



Sunshine Hill Farms LLC

Treatment Options



15+ year hobbyist beekeeper – 15 to 20 hives

INTRODUCTION – Kevin Inglin

EAS Master Beekeeper




Past President – NWNJBA





Day Job > Medical Affairs IT, Bristol Myers Squibb




Beekeeping Podcaster

Managed Mentoring Program for Getting Started in Beekeeping

Our Home Yard

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Know the Enemy

Much of beekeeping revolves around Varroa Mites

**Beeks that
learn about
treatment
options can
be happy**





**But you must
understand
why you do
what you do**

Varroa Destructor and Honeybees

*Understanding the
relationship is key*



Image credit: Antoine Franck

It is about Varroa Mites

□ Let's face it, it is about Varroa

- *Before varroa mites, beekeepers had viruses and diseases to worry about, along with some pests (like trachea mites)*
 - But it was far easier to keep bees and colony losses were not really a concern
- ***The craft of beekeeping changed with the introduction of Varroa***
 - *Beekeepers needed to decide what to do...*

✓ In 1987 things were different

□ When Varroa first arrived

- *Researchers indicated that **European bees could not manage with Varroa Destructor***
- *Apis Ceranae, the Asian honeybee, had evolved and adapted to cope with Varroa Destructor – but our bees could not*
- *It was predicted that the rate of evolution for our Apis Mellifera bees **would take decades to evolve** as Apis Ceranae did*

Early 1990s > Bees in Danger

□ Pollination, Honey Production, Food Supplies

- *These national economic factors were at stake*
- *Ensuring stability required expertise and choices*
- *The industry and government tested options*
 - In early days Commercial mite products provided the answer and **treating colonies to resolve varroa mite impacts won out**
 - Bear in mind that initially the products available delivered knockout punches. Use of **Fluvalinate and Coumophous rendered full kills. That is until mites became resistant**

A Quick Poll

By Show of Hands
Raise your Hand if....

For those that have bees already...

- Have you ever lost a colony over winter while it was carrying mites **below** the threshold?
- Have you ever had colonies that survived the winter while carrying mites **above** the threshold?



Treatment Free, Treatment Free-esque

□ Some did not agree with the choices

- *A minority championed letting the bees work it out naturally*
 - Mainstream feared that major impacts would risk our food supply, cause economic hardship for pollination requirements, and more
- *Mainstream went the treatment path, and still advocates for that today. **Much of it was predicated on the evolution factor***
 - As an aside, there has always been a contingent of beekeepers who have been managing bees alternatively
 - There is also the factor that bees are in nature, not managed by humans – and they are not treated

New Beekeepers Today

□ Exposure to Both Sides

- *If you search the internet, you can see information for both sides*
 - **Treatment is still the norm.**
 - However, **Treatment Free has emerged from the shadow** enough that some work is now exploring practices that are succeeding

Which Path to choose?

Let's not choose yet.

Let's explore how mites impact bees, and then with information we can consider options and tactics

Varroa Cause Harm

Knowing how Varroa Cause Harm

Treatments Options are not just what treatment product to use

Varroa Mites Cause Damage

- Varroa Mites Wound Bees
- Varroa Vectors Viruses which harm larva and adults

Harm to the Superorganism

- Bees die prematurely
- Sick bees do not produce

Population Dynamics Matter

- Summer Impact
- Winter Impact

We must take into account the colony development stages

Mite-Bee Relationships

How colony growth and varroa mites align

Treatment Research Today

□ The standard of Care

- *The Honeybee Health Coalition has one of the most prominent treatment resources*
- *Trusted by commercial and hobby interests alike*
 - It is the most current research available for understanding a monitor and treat approach to beekeeping
- *It promotes monitor and treat as required*
 - Monitoring is an important aspect that is meant to bridge us to the path to less treatments

An Important Resource

TOOLS FOR VARROA MANAGEMENT

A GUIDE TO EFFECTIVE VARROA SAMPLING & CONTROL

HEALTHY BEES · HEALTHY PEOPLE · HEALTHY PLANET™

Many of the modern concepts of varroa management, **including treatment options**, in hobby and industry derive from this resource



<https://HoneyBeeHealthCoalition.com>



**HONEY BEE
HEALTH
COALITION™**

✓ The Premise of Monitoring

□ Do NOT Blindly Treat

- *A practice of measuring mite impacts has been established and it allows beekeepers to determine if a colony is subject to injury*
- *If you monitor, and mite counts are below specified thresholds, then you do not need to treat*
 - Common sense dictates that you should not administer medicine or treatment if the colony is not subject to harm.
- *Only treat when the threat exceeds **economic threshold***

Economic Threshold

□ Sustainable Injury (Economic Threshold)

This is a concept that if you keep injury down, the bees can function

- *If 2 or 3 bees out of 100 (2 – 3%) are impacted by mites, this will be ok*
- *Higher than 2 - 3%, the colony can experience problems*
 - The percentage of damage they can endure varies depending only colony dynamics and other factors

Development Phases

Honey Bee Health Coalition development phases

Colony Development Stages

Dormant

- No forage available
- Colony is clustered
- Population is maintaining or slightly declining

