

2020 Columbia County Winter Loss by Dewey M. Caron

Columbia County members were encouraged to participate in the 2019-2020 PNW overwintering loss survey. Members were directed to the online survey at www.pnwhoneybeesurvey.com, an 11 year continuing effort to define overwintering success of beekeepers in the Pacific Northwest. Statewide Oregon (and Washington) reports, along with individual club reports, are posted on the PNW website www.pnwhoneybbesurvey.com.

I received 302 survey responses from Oregon backyarders, and an additional 133 from Washington beekeepers. Columbia County members sent in 17 surveys, 6 more than last year, providing information on 60 fall colonies. **Total overwintering losses of Columbia County respondents was 25 colonies = 42% weighted loss rate.** This loss level is four percentage points above the statewide OR beekeeper loss rate of 38%.

Loss rate was determined by hive type. CC members started winter with 35 Langstroth 10-frame hives (51½% of total), 23 Langstroth 8-frame hives, one 5-frame nuc and one Top bar colony. The Nuc and Top Bar hives survived. Figure 1 shows percent loss for each hive type compared with statewide Oregon beekeeper data.

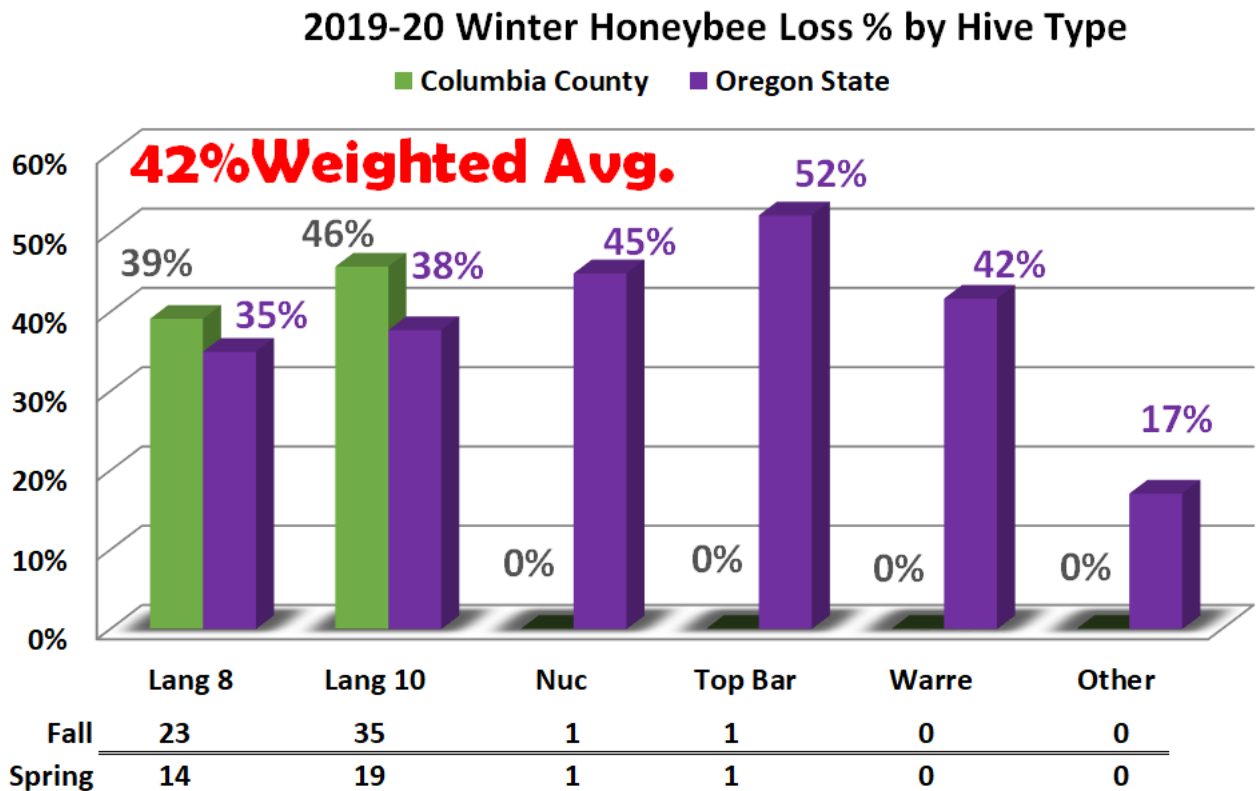


Figure 1

Losses by hive origination were also tallied. The data for CC and statewide are shown in Figure 2. Overwintered hives, packages and nucs of CC members had poorer survival than statewide.

