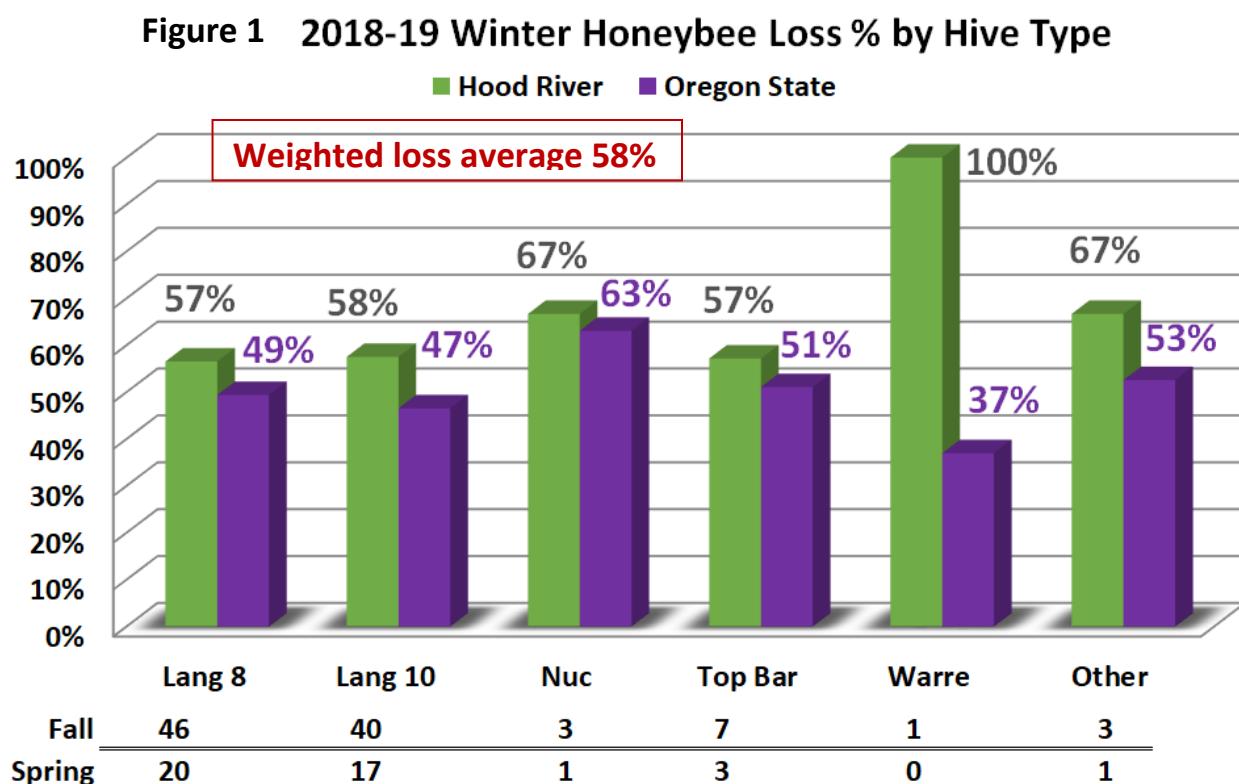


2019 Columbia Gorge Beekeeper Winter Loss by Dewey M. Caron

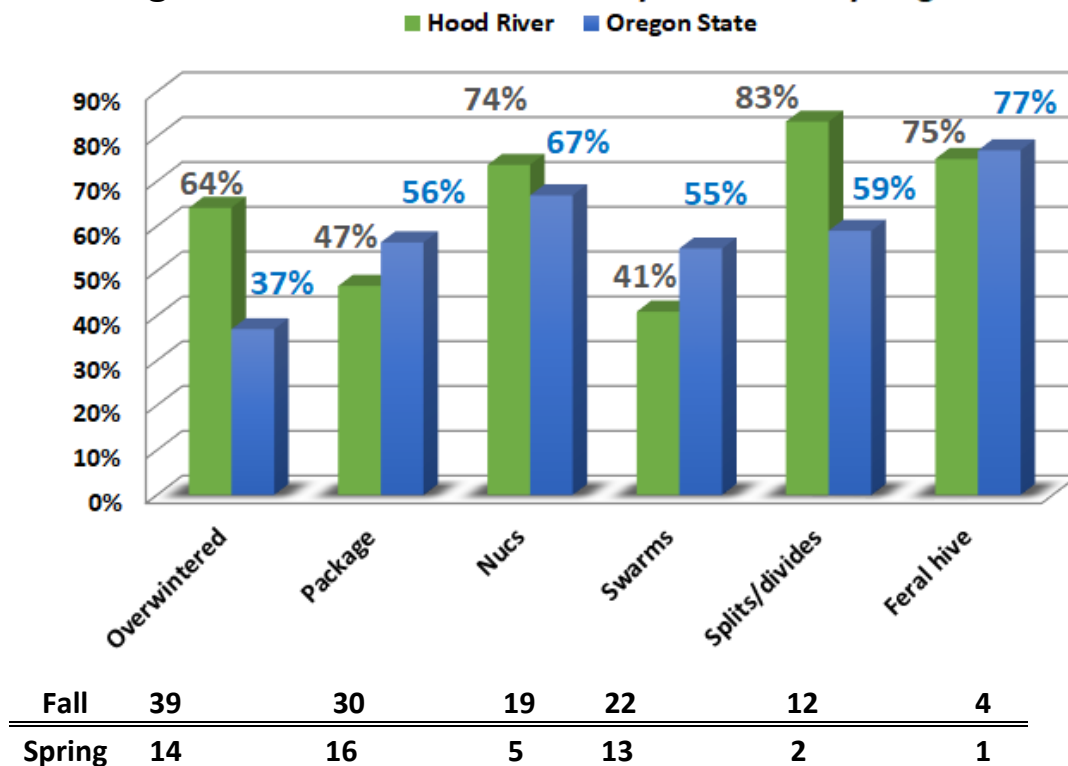
This was the 10th year of a survivorship/loss survey of Oregon and Washington beekeepers. I received 416 responses from Oregon (OR) backyarders, an additional 98 from Washington beekeepers, keeping anywhere from 1 to 38 colonies (40 in WA). I received 29 survey returns from Columbia Gorge beekeepers, double (13) and triple (8) previous years.

Overwinter losses were determined by asking the number of fall colonies and surviving spring colonies for 5 hive types. **Overwintering losses of Columbia Gorge respondents was 58 colonies of 100 fall colonies = 58%**, 10 percentage point higher than the statewide loss of 48%. The Gorge and statewide loss comparison is shown in Figure 1 with numbers below. The 3 other hives were long hives. Movable frame hives constituted 92% of total hives.

