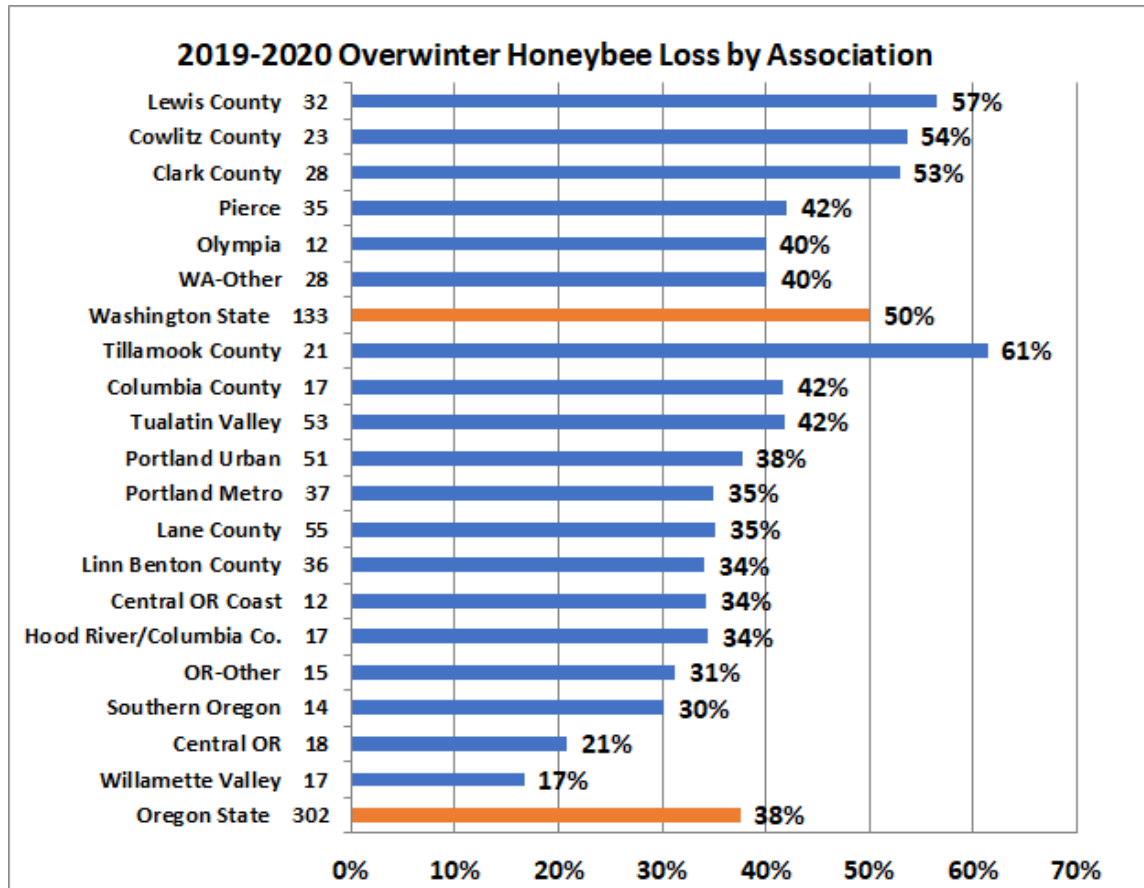


Cowlitz Co beekeeper Losses 2019-20 by Dewey Caron

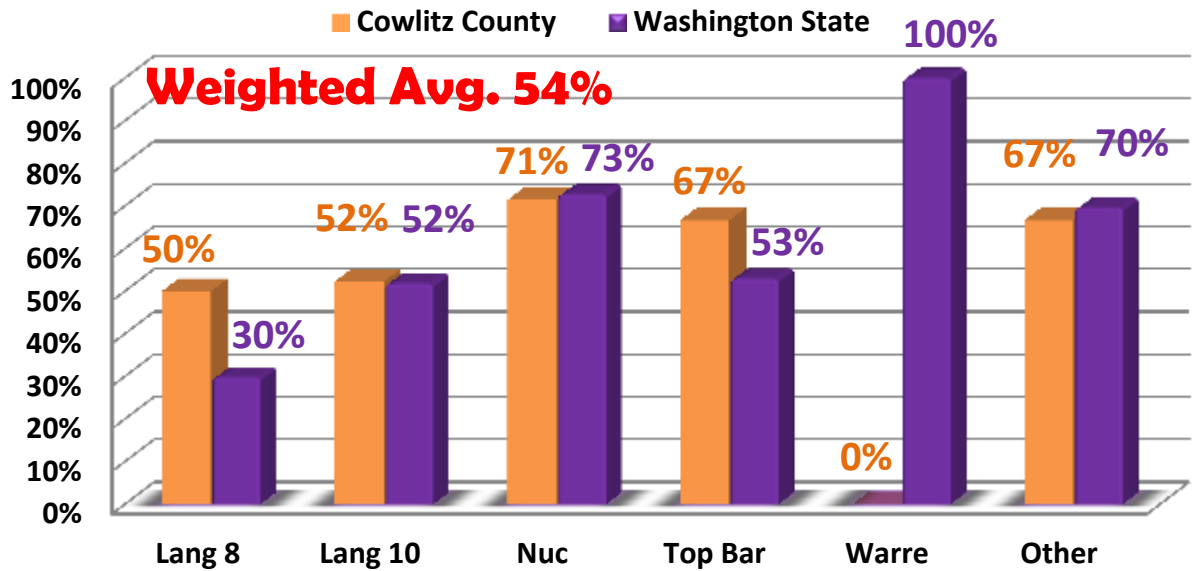
Overwintering losses of small scale Washington beekeepers was determined from information provided by 133 Washington backyard beekeepers with an electronic honey bee survey instrument www.pnwbeehoneybeesurvey.com. Statewide losses were 10 percentage points less than last winter but Cowlitz losses were elevated from the previous year. Twenty three Cowlitz beekeepers returned surveys reporting on 113 fall colonies. Figure 1 shows total WA & OR response. Or losses (38%) statewide were once again lower (by 12 percentage points) compared to those of Washington beekeepers.



Cowlitz Co backyard beekeeper overwinter loss = 54% loss.

The loss survey overwintering statistic was developed by our asking number of fall colonies and surviving number in the spring by hive type. Results, shown in Figure 2 bar graph illustrate overwintering losses in comparison with other Washington beekeepers. All but 3 top bar hives of the 113 total fall hives were movable comb Langstroth (8 and 10 frame hives plus 7 nucs).

