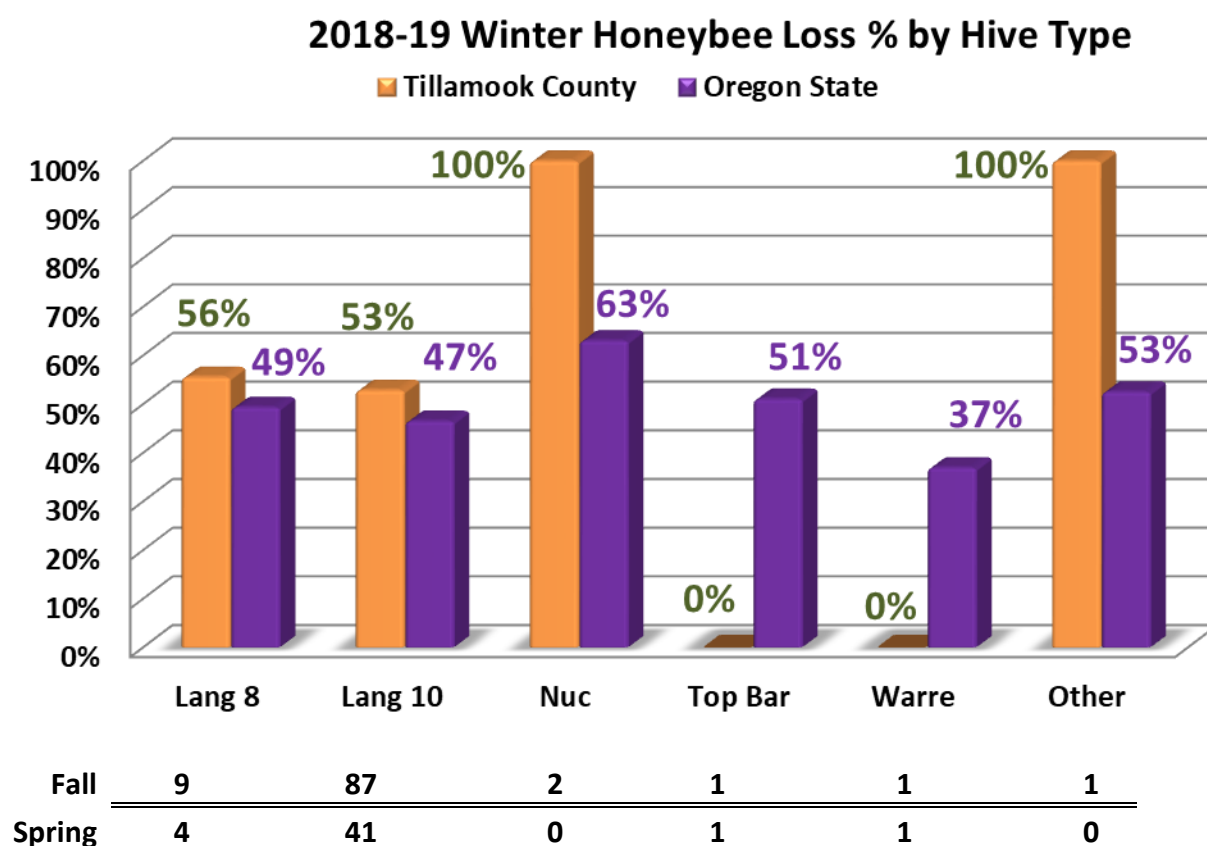


## 2018-19 Tillamook Winter Loss by Dewey M. Caron

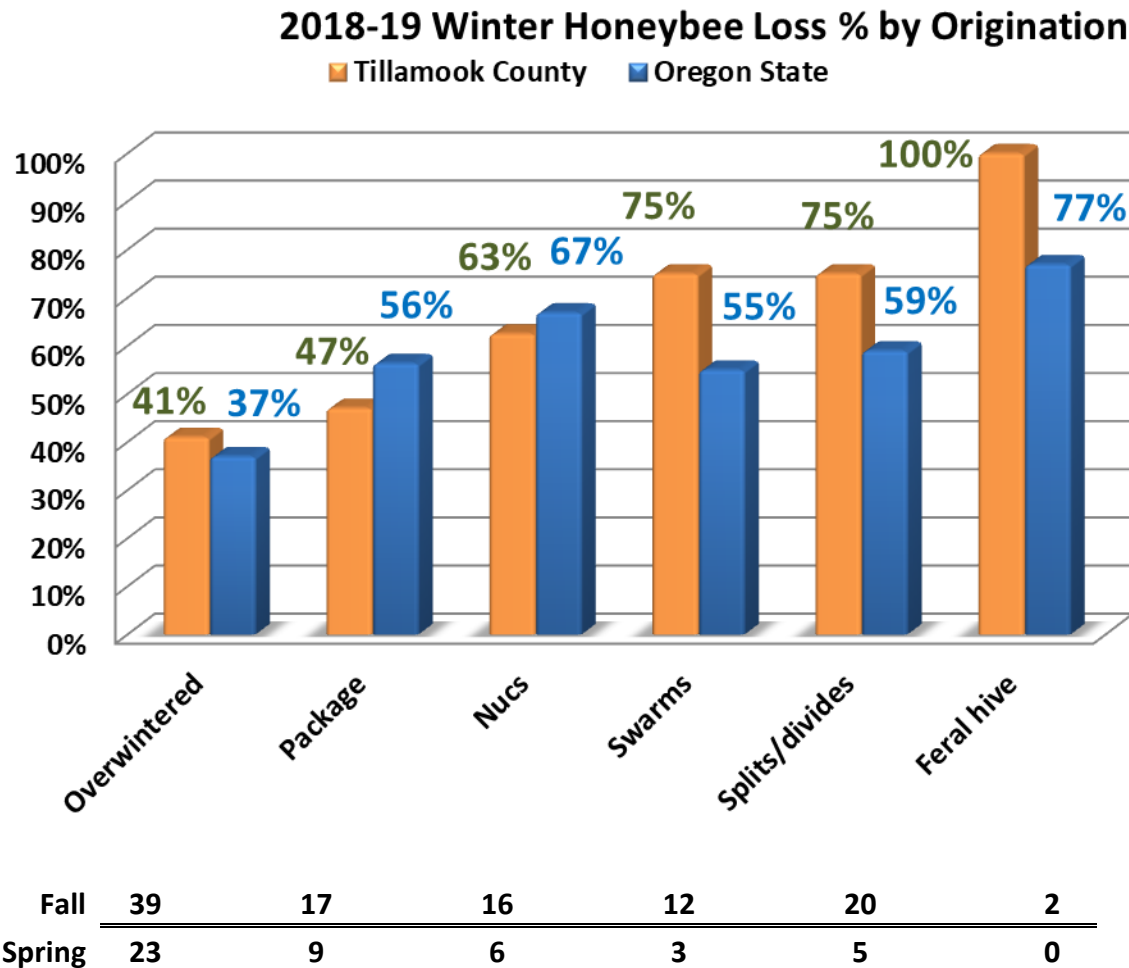
Tillamook beekeepers at the March meeting were directed to a web-based survey document in a continuing effort to define overwintering losses/successes. This was the 10<sup>th</sup> year of such survey activity. I received 416 responses from Oregon backyarders and 98 from Washington beekeepers keeping anywhere from 1 to 38 OR/40 WA colonies. Twenty Tillamook Association members, 10 more than last year, completed a survey reporting 101 fall colonies.

