2020-2021 Cowlitz Winter Loss Report by Dewey M. Caron

Cowlitz members were encouraged to complete a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon and Washington. This was the 12th year of such survey activity. I received 163 responses from WA backyarders, keeping anywhere from 1 to 39 colonies; Cowlitz County members sent in 25 surveys, 2 more than last year, reporting on 178 fall colonies.

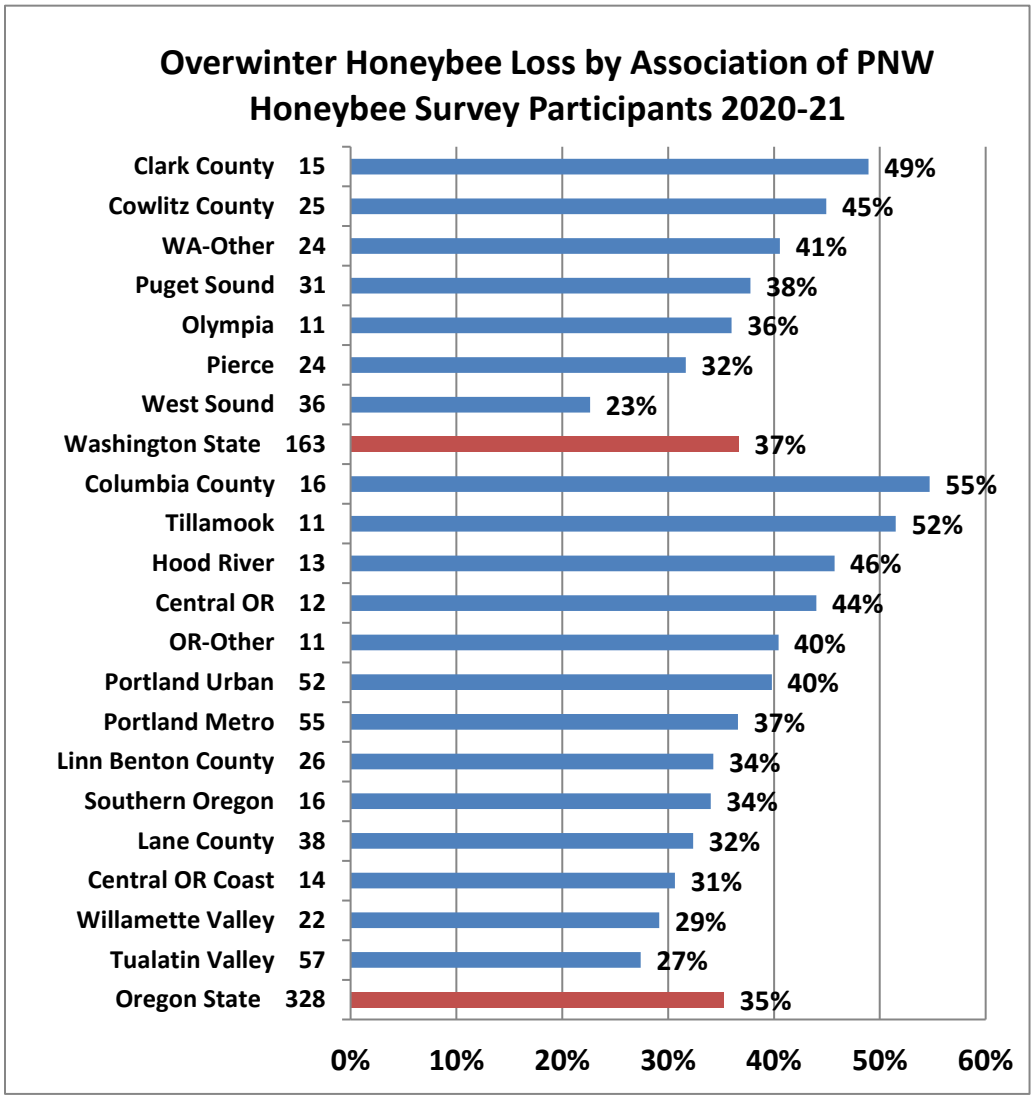
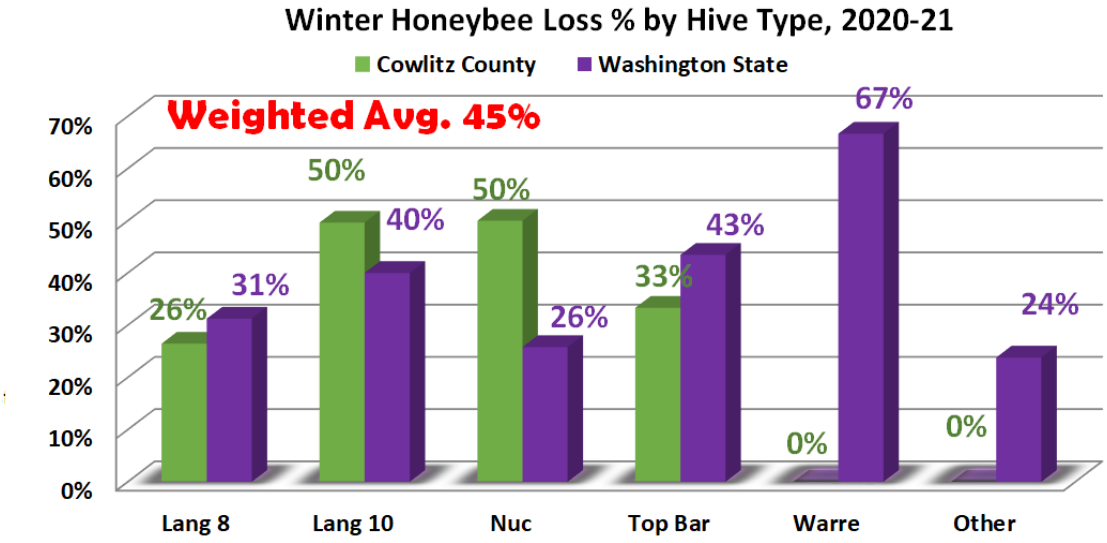