Population Increase

- Abundant Forage
- Populations of bees and mites are growing at a high rate

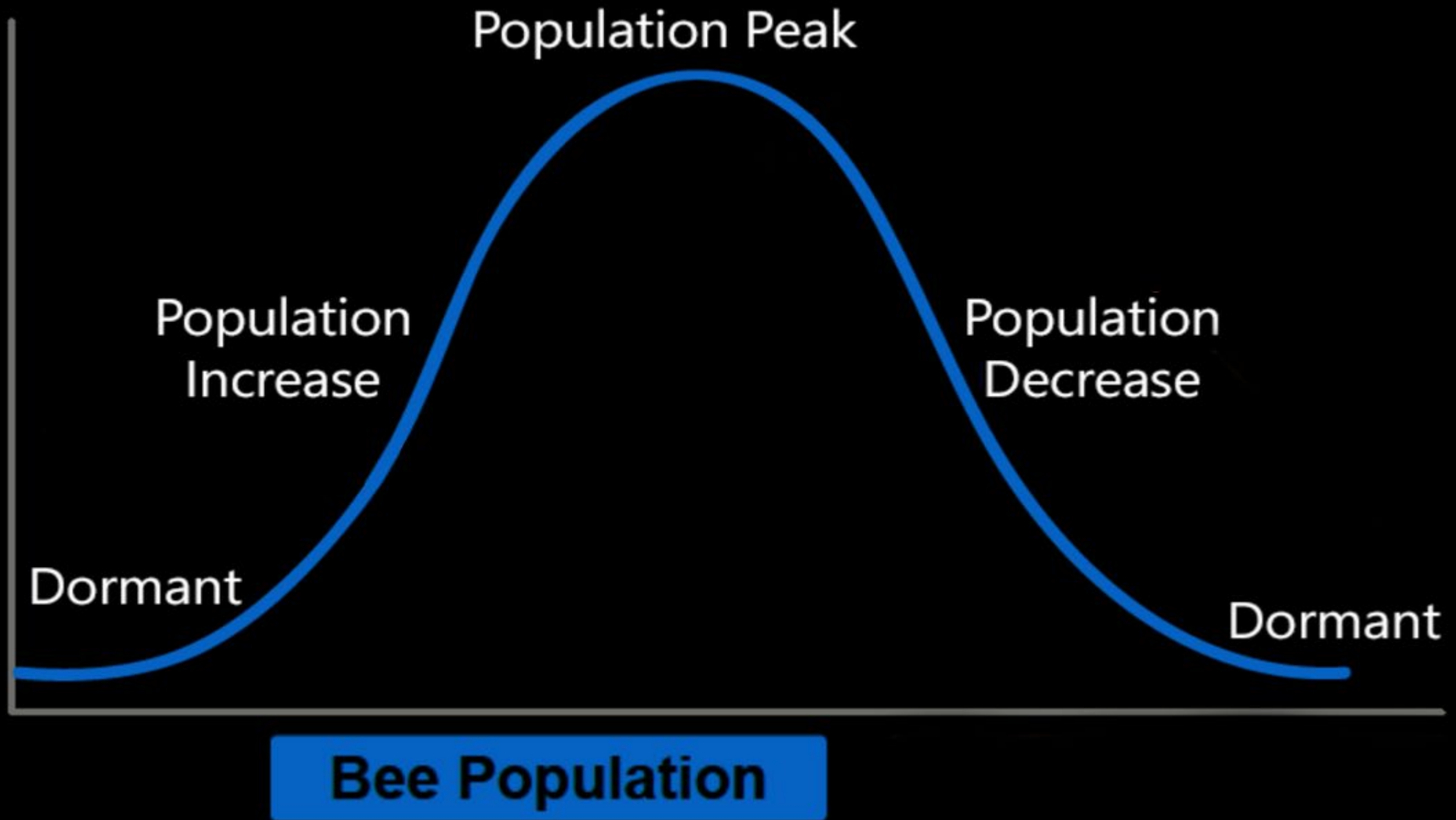
Population Peak

- Forage at peak or slightly declining
- Peak population for bees, then peak population for mites

Population Decline

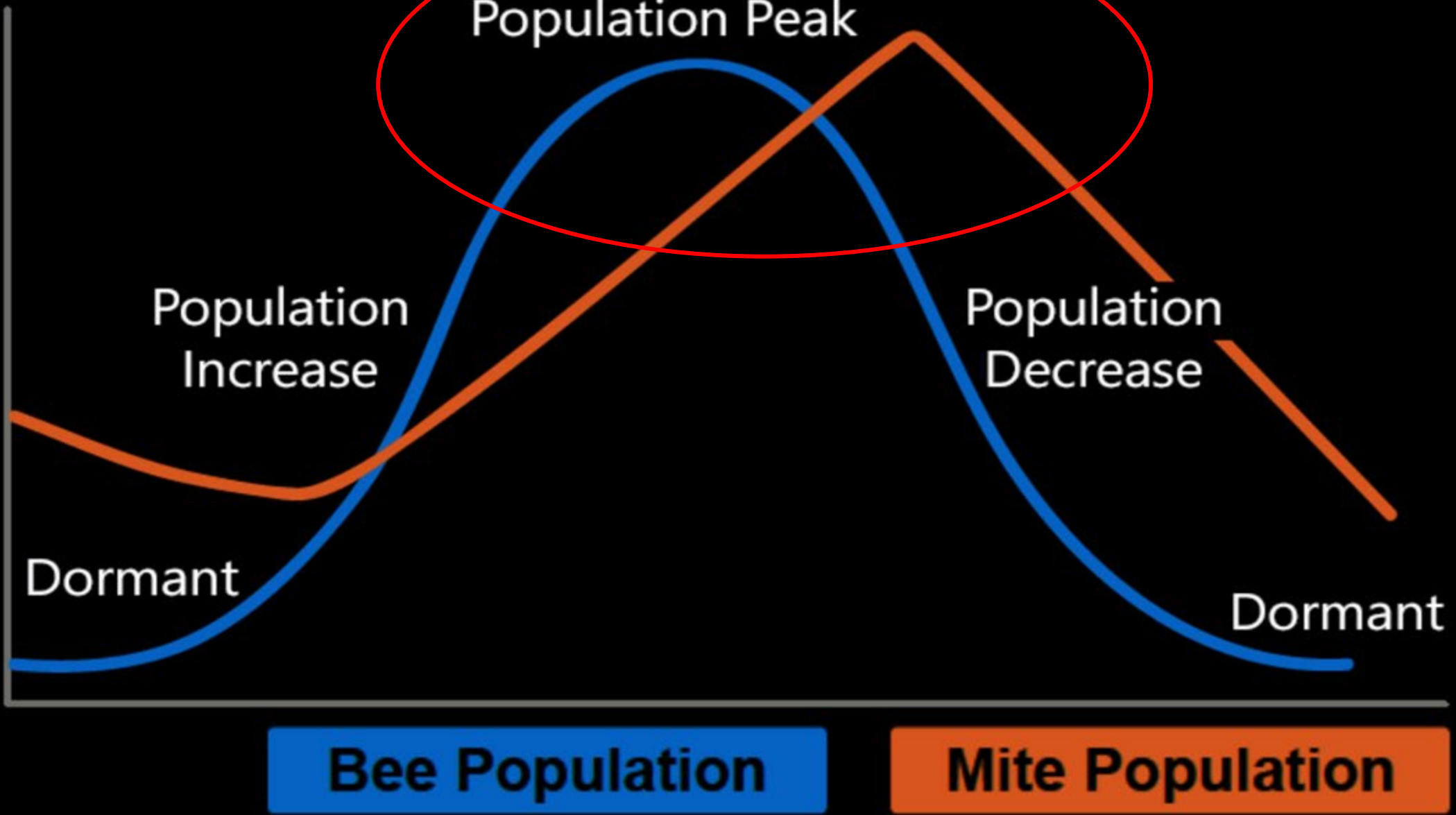
- Forage is slow or tapers off, with some flourishes depending on location
- Colony populations, and mites in decline

