2019

POLLINATOR PARTNERSHIP

Mite-A-Thon Final Report

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- Greg Wolgemuth

Five County Beekeepers Association

2019 Mite-A-Thon Analysis

Introduction

Following the third annual Mite-A-Thon, this document is a report on the results of the Mite-A-Thon 2019, with some brief comparison to previous years. This report attempts to answer the questions:

1) What does the data show us concerning mite levels and participation across North America?
2) Is this a useful project for beekeepers and leadership team partners?
3) Is there anything more that should be added to this project in future years?

The project was led by the Pollinator Partnership and NAPPC, and funded by following sponsors and leadership team as of September 2019:

- Almond Board of California
- American Beekeeping Federation
- American Honey Producers Association
- Bee Friendly Farming
- Bee Informed Partnership
- Canadian Honey Council
- Honey Bee Health Coalition
- Michigan State University
- Pollinator Partnership
- Project Apis m.
- University of Maryland
- University of Minnesota Bee Lab and Bee Squad
- USDA

Background

The varroa mite, *Varroa destructor*, is a leading cause of colony mortality in North American honey bee colonies. Honey bees face multiple stressors (pests, pathogens, pesticides, and poor nutrition). The combined effects might be more damaging than the individual effects of each stressor. Among all those stressors, varroa is arguably the single most important driver of colony mortality. It is both extremely damaging to the bees and widely spread, detected in over 90% of the colonies sampled by the APHIS National Honey Bee Disease Survey in the US. Varroa is an ectoparasite of the honey bee that was inadvertently introduced into North America 30 years ago from Asia. In addition to the direct damage inflicted from the parasite, mites serve as a vector for a series of viruses. They also cause bees to have a higher risk of infection by compromising their immune systems. There are significant data showing that low rates of varroa mite infestation make overwintering success more probable. The management of varroa mites implies both the monitoring of load levels in colonies and the use of control techniques (both prophylactic and therapeutic). However, even the first step, monitoring of varroa mite prevalence and load, is too rare in the beekeeping community, resulting in a large portion of beekeepers unaware of the level of infection present in their colonies.

Approach

Pollinator Partnership and NAPPC organized the Mite-A-Thon, a citizen science initiative, to promote the practice of monitoring varroa levels and to gather data on varroa mite infestations across North America for all types of beekeepers. The Mite-A-Thon has become a 2-week intensive outreach effort. Early September was chosen because it represents a critical period for monitoring varroa mites in North America, just before the start of the overwintering period. The first iteration took place in 2017 (September 9 to 16), and was repeated in 2018 (September 8 to 22) with the addition of a second week so that beekeepers affected hurricanes along the Atlantic coast could participate. In 2019 (September 7-21), a second week was also added so that beekeepers attending Apimondia could participate. In addition to the intensive outreach during the Mite-A-Thon, an online tool allowing the entry of varroa monitoring results (www.mitecheck.com) is available year-round. The website also allows the public to view a dynamic, county level map displaying the highest mite counts reported.

Participants were encouraged to test the level of mites present in their colonies via standardized protocol utilizing two common methods of assessment (alcohol wash or powdered sugar roll) and then to upload their data (www.mitecheck.com). Uploads included data on location, total number of colonies, number of colonies tested, management methods that have been used and that are being considered, and number of varroa mites counted from each colony.

Commercial, sideliner, and hobbyist beekeepers were all encouraged to participate in order to create a rich distribution of sampling sites in Canada, Mexico, and the United States. To this end, outreach by all partner organizations was carried out across North America. The following partner outreach initiatives were conducted in 2019 (partial list):

Partners	Outreach Initiatives
Almond Board of California	Publicized in weekly newsletter
American Beekeeping Federation	Emailed reminder to members, newsletter articles in 2 issues, promoted at Apimondia
American Honey Producers Association	Promoted in 2 of their bi-monthly member emails
Bee Culture Magazine	Featured on Beekeeping Today podcast
Bee Friendly Farming	Publicized in monthly newsletter
Bee Informed Partnership	Promoted on BIP website, MiteCheck website, MiteCheck app, and social media posts
Canadian Honey Council	
Honey Bee Health Coalition	Publicized in 2 special edition newsletters at the beginning and 2/3's of the way through the 2-week period
Michigan State University	Promoted in talks to local beekeeping clubs, promoted on social media, promoted at Apimondia, publicized in Michigan beekeeper newsletter.
Pollinator Partnership	Featured on website homepage, promoted Mite Mondays on social media, publicized in monthly newsletters, semiannual newsletter and Mite Monday Mailchimp emails to MAT audience, emailed all beekeepers and beekeeping organization contacts, created Spanish outreach materials and reached out to Mexican contacts, promoted at Apimondia
Project Apis m.	Featured in a special eNews bulletin that was picked up by the American Bee Journal and sent to their mailing list as well, Promoted in social media posts
University of Maryland	Promoted in social media posts
University of Minnesota Bee Lab and Bee Squad	Promoted in social media posts
USDA	

In addition to general outreach, 2019 was the first year of the Mite-A-Thon Giveaway. An additional survey was open during the two-week period for members of beekeeping organizations to submit additional data on their club's participation and educational efforts surrounding the event. One of these entries was chosen to win a $100 Dadant gift certificate to thank them for their participation and to encourage others to strive for greater participation in the future.