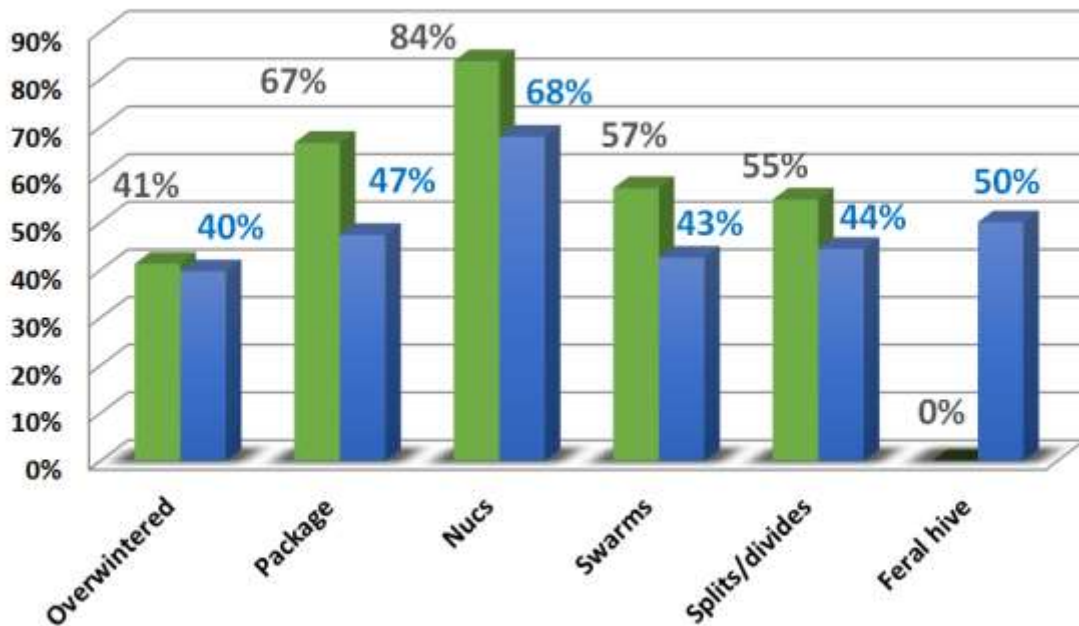
Figure 2 Winter Honeybee Loss % by Hive Type, 2019-20



| | | | | | | |
|--------|----|----|---|---|---|---|
| Fall | 22 | 88 | 7 | 3 | 0 | 3 |
| Spring | 11 | 42 | 2 | 1 | 0 | 1 |

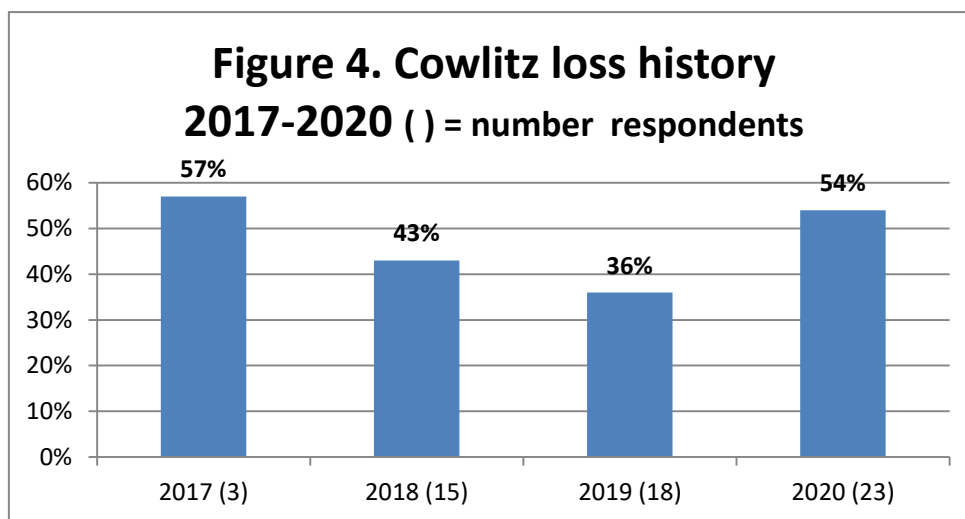
Loss by hive origination: We also asked survey respondents to list their loss by hive origination. The result is graphically presented in Figure 3 for the 18 Cowlitz Co respondents, alongside the data for the 133 Washington State survey returners. There was great similarity of Cowlitz loss levels with statewide although higher in all instances.

Figure 3 2019-20 Winter Honeybee Loss % by Origination

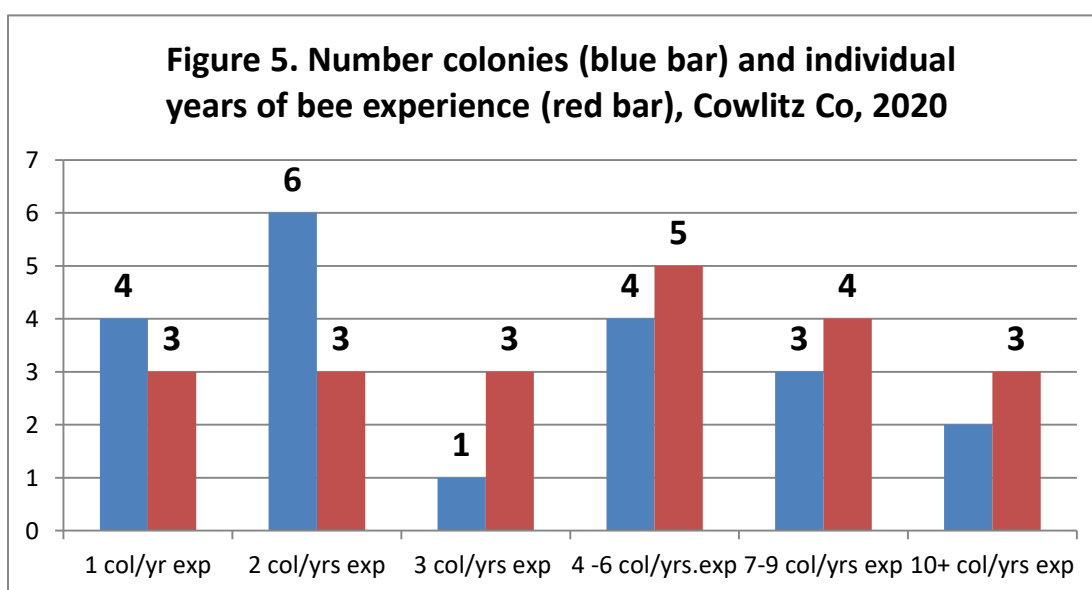


| | | | | | | |
|--------|----|---|----|----|----|---|
| Fall | 46 | 3 | 37 | 21 | 42 | 0 |
| Spring | 27 | 1 | 6 | 9 | 19 | 0 |

