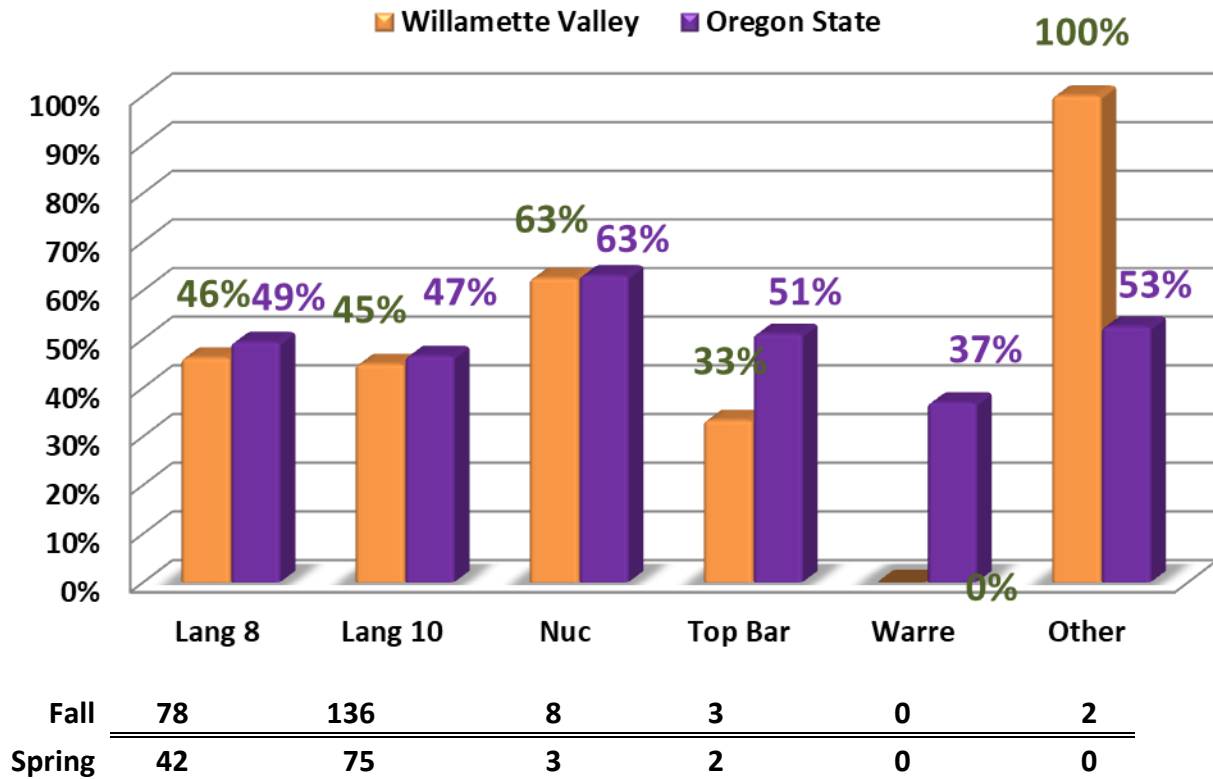


2018-19 WVBA Winter Loss Report by Dewey M. Caron

At the April WVBA meeting I distributed paper copies and directed members to a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon. This was the 10th year of such survey activity. I received 416 responses from OR backyarders, keeping anywhere from 1 to 38 colonies; Willamette Valley members sent in 38 surveys, 4 more than the previous year, reporting survivorship of 227 fall colonies.

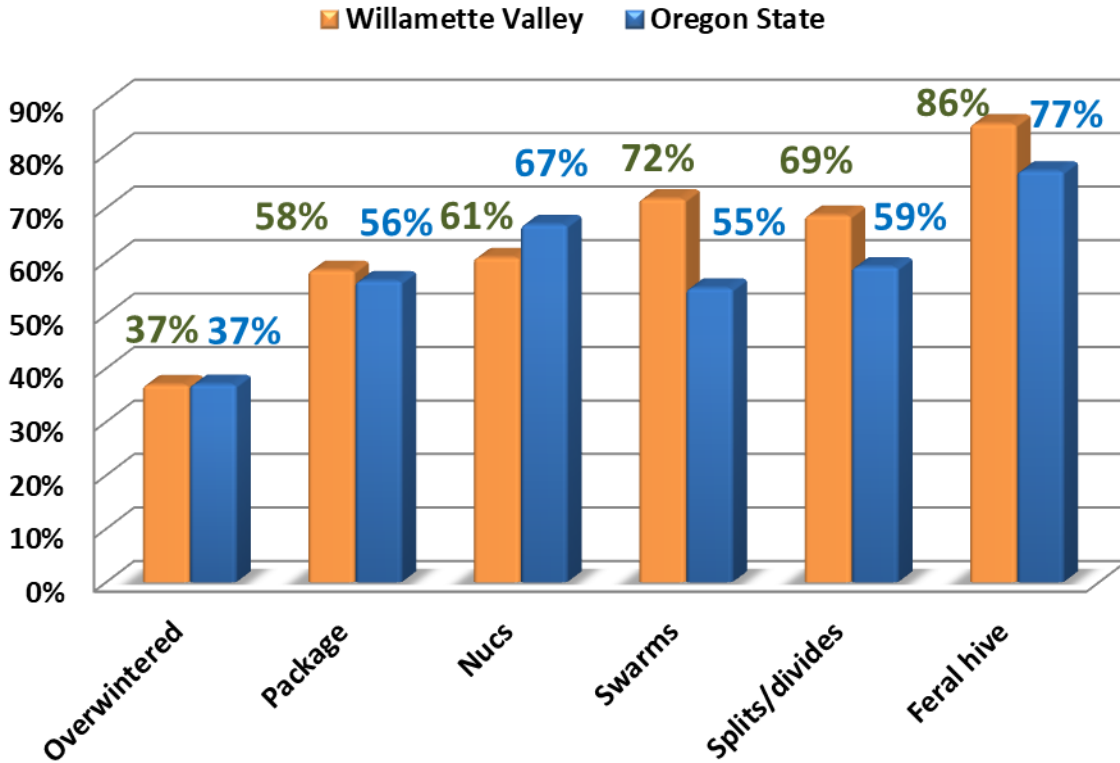
Overwintering losses of WVBA respondents was 122 colonies = 46 %, slightly lower than the statewide loss of 38% (database of 416 OR backyarders.) Percent losses, determined by hive types, are shown in Figure 1 comparing WVBA with the statewide backyarders. WVBA member respondents started winter with 84 Langstroth 10-frame, 60 Langstroth 8-frame hives and 4 5-frame nucs; there were an additional 4 Top Bar hives (2 lost) and 2 Warré hives (1 lost). Losses of 8 and 10 frame hives (94% of total) were slightly less compared to statewide beekeepers.

