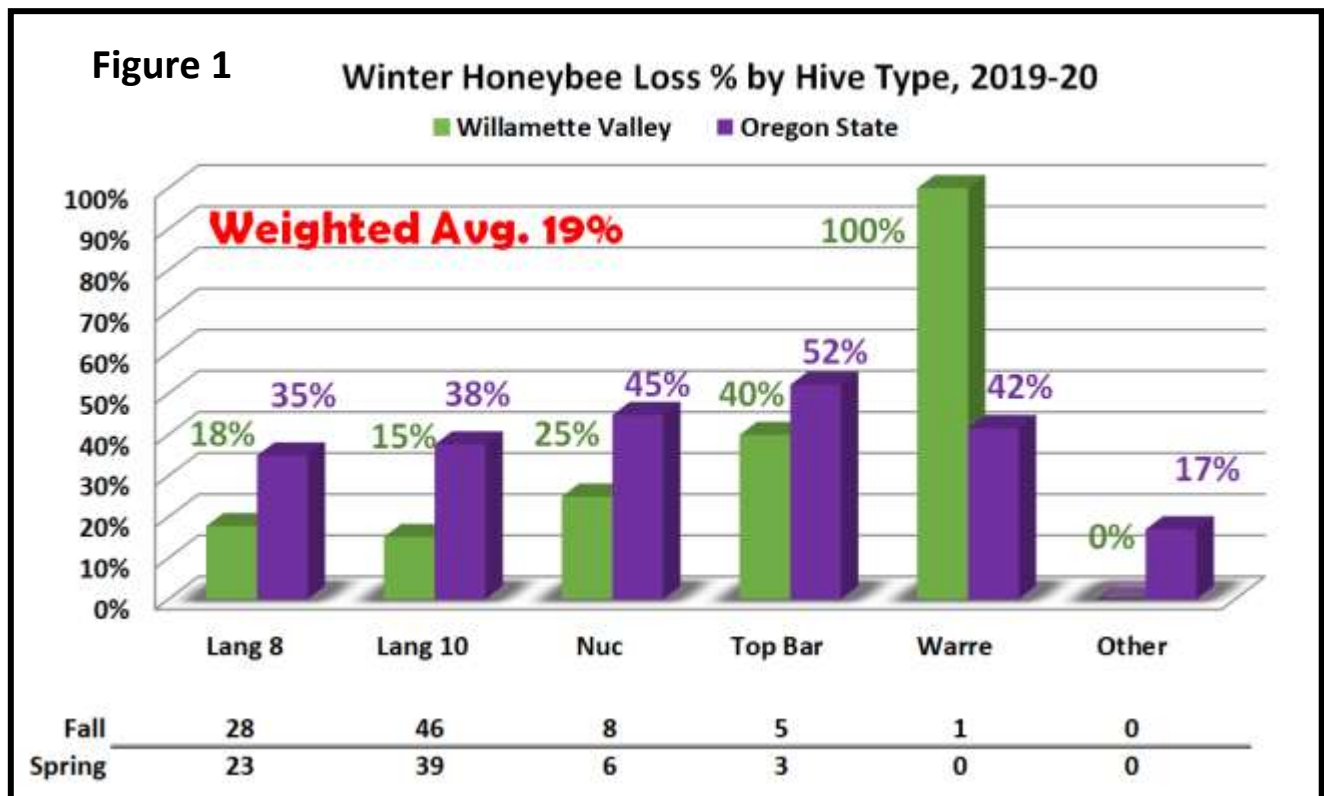


2019-2020 WVBA Winter Loss Report by Dewey M. Caron

WVBA members were encouraged to complete a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon. This was the 11th year of such survey activity. I received 302 responses from OR backyarders, keeping anywhere from 1 to 45 colonies; Willamette Valley members sent in only 16 surveys, 22 fewer than the previous year, reporting on only 88 fall colonies.

