

POLLINATOR PARTNERSHIP

2017 and 2018 Mite-A-Thon Analysis

Introduction

In anticipation of a third Mite-A-Thon in 2019, this document is a report on the 2017 and 2018 results of the Mite-A-Thon project led by the Pollinator Partnership and NAPPC, and funded by following sponsors and leadership team as of May 2019:

- Almond Board of California
- American Beekeeping Federation
- American Honey Producers Association
- 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
- Valmont

Background

The *Varroa* mite is the leading cause of colony mortality in North America honey bee colonies. Honey bees face multiple stressors (pests, pathogens, pesticides and poor nutrition), and their combined effects might be more damaging than each individually. 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. 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* mites 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* and gather data on *Varroa* mite infestations across North America for all types of beekeepers. Mite-A-Thon was designed as a 1 week intensive outreach effort. Early September was chosen as 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 15). In addition to the intensive outreach during those annual week-long events, an online tool allowing the entry of measures of *Varroa* monitoring (www.mitecheck.com) is available all year long. That website also allows the public to view the dynamic *Varroa* mite heat map.

Participants were encouraged to test the level of mites present in their colonies using a standardized protocol utilizing two common methods of assessment (powdered sugar roll or alcohol wash) and then to upload their data (at www.mitecheck.com), including location, total number of colonies, number of colonies tested, local habitat, and the 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, the United States, and Mexico.

Objectives

The primary objectives for this annual project are 1) to raise awareness about honey bee colony *Varroa* infestations in North America through effective monitoring methods and 2) to make management strategies available for discussion within bee organizations utilizing Mite-A-Thon partner-developed information and outreach materials.

Results

Over 900 beekeepers reported data on 3,026 colonies from across the continent in 2017, and 684 reported on 2323 hives in 2018. Results of this survey are presented in the following Appendix.

Of the 3,026 results submitted in 2017, 79.81% detected *Varroa* mites, and 41.41% were found above the 3 mites per 100 bees action threshold (see Figure X). In terms of beekeepers, 92.27% of all participants submitted at least one positive sample, and 62.87% had at least one colony above the 3 mites per 100 action threshold (see Figure X).

Of the 2,323 results submitted in 2018, 71.55% detected *Varroa* mites, and 32.33% were found above the 3 mites per 100 bees action threshold (see Figure X). In terms of beekeepers, 88.16% of all participants submitted at least one positive sample, and 53.65% had at least one colony above the 3 mites per 100 action threshold (see Figure X).

In 2017, 607 beekeepers provided answers to the management questions associated with the sampling event. They reported that the most popular management was Mite Away Quick Strips, followed by Break Brood Cycle and Drone Comb Removal. Concerning future management practices, 26.56% of beekeepers declared they would use Break Brood Cycle in the weeks following their monitoring.

In 2018, 482 beekeepers provide answers to the management questions associated with the sampling event. They reported that the most popular management was Oxalic Acid, followed by Mite Away Quick Strips and Apivar. Concerning future management practices, 52.48% of beekeepers declared they would use Oxalic Acid in the weeks following their monitoring.

An interpolation method was used to create a density map of the *Varroa* mite load in North America during that September week. 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 certain geographic areas had smaller populations while others may have larger populations, but have fewer respondents. The interpretation of these graphs should be considered in the context of the program's stated objectives – to increase knowledge and data for individual beekeepers about their colonies.