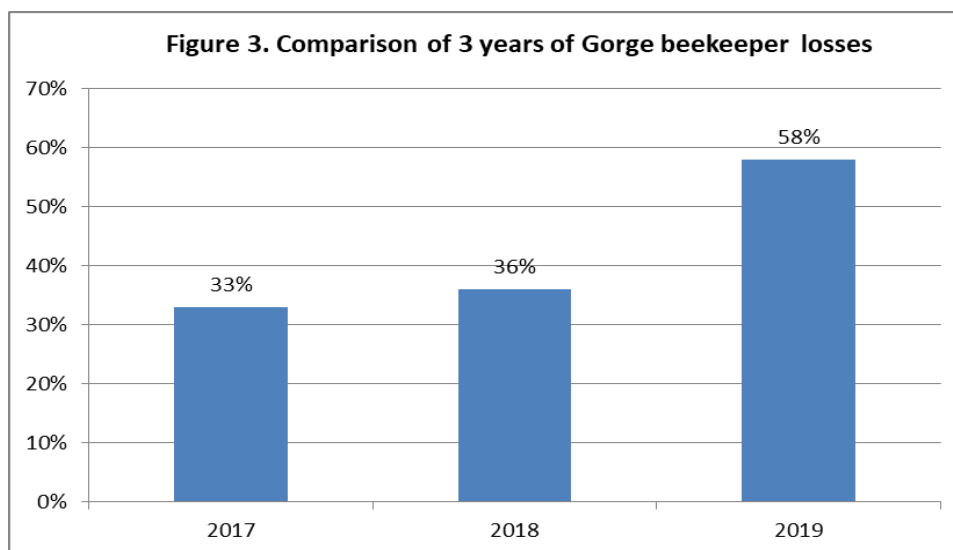


The survey also asked for hive loss by hive origination. Packages and swarms had lower losses (in 40%^s) compared to overwintered colonies (64%); nuc, feral hive cutouts split losses were 75%+. Comparison of Gorge losses with stateside shown in Figure 2 below – numbers below graph.

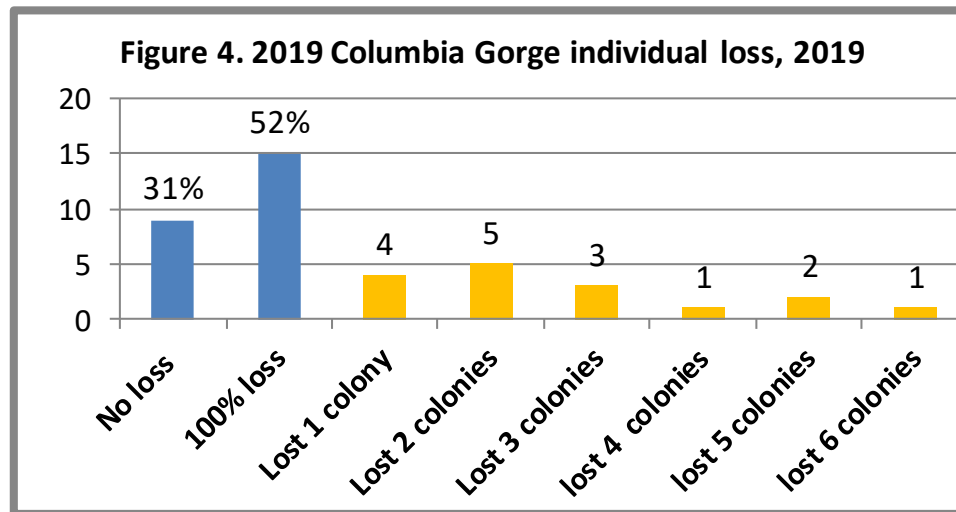
Figure 2 2018-19 Winter Honeybee Loss % by Origination



Losses this past year were nearly double the previous 2 years.



Not everyone had loss. Nine individuals (31%) reported total winter survival; unfortunately 15 individuals (52%) experienced total loss this past winter. Most losses were of a single colony (4 individual) or 2 colonies (5 individuals); highest loss was 6 colonies. Figure 4.



Colony numbers were low. Twenty individuals (69%) had 1, 2 or 3 colonies (both 2 and 3 colonies were the most common hive numbers =7 individuals each). Seven individuals had 4, 5 or 6 colonies and two individuals had 8 or more colonies; highest number was 16. Thirteen individuals (45%) had 1 or 2 year's experience, 9 had 4 to 6 (3 and 4 years, 5 individuals each, was the most common), 6 individuals had 8-10 years experience and one individual had 13 years experience. Twenty five of 19 individuals said they had a mentor available in their first years of keeping bees.

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 56 total listing for Gorge beekeepers, 2.8/individual (statewide 2.3/individual) Twelve individuals listed varroa (60% of respondent choices) same as starvation, followed by poor wintering and weak in fall (30% and 25% respectively); 3 individuals checked Don't know 15%. See comparison of Gorge with statewide responses in Table below.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	CCD	Yellow jackets	Other
Columbia(#)	12	6	5	4	12	1	2	2
Gorge (%)	(60%)	(30%)	(25%)	(20%)	(60%)	(5%)	(10%)	(10%)
Statewide %	40%	23%	29%	27%	18%	4%	14.5%	15%

Survey individuals are asked to indicate what might be an acceptable loss level. The median (middle) selection was 20%. PM responses of 15% or less =41%, 24% of respondents selected 25% and 17% indicated 33%; 2 individuals listed 50% and one said 100%.

Why colonies die? There is no easy way to verify reason(s) for colony loss. Colonies in the same apiary may die for different reasons. Examination of dead colonies is, at best confusing, and, although some options may be ruled out, we are often left with two or more possible reasons for losses. I am working on a book chapter on necropsy of dead bees and will post it as report on the www.pnwhoneybeesurvey.com website.

There is a good deal of variance in opinion as to what might be an acceptable loss level. We are dealing with living animals which are constantly exposed to many different challenges, both in the natural environment and the beekeeper's apiary. Gorge individual choices varied from zero to 50%, with medium of 20%. This acceptable loss level has crept upwards over time.