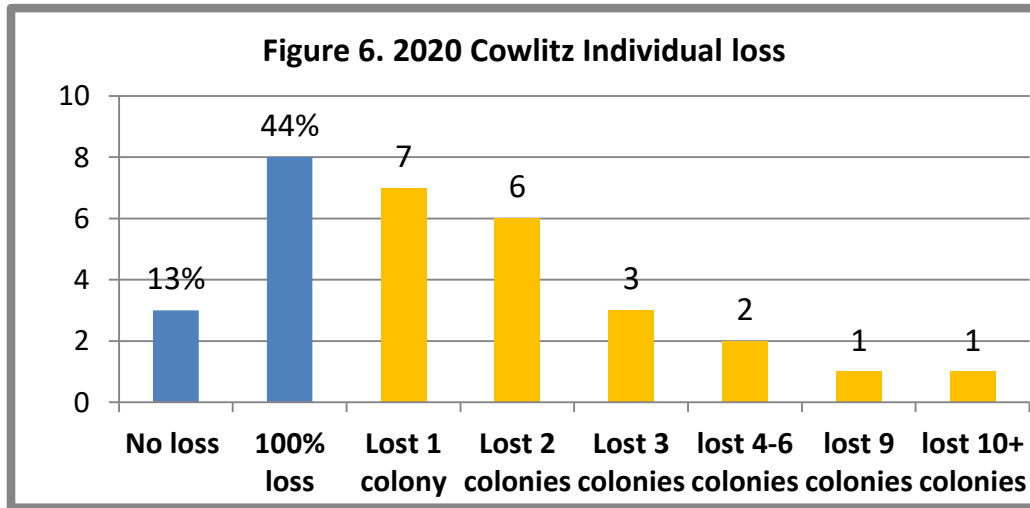
Loss History Losses this past overwinter returned to greater than 50%. Response (23 individuals) was increased by 5 individuals from last year. NOTE: 2019 losses were lowest among tallied Washington clubs. Figure 4 shows 4-year Cowlitz loss history (bars) with number of survey respondents (in () on x-axis.)



The 23 Cowlitz Co respondents to the electronic survey had 1 to 36 colonies. Eleven (48%) had 1, 2 or 3 colonies. Four had 4-6 and 3 had 7-9 colonies. Two had 10+ (highest number 36). Nine individuals (45%) had 1, 2, or 3 years' experience. Five had 4-6 and 3 had 7-9 years experience. Three had 10+ with 45 the highest. Some questions not answered by all individuals – in this instance 20 of 23 individuals provided an answer.)



Colony Losses. Individuals with 1-3 colonies lost 74% of their colonies, those with 4-6 fall colonies lost 68% and the 2 individuals with 10+ lost 63%. Individuals with 1-3 years experience lost 80% of their colonies, those with 4-6 years experience lost 65% and the 3 individuals with 10+ years experience lost 59%. For the 23 respondent Cowlitz beekeepers, 3 individuals (13%) had no loss but 8 individuals (=35%) loss all their colonies. Seven individuals lost 1 colony, 6 individuals lost 2 colonies. 3 lost 3, 1 each lost 4, 5 and 9 colonies. Heaviest loss was 20 colonies.



Self-reported “reasons” for colony losses: One survey question asked respondents to check the “reasons” for winter loss; multiple responses were possible. There were a total of 35 selections (2.6/individual) provided by Cowlitz County respondents as the reasons for their overwintering losses. Five individuals said they didn’t know reason for loss. Varroa mites, most commonly chosen by statewide beekeepers, were indicated by 8 Cowlitz individuals. Weak in fall and queen failure by 6 individuals each, yellow jackets by 4 and 3 picked both poor wintering and starvation. He one other was Nosema.

| | Varroa mites | Poor wintering conditions | Weak in fall | Queen failure | Starvation | pesticides | Yellow jackets | Other |
|-------------|--------------|---------------------------|--------------|---------------|------------|------------|----------------|-------|
| Cowlitz # | 8 | 3 | 6 | 6 | 3 | 0 | 4 | 1 |
| Co % | (44%) | (17%) | (33%) | (33%) | (17%) | | (24%) | (5%) |
| Statewide % | 18% | 9% | 17% | 15% | 9% | 3% | 10% | 10% |

Acceptable loss. When asked to choose an acceptable loss Cowlitz Co mirrored statewide respondents. Greatest % selection was 25%, both for Cowlitz Co and Statewide. Medium number for Cowlitz was 10%; statewide medium was 20%.

| | None 0% | 5% | 10% | 15% | 20% | 25% | 33% | 50% | 75% | Total 100% |
|-----------|------------|----|-----|-----|-----|-----|-----|-----|-----|---------------|
| Cowlitz | 4 | 0 | 6 | 2 | 2 | 2 | 1 | 3 | 1 | 0 |
| Statewide | 12 | 7 | 10 | 4 | 16 | 21 | 12 | 8 | 3 | 1 |

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. Cowlitz Co individual choices varied from zero to 75%, with medium of 10%, ½ of statewide acceptable level.

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 colonies are not as healthy as they should be.

Colony Managements

We asked in the survey for information about some managements practiced by respondents. 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 multiple 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.

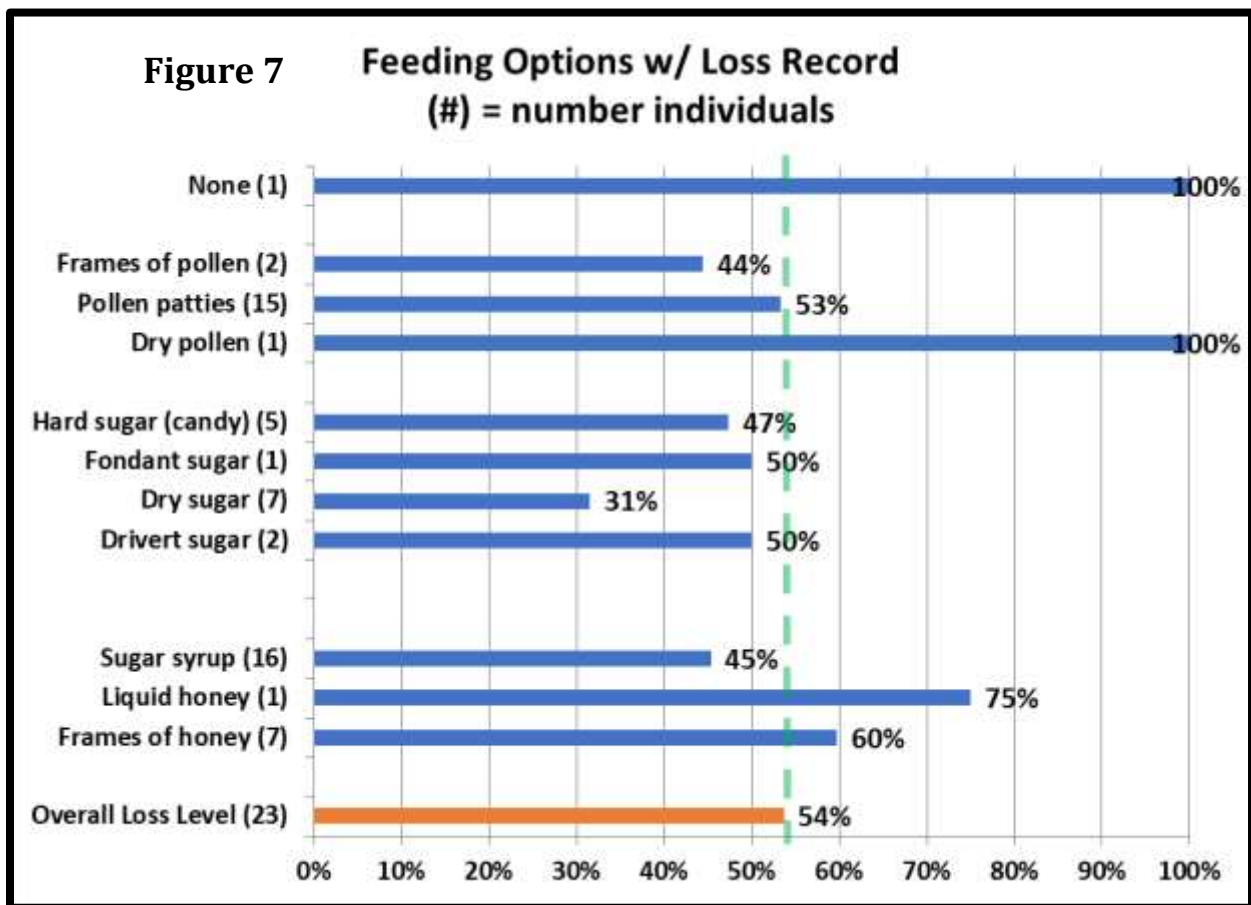
Most Washington beekeepers do not perform just one management to their colony (ies) toward improving colony health and overwintering success. This analysis however compares a single factor equated with loss level. Such analysis is correlative and doing a similar management as fellow beekeepers does not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

