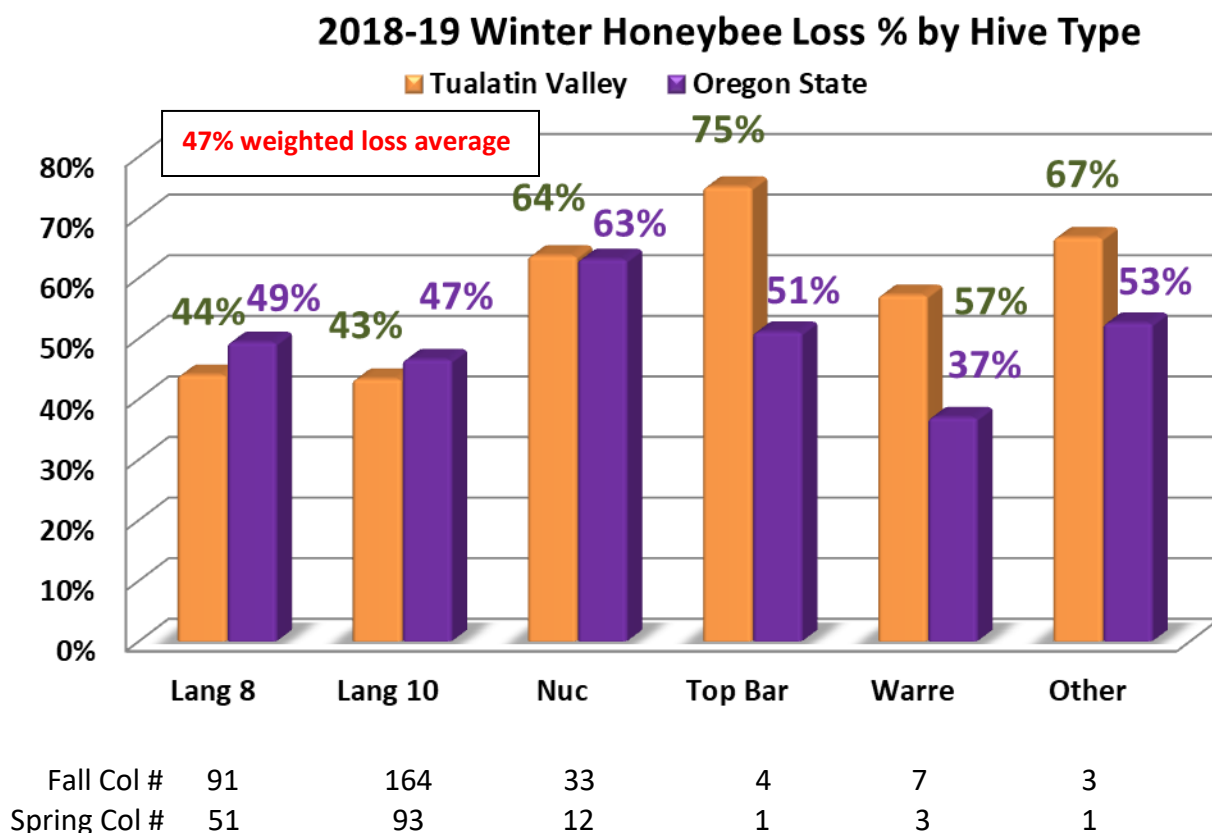


2019 Tualatin Valley (TVBA) Winter Loss by Dewey M. Caron

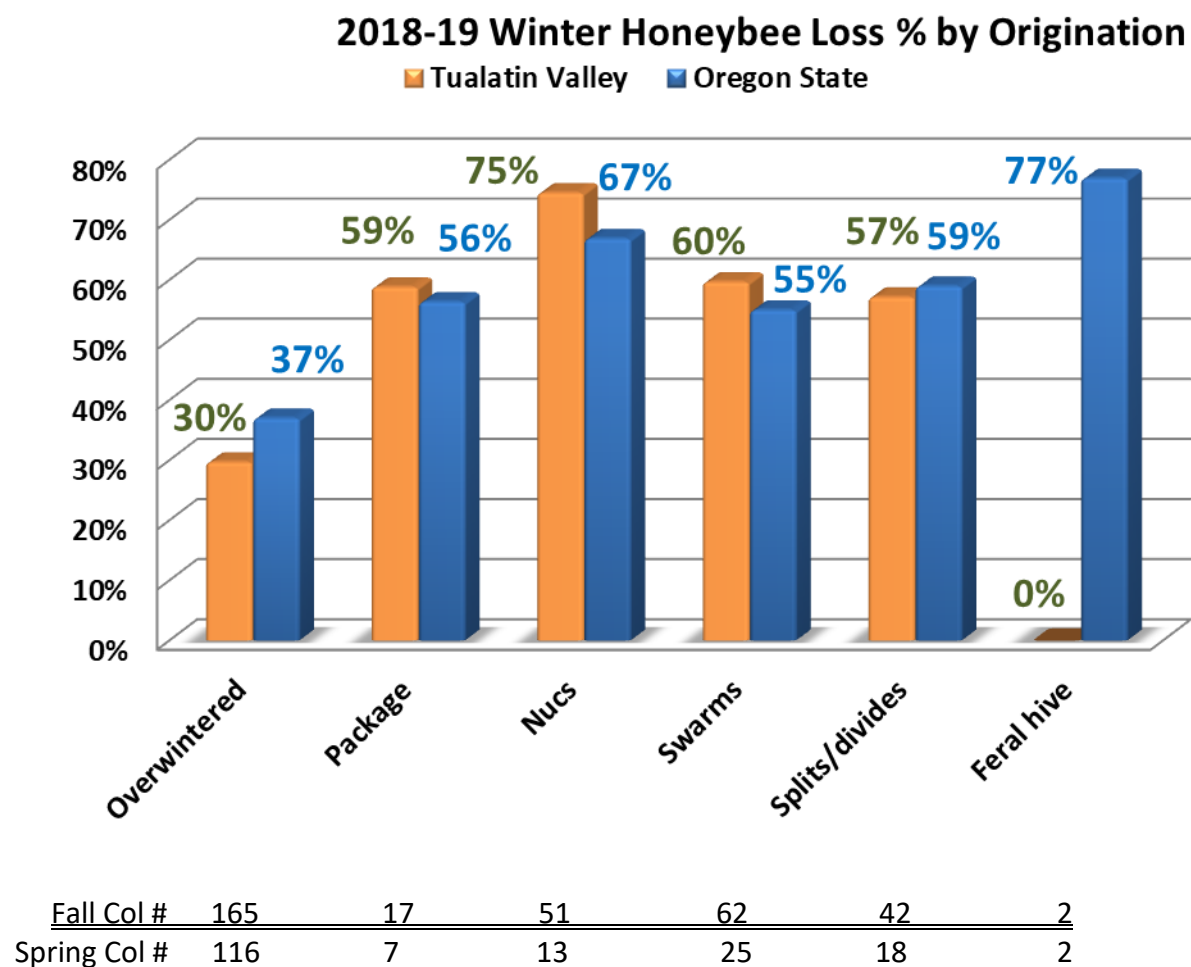
At the March TVBA meetings I encouraged TVBA members to participate in the 2018-2019 PNW overwintering loss survey. Members were directed to the online survey at www.pnwhoneybeesurvey.com, a continuing effort to define overwintering success of beekeepers in the Pacific Northwest. A statewide Oregon (and Washington) report, along with individual club reports, are posted on the PNW website www.pnwhoneybbesurvey.com. The report this year will be in 2 parts. This Part 1 is reporting survey results related to losses.