FIGURE 2

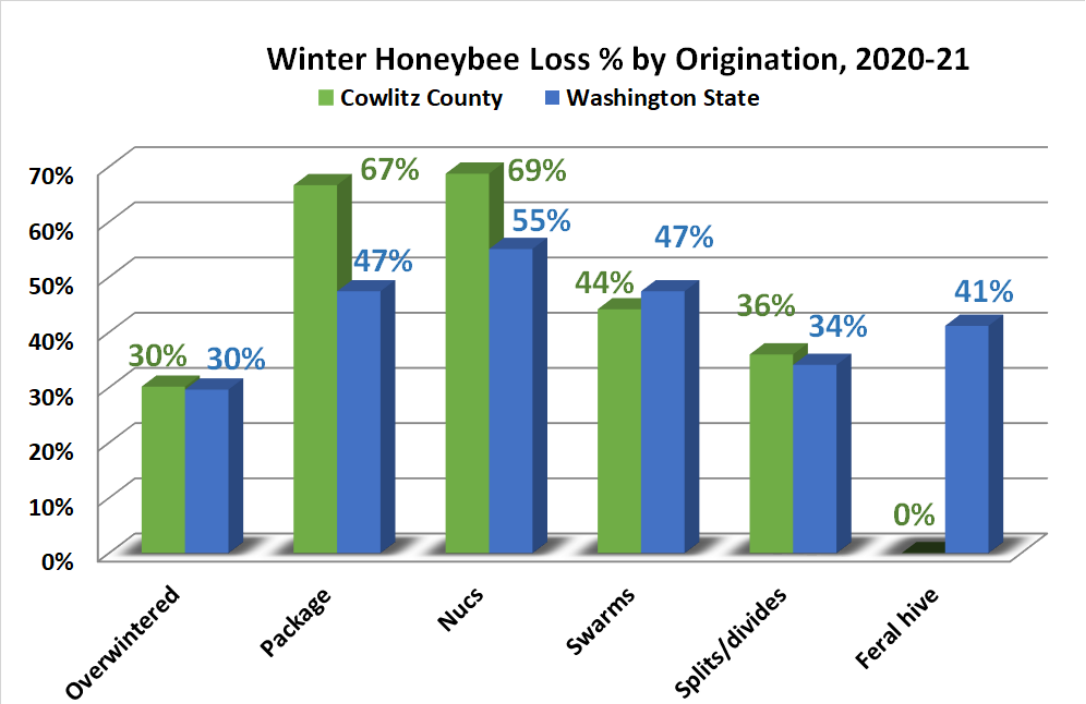
Overwintering losses of Cowlitz Co respondents = 45 %, an improvement from last year (losses last year were 54%) but greater than overall losses for Washington beekeepers of 37%**.** Percent losses, determined by hive types were 26% for Langstroth 8 and 50% loss for Langstroth 10 frames hives (there were 4 times the number of Langstroth 10 frames hives compared to 8 frame hives of respondents – 139 10-framers vs 34 8-framers). In addition, there were 2 nucs (1 lost) and 3 top bar hives (1 lost). Figure 2.



	Lang 8	Lang 10	Nuc	Top Bar	Warre	Other
Fall	34	139	2	3	0	0
Spring	25	70	1	2	0	0

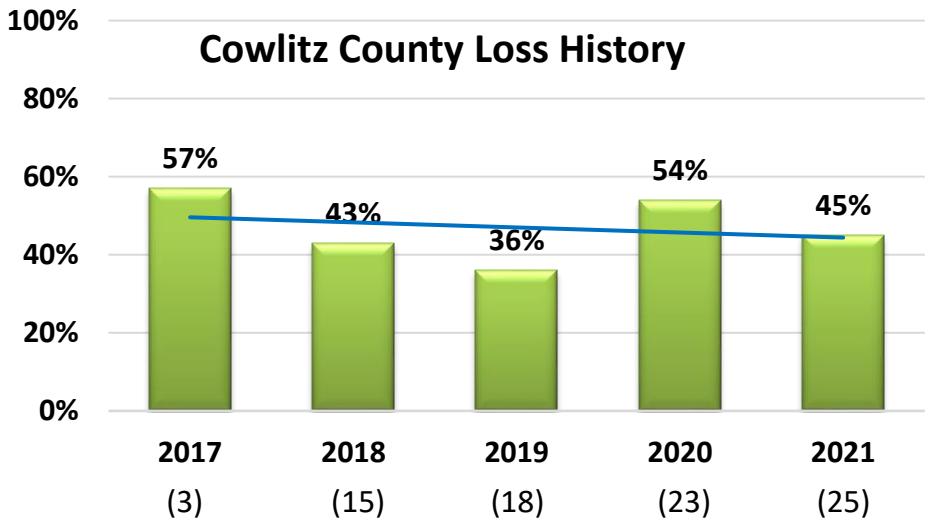
The survey also asked for hive loss by **hive origination**. The members reported 31% loss of previously overwintered colonies, a heavy 67% loss of the 6 packages and 69% of nucs (32 total), while swarm (44%) and split (36%) losses were intermediate. Most impressive was no loss of the 8 feral transfers.

Figure 3

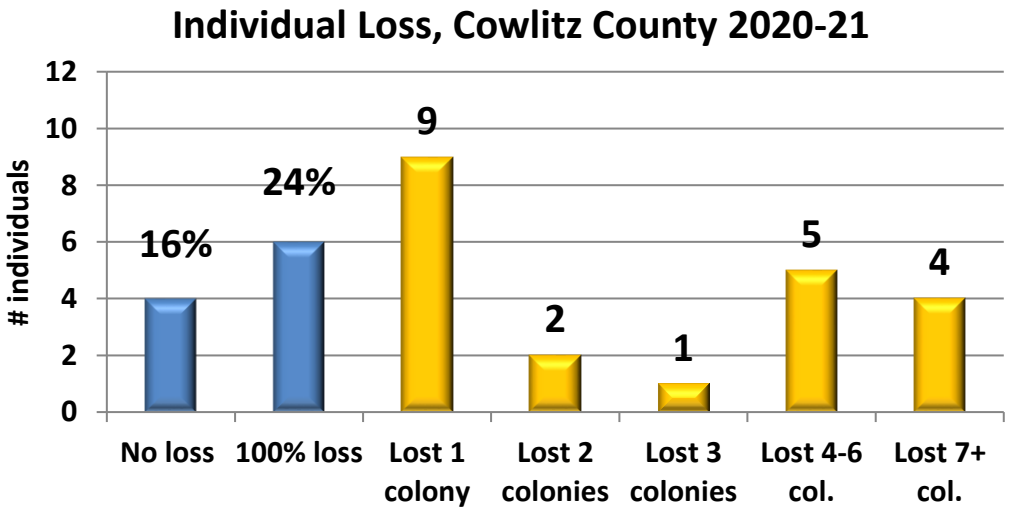


	Overwintered	Package	Nucs	Swarms	Splits/divides	Feral hive
Fall	63	6	32	43	25	8
Spring	44	2	10	24	16	8

Average winter losses of Cowlitz members were the 2nd highest of all 6 Washington clubs. It was lower than the past 5-year average of 47% colony losses for club members completing a survey. The **attached figure 4 shows Cowlitz losses for past 5 years**. The number below the year in ( ) is the number of survey respondents for the year.