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



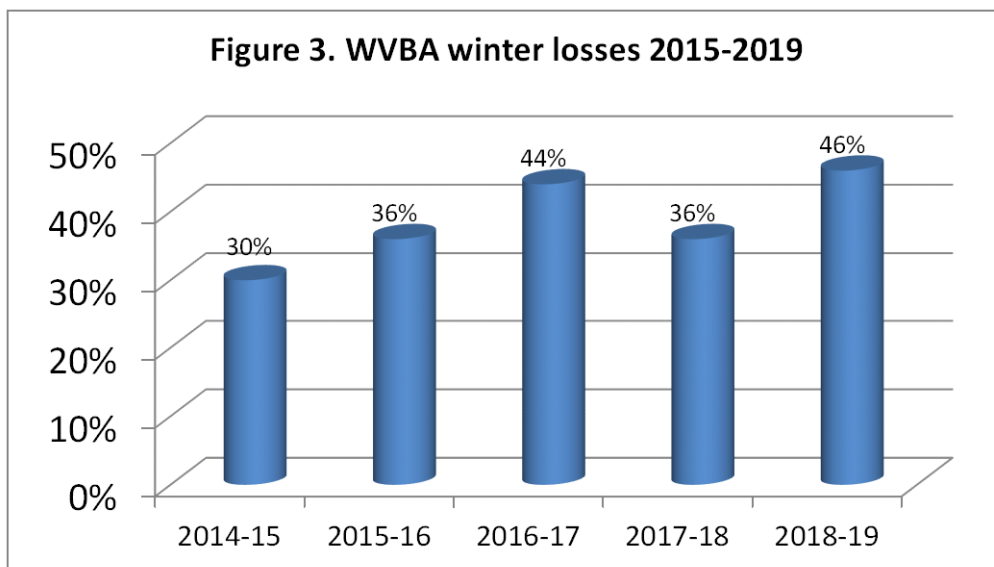
The survey also asked for hive loss by hive origination. Eighty two of 130 overwintered WVBA colonies were alive in the spring (37% loss rate). WVBA respondents reported slightly lower nuc loss levels compared to statewide Oregon beekeepers while other hive originations were slightly higher.

Figure 3 2018-19 Winter Honeybee Loss % by Origination



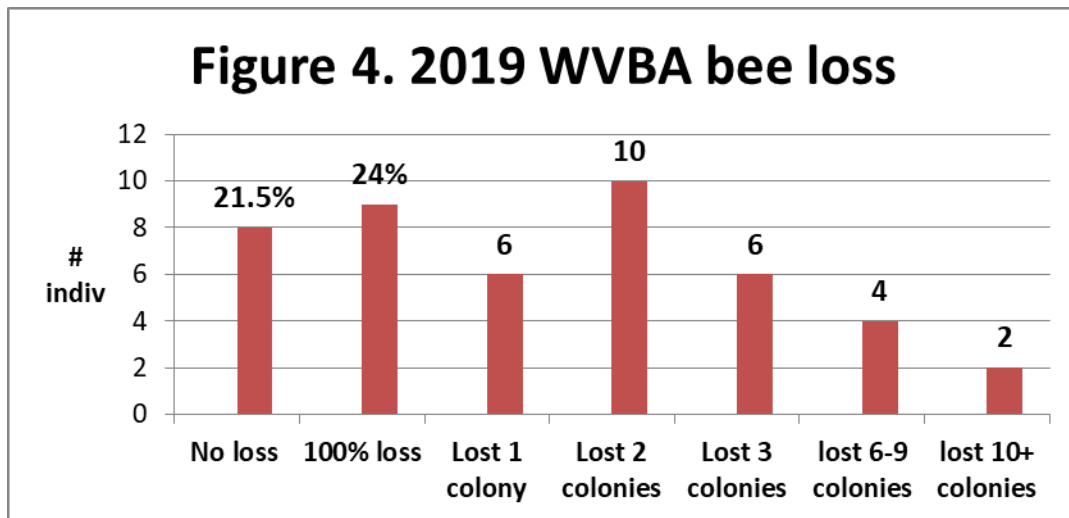
Fall	130	12	28	53	51	7
Spring	82	5	11	15	16	1

Average winter losses of WVBA members continues to increase. Losses of 2018-19 were the highest of the previous 4 years and 9.5% above the 4 year average. As with last season, WVBA losses were lower than the statewide loss level (but by only 2 percentage points). Figure 3.



Typical of the statewide data, the WVBA respondents are largely new beekeepers. 54% of WVBA respondents had 1, 2 or 3 fall colonies, 7 (20%) had 4-6 colonies, 5 had 7 or 8 colonies (14%) and 2 had 10 and another 2 had 12 fall colonies, the largest number of respondents. Nineteen individuals (51%) had 1, 2 or 3 years of experience (3 years experience was most common), 12 individuals had 4 or 5 years (32%), 2 each had 7 or 8 colonies one had 10 years, another 25 and one 30, the greatest experience.

Not everyone had loss. Eight WVBA individuals (21.5%) reported total winter survival; 9 individuals (24%) lost 100% of their colonies. Six individuals lost 1 colony, 10 members lost 2 colonies, 6 lost 3 colonies and 3 lost 4 colonies. One individual each lost 6, 7, 8, 9 and 10 colonies. Heaviest loss was 13 colonies. Data graphically below in Figure 4.



Three individuals had more than one apiary location. Loss at 2nd apiary site was 63.5% compared to 55% at home apiary. Four individuals moved bees during the year, one a new hive, one short distance and 2 for pollination.

Reasons for Colony Loss/Acceptable loss

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 WVBA selections with statewide in table below.

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

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. WVBA 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.