I received 416 survey responses from Oregon backyarders, and an additional 98 from Washington beekeepers. Tualatin Valley members sent in 57 surveys, 8 more than last year, providing information on 302 fall colonies. **Total overwintering losses of TVBA respondents was 161 colonies = 47% weighted loss rate.** This loss level is one percentage point lower than the statewide OR beekeeper loss rate.

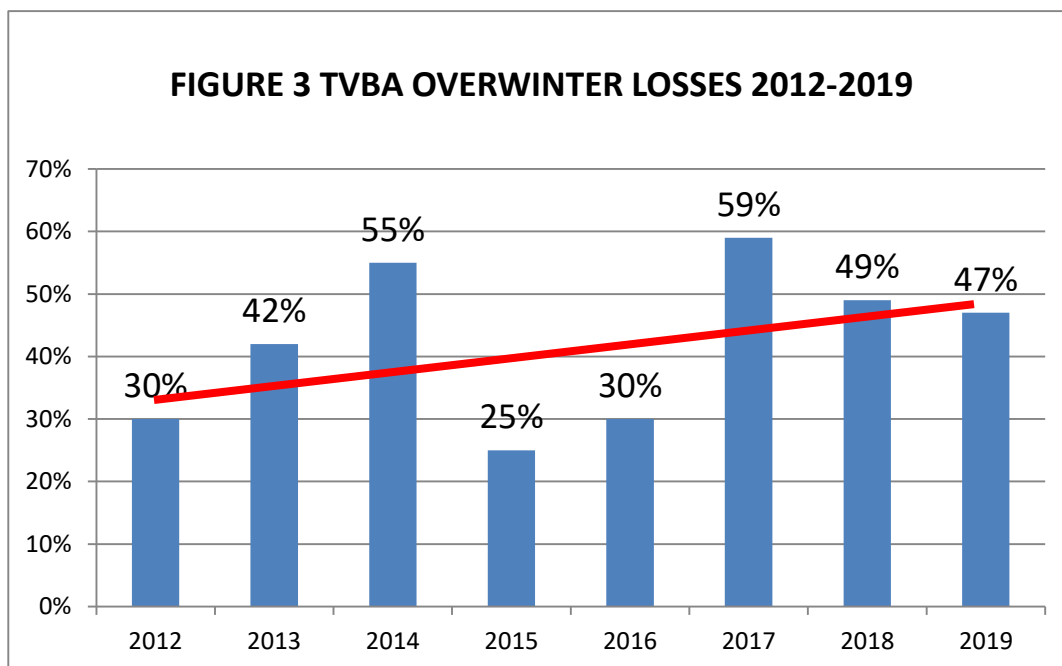
Loss rate was determined by hive type. TVBA members started winter with 164 Langstroth 10-frame hives (54% of total), 91 Langstroth 8-frame hives, 33 5-frame nucs, 4 Top bar colonies, 7 Warré hives and 3 other identified as mating nucs. The 11 Top Bar and Warré non-removable frame hives constituted 3.5% of total hives. Figure 1 shows percent TVBA loss for each hive type compared with statewide Oregon beekeeper data. Both 8 and 10 frame hives had slightly better survivorship compared to statewide.



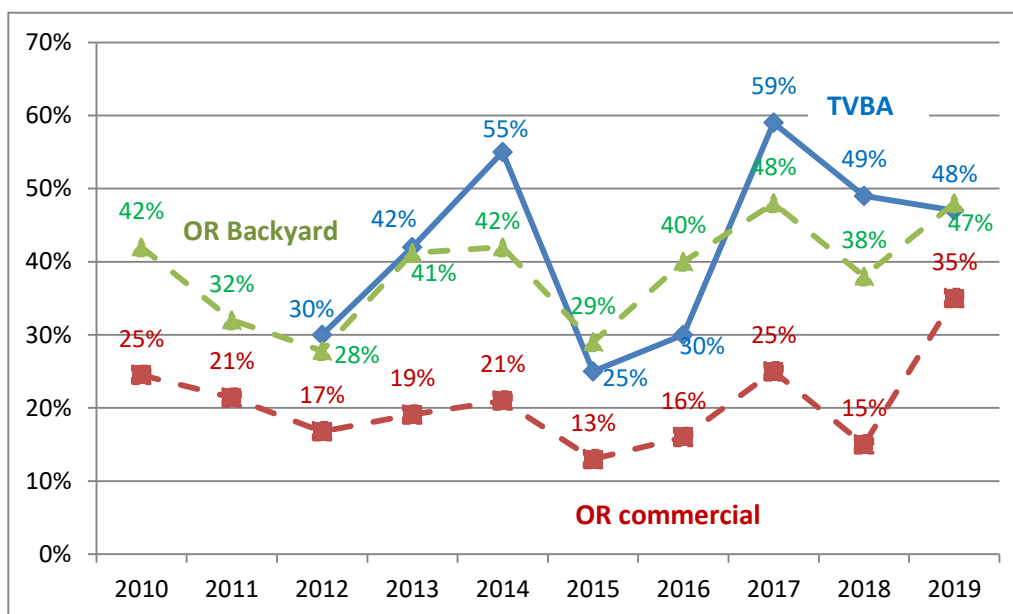
Losses by hive origination were also tallied. The data for TVBA and state wide are shown in Figure 2. Overwintered hives of TVBA members had better survival than statewide.



Losses this past winter were 10 percentage points lower than the terribly elevated loses of the 2017 winter but 9 percentage points above the 40% TVBA loss average of the previous 6 seasons. Trend line (in red) however is, certainly not heading in the right direction the past 8 years of tallies of TVBA survey returns. Figure 3.

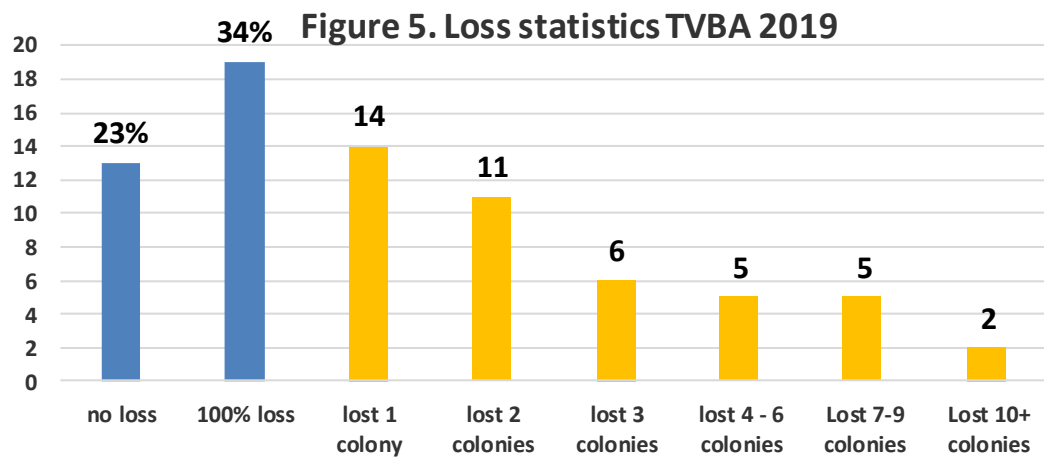


Comparison of losses of TVBA and Backyard shows similar fluctuations. Commercial beekeepers in Oregon have the same general pattern but at lower loss level.