Typical of the statewide data, the Cowlitz respondents are largely new beekeepers. 52% of Cowlitz respondents had 1 to 4 fall colonies while 5 respondents (20%) had 10+ colonies – maximum number for any respondent was 30 colonies. Not everyone had loss. Four Cowlitz individuals (16%) reported total winter survival; but unfortunately, 6 had 100% winter loss of colonies. Highest loss number was 1 colony with 12 colonies the heaviest loss for any member.



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. Nine individuals (45%) of those having losses said Varroa mites, 7 said didn't know, 6 individuals (30%) said weak in fall, 5 (25%) indicated queen issues, 4 individuals said poor winter conditions, 3 indicted yellow jackets, 2 said pesticides and 1 indicated starvation

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.

Major factors in colony loss are mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide exposure 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 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.

Colony Management

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.

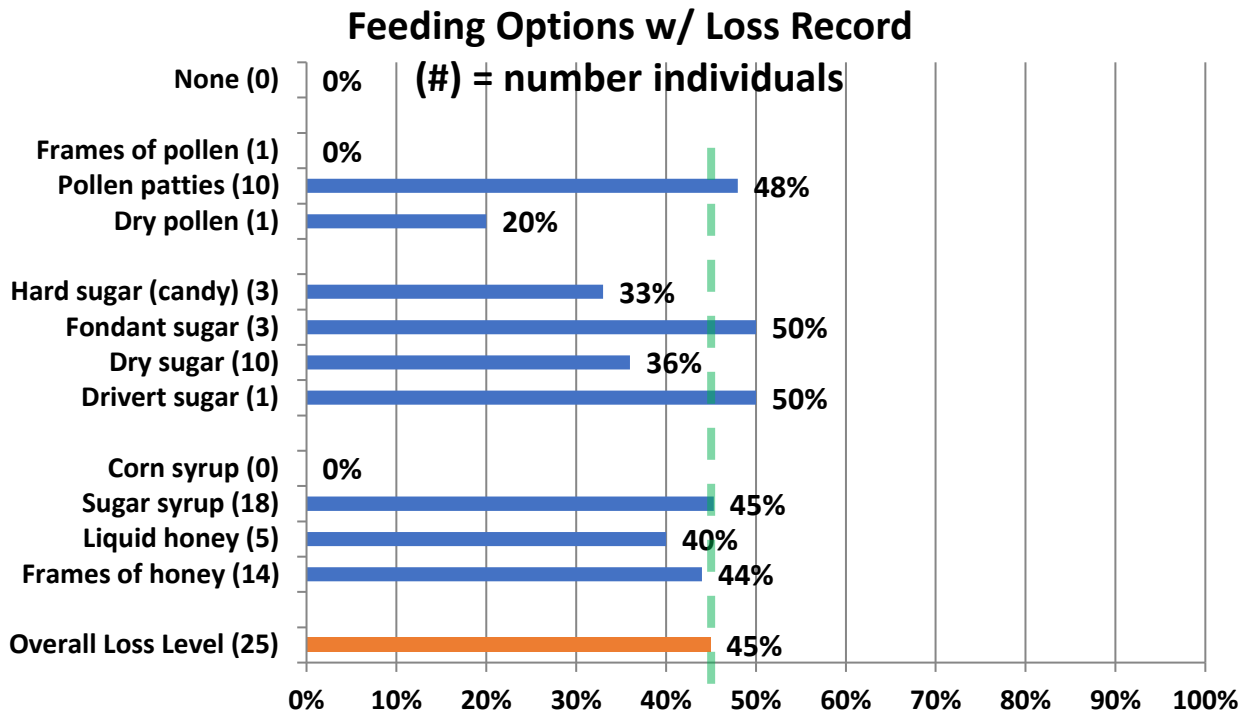
Most beekeepers do not perform just one management to their colony (ies) toward improving colony health and overwintering success. This analysis however compares a single factor equated with loss level. Such analysis is correlative and doing a similar management as fellow beekeepers does not necessarily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

FEEDING: Cowlitz survey respondents checked 66 feeding options = 2.6/individual. Each individual made at least one selection. Two individuals selected a single choice (one hard candy and other sugar syrup), 10 indicated 2 choices and 10 made 3 choices. One had 4 selections and one made 6.

The choices, with percent of individuals making that selection is in ( ), bar length indicates loss level of individuals doing this management, below. Those bar lengths to left of 45% (**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 (18 individuals of 25 respondents). Their loss rate was 45%, same as overall club loss. Five fed liquid honey and 14 frames of honey but neither greatly improved survival. Ten fed pollen patties and had just over average loss level. The managements that showed best survival included feeding fames of pollen (one individual had no loss) and feeding dry pollen. Non-liquid sugar (especially hard sugar 3 individuals – 33% loss and dry sugar – 10 individuals--36% loss)had better survival.).



