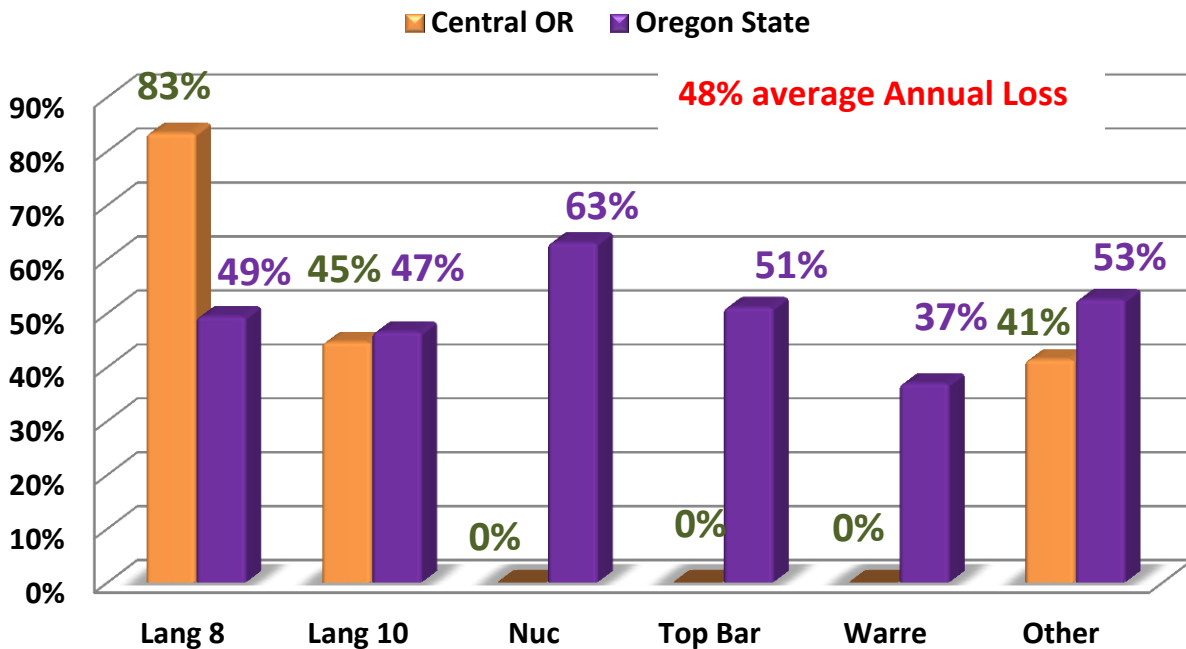


2018-19 COBA Beekeeper Winter Loss Report by Dewey M. Caron

Oregon and COBA beekeepers were directed to a web-based survey document as a continuing effort to define overwintering successes/losses. This was the 10th year of such survey activity. I received 416 responses from OR backyarders and 98 from Washington beekeepers keeping anywhere from 1 to 38 OR/40 WA colonies. Central Oregon members sent in 18 surveys. A report of the OR beekeeper survey responses, including losses and responses to management questions in the survey, is posted at www.pnwhoneybeesurvey.com.

Overwintering losses were determined by asking number of fall (October) colonies by hive type and subsequently how many were still alive in the spring (April). COBA response included 65 Langstroth 10 frame and 12 Langstroth 8 frame hives in the fall, but no nucs, Top bar or Warre hives. The majority of other were long hives (a removable frame hive). **Total COBA loss = 48%** same as statewide. Data comparing Central Oregon and state-wide respondents shown in Figure 1.

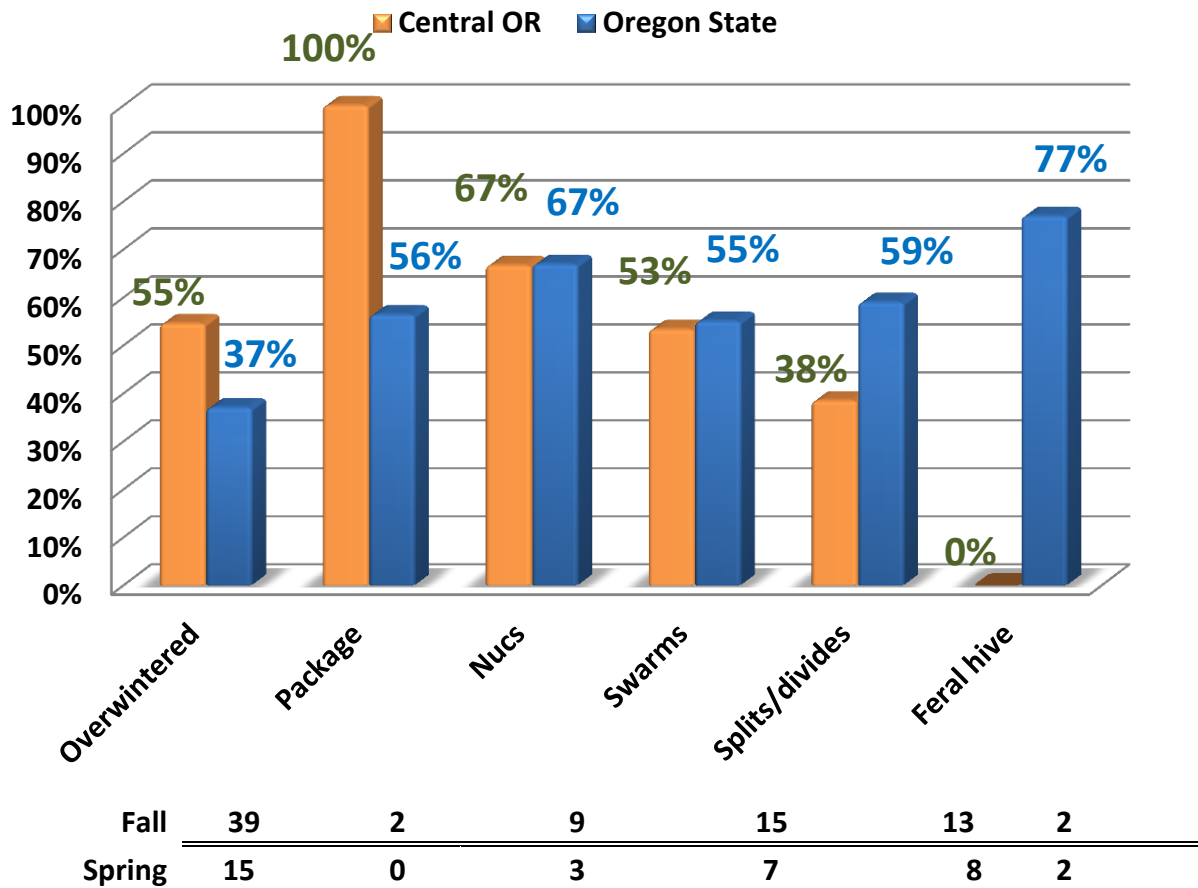
Figure 1 2018-19 Winter Honeybee Loss % by Hive Type