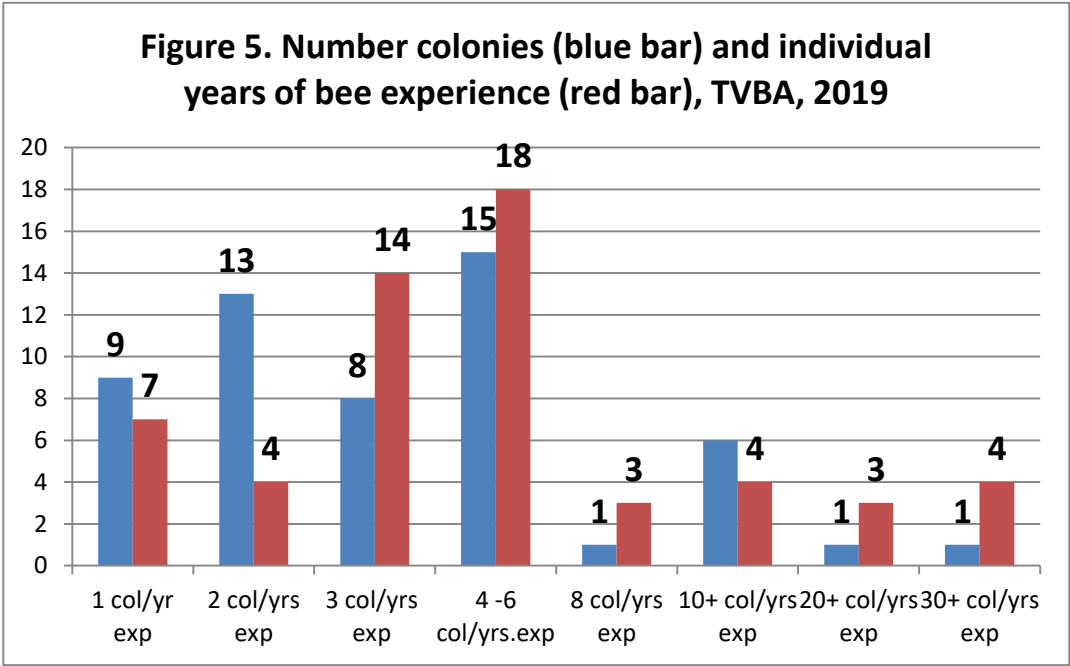
Not everyone had loss. Thirteen individuals (23%) reported total winter survival. Unfortunately 19 individuals (34%) lost 100% of their colonies. Fourteen individuals lost 1 colony, 11 individuals loss 2. Heaviest losses were 11 and 12 colonies. See figure 5. Of 7 TVBA individuals with 10

or more colonies, the loss rate was almost 10 points higher = 56.5% but statewide individuals with 10+ colonies had a 6 percentage point lower loss average than those with 1 to 9 colonies (see Figure 5 of OR state report).



Nine individuals had 2 apiaries and 2 had 4. Loss Survival at 2nd and 3rd apiary sites (46.5%) was same as at the home apiary for these 9 individuals. Four TVBA individuals moved bees during the year, two for pollination (6 hives total), one a short distance within the same area and the 4th to establish a new apiary site.

Typical of the statewide data, the TVBA respondents are largely new beekeepers. 53.5% of TVBA respondents had 1, 2 or 3 colonies (2 colonies, 13 individuals, was most common) while 14% had 11 or more. 38 was the highest number. Individuals with 1, 2 or 3 colonies lost 59% of their colonies (single colony beekeepers lost 67%) while those with 10 or more colonies lost 41% of their colonies,



In years of experience, 44% had 1, 2 or 3 years of experience (3 years of experience, 14 individuals, was most common) while 14% had 20+ years of experience. In terms of losses those respondents with 1, 2 or 3 years of experience lost 58% (single year experience beekeepers lost 47%) while those with 10+ years experience lost 37% of their colonies. See Figure 6 for graph of number of colonies and years experience.

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 94 total listing for TVBA, 2.3/individual, same as statewide. Sixteen TVBA individuals listed varroa (36.51% of respondent choices), followed by queen failure (34%) and weak in fall (23% each); 15 individuals chose Don't know 34%. Choices were very similar to last year with Varroa higher by 12 percentage points; unlike last year, pesticides were not listed by any TVBA member as reason for loss. Table compares TVBA with % statewide.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	CCD	Yellow jackets	Other
TVBA (#)	16	8	10	10	9	2	5	2
(%)	(36.5%)	(18%)	(23%)	(23%)	(20.5%)	(4.5%)	(12%)	(4.5%)
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%. TVBA responses of 15% or less =46%, (none, 10 individuals was most common), 9 individuals (17%) chose 20%, 15 individual respondents (28%) selected 25% with 2 individuals answering 50% and 1 said 100%.

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 as report on the www.pnwhoneybeesurvey.com website.

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. TVBA individual choices varied from zero to 100%, with medium of 20%. This acceptable loss level has crept upwards over time.

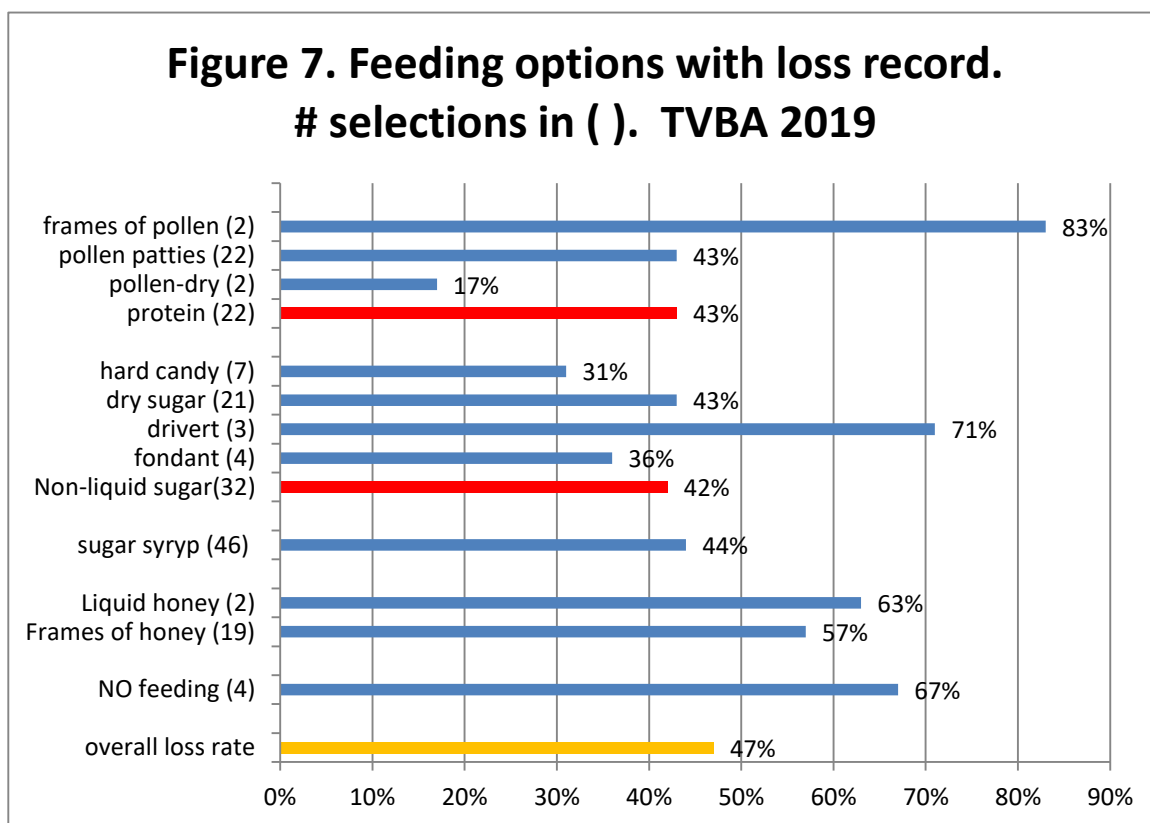
Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies, 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

The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring and both mite control techniques (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls used. Individuals could check none or more than one response; many TVBA and OR beekeepers often do not do just one thing/management to their colony (ies) to control mites toward improving 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: TVBA survey respondents checked 136 feeding options = 2.4/individual (statewide it was 2.8/individual). Fifteen individuals selected a single choice (they had a 58% loss), 21 chose 2, (greatest number and medium) 8 chose 3 and 7 chose 4. The three individuals selecting 5 plus one individual indicting 6 selections had a 43% loss level.