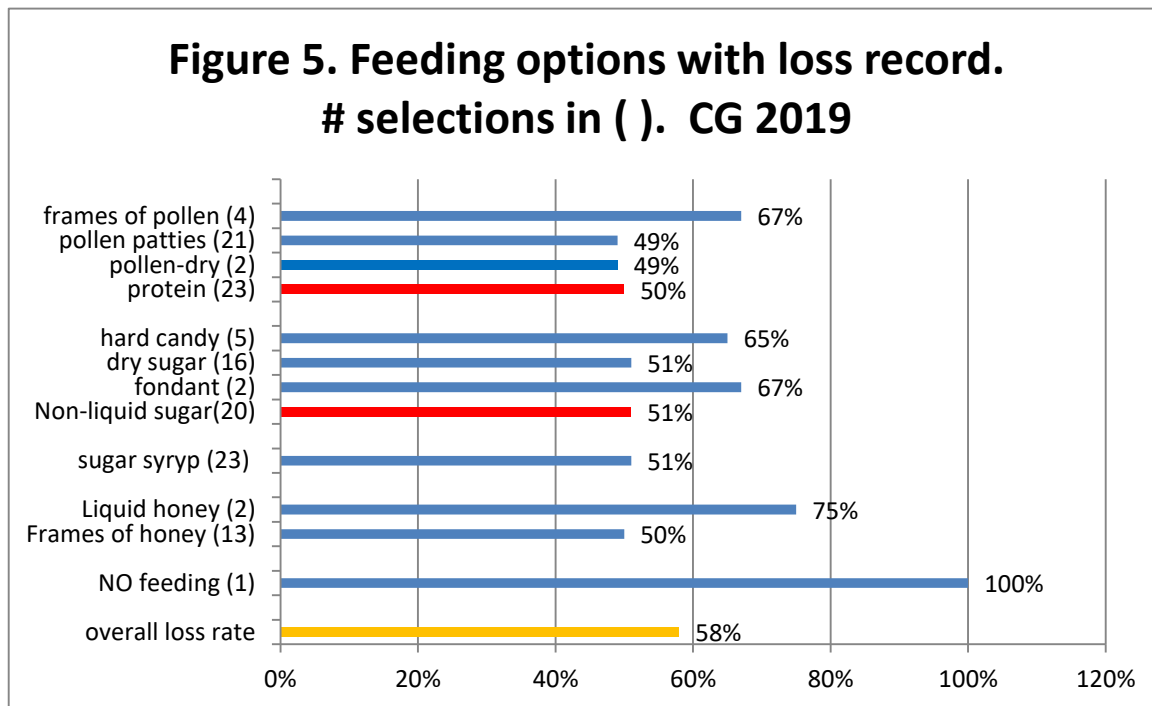
Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus), declining nutritional adequacy/forage and diseases. Pesticide in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies, Management, especially learning proper bee care in the first years of beekeeping, also remains a factor in losses. What effects our changing environment, such as global warming, contrails, electromagnetic forces, including human disruption of them, 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.

Part 2: Management selections and losses

We asked in the survey for information about some managements practiced by respondents. Multiple responses were accepted. 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 options and there was always a none and other selection possible. 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 Gorge survey respondents checked 92 feeding options = 3.3/individual (statewide it was 2.8/individual). Two individuals selected a single choice (they had a 100% loss), 5 chose 2, 10 chose 3 (greatest number and medium – they had a 33% loss level) 6 chose 4 5 selected 5 (they had 83% losses).



Percent colony losses are presented for feeding options with numbers of Gorge members indicating doing the management in (). Bar lengths of left of 58% indicate better than average survival while those to right had heavier than average losses. Individuals feeding protein as with pollen patties, (21 individuals), dry pollen (2 individuals) had better survival than overall for Gorge respondents. Likewise individuals feeding dry sugar had improved survival versus overall for Gorge members.

Twenty three Gorge individuals (82% of individuals who did some feeding) said they used sugar syrup. They had a 51% loss rate, slightly lower than the overall loss level of 58%; individuals feeding frames of honey also had losses below the overall average.

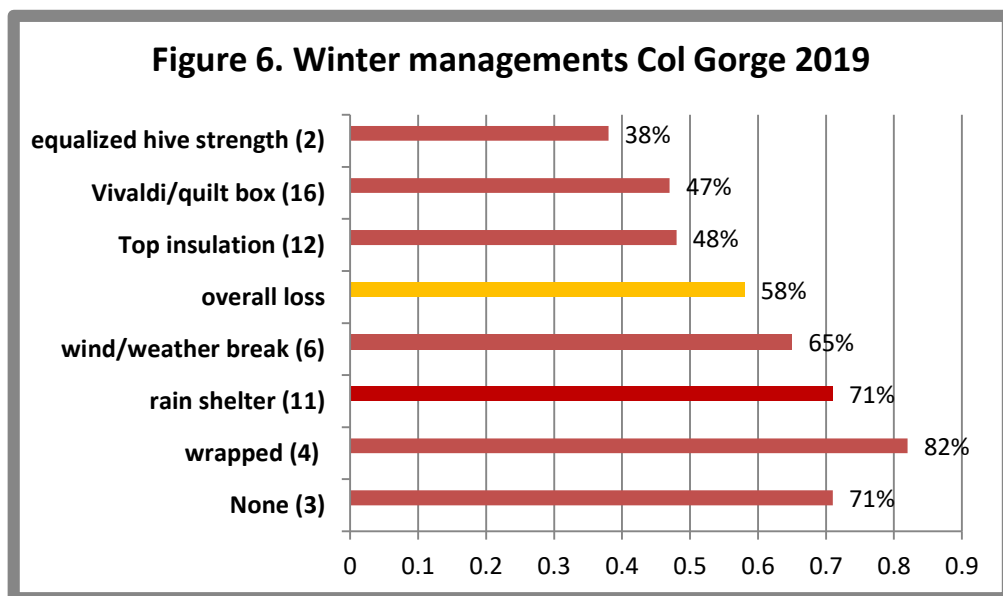
For the last 3 years of heavier losses (48% in 2017 and 2019 and 38% in 2018 spring) individuals statewide and in Gorge doing no feeding had poorer survival all 3 years. Individuals that fed sugar syrup statewide had a 10% lower loss level (average for the 3 years). Individuals feeding non-liquid sugar (in any of the forms) had lower losses all three past winter seasons, with 5 or 6 percentage point improvement from overall losses but only dry sugar feeders in Gorge had better survival this year..

For individuals feeding protein statewide, only the protein patty users showed marginally better survival all 3 years; dry pollen feeders had better survival in one of the three

years with losses the remaining two close to the overall average; the 2 gorge members feeding dry pollen had better survival this past season.