Objectives

The primary objectives for this annual project are 1) to teach effective varroa mite monitoring methods and encourage testing and 2) to make management strategies available for discussion within bee organizations utilizing Mite-A-Thon partner-developed information and outreach materials.

Giveaway Results

The first year of the giveaway was a success, with Five County Beekeepers Association in North Carolina selected as the winner. They not only had active participation in the event, including 25 new participants, but also engaged their members in a monthly meeting to discuss Mite-A-Thon and Honey Bee Health Coalition interactive varroa treatment tools. During the Mite-A-Thon, they held a field day in their club apiary. After the two weeks ended, Co-President Greg Wolgemuth had the following reflection on the event:

> Thanks for offering this giveaway. It gave us a great platform to promote individual participation, as well as a valuable club activity for our members. Our push for getting involved really was the "boost" many of our members needed to do late season mite counts. Even though in general our counts were relatively low, I had numerous members admit they had become pretty slack with their monitoring, several admitted they had never done a count, also had a couple members tell me they thought they had been doing really well based on spring, early summer counts, and they had some of the worst counts. The field day we dedicated to the Mite-A-Thon, included 4 members that performed their first counts, (we had done 3 other field days this year with counts, but did not capture their attention until we promoted it as an event).

Photos from Five Counties Beekeepers Association.

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Survey Results

1. Number of mites.

The result of the combined partner outreach initiatives was participation from 545 beekeepers across the continent who tested 1,842 colonies for mites. Of the nearly 2,000 results submitted this year, 73.23% detected varroa, and 24.21% were found above the 3 mites per 100 bees (sample) threshold.

Table 1. Number of samples recorded having each number of varroa mites.

Number of Mites	Number of Samples
0	493
1	467
2	254
3	182
4	102
5	100
6	51
7	48
8	22
9	17
10	19
11+	87
Total Colonies	**1842**

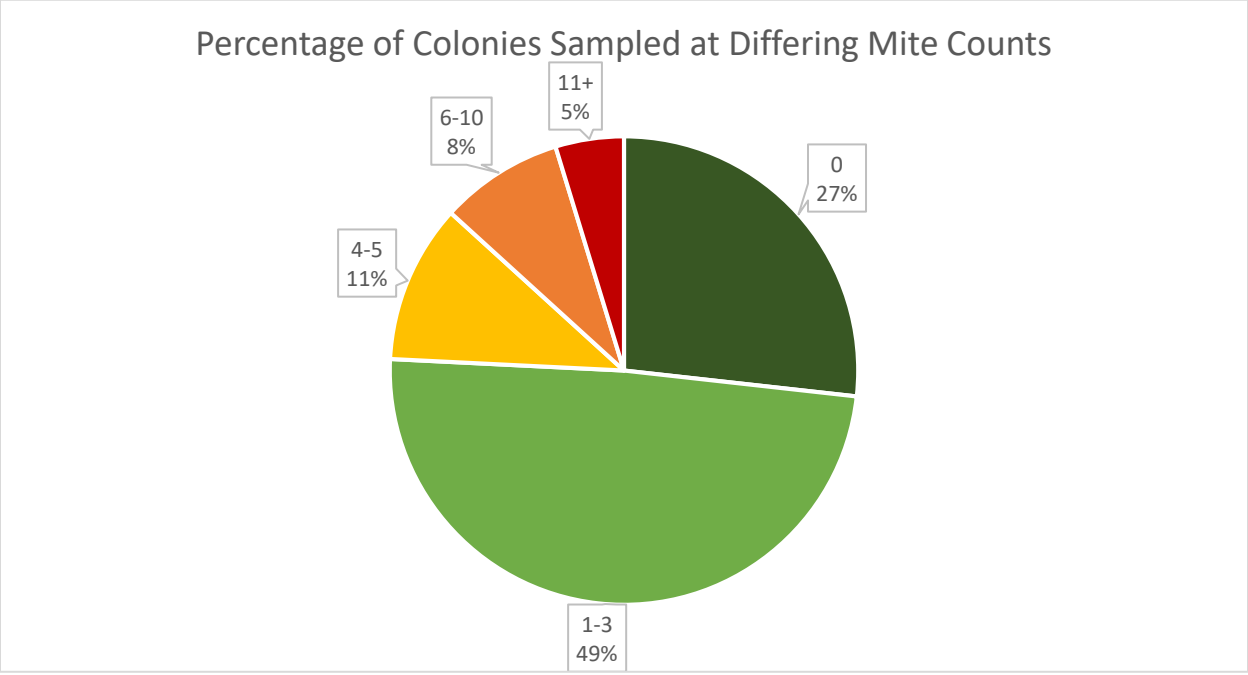

Figure 1. Percentage of samples recorded at each of 5 levels of varroa mite infestation.

2. Number of reports at each level of mite infestation.
Of the participants, 89.54% submitted at least one positive sample, and 32.84% had an average varroa count above the 3 mites per sample action threshold.

Table 2. Number of participants at each varroa mite count level.