**Overwintering losses of Tillamook respondents was 53%.** This loss is 5 percentage point higher than the statewide loss of 48% (database of 416 OR backyarders). Percent losses were determined by asking fall colony numbers and surviving spring numbers. Tillamook member respondents started winter with 82 Langstroth 10-frame and 9 Langstroth 8-frame hives plus 2 5-frame nuc (3 did not survive), 1 top bar, 1 Warre (also did not survive) and 1 other, IDed as a horizontal hive. Comparison of loss with statewide OR beekeeper losses is shown in Figure 1 below.



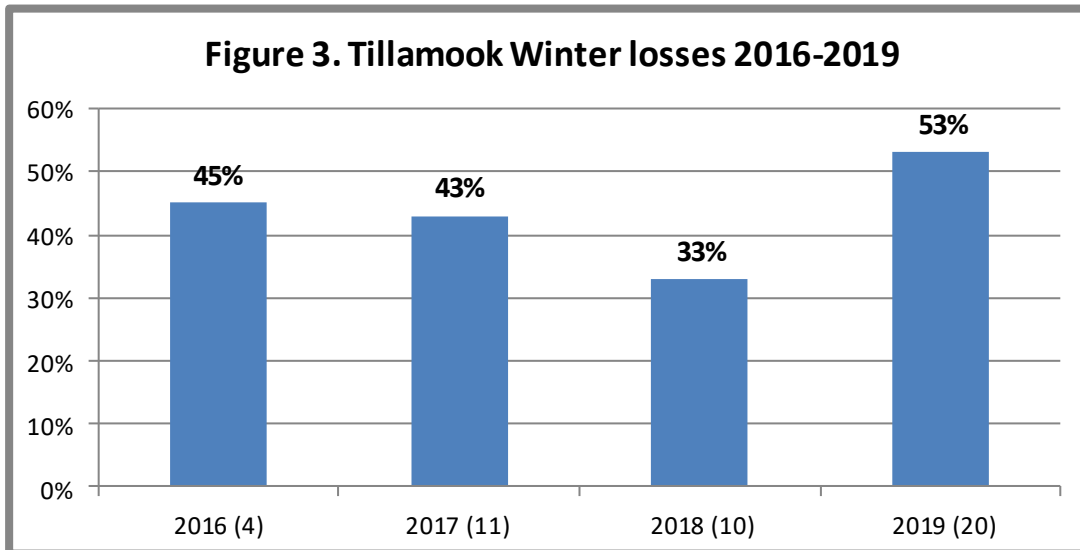
The survey also asked for hive loss by hive origination. Twenty three of 39 overwintered Tillamook beekeeper colonies were alive in the spring (41% loss rate), four percentage points

higher than statewide. Other hive survival was very similar to statewide. See Figure 2 for Tillamook and statewide comparisons.

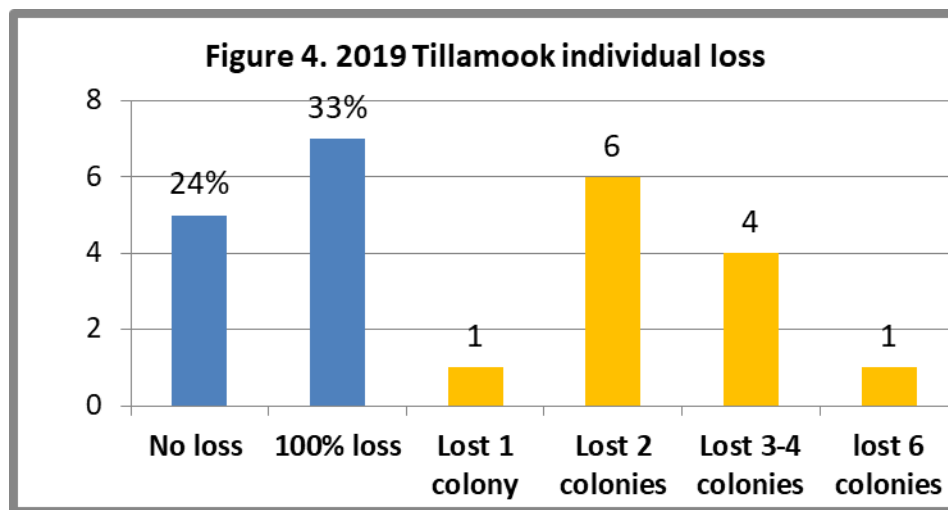


The Tillamook survey respondents were a mixture of new beekeepers with a few colonies and more experienced individuals. Two Tillamook respondents had 1 fall colony, 9 had 2 (the highest number), 1 had 3 (57% of respondents had 1, 2 or 3 colonies) 6 individuals had 4, 6 or 7 colonies, 2 had 10+ and one individual had 24 colonies the highest number. Thirteen individuals (62%) had 1, 2 or 3 year of experience (2 years with 6 individuals was most common), 8 had 4 to 7 years' experience, 1 had 9 and one individual had 11 years experience, the greatest number.

The losses this past winter were the heaviest of 4 seasons of gathering loss data from Tillamook beekeepers. Information shown in Figure 3 below. The numbers in ( ) represent the number of County respondents.



Not everyone had loss. Five Tillamook respondents had NO LOSS (24%) but seven had total loss (33%). One individual lost 1 colony, six individuals lost 6 colonies and two lost 3 and equal number lost 4 colonies. Heaviest losses were 6, 9 and 11 colonies. See Figure 4 for graphic of loss rates.



### Reasons for Colony Loss/Acceptable loss

Two individuals had two apiary locations and three had two additional apiary sites. Loss at 2<sup>nd</sup> apiary site was 37% compared to 42% at home apiary for these 5 individuals. Three individuals moved bees during the year, two for a better site and due to bear attack.

We asked of individuals that had colony loss to estimate what the likely reason(s) might have been, Multiple responses were permitted. There were 64 selections (1.7/individual). Varroa mites (14) and weak in fall (15) were most chosen, followed by poor wintering and

queen failure. Seven said don't know. Comparison of Tillamook selections with statewide in table below.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	pesticides	Yellow jackets	Other
Tillamook # %	14 (47.5%)	7 (23%)	15 (50%)	8 (27%)	4 (13%)	2 (7%)	4 (13%)	3 (10%)
Statewide %	39%	16%	24.5%	30%	9%	7%	11%	23%

### Why do colonies die?

There is no single reason for loss and a good deal of variation in opinion as to what might be an acceptable loss level. We are dealing with living animals which are constantly exposed to many different challenges, both in the natural environment and the beekeeper's apiary. We don't know what influence our winter weather could have been a factor in heavier losses. The four major factors affecting losses are thought to be mites, pesticides, declining nutritional adequacy of the environment and diseases, especially viruses. Management, either failure to do something or doing things incorrectly, remains a factor in overwinter losses. What effects alteration to the bee's natural environment and other external factors play in colony losses are not at all clear.