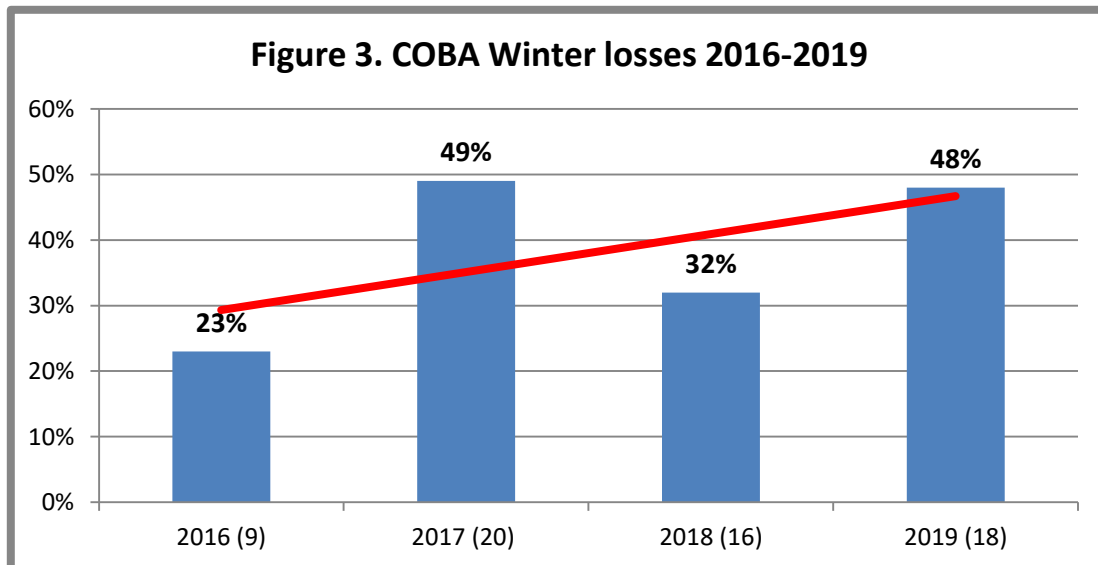
| | | | | | | |
|--------|----|----|---|---|---|----|
| Fall | 12 | 65 | 0 | 0 | 0 | 29 |
| Spring | 2 | 36 | 0 | 0 | 0 | 17 |

Survey also asked about colony losses by hive origination. Fifteen of 39 overwintered colonies survived (55% loss). No packages survived (of 2 total) while of 3 nucs of 9 overwintered survived (67% loss) only one did not survive. Split survival was better than statewide and the 2 transfers survived (0% loss). **COBA compared with statewide in Figure 2.**

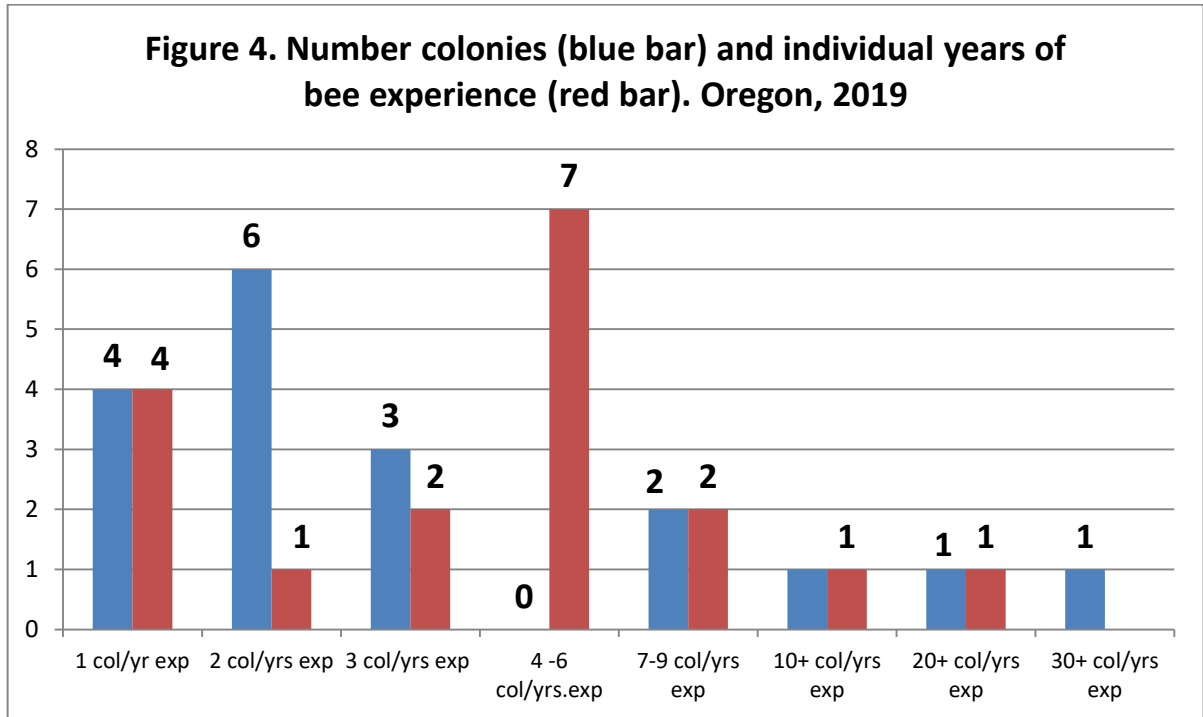
Figure 2 2018-19 Winter Honeybee Loss % by Origination