FEEDING: Cowlitz survey respondents checked 57 feeding options = 2.6/individual. One individual made no selection – they had 100% loss (one colony). Three individuals selected a single

choice and had 86% loss level, 6 indicated 2 choices and had a 37½% loss, 8 (the greatest choice and also the median) made 3 choices and reported a 53% loss level and 4 had 4 and 5 choices with a 44% loss.

The choices, with percent of individuals making that selection is in (), bar length indicates loss level of individuals doing this management, Figure 7 below. Those bar lengths to left of 54% (green dashed line) had better survival while those to right had greater loss level.

For individuals indicating one or more feeding managements, feeding sugar syrup was the most common feeding option of respondents (16 individuals, 100% of respondents). Their loss rate was 45%, 9 percentage points better survival than overall. Fifteen fed pollen patties and had same average loss level. The managements that showed best survival included feeding frames of pollen and feeding non-liquid sugar (especially dry sugar – 31% loss).

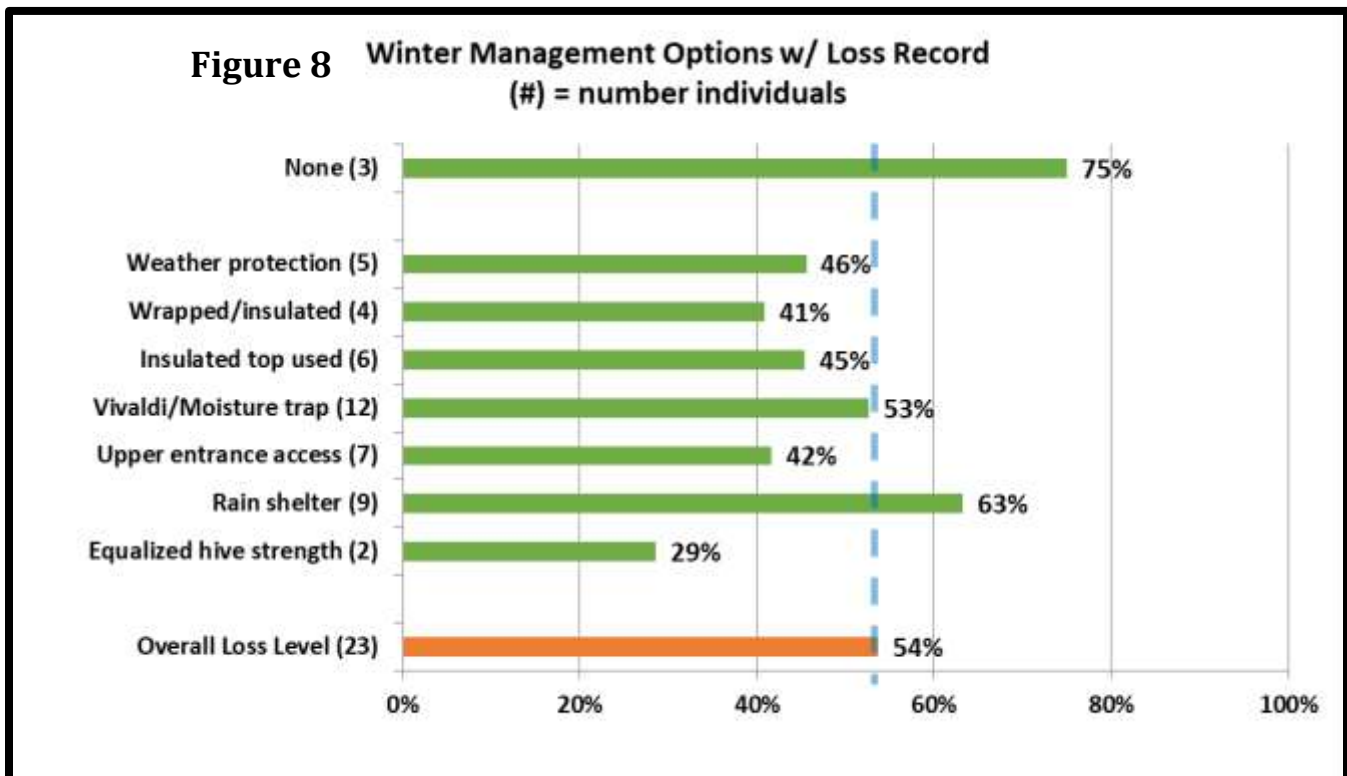


Statewide WA summary: For the last 3 years of losses individuals statewide doing no feeding had poorer survival all 3 years. Individuals that fed sugar syrup had marginal lower loss level in 3 of four years as did those using frames of honey to feed bees. Individuals feeding non-liquid sugar in the form of fondant and hard candy likewise had lower losses in at least two years, including this most recent survey year; hard candy improved survival in three of the four years. For individuals

feeding protein, protein patty users showed slightly better survival in 3 of 4 years and dry pollen feeders had significantly better survival in three of the four years.

WINTERING PRACTICES: We received 45 responses (2.3/individual) about WA beekeeper wintering management practices (more than one option could be chosen). Three individuals (18%) indicated none of the several listed wintering practices was done; these individuals had a 75% winter loss, 21 percentage point higher loss than overall loss of 54%. For those indicating some managements, 5 did one single thing had 69% loss level, 7 respondents doing 2 had 74% loss, 8 had 3 or 4 choices with a 48% loss.