Dormant



Varroa Mite Interaction

■ Make note of the lag



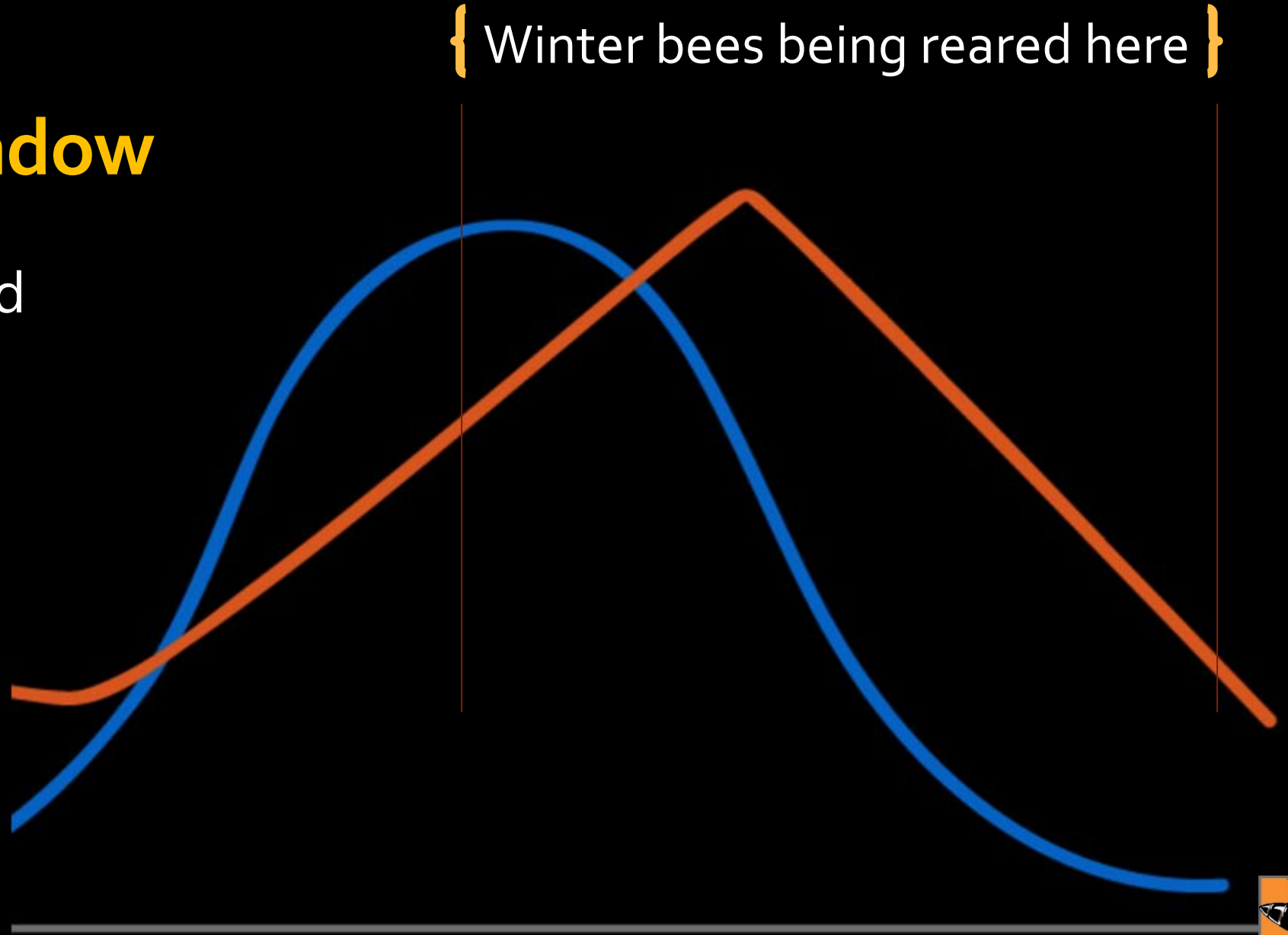
Bee Population

Mite Population



Winter Bee Window

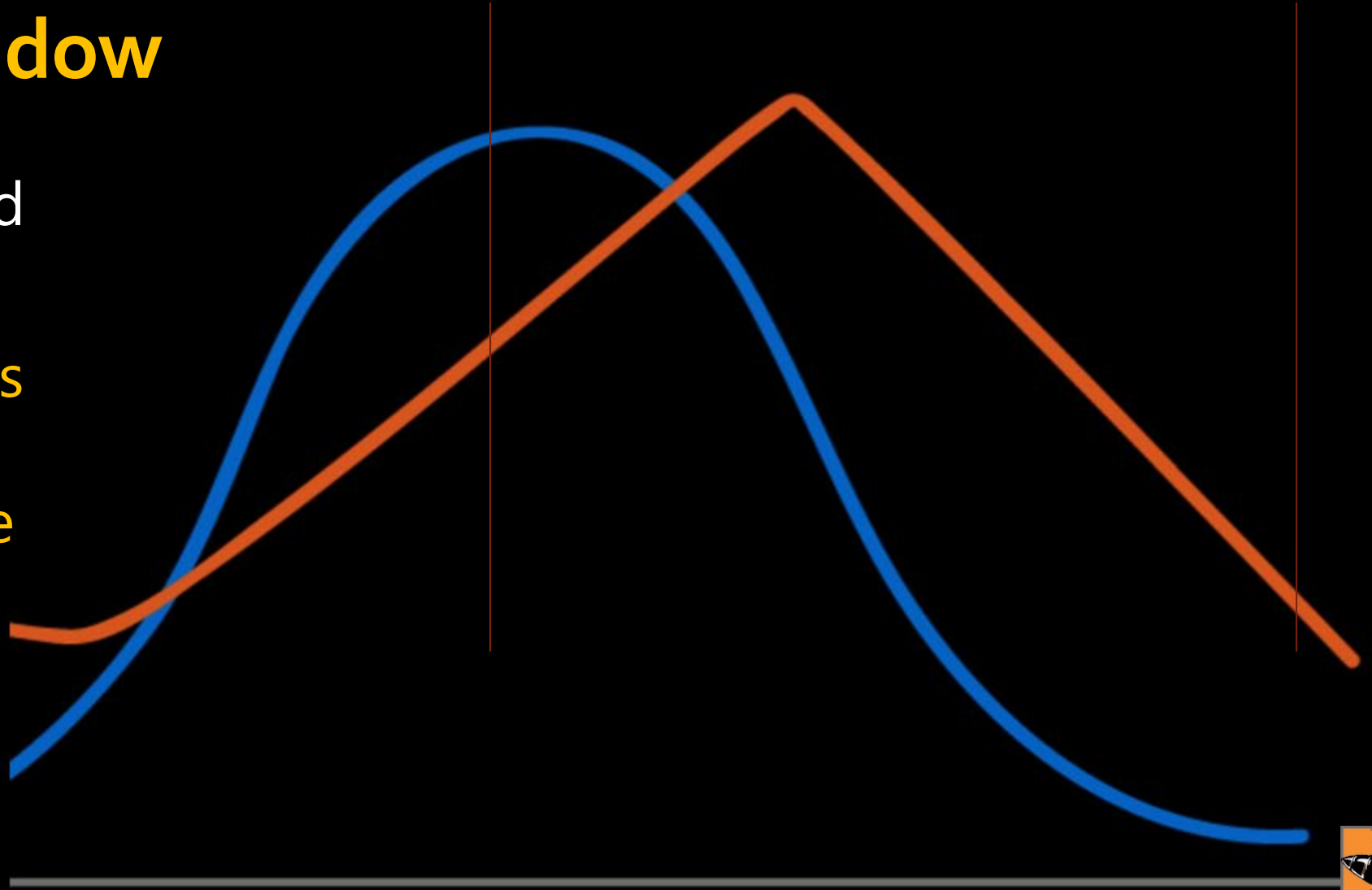
- Winter Bees reared in this timeframe



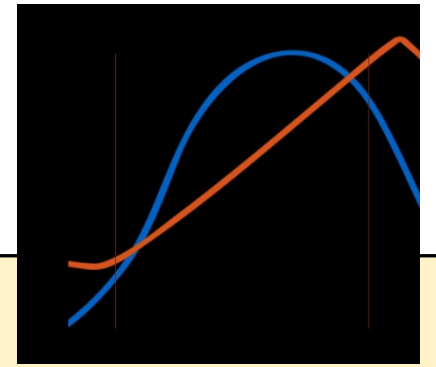
{ Winter bees being reared here }

Winter Bee Window

- Winter Bees reared in this timeframe
- If mite populations are not addressed winter bees will be compromised



Colony Development Stages



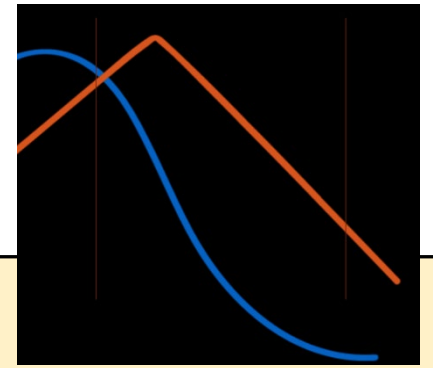
Population Increase

- Abundant Forage
- Populations of bees and mites are growing at a high rate

□ Higher mite tolerance in this stage

- *High attrition and population curves offset risk*
 - **Bees live shorter lifespans, and if they are impacted by varroa, they die quickly**
 - The population growth of bees in the colony in early season allows for more fresh bees to compensate for mite impacts
 - Good nutrition and abundance of fresh propolis help compensate some for the overall health of the colony

Colony Development Stages



Population Peak

- Forage at peak or slightly declining