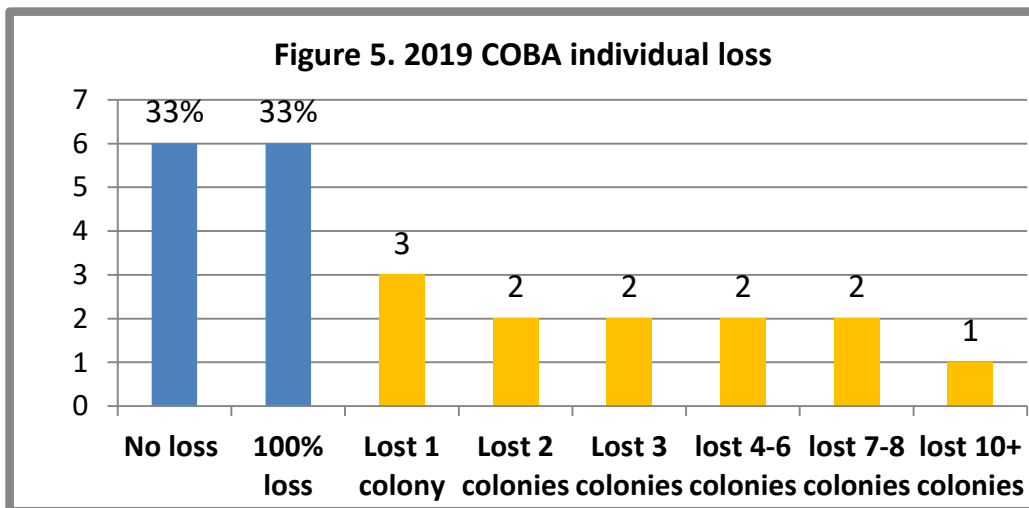
Losses this past overwinter were elevated again similar to 2016-17 winter. Figure 4 shows number of COBA responses and percent loss for this and past four seasons. Respond number in (). Trend line in red.



The COBA association respondents can be characterized, as are the state respondents, by small numbers of colonies and a wide range of years of experience. Four individuals had 1 fall colony, 6 had two and 3 had three (72% of total). One individual each had 7, 9, 11, 21 and 31 colonies (the highest number). Years experience shows a broad spread. There were 7 individuals with 1, 2 or 3 years experience (39%), and an equal number had 4-6 years experience; remainder had 8, 9, 15 and 25 years experience the highest.



Not all Central Oregon individuals had losses Six individuals (33%) had NO LOSS while an equal number lost all their fall colonies. Three individuals lost one colony, 2 lost two and 2 lost 3 colonies. Heavier losses of 6, 7, 8 and 11 colonies were also experienced.



Four individual respondents kept their bees in 2 apiaries and one had 4 sites. Inexplicably the loss was considerably lower in the out apiaries (18%) compared to overall (48%). Two individuals moved colonies during the year, both for a better location for nectar sources.

Reasons for Colony Loss/Acceptable loss

We asked individuals that had colony loss to estimate what the reason might have been for their loss (multiple responses were permitted). There were 23 total listings for COBA, 1.9/individual. Four Central Oregon individuals listed weak in fall and Poor wintering with queen failure and varroa listed by 3 individuals each. One individual checked don't know. Table compares COBA with % statewide selections.

| | Varroa mites | Poor wintering conditions | Weak in fall | Queen failure | Starvation | CCD | Yellow jackets | Other |
|-------------|--------------|---------------------------|--------------|---------------|------------|------|----------------|-------|
| COBA (#) | 3 | 4 | 4 | 3 | 2 | 1 | | 2 |
| COBA (%) | (25%) | (33%) | (33%) | (25%) | (17%) | (8%) | (25%) | (17%) |
| Statewide % | 40% | 23% | 29% | 27% | 18% | 4% | 14.5% | 15% |

Survey individuals are asked to indicate what might be an acceptable loss level. The median (middle) selection was 20%. One individual said didn't know. 4 said none (the heaviest choice), 7 elected 15% or less (39%) and 2 individuals chose 20, 33 and 50%. Three individuals listed 25%.

Why colonies die? There is no easy way to verify reason(s) for colony loss. Colonies in the same apiary may die for different reasons. Examination of dead colonies is, at best confusing, and, although some options may be ruled out, we are often left with two or more possible reasons for losses. I am working on a book chapter on necropsy of dead bees and will post it on website www.pnwhoneybeesurvey.com

There is a good deal of variance 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. Central Oregon individual choices varied from zero to 50%, with medium of 20%. This acceptable loss level has crept upwards over time.

Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies, Management, especially learning proper bee care in the first years of beekeeping, remains a factor in losses. What effects our changing environment such as global warming, contrails, electromagnetic forces, including human disruption of it, human alteration to the bee's natural environment and other factors, play in colony losses are not at all clear.

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, but by no means the only reason, colonies are not as healthy as they should be.