Percent colony losses are presented for feeding options with numbers of TVBA members indicating doing the management in (). Bar lengths of left of 47% indicate better than average survival while those to right had heavier than average losses. Individuals feeding Pollen patties, (2 each also fed pollen in frame and dry pollen) had better survival than overall for TVBA respondents. Likewise individuals feeding non-liquid sugar had improved survival versus overall for TVBA members with fondant and hard candy feeders showing the best survival.

Forty six TVBA individuals (85% of individuals who did some feeding) said they used sugar syrup. They had a 44% loss rate, slightly lower than the overall loss level of 47%; individuals feeding frames or liquid honey had losses above the overall average.

For the last 3 years of heavier losses (48% in 2017 and 2019 and 38% in 2018 spring) individuals statewide and in TVBA doing no feeding had poorer survival all 3 years. Individuals that fed sugar syrup had a 10% lower loss level (average for the 3 years). Individuals feeding non-liquid sugar (in any of the forms) had lower losses all three past winter seasons, with 5 or 6 percentage point improvement from overall losses. Dry sugar and hard candy feeders had improved survival all 3 winters while fondant feeders had better survival 2 of the 3 winters.

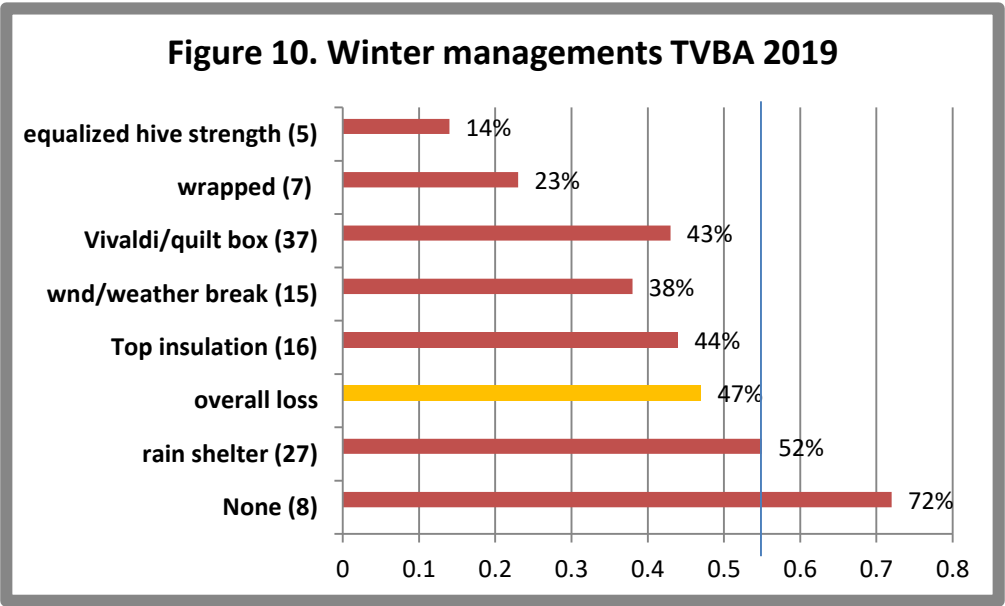
For individuals feeding protein, only the pollen patty users showed marginally better survival all 3 years; dry pollen feeders had better survival in one of the three years with losses the remaining two close to the overall average; the 2 TVBA members feeding dry pollen had only a 17% loss this year.

WINTERING PRACTICES: Eight TVBA individuals (14%) reported doing no winterizing; they had loss level of 72%; statewide these 8 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 state loss of 48%. Multiple selections were possible and in fact the 49 TVBA members averaged 2.3/individual. Twelve individuals chose a single management and had a 55% loss level while the eleven individuals checking 4 (9 individuals) or 5 or 6 (1 each) of the options had a 40% loss level. Twelve individuals chose 2 selections and 13 selected 3 options

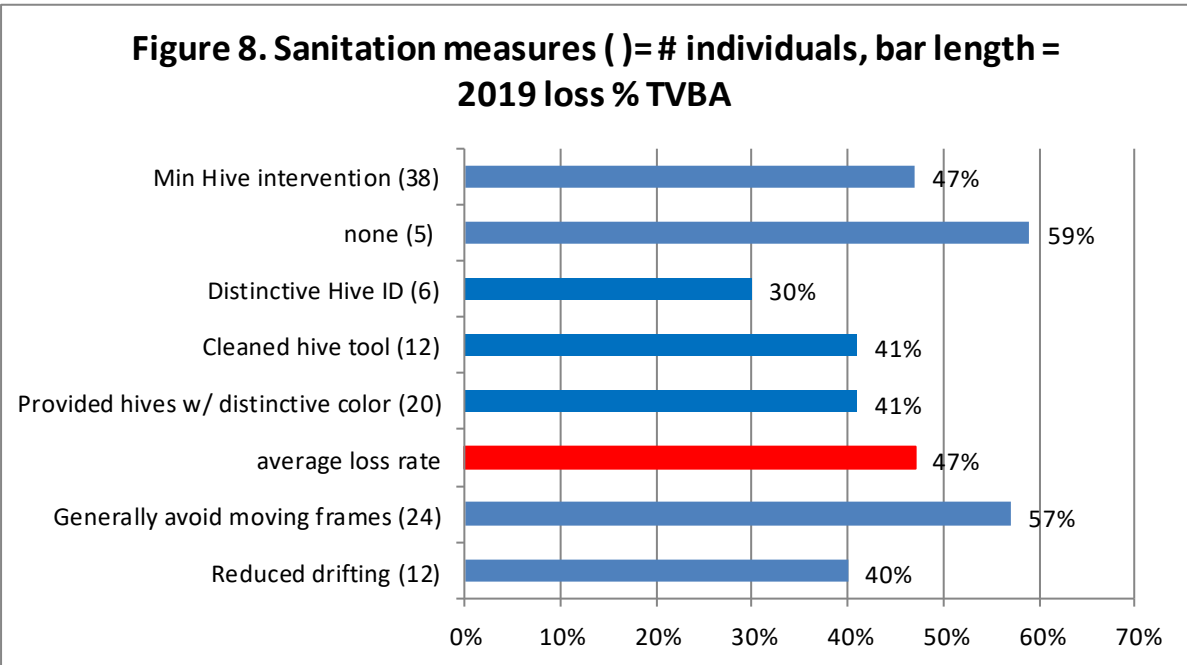
The two most common wintering managements selected were use of a quilt box (Vivaldi board) at colony top (242 individuals statewide (58%) and 37 TVBA (75%) and use of a rain shelter (159 individuals statewide (38%), 27 TVBA (55%) respondents. Figure 8 shows number of individual choices for TVBA members in () and percent loss of each selection. Use of rain shelter loss was only higher than overall TVBA loss but Vivaldi board difference was 4 percentage points less. The seven TVBA individuals who wrapped their hives had the best survival (23% loss); those using wind/weather protection (38% loss) and top insulation (44% loss) also had slightly better survival. Most Vivaldi boards have a built in top entrance.