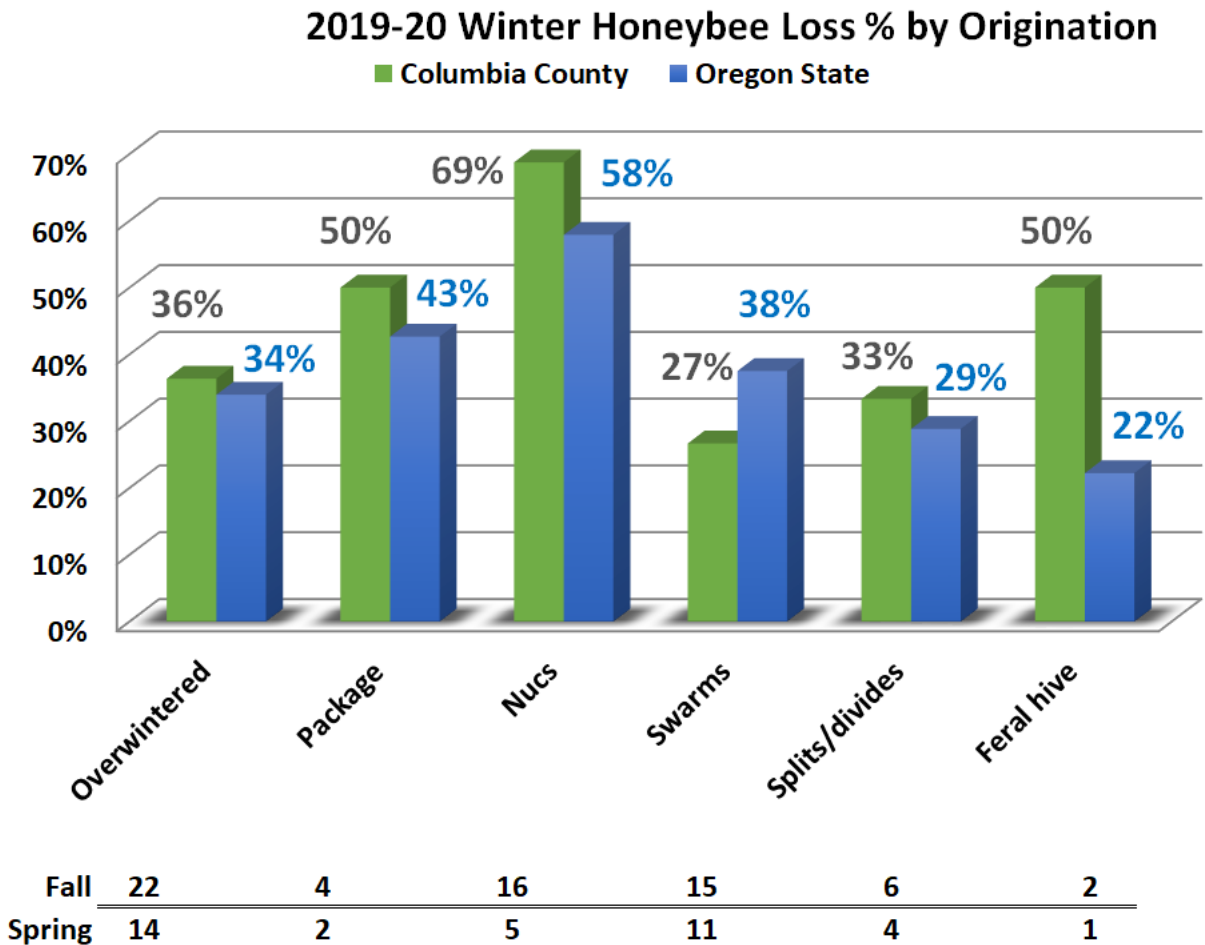
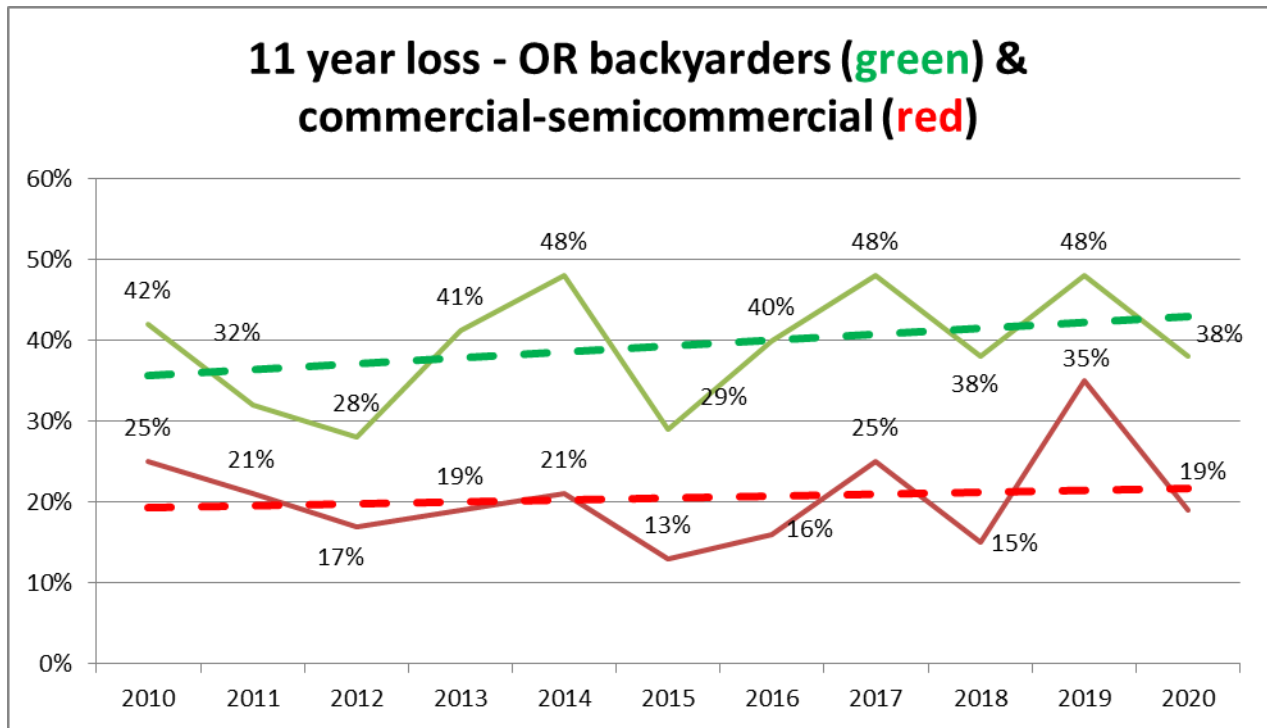


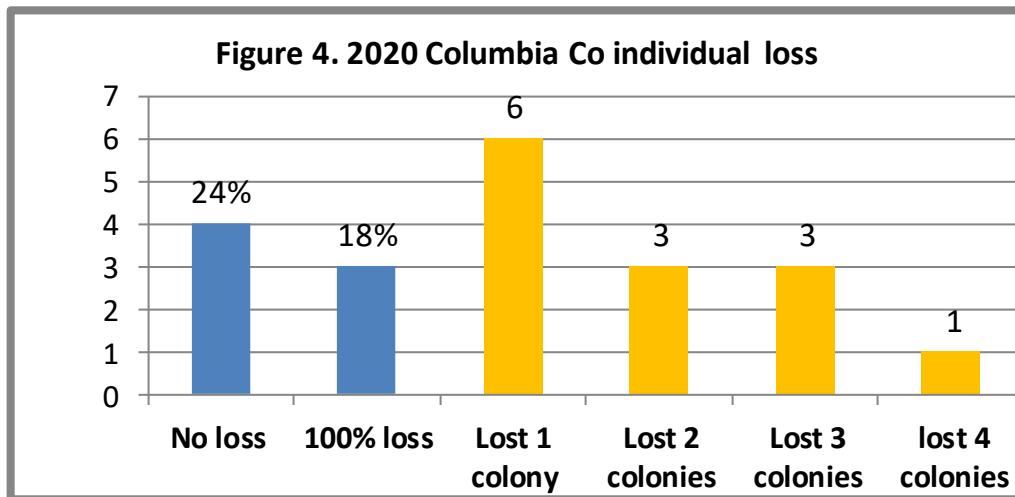
Figure 2

I do not have a past record of losses by Columbia County beekeepers. Figure below shows eleven year losses of Oregon backyarders and commercial/semi-commercial beekeepers. Backyarders have double the losses of the larger-scale beekeepers.