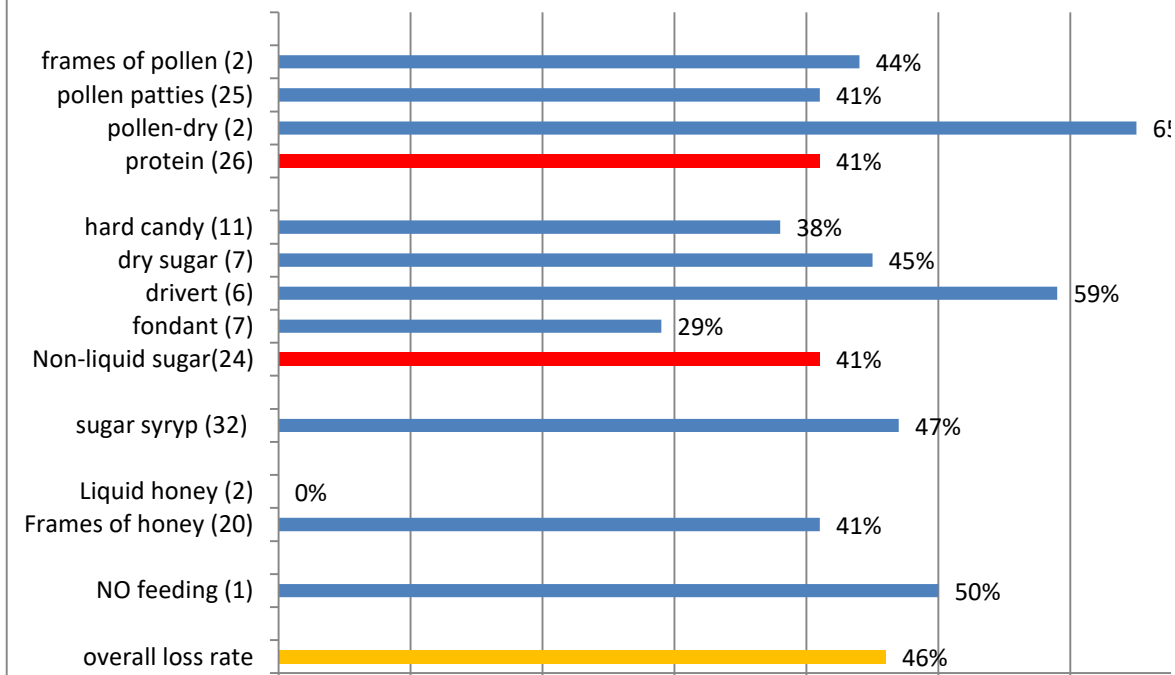
There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are necessarily excessive for all the issues facing honey bees in the current environment. Varroa mites and the viruses they transmit are considered a major factor, but by no means the only reason, 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 WVBA 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: WVBA survey respondents checked 118 feeding options = 3.1/individual (statewide it was 2.8/individual). Five individuals selected a single choice (they had a 71% loss), 7 chose 2 (they had 51% loss level), 3 and 4 individuals chose 10 (greatest number and medium), 2 selected 5 and 3 six These 5 individuals had 43% loss level). One individual made no selections and had a 50% loss

**Figure 5. Feeding options with loss record.
selections in (). WVBA 2019**



Percent colony losses are presented for feeding options with numbers of WVBA members indicating doing the management in (). Bar lengths of left of 46% indicate better than average survival while those to right had heavier than average losses. The 26 members feeding Pollen patties, (2 each also fed pollen in frame and dry pollen) had better survival (41%) than overall for WVBA respondents (46%). Likewise the 24 individuals feeding non-liquid sugar had improved survival (41%) versus overall for WVBA members with fondant (29%) and 11 hard candy feeders showing the best survival (38%).

Thirty two WVBA individuals (86% of individuals who did some feeding) said they used sugar syrup. They had a 47% loss rate, one percentage point higher than the overall loss level of 46%; individuals feeding frames or liquid honey had losses lower (41%) than the overall average.

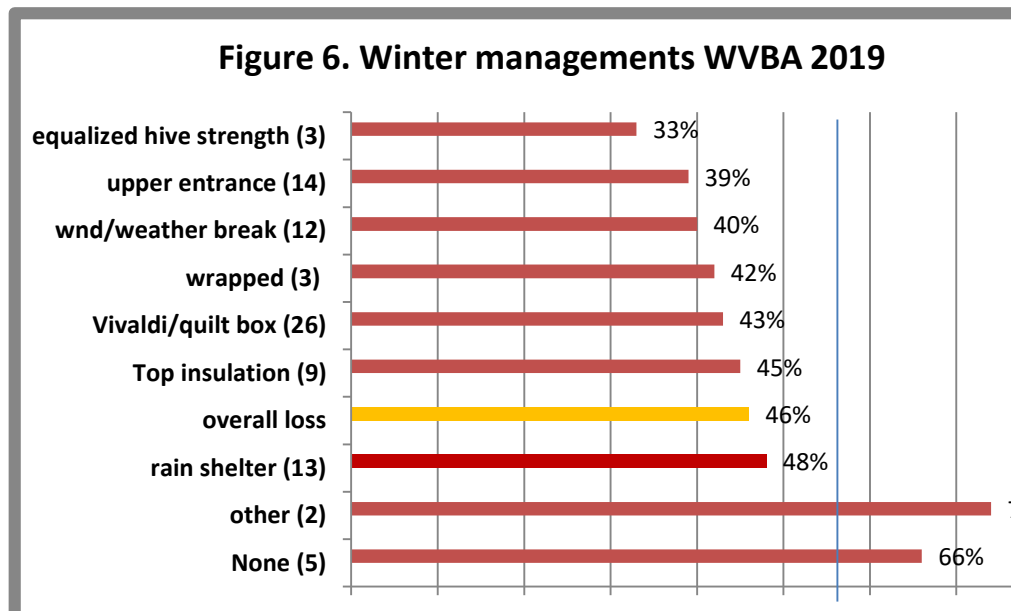
For the last 3 years of heavier losses (48% in 2017 and 2019 and 38% in 2018 spring) individuals statewide and in WVBA doing no feeding had poorer survival all 3 years. Individuals that fed sugar syrup had a 10% lower loss level statewide (average for the 3 years). Individuals feeding non-liquid sugar (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 protein 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 were close to the overall average though the 2 WVBA members feeding dry pollen had a 65% loss this year.

WINTERING PRACTICES: Five WVBA individuals (13%) reported doing no winterizing; they had loss level of 66%; 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 38 WVBA members averaged 2.2/individual. Nine individuals chose a single management and had a 28% loss level, eleven individuals chose 2 (48% loss level) the greatest selection, 5 individuals had both 3 and 4 selections while 2 had 5 and one 6 (these last 3 had 42% loss

The most common wintering managements selected were use of a quilt box (Vivaldi board) at colony top (242 individuals statewide (58%) and 26 WVBA (68%). Figure 6 shows number of individual choices for WVBA members in () and percent loss of each selection. Vivaldi board difference was 3 percentage points less. The three WVBA individuals who equalized hive strength had the best survival (33% loss); those using top insulation (39% loss) also had better survival. Most Vivaldi boards have a built in top entrance. The two other choices, more hive ventilation and reducing to one box, did not improve survival.