Number of Mites	Number of Participants
0	57
1	107
2	72
3	70
4	36
5	41
6	30
7	35
8	15
9	8
10	9
11+	65
Total Beekeepers	**545**

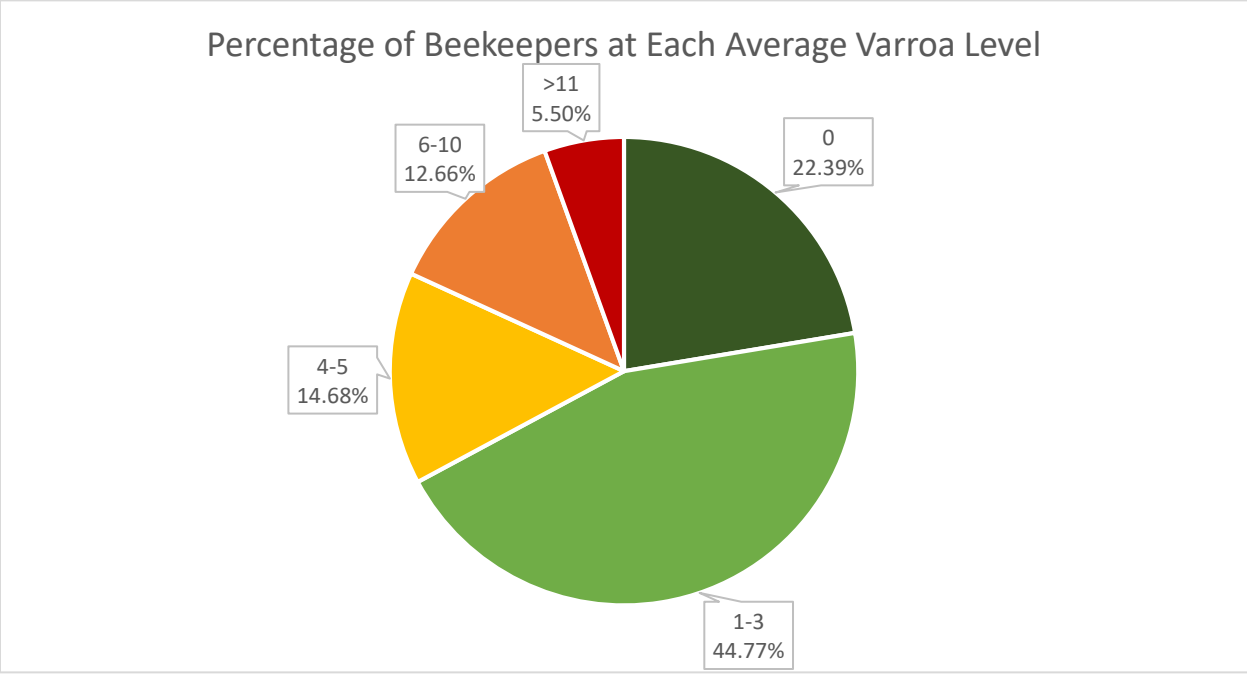

Figure 2. Percentage of Mite-A-Thon participants with average varroa levels at each of 5 infestation levels.

3. Hive movement.

The survey asked the following question: “Have you moved the majority of these colonies in the last 2 months?” This year, 382 beekeepers answered the question on hive movement, with only 2% having moved their hives in the last 2 months. Of this 2%, average varroa counts were 1 mite per sample. The average counts of those who did not move their hives was between 3 and 4 mites per sample, just above the action threshold. Nearly 30% of beekeepers chose not to answer this question.

Table 3. Number of yes, no, and no answer responses to the question, “Have you moved the majority of these colonies in the last 2 months?” and average mite counts for each response.

Hives Moved in the Last 2 Months	Number of Responses	Average Mite Counts
Yes	9	1.01
No	373	3.76
No Answer	163	3.13