- Peak population for bees, then peak population for mites

Winter bees being reared here

Population Decline

- Forage is slow or tapers off, with some flourishes depending on location
- Colony populations, and mites in decline

□ Low mite tolerance

- *High risk profile for survival*
 - **Bees must live longer and do not do well when they are sick**
 - Sick nurse bees are feeding the long-lived bees
 - Low forage, higher stress period
 - Mites moving from drones put added pressure on the system

Winter Bee Survival

Protecting the development of winter bees

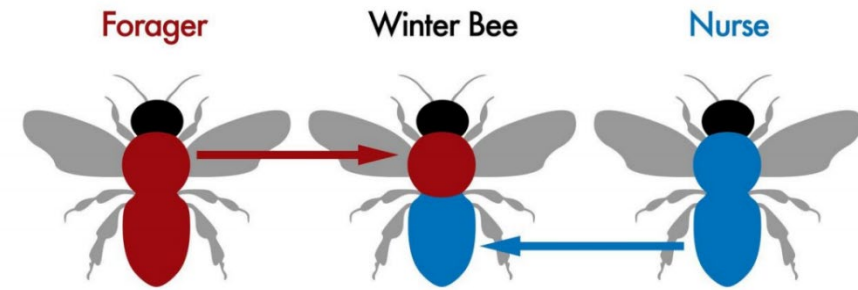
Winter bees are different

□ They are a different phenotype

- *You will find that the winter bee can be thought of as a mix of a nurse and forager*
 - Winter bees resemble nurse bees in **fat body tissues**
 - Winter bees resemble forager bees in **flight muscle tissues.**

The hypothesis is that winter bees are using tissue-specific genetic toolkits

- It is a bit of a mix-and-match molecular and physiological traits strategy for adapting to winter conditions in temperate environments



Definition

Phenotype:
observable traits
or characteristics.