WINTERING PRACTICES: Three CG individuals (10%) reported doing no winterizing; they had loss level of 71%; statewide these 3 were among 51 individuals (12% of overall statewide respondents) that indicated none of the several listed wintering practices; statewide losses were 63% for those doing no winterizing managements, 15 percentage points higher loss than overall state loss of 48%. Multiple selections were possible and in fact the 29 Gorge members averaged 2.5/individual. Ten individuals chose a single management and had a 70% loss level while the five individuals checking 4 (3 individuals) or 5 (2 respondents) of the options had a 67% loss level. The 8 individuals doing 3 managements had the best survival (54% loss).

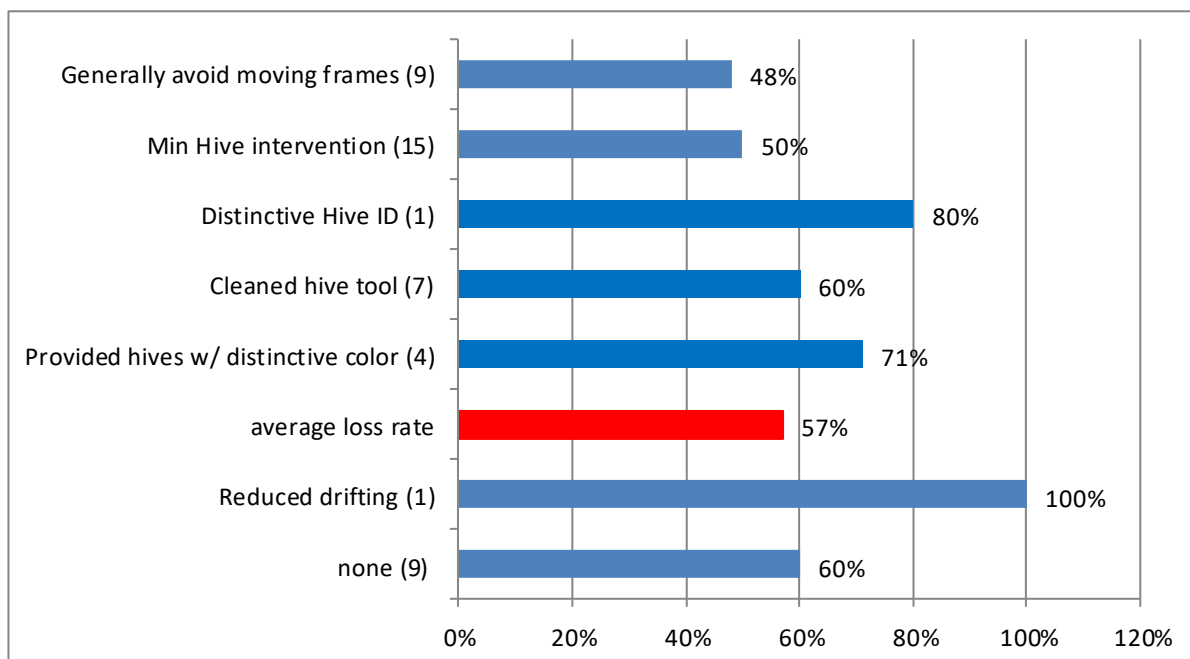
The two most common wintering managements selected were use of a quilt box (Vivaldi board) at colony top (242 individuals statewide (58%) and 16 gorge members 62%) and upper entrance (Vivaldi Board has this built in), 12 Gorge members plus use of a rain shelter (159 individuals statewide (38%), 11 Columbia Gorge (42%) respondents. Figure 6 shows number of individual choices for TVBA members in () and percent loss of each selection. Equalized hive strength had best survival (38%) loss rate while use of Vivaldi Board and top insulation also showed improved survival.



Over the past three years no single winterizing management statewide improved survival each survey year. However 6 managements improved survival in 2 of the 3 years. Those managements are Equalizing colonies in the fall, Use of the quilt box/Vivaldi board/moisture trap at top of colony, an upper entrance (most Vivaldi boards have an upper entrance built into the equipment), Wrapping colonies, Wind/weather protection and other (the other items are a large mixture from reduced bottom entrance, reducing number of boxes and some means of reducing moisture). In all 3 years those statewide, including TVBA, doing no winterizing had heavier losses than overall.

SANITATION PRACTICES: It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. Gorge beekeepers had 47 responses 2.4/individual. Sixteen percent statewide and 9 Gorge individuals (31%) said they did not practice any of the 6 offered alternatives. Loss rate statewide was 52%, four percentage points higher than the overall loss rate of 48%; for Gorge it was 60%, 3 percentage points greater than overall Gorge average loss of 57%. Nine Col Gorge members had 1 selection (loss rate 43%), 8 made 2 choices, 3 made 3 choices and 2 had 4; The 5 respondents 3 and 4 selections had 50% loss level.

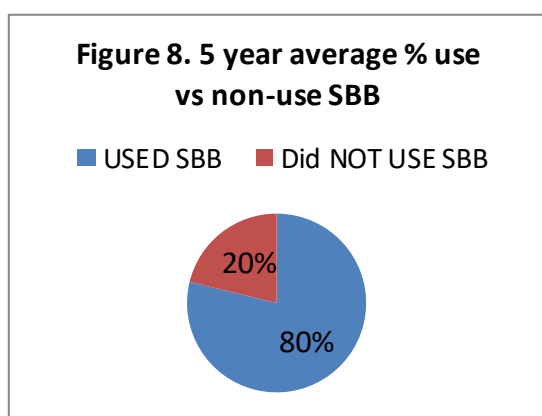
Figure 7



Minimal hive intervention (209 individuals, 15 of them Columbia Gorge beekeepers) was the most common option selected along with generally avoid moving frames (9 Gorge

members). The two sanitation choices that did seem to improve survival statewide was reduce drifting by spreading colonies out and providing hives with distinctive ID /doing other hive ID measures; for Gorge members these two resulted in poorer survival/heavier losses

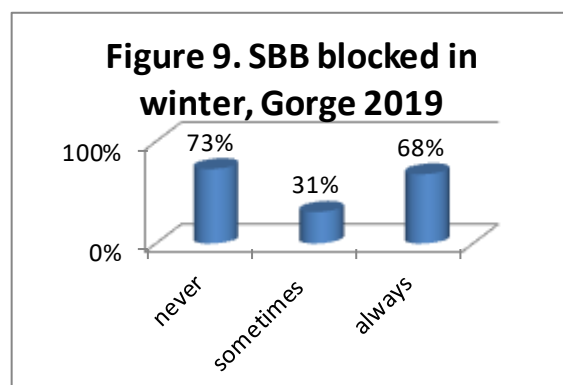
In past three years the only sanitation choice that displayed better survival in other than a single year of occurrence was to reduce drifting. Doing nothing had a high or the highest loss rate in all 3 years.



