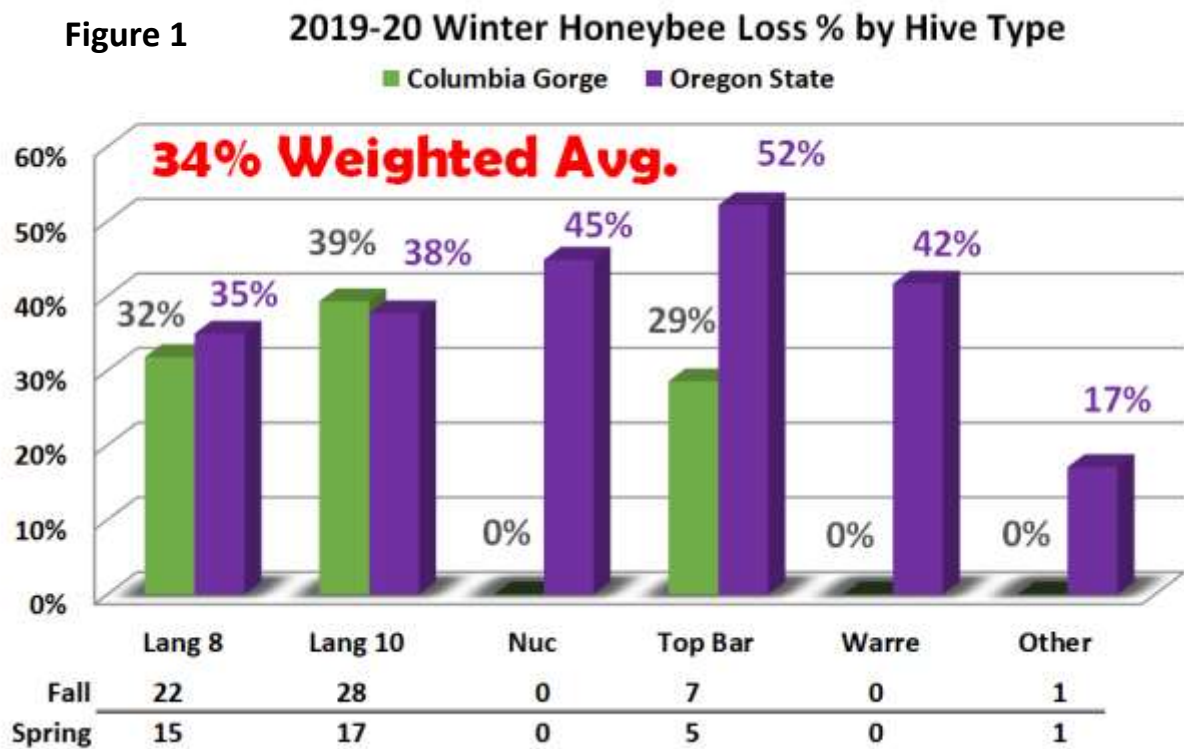


2020 Columbia Gorge Beekeeper Winter Loss by Dewey M. Caron

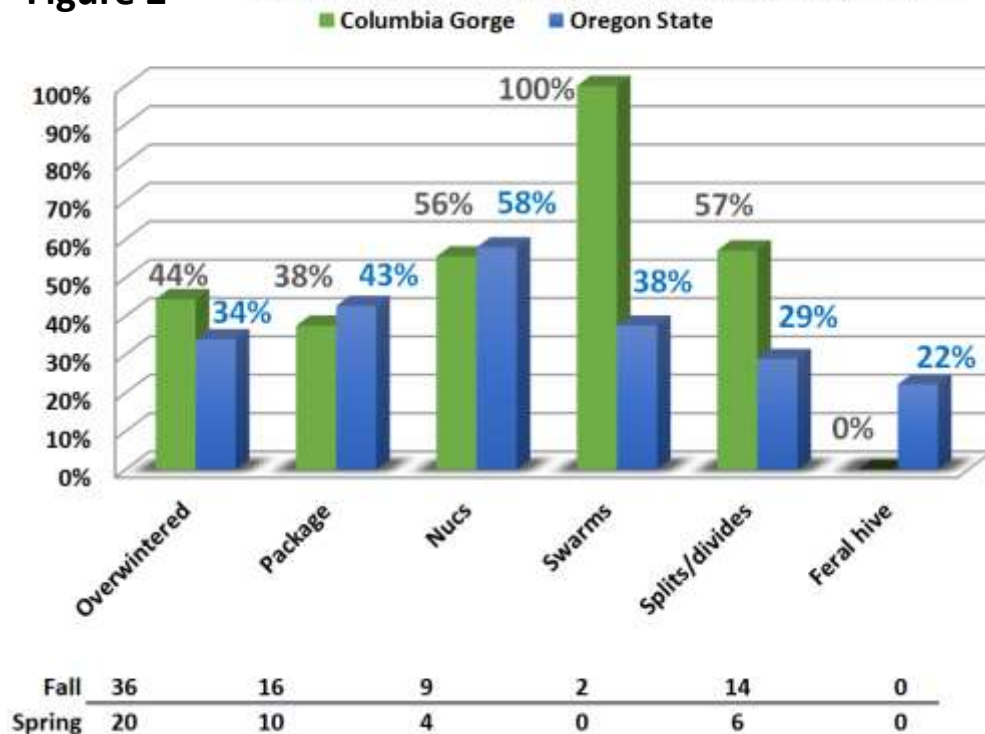
This was the 11th year of a survivorship/loss survey of Oregon and Washington beekeepers. I received 302 responses from Oregon (OR) backyarders, an additional 133 from Washington beekeepers, keeping anywhere from 1 to 45 colonies. I received 17 survey returns from Columbia Gorge beekeepers, a dozen fewer than last year.

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 34%**, 4 percentage points lower than