**Can be appearance
or physical traits –
driven by genes
and environmental
factors**

Mites and Brood Dynamics

❑ Mites favor the drone brood

- *The mites reproduce and feed off the developing brood*
 - **Mites favor the drone brood** when it is available

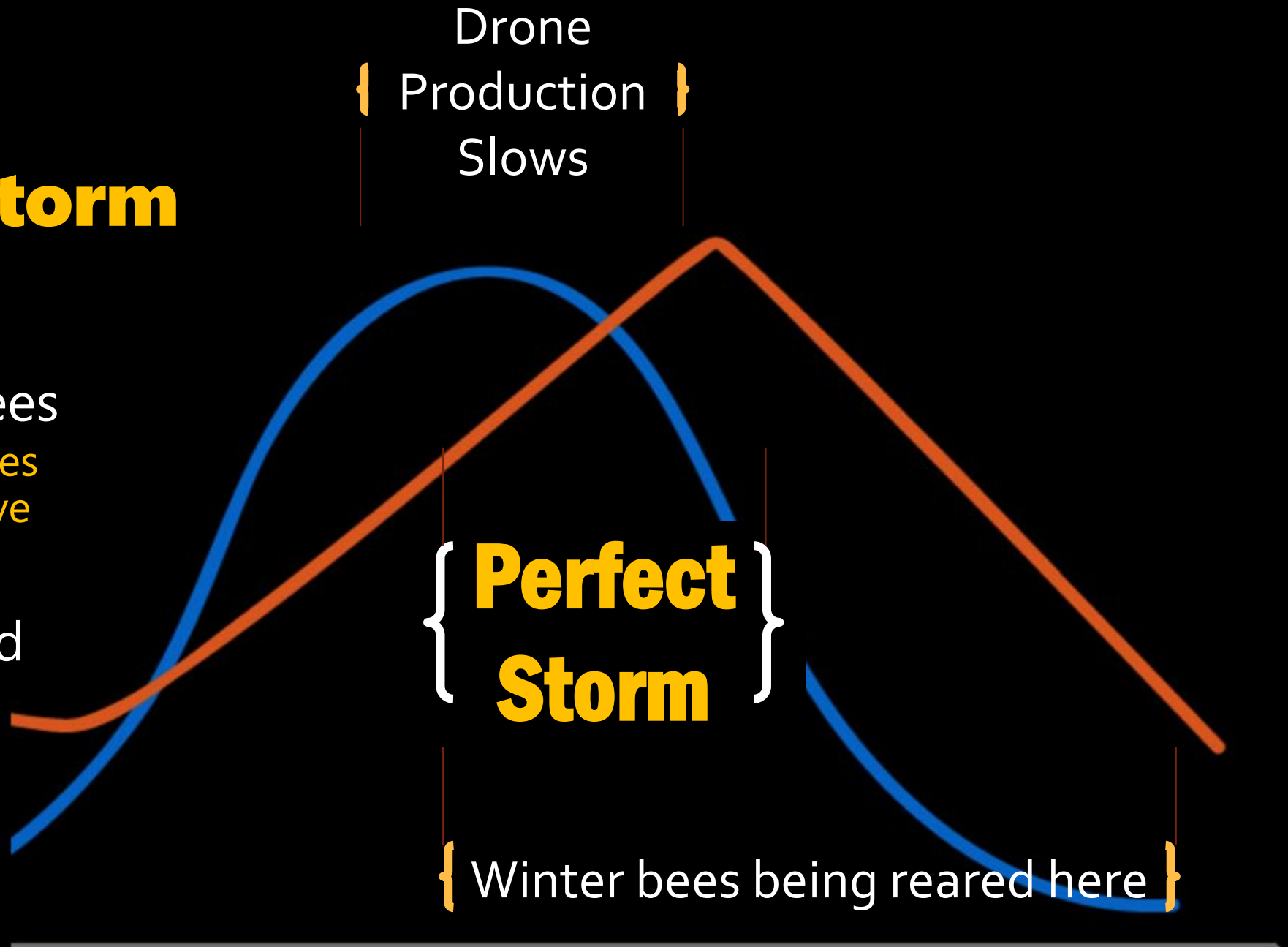
❑ Mites must feed on adult bees too

- *The reproductive female mites requires vitellogenin from adult fat body*
 - As the ride on their worker bee host, they feed on the fat body of the bee
 - They hop off the nurse bees (after feeding on them) on their quest to move into the developing brood to do continue feeding and reproduce

When colonies cease producing drones, mites switch over to worker bees

The Perfect Storm

- Mites on Drones switch to nurse bees
 - There are less drones present so they have no choice
- Winter Bees reared in this timeframe are compromised



Threshold Relationship – what damages bees

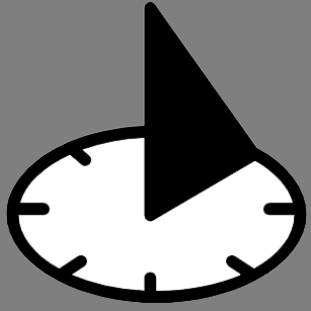
Colony Phase	Acceptable Further control not needed	Caution Control may be warranted	Danger Control Promptly
Dormant with Brood	<1%	1-2%	<2%
Dormant without Brood	<1%	<2-3%	<2%
Population Increase	<1%	<2-3%	<3%
Peak Population	<2%	<3-5%	<5%
Population Decrease	<2%	<2-3%	<3%

Graphic Values: BIP Tools for Varroa Management

- **Acceptable:** Current mite populations are not an immediate threat.
- **Caution:** Mite population is reaching levels that may soon cause damage; non-chemical control might be employed while chemical control may be needed within a month; continue to sample and be prepared to intervene.
- **Danger:** Colony loss is likely unless the beekeeper controls Varroa immediately.