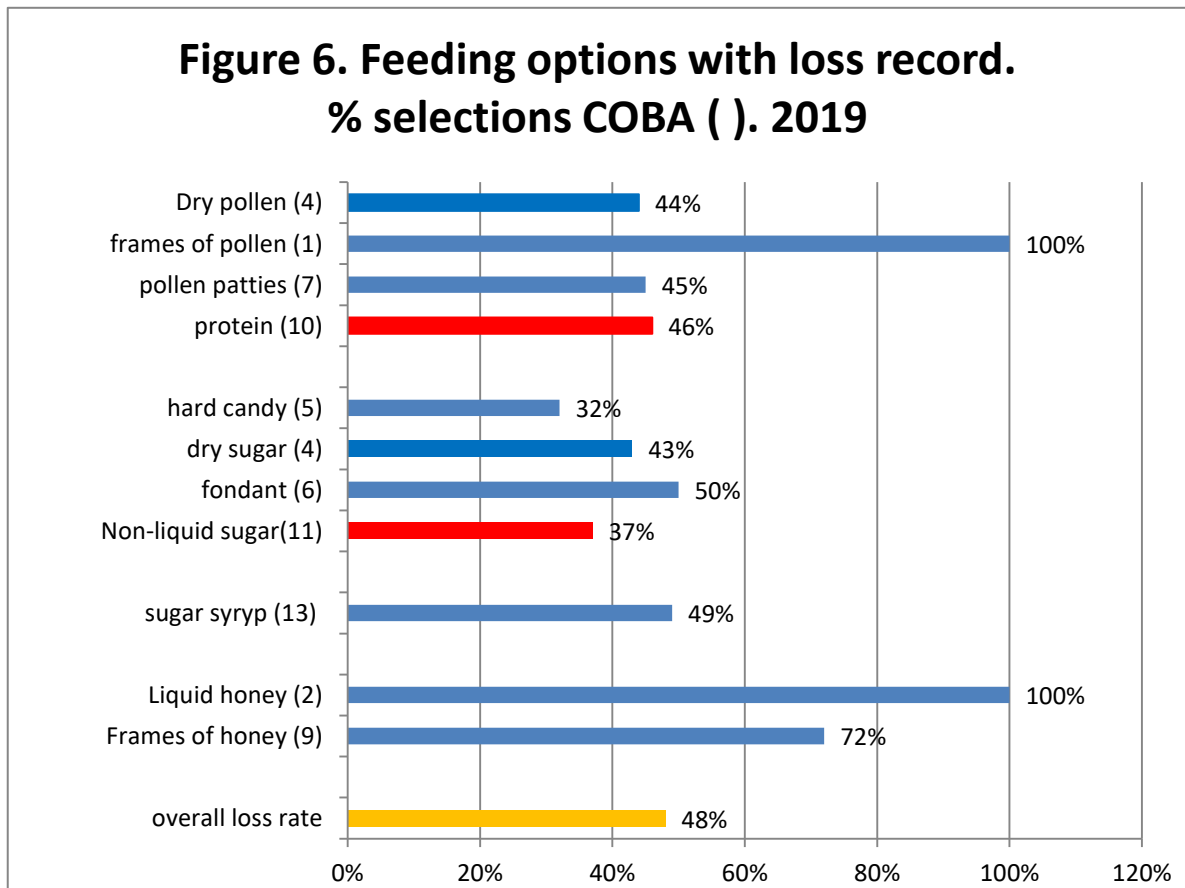
Management selections and losses

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: Central Oregon beekeeper survey respondents checked 51 feeding options = 2.8/individual and every respondent had at least one option indicated. One individual (5%) selected a single choice and had no loss, 8 individuals had 2 choices (49% loss), 4 had 3 selections (67% loss) and 3 had 4, 2 had 5 (losses of 41%). Clearly doing more helped improve survival.

Percent colony losses are presented in Figure 6 for feeding options with numbers of COBA member numbers in (). Thirteen individuals (72% of respondents) said they used sugar syrup. They had a 49% loss rate, similar to the overall COBA average of 48% which was also the case for statewide beekeepers.



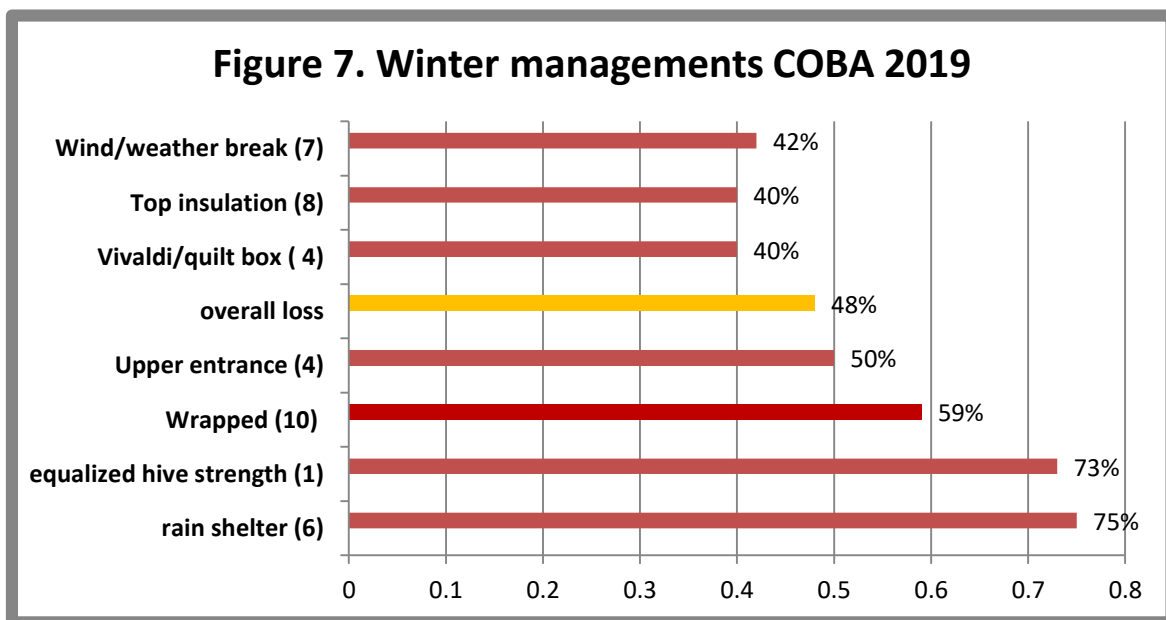
The 10 COBA individuals (56% of respondents) that fed protein had a slightly lower loss, 46%, compared to overall loss of 48%. Those using non-liquid sugars (11 COBA individuals) had a lower loss level (37%) compared to overall COBA average which was also the case with statewide beekeepers. Those 5 individuals 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 6 fondant Central Oregon users.

Statewide, Individuals that fed non-liquid sugar collectively had a 5 percentage point lower loss level compared to overall statewide while for COBA it was an 11 percentage point better rate. Feeding of protein improved survival marginally both statewide and for Central Oregon beekeepers. Feeding honey did not improve survival for either COBA or statewide beekeepers.

WINTERING PRACTICES: All COBA individuals reported doing some winterizing; 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 18 COBA members averaged 2.2/individual. Five individuals chose a single management and had a 67% loss level, 7 individuals checking 2 had a 42% loss level. Doing more did not improve survival the 3 individuals who did 3 and the 3 indicating 4 selections had a 58% loss.

The most common wintering management selected was wrapping colony 10 individuals (56%). Loss level was actually higher than overall loss level. Figure 7 shows number of individual choices for COBA members in () and percent loss of each selection.

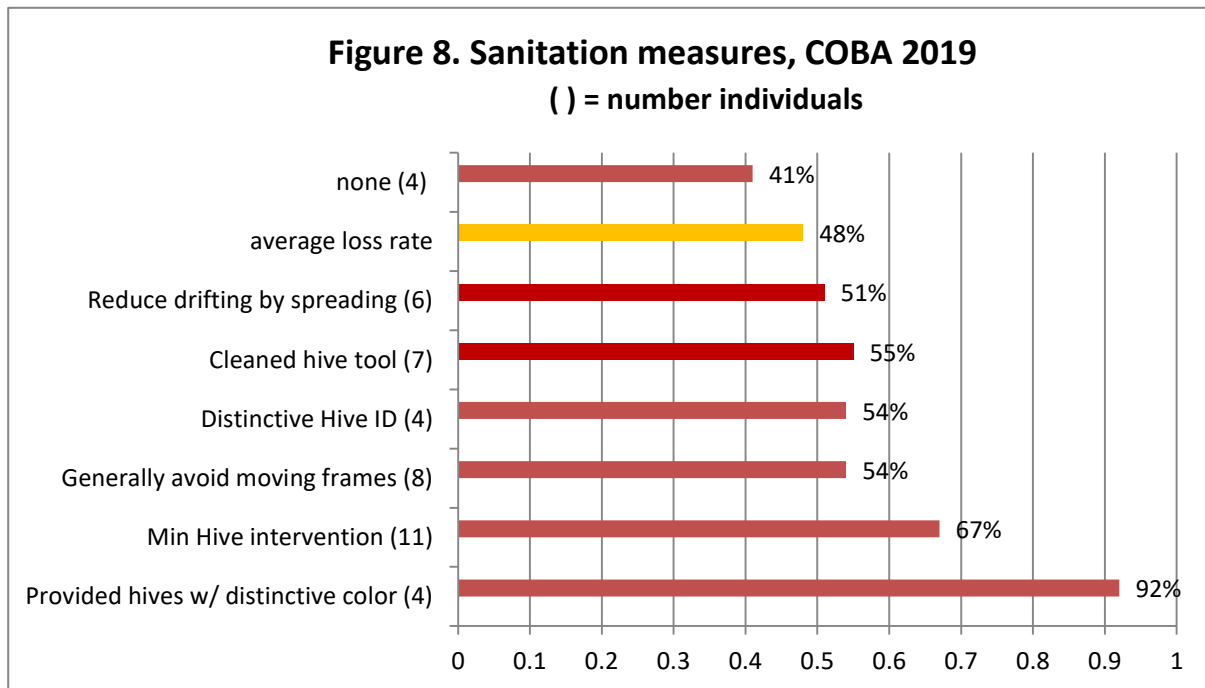
Over the past three years no single winterizing management improved survival each survey year. However 5 managements improved survival in 2 of the 3 years. Those managements were