the statewide loss of 38%. The Gorge and statewide loss comparison is shown in Figure 1 with fall and spring numbers below. Eighty six percent (86%) of the 58 respondent colonies were 8 or 10 removable frame Langstroth hives.



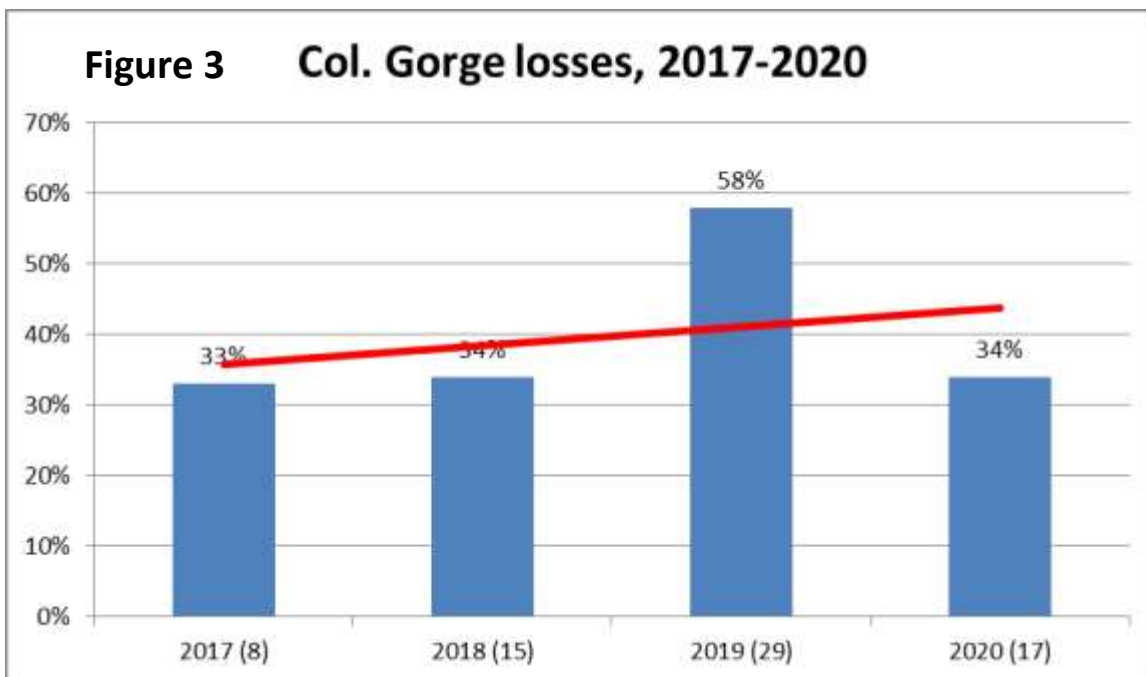
The survey also asked for hive loss by hive origination. Packages and nucs had slightly lower losses compared to statewide with overwintered colony losses 10 percentage points higher than statewide rate. Comparison of Gorge losses with stateside shown in Figure 2 below – numbers below graph.

