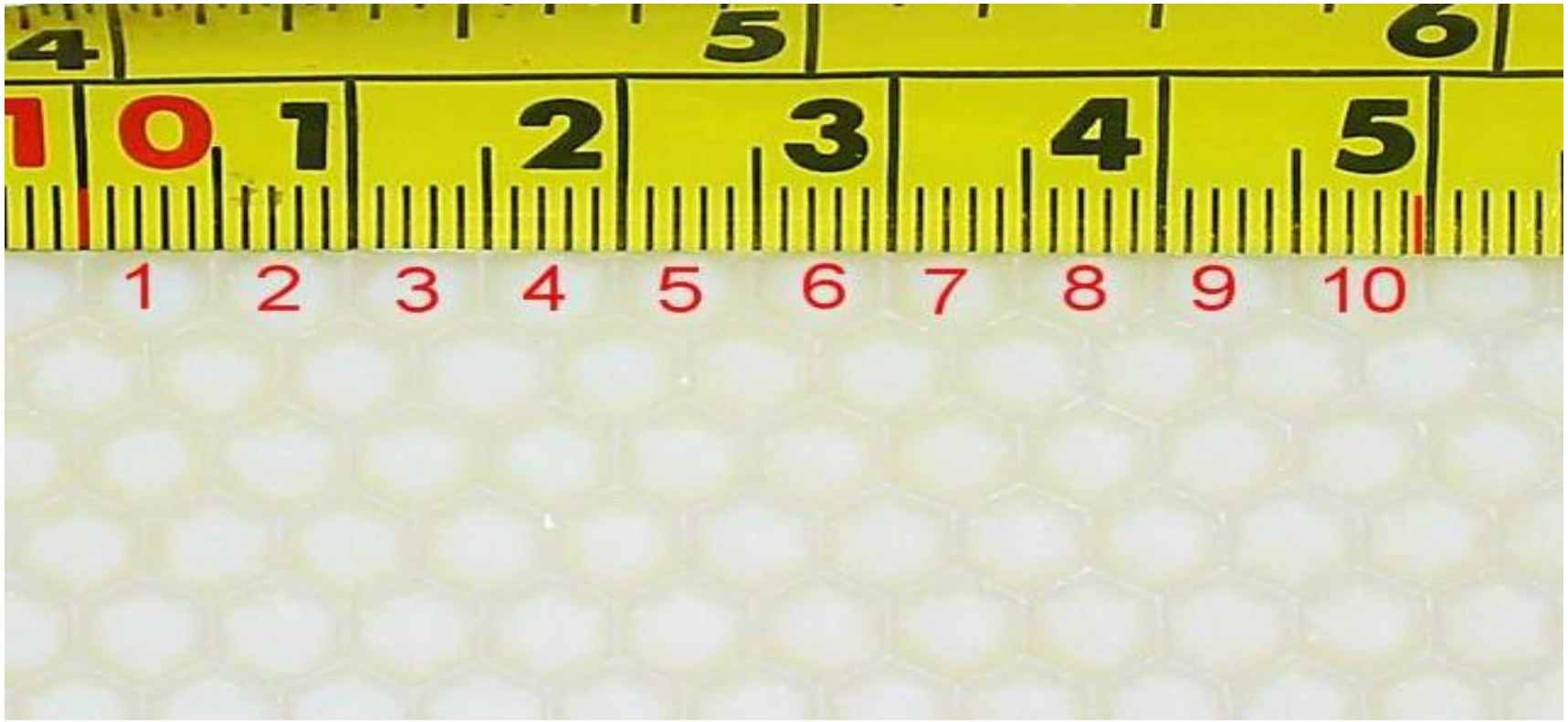
Integrated Varroa Mite Management



https://extension.psu.edu/methods-to-control-varroa-mites-an-integrated-pest-management-approach

Small Cell Comb

Literature split on effectiveness against varroa mites



From Michael Bush

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Brood Break

Cage queen for 14-20 days

Pause the reproduction of bees

Causes mites to also pause reproduction

Mites will be phoretic = time to treat

Time this carefully

- Consider loss of honey production
- Consider the need for winter bees

Scalvini cage

www.amazon.nl

Queen keeps laying

No new brood develops

Make a split

Take:

- The queen
  - Food resources
  - Brood

Leave behind:

- Eggs, young larvae
- Queen cells (If present)