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. Wrapping or equalizing (only single individual) did not improve Central Oregon beekeeper overwintering. The selections of wind/weather break, top insulation and Vivaldi board use did seem to improve survival.

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, 41 were COBA member responses. Sixty eight individuals statewide (16%) and 4 among COBA (22%) said they did not practice any of the offered alternatives. Loss rate statewide (52%) was 4 percentage points higher than the overall loss rate of 48%; for the four Central Oregon respondents, loss rate was 7 percentage points lower and was in fact the only alternative that showed improved survival. Three members had 1 selection (loss rate 60%), 5 made 2 choices (33% loss), 2 selected 3 managements (67% loss) and 2 had 4 (100% loss) One each had 5 and 6 choices (loss rate 60%). COBA members had 2.9 selections/individual.

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 COBA respondents, these did not improve survival. See Figure 8. Number in () is number statewide/number COBA individuals.

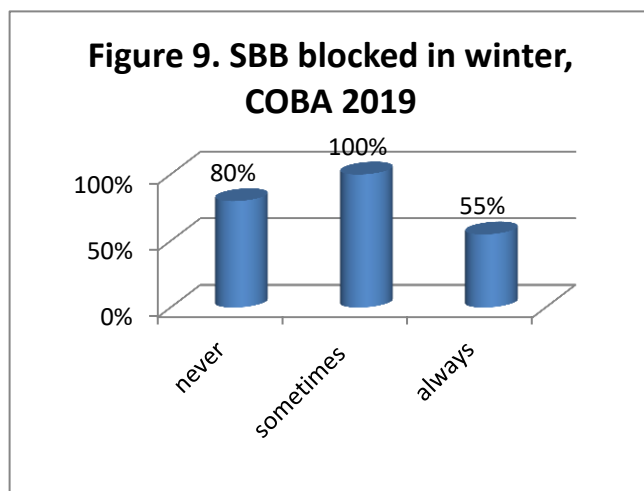


SCREEN BOTTOM BOARDS: Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In the recent survey 63 individuals (20%) statewide among them 4 COBA members (24%) said they did not use

screen bottom boards. Loss level statewide was 48% for the small number of non-users and 49% for those who used SBB (one percentage point difference is not significant); the loss rate for those COBA members, who used SBB on some or all of their colonies, was 60% while 4 individuals not using SBB had 31% loss. Results were opposite statewide.

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 said they always blocked SBB during winter; statewide loss rate was 37%; one hundred fourteen individuals statewide (44%) did not block them during winter (never response), of which 2 individuals were COBA members. Statewide never responders had a 42% loss rate; i.e. statewide there was a 5 percentage points higher survivorship for those who blocked. For COBA 12 individuals blocked with 55% loss and 2 never blocked had 80% loss a difference of 25



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 9 for Central Oregon.

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

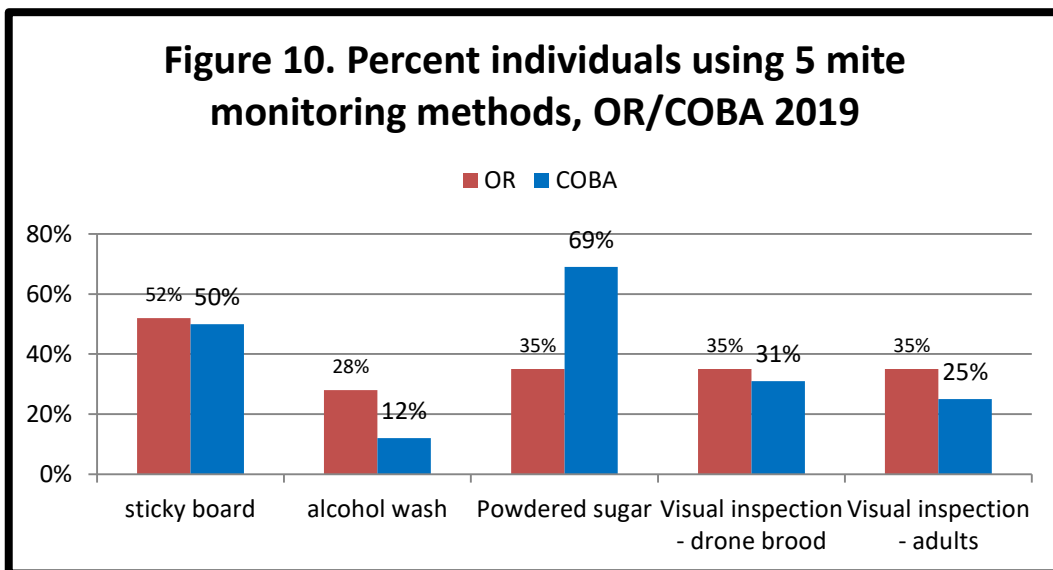
We asked percentage of Oregon hives monitored for mites during the 2018 year and/or overwinter 2018-19, whether sampling was pre- or post-treatment or both and, of the 5 possible mite sampling methods, what method was used and when it was employed. Statewide 277 individual respondents (67%) said they 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.