Langstroth wrote about the importance of taking losses in fall management saying if the beekeeper neglects such attention to his/her colonies 45% loss levels may occur, depending upon variable environmental conditions. It seems the "normal" of backyard losses is 30-50%. Older, more experienced beekeepers recall when loss levels were 15% or less. Honey production fluctuates each year but, once again, it seems to be declining on average. Despite continuing heavy annual losses numbers of U.S. bee colonies have increased somewhat since the 1970s; worldwide numbers of bee colonies have been steadily increasing.

**There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are necessarily excessive for all the issues facing honey bees in the current environment. Varroa mites and the viruses they transmit are considered a major factor colonies are not as healthy as they should be.**

### Management selections and losses

We asked in the survey for information about some managements practiced by respondents. Multiple responses were accepted. The survey inquired about feeding practices,

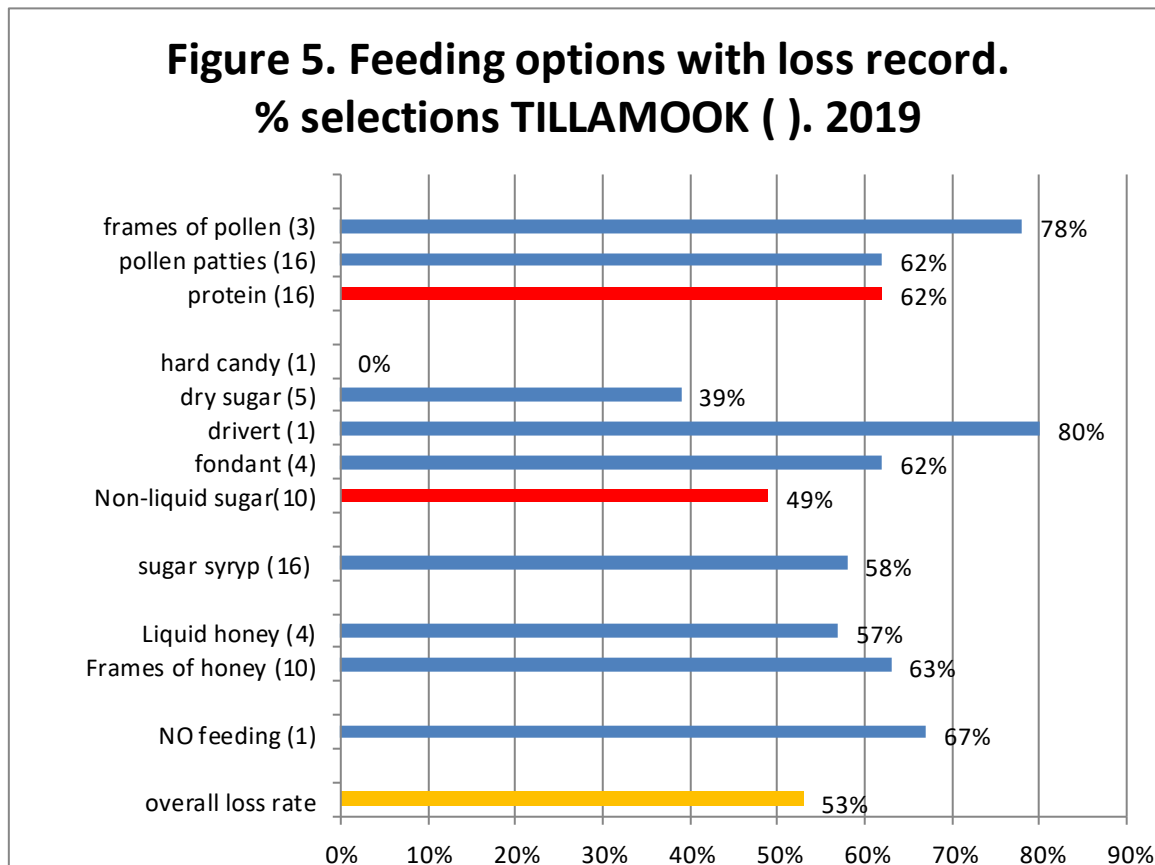
wintering preparations, sanitation measures utilized, screen bottom board usage, mite monitoring, both non-chemical and chemical mite control techniques and queens. Respondents could select options and there was always a none and other selection possible. This analysis seeks to compare responses of this past season to previous survey years.

Most Oregon beekeepers do not perform just one management to their colony (ies) toward improving colony health and overwintering success. This analysis however is mainly of a single factor equated with loss level. Such analysis is correlative and doing a similar management as fellow beekeepers do does not necessarily mean you too will improve success.

**FEEDING:** Tillamook survey respondents checked 62 feeding options = 2.2/individual. One individual (5%) selected a single choice and had no loss, 6 individuals had 2 choices (56% loss), 8 had 3 selections (69% loss) and 2 had 4, 2 had 5 and 1 6. One Tillamook individual said they did NO FEEDING. They had a 67% loss level.

Percent colony losses are presented for feeding options with numbers of Tillamook member numbers in ( ). Sixteen individuals (76% of respondents) said they used sugar syrup. They had a 58% loss rate, slightly higher than the overall Tillamook average of 53% which was also the case for statewide beekeepers.

In contrast to statewide, the 16 Tillamook individuals (76% of respondents) that fed protein had a slightly higher loss, 62%, compared to overall loss of 53%. Those using non-liquid sugars (10 Tillamook individuals) had a lower loss level (49%) compared to overall Tillamook average which was also the case with statewide beekeepers. Those 1 individual using hard



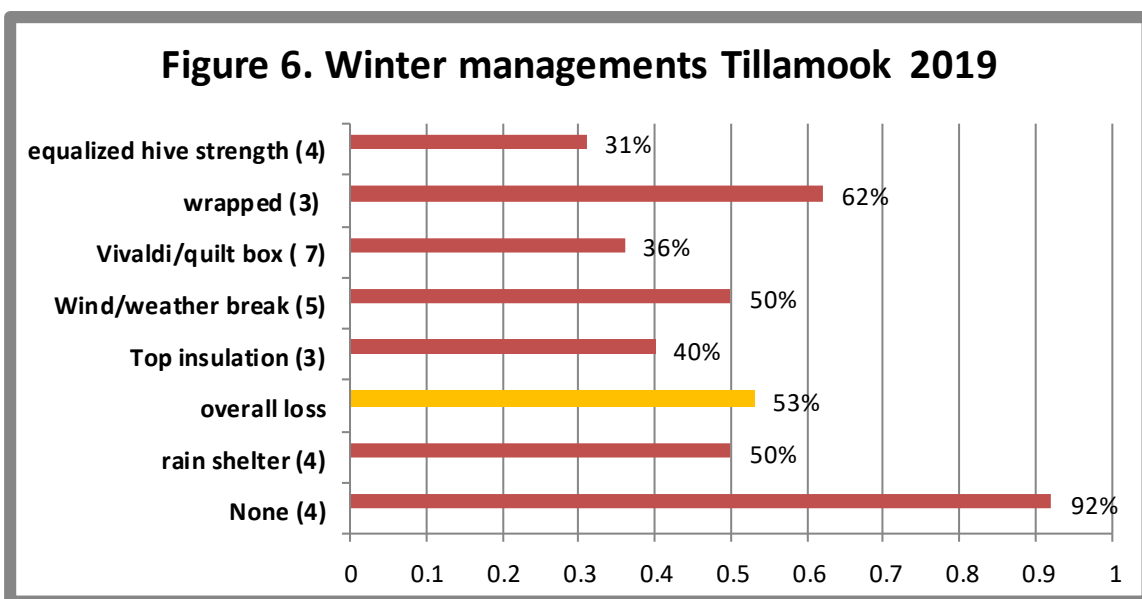
sugar candy and the 5 using dry sugar had the best survival. Statewide fondant feeders had better survival but this wasn't the case for the 4 fondant Tillamook users.