Over the past three years no single winterizing management statewide improved survival each survey year. However 6 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, Wind/weather protection and other (the other items are a large mixture from reduced bottom entrance, reducing number of boxes and some means of reducing moisture). In all 3 years those statewide, including TVBA, doing no winterizing had heavier losses than overall.



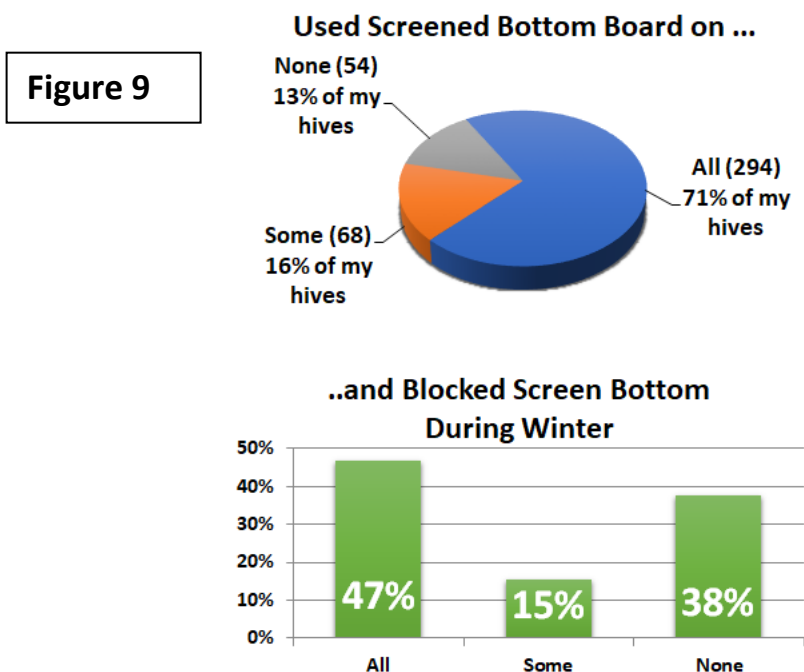
SANITATION PRACTICES: It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. TVBA beekeepers had 121 responses 2.3/individual. Sixteen percent statewide and 5 TVBA individuals (20%) said they did not practice any of the 6 offered alternatives. Loss rate statewide was 52%, four percentage points higher than the overall loss rate of 48%; for TVBA the 5 individuals had a 59% loss rate, 2 percentage points greater than overall TVBA average loss of 47%. Thirteen TVBA members had 1 selection (loss rate 44%), 22 made 2 choices, 11 made 3 choices; four individuals selected 4 and 2 additional 5 selections, they had a 45% loss rate.

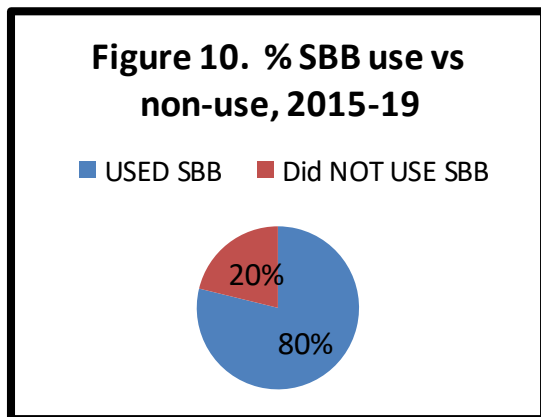


Minimal hive intervention (209 individuals, 38 of them TVBA beekeepers) was the most common option selected along with generally avoid moving frames (24 TVBA members). The two sanitation choices that did seem to improve survival statewide was reduce drifting by spreading colonies out and providing hives with distinctive ID /doing other hive ID measures; for TVBA members these two provided better survival but only 18 respondents made these managements. Cleaning hive tool (12 individuals also had better survival for TVBA members).

In past three years the only sanitation choice that displayed better survival in other than a single year of occurrence was to reduce drifting. Doing nothing had a high or the highest loss rate in all 3 years.

SCREEN BOTTOM BOARDS (SBB): 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 54 individuals (16%) statewide said they did not use screen bottom boards. Figure 9. This past overwintering season, the 54 non-SBB users had 233 fall colonies of which they lost 122 for 48% loss. Those beekeepers using SBB on all of their colonies had 49% loss. For TVBA, 67% used SBB on all colonies (47% loss) and 23% did not use them (53% loss).





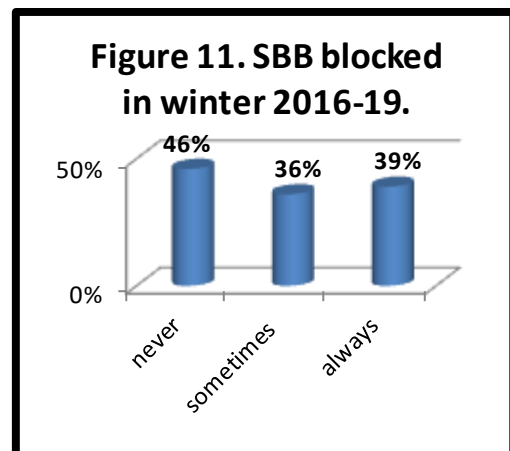
In 5 survey years 20% said they did not use SBB and 80% did use SBB on some or all of their colonies. See Figure 10 to left for statewide results.

Examining the four year average of SBB use, loss level of those using SBB on all or some of their colonies had a 42.8% loss level whereas for those not using SBB had loss rate of 44.2% (a 3% positive survival gain for those using SBB versus those not using them). They are very minor in improving overwinter survival.

We asked if the SBB was left open (always response) or blocked during winter (bottom Figure 9). This past season 47% of individuals said they always blocked SBB during winter. They had 884 colonies in the fall and lost 503 for a 43% loss rate. One hundred forty seven individuals (38%) never blocked them during winter (never response). They had 724 colonies in the fall and lost 303 colonies =58% loss rate, 16 percentage points higher than the average of three previous years. Sixty individuals (16%) blocked them on some of their colonies. Their loss rate was 52%.

Comparing the always and sometimes left open with the closed in winter response reveals a 9 percentage point difference in favor of closing the SBB over the winter period. See Figure 11.

There is no good science on whether open or closed bottoms make a difference overwinter but some beekeepers “feel” bees do better with it closed overwinter. Four years of comparison shows those closing the screen during winter did have a 9 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 and promote good hive ventilation.