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.

| | ALL Colonies Monitored % individuals | % loss | SOME Colonies Monitored % individuals | % loss | No colonies Monitored % individuals | % loss |
|-----------------|---|---------------|--|---------------|--|---------------|
| 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% |

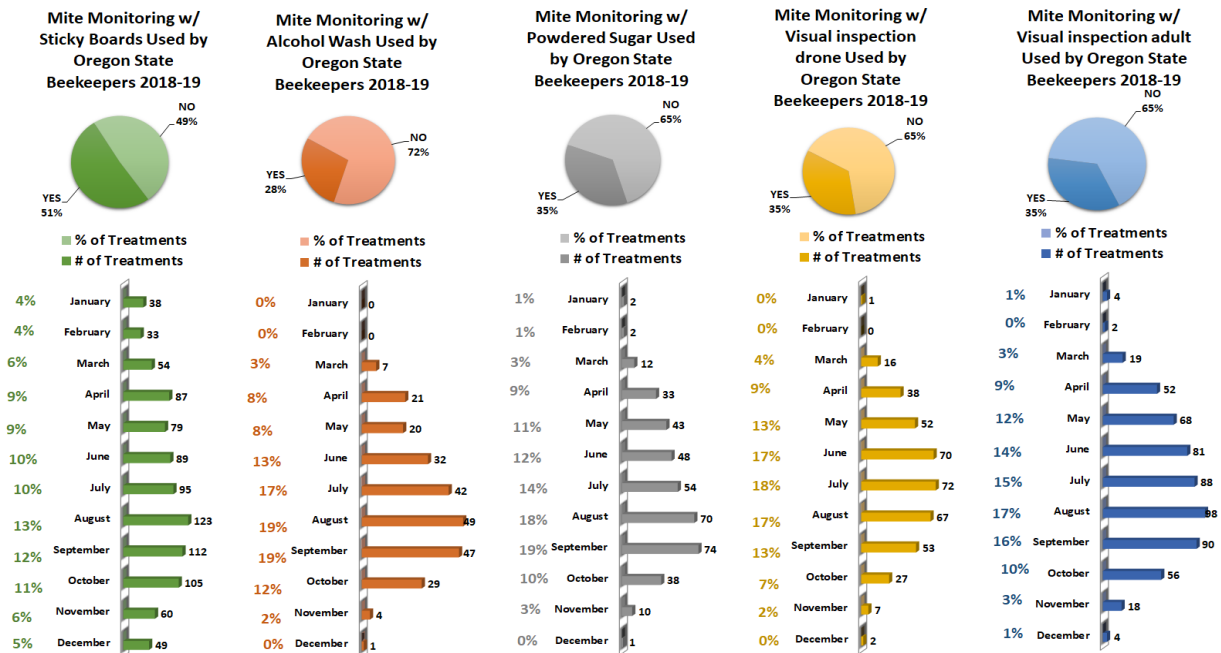
Among COBA respondents, 13 individuals (72%) monitored all colonies; they had 51% loss). Two individuals (11%) did no monitoring and they had a 25% loss, exactly opposite results from statewide. In order of popularity of use, Sticky boards were used by 52% of total respondents statewide, 35% of individuals used powdered sugar monitoring and visual inspection of drones and adults. Alcohol wash was used by 28% of the statewide respondents. Among OBA respondents less use of alcohol and higher use of powdered sugar is evident.

Alcohol wash and powdered sugar are the 2 most reliable means of monitoring mite load in colonies while visual looking on adults for mites or from drone brood are not reliable methods of determining how many mites are in a colony.



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 11 below for number of months each of the 5 sampling methods were used.

Figure 11



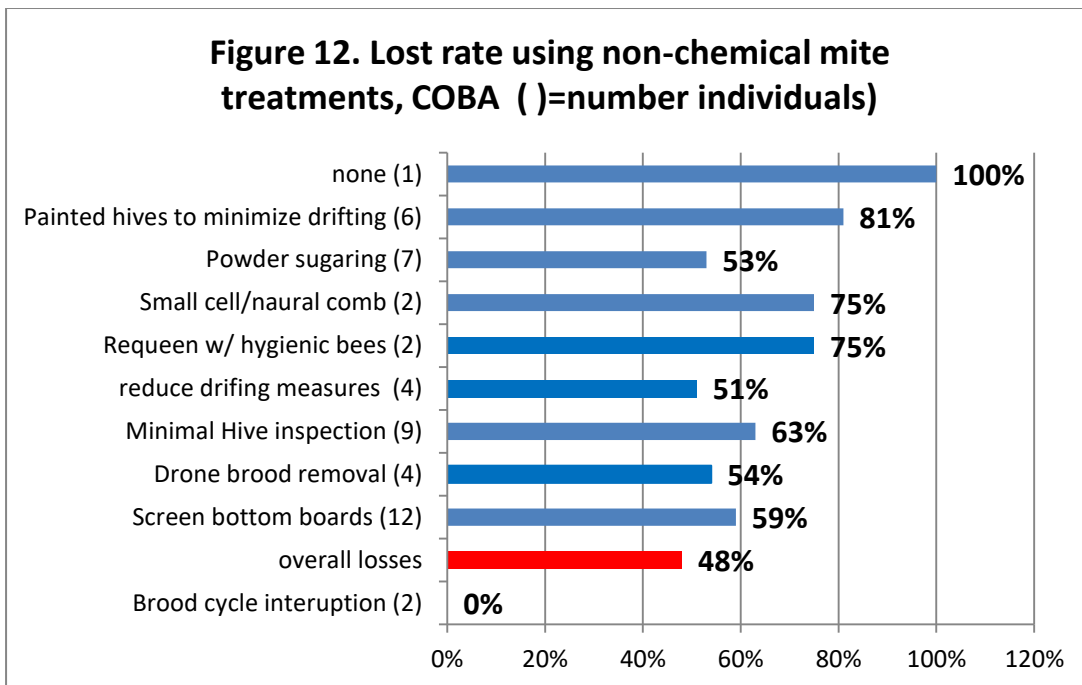
It is important to **KNOW** mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm 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 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 COBA the one individual not using a non-chemical treatment had total loss), while those who did not use a chemical control statewide lost 69% of their colonies; for COBA, 4 individuals (22%) 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 COBA respondents 3 used one (had 34% loss), 5 used 2 (56% loss), 7 used 3 selections, while 2 each used 6 and 8 5 choices; those using 3 had 71% loss and individuals with 6 and 8 had 60% loss. More is not better.