Statewide, Individuals that fed non-liquid sugar collectively had a lower loss level of 43% compared to 48% overall. Feeding of protein improved survival marginally both statewide. Feeding honey did not improve survival for either Tillamook or statewide beekeepers.

**WINTERING PRACTICES:** Four Tillamook individuals reported doing no winterizing; they had loss level of 92%; statewide these 4 were among 51 individuals (12% of overall statewide respondents) that indicated none of the several listed wintering practices; statewide losses were 63% for those doing no winterizing managements 15 percentage points higher loss than overall loss of 48%. Multiple selections were possible and in fact the 17 Tillamook members averaged 2.2/individual. Seven individuals chose a single management and had a 41% loss level while the 5 individuals checking 2 had a 25% loss level. Doing more did not improve survival the 3 individuals who did 3 and the 2 indicating 4 selections had a 60% loss.

The most common wintering management selected were use of a quilt box (Vivaldi board) at colony top (242 individuals statewide (58%) and 7 Tillamook. Loss levels were better than overall for both statewide and Tillamook members. Figure 8 shows number of individual choices for Tillamook members in ( ) and percent loss of each selection.

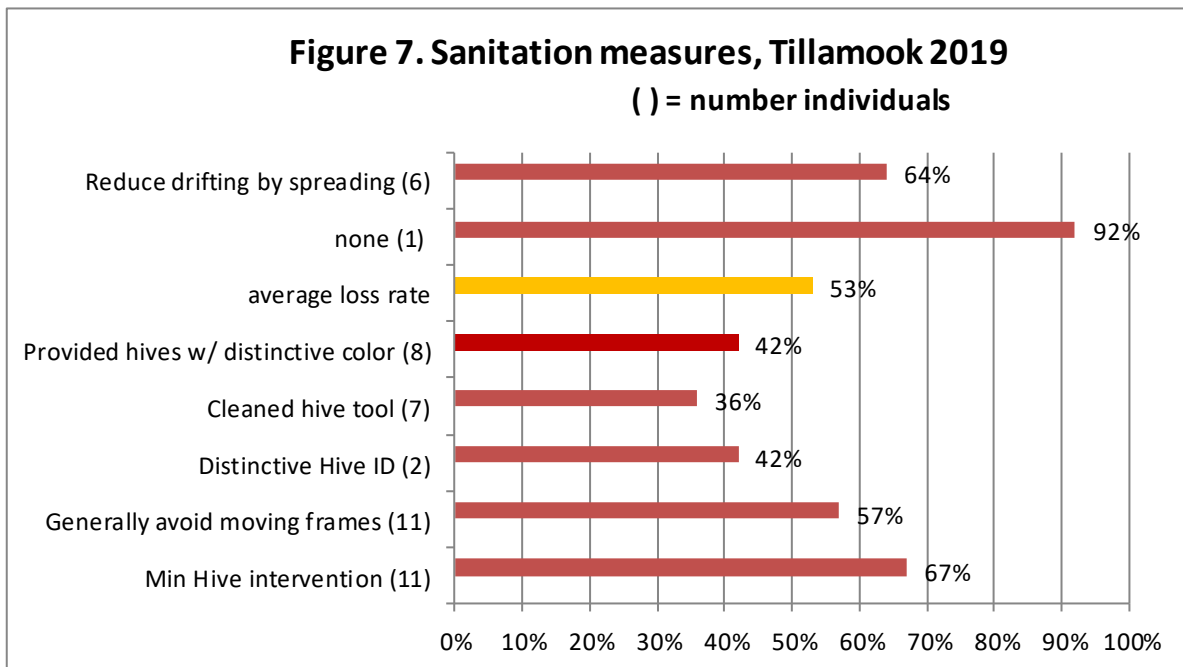
Over the past three years no single winterizing management improved survival each survey year. However 5 managements improved survival in 2 of the 3 years. Those managements are equalizing colonies in the fall, use of the quilt box/Vivaldi board/moisture trap at top of colony, an upper entrance (most Vivaldi boards have an upper entrance built into the equipment), wrapping colonies, and wind/weather protection. Only wrapping (3 individuals) did not improve Tillamook beekeeper overwintering. In all 3 years those statewide and for Tillamook individuals had heavier losses than overall.



**SANITATION PRACTICES:** It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. We received 826 responses for this survey question statewide, 47 were Tillamook member responses. Sixty eight individuals statewide (16%) and 1 among Tillamook (5%) said they did not practice any of the 6 offered alternatives. Loss rate statewide (52%) was 4 percentage points higher than the overall loss rate of 48%; for the single Tillamook respondent, loss rate was 92%. Five members had 1 selection (loss rate 70%), 8 made 2 choices (38% loss), 4 selected 3 managements (94% loss) and 2 had 4 made and 1 made 5 choices (loss rate 33%). Statewide and Tillamook members had 2.4 selections/individual.

Minimal hive intervention (209 individuals, 11 of them Tillamook beekeepers) was the most common option selected. It could be argued that less intervention might mean reduced opportunity to compromise bee sanitation efforts of the bees themselves and that excessive inspections/ manipulations can potentially interfere with what the bees are doing to stay healthy. This option however did not improve winter survival; the loss rate for this group statewide was 54%, 67% for Tillamook.

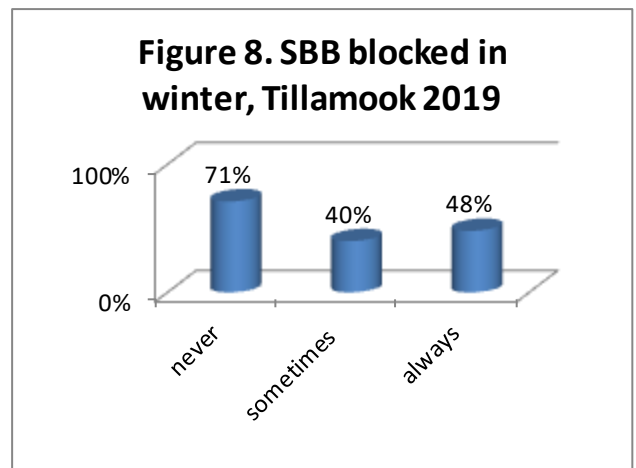
The two sanitation choices that did seem to improve survival was reduce drifting by spreading colonies out and providing hives with distinctive ID /doing other hive ID measures. For Tillamook respondents, 5 did managements to reduce drifting and 8 used colors to provide distinctiveness. See Figure 7. Number in ( ) is number statewide/number Tillamook individuals.