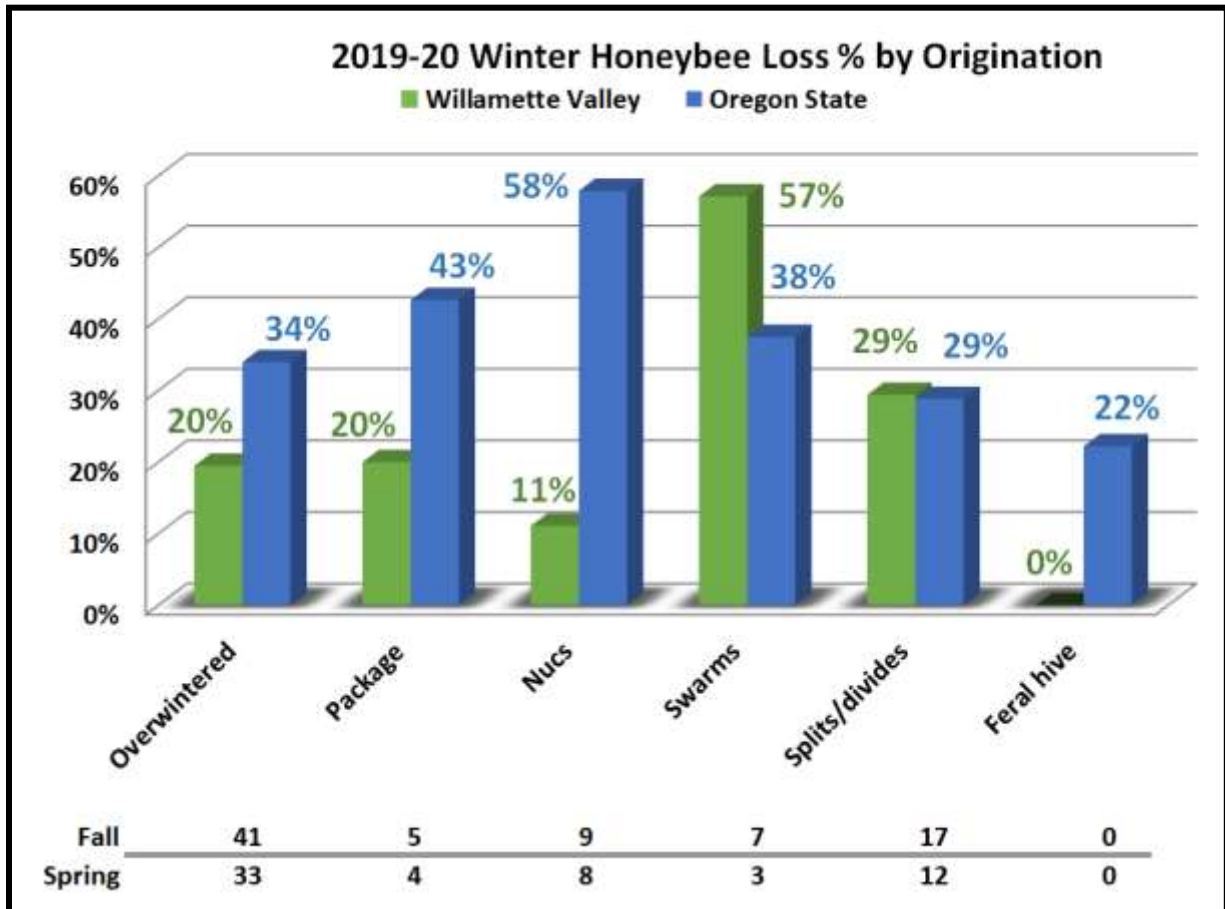


Overwintering losses of WVBA respondents =19%, the best record of OR clubs, 1/3rd of the losses compared to the club with the heaviest losses. Percent losses, determined by hive types, are shown in Figure 1 comparing WVBA with the statewide backyarders. WVBA member respondents started winter with 74 Langstroth 8 and 10-frame, 8 5-frame nucs; there were an additional 5 Top Bar hives (2 lost) and 1 Warré hives (1 lost).

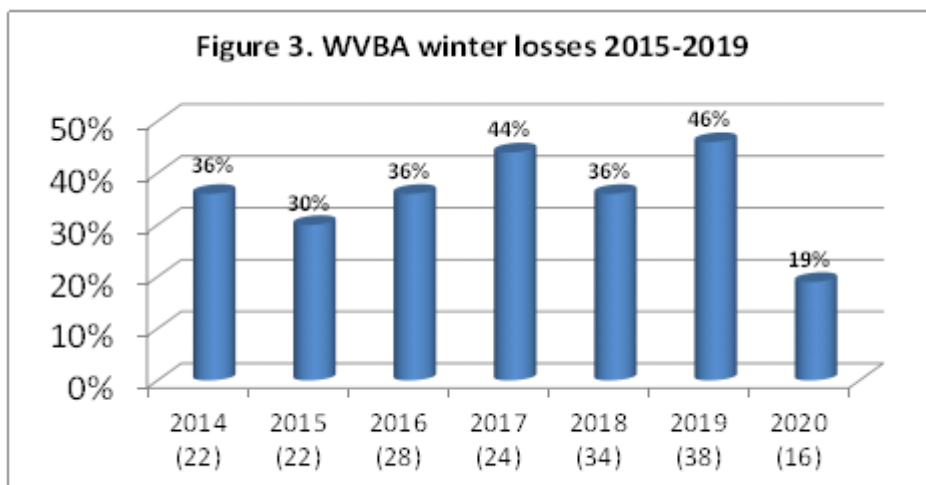
The survey also asked for hive loss by hive origination. Thirty three of 41 overwintered WVBA colonies were alive in the spring (20% loss rate). Only swarms had higher loss rate than statewide respondents. See figure 2.

Figure 2



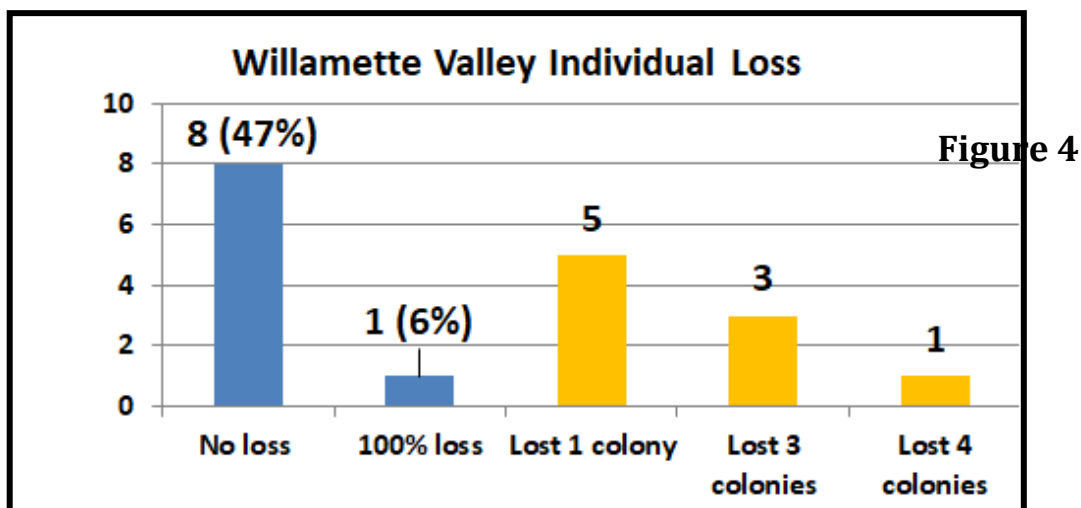


Average winter losses of WVBA members was the lowest of past 7 years as was the number of surveys returned (number respondents in () below spring of survey year).



Typical of the statewide data, the WVBA respondents are largely new beekeepers. 50% of WVBA respondents had 1 or 2 fall colonies, 2 (12.5%) had 4 or 5 colonies, 3 had 7, 8 or 9 colonies (19%) and 3 had 10+ colonies; highest number was 15 colonies. Four individuals (25%) had 1, 2 or 3 years of experience, 9 individuals had 4-7 years experience, and 3 had 10+ years of beekeeping. The 4 individuals with 1- 3 years experience had no loss, the 9 with 4-7 beekeeping year experiences had 26% loss and the 3 with 10 + years had 6% loss.