Figure 2 2019-20 Winter Honeybee Loss % by Origination



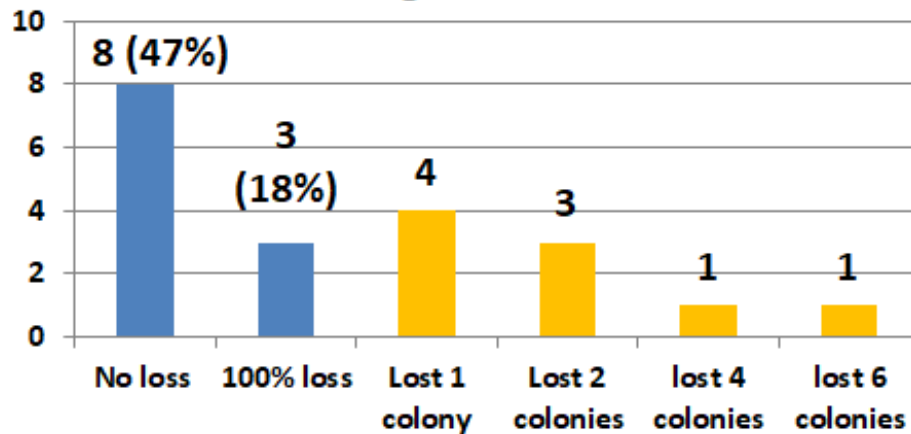
Losses this past year returned to earlier years, well below last year. Red line is trend.

Figure 3 Col. Gorge losses, 2017-2020



Not everyone had loss. Eight individuals (47%) reported total winter survival; unfortunately 3 individuals (18%) experienced total loss this past winter. Highest loss numbers were a single colony (4 individuals) or 2 colonies (3 individuals); highest loss was 6 colonies. Figure 4.

Figure 4 Columbia Gorge Individual Loss



Colony holdings were low. Twelve individuals (70%) had 1, 2 or 3 colonies (1 colony was the most common number - 6 individuals). Four individuals had 4 or 5 colonies and one had more than 10 colonies. Beekeeping experience was larger. Six individuals (35%) had 1, 2 or 3 year's experience, 7 had 4 to 6 years experience; 2 individuals had 10 years experience. The 4 individuals with 8+ years experience had 40% loss while the 6 with 1-3 colonies had 26% loss level. Twelve of 17 individuals said they had a mentor available 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 14 total listings for Gorge beekeepers, 1.4/individual. Five individuals listed varroa (50% of respondent choices). One said don't know 10%. 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(#)	5	1	1	2	3	1	1	0
Gorge (%)	(50%)	(10%)	(10%)	(20%)	(30%)	(10%)	(10%)	
Statewide %	24%	3%	15%	16%	18%	4%	6%	13%

Survey individuals are asked to indicate what might be an acceptable loss level. The median (middle) selection was 20%. CG responses of 15% or less =35%. Twenty four percent (24%) of respondents selected 25% and 3 individuals listed 50%.

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. 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. 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, 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.