Figure 3



Not everyone had loss. Four individuals (24%) reported total winter survival. Unfortunately 3 individuals (18%) lost 100% of their colonies. Six individuals lost 1 colony (the heaviest loss), 3 individuals lost 2. Greatest number lost was 4 colonies. See figure 4.

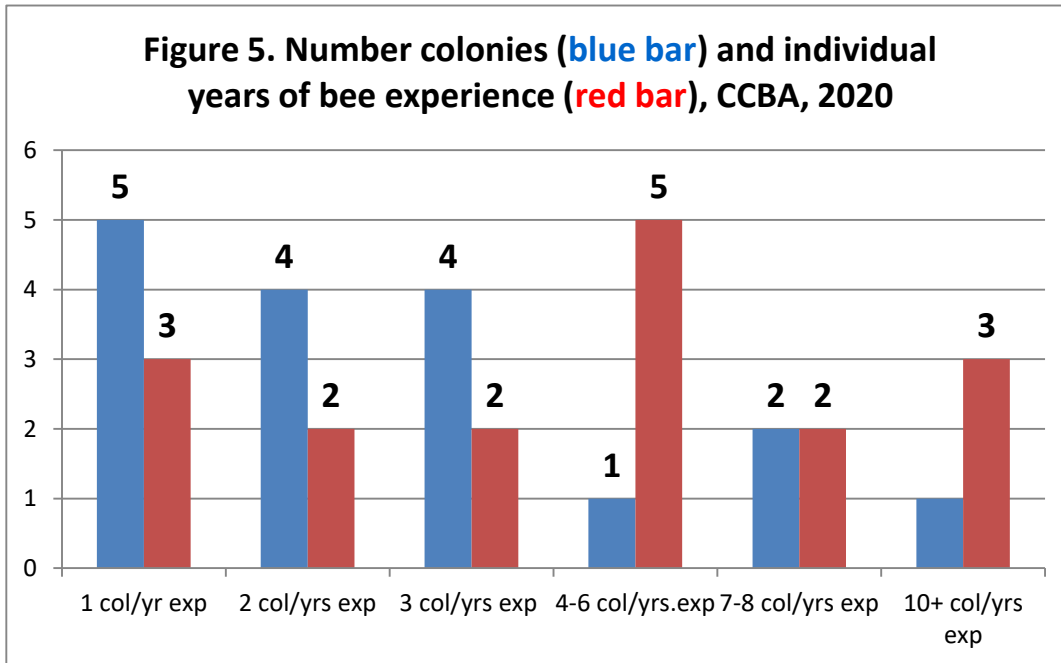


Who is responding to survey?

OF the 17 respondents, the vast majority (13 individuals - 76%) had 1 to 3 fall colonies (greatest number was 5 individuals with one colony); these individuals had a 46% winter loss. One

individual had 5 colonies. Two colonies had 8 and one individual had 10 colonies (the greatest colony number). The 3 individuals with 8 and 10 colonies had a 35% loss level.

Typical of the statewide data, the Columbia County respondents are a mix of new beekeepers with those with more beekeeping experience. Three individuals had 1 year of beekeeping; they had 75% winter loss. Seven individuals had 1-3 years experience; they had 56% loss level. Five individuals had 4 to 6 year experience, 2 had 7-8 years and there were three individual with 10+ years experience (greatest number was 12 years). These three with greater number of experience had 45% loss. Figure 5 shows number of colonies per individual (blue bar); red bar illustrates the number years beekeeping.



Reasons for Colony Loss/Acceptable loss

We asked individuals that had colony loss to estimate what the reason might have been for their loss (multiple responses were permitted). There were 18 total listings by Columbia County. Six individuals listed varroa (33% of respondent choices), followed by weak in the fall (15%), queen failure and yellow jackets (11% each); 2 individuals chose don't know. For other there were 2 who said pesticides plus one indicated nosema. Table compares CCBA with statewide percent response.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	CCD	Yellow jackets	Other
TVBA (#)	6	1	3	2	1	0	2	3
(%)	(33%)	(5.5 %)	(17%)	(11%)	(5.5%)		(11%)	(17%)
Statewide %	24%	3%	15%	16%	11%	4%	6%	14%

Survey individuals were asked to indicate what might be an acceptable loss level. Two said zero. The median (middle) selection was 20%. Data in table shows number of individual choices.

DK	Zero	5%loss	10%loss	15%loss	20%loss	25%loss	33%loss	50%loss	75%loss	100%loss
0	2	2	1	1	2	4	2	1	1	0

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. Columbia County individual choices varied from zero to 75%, with medium of 20%. This acceptable loss level has been consistent for last few survey years but once again actual losses were double the “acceptable” level