Not everyone had loss. Eight WVBA individuals (50%) reported total winter survival; 1 individual (6%) lost 100% of their colonies. Five individuals lost 1 colony, 3 members lost 2 colonies, and 1 lost 4 colonies, heaviest loss. Data graphically below in Figure 4.



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. Eight of 11 individuals said Varroa mites and ½ that number said queen failure. When asked acceptable level 6 said none, medium was 15%.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	pesticides	Yellow jackets	Other
WVBA #	8	0	3	4	3	1	1	0
%	(73%)		(29%)	(36%)	(29%)	(9%)	(9%)	
Statewide %	24%	16%	15%	16%	11%	5%	6%	14%

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. 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 50%, with medium of 15%.

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 50 feeding options = 3.1/individual (statewide it was 2.8/individual). Three individuals selected a single choice (they had a 60% loss), 3 also chose 2 (they had 17% loss level), 3 individual likewise chose 3 and they too had 17% loss; six individuals chose 4, 5, 6 and 7 selections – they had 13% loss. One individual made no selections and did not lose their single colony - 0% loss.

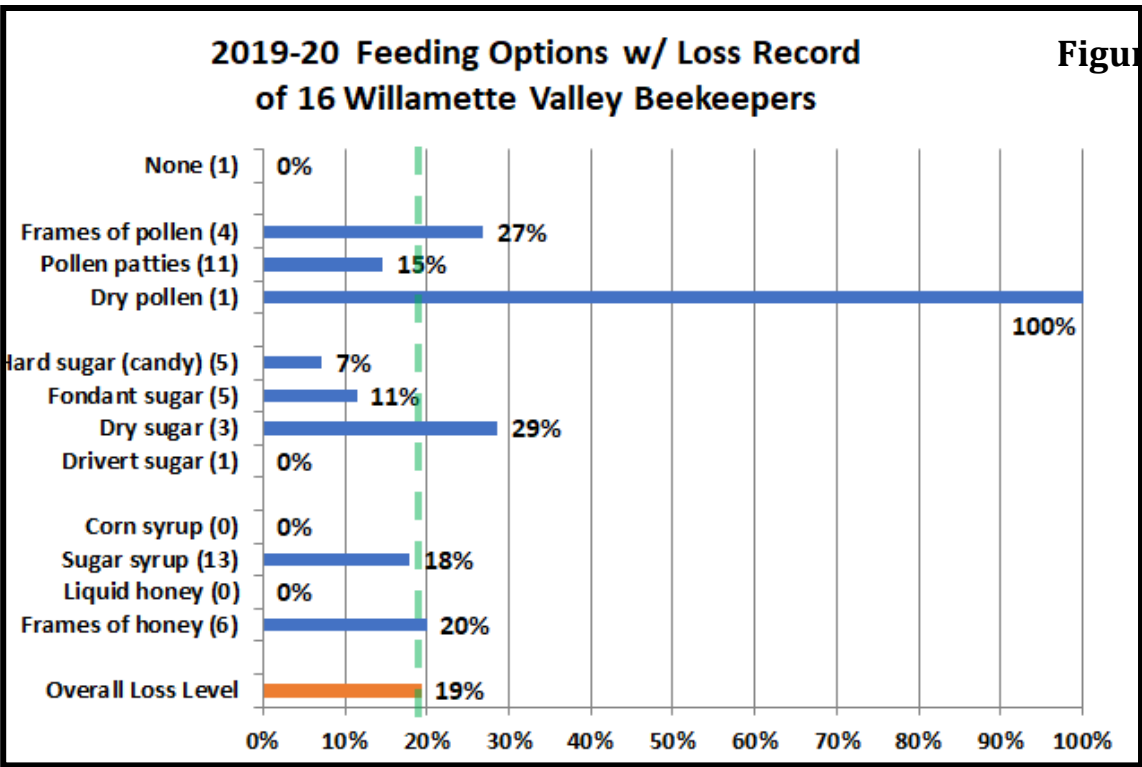


Figure 5

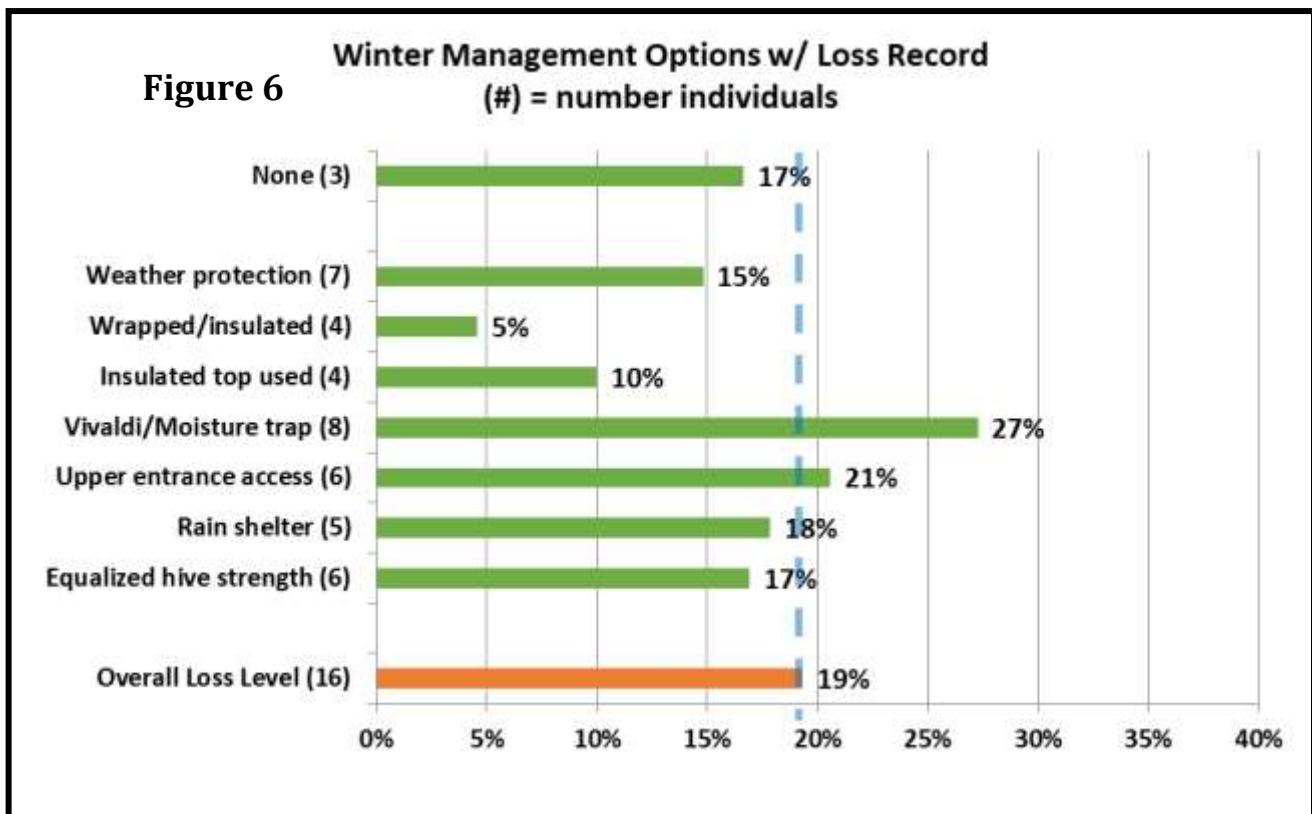
Percent colony losses are presented for feeding options with numbers of WVBA members indicating doing the management in (). Bar lengths of left of 19% indicate better than average survival while those to right had heavier than average losses. The 11 members feeding Pollen patties had only 15% loss. Likewise the 5 individuals each feeding hard sugar candy and fondant had increased survival. Thirteen WVBA individuals (81% of individuals who did some feeding) said they used sugar syrup and 6 (40%) fed frames of honey. Their losses were same as overall WVBA loss.

Number of returns for WVBA are small this year. Here is statewide: For the last 4 years (average loss rate=43% average losses), **individuals doing no feeding had annual losses 12.6 percentage points higher than average overall losses.**