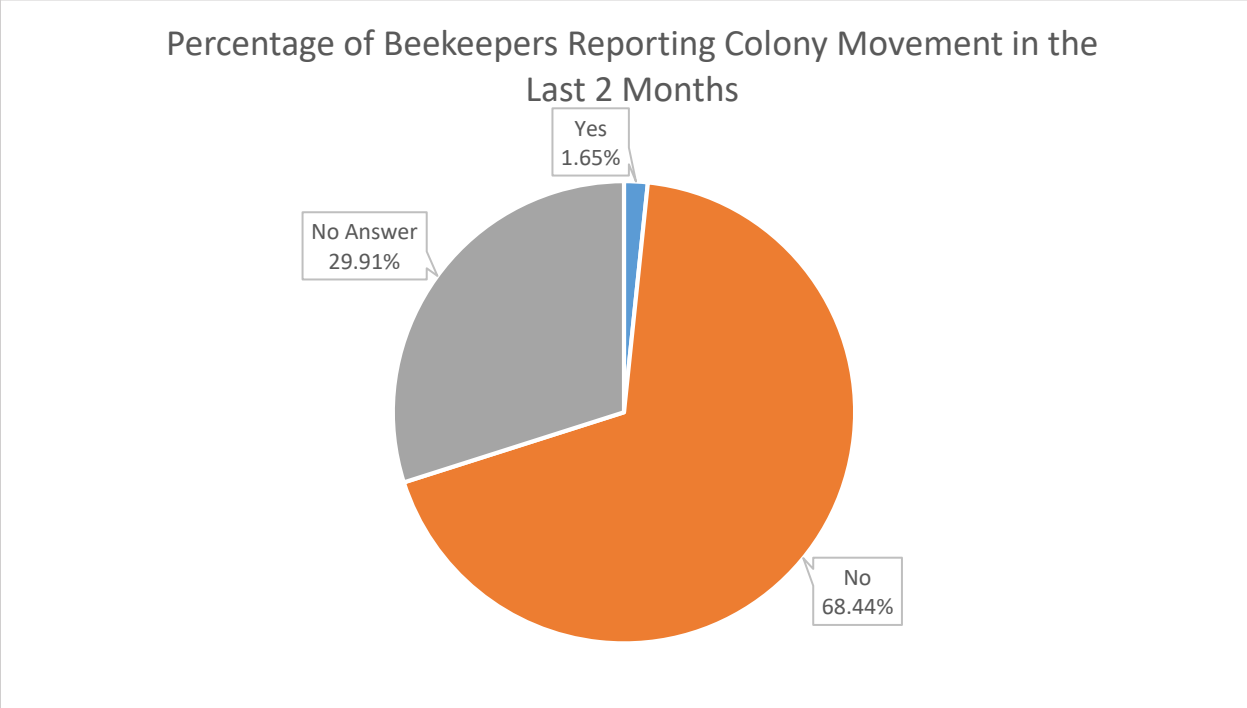

Figure 3. Percentage of responses recorded for yes, no, and no answer in answer to the question, “Have you moved the majority of these colonies in the last 2 months?”

4. Management methods used and intended to use.

This year, 441 beekeepers provided answers to the management questions associated with the sampling event. The most popular management method reported was **Oxalic Acid**, followed by **Break Brood Cycle** and **Drone Comb Removal**.

With respect to future management practices, 46.97% of beekeepers said they would use Oxalic Acid in the weeks following their monitoring. The next highest method considered for future use was Formic Pro, reported by 21.10% of beekeepers. Interestingly, 104 beekeepers declined to answer the management methods-used question; however, only 52 declined when asked which methods were being considered.

Table 4. Number of beekeepers who used each varroa management method over the past 2 months and number of beekeepers considering each management method for the next 2 months.

Management Methods	Number Used in the Past 2 Months	Number Considering for the Next 2 Months
Oxalic Acid	112	256
Break Brood Cycle	107	16
Drone Comb Removal	100	35
Formic Pro	88	115
Mite Away Quick Strips	58	90
Other	54	33
Apivar	44	58
Apiguard	40	43
Hop Guard	22	26
Powdered Sugar	18	24
Formic Acid	8	25
ApiLifeVar	6	15
Apistan	3	2
CheckMite+	2	1
No Answer	104	52

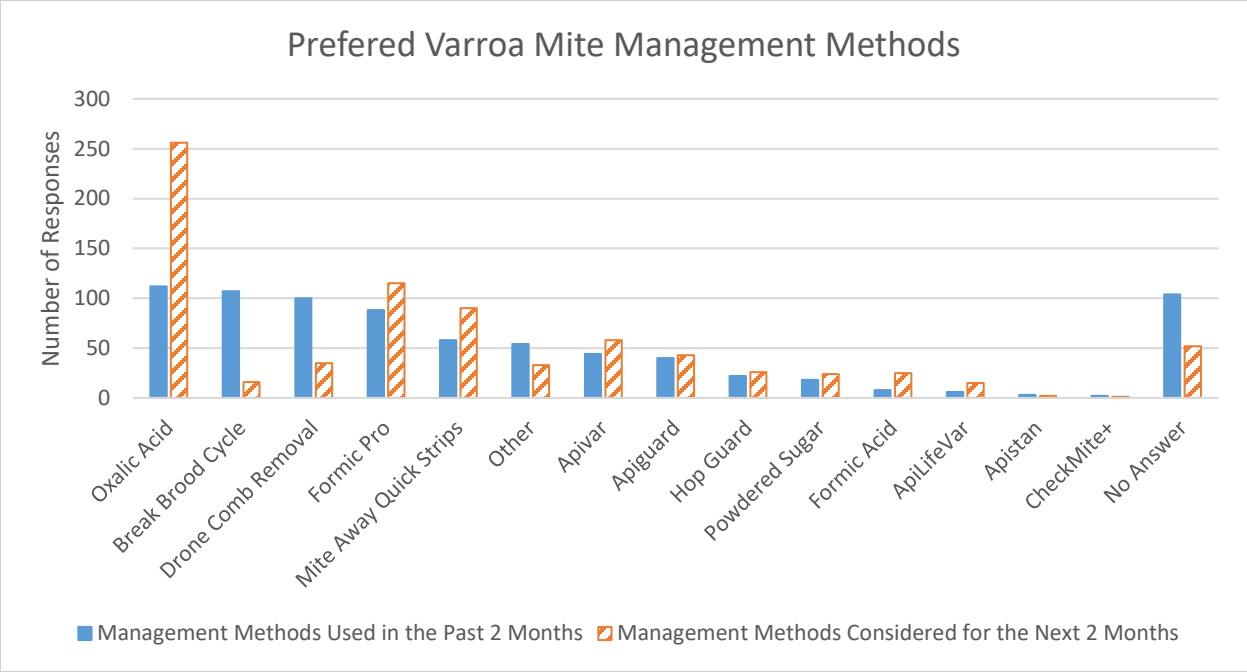

Figure 4. Number of beekeepers who used each varroa management method over the past 2 months and number of beekeepers considering each management method for the next 2 months.

5. Density of varroa within sample areas.

A density map was created, showing the average varroa mite load per square kilometer in North America during the event's timeframe. This shows a snapshot of the reporting regions, and while it illustrates the variability in mite pressure observed throughout the continent, it also must be recognized that higher mite densities may simply be reflecting the amount of responses received from those geographic areas. Likewise, areas with lower density could be the result of low response rates from those areas. The interpretation of these maps should be considered in the context of the program's stated objectives – to increase knowledge and use of testing protocols and to secure data from individual beekeepers about their colonies.