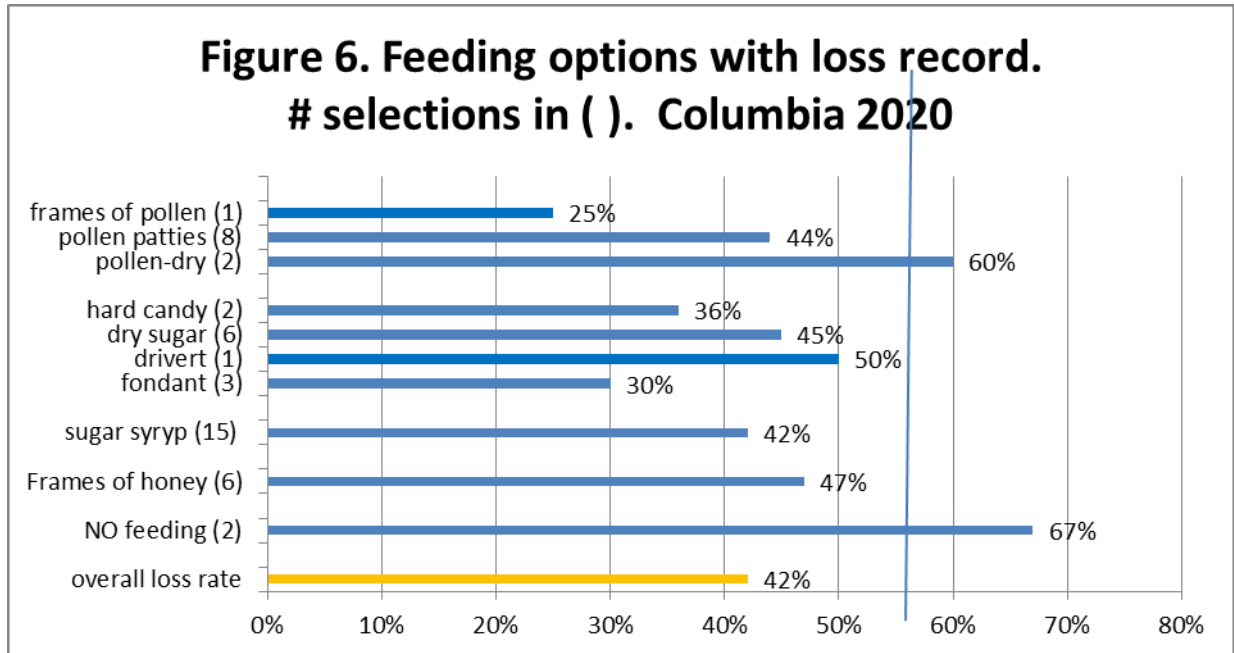
Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticides in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies. Management, especially learning proper bee care in the first years of beekeeping, remains a factor in losses. Colonies too weak may starve and in some winters starvation is a significant factor in colony loss. 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 non-chemical mite control techniques (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls utilized. Individuals could check none or more than one response; many Columbia 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: Columbia County survey respondents checked 42 feeding options = 2.9/individual (same as statewide). Two individuals selected a single choice (they had a 83% loss), 4 chose 2 (31% loss), 3 selected 3 (24% loss) and 5 selected 4 and 1 had 5 choices – these individuals had 42% loss.



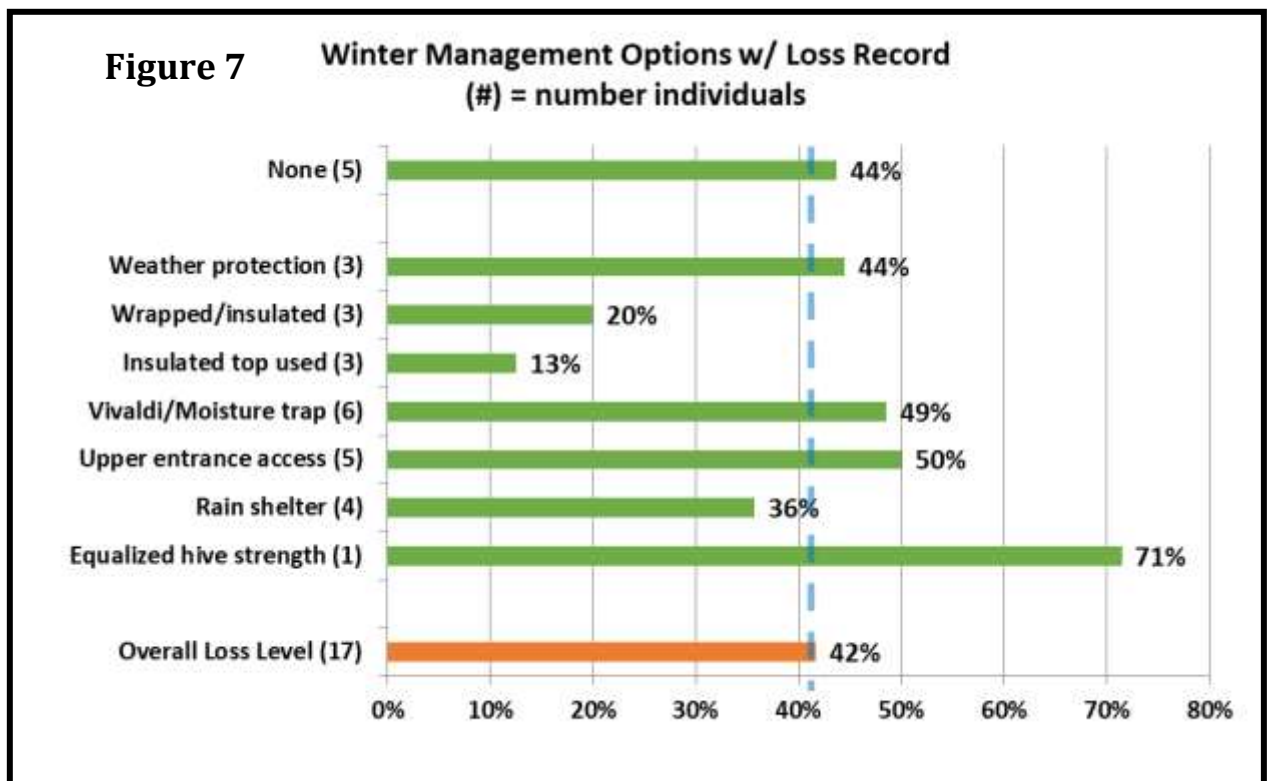
Percent colony losses are presented for feeding options with numbers of CC members indicating doing the management in (). Bar lengths of left of 42% indicate better than average survival while those to right had heavier than average losses. Individuals feeding frames of Pollen (2) had had better survival than overall. Likewise individuals feeding hard candy and fondant (2 and 3 individuals respectively) also had better survival.

Summary: For the last 4 years statewide (average loss rate =43%), **individuals doing no feeding had 12.6 percentage points higher losses (poorer survival) all 4 years (AVERAGE PER CENT DOING NO FEEDING = 8% of individuals, AVERAGE STATEWIDE LOSS 4 YEARS = 55.6%).**

Individuals statewide that fed sugar syrup had a 7% 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= 39%) 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 (37³/₄ % 4-year average).