Individuals statewide that fed sugar syrup had a 7³/₄% lower loss level (average for the 4 years). Those feeding honey (as frames or liquid) had lower loss only during the 2018 and this past winter overwinter period. Individuals feeding non-liquid sugar (in any of the forms) had lower losses all four past winter seasons, with 5 or 6 percentage point improvement from overall losses. Dry sugar feeders had slightly better survival all 4 winters (average of 4 winters 39 ¹/₄%) while hard candy feeders had a much improved survival all 4 winters (31% average survival). Fondant feeders had better survival 3 of the 4 winters (37 ³/₄%). For individuals feeding protein, only protein patty users showed better survival all 4 years; dry pollen feeders had much better survival in two of the four years with losses the remaining two close to the overall yearly average.

WINTERING PRACTICES: Three WVBA individuals (19%) reported doing no winterizing; they had loss level of 19%; statewide these 3 were among 37 individuals (12 ½ % of overall statewide respondents) that indicated none of the several listed wintering practices; statewide losses were 50% for those doing no winterizing managements, 12 percentage points higher loss than overall state loss of 38%. Multiple selections were possible and in fact the 14 WVBA members indicating doing one or more winter managements averaged 2.9/individual. Two individuals chose a single management and had zero loss, six individuals chose 2 (16% loss level) and 6 individuals had 3 to 7 selections and they had a 22% loss.

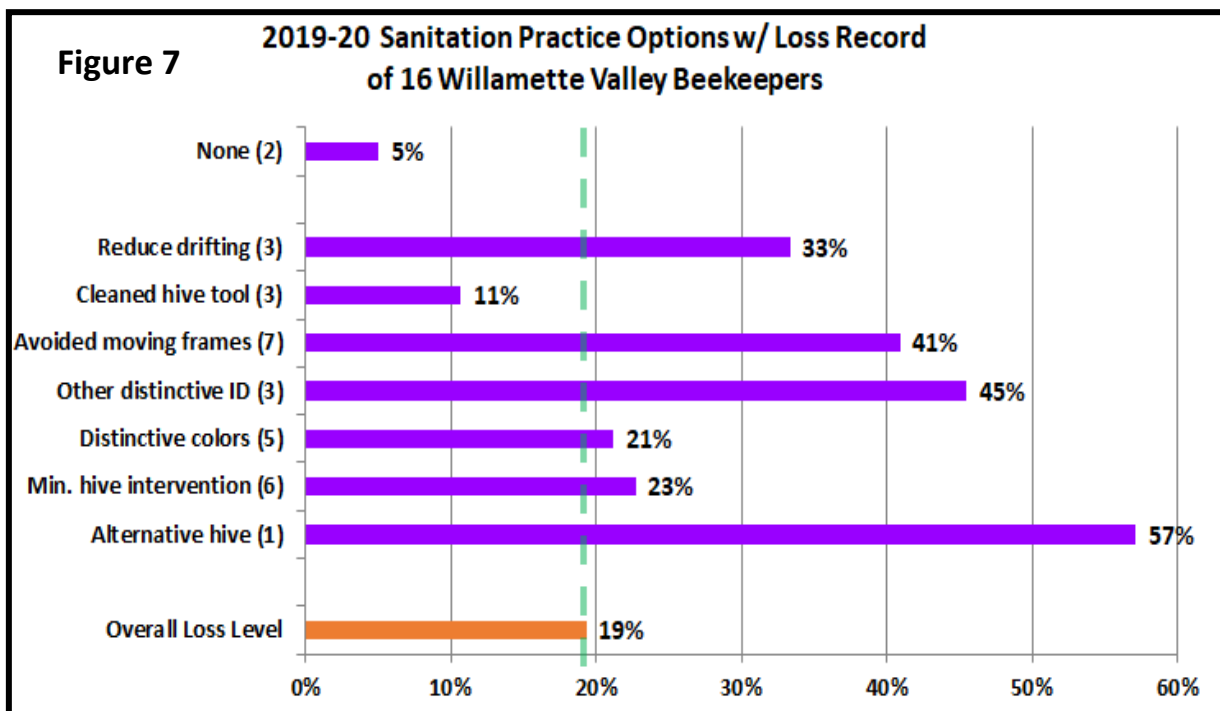
Figure 6 shows number of individual choices for WVBA members in () and percent loss of each selection. Wrapping (4 individuals 5% loss) and insulated top (4 individuals 10% loss) were the two managements that most improved survival. Statewide over the past three years individuals that did no winterizing practice (average 13 1/3% of individuals) averaged 48% loss compared to 41% overall average loss of last 3 years, a 7 percentage point poorer survival rate. Only 2 winterizing managements improved survival all 3 years – these were wrapping (30 % lost rate, an 11 percentage point and top insulation (32 % survival average over 3 years, a 9 percentage point improvement – for WVBA members these two also resulted in better survival this past winter). Vivaldi (38 % loss rate over 3 years), upper entrance also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (also 38%) had only slightly improved survival rates statewide over the past 3 years– 3 percentage points.