Next Steps

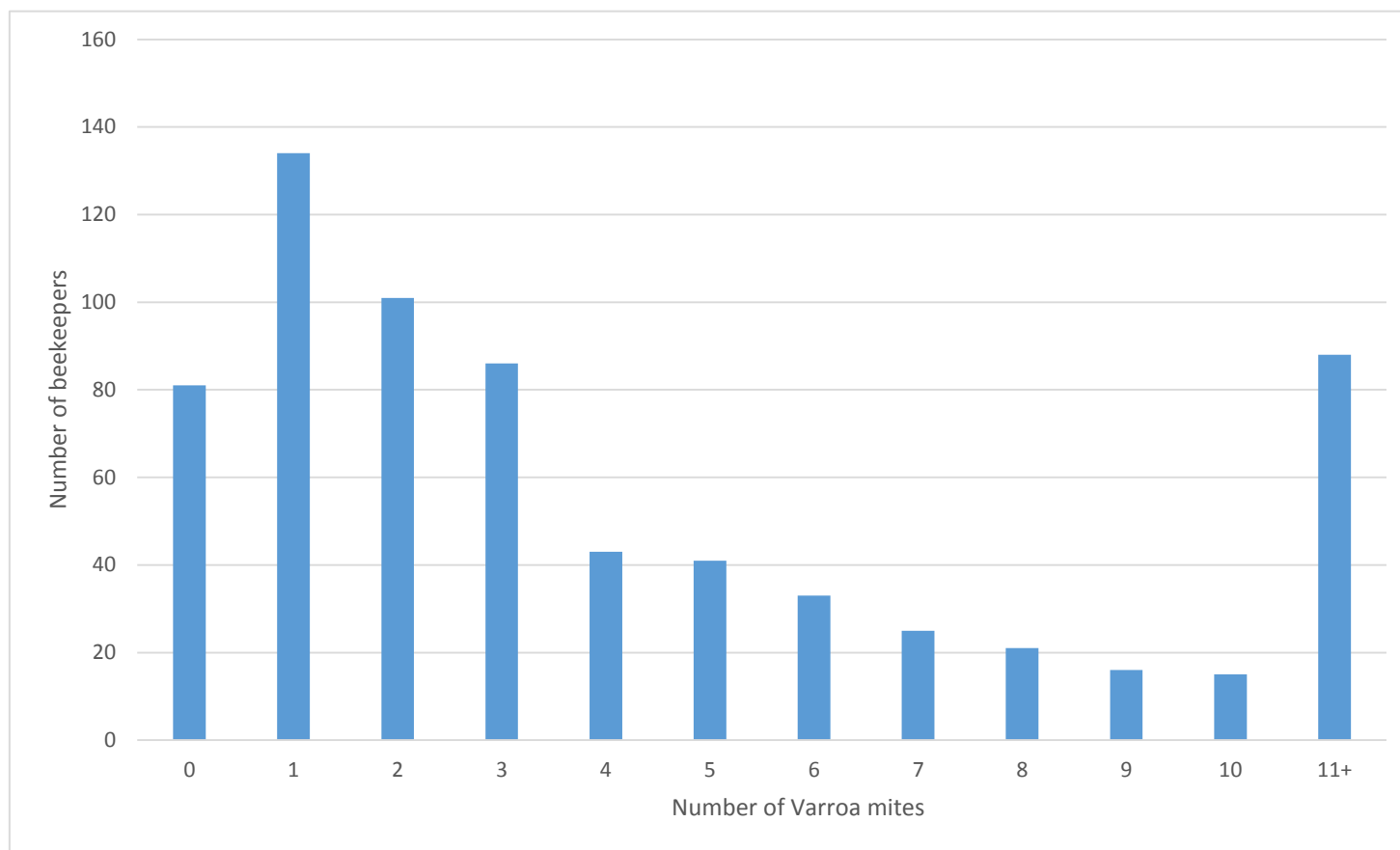
With a better idea of the gaps in currently available data, Pollinator Partnership is seeking to increase participation in **Mite-A-Thon 2019 that will take place the week of September 7, 2019**. Increased participation is a key to the success of this project and a large impetus for beekeepers to participate would be to receive a report documenting the results.

We have decided to provide such a report with results from 2018 prior to this year's kick-off to all participants from the previous 2 years. We also believe that a report in by the end of 2019 to document this year's efforts, and for all subsequent years, will help retain and recruit participants. The Bee Informed Partnership has had success in reporting on trials using a 1 page infographic that beekeepers can easily read and understand and may be shared with beekeeping groups.

Social media also plays a significant role in engagement and we need to do a better job at disseminating this initiative as well as advertising and educating the goals and benefits of *Varroa* monitoring via several social media platforms and request that our partners and sponsors, listed below, do the same.