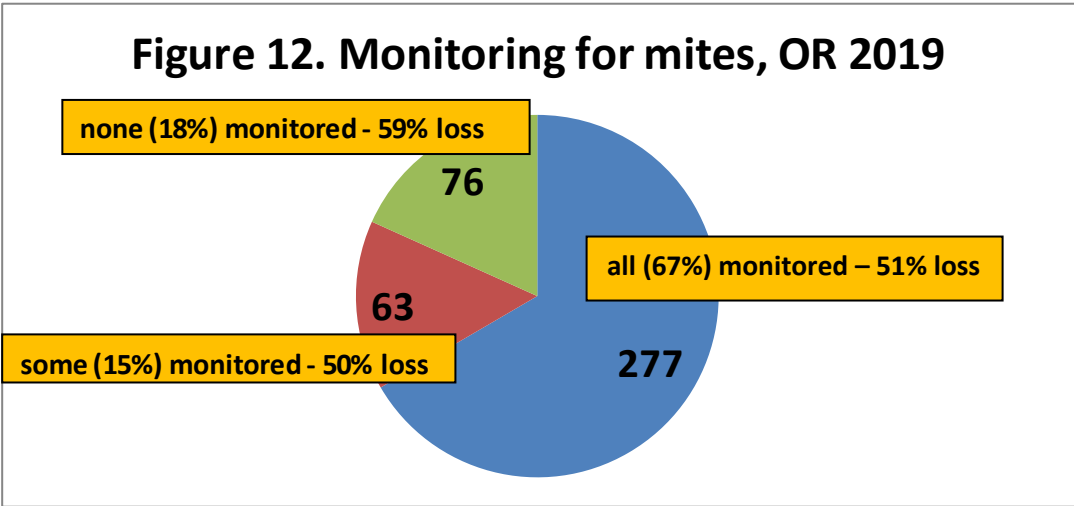


Mite monitoring/sampling and control management

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

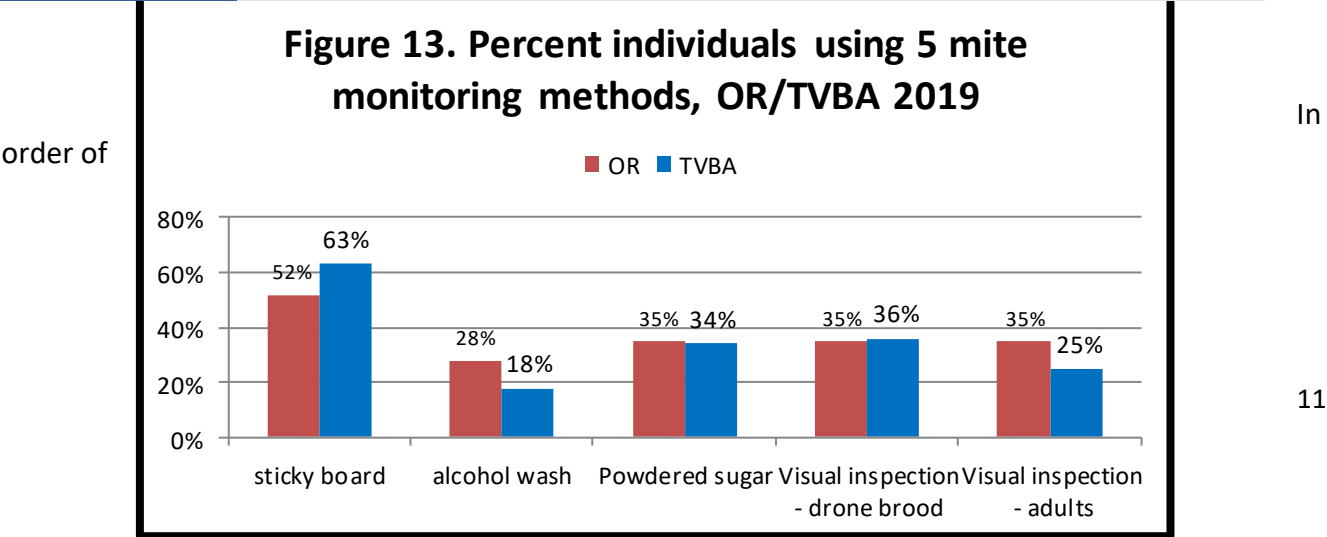
51%. Seventy six (18%) reported no monitoring; they had a higher loss rate of 59% loss. 63 individuals reported monitoring some of their colonies; they had a 50% loss. See Figure 12.

Among TVBA 34 individuals (50% monitored all colonies; they had 49% loss. Thirteen individuals (23%) did no monitoring and they had a 55% loss



It is obvious that 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%



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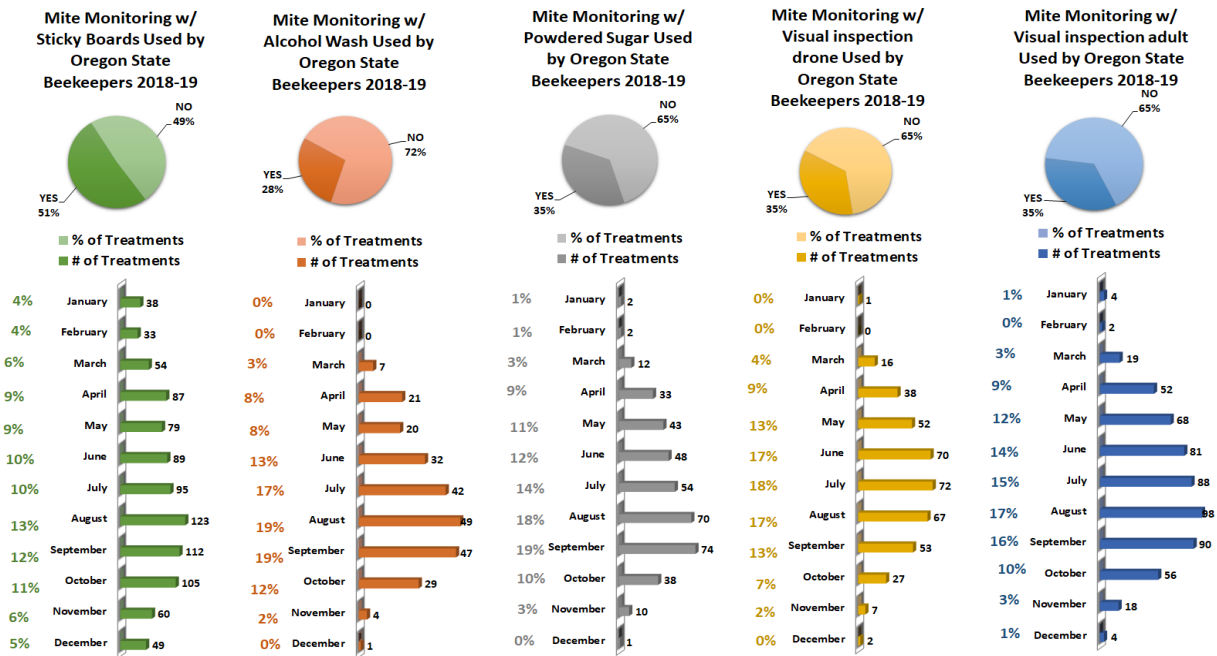
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popularity of use, Sticky boards were used by 52% of total respondents statewide 35% of individuals used powdered sugar monitoring and visual inspection of drones and adults.

Alcohol wash was used by 28% of the statewide respondents. TVBA members use sticky boards at higher level and alcohol wash less. 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 TVBA.

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

Figure 14



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.