SANITATION PRACTICES: It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care to help insure healthy bees. WVBA beekeepers had 28 responses 2 individual. Sixteen percent statewide and 2 WVBA individuals (13%) said they did not practice any of the 6 offered alternatives. Loss rate statewide was 52%, twelve percentage points higher than the overall loss rate of 38%; for WVBA the 2 individuals had only 5% loss rate. Three WVBA members had 1

selection (loss rate 25%), 6 made 2 choices (had only 4% loss) and 4 6 made 3 choices; their loss rate was 48%.

Minimal hive intervention (209 individuals statewide, 6 of them WVBA beekeepers) was the most common option selected. The single choice that did seem to slightly improve survival was clean hive tool - 3 individuals, 11% loss. Figure 7 shows number of individual choices for WVBA members in () and percent loss of each selection



Statewide avoiding moving frames and reducing drifting were the two sanitation choice that demonstrated better average survival the past three years – 4 year loss rate was 35% for frame moving and 37½% for reducing drifting compared to overall rate of 41%, both relatively minor 6 and 3 ½ percentage point difference. Distinctive hive address via painting (40% this year which was also 3 year average) had but a single percentage point advantage over average loss rate (41%) of last 3 years.

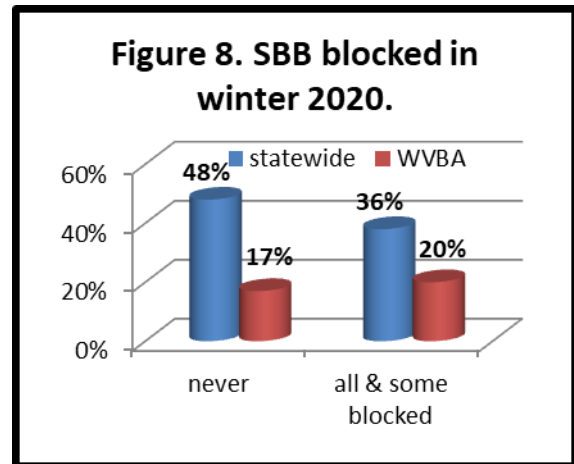
SCREEN BOTTOM BOARDS (SBB)

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 30 individuals statewide (10%) and 2 in WVBA (12%) said they did not use screen bottom boards. This was the lowest percent of respondent non-use of SBB statewide in last 6 years. Average non-use is 18% vs 82% use on some or all colonies over the 6 year period.

This past overwintering season, the 30 statewide non-SBB users (10% of respondents) had 222 fall colonies of which they lost 120 for 54% loss. The 220 beekeepers using SBB on all of their colonies had 37% loss. This was the greatest difference between non-users and users in past 5 years. **Examining the five year**

average of SBB use, loss level of those using SBB on all or some of their colonies had a 41% loss level whereas those not using SBB had loss rate of 36% (a 5 percentage point 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. This past season 12 WVBA respondents (80%) always or sometimes blocked their SBBs. Those who said they never blocked (3 individuals in WVBA) had a 20% winter loss, a 3 percentage point difference. **Comparing the always and sometimes left open with the closed in winter (all closed + some closed) response reveals an 12 percentage point difference in favor of closing the SBB statewide over the winter period to improve survival** See Figure 8.



Summary: Screen bottom board use has a slight survival advantage. For those using SBB, the advantage appears to be to close, partially or completely the open screen bottom over the winter period.

Things that seem to improve winter success: It should be emphasized that these comparisons are correlations not causation. They are single comparisons of one item with loss numbers. WVBA beekeepers do not do only one management nor do they necessarily do the same thing to all the colonies in their care. We do know moisture kills bees, not cold, so we recommend hives be located in the sun out of the wind. If exposed, providing some extra wind/weather protection might improve survival.

Feeding, a common management appears to be of some help for beekeepers statewide in reducing losses. Feeding fondant sugar, a hard sugar candy or dry sugar during the winter means lower loss levels. Providing frames of honey and feeding sugar syrup also meant lower losses for some individuals and such feeding management is of great value for the spring development and/or development of new/weaker colonies. Feeding protein in form of dry pollen and pollen patties did slightly improve survival. The supplemental feeding of protein (pollen patties), might be of assistance earlier in the season to build strong colonies and in the fall to build the fat bee population needed for successful overwintering.

Winterizing measures that apparently helped lower losses for some statewide beekeepers was, a moisture trap (Vivaldi board or quilt box) and upper insulation, plus wrapping the colonies (or otherwise adding some insulation to provide added protection against the elements). Spreading colonies out in the apiary and doing other measures to reduce drifting also appeared to be of some value in reducing winter losses. Avoiding movement of frames from one colony to another might also improve survival but the gain over what this interchange might accomplish to bolster weak colonies and start new divides might be greater than a minor advantage in survival.