**SCREEN BOTTOM BOARDS:** Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In the recent survey 63 individuals (20%) statewide among them 3 Tillamook members (14%) said they did not use screen bottom boards. Loss level statewide was 48% for the small number of non-users and 49% for those who used SBB. As statewide, most Tillamook members (76%) used SBB; the loss rate for those Tillamook members, who used SBB on some or all of their colonies, was (45%) while 3 individuals not using SBB had 42% loss. Statewide one percentage point difference is not significant.

This one percentage point difference means that in the PNW surveys there have been differences of 1, 1, 2 and 13.4 percentage points better survival (over 4 years) i.e. better survival), and for the fifth year 8 percentage points lower survival. **The five year average of SBB use, 42.8% loss level of those using SBB on all or some of their colonies and 44.2% for those not using SBB. The 3% positive gain illustrates how SBB are very minor in improving overwinter survival.**

The survey asked if the SBB was left open (always response) or blocked during winter. This past season 23% of individuals statewide (Tillamook 58%) said they always blocked SBB during winter; statewide loss rate was 37%; Tillamook losses were 48%. One hundred fourteen individuals statewide (44%) did not block them during winter (never response), of which 6 individuals were Tillamook members. Statewide never responders had a 42% loss rate (Tillamook 71%) Statewide there was a 5 percentage points higher survivorship for those who blocked. For Tillamook the difference was 23 percentage points. **Comparing the always and sometimes left open with the closed in winter response reveals an average 10 percentage point difference (over 5 years) in favor of closing the SBB over the winter period for OR beekeepers.** See Figure 8 for Tillamook.



There is no good science on whether open or closed bottoms make a difference in overwintering but some beekeepers “feel” bees do better with it closed overwinter. Five years of comparison shows those closing the screen during winter did have a 10 percentage point



improvement in colony survival. An open bottom, at least during the active brood rearing season, can assist the bees in keeping their hive cleaner.

### Mite monitoring/sampling and control management

We asked percentage of Oregon hives monitored for mites during the 2018 year and/or overwinter 2018-19, whether sampling was pre- or post-treatment or both and, of the 5 possible mite sampling methods, what method was used and when it was employed. Statewide 277 individual respondents (67%) said they monitored all their hives. Losses of those individuals monitoring was 51%. Seventy six (18%) reported no monitoring; they had a higher loss rate of 59% loss. 63 individuals reported monitoring some of their colonies; they had a 50% loss. See Figure 12.

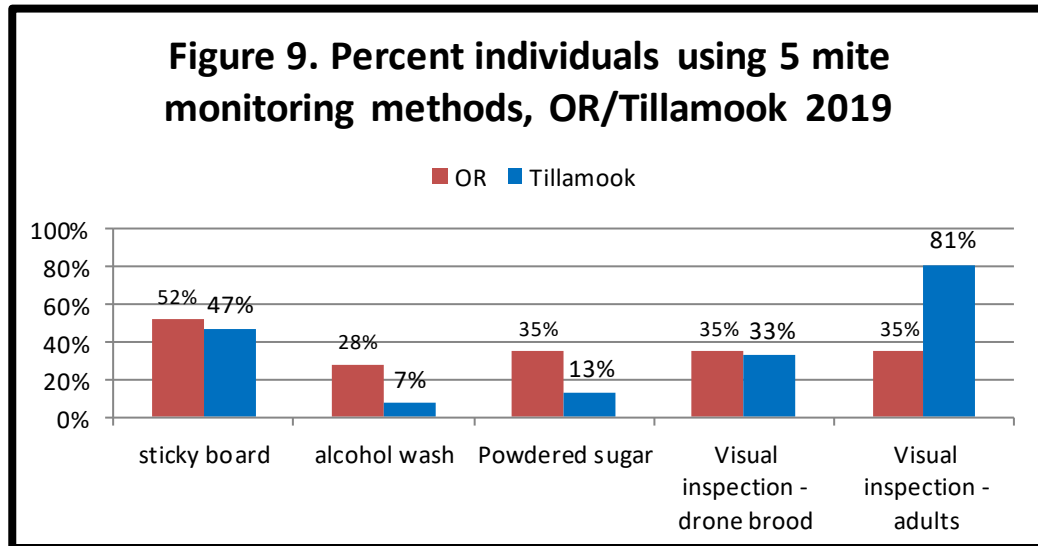
At last statewide, monitoring alone is a means towards improved winter survival. The table below compares % individuals and % winter loss for individuals statewide who monitored all colonies compared with those who monitored none. The 14-15% who monitored some colonies was variable but 3 year average mirrors those who monitored all colonies.

	<b>ALL Colonies Monitored % individuals</b>	<b>% loss</b>	<b>SOME Colonies Monitored % individuals</b>	<b>% loss</b>	<b>No colonies Monitored % individuals</b>	<b>% loss</b>
2019	67%	51%	15%	50%	18%	59%
2018	63%	38%	14%	26%	26%	49%
2017	63%	43%	15%	60%	22%	48%
3 year loss age		44%		45%		53%

Among Tillamook respondents, 13 individuals (62% monitored all colonies; they had 75% loss). Six individuals (29%) did no monitoring and they had a 38% loss, exactly opposite results from statewide. I believe the different results for Tillamook compared to statewide can be seen in the method used to monitor. In order of popularity of use, Sticky boards were used by 52% of total respondents statewide 35% of individuals used powdered sugar monitoring and visual inspection of drones and adults. Alcohol wash was used by 28% of the statewide respondents. In past 5 years, the use of sticky boards has decreased in use and both alcohol wash and powdered sugar shake have increased in use.

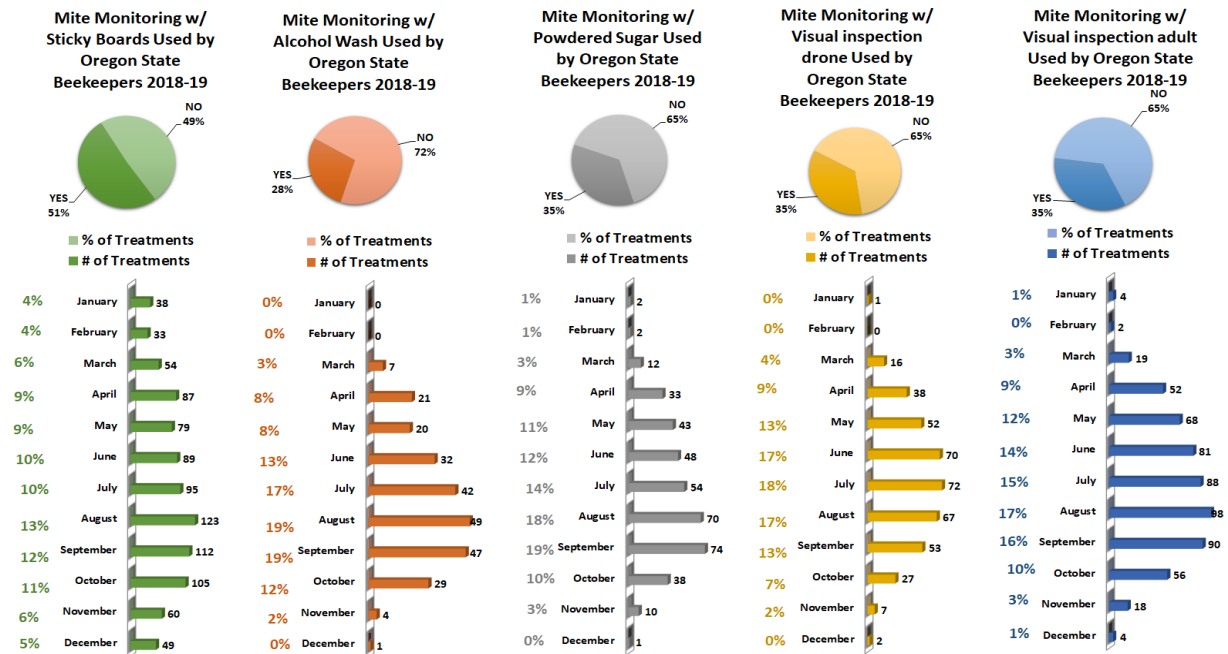
Figure 13 red bars are statewide responses and blue is Tillamook. Only a single Tillamook member used alcohol wash and 2 used powdered sugar, the 2 most reliable means of monitoring mite load in colonies while 13 (of 15 who answered question) used visual looking on adults for mites as their monitoring method (more than one selection could be used) which is