SCREEN BOTTOM BOARDS: 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 63 individuals (20%) statewide and 6 Gorge members (21%) said they did not use screen bottom boards. Loss level was 48% for non-users; Gorge, non-users had 71% loss. In 5 PNW survey years, 20% said they did not use SBB and 80% did use SBB on some or all of their colonies.

The five year average of SBB use, 42.8% loss level of those using SBB on all or some of their colonies and 44.2% for those not using SBB (a 3% positive gain), illustrates how SBB are very minor in improving overwinter survival.

The survey asked if the SBB was left open (always response) or blocked during winter. This past season 23% of individuals statewide (Gorge 24%) said they always blocked SBB during winter; statewide loss rate was 37%; Gorge losses were 46%. One hundred fourteen individuals statewide (44%) did not block them during winter (never response), of which 15 individuals were Gorge members. Statewide never responders had a 42% loss rate, 5 percentage points higher than those who block. For Gorge the difference was 19 percentage points. **Comparing the always and sometimes left open with the closed in winter response reveals an average 10 percentage point difference (over 5 years) in favor of closing the SBB over the winter period for OR beekeepers.** See Figure 10.

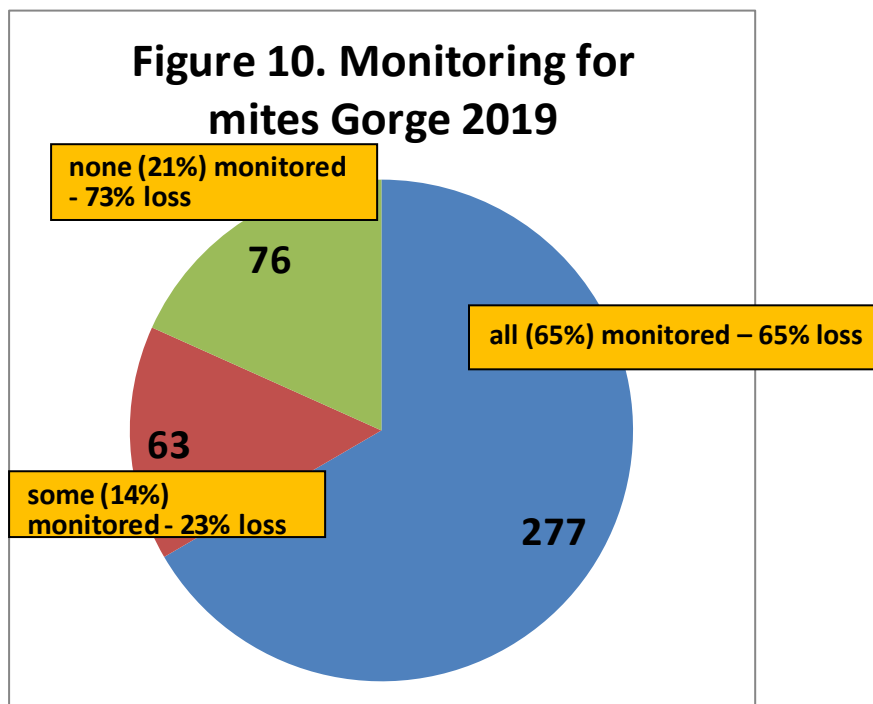


There is no good science on whether open or closed bottoms make a difference in overwintering but some beekeepers “feel” bees do better with it closed overwinter. Five years of comparison shows those closing the screen during winter did have a 10 percentage point improvement in colony survival. An open bottom, at least during the active brood rearing season, can assist the bees in keeping their hive cleaner.

Mite monitoring/sampling and control management

We asked percentage of 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. 277 individual respondents (67%) statewide 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 10.

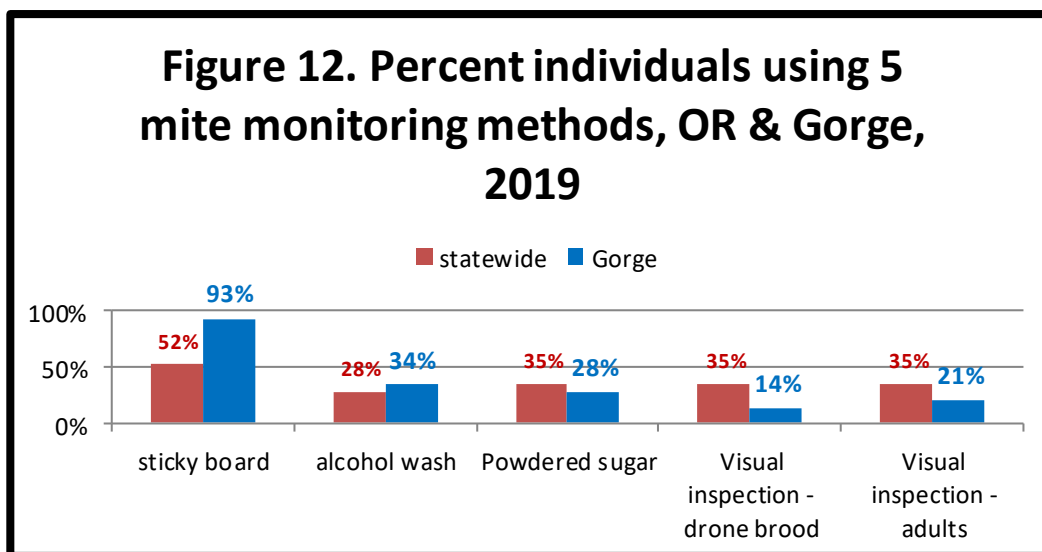
This past year, nineteen (65%) Gorge individuals monitored all their colonies; they had a lost rate of 65%. Six individuals (21%) did no monitoring and had the highest loss level 73%. The some colonies monitored individuals (4 individuals - 14%) had a 23% loss.