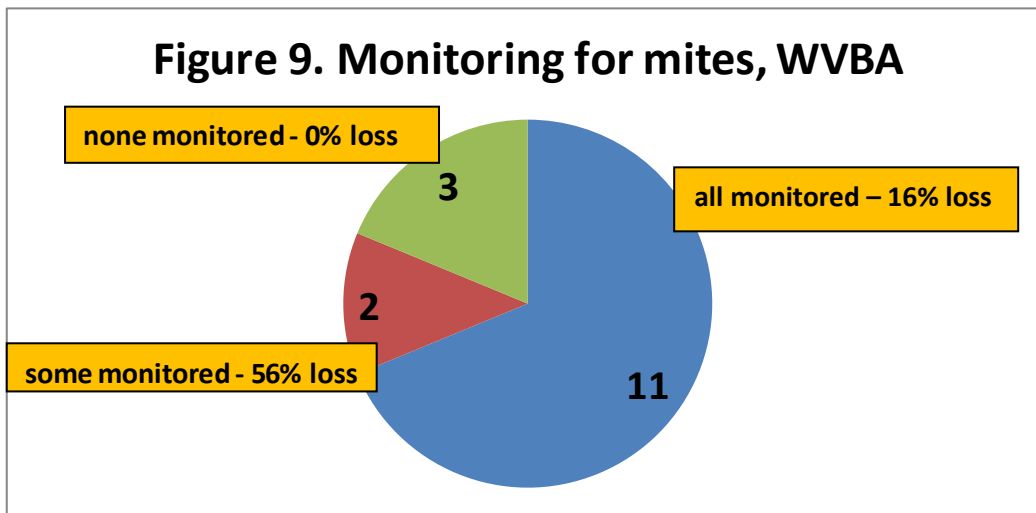
It is clear that doing no feeding or winterizing or sanitation resulted in the heaviest overwinter losses.

Replacing standard bottom boards for screened bottoms marginally improved winter survival. It is apparently advantageous to close the bottom screens during winter.

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 9.

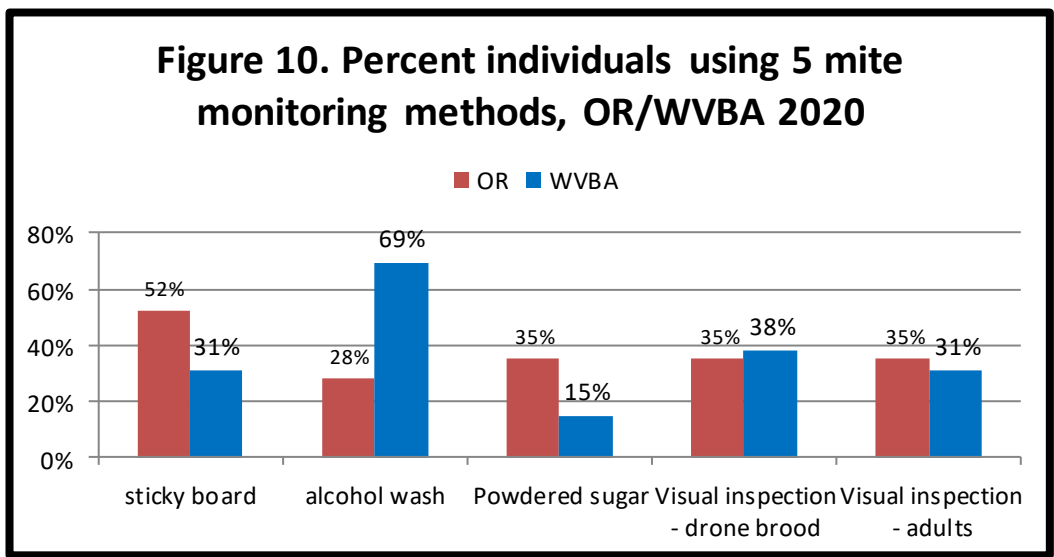
Among WVBA 11 individuals (70%) monitored all colonies; they had 16% loss. Three individuals (18%) did no monitoring and they had zero loss



It is obvious from statewide data that monitoring alone is a means towards improved winter survival (although this was not the case with the 16 WVBA respondents). 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.

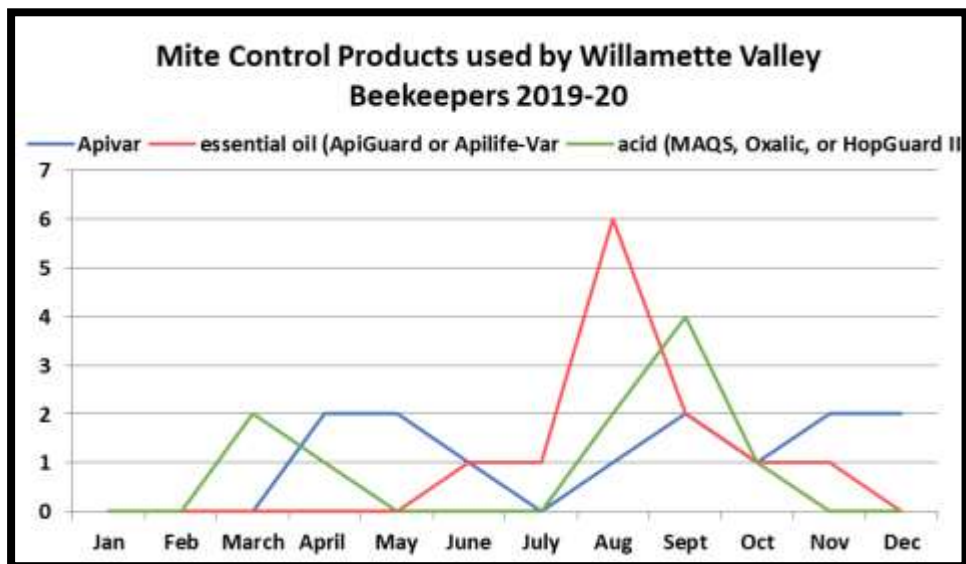
	ALL Colonies Monitored % individuals	% loss	SOME Colonies Monitored % individuals	% loss	No colonies Monitored % individuals	% loss
2019	67%	51%	15%	50%	18%	59%
2018	63%	38%	14%	26%	26%	49%
2017	63%	43%	15%	60%	22%	48%
3 year loss age		44%		45%		53%

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 sticky boards 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 10 red bars are statewide responses and blue is WVBA.