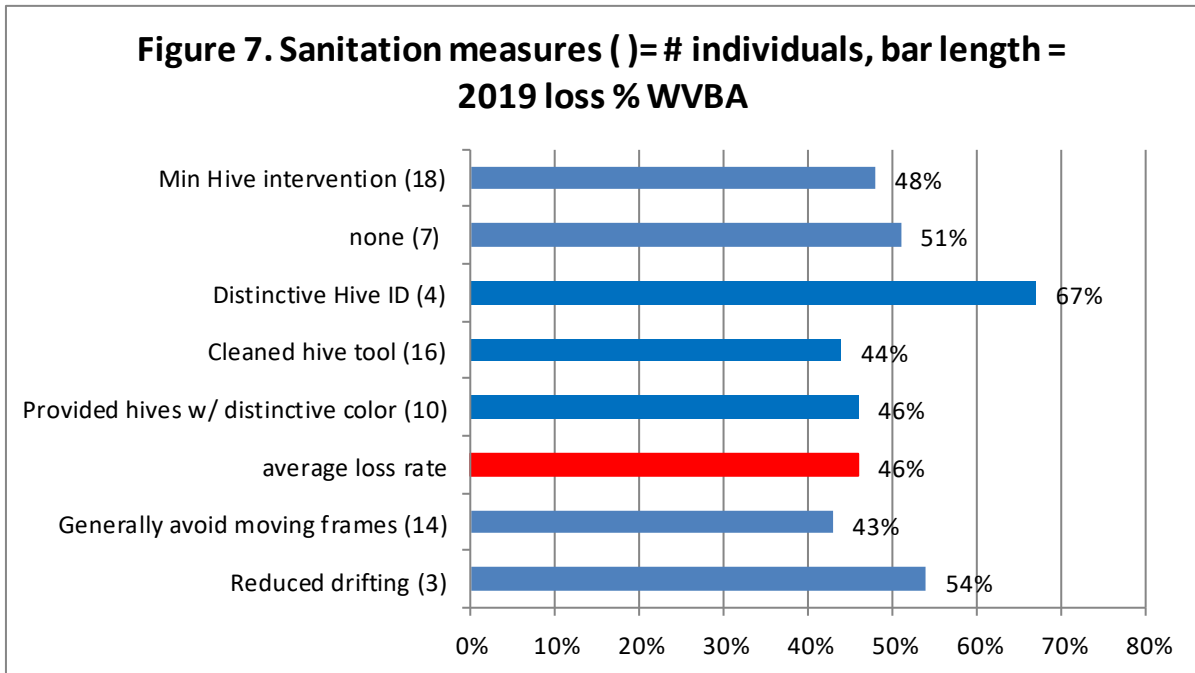
Over the past three years no single winterizing management statewide improved survival each survey year. However 6 managements improved survival in at least 2 of the 3 years. Those managements are equalizing colonies in the fall, use of the quilt box/Vivaldi board/moisture trap at top of colony, an upper entrance, wrapping colonies, and 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 WVBA, 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. WVBA beekeepers had 74 responses 2.4/individual. Sixteen percent statewide and 7 WVBA individuals (18%) 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 WVBA the 5 individuals had a 51% loss rate, 5 percentage

points greater than overall WVBA average loss of 46%. Ten WVBA members had 1 selection (loss rate 46%), 11 made 2 choices (had 30%), 6 made 3 choices; four individuals selected 4 and 1 additional 5 selections, they had a 55% lose rate.

Minimal hive intervention (209 individuals, 18 of them WVBA beekeepers) was the most common option selected along with cleaning hive tool, 16 respondents generally avoid moving frames (14 WVBA members). The two sanitation choices that did seem to slightly improve survival was clean hive tool and generally avoid moving frames.

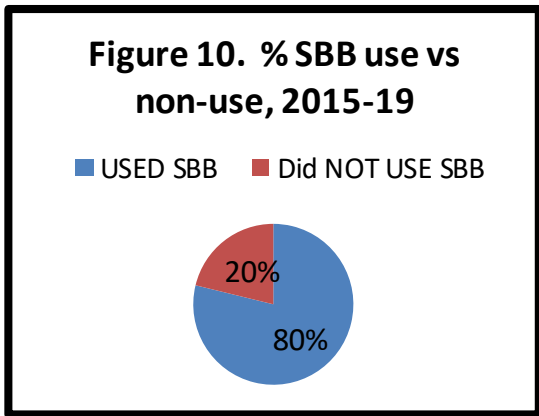
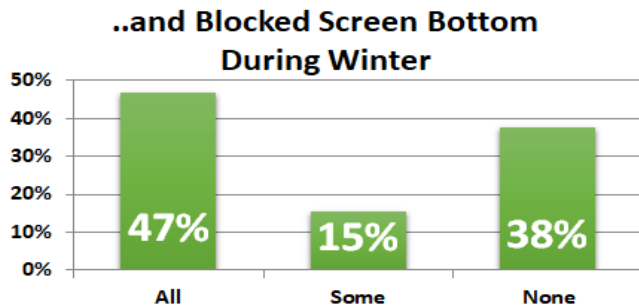
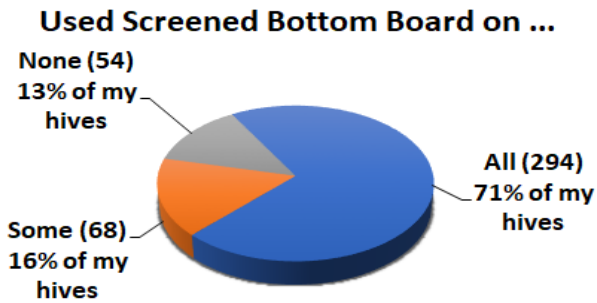


In past three years the only sanitation choice that displayed better survival in other than a single year of occurrence was to reduce drifting though it did not prove to be the case for WVBA this past season. Doing nothing had a high or the highest loss rate in all 3 years.

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 WVBA, 76% used SBB on all colonies (50% loss) and 8% did not use them (86% loss).

Figure 8 below shows statewide data this past season.