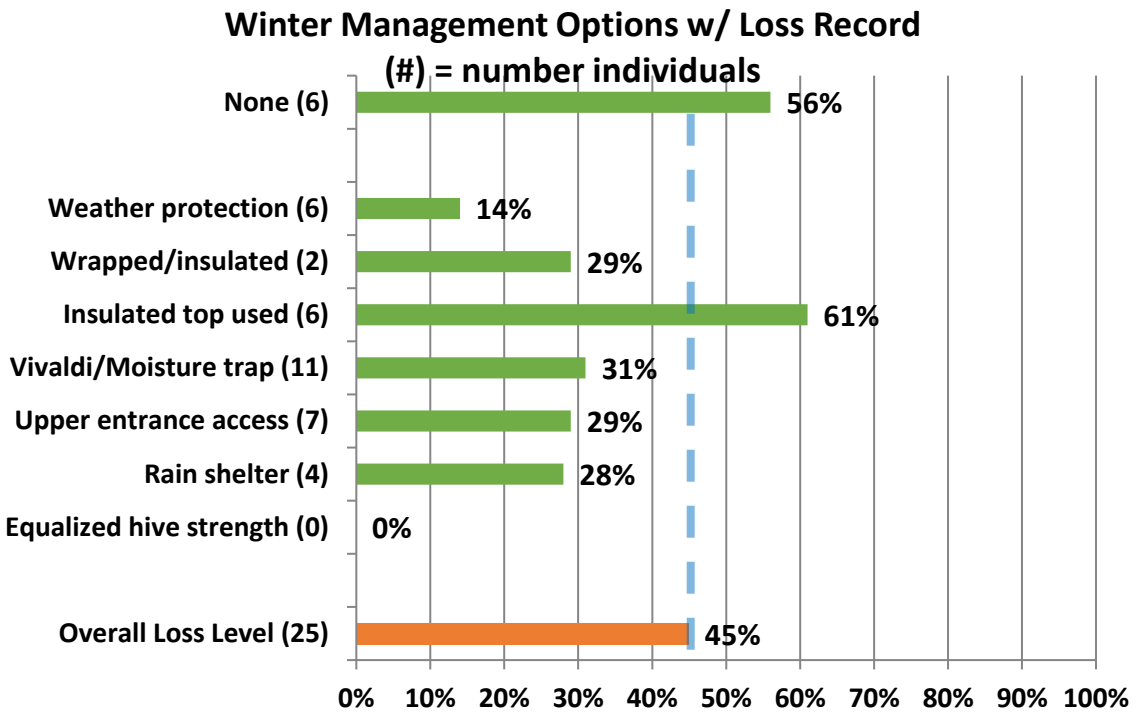
Comparing to last year, one individual did no feeding and had 100% loss. The sugar feeders had a 9-percentage point better survival, but the honey feeders had increased loss over the average (last year losses averaged 9 percentage points higher at 54%). The two frames of pollen feeders did 10 percentage points better than average, but the single dry pollen feeder had 100% loss. The hard candy and dry sugar feeders did better than average last year. Small number of respondents can really affect analysis as well as small numbers of colonies (52% of respondent had 1 to 4 colonies vs larger colony numbers (20% pf respondents).

For the last 4 years of survey losses individuals doing no feeding had poorer survival all 3 of 4 years (this year was the exception). Individuals that fed sugar syrup had marginal lower loss level in 3 of four years (including this year) as did those using frames of honey to feed bees; however, this year the 56 feeding frames of honey had 9 percentage points poorer survival. Individuals feeding non–liquid sugar in the form of hard candy likewise had lower losses in 3 of 4 years; this year a 12 percentage point better survival. For individuals feeding protein, protein patty users showed slightly better survival in 3 of 4 years; dry pollen feeders had significantly better survival in three of the four years.

WINTERING PRACTICES: We received 44 responses (2.3/individual) about WA beekeeper wintering management practices (more than one option could be chosen). Six individuals (24%) indicated none of the

several listed wintering practices was done; these individuals had a 56% winter loss, 11 percentage point higher loss than overall loss of 45%. For those indicating some managements, 5 did one single thing, 10 respondents did 2 and 2 each made 3 and 4 choices.

The most common wintering management selected was ventilation/use of a quilt box at colony top 112 individuals (58% of respondents with 31% loss), followed by upper entrance (7 individuals 29% loss)). Figure below shows number of individual choices and percent loss of those employing each selection. Bar length beyond 45% (**blue dashed line**) had better than average winter survival.



Last year Vivaldi board was most popular, but loss was only one percentage point improved form County average. Insulated top did well last year (7 individuals – 42% loss a 12 percentage point improvement). Equalizing colony strength last year – done by 2 individuals showed the very best survival (only 29% loss) but nobody in Cowlitz respondents indicated they did this management this year to winterize. Weather protection – the best winterizing management with only 14% loss was not as helpful last year – it had an 8 percentage point advantage

Over the past four years a couple of winterizing management improved survival. Those doing no winterizing had higher losses all 4 years; this year 11 percentage points lower. Equalizing hive strength in the fall demonstrated lower loss levels in all four recent winter periods (only 24% loss this past winter and 25% loss for this management last year when average loss was 50%). Top insulation has demonstrated lower loss all four years, in the most recent winter 56 individuals realized a 6 percentage point improvement. Ventilation above the colony (Vivaldi Board/quilt box) demonstrated improved survival three of the four winters including a 5 percentage point better survival this past winter.

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 58 responses for this survey question 2.4/individual. One individual (4%) said they did not practice any of the 6 offered alternatives; they had a loss rate of 100% (compared to overall rate of 45%). Three individuals had 1 selection (distinctive hive color), 10 had 2 choices, 7 selected 3 and two respondents made 4 managements.

In all four years doing none of these managements resulted in better than average survival; this was the case this past winter when the 22 individuals doing nothing had losses of only 20%. Using a minimum hive intervention/inspection (78 individuals had 46% loss level. Nine individuals who said they used an alternative hive reported lower losses in two of four winters; this winter the 9 selecting this option had 24% losses. Providing hives with color, distinctive hive ID measures were helpful managements with average losses in all four years for statewide individuals – this year 36% loss level for 53 individuals.

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 four Cowlitz individuals (16%) said they did not use screen bottom boards; they lost 31 56% of their colonies. Those 13 beekeepers using SBB on all of their colonies had 5054% loss. The 8 individuals using SBB on some of their colonies had 4548% loss. Last year it was 5^%, 54% and 48%.

In 5 survey years just under 20**% said they did not use SBB and nearly 80% did use SBB on some or all of their colonies.** See Figure 10.

Examining the six year average of SBB use, loss level of those using SBB on all or some of their colonies had a 43.7% loss level whereas for those not using SBB had loss rate of 42% (a <2% positive survival gain for those using SBB versus those not using them). They are very minor in improving overwinter survival.