For individuals feeding protein, only the 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 years close to the overall yearly average.

WINTERING PRACTICES: Five Columbia County individuals (29%) reported doing no winterizing; they had loss level of 100%; statewide these 2 were among 37 individuals (12½ % 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 12 Columbia county members averaged 2.1/individual. Four individuals chose a single management and had a 42% loss level while the 4 individuals checking 3 (3 individuals) and 4 (1 individual) had a 29% loss level. Two individuals chose 2 selections and had 54% loss.



The most common wintering management selected was ventilation/use of a quilt box at colony top (6 individuals followed by upper entrance (5 individuals); neither management improved survival for Columbia County members. Insulate top (3 individuals) and Wrapped/insulated colonies (also 3 individuals) resulted in best survival for the respondents. Figure 7 shows number of individuals in () and bar length shows percent winter loss of each selection. Bars to left of **blue dashed line** means better survival than overall. Providing rain shelter also showed slightly better survival for the 4 individuals doing the management.

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. Columbia County beekeepers had 25 responses 2.8/individual. Sixteen percent statewide and 3 CCBA individuals (18%) 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 CC the 3 individuals had a 25% loss rate, 17 percentage points better than overall TVBA average loss of 47%. Five Columbia County members had 1 selection (loss rate 62%), seven made 2 choices (45% loss) and 2 made 3 choices; they had a 40% lose rate.

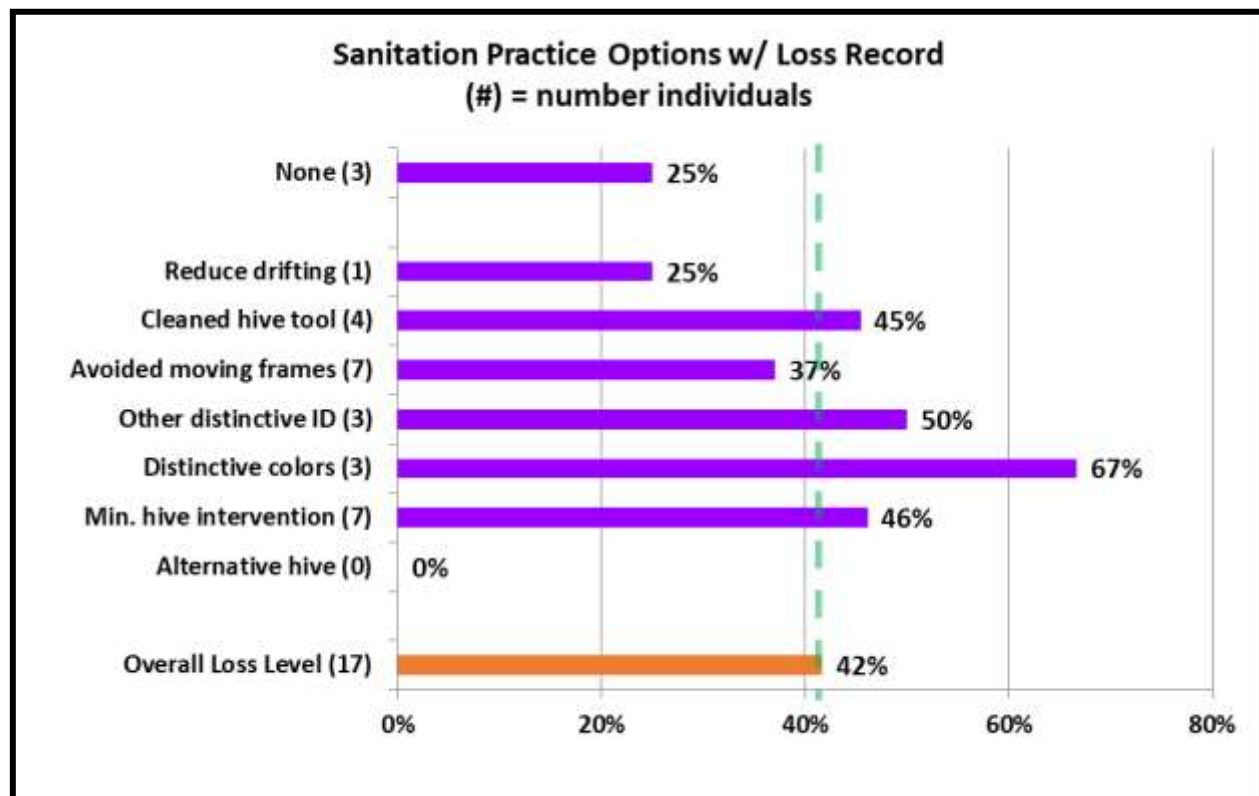


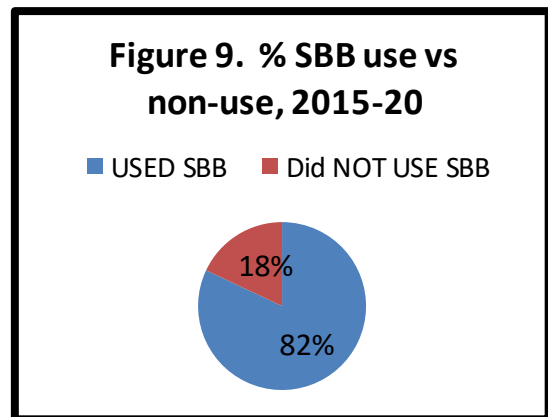
Figure 8

Most common option selected was generally avoid moving frames (7 members) and minimal hive intervention also 7 individuals: Only the avoiding moving frames management improved survival (by 5 percentage points). Also the one individual who took measures to reduce drifting had improved survival.

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 not moving frames and 37½% for reducing drifting compared to overall rate of 41%, both relatively minor 6 and 3 ½ percentage point differences. 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. Sanitation appears to be relatively minor toward improving survival.