Figure 8



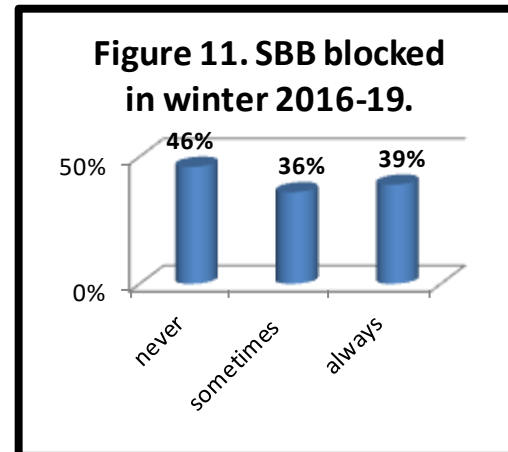
In 5 survey years 20% said they did not use SBB and 80% did use SBB on some or all of their colonies. See Figure 10 to left for statewide results.

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 shows statewide information). 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 statewide reveals a 9 percentage point difference in favor of closing the SBB over the winter period. See Figure 11. For WVBA members there was a 7 percentage point difference.

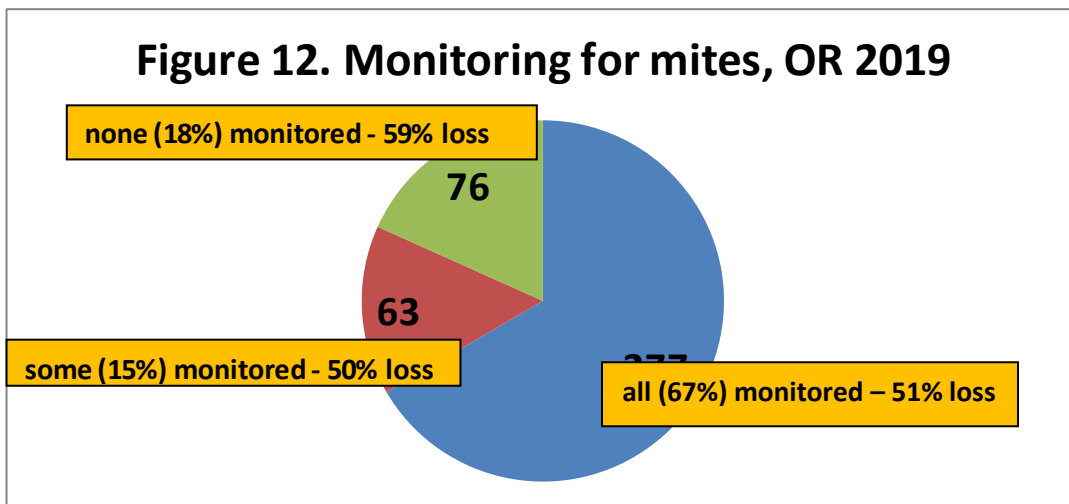
There is no good science on whether open or closed bottoms make a difference overwinter but some beekeepers “feel” bees do better with it closed overwinter. Four years of comparison shows those closing the screen during winter did have a 9 percentage point improvement in colony survival. An open bottom, 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.

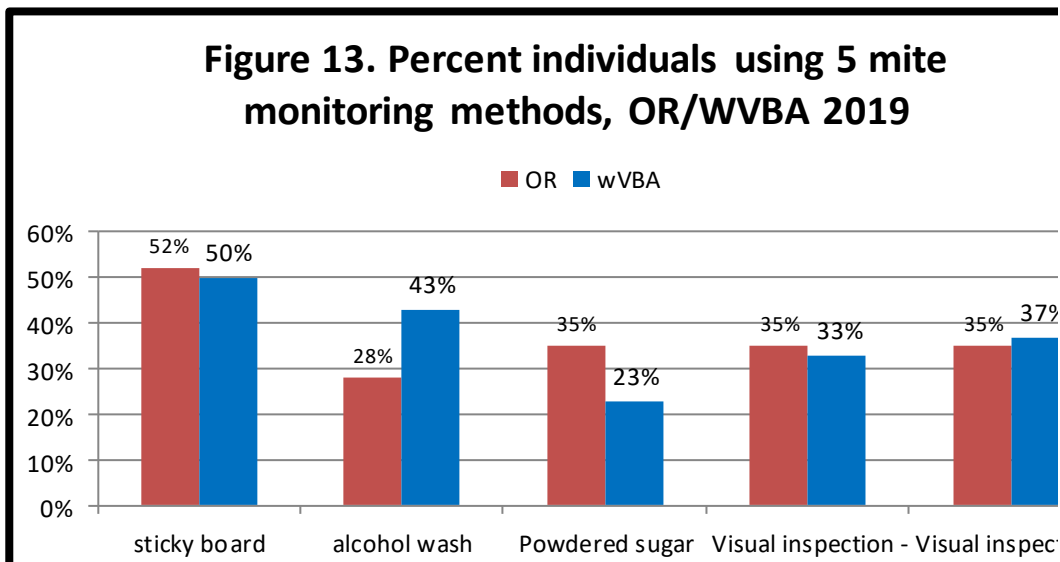
Among WVBA 25 individuals (66%) monitored all colonies; they had 50% loss. Eight individuals (27%) did no monitoring and they had a 64% loss