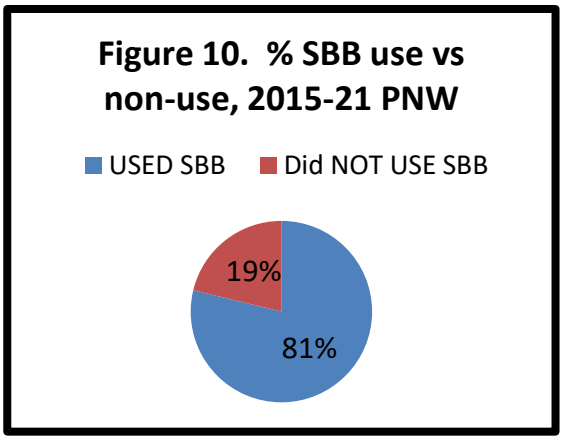


Figure 10. % SBB use vs non-use, 2015-21 PNW

We asked if the SBB was left open (always response) or blocked during winter. In the 2019-20 season. Six individuals (29%) said they never blocked SBB and had loss rate of 61½%; this past season six said the same thing and they had a 36% loss.

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, except for this past 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 dry 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 loses 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. The supplemental feeding of protein (pollen patties) might be of assistance earlier in the season to build strong colonies but did not seem to help overwintering success.

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.

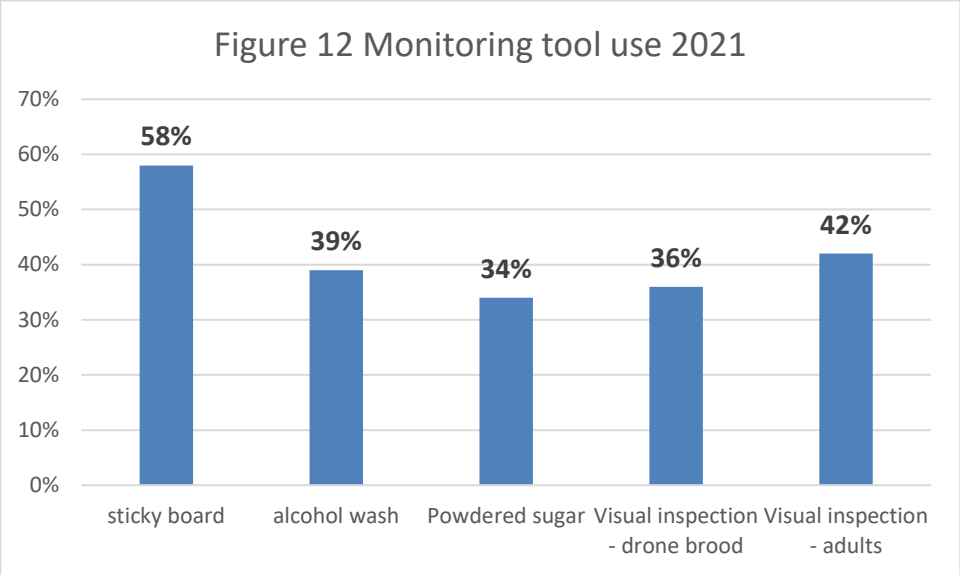
It is clear that doing nothing for feeding or winterizing resulted in the heaviest overwinter losses.

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

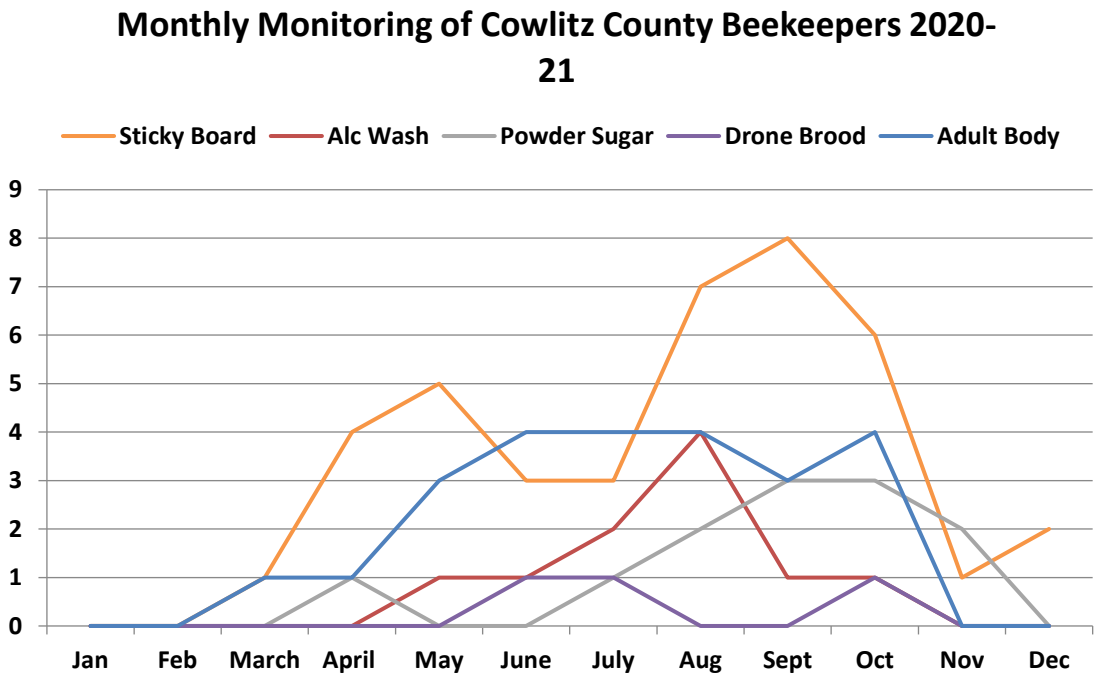
Mite monitoring/sampling and control management

We asked percentage of Washington hives monitored for mites during the 2020 year and/or overwinter 2020-21, 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. One hundred nineteen individual respondents (73% - an increase of 8 percentage points from last year) said they monitored all their hives. Losses of those individuals monitoring was 34%. Thirty-two (20%), reported no monitoring; they had a higher loss rate of 42%. Twelve individuals monitored some with loss rate of 44%. In Cowlitz respondents 14 said they monitored all and had 42% loss, 5 monitored some with 61% loss and 6 said they monitored none and they had the best survival 36%., 6 percentage points better than those monitoring all.