Statewide it is obvious that monitoring alone is a means towards improved winter survival. The table below compares % individuals and % winter loss for individuals 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 avg		44%		45%		53%

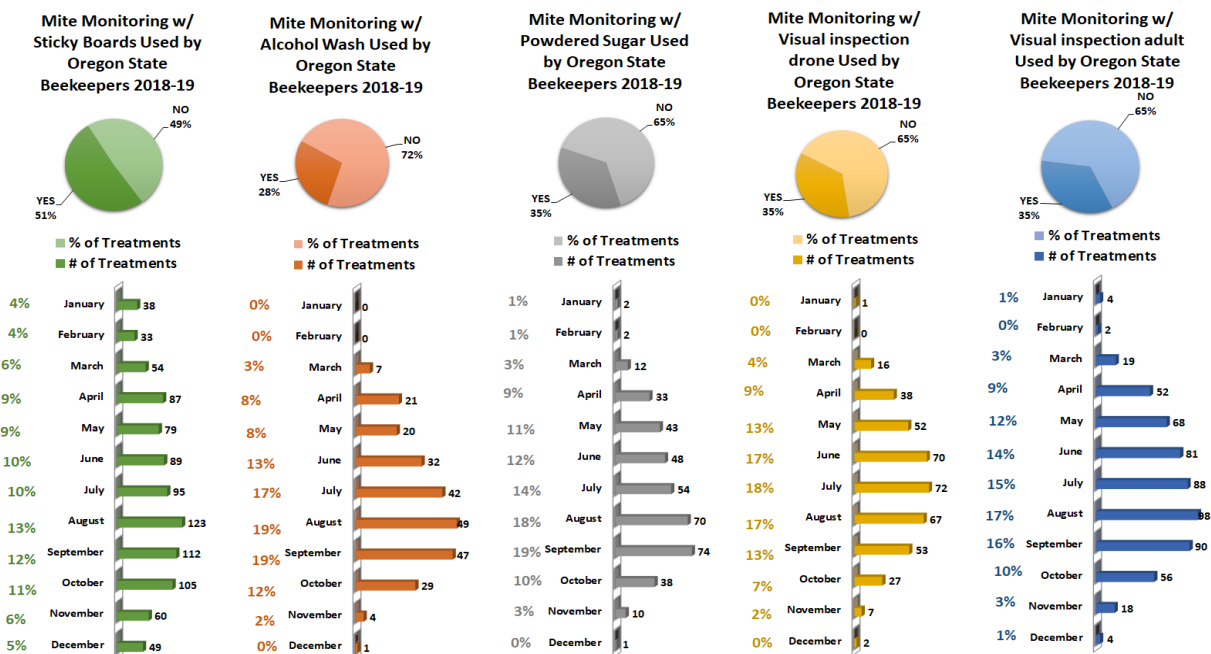
In order of popularity of use, visual sampling methods were used by 4 (drone brood) and 6 (adults) Gorge individuals. Sticky boards were utilized by all but 2 individuals (93%). The comparison of statewide (red bars) and Gorge (blue bars) is shown below. In past 5 years, the use of sticky boards has decreased in use and both alcohol wash and powdered sugar shake have increased in use statewide; visual methods have remained about the same. Figure 12.



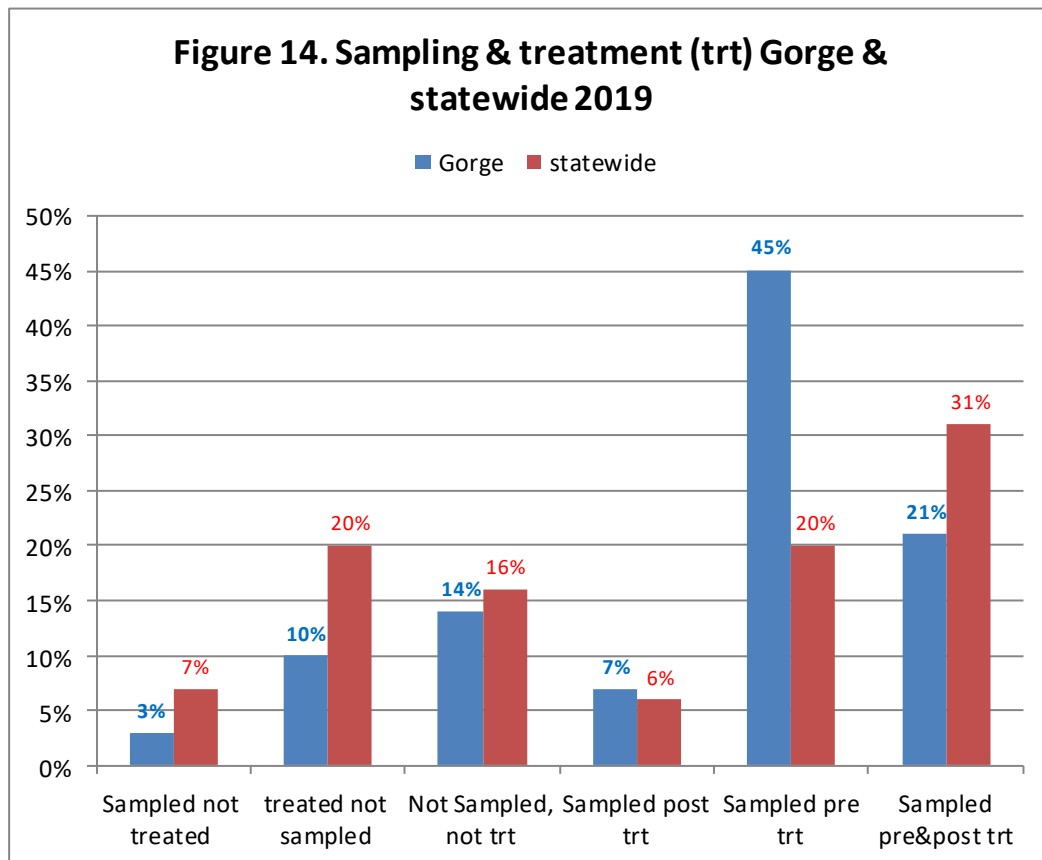
Individuals however are likely to use more than one monitoring technique (1.8/individual). In total choices statewide, the two visual methods were the greatest in terms of use, 49% & 45%, followed by 40% of sticky board and 38% of powdered sugar; alcohol wash was used the least (13%) by both Gorge members and Statewide.

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 record of months each of the 5 sampling methods were used (statewide data).

Figure 13



The most common sampling of respondents in 2018-19 was both pre and both pre & post-treatment (51%) statewide but for Gorge it was 66%. Data comparison for 2019 between Gorge and statewide. Figure 14.