not a reliable method of determining how many mites are in a colony. Ineffective looking at drones and adults does not constitute a reliable mite sampling program.



Most sampling to monitor mites was done in July – September, as might be expected since mite numbers change most quickly during these months and results of sampling can most readily be used for control decisions. See Figure 10 below for number of months each of the 5 sampling methods were used.

Figure 10



**It is important to KNOW mite numbers.** Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm the usefulness of a treatment when inserted post treatment. Visual sampling is not accurate: most mites are not on the adult bees, but in the brood. Unfortunately looking for mites on drone brood is also not effective as a predictive number but can be used as an early warning that mites are present; if done, look at what percentage of drone cells had mites.

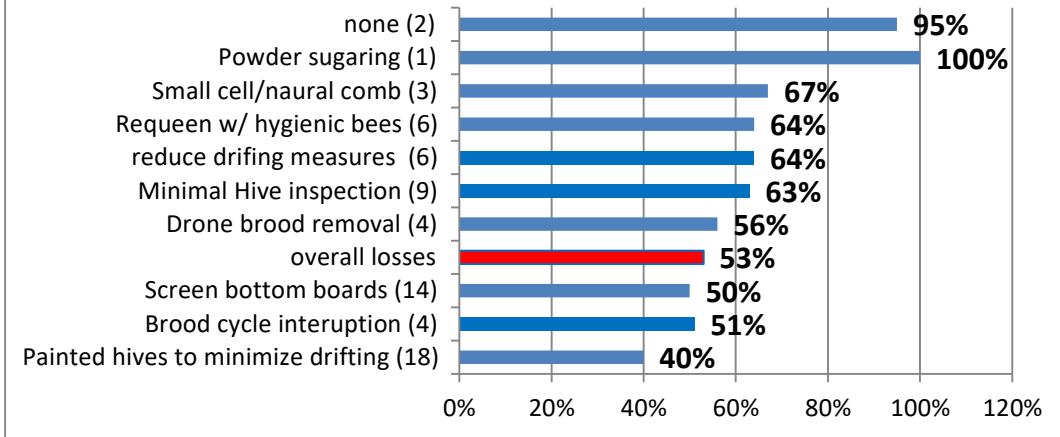
See **Tools for Varroa Monitoring Guide** [www.honeybeehealthcoalition.org/varroa](http://www.honeybeehealthcoalition.org/varroa) on the Honey Bee Health Coalition website for a description of and to view videos demonstrating how best to do sugar shake or alcohol wash sampling. The Tools guide also includes suggested mite level to use to base control decisions based on the adult bee sampling. A colony is holding its own against mites if the mite sample is below 2%. It is critical to not allow mite levels to exceed 2% during the fall months when bees are rearing the fat fall bees that will overwinter. It is also the most difficult time to select a control method (if one is deemed needed) as potential treatment harm may negatively impact the colony. We are seeing more colonies suddenly disappear (abscond?) during the fall, which may be related to the treatment itself.

## **Mite control treatments**

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Fifty one individuals (12%) statewide, same percentage as last year, said they did not employ a non-chemical mite control and 99 individuals (24%), nine more than last year, did not use a chemical control. Those 51 individuals statewide (12%) who did not use a non-chemical treatment reported a 50% winter loss (for Tillamook the 2 individuals (9%) not using a non-chemical treatment had 95% loss), while those who did not use a chemical control statewide lost 69% of their colonies; for Tillamook, 2 individuals (9%) not using any chemical had a loss rate of 75%. The individual options chosen for non-chemical and chemical control are discussed below

**Non-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey (+ other category,) 89 individuals statewide used one method, 118 used two, 95 used three, 54 used 4 or 5 and 9 individuals used 6. Among Tillamook respondents 4 used one (had 50% loss), 6 used 2 (31% LOSS), 5 used 3 selections, while 3 used 4 and 1 used 5 choices; those using 3 had 67% and individuals with 4 and 5 76% loss. More is not better.

**Figure 11. Lost rate using non-chemical mite treatments ( )=number individuals)  
Tillamook**



Use of painted hives and screened bottom board (18 and 14 individuals respectively among Tillamook respondents) were most common. As reported above SBB show a slight advantage (50% loss compared to 56% overall for Tillamook) while those using painted hives had the best survival (40%). The 4 individuals using brood cycle interruption also had improved survival compared to average overall loss rate for Tillamook beekeepers. The use of the remaining 7 selections are shown in Figure 15; number of individuals in ( ), bar length represents average loss level of those individuals using each method.