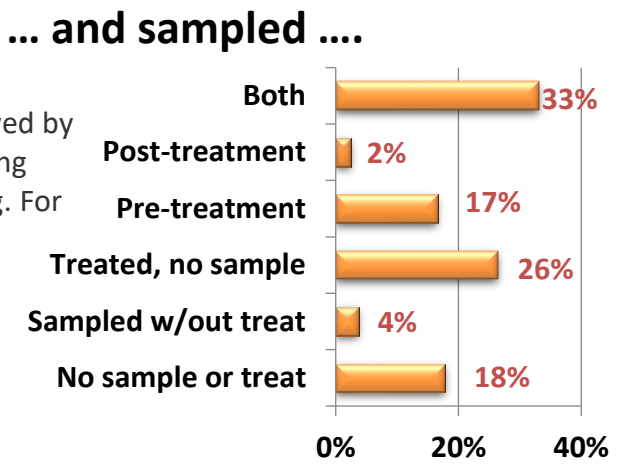
In order of popularity of use, Sticky boards were used by 76 individuals, 58% total of 131 individuals who did some or all monitoring of colonies, followed by 58 individuals (42% of individuals doing monitoring) that used visual inspection of adults , 51 individuals (39%) that used alcohol wash, 47 individuals using visual inspection of drone brood and 44 who employed powdered sugar roll.



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



The most common sampling of respondents in 2020-21 was sampling both pre and post (both 33%) followed by treated but did not sample (26% of individuals). Pre-monitoring was more frequent compared to a post treatment monitoring. For this question only 18% checked not sampling whereas 20% had previously indicated not monitoring. Figure right statewide: for Cowlitz both was 24%, post zero, pre-treatment 20%, treated but not sampling 27%, sampled but not treated 1 individual 4% and no sample and no treatment 24% .

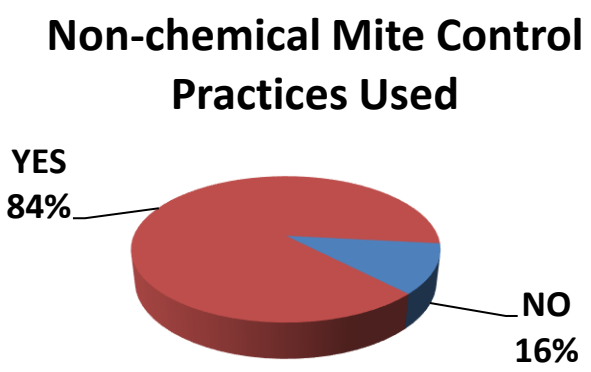


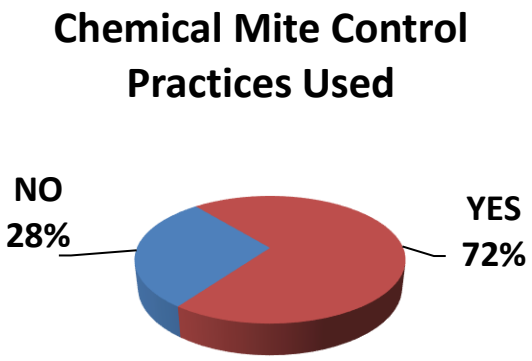
It is important to KNOW mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm the useful 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.

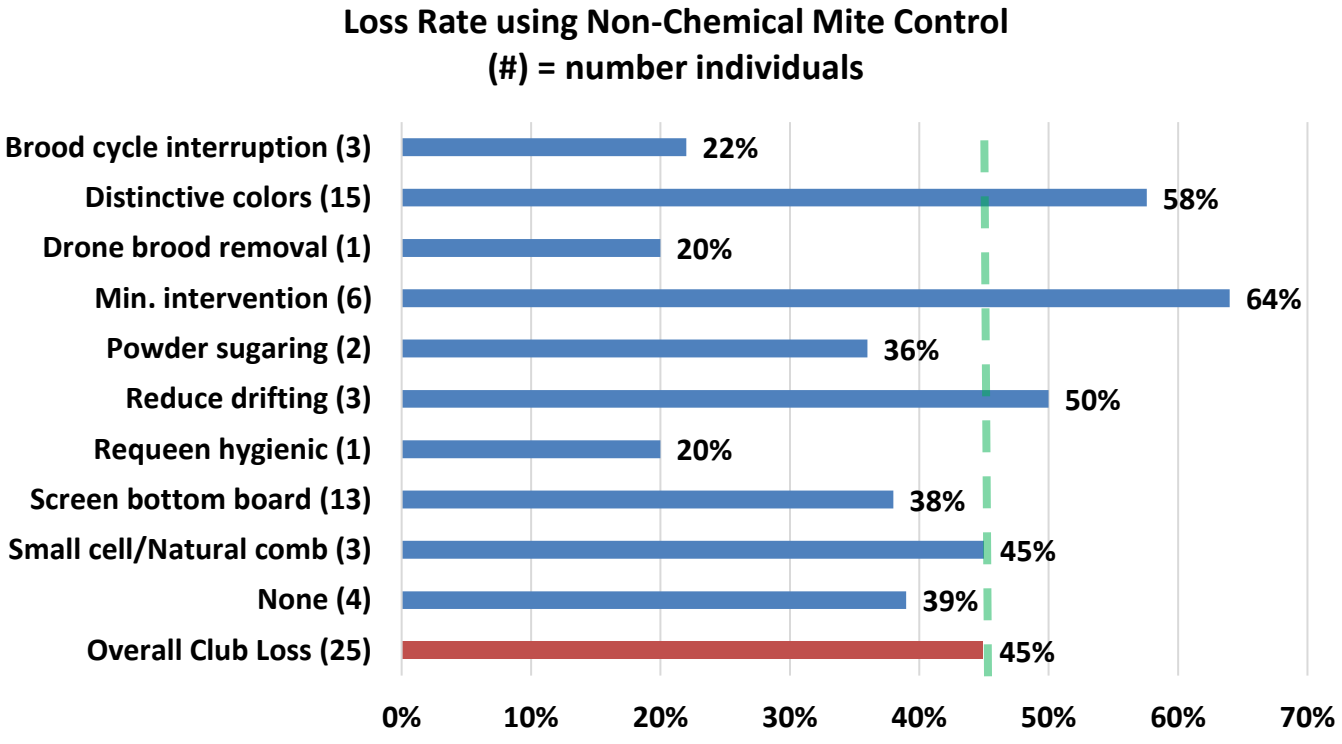
Mite Control Treatments

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Four Cowlitz individuals (16%), said they did not employ a non-chemical mite control and 7 individuals (28%), did not use a chemical control. See Figure. Those 4 individuals who did not use a non-chemical treatment reported a 39% winter loss, same percentage as statewide while those who did not use a chemical control lost 59% of their colonies, 6 percentage points fewer than statewide . The individual options chosen for non-chemical and chemical control are discussed below.