Winter Bee Timing

Early summer mite management is critical to winter survival



summer solstice
June 20th or 21st

Winter Bees

- **Winter bees start in summer**
 - What you do in spring and summer impacts survivability for winter
 - **Winter bees are thought to start on the journey to switch over after the summer solstice**

- **Months, not weeks**
 - Fair weather bees live for weeks
 - **Winter bees must persist for months**
 - *And they are doing hard work in generating heat for the colony during the duration – which means they must be healthy*

Protecting Winter Bees (Timing)

□ August through October

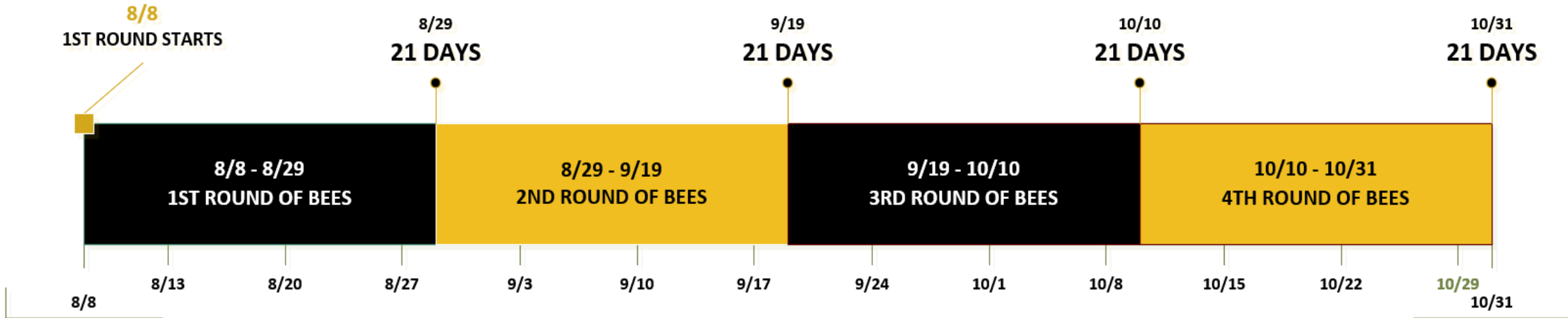
- *If a bee takes 21 days to emerge, then how many of those 21-day windows do you have from August to November – and winterization?*
 - There are about 4 to 5 generations of bees before winter bees are established
 - In this time period bees change over from short term lifespans to ones that will live overwinter – they physically change in several ways

Winter Bees

■ 4-Cycles (of 21 days)

- In NJ our first frost can come as early as Nov 1.
 - *Some years it is Nov 1, other years it might be Thanksgiving*
 - *Since we cannot tell, we plan for Halloween (Oct 31)*
 - *By Halloween, we want our bees are fat and happy*
 - And we want all honey ripened and pollen stores flush throughout the comb.

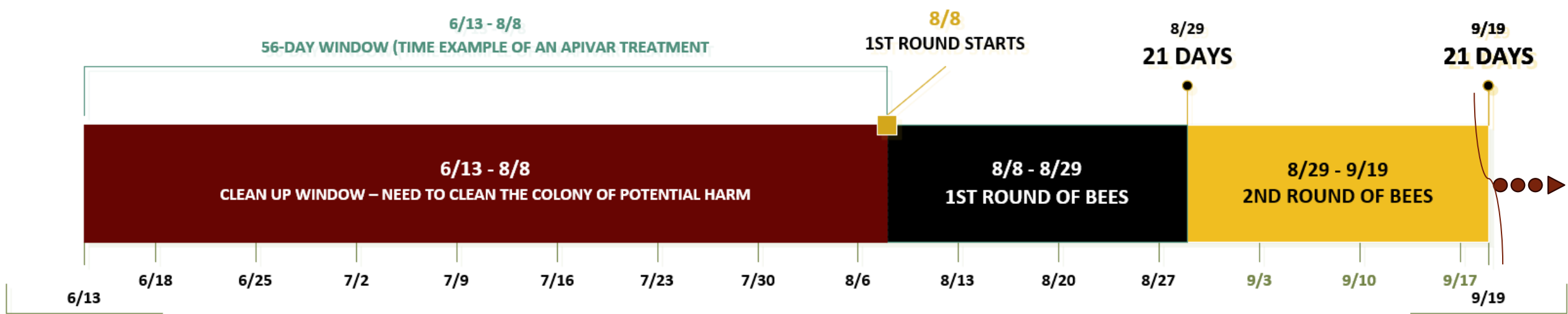
We want a cycle of 4 generations of CLEAN Bees to overwinter, and that starts August 8th.



Clean Up Window

- **In Advance of August 8th**
 - Consider that we want to start with no mite impacts by August 8th
 - This means we need to finish treating by 8/8
 - What if we choose ApiVar? (56-day treatment window)
 - Working this backwards, 8/8 – 56 days – **that's June 13th**

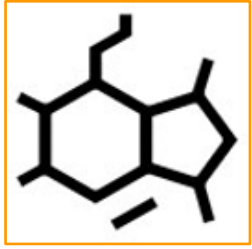
This means that we will want to monitor and treat to keep thresholds down by early to mid June



Treatment Products

Products and techniques to battle varroa mites

Treatment Forms



Synthetic Chemicals

SYNTHETICS

- Apivar
- ~~Apistan~~
- ~~CheckMite+~~

Still sold, no longer effective



Organic Acid

ACIDS

- Formic Pro
- Oxalic Acid
- Mite Away Quick Strips
- HopGuard III



Essential Oil

ESSENTIAL OILS

- Apiguard
- Api Life Var
- Grease Patty with Essential Oil

OTHER OILS

- Mineral Oil

Treatment Forms



Non Chemical

NON CHEMICAL

- Screened Bottom Board
- Sanitation – Comb Replacement
- Sanitation – Brood Removal
- Colony Division
- Brood Interruption
- Re-queening | Mite tolerant stock
- Powdered Sugar

Treatment Forms

MANY CHOICES

- Apivar
- ~~Apistan~~
- ~~CheckMite+~~
- Formic Pro
- Oxalic Acid
- Mite Away Quick Strips
- HopGuard III
- Apiguard
- Api Life Var
- Grease Patty with Essential Oil

■ Which do you Choose, And Why?