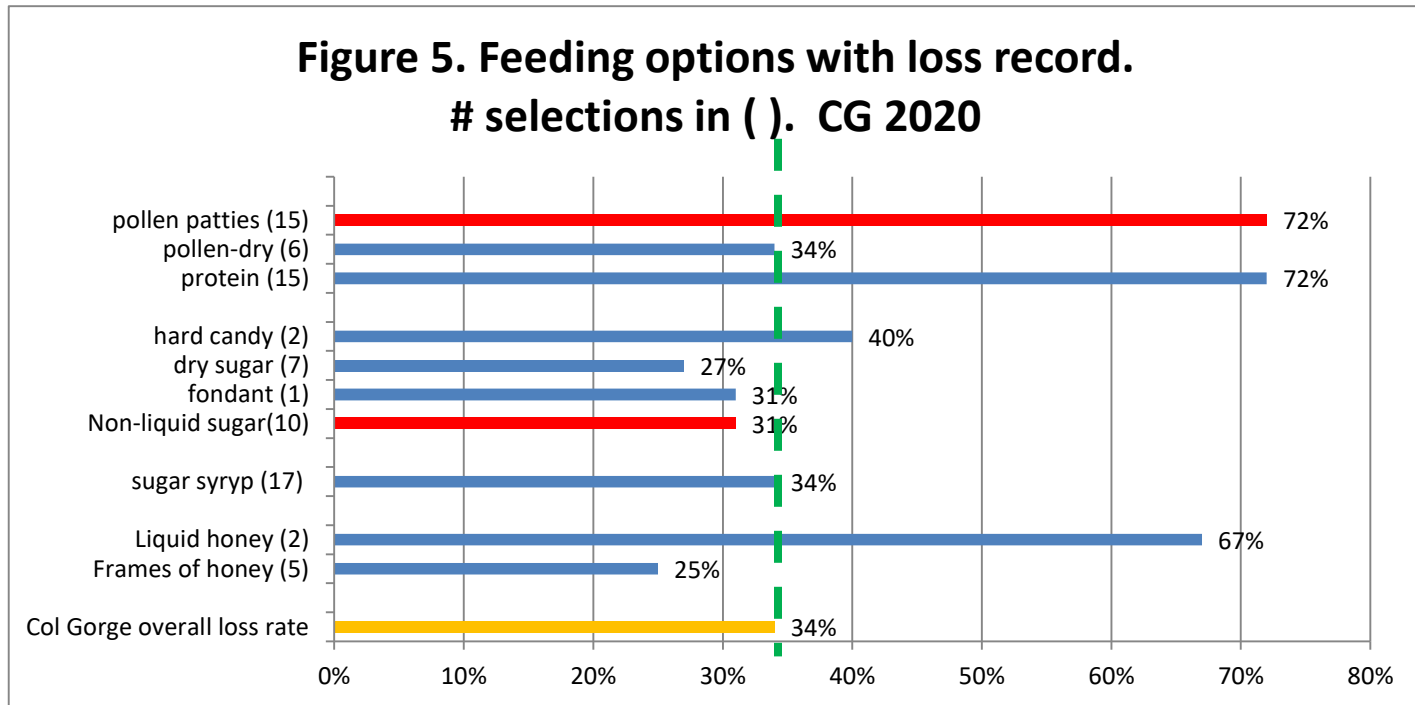
There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are necessarily excessive for all the issues facing honey bees in the current environment. Varroa mites and the viruses they transmit are considered a major factor colonies are not as healthy as they should be.

Part 2: Management selections and losses

We asked in the survey for information about some managements practiced by respondents. 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 selections 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 55 feeding options = 3.2/individual (statewide it was 2.9/individual). One individual selected a single choice (sugar syrup only - they had an 80% loss), 3 chose 2, 5 chose 3 (medium). 7 chose 4 and one selected 5 (they had zero losses). Percent colony losses are presented for feeding options with numbers of Gorge members indicating doing the management in (). Bar lengths to left of 34% (**green dashed line**) indicate better than average survival while those to right had heavier than average

losses. Only three feeding options showed lower losses, feeding frames of honey (5 individuals) and feeding dry sugar (7 individuals) and fondant, with but a single individual. See Figure 5.