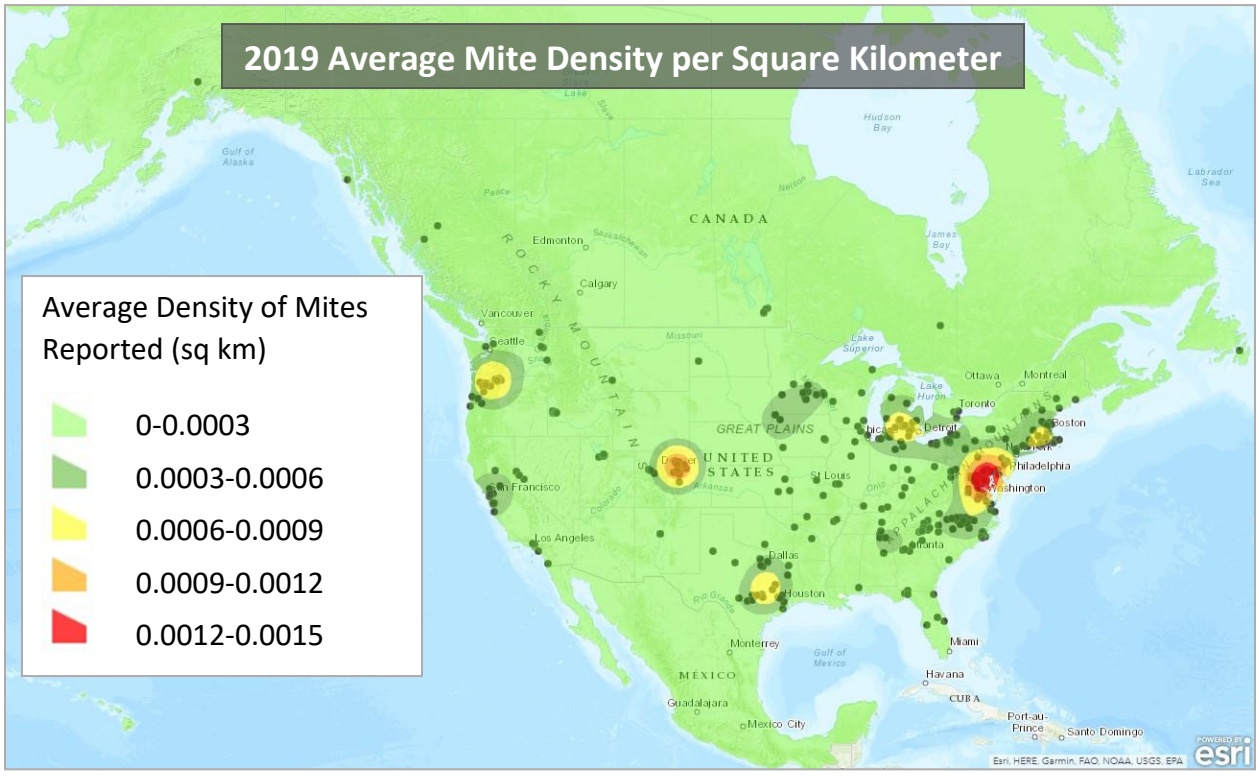

Figure 5. Average density of mites reported per square kilometer in North America.

6. Location of participants.

This year, as in previous years, the majority of participants came from the United States. North Carolina had the most participation thanks in part to Five County Beekeepers Association, followed by Michigan and Virginia (Table 5). This is a difference from 2018, for which the top regions for participation were Oregon, Manitoba, and California (Table 6).

Table 5. Top 10 participating states and provinces for 2019 with number of participants.

State or Province	2019 Participants
NC	72
MI	47
VA	41
CO	29
CA	28
MD	27
TX	26
PA	25
OR	18
MA	15

Table 6. Top 10 participating states and provinces for 2018 with number of participants.

State or Province	2018 Participants
OR	62
MB	48
CA	45
MD	41
MI	41
TX	39
NC	33
CO	30
PA	28
WI	26