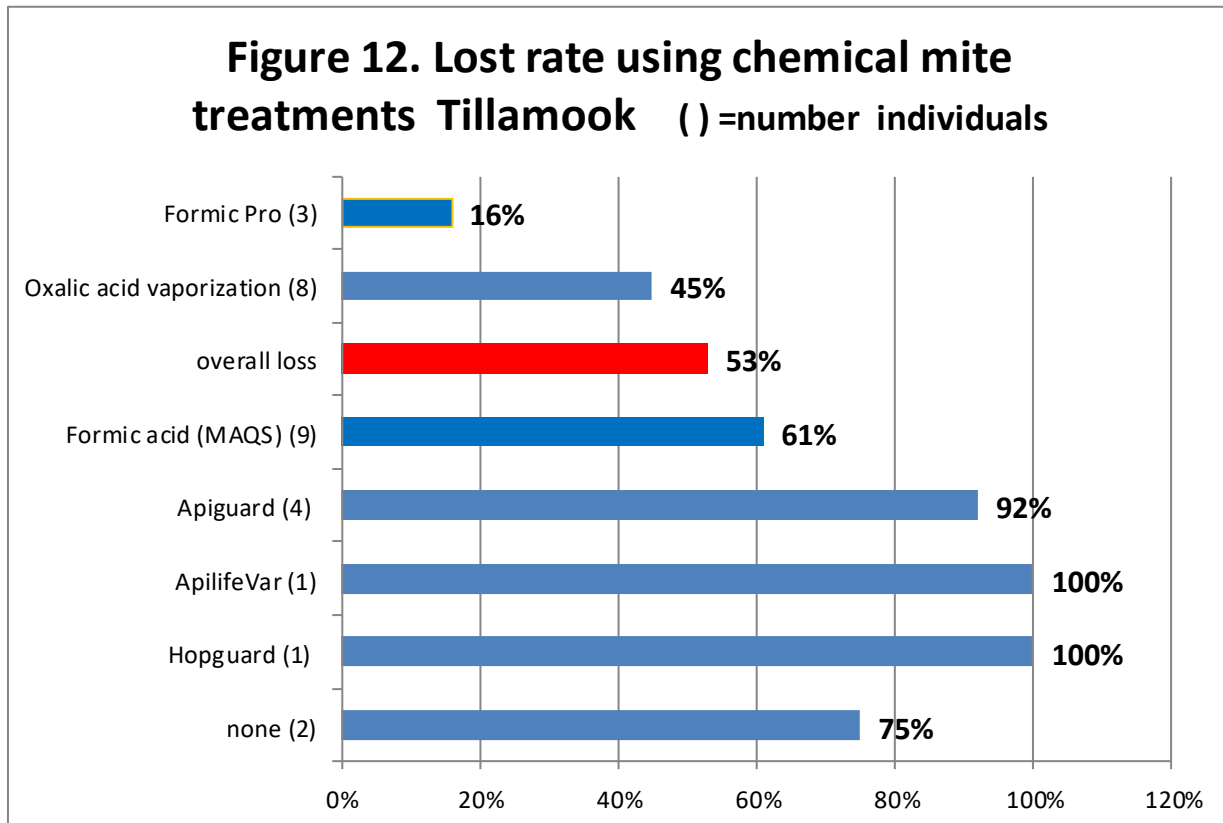
Three of the non-chemical alternatives have demonstrated reduced losses over past 4 year statewide and Tillamook data mirrors the overall Oregon beekeeper experiences. Reducing drifting such as spreading colonies, different colony colors in apiary has demonstrated a 13% better survival, Brood cycle interruption an 11% better survival and drone brood removal a minor 2% advantage. Some control alternatives demonstrate an advantage on one or two years but overall no improvement.

**Chemical Control:** For mite chemical control, 99 individuals (24% of total respondents) used NO chemical treatment Statewide and for Tillamook members 2 individuals (9%) used no chemical treatments. Those using chemicals used at rate of 1.4/individual (slightly lower use than statewide 1.8/individual). Statewide, one hundred thirty three individuals (42%) used one chemical, 122 used two (medium), 54 used 3 (17%), 7 used 4 and one used 5. With Tillamook respondents 13 individuals (68%) used one chemical (they had a 65% loss) 5 used 2 (42% loss) and 1 used 3 (50%) illustration that one chemical alone might not be the approach to improve survival.

One hundred fifty OR Beekeepers (23% of total chemical uses) indicated they most commonly utilized MAQS, formic acid; among Tillamook respondents 9 individuals used Mags while three used Formic pro and they had the best overall survival. Eight individuals used oxalic acid vaporization (no reported using the drizzle method of application) had slightly better survival. Figure 12 illustrates number of uses ( ) and bar length indicates the loss rate for those using that chemical.

Consistently the last 3-4 years five different chemicals have helped beekeepers statewide experience better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level. Both did not perform for the five Tillamook users this past season. Apiguard has a 31% better survival and ApiLifeVar has a 30% better survival record over past 4 years statewide.

Apivar use, the synthetic (amitraz), has demonstrated a 29% better survival over past 4 years (2016-19); No Tillamook respondent used it. Oxalic acid vaporization over past 3 years has a 13% better survival (the survey did not differentiate Oxalic vaporization from drizzle in 2016). Formic acid demonstrated a 14% better survival but this product has changed and how we use it is changing so this information is more difficult to tease out of the data. This past season for example Formic Pro seemed to perform better than the traditional formic MAQS pads, exceedingly s for Tillamook beekeepers.



The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 17 for 2016-17 season. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals.

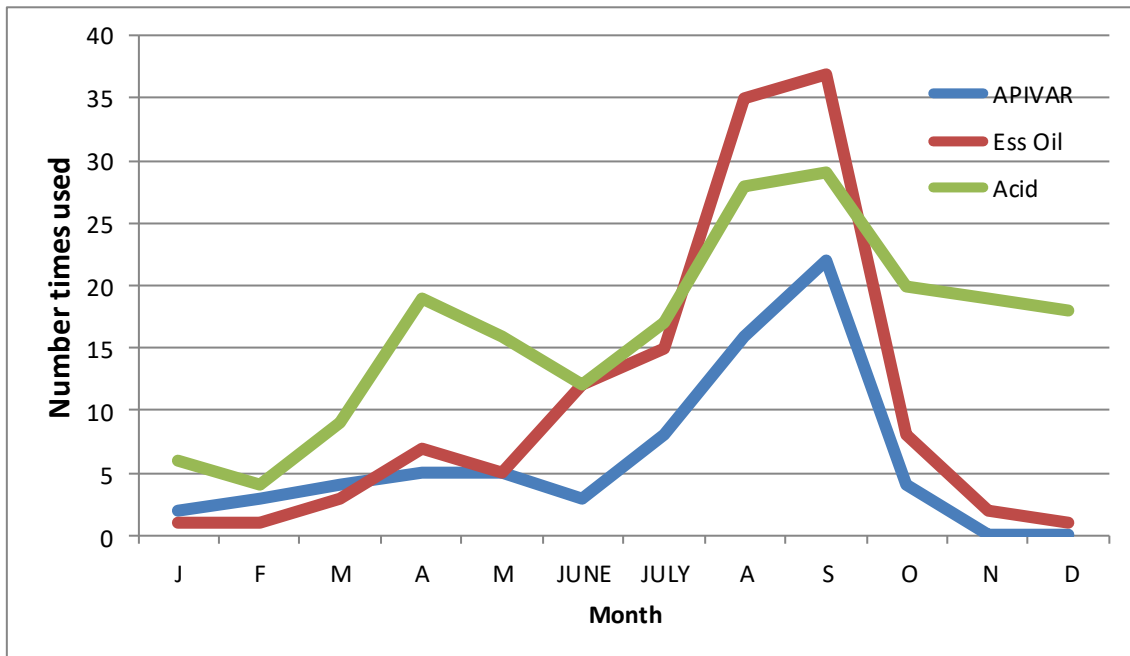


Figure 13

## Queens

We hear lots of issues related to queen “problems”. In Section 8 of the survey we asked what percentage of loss could be attributed to queen problems. Statewide 129 individuals subdivided queen related issues from 10 to 100% of their hives. A larger number 183 (44%); an additional 103 individuals (24.5%) said they didn’t know. The number and percent expressed from statewide survey is shown in pie chart Figure 14. For Tillamook 11 (55%) said no, 24% said yes and an equal number said they