Six WVBA respondents said they treated but did not sample. Three sampled pre versus zero sampled post treatment while 5 individuals sampled both pre and post treatment. One sampled but did not treat.

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



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. Two WVBA individuals (12% compared to 12% statewide) said they did not employ a non-chemical mite control and 2 WVBA individuals, did not use a chemical control (statewide=20%). Those WVBA individuals who did not use a non-chemical treatment had a 33% loss, about ½ the statewide level, 61%. The 2 LBBA members not using a chemical control had a loss rate of 50%; statewide lost rate=57% of colonies for individuals using no chemical treatment.

NON-CHEMICAL CONTROL: Of nine non-chemical alternatives offered on the survey (+ other category) 2 individuals selected none – they had 33% loss. The remaining 14 individuals selected 1 to 5 treatment choices (2 chemicals was most common (5 individuals) with 3 selected by 4 members), 61 total or 2.6/individual.

Use of screened bottom board (12 individuals) was most common. The use of the remaining selections are shown in Figure 12; number of individuals in (), bar length represents average loss level of those individuals using each method. The one individual using hygienic queens (12 colonies, zero loss) and the 7 individuals using drone brood removal (7% loss) had the best survival.

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.

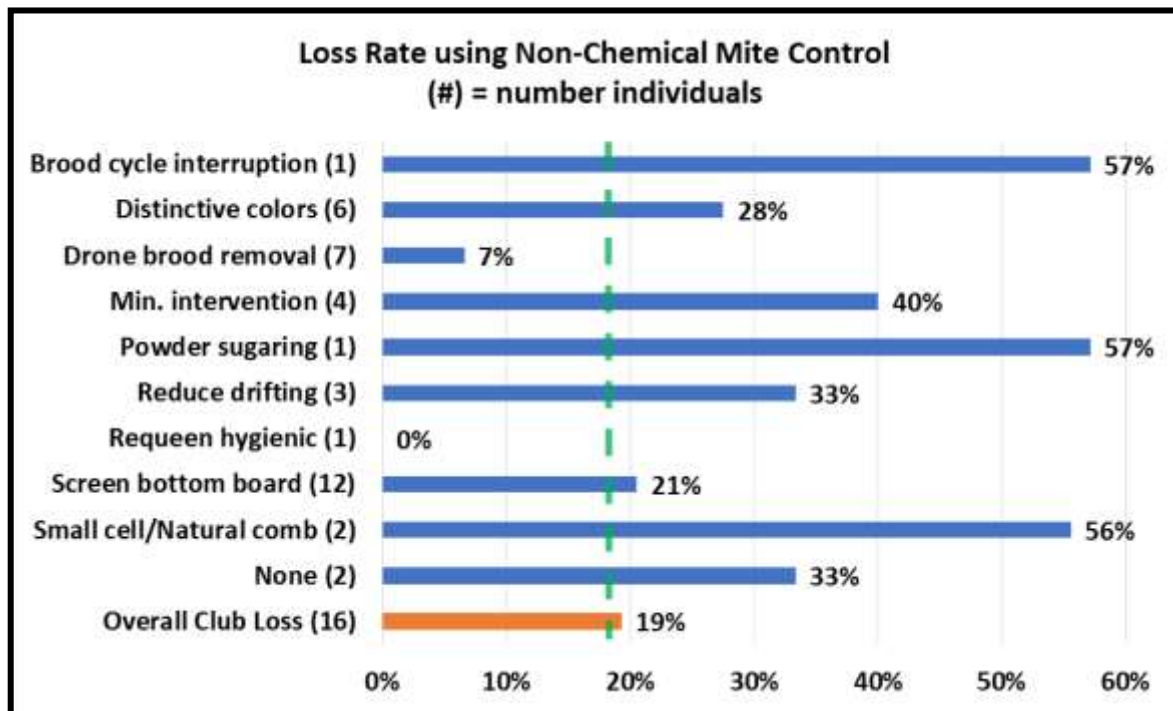


Figure 12

Chemical Control: For mite chemical control, 99 individuals (24% of total respondents) used NO chemical treatment Statewide and for WVBA members 2 individuals (12%) used no chemical treatments. Those using chemicals used at rate of 1.8/individual statewide and 2.6/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 3 individuals used one chemical (they had a 50% loss), 4 used 2 (20% loss), 5 used 3 chemicals (8% loss), and 1 each used 4 and 5 chemicals - they had 23% loss.

One hundred thirty OR Beekeepers indicated use of MAQS, formic acid, plus an additional 13 used Formic Pro; only the Formic Pro use improved survival. The same holds for WVBA formic acid users; seven WVBA members indicated use of MAQS (not better survival) but none indicated use of Formic Pro. Figure 13 illustrates number of uses () and bar length indicates the loss rate for those using that chemical. The essential oil products (Apiguard and ApiLifeVar) plus Apivar users had better survival.