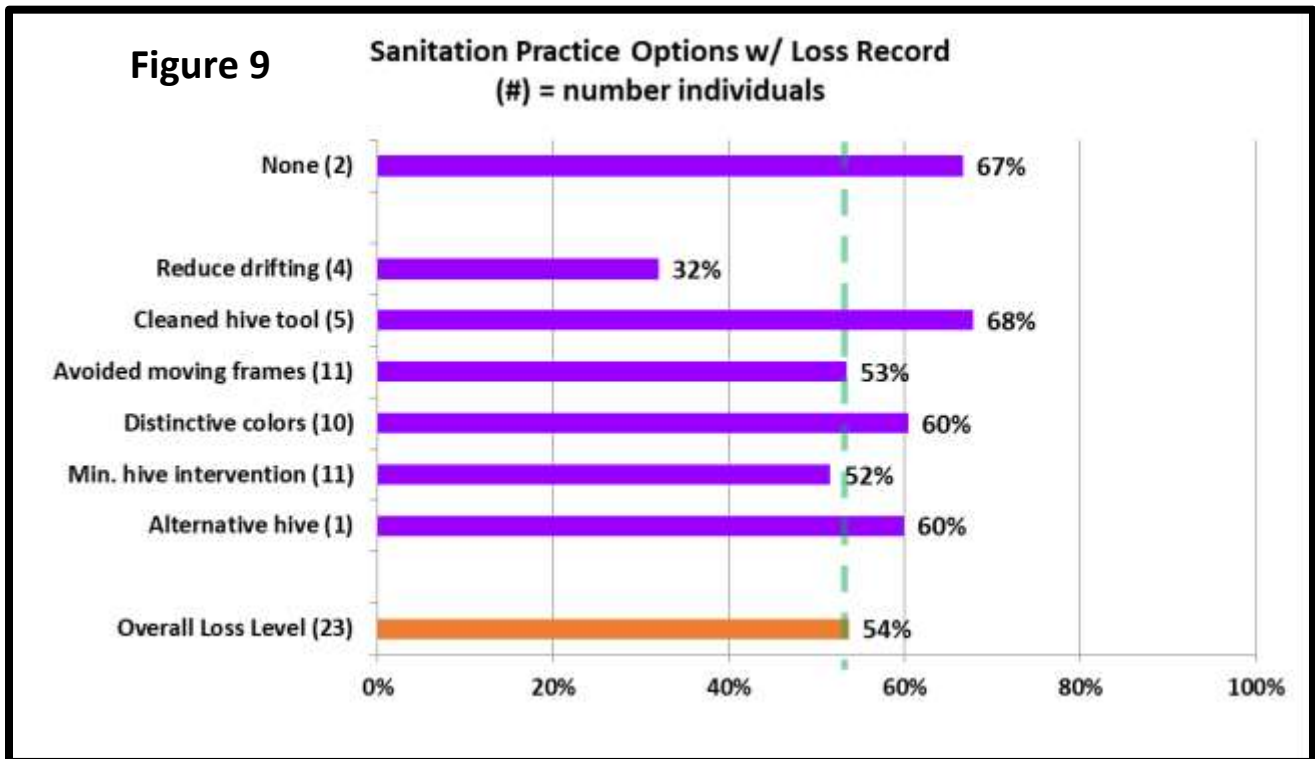
The most common wintering management selected was ventilation/use of a quilt box at colony top (12 individuals (86% of respondents with 53% loss), followed by rain shelter provision (9 individuals 63% loss) and upper entrance bee access (7 individuals, 42% loss). Figure 8 shows number of individual choices and percent of each selection. Bar length below 50% (blue dashed line) had better than average winter survival.



Statewide summary: Over the past three years a couple of winterizing management improved survival of Washington beekeepers. Those doing no winterizing had higher losses all 4 years. Equalizing hive strength in the fall demonstrated lower loss levels in all four recent winter periods. Top insulation has demonstrated lower loss in three of the four years and ventilation above the colony (Vivaldi Board/quilt box) demonstrated improved survival two of the four winters.

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. We received 43 responses for this survey question 1.6/individual. Two individuals (13%) said they did not practice any of the 6 offered alternatives; they had a loss rate of 67% compared to overall rate of 54%. Nine individuals had 1 selection and had 50% loss, 3 had 2 choices with 64% loss, 9 selected 3 or 4 managements with 54% loss.

In three of four years doing none of these managements resulted in improved survival; the two individuals in Cowlitz who indicted doing none had a 67% loss. Using an alternative hive resulted in lower losses in two of four winters while providing hives with color and distinctive hive ID measures were helpful managements only one of the past three seasons.

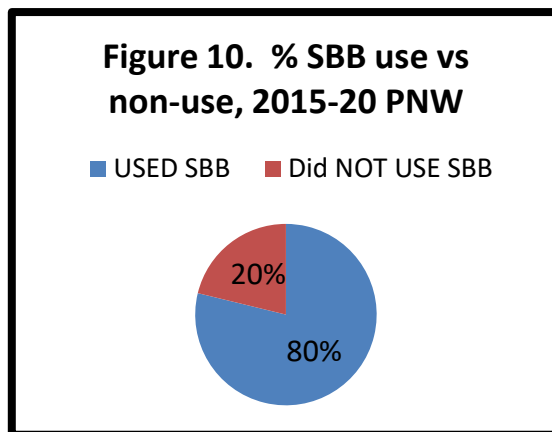


SCREEN BOTTOM BOARDS (SBB)

Although many beekeepers use SBB to control varroa mites, BIP and PNW surveys clearly point out they are not or at best not a very effective varroa mite control tool. In the most recent survey two Cowlitz individuals (9%) said they did not use screen bottom boards; they lost 56% of their colonies. Those 16 beekeepers using SBB on all of their colonies had 54% loss. The 5 individuals using SBB on some of their colonies had 48% 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.

Examining the five 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 10). This past season 10 Cowlitz individuals (48%) said they always blocked SBB during winter. They had a 40½% loss rate. Six individuals (29%) said they never blocked SBB and had loss rate of 61½%. Five individuals (24%) blocked them on some of their colonies. Their loss rate was 63%.

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. **Comparing the always and sometimes left open with the closed in winter response reveals a 21 percentage point difference in favor of closing the SBB over the winter period.. This relationship has been consistent over the past five years averaging over a 10 percentage point advantage when the SBB is closed during the winter.** 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.

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. Individual beekeepers do not do only one management option 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 in reducing losses. Feeding fondant sugar or a hard sugar candy during the winter meant lower loss levels. Providing frames of honey or sugar syrup, the most common selection, also meant slightly lower losses for some individuals but these basic managements are useful in other ways such as for spring development and/or development of new/weaker colonies besides insuring better winter survival.

Feeding protein in form of 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.

Winterizing measures that apparently helped lower losses for some beekeepers was equalizing strength, providing an upper entrance, a moisture trap (Vivaldi board or quilt box) and

some attention to adding protection against the elements. Spreading colonies out in the apiary and painting distinctive colors or 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 might be greater than a minor advantage in survival.