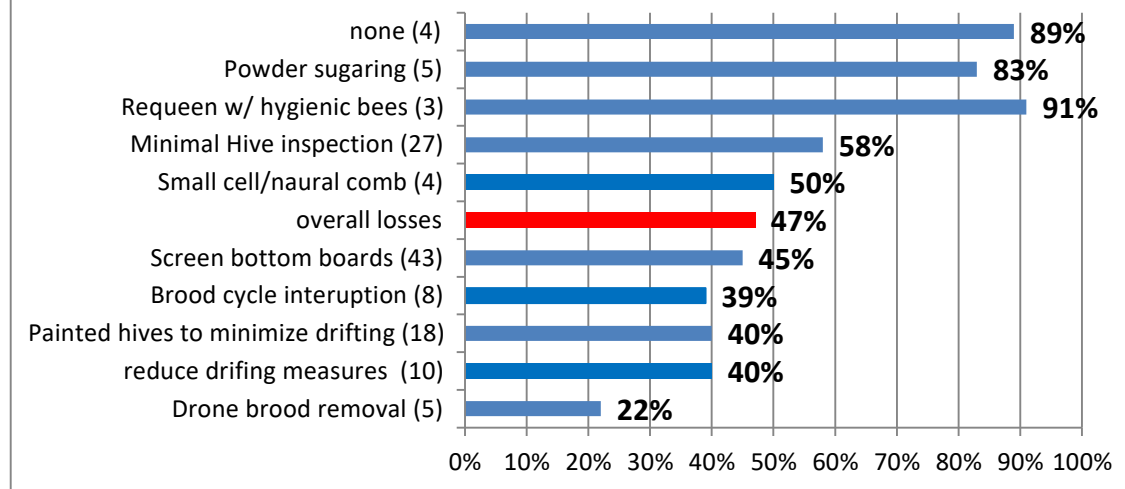
See ***Tools for Varroa Monitoring Guide*** www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of and to view videos demonstrating how best to do sugar shake or alcohol wash sampling. The Tools guide also includes suggested mite level to use to base control 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 but 5 percentage points fewer, 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 TVBA the 4 individuals (7%) not using a non-chemical treatment had 89% loss), while those who did not use a chemical control statewide lost 69% of their colonies; for TVBA, 16 individuals (28%) not using any chemical had a loss rate of 68%. 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 used one method, 118 used two, 95 used three, 54 used 4 or 5 and 9 individuals used 6. Among TVBA respondents 16 used one (had 49% loss), 20 used 2, 8 used 3 selections, while 5 used 4 and 2 each used 5 and choices; this last three lost 45% of colonies.

Figure 15. Lost rate using non-chemical mite treatments ()=number individuals) TVBA



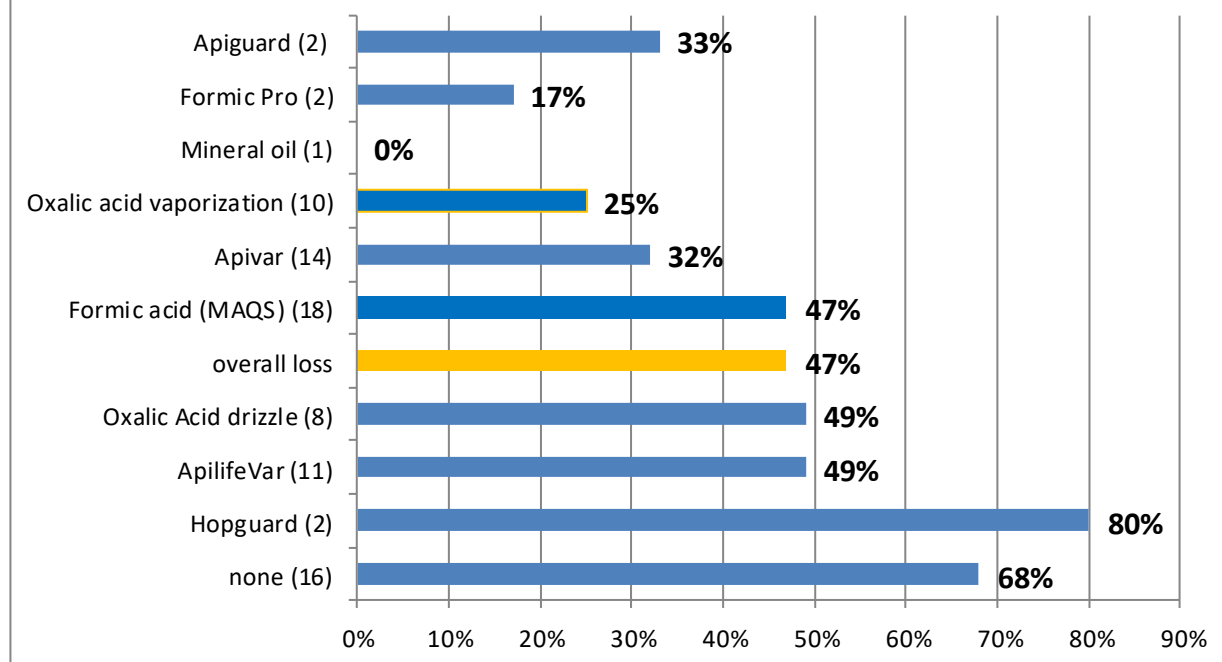
Use of screened bottom board and minimal hive inspection (43 and 27 individuals respectively among TVBA respondents) were most common. As reported above SBB show a slight advantage (45% loss compared to 47% overall for TVBA members) but minimal hive intervention does not, either statewide nor in TVBA member use. 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. 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 TVBA members 16 individuals (28%) used no chemical treatments. Those using chemicals used at rate of 1.8/individual (both statewide and among TVBA members). 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 TVBA respondents 18 individuals (44%) used one chemical (they had a 68% loss) 15 used 2 and 8 used 3 (19%) and one four (these last two groups had a 36% loss level.)

One hundred fifty OR Beekeepers (23% of total chemical uses) indicated they most commonly utilized MAQS, formic acid, (down 10 individuals from last year), at least 6 making their own

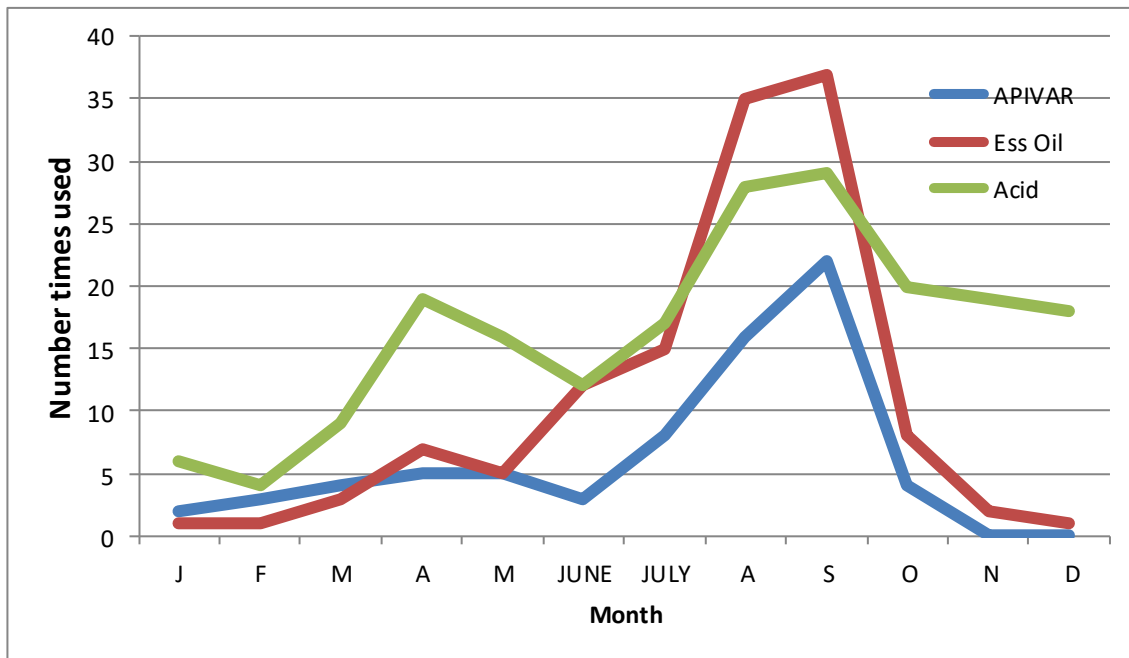
Figure 16. Lost rate using chemical mite treatments TVBA () =number individuals