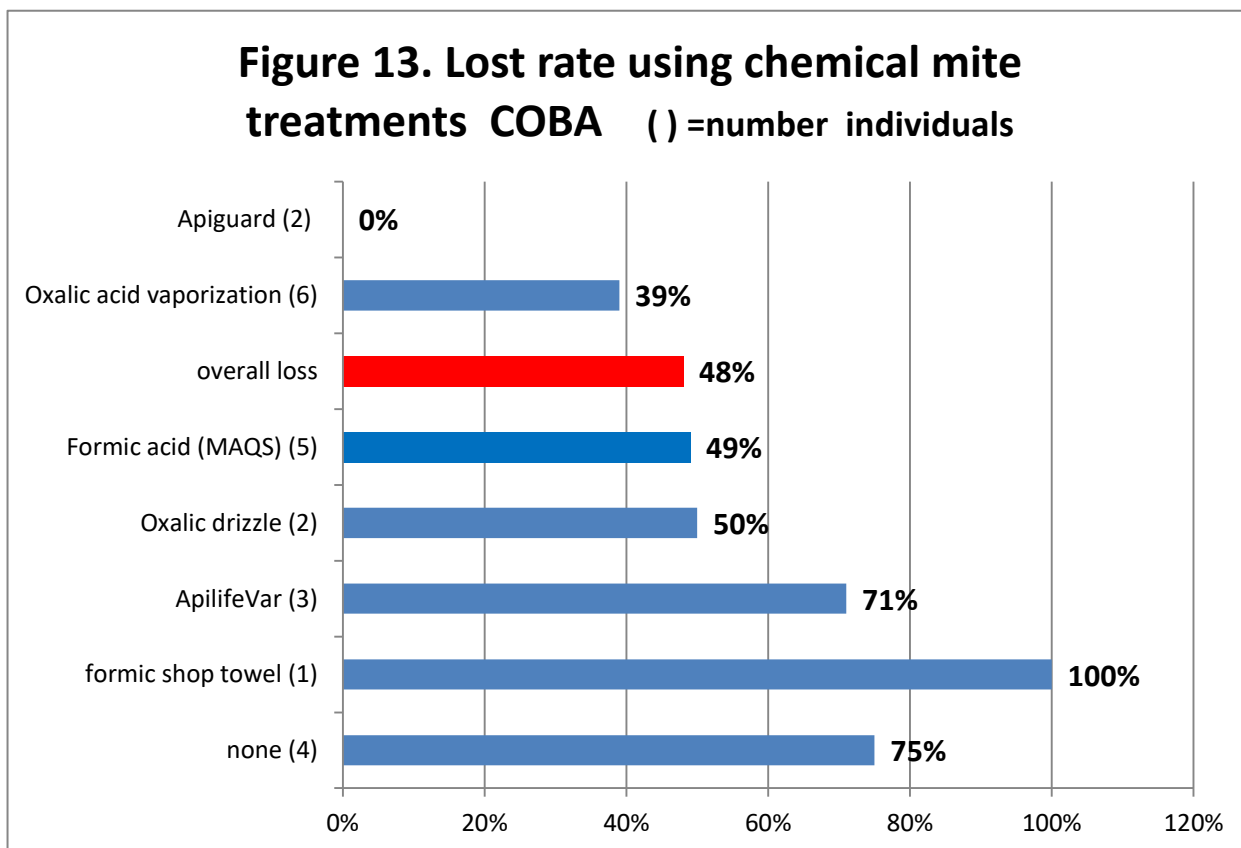


Use of minimal hive inspection and screened bottom board (9 and 12 individuals respectively among COBA respondents) were most common. As reported above SBB show a slight advantage but not shown here for COBA while minimal hive inspection does not. The 2 individuals using brood cycle interruption had no loss, the only treatment that showed improved survival for COBA of 8 alternatives. Three of the non-chemical alternatives have demonstrated reduced losses over past 4 year statewide. Reducing drifting measures such as spreading colonies and different colony colors in apiary has demonstrated a 13% better survival, Brood cycle interruption an 11% better survival; statewide drone brood removal results show 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 statewide respondents) used NO chemical treatment Statewide and for COBA members 4 individuals (22%) used no chemical treatments. Those using chemicals used at rate of 1.4/individual (slightly lower use than statewide 1.6/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 Central Oregon respondents 6 individuals (33%) used one chemical (they had a 41% loss), 7 used 2 (51% loss) and 1 used 3 (0% loss).

One hundred fifty OR Beekeepers (23% of total chemical uses) indicated they most commonly utilized MAQS, formic acid; among COBA respondents 5 individuals used Mags while one used Formic in a shop towel application. The MAQS users had a 49% loss (average for COBA) while the one using the shop towels had 100% loss. Six individuals used oxalic acid vaporization (2 reported using the drizzle method of application); the vaporization method users had 39% loss level and the drizzle users had 50% loss. Figure 13 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 realize better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level. ApiifeVar did not perform for the 3 COBA users this past season. Statewide Apiguard has a 31% better survival and ApiLifeVar has a 30% better survival record over past 4 years statewide.



Apivar, the synthetic (amitraz), has demonstrated a 29% better survival over past 4 years (2016-19); No COBA 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) and was helpful for COBA users. 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, but no COBA members indicated its use. The single shop towel with formic user lost all their colonies.

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 below for statewide users. The acids and oils are used spring and post harvest whereas most Apivar use is following removal of supers.

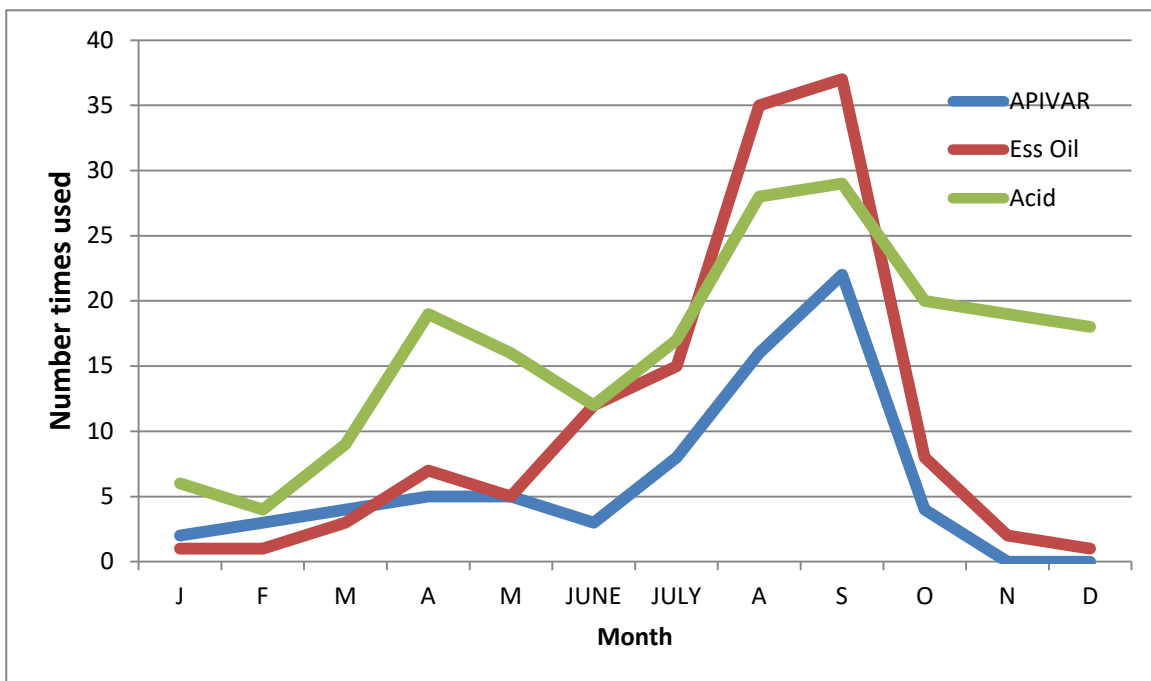


Figure 14

Queens

We hear lots of issues related to queen “problems”. Statewide 129 individuals subdivided queen related issues from 10 to 100% of their hives. A larger number 183 (44%) said they had no queen problems; an additional 103 individuals (24.5%) said they didn’t know. The number and percent