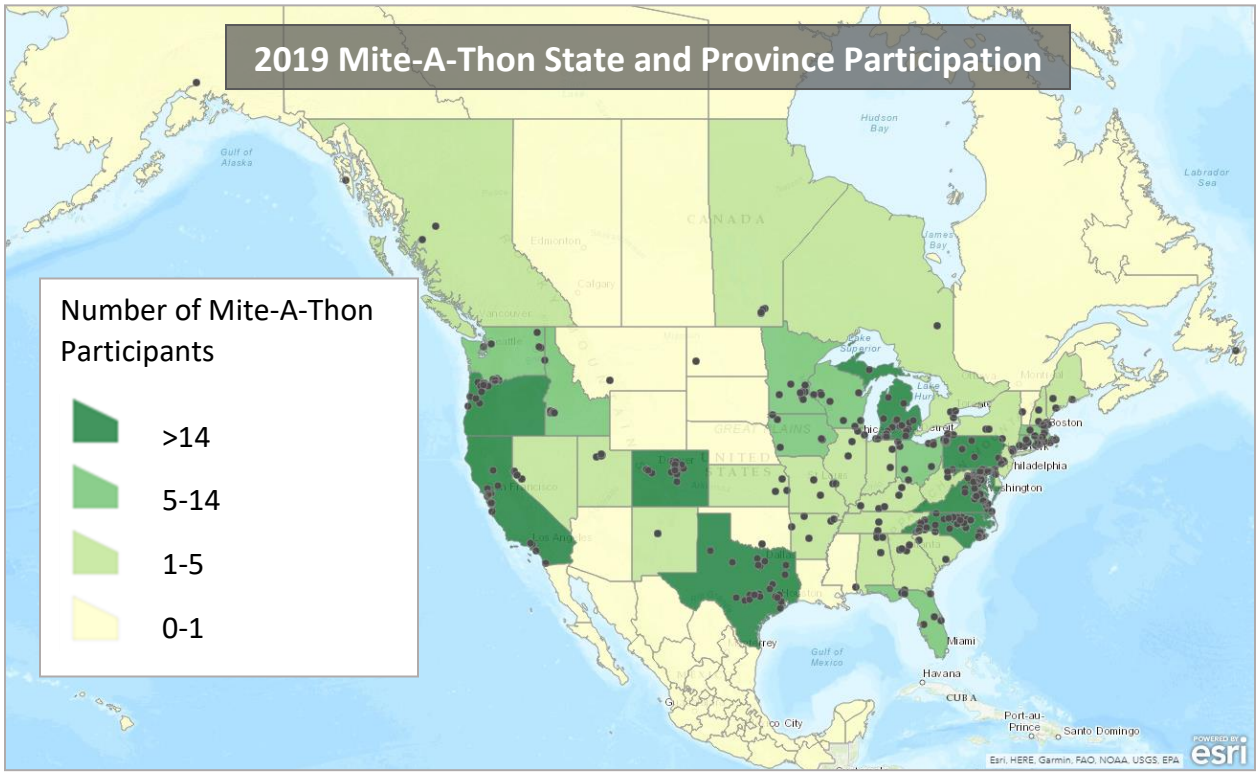

Figure 6. Distribution of Mite-A-Thon Participants across North America aggregated by state or province.

7. Number of hives managed by participants.

Of these participants, 85% had 10 hives or fewer.

Table 7. Number of hives owned by Mite-A-Thon participants.

Number of Hives	Participants
1-3	259
3-10	203
10-100	81
100+	2

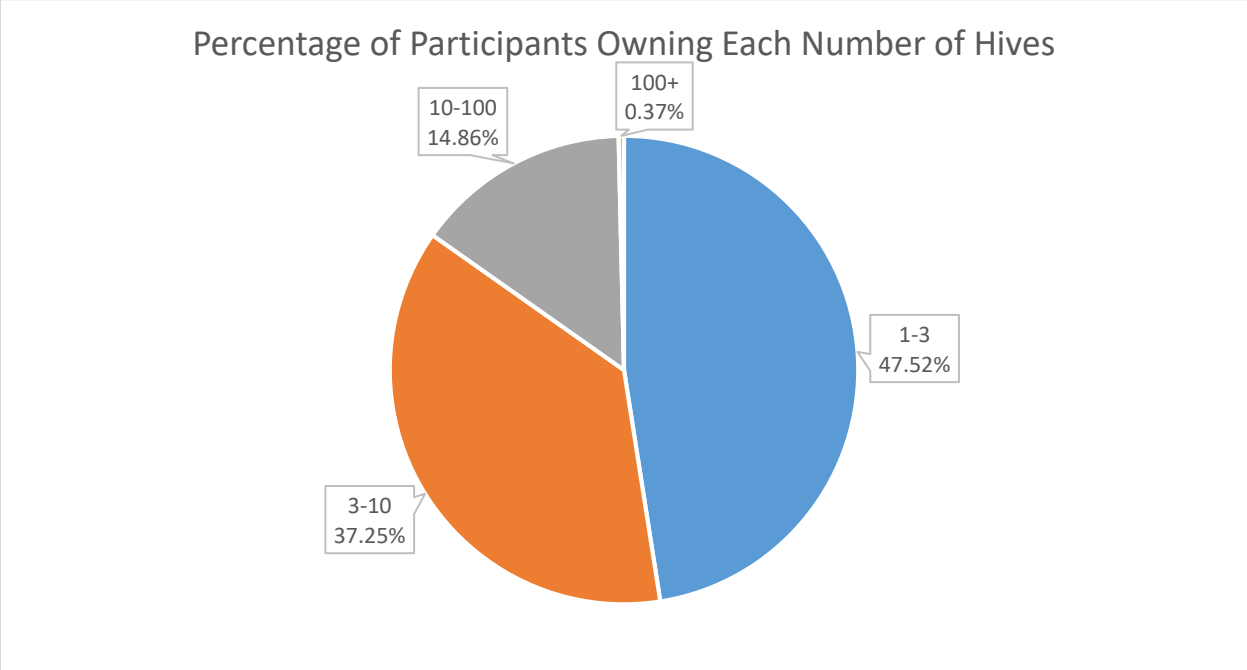

Figure 7. Percentage of Mite-A-Thon participants who own each number of hives.

8. Number of new and returning participants.

Interestingly, 80.05% of 2019 participants were new to the Mite-A-Thon, meaning over 330 beekeepers participated for the first time (Figure 8). Because recurring participation was determined by calculating duplicated email addresses from 2018 and 2019, it doesn't take into account the 129 participants who were unwilling to share their contact information or those who may have changed email addresses.