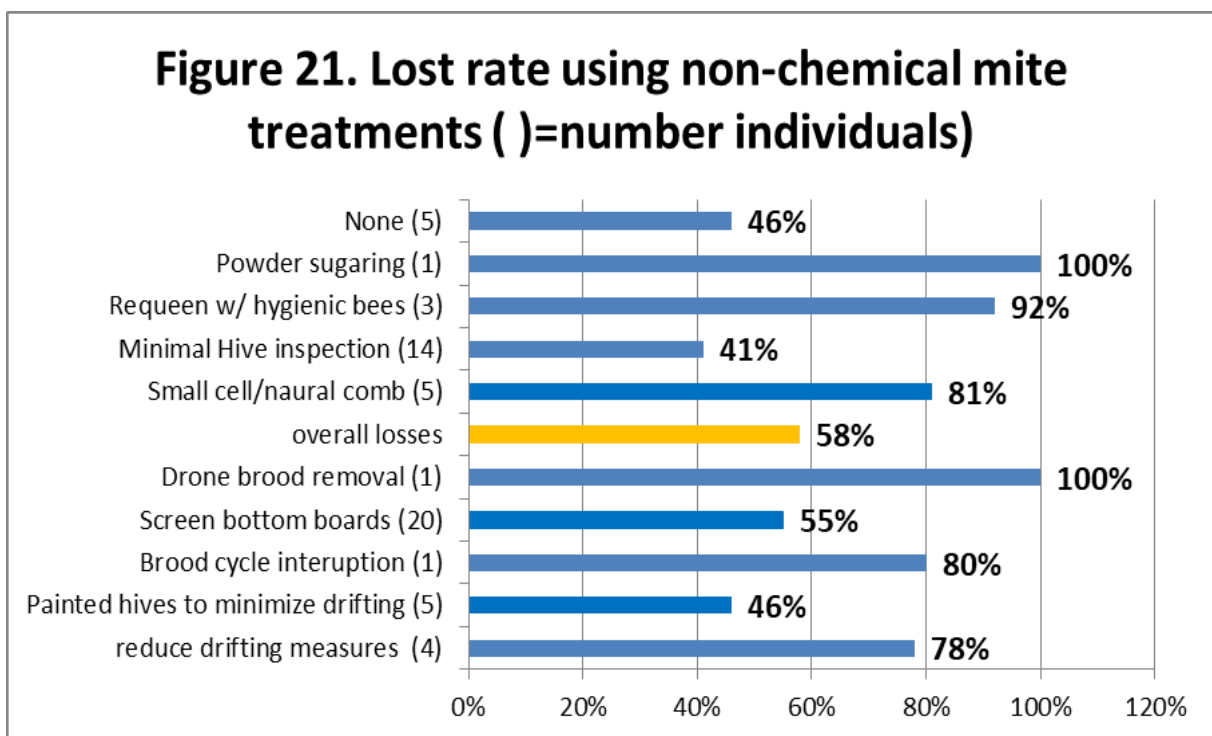
It is important to KNOW mite numbers. Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm the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

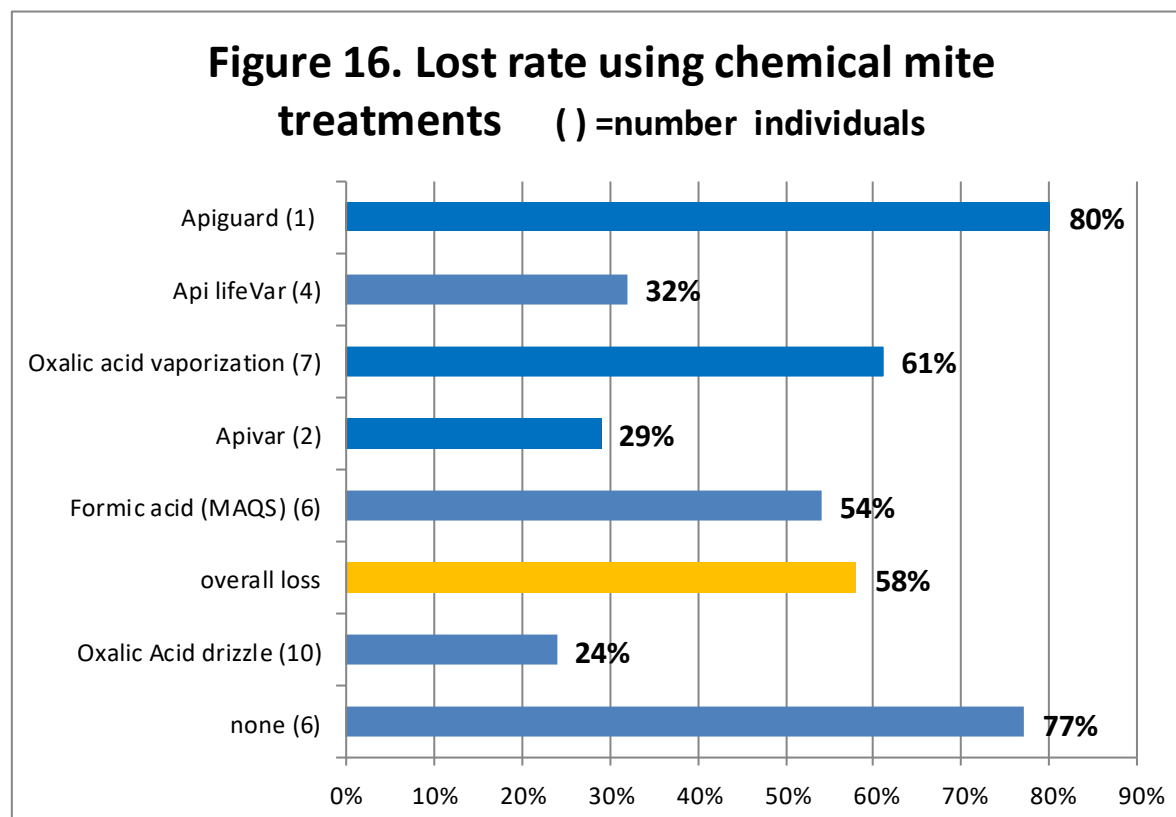
Mite control treatments

Non-Chemical Mite Control: Of nine non-chemical alternatives offered on the survey (+ other category), 11 Gorge individuals used one method, 10 used two, 5 used three, 1 each used 4, 5 and 6 choices. Rate loss of those using one selection was 67% and those using 2 was 52%. The 3 individuals using 4, 5 or 6 was 100%. Use of screened **bottom board** was listed by **20 individuals with minimal hive inspection (24 individuals) next most popular**. Both were just below the average Gorge losses. The use of the remaining 7 selections are shown in Figure 21; number of individuals in (), bar length represents average loss level of those Gorge individuals using each method.

Four of the non-chemical alternatives have demonstrated reduced losses over past 4 year. Reducing drifting such as spreading colonies and different colony colors in apiary has demonstrated a 13% better survival. Painted hives showed better survival this past winter for Gorge members. Brood cycle interruption has demonstrated an 11% better survival and drone brood removal a minor 2% advantage over past three years statewide. These two, only utilized by 1 individual each, did not do as well for the two Gorge members.