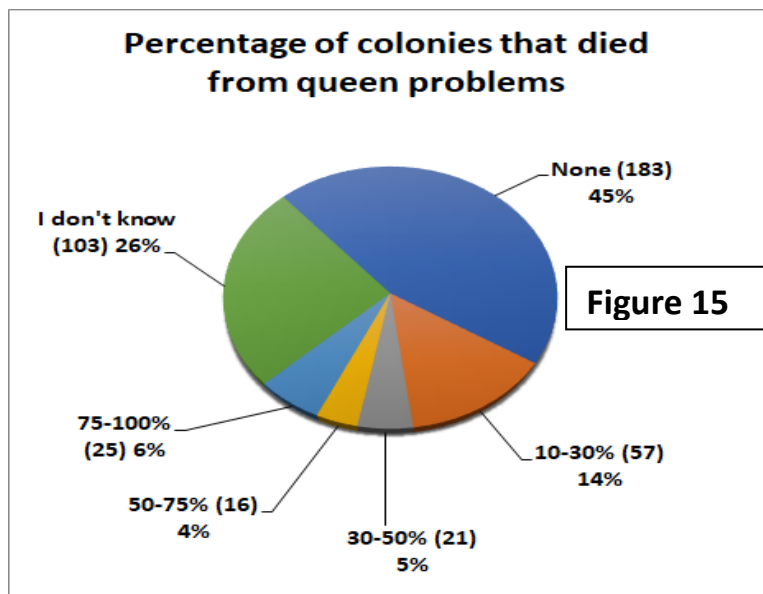
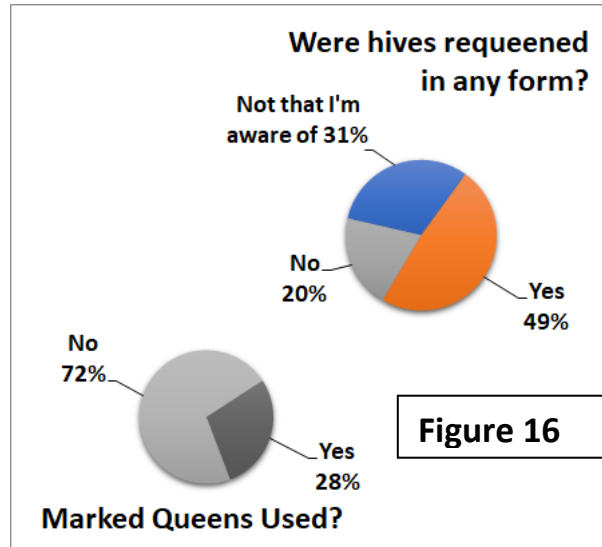


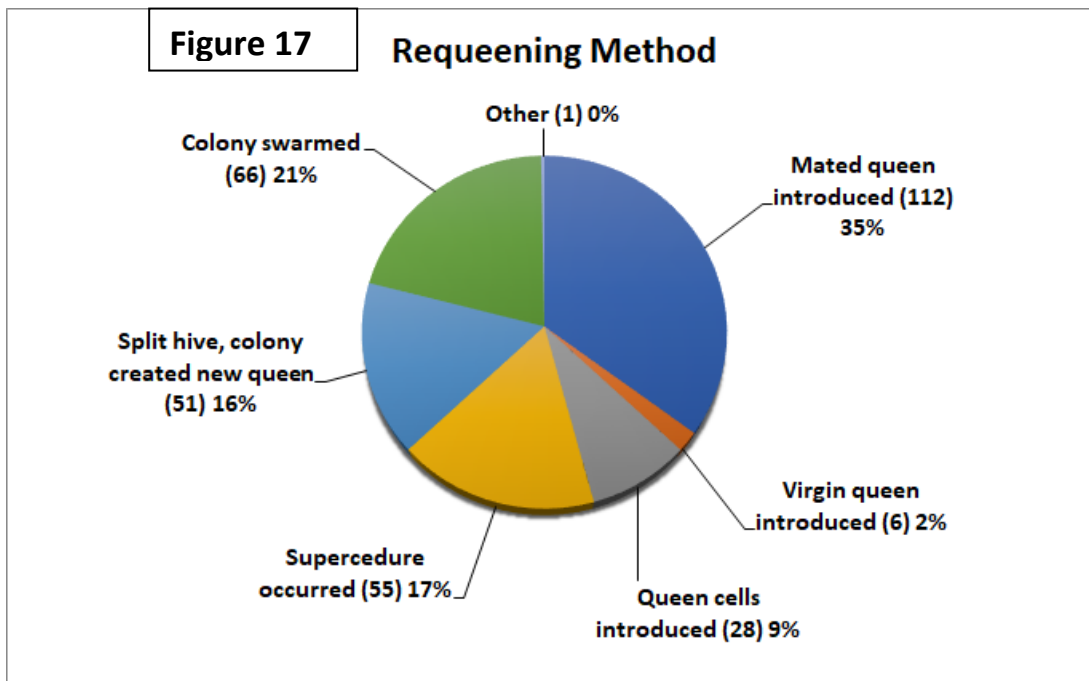
Figure 15

expressed from statewide survey is shown in pie chart Figure 15. For Central Oregon (44%) said no, 28% said yes and an equal number said they didn't know. Those indicting no had a 47% loss while those saying yes had almost an equal loss 44%; the don't know individuals had the heaviest loss rate – 71%.

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 considerably more 56% saying yes in COBA. 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 16. For COBA equal numbers 39% said YES and no with 4 saying 'not that I am aware of'. Figure 16 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 17. 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 COBA respondents 43% said they requeened with mated queen (3 individuals), virgin queen (1 individual) or with queen cell (2 individuals); 57% indicated the bees requeened themselves, via supersedure or swarming (3 individuals each) and 2 via splits. 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 BeelInformed website www.beeinformed.org and individuals are encouraged to examine that data base as well. Recall that the BeelInformed 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 with "REMINDER" in the subject line. We have a blog on the 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