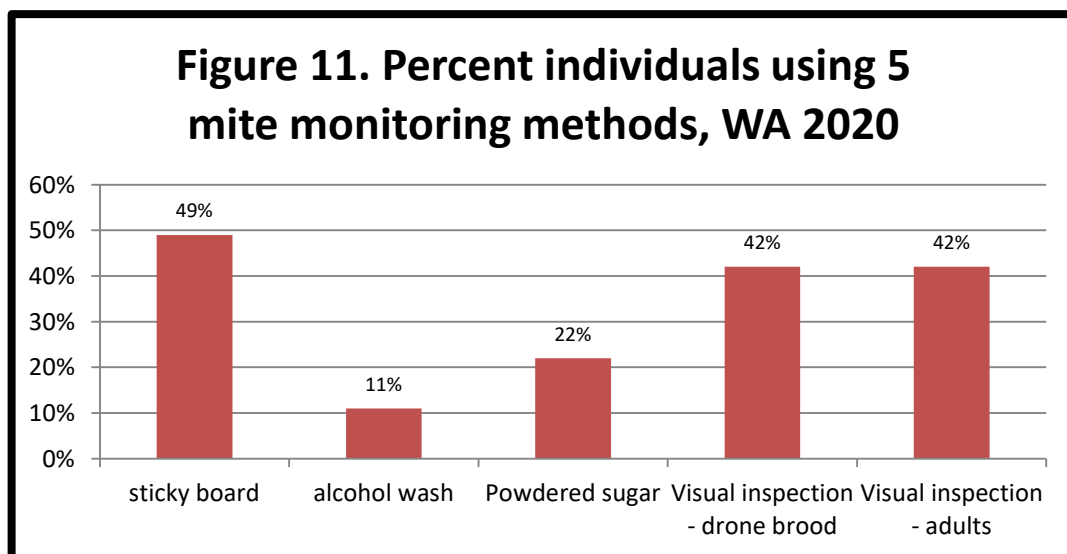
It is clear that doing nothing for feeding or winterizing or this past season in sanitation resulted in the heaviest overwinter losses.

Replacing standard bottom boards for screened bottoms only 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 Cowlitz hives monitored for mites during the 2019 year and/or overwinter 19-20, 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. Fifteen individual respondents (65%) said they monitored their hives. Losses of those individuals monitoring was 48%. Five (22%), reported no monitoring; they had a higher single percentage point higher loss rate of 70%. Three individuals monitored some with loss rate 78%.

In order of popularity of use, Sticky boards were used by 13 individuals, 72% total of 18 individuals who did some or all monitoring of colonies, followed by 7 individuals (39% of individuals doing monitoring) that used both visual inspection of adults and visual inspection of drones brood. The two most accurate means of determining mite load, alcohol wash was used by 2 individuals (11%) and powdered sugar was employed by 6 respondents (32%). Individuals were able to select more than one option and averaged 1.9/individual. Figure 11.



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

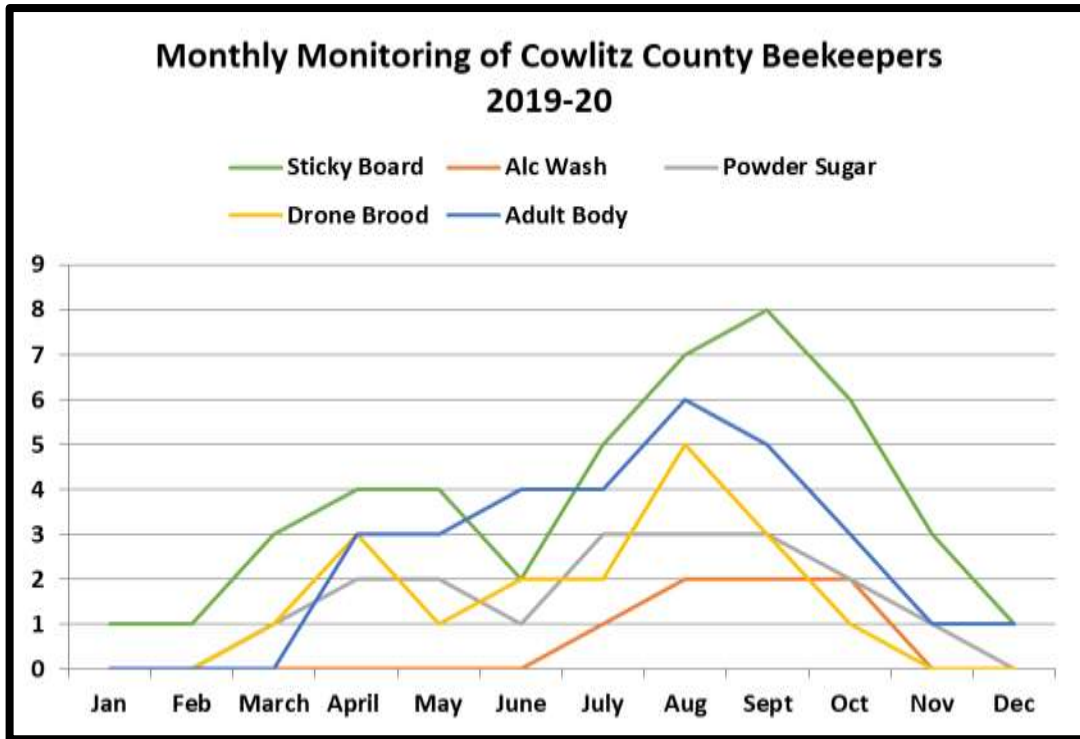
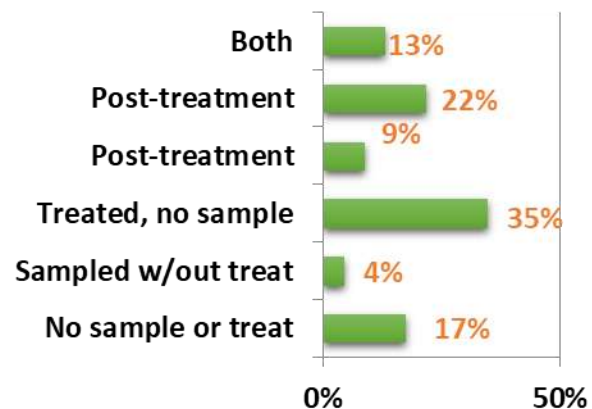


Figure 12

The most common sampling of respondents in 2018-19 was treated but did not sample (35% individuals) followed by not sampling nor treating 17%. Post treatment sampling was more common than either pre or both sampling. One individual sampled but did not treat. Selections shown in Figure 13.