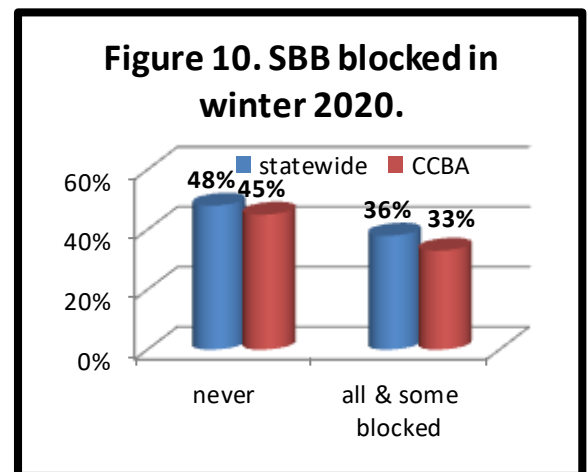
SCREEN BOTTOM BOARDS (SBB)

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 CCBA (12%) said they did not use screen bottom boards. This was the lowest percent of respondent non-use of SBB in last 6 years. Average non-use is 18% vs 82% use on some or all colonies over the 6 year period. Figure 9 shows 6-year.



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 6 CCBA respondents (47%) always or blocked some of the SBBs. Those who said they never blocked (9 individuals, 53%) had a 45% winter loss, a 12 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 10.



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. Columbia County 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.

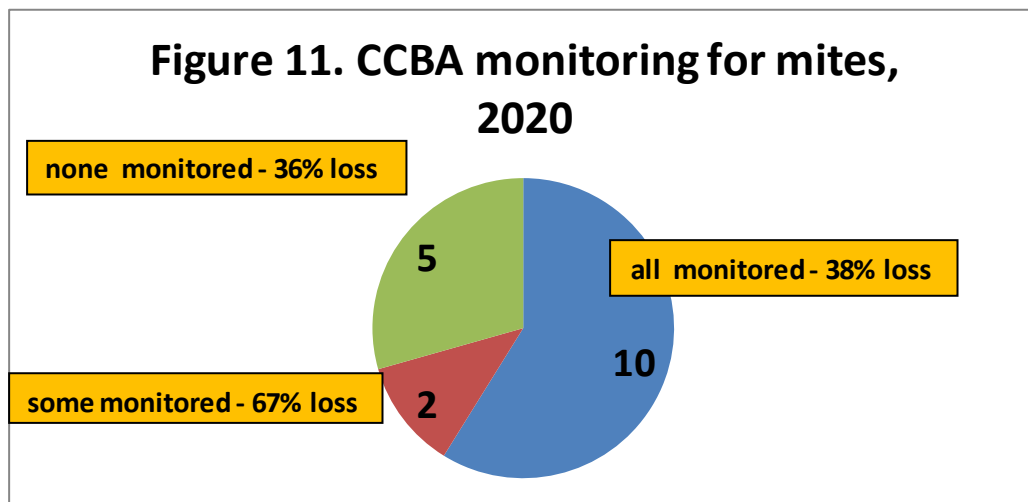
Winterizing measures that apparently helped lower losses for some statewide beekeepers was, a moisture trap (Vivaldi board or quilt box) and upper insulation, even wrapping the colonies (or otherwise adding some insulation to provide added protection against the elements). Spreading colonies out in the 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.

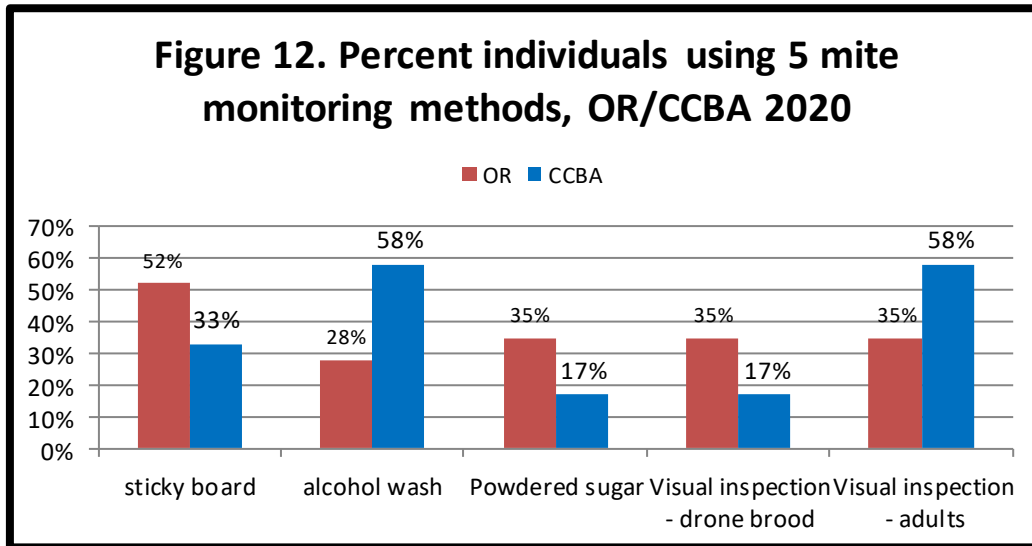
Replacing standard bottom boards for screened bottoms marginally improved winter survival. It is apparently advantageous to close the bottom screens during winter.

Mite monitoring/sampling and control management

We asked percentage of Oregon hives monitored for mites during the 2019 year and/or overwinter 2019-20, 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. Among CCBA 10 individuals (59%) monitored all colonies; they had 38% loss. Two individuals monitored some colonies; they had a 67% loss level. Five individuals (29%) did no monitoring and they had a 36% loss. Statewide 82% said they monitored all or some of their hives (losses =51%); 18% reported no monitoring (loss rate = 59%). See Figure 11.