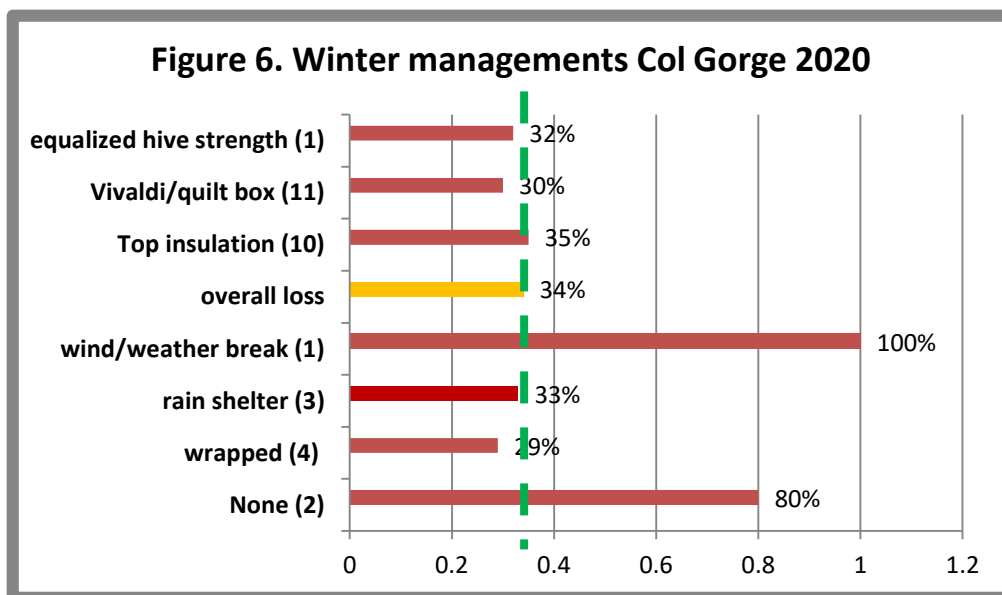
Statewide Summary: For the last 4 years (average loss rate =43%), **individuals doing no feeding had 12.6 percentage point higher losses (poorer survival) all 4 years (AVERAGE PER CENT DOING NO FEEDING = 8% of individuals, AVERAGE STATEWIDE LOSS 4 YEARS = 55.6%).**

Individuals statewide that fed sugar syrup had a 7¾% 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= 39¼%) 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 (37¾%). 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 were close to the overall yearly average.

WINTERING PRACTICES: Two CG individuals (12.5%) reported doing no winterizing; they had loss level of 80%; 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 15 Gorge members averaged 2.3/individual. One individual chose a single management (upper entrance) and had a zero loss level while the three individuals checking 4 of the options had a 12½% loss level.

The two most common wintering managements selected were use of a quilt box (Vivaldi board) at colony top (175 individuals statewide (71%); 11 gorge members (73%) and top insulation, 10 Gorge members. Figure 6 shows number of individual choices for Gorge members in () and percent loss of each selection. Wrapping had best survival (4 individuals, 29% loss rate) while those doing no winterizing or the one individual that selected wind/weather break had poorest survival.