Figure 13

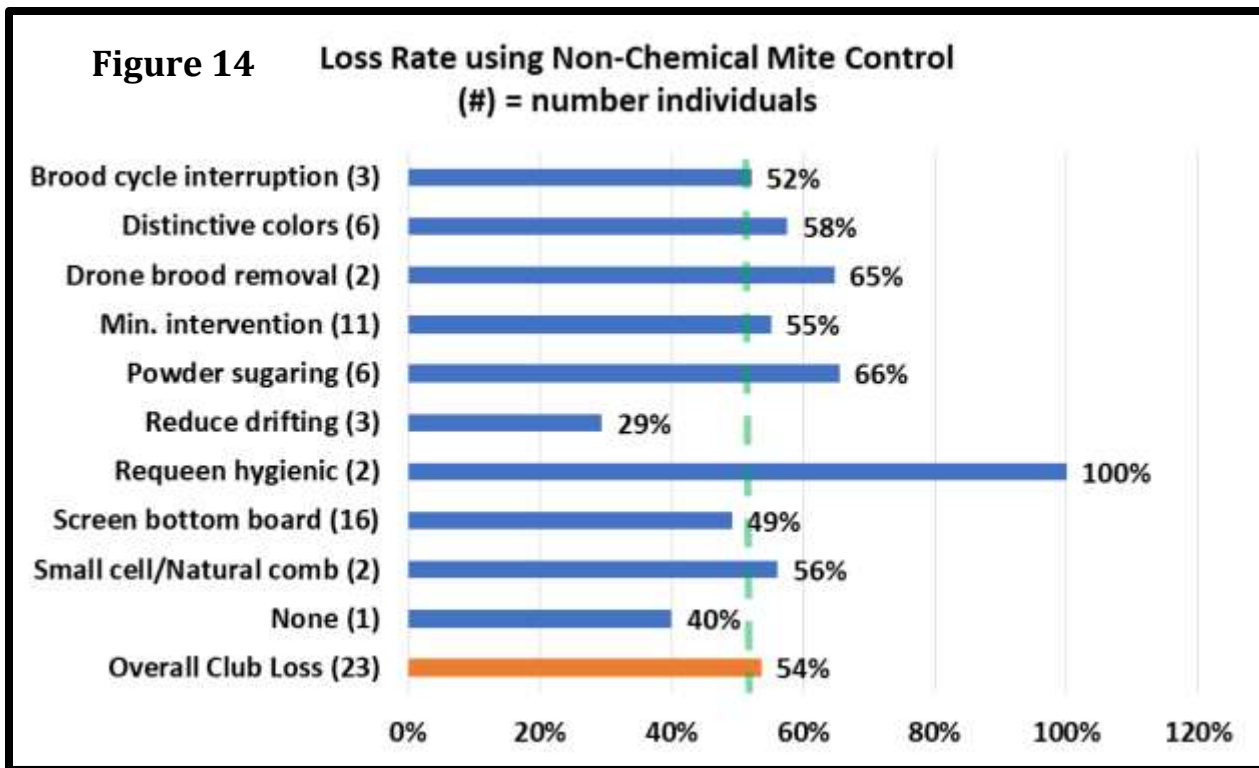
... and sampled



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.

Non-Chemical Mite Control: Of nine non-chemical alternatives offered on the survey (+ other category,) 7 individuals used one method and had a 21% loss, 4 used two (14% loss level), 8 used three (79% loss) and 3 used 4 or 5 (70% loss). Total selections were 51, 2.3/individual.

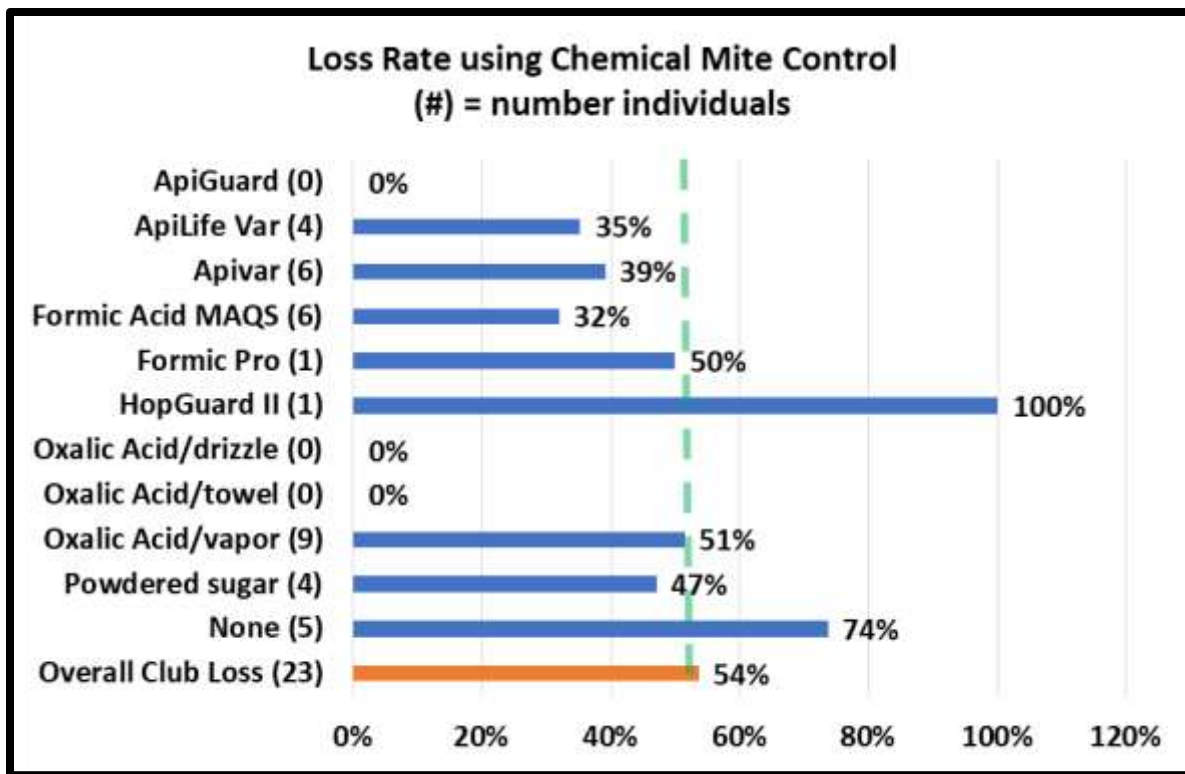


Use of screened bottom board was listed by 16 individuals. They had 5 percentage point better survival. The next most common selection was minimal hive inspection (11 individuals); they had average losses. The use of the remaining 7 selections are shown in Figure 14; number of individuals in (), bar length represents average loss level of those individuals using each method. Those to left of **green dashed line** had better than average survival.

Drone brood removal and painting hives distinctive colors has resulted in better survival in each of past three survey years for Washington beekeepers. None of the other choices has consistently in past years for statewide beekeepers improved survival.

Chemical Control: For mite chemical control, 5 individuals (223% of total respondents) used NO chemical treatment; these individuals had a 63% loss level. Those using chemicals used at rate of 1.7/individual. Seven individuals (41%) used one chemical and had 54% loss, six used two and also had 48% loss and 4 used 3 (39% loss). Nine (One half of respondents using chemicals indicated they most commonly utilized Oxalic acid vaporization but they only had a 3 percentage point improvement over average loss. Individuals using ApiLifeVar (4 individuals) and 6 individuals each that used Apivar and Formic acid (MAQS) showed the best survival. Figure 15 illustrates number of uses () and bar length indicates the loss rate for those using that chemical.