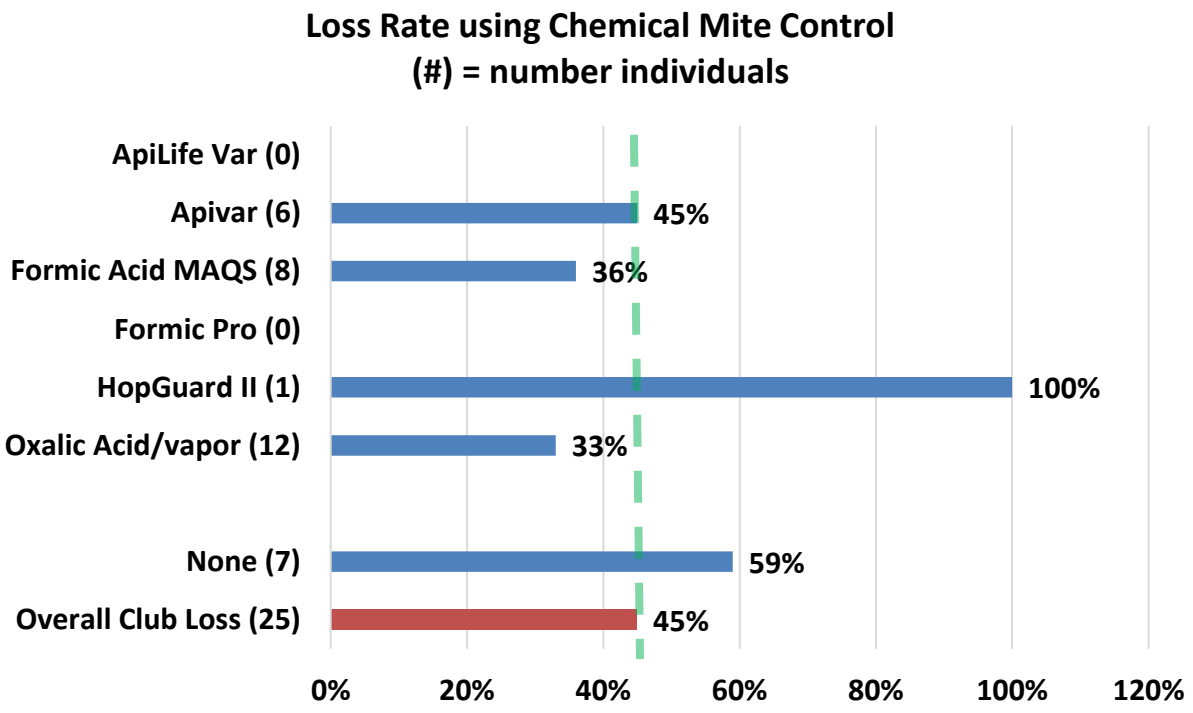
Non-Chemical Mite Control: Of nine non-chemical alternatives offered on the survey (+ other category,) 51 selections were indicated 2.2/person (statewide 2.3/individual). Four individuals used one method and had a 75% loss, 7 used two (23% loss level – the best survival - 5 of the seven used SBB and distinctive colors), 8 used three (64% loss) and one individual used 5 with a 20% loss level. Use of screened bottom board was listed by 13 individuals (52% of individuals). They had slightly better than average loss. The most common selection was painting distinctive colors – there loss was 13 percentage points higher than average loss. Minimal hive inspection (6 individuals) had the heaviest loss of 54%. The use of the remaining 7 selections are shown in Figure; 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.



Three of the non-chemical alternatives demonstrated reduced losses this past year – requeening with

hygienic queens, only a single individual, had only a 20% loss. Drone brood removal (1 individual, 25 statewide) and brood cycle interruptions (3 Cowlitz individuals - also 25 individuals statewide) have also been useful in previous year surveys in reducing winter losses (in some of past 5 years but not all). Painting hives distinctive colors has resulted in better survival in each of past three survey years: this year by only single percentage point but not for Cowlitz members. Small cell/natural comb and powder sugaring has not been demonstrating better survival this year or in past years but for the two Cowlitz members it did show better survival.

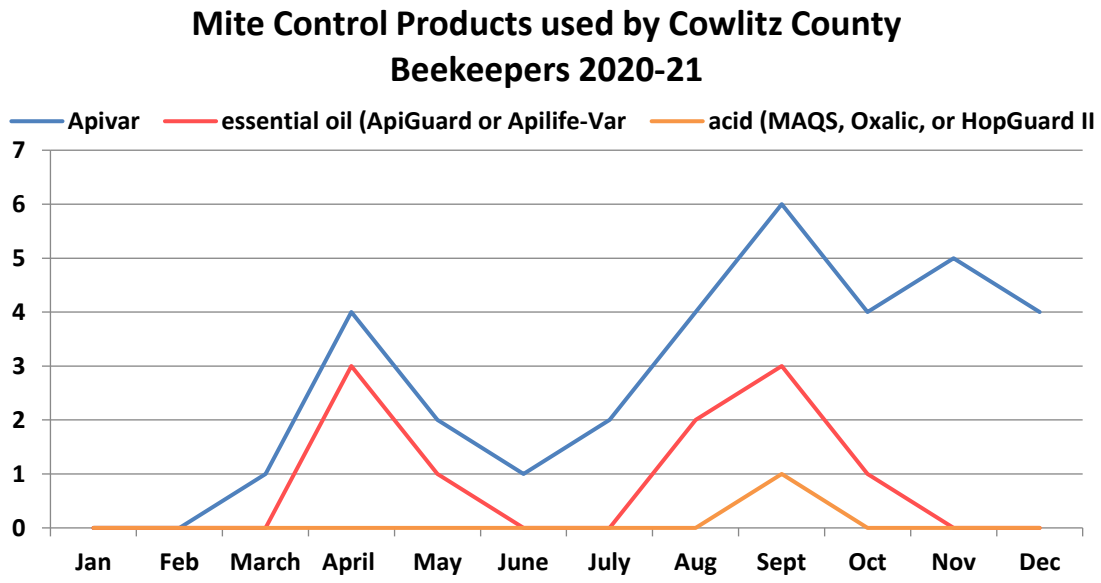
Chemical Control: For mite chemical control, 35 individuals (21 ½ % of total respondents) used NO chemical treatment; these individuals had a 63% loss level (same as last year). For Cowlitz, 7 individuals said they used no chemical treatments – they had 59% loss. Those using chemicals used at rate of 1.8/individual (statewide1.7/individual). Seven individuals (39%) used one chemical and had 41% loss (three used OAV and had only a 33% loss), eight used two and had 32% loss (3 used Apivar with OAV but had 50% loss while 4 using MAQS with OA had 17% loss), 1 used 3 (50% loss) and the 2 using 4 had 36% loss. Figure illustrates number of uses ( ) and bar length indicates the loss rate for those using that chemical.