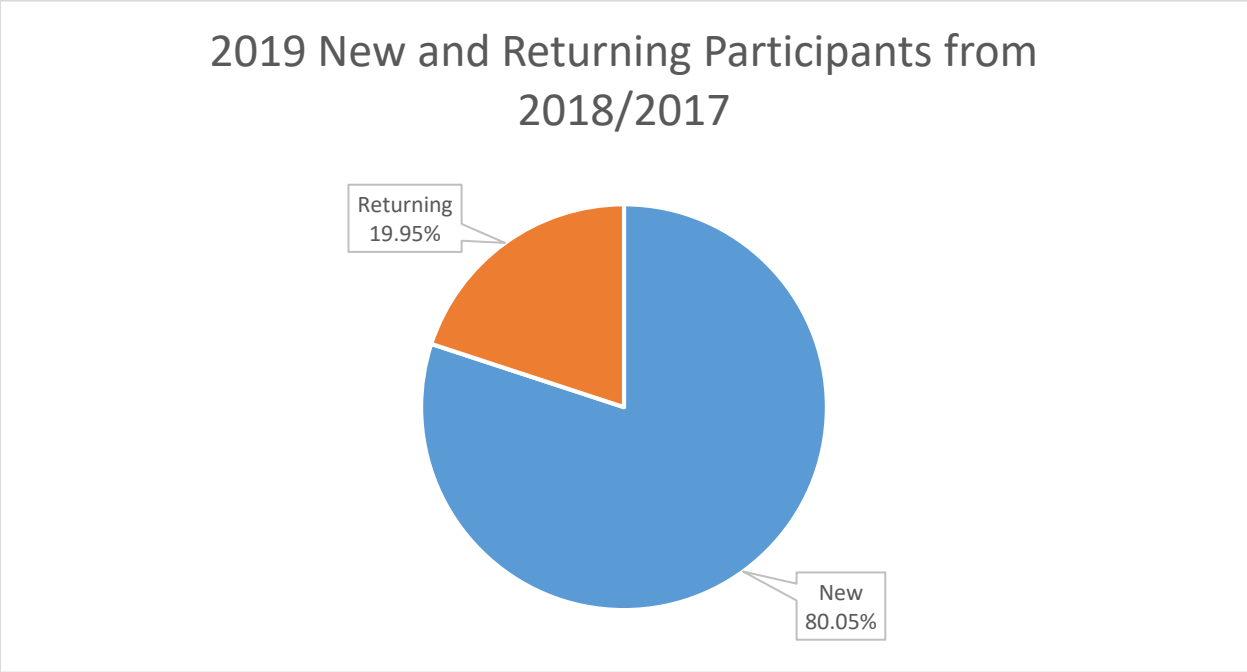

Figure 8. Number and percentage of new Mite-A-Thon participants in 2019 and returning participants from 2018/2017.

Compared to 2018, 2019 had 138 fewer participants and 480 fewer colonies tested. Estimating using the 80.05% new participation rate for 2019 and the rate of 85.77% for 2018, the Mite-A-Thon has seen about 2,000 different participants over 3 years and 7,174 colonies have been sampled. The 2019 results showed no substantial differences from 2018 in the numbers of mites found in each sample, average varroa counts for each beekeeper, or the highest mite counts reported by each beekeeper.

Table 8. Yearly participation comparison with projected new participants for each year.

Year	Participants	Colonies Sampled	Projected New Participants
2019	545	1842	436
2018	683	2322	586
2017	904	3010	904
Total	**2132**	**7174**	**1926**

9. Social media penetration.

The Pollinator Partnership social media outreach initiative "Mite-A-Thon Mondays" had a total reach of 89,093 from Facebook, Instagram, and Twitter, averaging a reach of 12,728 per post. This combined reach for the 7 posts across the 3 platforms was 19.58% of the total potential reach, 455,000.

Table 9. Reach of the 7 Mite-A-Thon Monday posts from Facebook, Instagram, and Twitter from August 5, 2019 – September 21, 2019.

Social Media	Total Reach (Twitter Impressions)	Average Reach per Post	Total Potential Reach	Potential Reach per Post
Facebook	44,240	6,320	364,000	52,000
Instagram	25,347	3,621	42,000	6,000
Twitter	19,506	2,787	49,000	7,000
Combined	89,093	12,728	455,000	65,000

10. Social media pageviews.

It should be noted that reach includes unique views of each post, not unique individuals, because it includes double counting of individuals who viewed more than 1 of the 7 posts. Engagement includes likes, shares, and comments. These analytics were obtained from the first post on 8/5/2019 until the final day of the Mite-A-Thon on 9/21/2019. During the same timeframe, 3,873 unique pageviews were recorded on https://www.pollinator.org/miteathon, of which 21.84% viewed the giveaway, signup, or resources page (Table 10, Figure 9). Pageviews peaked the first weekend of the event, and had an additional small peak the following weekend.

Table 10. Total unique website pageviews of pollinator.org/miteathon web pages from August 5, 2019 – September 21, 2019.