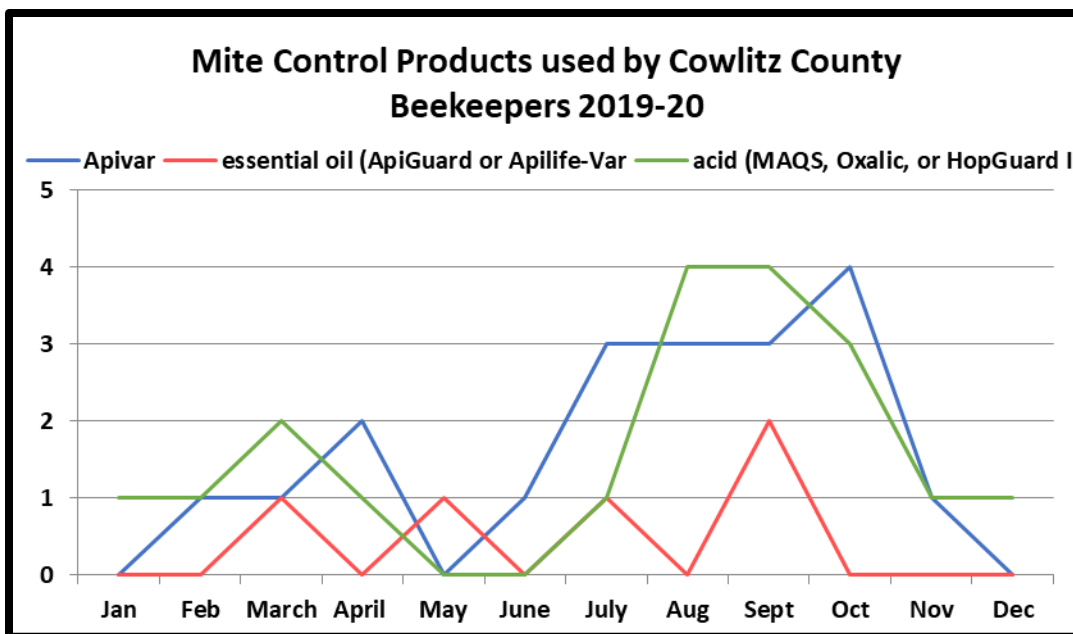
Figure 15



Consistently the last 3-4 years five different chemicals have helped beekeepers realize 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). 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.

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

Figure 16



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. Ten individuals (43%) subdivided queen related issues from 10 to 100% of their hives; the majority (5 individuals) indicated 10 to 30%. Ten six individuals also said none; an additional 5 individuals said they didn’t know. The number of respondents and percent losses of each is shown in Figure 17.

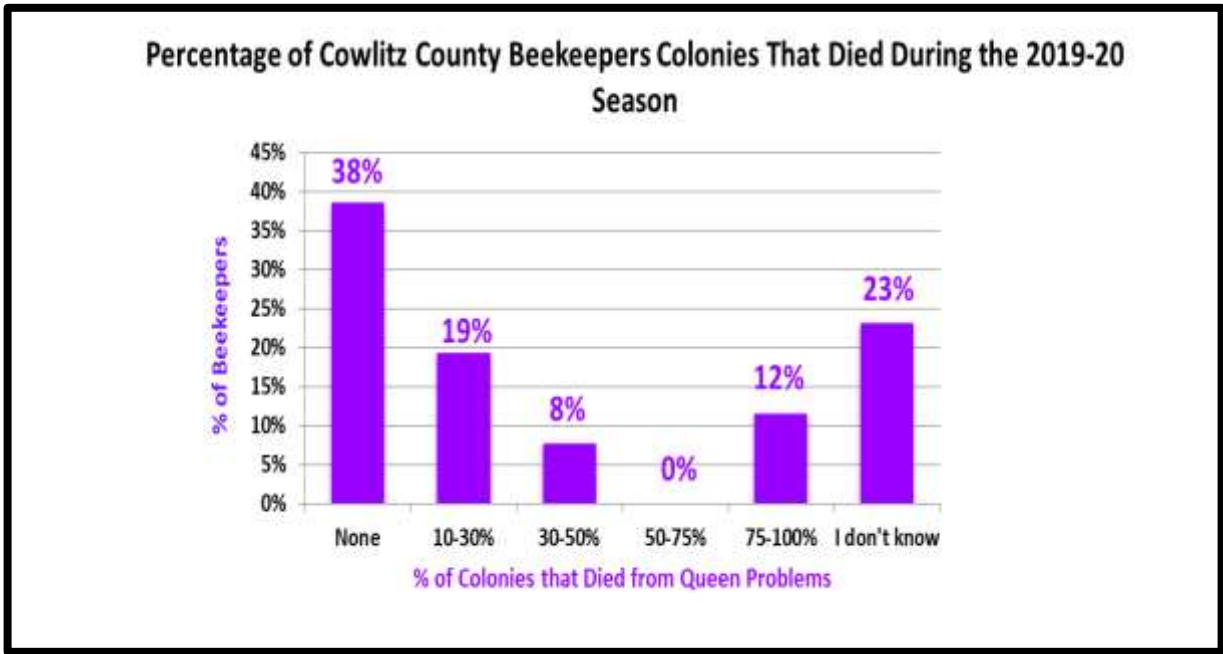
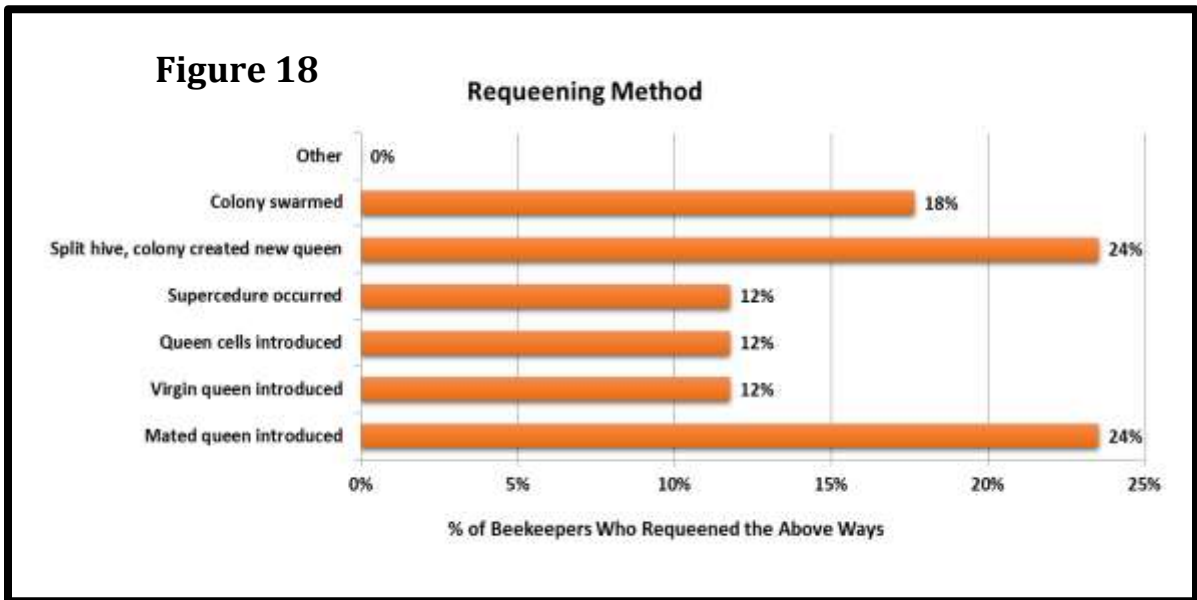


Figure 17

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. Three individuals of 21 said yes. The related question then was did you or your bees replace their colony queen? Ten said yes, 8 individuals said no, and 5 indicated 'not that that I am 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 17 responses. Four individuals indicated they requeened with a mated queen, 2 with virgin queens and 2 with queen cells. One more respondent said the bees requeened naturally via Supersedure (2 instances), splitting (4 individuals) or via swarming (3 individuals). With the exception of use of mated queen and splitting, loss levels were very similar

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 reporting losses of the larger scale WA beekeepers not the backyarders (Figure 5). Reports for individual bee groups with 18 or more respondents 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 2020