- Sometimes it is about favoring a class
 - *No synthetics, only natural*
- Often it is about conditions
 - *Hot temperatures, Honey Present, Brood Right or Brood Less*
- Maybe it is about how you use it or other factors...
 - *Easier to use, less costly, doesn't require special equipment*

It has become complicated

Which is why there is a management guide

- **Which do you choose, and why?**
 - Today's beekeeper needs to know
 - *What products are available*
 - *Consider important usage constraints*
 - *Understand how much it is going to cost*
 - *Rationalize what products are effective*
 - **Learn the labels, adhere to the law, and use proper application techniques** (along with proper personal protection in many cases)
 - And... Beekeepers are treating many times a year
 - *And they want to know what might be good models and patterns...*

Example Treatment Routine 1

❑ Colony on Cluster (Late Fall, Winter)

- *Treat with Oxalic Acid Vaporization while broodless*

❑ End of Nectar Flow (Late Spring)

- *Harvest Consumable Honey – Apply Apivar Strips*

❑ Going into Winter (Mid Summer, Fall)

- *Use Formic Pro or take fall honey off and use ApiGuard*

This knocks down mites early – starts spring with low mite loads

The benefit is lower mite thresholds when you get to the late spring harvest window

Example Treatment Routine 2

❑ Colony on Cluster (Late Fall, Winter)

- *Treat with Oxalic Acid Vaporization or Apivar while broodless*
 - This knocks down mites early – starts spring with low mite loads

❑ Late Nectar Flow (Late Spring)

- *Apply Formic Pro (weather dependent – kills mites under capping)*
 - Can apply while honey is still on

❑ Going into Winter (Fall)

- *Test for mite levels, if warranted use ApiGuard,*

This is a rather popular routine these days.

You can treat in summer with supers still on

Subtleties about these examples

□ Treatment Variations

- *To avoid mites developing resistance to treatments, different treatments are used each time*

□ Multiple Treatments

- *Treatments are staged during crucial colony development windows and to keep pace with mite populations*
 - Thereby knocking down the harm mites can do to a colony a key points of the year

What about Just Treat?

□ Truth in practice

- *It is fairly common belief that if you monitor you will find a lot of mites – so why bother monitoring?*
 - Beekeepers sometimes simply treat three times a year – prophylactically
 - They rationalize that if they monitored for mites, they will see high numbers.
 - **This being the case, monitoring is perceived as a waste of time**
- *Important > It is possible to monitor and not see high mite load*
 - Monitoring provides **false positives** during the height of the season

False Positive

Even if you monitor



False Positive

Even if you monitor



❑ Varroa mites hiding in plain site

- *Mites under capped comb do not show up in mite samples!*

Read the Labels – Protect Yourself

□ HBHC has product information



- *Do your research every time you plan to use a treatment!*
 - Study the background of the products you choose, just before you are going to use them. No matter how practiced you are – do it this way
 - Don't forget to review the product website
 - HBH has instructional videos and a **treatment selection tool**
- *Do not forgo personal protection*
 - Some see it as silly, but there is real risk
 - Don't be that one that is injured because you skimped on personal protection

Alternatives to Treating

Alternatives to the conventional treating
management style

▲ A Small Disclaimer



- ❑ **Discussing a TREATMENT FREE-esque approaches, are like discussing climate change.**
- ❑ **There is a mystical quality to it**
 - *This presentation is a philosophical exploration of ways to be more sustainable*
 - *It explore adoption of treatment free constructs and is more of an exploration and not a literal how-to*

Do you have what it takes?

□ A question some simply never ask

- *They go treatment free from the beginning and take what comes*
 - They align to the practice and simply may not have any pragmatic experience with treating because they've never considered it – and they make it work
 - Some fail and quit, never considering treating – its just not in their DNA

□ Some wish to switch, but are apprehensive

- *They practice treatment beekeeping, but harbored a curiosity for TF*

Treatment Free – Chicken and Egg

❑ Be a competent beekeeper first

- *Even if that means being a treatment beekeeper first*
 - **Consider that you cannot become a competent beekeeper if your bees die**
 - ❑ If you are starting out – you usually start out with a few hives
 - ❑ A few hives – and treatment free is a risky proposition
- *Fact – New Treatment Free Beekeepers Struggle*
 - New treatment free beekeepers often report frustration with failure
 - It is expressed repeatedly – and it is a tough way to get ahead

Labeling Treatment Free – *the ambiguity*

□ Like beekeepers that treat, treatment free groups have their own factions

- **Pure treatment free** - *people forgo any form of treatment*
 - No splits, no soft chemicals, no packages, feral bees rule, etc.
 - The “James Bond” Method > Live and Let Die, **period**
- **Moderate treatment free** – *more lenient approach*
 - No hard chemicals, but natural products are natural and therefore not harmful and allowed.
 - Sometimes even the biodynamic beekeeping methods come into play – essential oils and practices are allowed

These are illustrative.

Note that there are many variations on approaches

A successful treatment free beekeeper...

□ Has the right mix of conditions:

- **The right bees** – *feral survivors preferred, and hygienic / good stock is a large bonus.*
- A **great location** – *especially for resources*
- Could benefit from **Isolation** and control of colony interactions
- **Experience** and **knowledge** in bee biology
- **Perseverance** as a beekeeper and the **right constitution**
- *Is willing stand by and **let bees die** for the greater good*

As an aside, these are mostly true of all beekeepers

Except for the last bullet, the communities are not too far apart

Treatment Free Benefits

- **Supporting survivor stock**
- **Foster good genetics**
- **Only the strong survive**
- **Faster evolution***
- **Less labor and expense**
- **Avoid harming the bees with treatments**
- **More natural, and in harmony with the natural order of things**

* There is great debate about this phenomena, but we will let it be

Hybrid Approaches

Going a different way from the conventional treating path

Save Lives – Monitor Hives [Bee Culture]

□ Meghan Milbrath – **Toward Treatment Free** approach mentioned for Bee Culture.

- *To read her take on this, see the **July 2019 Bee Culture** article on **page 54** entitled *Save Lives, Monitor Hives*.*

<https://www.beeulture.com/save-lives-monitor-hives>

▸ The ‘Toward Treatment Free’ Approach

□ It does not promote letting hives die

- *Dying hives is cruelty; You are a caretaker of livestock.*
- *Dying hives impact health hives – neighbors and any of your potential survivors!*
- *The principle: You have to treat in order to go treatment free.*
 - Monitor and treat those that exceed thresholds – breed from the rest.
 - Use the treated hives as stock to requeen and make into survivor hives
 - Rinse, lather, repeat

What do you do with the duds?