Website Traffic	Unique Pageviews
Main Page	3,027
Giveaway	394
Resources	314
Newsletter Signup	138
Total	3,873

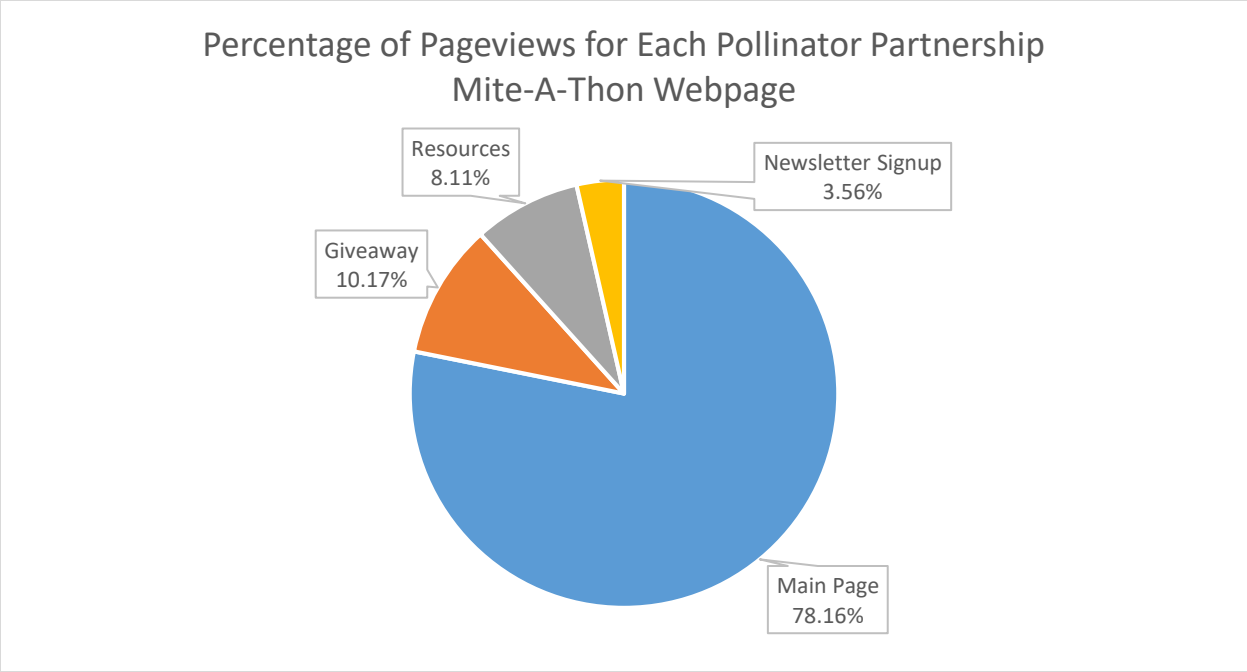

Figure 9. Percentage of Pollinator Partnership Mite-A-Thon pageviews for each webpage.

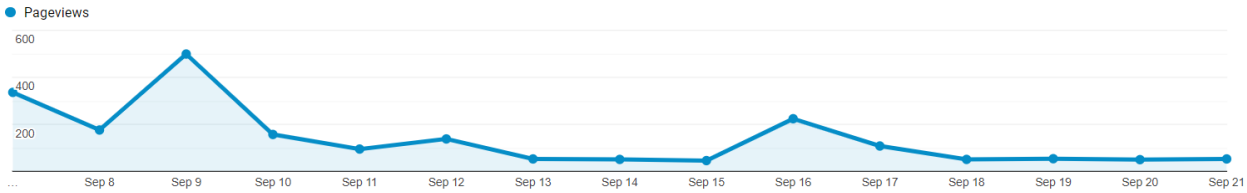

Figure 10. Pageviews per day on https://www.pollinator.org/miteathon during the 2-week period of the Mite-A-Thon.

The Bee Informed Partnership also reached close to 6,000 social media followers with their posts. They also saw 1,100 users access the MiteCheck app during the month of September, with 483 of those being new users.

Discussion and Next Steps

It is encouraging that 88% of participation was from new people who had not participated in previous years. Past participants may now be trained and familiar with mite testing, lessening their desire to contribute data during the event.

Another encouraging result was the 50% decrease in declined answers to the management methods question when asked which methods would be considered for the coming months. This could indicate success is making beekeepers, many of which were first time participants, aware of available management methods. It also points to the need for a “no treatment” option to be added in the future.

Lower than anticipated overall participation in Canada may have been due to Apimondia occurring in Canada during the first week of the Mite-A-Thon. A consideration for future years should be the timing of the event. Both the Saskatchewan Provincial Apiculturist and the Alberta Provincial Apiculturists want to be involved in planning next year's event and have suggested that monitoring in Canada and other northern regions be done earlier in the year. It may also be possible that monitoring in Mexico should be later in the year. Future Mite-A-Thons should engage Mexican participants in leadership. Mite-A-Thon partners will need to determine whether to broaden the date range for participation, set different date ranges for different latitudes, or leave the date range as is. They have begun discussing whether to move the event to the spring or hold an event in the spring and fall.

Additionally, outreach was done to Mexico for the first time, but it occurred in the last two weeks before the Mite-A-Thon. Future outreach to Mexican beekeepers must occur sooner to give ample time for scheduling. Adding a Spanish version of the MiteCheck survey and the protocol videos will also be an important component for involving Mexico more in future years.

With a better idea of the gaps in currently available data, Pollinator Partnership is seeking to increase effectiveness of the **Mite-A-Thon in 2020**. Increased participation is one indicator of the success of this project, but other criteria need to be established. The timely dissemination of this report to all participants and other beekeepers will be a large impetus for increased effectiveness of the program. Although not the primary priority of the project, collecting a more robust data set in future years may be possible by continuing to reengage those who have already been trained. The timely reporting of results after each year's event to document the year's efforts will help retain and recruit participants.