Consistently the last 3-4 years five different chemicals have helped beekeepers realize better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level; this year Apiguard did not perform as well for the 16 users nor for Cowlitz members - 2 who used it had 50% loss – not shown on graph. Apiguard has a 37% better survival over last 5 years and ApiLifeVar has a 30% better survival record over past 4 years; no Washington respondents indicated use this year Apivar use, the synthetic (amitraz), has demonstrated a 29% better survival over past 5 years (2017-21). Oxalic acid vaporization over past 4 years has a 18% better survival (the survey did not differentiate Oxalic vaporization from drizzle prior before 2018). 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 Formic Pro performed better for 3 who used it (no Cowlitz members) than the traditional formic MAQs pads while the homemade remedy using formic acid did not for the four users, none Cowlitz .

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 times for the various chemicals. NOTE the key has switched Apivar (should be orange) with acid use (is blue not orange line).



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. Forty six individuals (30%) subdivided queen related issues from 10 to 100% of their hives; the majority (25 individuals) indicated 10 to 30%. Forty-two individuals said none; an additional 36 individuals said they didn't know. The number of respondents and percent losses of each is shown in Figure 18.

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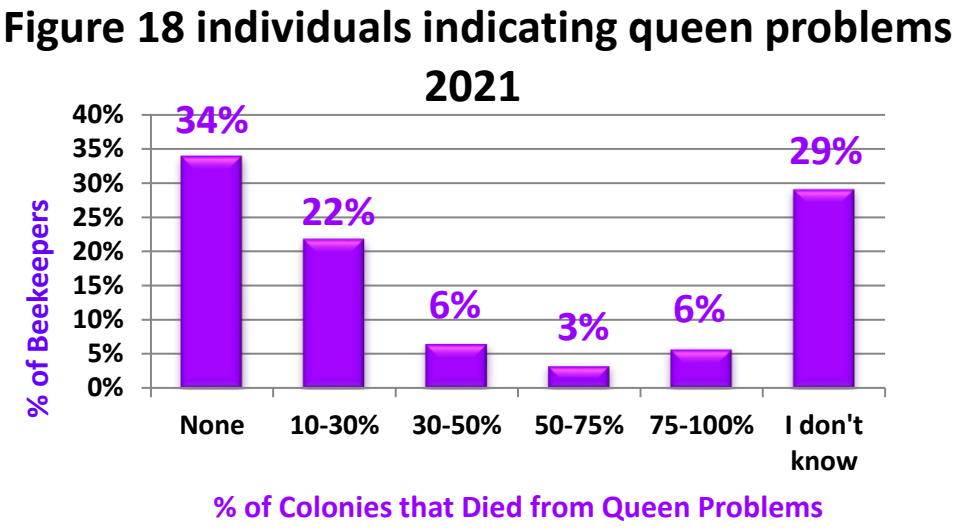
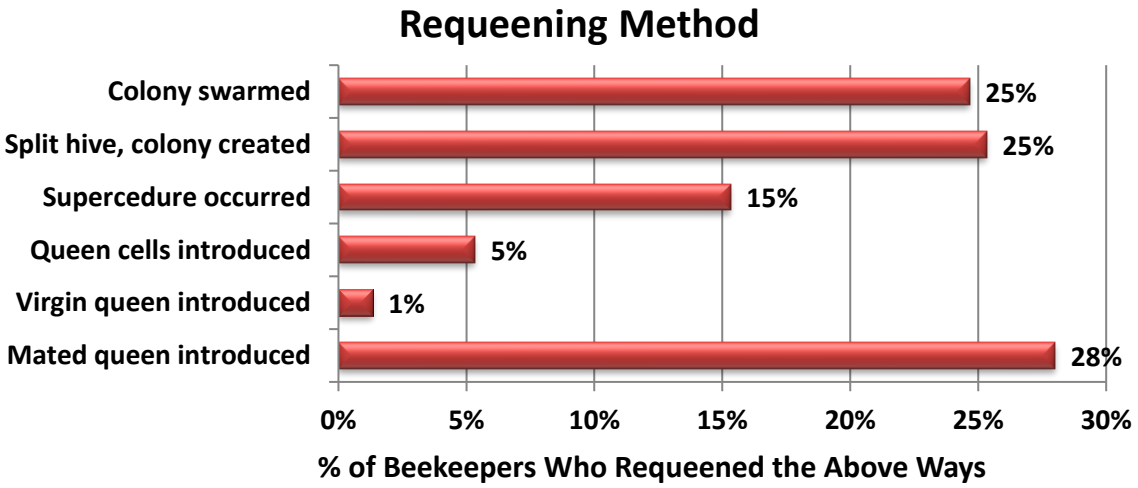
Queen events can be a significant factor contributing to a colony not performing as expected. We asked if you had marked queens in your hives. Forty-one percent% said yes. The related question then was 'were your hives requeened in any form?' to which 56% (91 individuals) said yes, 24% said no. and the remainder '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 140 responses (more than one option could be checked). as illustrated in last figure. Forty-two individuals indicated they requeened with a mated queen and they had a 25% loss level, two used a virgin queen (42% loss) and 8 used a queen cell (12% loss). A higher percentage said the bees requeened via Supersedure (23 individuals, 39% loss), splitting (38 individuals, 30% loss) or swarming (37 individuals, 37% loss). 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 August 2021