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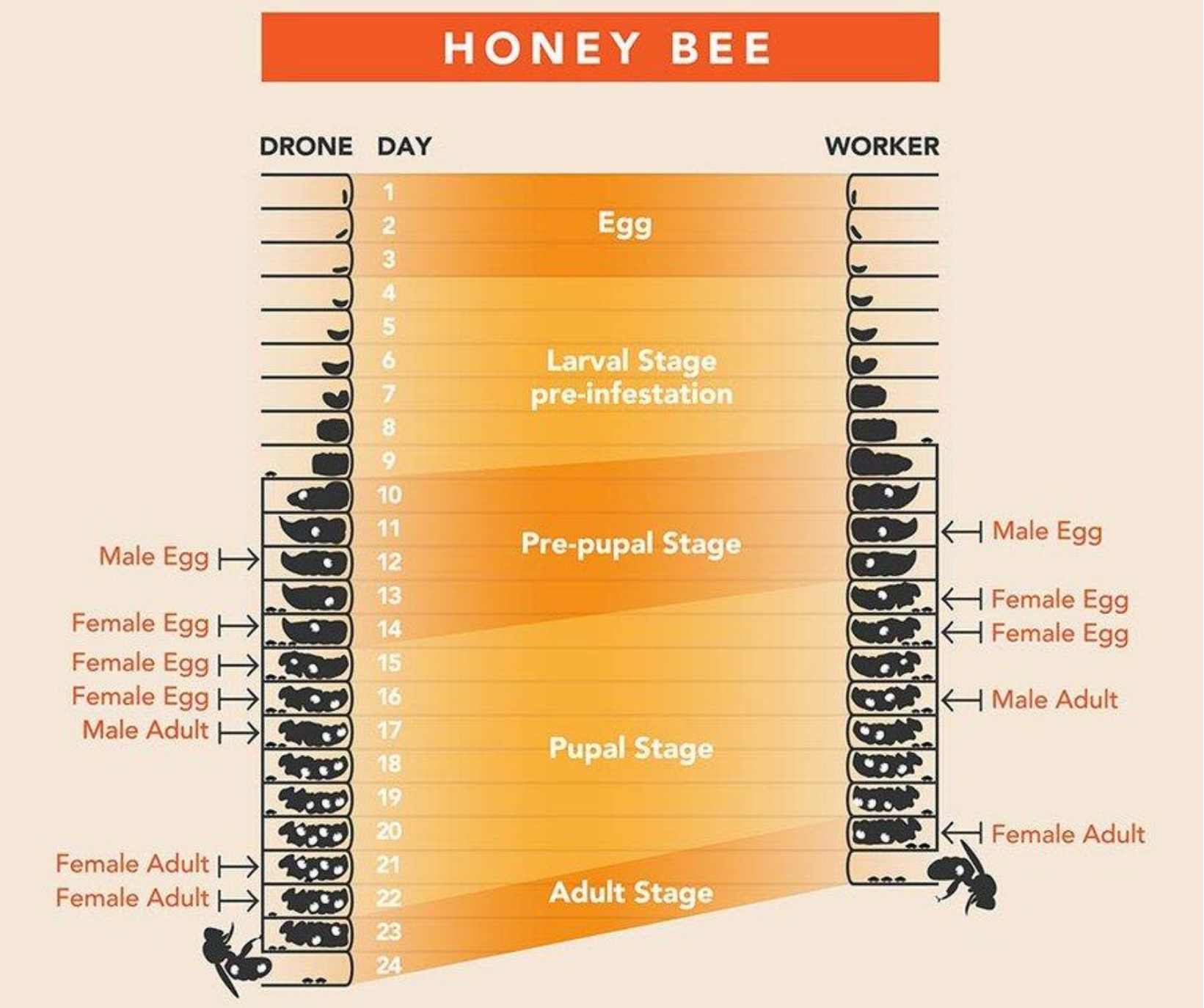
Mite Trapping



https://extension.psu.edu/methods-to-control-varroa-mites-an-integrated-pest-management-approach

Drone frames

- One drone frame per brood chamber box
- Scraped/frozen every 14-23 days
- Leaving them for longer GROWS mites