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%

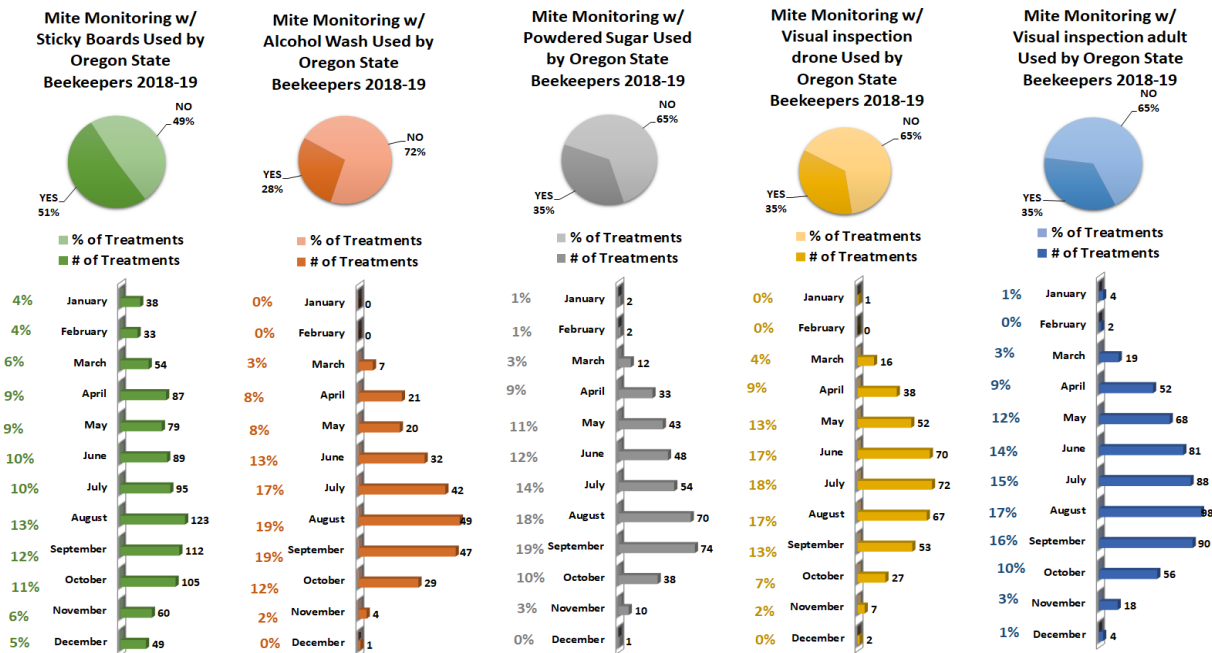
In order of popularity of use, Sticky boards were used by 52% of total respondents statewide 35% of individuals used powdered sugar monitoring and visual inspection of drones and adults. Alcohol wash was used by 28% of the statewide respondents. WVBA members used alcohol wash more and powdered sugar less than 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 WVBA.



Twelve WVBA respondents said they treated but did not sample. Twice as many sampled pre versus post treatment (8 vs 4 individuals) and 11 individuals said they sample both pre and post treatment.

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



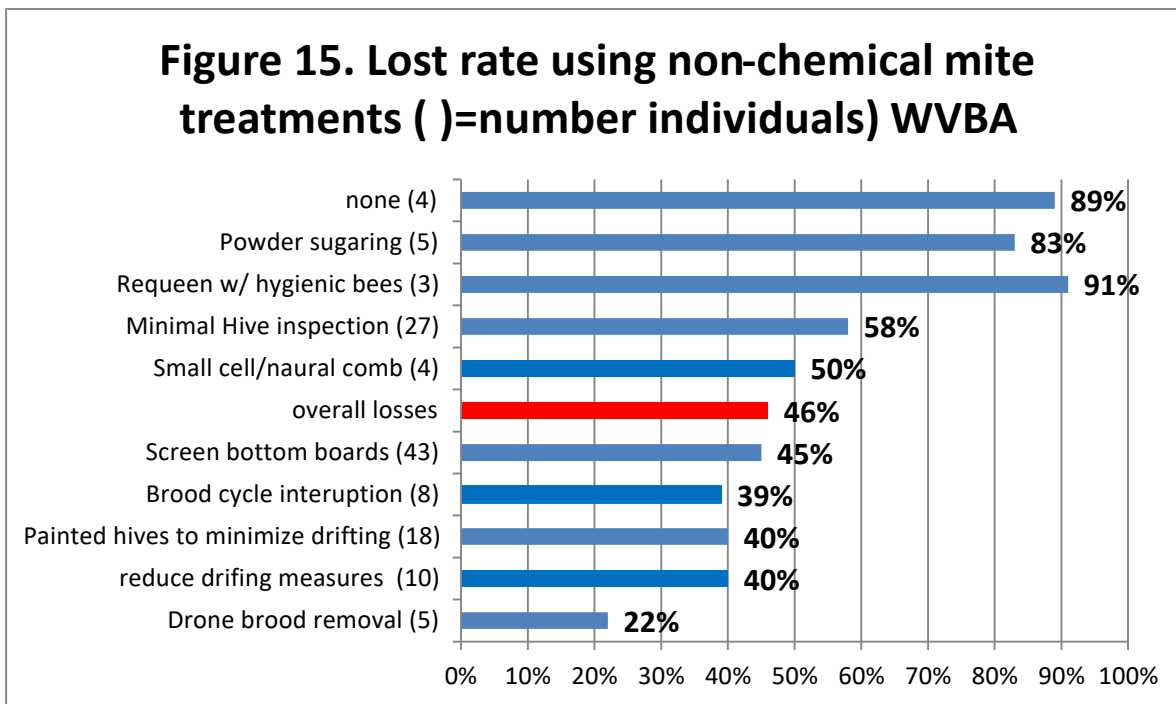
It is important to KNOW mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm the 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 WVBA the 6 individuals (16%) not using a non-chemical treatment had 79% loss), while those who did not use a chemical control statewide lost 69% of their colonies; for WVBA, 3 individuals (8%) not using any chemical had a loss rate of 50%. 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,) statewide 89 individuals used one method, 118 used two, 95 used three, 54 used 4 or 5 and 9 individuals used 6. Among WVBA respondents 5 used one (had 51% loss), 12 used 2 (had 29% loss), 12 used 3 selections, while 2 used 4 and 1 used 5 choices; this last three lost 63% of colonies.