Formulation to apply via shop towels, plus an additional 17 used formic pro, followed distantly by Oxalic acid vaporization (116 individuals, 18% of total chemicals used). Figure 16 illustrates number of uses () and bar length indicates the loss rate for those using that chemical. All but doing nothing and using Hopguard helped improve survival (ApiLife Var and Oxalic acid drizzle had slightly higher loss level) with Apivar, Formic Pro, Oxalic acid vaporization and Apiguard showing best survival.

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. Reason it did not perform as well this past season for TVBA members is unknown. Apiguard has a 31% better survival and ApiLifeVar has a 30% better survival record over past 4 years. Apivar use, the synthetic (amitraz), has demonstrated a 29% better survival over past 4 years (2016-19). 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. At least indicated using formic acid in a “shop towel” delivery.

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

17

Queens

We hear lots of issues related to queen “problems”. Recall under the questions asking the reasons why colonies didn’t survive that 88 individuals, 27% believed queen failure as one of their selections. In Section 8 of the survey we asked what percentage of loss could be attributed to queen problems. One hundred twenty nine individuals subdivided queen related issues from 10 to 100% of their hives. One hundred eighty three (44%) said none; 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 18. For TVBA 46% said yes and 15 individuals (26%) said they didn’t know.

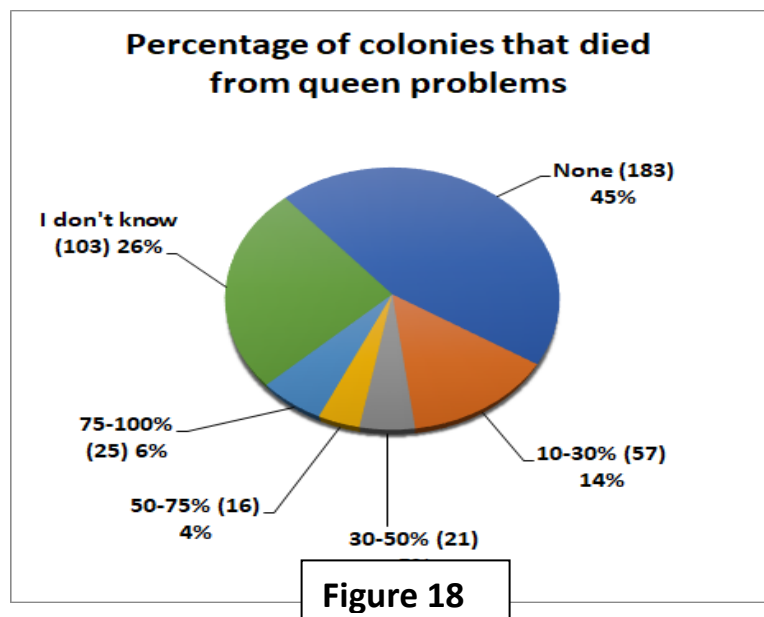
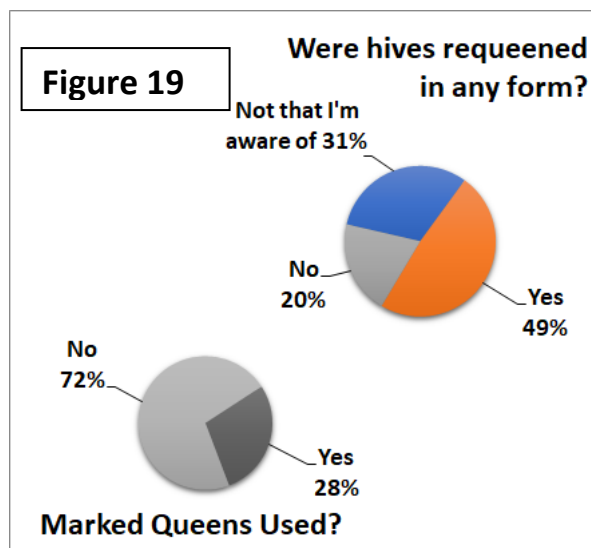
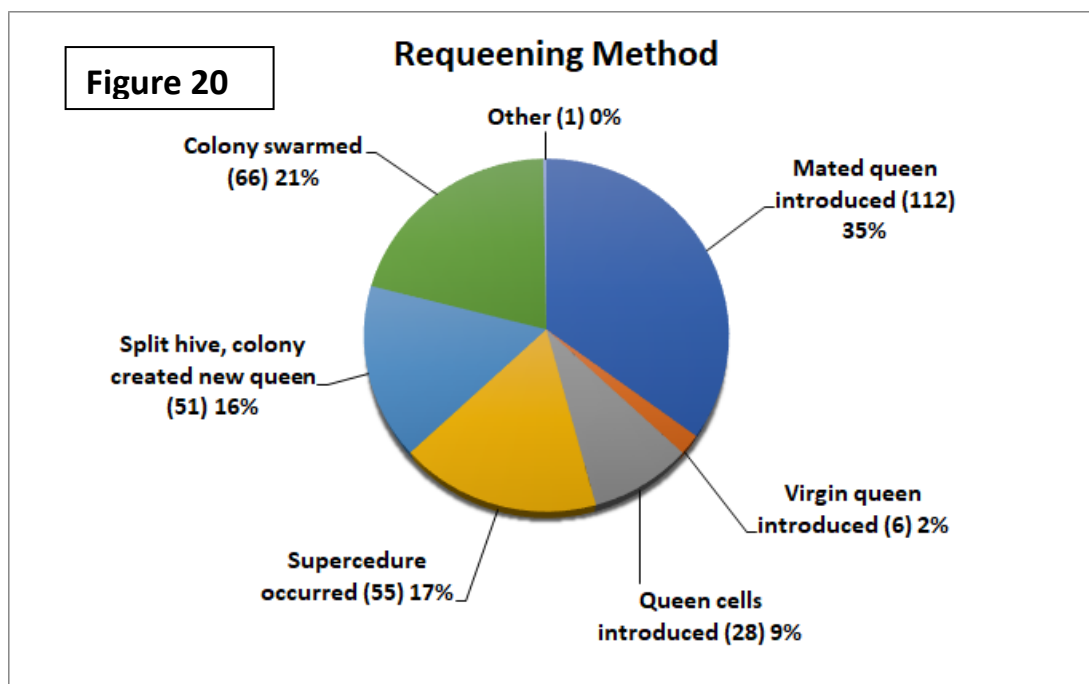


Figure 18

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 30% saying yes in TVBA. 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 19. For TVBA 47% said YES their colonies requeened, 39% said no and 8 individuals (14%) saying not that they were aware of.



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) as illustrated in Figure 20. 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. Among TVBA respondents 33% said they requeened with mated queen and 12% with queen cells; 52% requeened themselves, mostly via swarming (13 individuals). 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