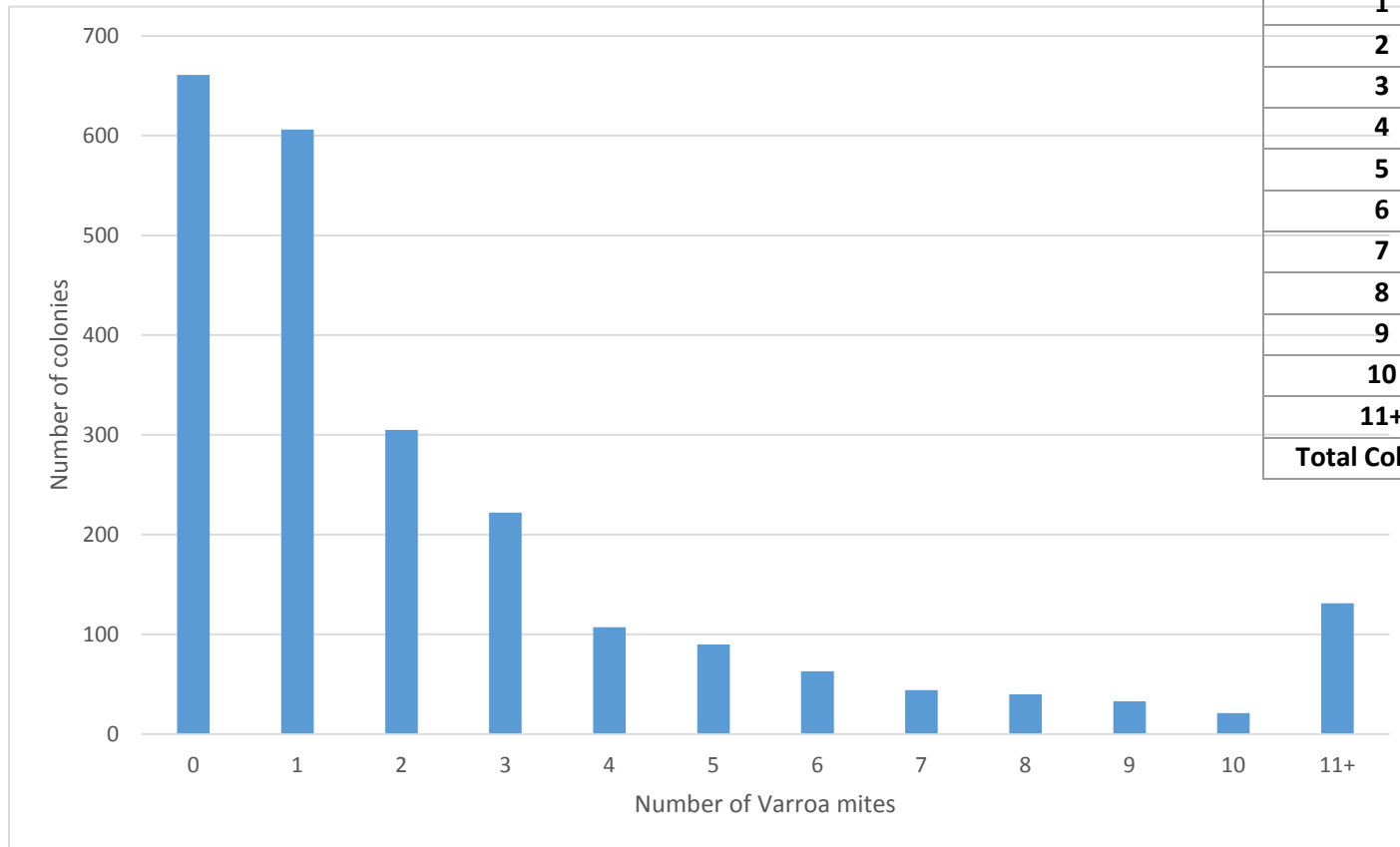
Appendix

Figure 1: 2018 Highest Mite Count for Each Participant



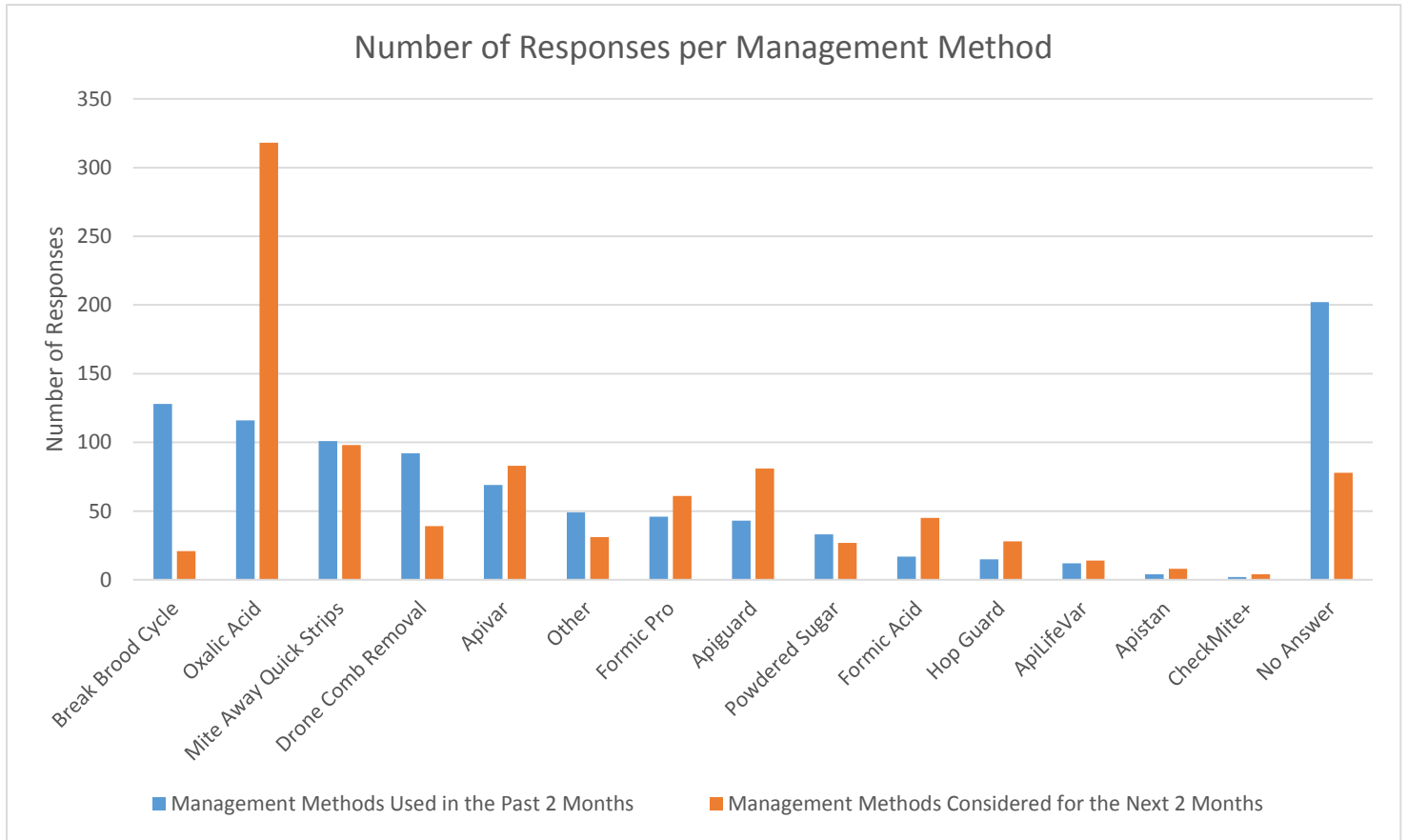
Highest Mite Count	Number of Submissions
0	81
1	134
2	101
3	86
4	43
5	41
6	33
7	25
8	21
9	16
10	15
11+	88
Total Submissions	684