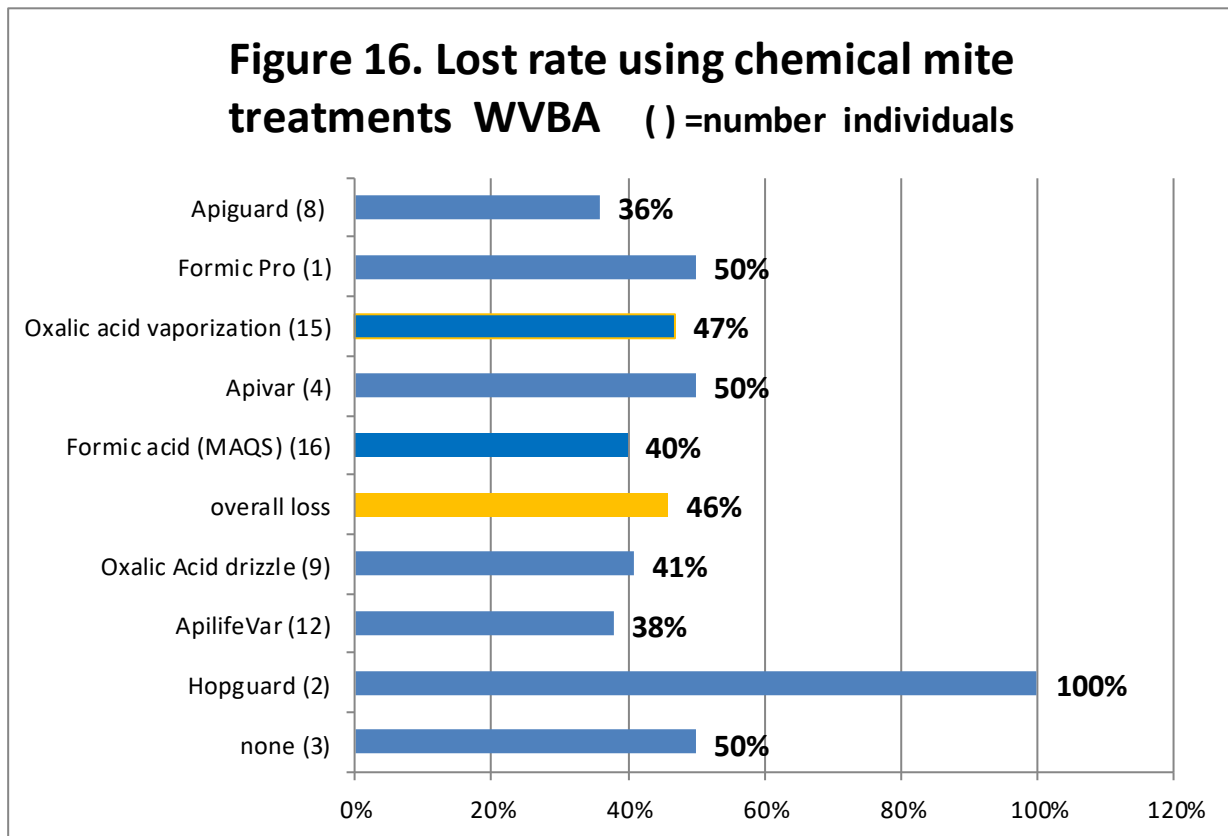


Use of screened bottom board and minimal hive inspection (30 and 12 individuals respectively among WVBA respondents) were most common. As reported above SBB show a slight advantage (45% loss compared to 46% overall for WVBA members) but minimal hive intervention does not, either statewide nor in WVBA 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.

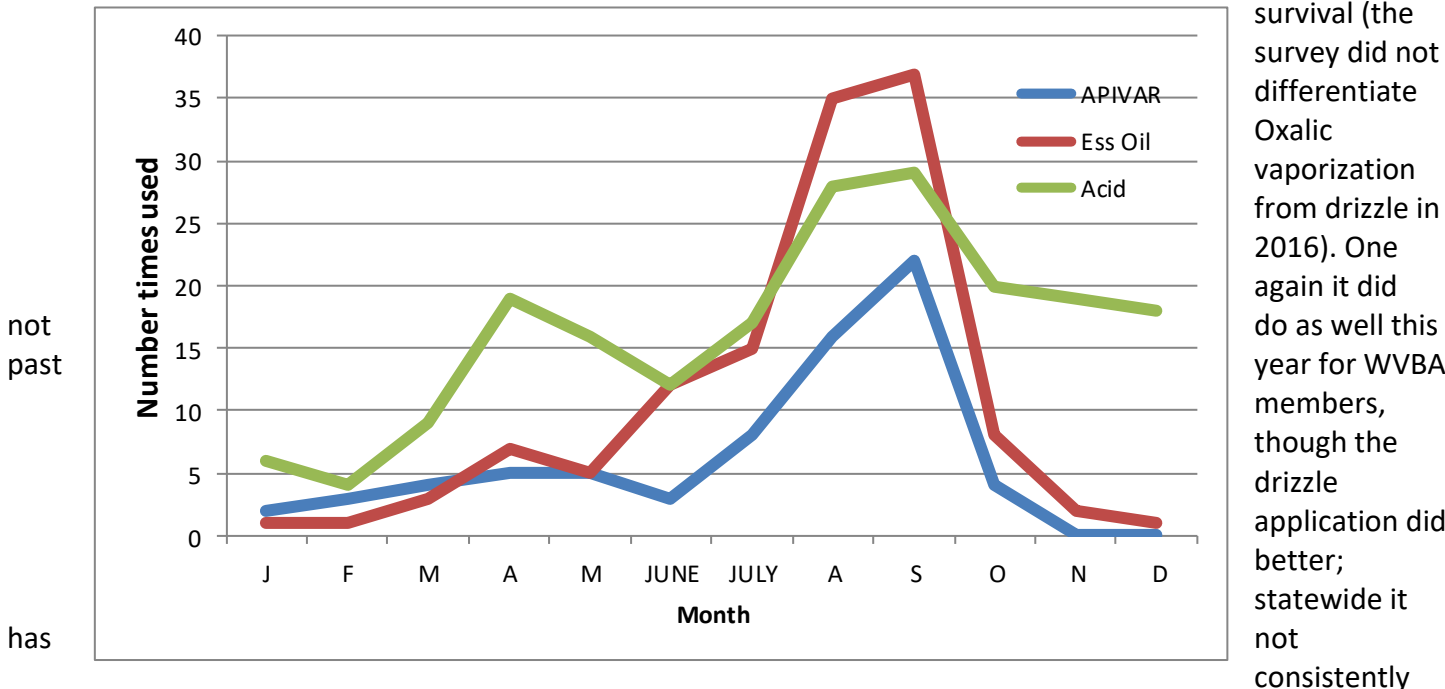
Three of the non-chemical alternatives have demonstrated reduced losses over past 4 year. Reducing drifting such as spreading colonies, different colony colors in apiary has demonstrated a 13% better survival, Brood cycle interruption an 11% better survival and drone brood removal a minor 2% advantage; this past year for the 5 individuals using drone brood removal losses were only 22%. 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 WVBA members 3 individuals (8%) used no chemical treatments. Those using chemicals used at rate of 1.8/individual statewide and 1.9/individual among WVBA 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 WVBA respondents 13 individuals (44%) used one chemical (they had a 50% loss) 9 used 2 (loss rate 57%), 11 use 3 materials (loss rate 45%) and the one individual at used 4 different chemical treatments had loss rate of 8%.

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 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. ApiLife Var and Apiguard (both essential oils) showed best survival for WVBA members last year.