□ Make Survivor Hives

- *Do not breed from them, but use their resources to help other hives thrive.*
 - Don't condemn the bees for bad queen genetics, embrace them.
- *Breed good bees in the hives that are coping well with mites, and **then make daughters from these good colonies***
- *Using those daughters, systematically requeen your factory hives with the desired genetics.*
- *This is a win-win scenario, **when you are willing to invest the time***

Treatment Free Practice

□ You need be able to tolerate losses

- *As we have been covering, if you do not treat for Varroa Mites, your bees will face a severe challenge*
 - To cover the spread – **it seems you need a lot of hives**
 - When you have a lot of hives, and some make it through....
 - You can recover and expand from survivors
 - Every few years you might take a beating
 - It requires a dedication – and it is not immune to setbacks
 - In time however – those who stick with can come out the other side

TF Considerations

□ To Monitor or Not to Monitor

- *Personal Preference*

- There seems to be a divide in the TF world as to the value
- Some feel like they can learn from knowing what the mite dynamics are, and others are nonplus about it

□ Treatment Free ≠ “Bee Haver”

- *If you have bees, you have an obligation to inspect and ensure that your bees are free from disease.*

Hybrid Approach

□ Treatment + Low Treatment

- *I am maintaining hives with two management approaches*
 - Bees that I keep in the Training Apiary for our beekeepers association are treated in accordance with their practices

□ My Low Treatment Method

- *Hives on my Property – I Observe the hives for problems*
 - When you see problems (disease, syndromes) intervene, otherwise let them go – even if they are at risk of perishing. If disease or syndromes begin to emerge, treat the sick

*I am doing a
several year
experiment*

*My situation
demands a
balanced
approach*

Low Treatment (cont.)

□ Management Allowances

- *Fresh Queens (Grafted from Survivors)*
 - Keep new queens at the helm of the colonies.
 - Do not let the queens go past a second season. **Requeen with selected stock**
- *Perform Splits – Keep Colonies Small*
 - **Do not allow supreme colonies.** I also use splits to replace losses.
- *Let bees swarm and keep refreshing honeycomb*
 - If a swarm happens, it is not the end of the world
 - Keep bees building honeycomb often – and refresh comb older than 3 years old

These concepts keep it from being a treatment free approach

Low Treatment (cont.)

□ Propagate Good Genetics

- *Keep the stock current*
 - Keep breeding from strong survivors
 - Keep bringing in new stock (feral bee tree bees preferred)
 - Requeen dud hives with queens from the good stock
- *Allow some Swarming*
 - I live in a wooded area and can afford to let some hives swarm
 - My woods are spotted with bee trees from the hives I let swarm
 - My hope is my bees are mating with offspring from colonies that did well in our apiary

My Results after 2 Years

□ Maintaining 18 Hives, 15 Untreated

- *2022 – Year 1: ...30% Loss | 70% made it through*
- *2023 – Year 2" ...50% Loss | 50% made it through*

- *Did not complete queen rearing in 2023*
- *No disease or syndromes encountered*
 - Bees that perished, perished overwinter

Treatment Free Considerations

□ NJ is not onboard with this

- *For several reasons, the NJ beekeeping scene generally does not align with the premise of treatment free beekeeping*

□ For You...It might require some consideration

- *You might wish gauge your tolerance for the lifestyle*
 - Some simply do not consider the matter worth discussion
 - Others look at it more objectively and consider if they are being a good beekeeper, and whether they might be impacting their neighbors

Conclusion – Wrap Up

Evaluate Options – Plan Your Approach

Wrapping Up

□ It is an ever-changing landscape

- *Treatment Approach is still leading*
 - There are promises of new treatment approaches – RNA is coming
 - Oxalic Acid and Formic Pro are current favorites
- *Hybrid and Treatment Free approaches are not as unusual as they used to be*
 - Some of this can be attributed to how treatment approaches are not as full proof as they once were. In some instances, you can break even
 - Expect this to continue to be a consideration

Recommendation

□ Plan the Work, Work the Plan

- *Evaluate your options – and make a plan*
- *Follow the plan, allowing for course corrections if the need arises*
- *Build a communication network with others*
 - There is strength in numbers as you can gain more experience in a shorter time through collaboration of what others are doing

Keep up with the trends

□ Stay engaged

- *Research, read, listen, and follow the conversation*
- *The journey of how we are going to manage Varroa Mites is not finalized*

□ Keep the best quality bees you can

- *Consider the quality of your bees and keep the best stock you can*

Questions

Note: This presentation is available for download

<https://www.bkcorner.org>

- *Search for presentations, it will appear in the search results*

Kevin Inglin

- kevin@bkcorner.org



RNAi - Ribonucleic acid Interference

□ Delivery and Mode of Action

- *Product is placed in sugar solution and fed to the bees*
- *The bees deposit the RNA material in the cells when feeding the larva*
- *The mites are exposed to the RNA when in the cell to reproduce*
 - The RNA acts to disrupt a vital protein involved in mite development
 - The physiology of the mite, necessary for normal function, is disrupted

Definition

RNAi: RNA molecules are involved in sequence-specific suppression of gene expression by double-stranded RNA, through translational or transcriptional repression.

Threshold Relationship – what damages bees

Colony Phase	Acceptable Further control not needed	Caution Control may be warranted	Danger Control Promptly
Dormant with Brood	<1%	1-2%	<2%
Dormant without Brood	<1%	<2-3%	<2%
Population Increase	<1%	<2-3%	<3%
Peak Population	<2%	<3-5%	<5%
Population Decrease	<2%	<2-3%	<3%

Graphic Values: BIP Tools for Varroa Management

- **Acceptable:** Current mite populations are not an immediate threat.
- **Caution:** Mite population is reaching levels that may soon cause damage; non-chemical control might be employed while chemical control may be needed within a month; continue to sample and be prepared to intervene.
- **Danger:** Colony loss is likely unless the beekeeper controls Varroa immediately.