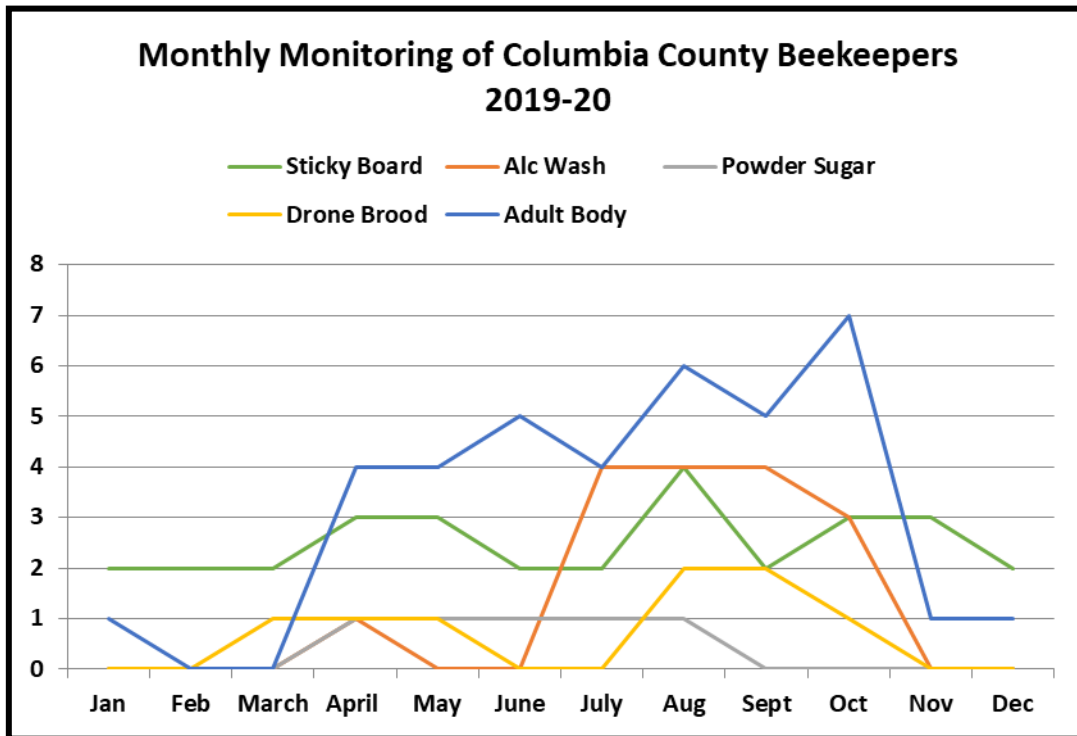
In order of popularity of use, Sticky boards were used by 33% of total CCBA respondents (of those who monitored). 58% of individuals used alcohol monitoring and only 17% used powdered sugar monitoring as did those looking at drone brood. In past 5 years, the use of sticky boards has decreased in use statewide and both alcohol wash and powdered sugar shake have increased in use. Figure 13 red bars are statewide responses and blue is Columbia County for 2020.



It is obvious that monitoring alone is a means towards improved winter survival. The table below compares per cent individuals and per cent 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
2020	67%	33%	13%	16%	20%	49%
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		41%		38%		51%

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.



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. **Four** individuals (35% - 3X the statewide percentage 12%) said they did not employ a non-chemical mite control and 7 individuals (41%), did not use a chemical control (statewide=24%).

Those CCBA individuals who did not use a non-chemical treatment had a 67% loss; statewide reported a 50% winter loss. Seven members not using a chemical control had a loss rate of 50%. Statewide lost rate=69% of their colonies. 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,) four individuals chose none (67% loss), 1 used one method (33% loss), three used two (31% loss) and 5 used 3, they had 50% loss. Drone brood removal (1 person), powder sugaring (2 individuals) and use of screen bottom boards (11 individuals) all showed improved survival.

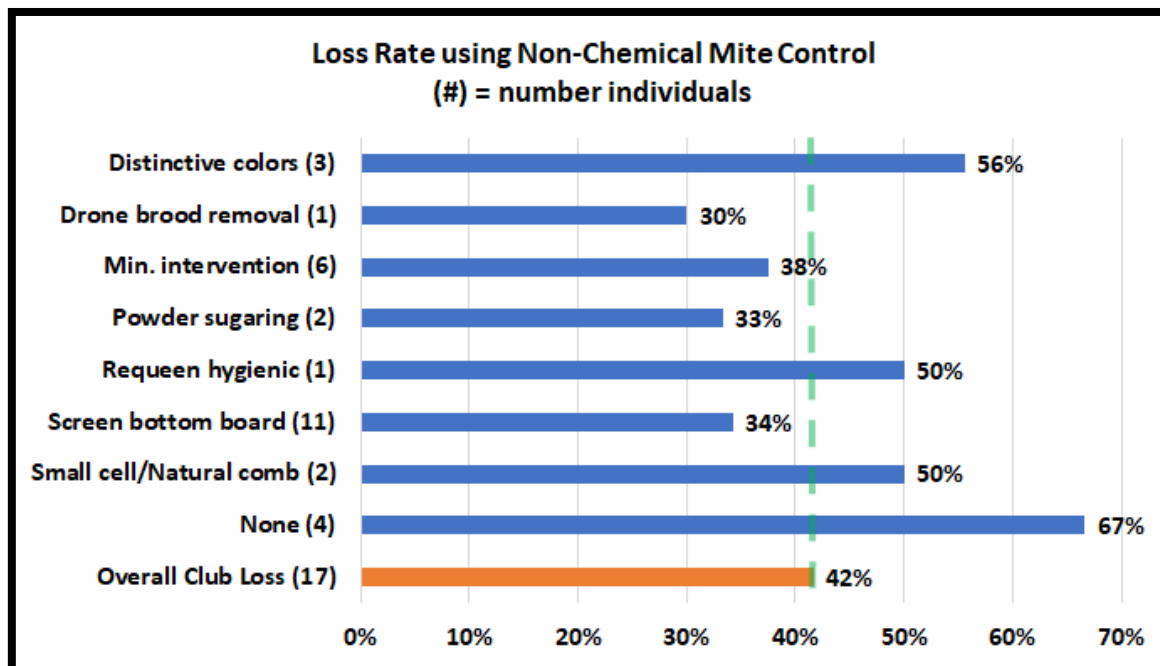


Figure 14

Three of the non-chemical alternatives have demonstrated reduced losses for statewide beekeepers over past 4 years. Reducing drifting such as spreading colonies (35% loss average for 3 years – question not asked in 2016-17 survey), brood cycle break (39% average over 4 years only 4 percentage point better survival) and different colony colors in apiary (42% average loss last four years –only one percentage point difference) has demonstrated better survival. Drone brood removal average loss for 4 year is the same as average loss for the four years (43%). Some non-chemical control alternatives demonstrate an advantage on one or two years but overall no improvement.