Figure 2: 2018 Number of Mites in Test Sample for Each Colony



Number of Mites	Colonies
0	661
1	606
2	305
3	222
4	107
5	90
6	63
7	44
8	40
9	33
10	21
11+	131
Total Colonies	2323

Figure 3: 2018 Preferred Management Methods



Management Methods	Used in the Past 2 Months	Considered for the Next 2 Months
Break Brood Cycle	128	21
Oxalic Acid	116	318
Mite Away Quick Strips	101	98
Drone Comb Removal	92	39
Apivar	69	83
Other	49	31
Formic Pro	46	61
Apiguard	43	81
Powdered Sugar	33	27
Formic Acid	17	45
Hop Guard	15	28
ApiLifeVar	12	14
Apistan	4	8
CheckMite+	2	4
No Answer	202	78

Figure 4: Varroa management practices

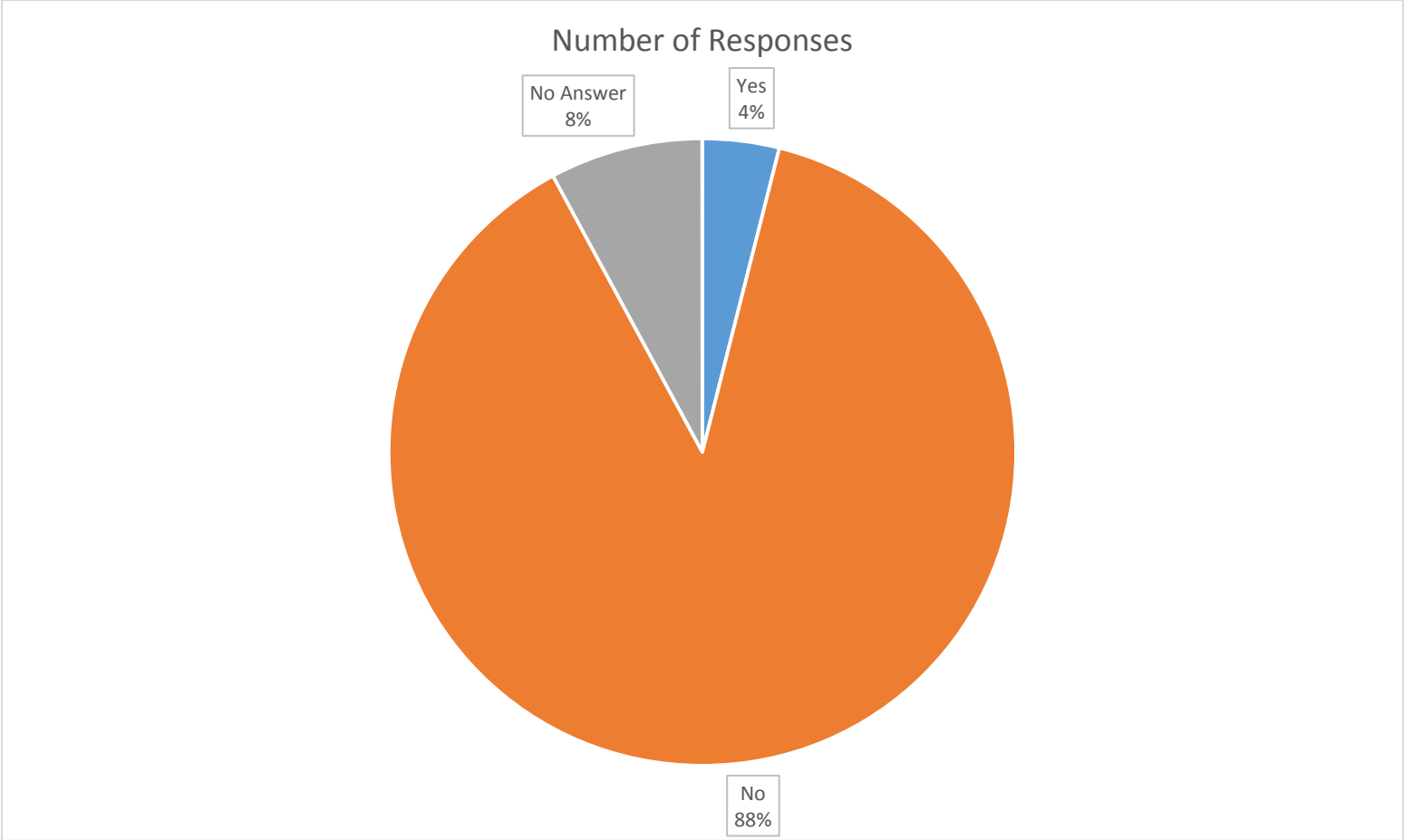
Management Method	Number of Users	Average Varroa
Powdered Sugar	33	5.46
Oxalic Acid	116	3.37
Formic Acid	17	1.19
Formic Pro	46	3.62
Drone Comb Removal	92	1.65
Other	49	2.49
Break Brood Cycle	128	2.22