Robyn Underwood


Robyn Underwood

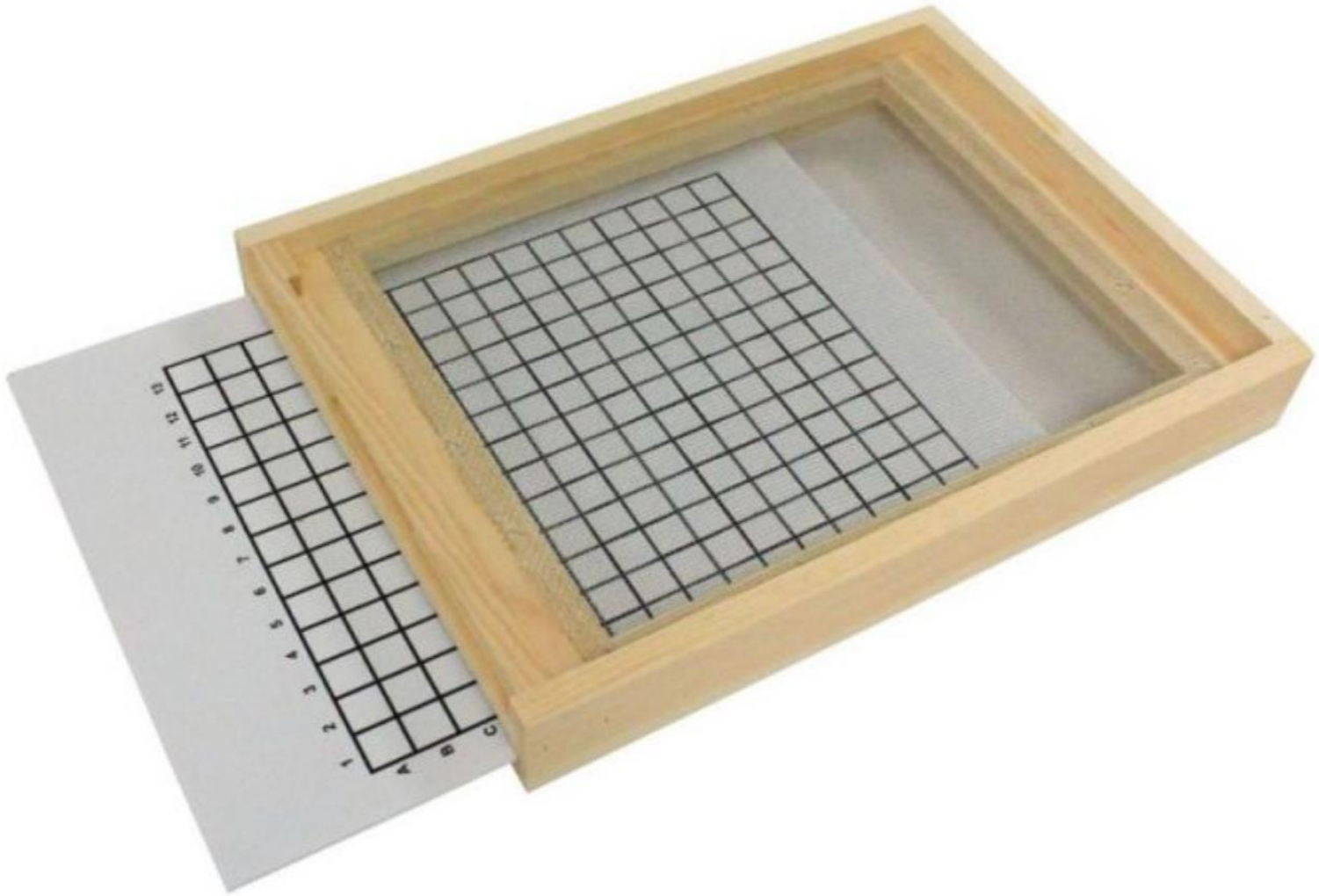
PennState Extension

Can also let them build drone comb on their own, then cut it off

Images by Randy Oliver, which can be found at the website below.

http://scientificbeekeeping.com/fighting-varroa-biotechnical-tactics-ii/

Screened bottom board



Mann Lake Ltd.

- Screened bottom boards
- Reduction of 14, 28, 37% of mites
- Helpful, but not enough alone