Chemical Control: For mite chemical control, 6 individuals (35% of total Columbia county respondents) used NO chemical treatment; they had loss rate of 50%. Statewide loss rate of those not using chemical treatments was 57%. Those using chemicals used at rate of 1.7/individual. Six individuals used one chemical (42% loss), 3 used two (35% loss) and 3 used 3 (50% loss rate).

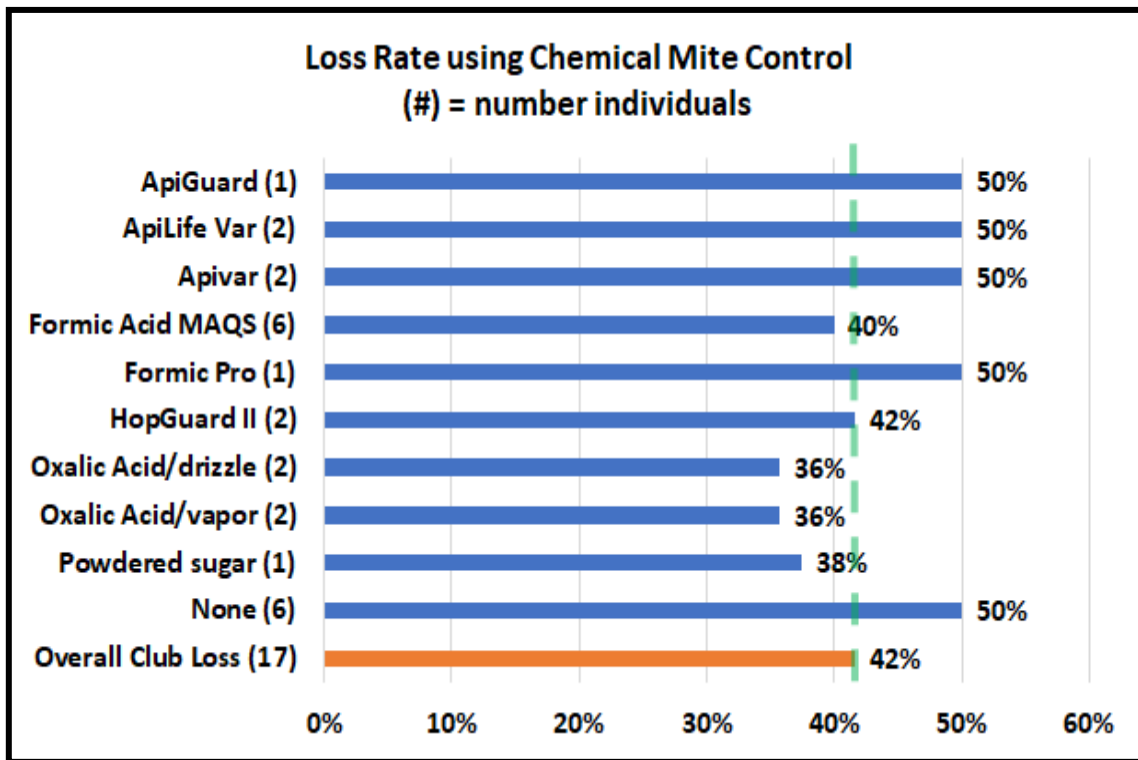
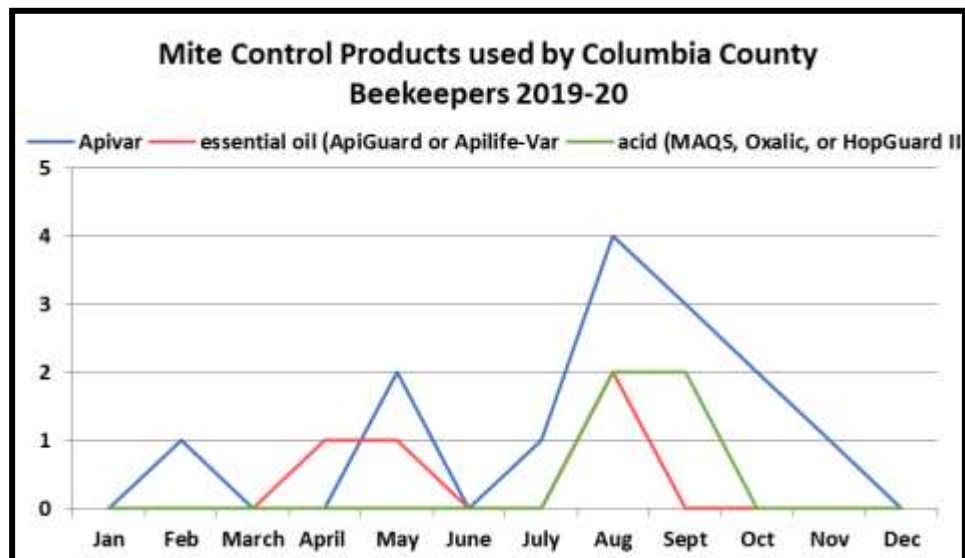


Figure 15

Consistently the last 4 years five different chemicals have helped beekeepers improve survival. The essential oils Apiguard (average 4 year loss level 32%), Apivar (32.5% average 4 year loss level), Oxalic acid vaporization (33.5% average loss level over last 4 years – in contrast the oxalic acid drizzle average of last 3 years is 41% loss level) and ApiLifeVar (36% average loss level over last four years). The formic acid MAGS formulation has same as average loss level (43%). Those who mix formic into shop towels have heavier losses. Formic Pro has increased in use – it looks very promising at a 26% loss level the past two years (when average loss was 43%).

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 16 for 2019-20 season. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals.



Queens

We hear lots of issues related to queen “problems”. Four CCBA individuals (36%) said they did not have any queen issues and 2 said they didn’t know. Five individuals (45%) who said they did have queen issues checked 10-30% twice and one each of 30-50%, 50-75% and 75-100%.

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. Five individuals said yes (31%) and 11 said no. Statewide 31% said yes. The related question then was did you or your bees replace their colony queen? Four (24%) said Yes. 3 did not know and 10 (59%) 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 two individuals who used a mated queen and 1 who used queen cells. The remainder requeened naturally via split and raised their own queens (2 individuals) and 1 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 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 May 2020