Apivar	69	2.71
Mite Away Quick Strips	101	3.54
Hop Guard	15	3.96
ApiLifeVar	12	2.77
CheckMite+	2	1.00
Apistan	4	2.21
Apiguard	43	4.33
No Answer	202	5.02

Average *Varroa* for participants by management method used. Note that many beekeepers use more than one strategy/treatment in a season so multiple treatments/practices are tabulated here.

Figure 5: Average *Varroa* for participants by management method used. This only includes results for participants that only used one management method.

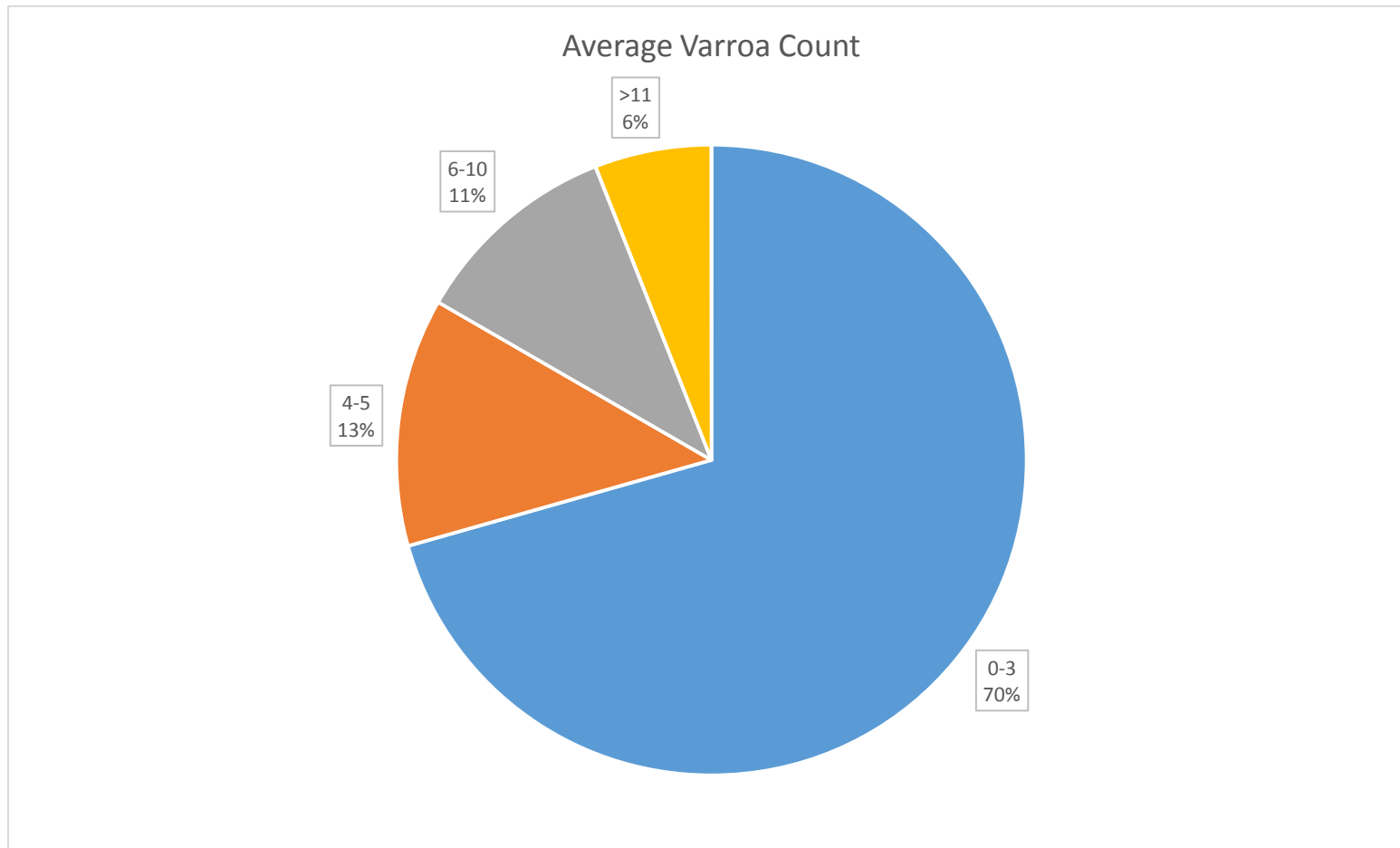
Management Method	Number of Users	Average Varroa
Powdered Sugar	14	4.3
Oxalic Acid	49	2.9
Formic Acid	5	1.8
Formic Pro	18	3.3
Drone Comb Removal	27	1.3
Other	32	2.9
Break Brood Cycle	36	1.9
Apivar	38	2.4
Mite Away Quick Strips	49	4.5
Hop Guard	7	3.8
ApiLifeVar	7	3.9
Apistan	2	0.3
Apiguard	22	3.6