Consistently the last 3-4 years five different chemicals have helped beekeepers statewide improve better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level. 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); for the 4 WVBA users it did not do quite that well. Oxalic acid vaporization over past 3 years has a 13% better survival



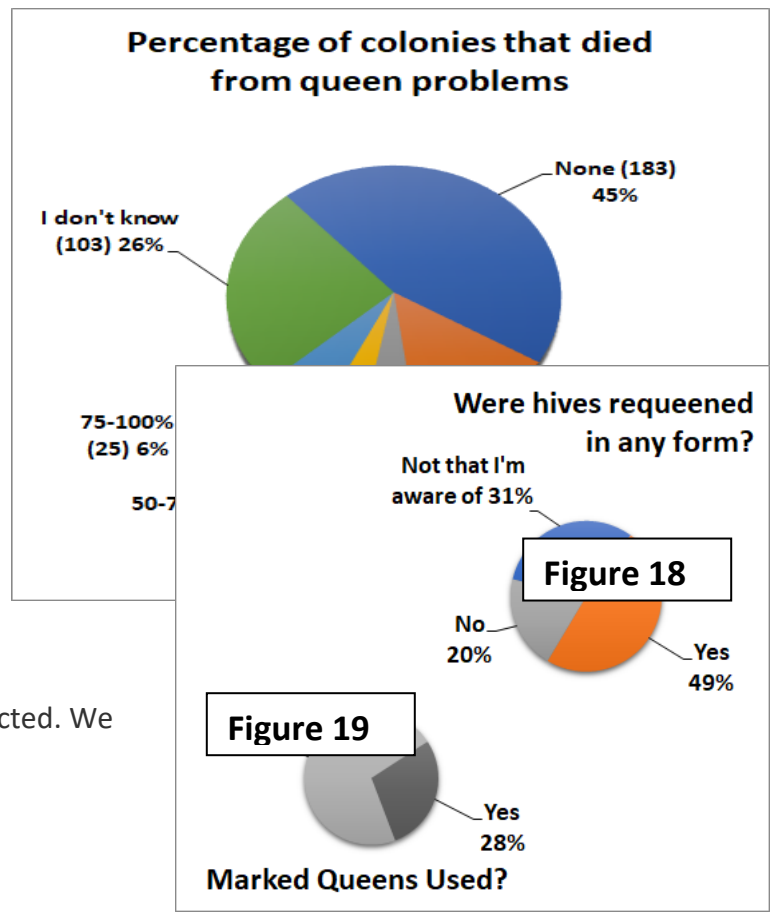
has demonstrated better survival. Formic acid demonstrated a 6 percentage point better survival for WVBA members but this product has changed and how we use it is changing so this information is more difficult to tease out of the data. This past season for example Formic Pro seemed to perform better statewide than the traditional formic MAQs pads but the one individual of WVBA lost 50% of colonies when used. One individual used formic acid in a “shop towel” delivery but lost both of his/her 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 effective than at other times for the various chemicals.

Nosema control

Eight WVBA members of 18 total statewide used fumagillan for Nosema control. These individuals had a 41% loss rate which is better than the overall WVBA member loss rate of 46%. Including the 8 members of WVBA the overall loss rate of the 18 respondents statewide who reported using fumagillan was 46%. 2 percentage points better than statewide overall loss rate of 48%. It would seem that this treatment needs a second look to determine if it works to consistently reduce overall losses.

Queens

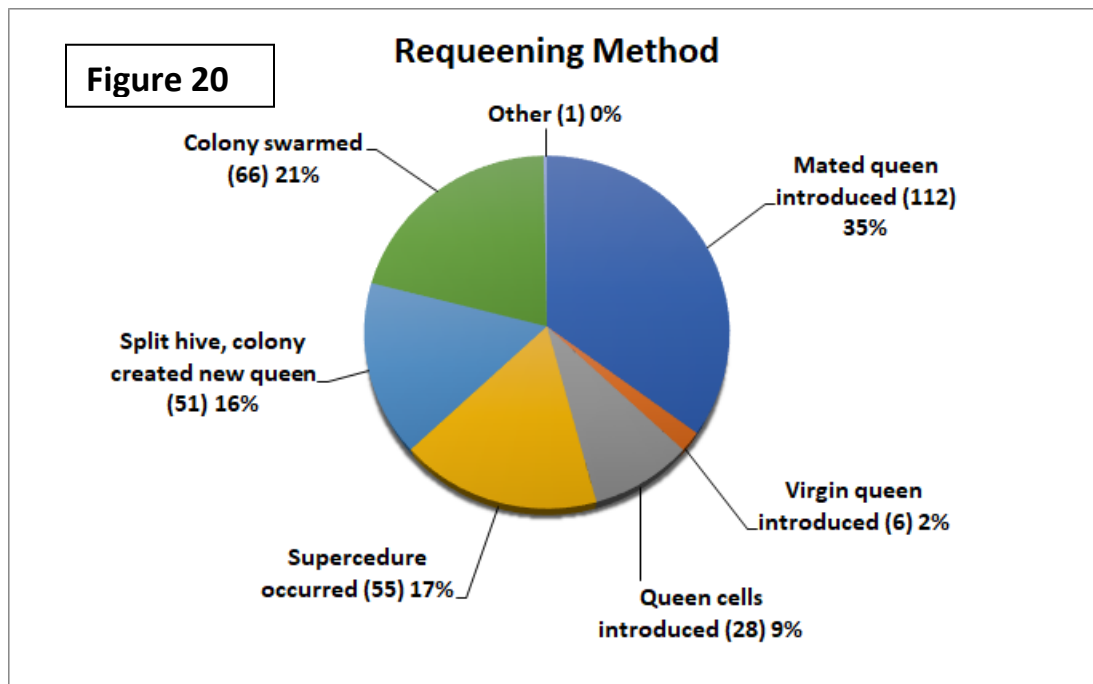
We hear lots of issues related to queen “problems”. In Section 8 of the survey we asked what percentage of loss could be attributed to queen problems. One hundred twenty nine individuals subdivided queen related issues from 10 to 100% of their hives. One hundred eighty three (44%) said none; an additional 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 WVBA, 17 individuals (46%) said none and 9 individuals (24%) said they didn’t know.



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 more, 37% saying yes in WVBA. 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 WVBA 22 persons (58% said YES their colonies requeened, 10 (26%) said no and 6 individuals (16%) 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 WVBA respondents 32% said they requeened with mated queen and 14% with queen cells; 54% requeened themselves, divided evenly (9 individuals each) between swarming, supersedure and rearing of emergency queens. 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 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 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