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Monitor and Manage

Wash monthly

1-2 % threshold

https://www.beeculture.com/ask-phil-monitoring-varroa-swarm-prevention-or-not/

https://www.blog-veto-pharma.com

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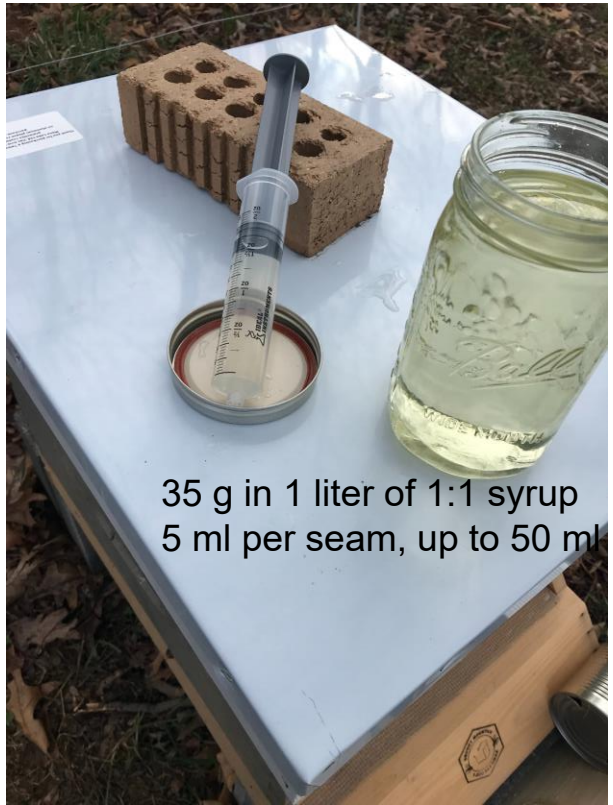
April & May: Oxalic Acid*

Dribble or vapor, if over threshold

Repeat 3 times @ 5-7 day interval



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June & July: Formic Acid*

MAQS or Formic Pro, if over threshold

Temperature-dependent

NOD Apiary Products

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Mid-August: Formic Pro*, Apiguard*, or ApiVar

IPM practices: *rotate chemicals*

"Fall" treatment for all colonies @ winter size

Two pads for 10 or 14 days

One sachet or 50g of gel on day 1, followed by a repeat application 2 week later.

Four strips for 42 days

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Overwintering

Down to size in mid August

Check that mite treatments worked

Weigh each colony in early Oct:

120+ lb goal (60 lb food), feed accordingly

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Winter and spring

- Check for life monthly
- OA vapor in mid-December
- Add solid food, if needed
- March: pollen patty optional

Focus on health and wellbeing

Mite monitoring is critical; monthly
Alcohol wash is most reliable
Keep careful records

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Focus on health and wellbeing

START with resistant stock!

TEST for VSH or MONITOR mite levels on adults

Adopt some cultural & mechanical controls

Control mites with approved chemicals, if needed

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extension.psu.edu

ARTICLES

Methods to Control Varroa Mites: An Integrated Pest Management Approach

By Robyn Underwood, Ph.D., Margarita López-Uribe, Ph.D.

Varroa mites (Varroa destructor), are the most influential of all of the pests and diseases of the European honey bee (Apis mellifera) today.

Free pdf online

ONLINE COURSES $159.00

Beekeeping 101

Sections 10 **Length** 9 hours

This online course about the science and practice of beekeeping is for beginning beekeepers. It covers bee biology and behavior, hive management, equipment, bee products, and more.

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GUIDES AND PUBLICATIONS

A Field Guide to Honey Bees and Their Maladies

By Robyn Underwood, Ph.D., Maryann Frazier

Identify and treat maladies in your honey bee colony.

ARTICLES

A Quick Reference Guide to Honey Bee Parasites, Pests, Predators, and Diseases

By Robyn Underwood, Ph.D.

Fact sheet on common honey bee maladies, including varroa mite, tracheal mite, bee louse, skunks, bears, foulbrood, and nosema.

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Thank you!

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Questions

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Some Questions for You

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Upcoming Webinars

Monday, March 25th - **Kosher, Halal and Insects: How do they relate?** with Joe Regenstein

Thursday, April 11th - **Reducing Synthetic Chemical Use to Optimize Pest Management and Crop Production: A case study of onion thrips in onion** with Brian Nault

https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/

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http://neipmc.org/go/APra

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Recording of IPM Toolbox Webinar Series

Past recordings and 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.

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Land Acknowledgment

The Northeastern IPM Center is based at Cornell University in Ithaca, New York.

Cornell University is located on the traditional homelands of the Gayogo̱hó꞉nǫ' (the Cayuga Nation). The Gayogo̱hó꞉nǫ' are members of the Haudenosaunee Confederacy, an alliance of six sovereign Nations with a historic and contemporary presence on this land. The Confederacy precedes the establishment of Cornell University, New York state, and the United States of America. We acknowledge the painful history of Gayogo̱hó꞉nǫ' dispossession, and honor the ongoing connection of Gayogo̱hó꞉nǫ' people, past and present, to these lands and waters.

This land acknowledgment has been reviewed and approved by the traditional Gayogo̱hó꞉nǫ' leadership.

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