Figure 6: In 2018 Have the Colonies Been Moved in the Past 2 Months?



Moved	Number of Responses	Average Varroa
Yes	27	2.13
No	603	3.86
No Answer	54	1.89

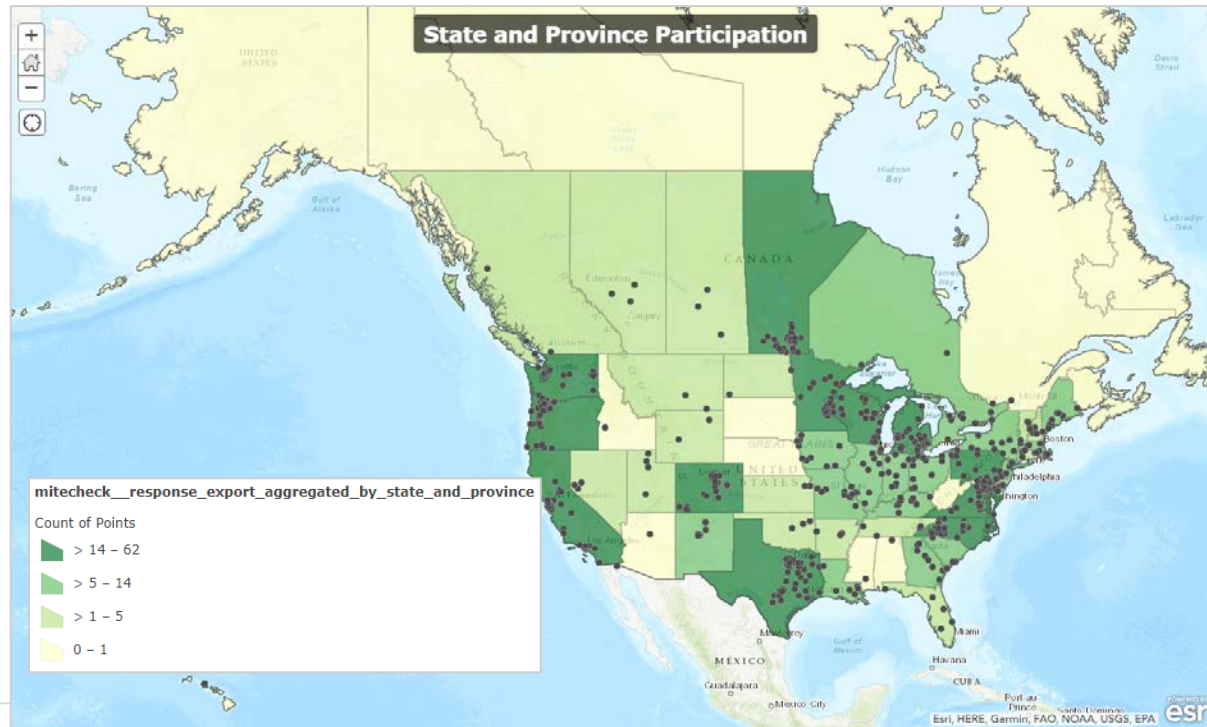
Figure 7: 2018 Percentage of Sites at Each *Varroa* Count