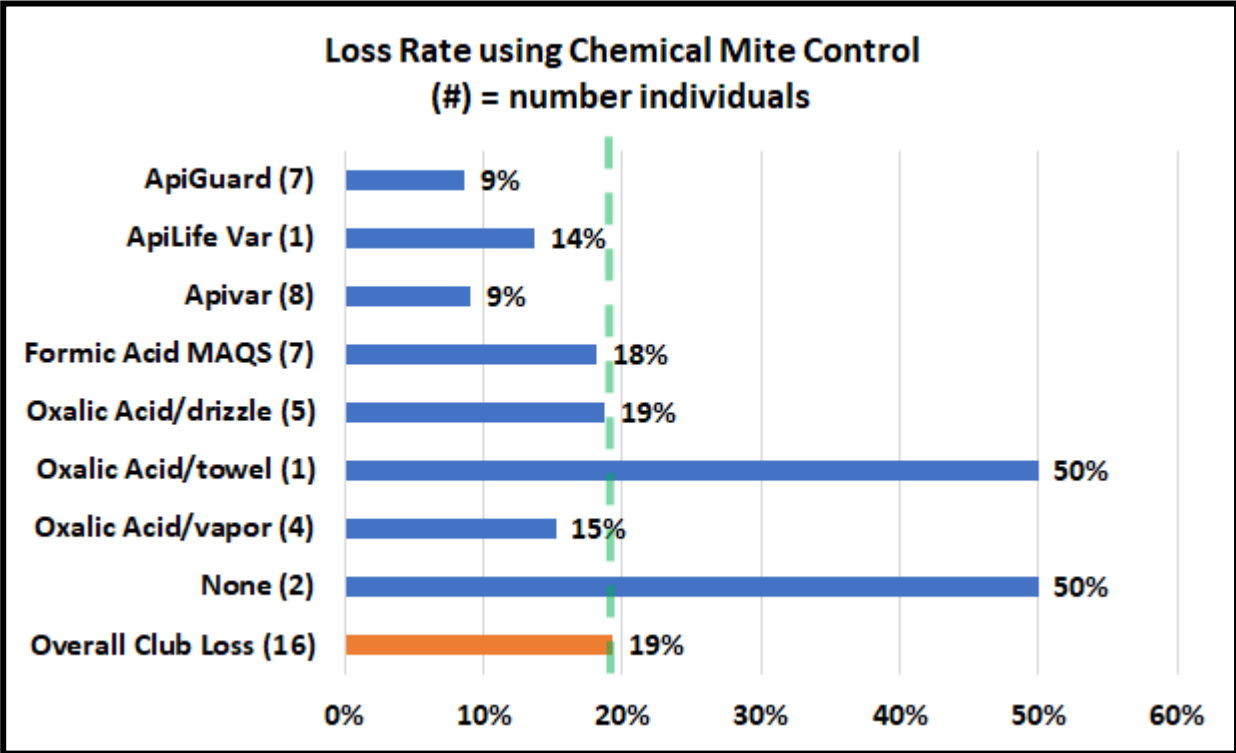


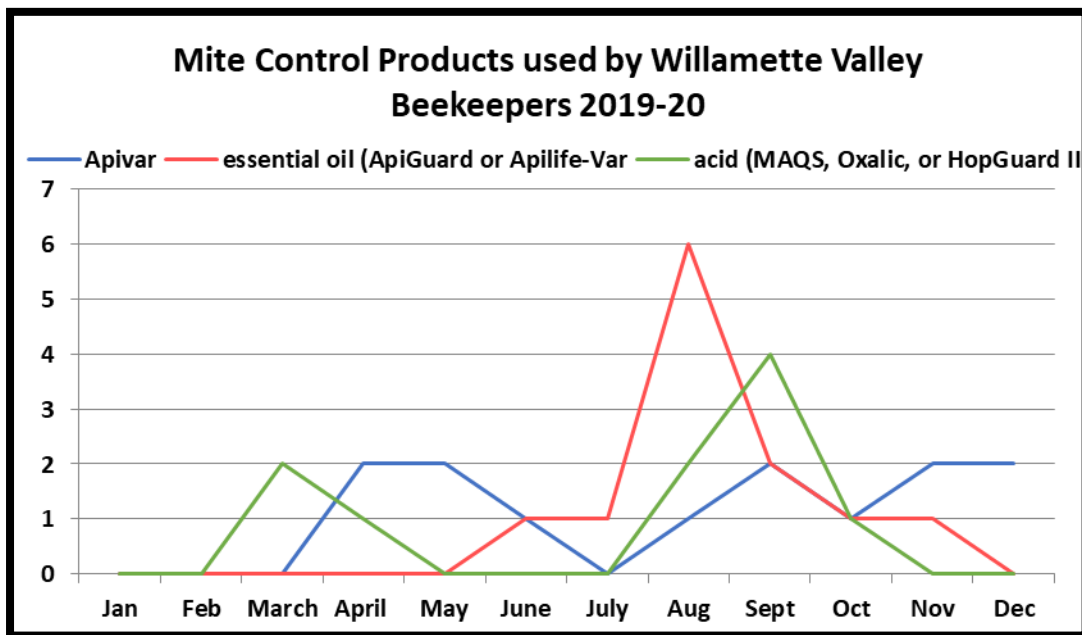
Figure 13

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 8 WVBA users it did improve survival. Oxalic acid vaporization over past 3 years has a 13% better survival (the survey did not differentiate Oxalic vaporization from drizzle in 2016). Oxalic vaporization did slightly improve survival this past year for WVBA members; drizzle or shop towel application did not.

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 14. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals.

Figure 14





Queens

We hear lots of issues related to queen “problems”. Five WVBA individuals (33%) said they did not have any queen issues and 1 said they didn’t know. Three of the 5 individuals (checked 10-30% and another 2 checked 30-50%. Statewide 50% said none and 19% 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. Four individuals said yes (25%) and 12 said no. Statewide 31% said yes. The related question then was did you or your bees replace their colony queen? Eight said yes, 3 did not know and 5 said no; statewide 45% said yes, 33% said no.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. Responses to the question “How did bees/you requeen” included five individuals who used a mated queen and 3 who used queen cells. The remainder requeened naturally via supersedure (2 individuals), split and raised their own queens (4 individuals) and 4 also said their colonies swarmed as queen replacement method. Statewide one-third of respondents indicated their bees were requeened with a mated queen and 58% indicated it was the bees that requeened via swarming (22%), supersedure (16%) or emergency rearing (20%). 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 May 2020