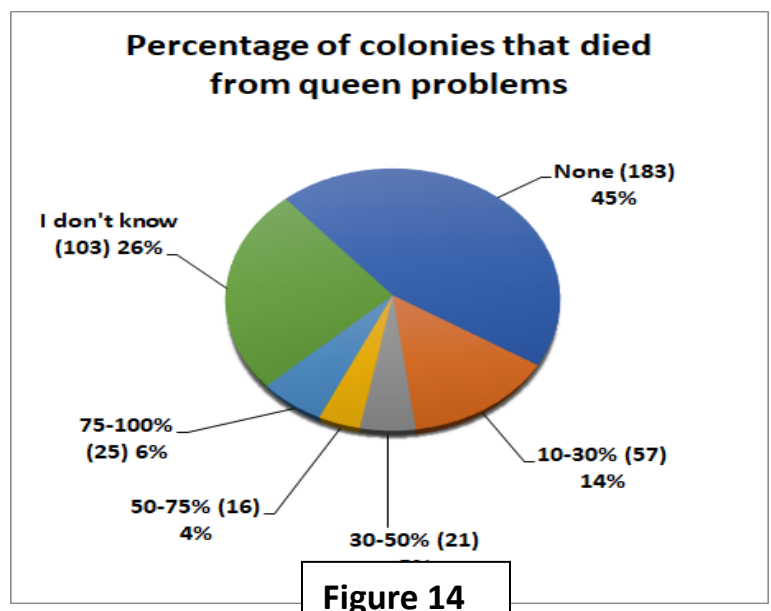
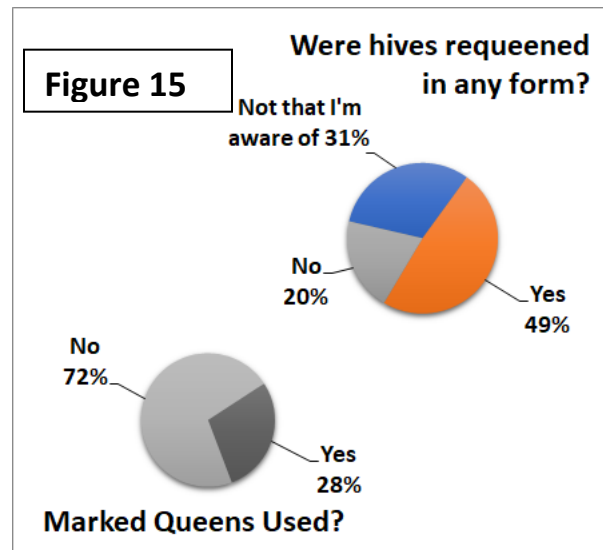


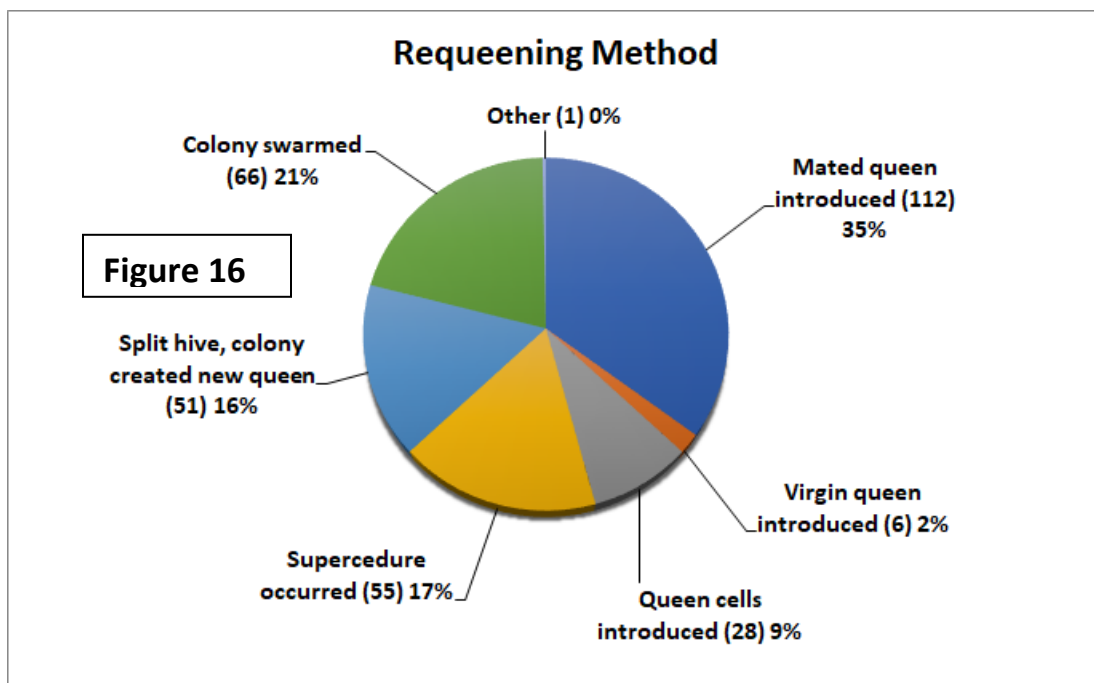
Figure 14

didn't know. Those indicating no had a 39% loss while those saying yes had a 67% loss.

Queen events can be a significant factor contributing to a colony not performing as expected. We asked if you had marked queens in your hives. One hundred sixteen (28%) statewide said yes with 29% saying yes in Tillamook. The related question then was did you or your bees replace their colony queen? Forty-nine percent (204 individuals) said yes, 31% said no, and the remainder 'not that that I am aware of.' Figure 15. For Tillamook 62% said YES their colonies requeened, 38% said no; there were none saying not that they were aware of. Figure 15 shows statewide data.



One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. The question "How did bees/you requeen" received 318 statewide responses (more than one option could be checked); data illustrated in Figure 16. Although over one-third of respondents indicated their bees were requeened with a mated queen, more than one half (54%) indicated it was the bees that requeened via swarming, supersedure or emergency rearing statewide. Among Tillamook respondents 39% said they requeened with mated queen and 3 additional 17% with queen cells; 44% requeened themselves, via swarming and splits (3 individuals) and 2 via supersedure. That means too few were seeking to use this valuable tool for mite control.



## Closing comments

This survey is designed to ‘ground truth’ the larger, national Bee Informed loss survey. Some similar information is additionally available on the BeeInformed website [www.beeinformed.org](http://www.beeinformed.org) and individuals are encouraged to examine that data base as well. Recall that the BeeInformed survey is measuring the larger scale OR beekeepers not the backyarders (figure 6 of OR state loss report.) Reports for individual bee groups are customized and posted to the PNW website.

We intend to continue to refine this instrument each season and hope you will join in response next April. If you would like a reminder when survey is open please email us at [info@pnwhoneybeesurvey.com](mailto:info@pnwhoneybeesurvey.com) with “REMINDER” in the subject line. We have a blog on the [pnwhoneybeesurvey.com](http://pnwhoneybeesurvey.com) and will respond to any questions or concerns you might have.

**Thank You to all who participated.** If you find any of this information of value please consider adding your voice to the survey in a subsequent season. Dewey Caron  
June 2019