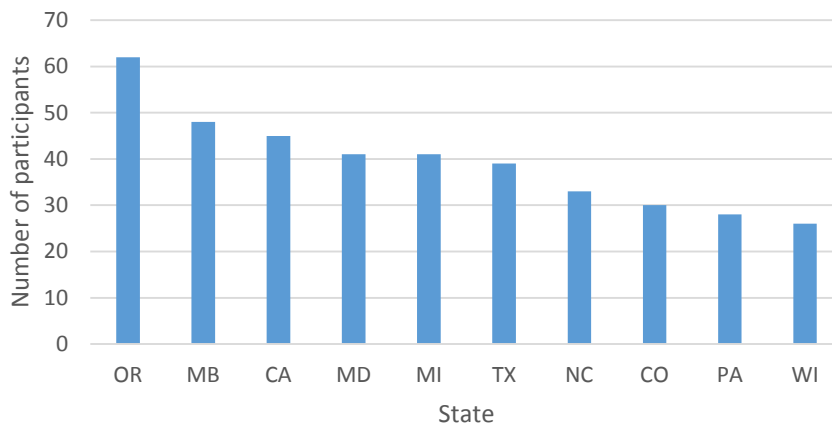
Average Varroa	Number of Sites
0-3	483
4-5	87
6-10	73
>11	41

State/Province Participation

Figure 8:

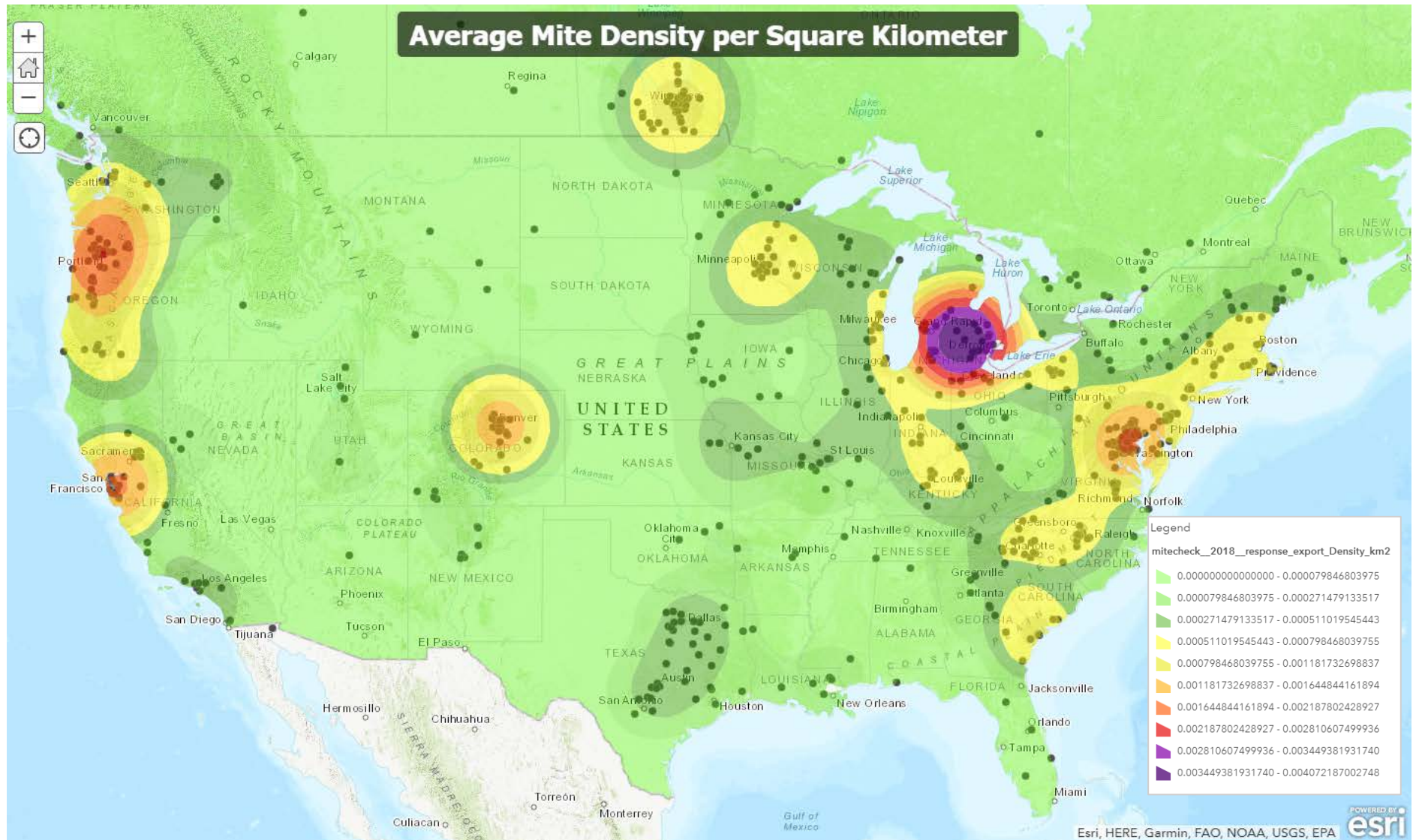


Top 10 States and Provinces by Participation



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

Figure 9: Average Mites/colony interpolation map



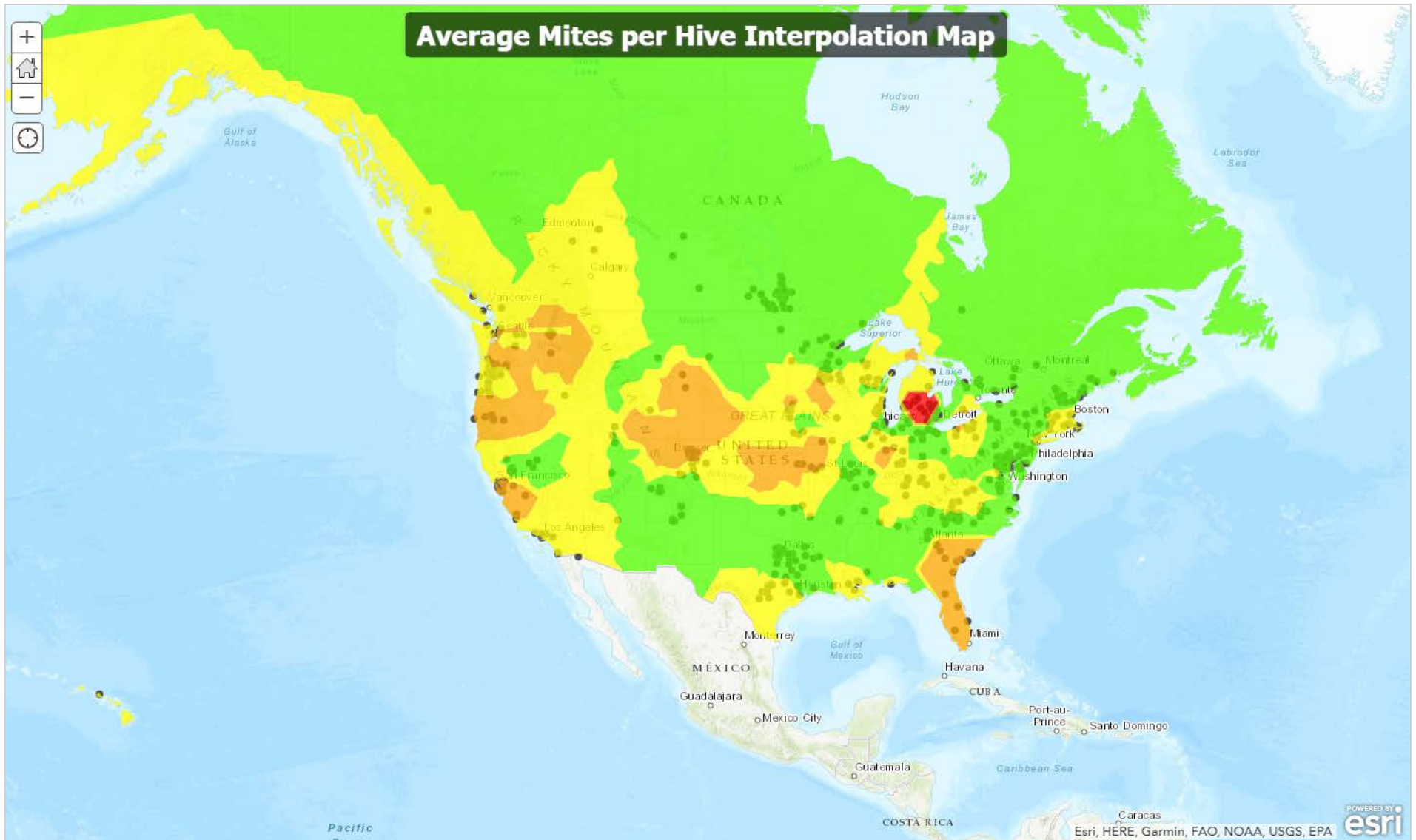


Figure 10: Average Mites/colony interpolation map