Chemical Control: For mite chemical control, 6 Gorge individuals used No Chemical treatment (21% of total Gorge respondents; statewide 24% used NO chemical). These 6 individuals had 77% loss Those 23 using chemicals used at rate of 1.9/individual; Nine used a single chemical, 10 used 2; 3 used 3 and one indicated use of 4 chemicals. Loss levels were 61% (for those using one choice), 33% for those utilizing two and 90% for those with 3 or 4 choices.



For Gorge members ApiLife Var and Apivar had lower losses than the Gorge members overall average (62%) . The 10 individuals using oxalic acid drizzle had reduced loss while those using oxalic acid vaporization had higher losses.

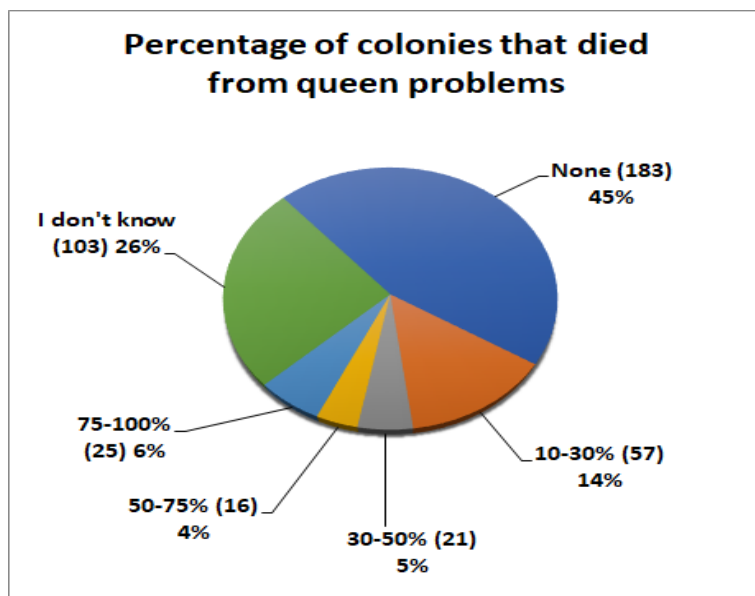
Consistently the last 3-4 years, five different chemicals have helped beekeepers improve better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level; this year Apiguard did not perform as well for a single Gorge member, Apiguard statewide demonstrates a 31% better survival and ApiLifeVar a 30% better survival record over past 4 years. Apivar, the synthetic (amitraz), has demonstrated a 29% better survival over past 4 years (2016-19). Oxalic acid vaporization over past 3 years has demonstrated a 13% better survival (the survey did not differentiate Oxalic vaporization from drizzle in 2016). Oxalic acid drizzle did better for 10 Gorge members this year than overall average loss.

Formic acid has been the most popular chemical for OR beekeepers statewide. Statewide is has 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 for example statewide Formic Pro seemed to perform better than the traditional formic MAQs pads.

Queens

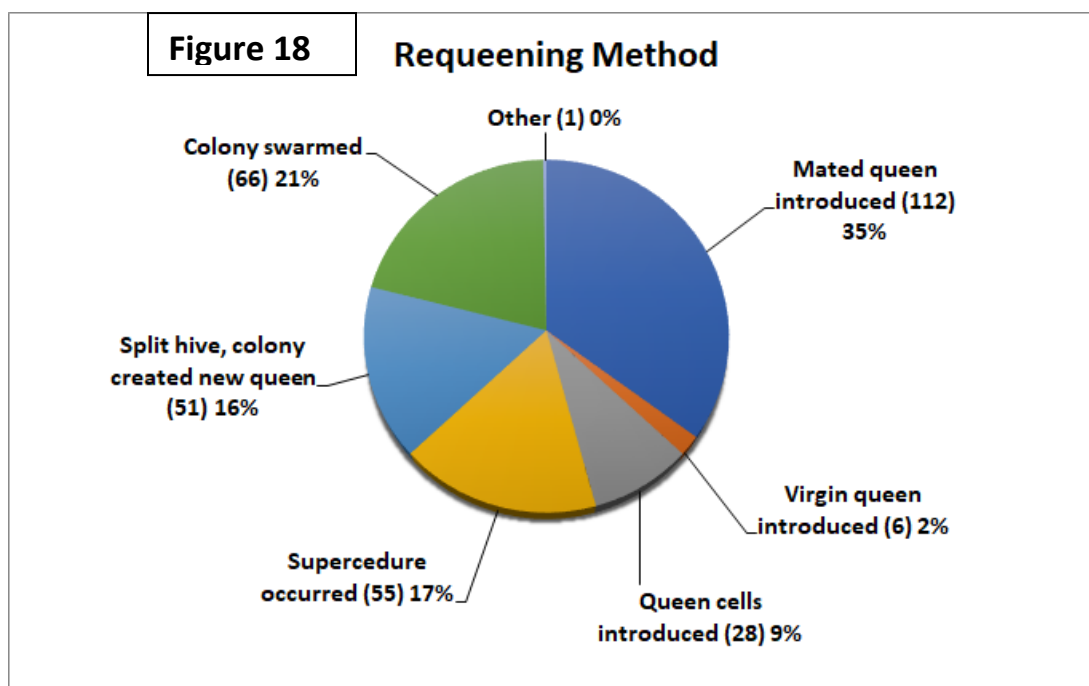
We hear lots of issues related to queen “problems. In Section 8 of the survey we asked what percentage of loss could be attributed to queen problems. One hundred twenty nine individuals statewide subdivided queen related issues from 10 to 100% of their hives. One hundred eighty three (44) said none (45%); an additional 103 individuals (24.5%) said they didn’t know. The number and percent expressed by statewide respondents is shown in pie chart 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. Twenty eight percent had marked queens statewide. The related question then was did you or your bees replace their colony queen? Forty-nine percent said yes statewide and 31% said no.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. The question “How did bees/you requeen”received 318 responses statewide (more than one option could be checked). Statewide responses are shown in Figure 18. Statewide, 35% indicated their bees were requeened with a mated queen while more than one half (54%) indicated it was the bees that requeened, via swarming, supersedure or emergency rearing. Such results indicates too few individuals 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. The BeeInformed survey is mainly the response of larger scale OR beekeepers not the backyarders. Reports for individual bee groups are customized and posted to the PNW website.

We intend to continue to refine this instrument each season and hope you will join in response next April. If you would like a reminder when survey is open please email us at info@pnwhoneybeesurvey.com with “REMINDER” in the subject line. We have a blog on the pnwhoneybeesurvey.com and will respond to any questions or concerns you might have.

Thank You to all who participated. If you find any of this information of value please consider adding your voice to the survey in a subsequent season. Dewey Caron June 2019