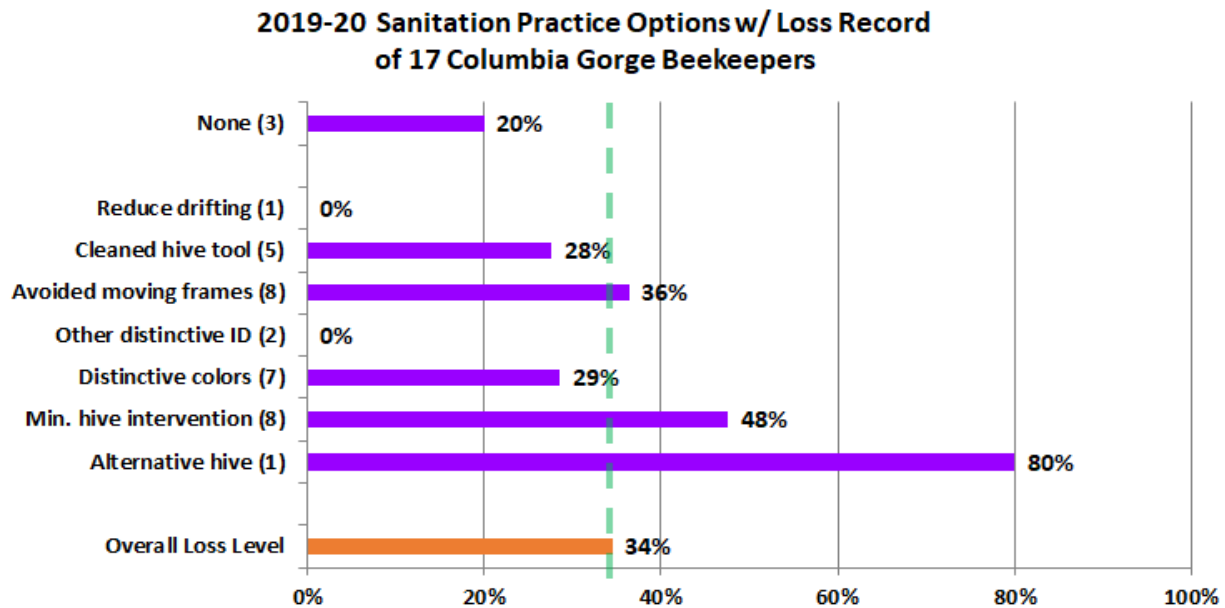


Over the past three years individuals statewide that did no winterizing practice (average 13¹/₃% of individuals) averaged 48% loss compared to 41% overall average loss of last 3 years, a 7 percentage point poorer survival rate. Only 2 winterizing managements improved survival statewide all 3 years – these were wrapping (30 % lost rate, an 11 percentage point improvement) and upper insulation (32 %, a 9 percentage point improvement). Vivaldi (38 %), upper entrance, also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (also 38%) had only slightly improved survival rates – 3 percentage points over most recent 4 year period.

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. Gorge beekeepers had 47 responses, 2.4/individual. Sixteen percent statewide and 3 Gorge 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 Gorge it was 20%, an improvement from overall Gorge average loss of 34%. Nine Columbia Gorge members had 1 selection (loss rate 43%), 8 made 2 choices, 3 made 3 choices and 2 had 4; the 5 respondents with 3 and 4 selections had 50% loss level.

Figure 7

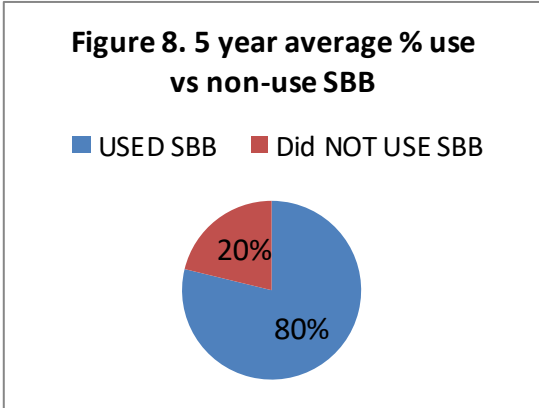


Minimal hive intervention (145 individuals, 8 of them Columbia Gorge beekeepers) was the most common option selected along with generally avoiding moving frames (also 8 Gorge members). The two sanitation choices that did seem to improve survival was reduce drifting by spreading colonies out (single individual) and providing hives with distinctive ID /doing other hive ID measures (2 individuals); distinctive hive colors and cleaning hive tool also improved survival.

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

SCREEN BOTTOM BOARDS

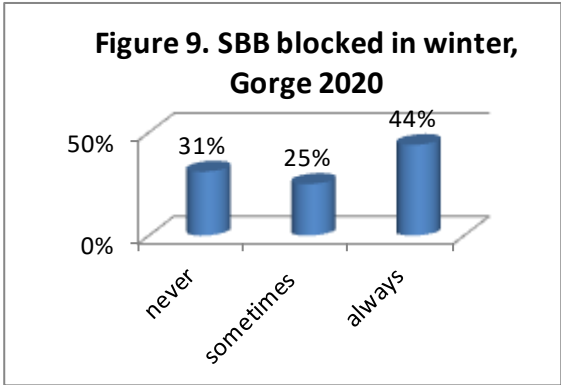
Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In the recent survey, 63 individuals (20%) statewide and 2 Gorge members (12%) said they did not use screen bottom boards. Loss level was 48% for non-users; Gorge, non-users had 40% 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 44%)

said they always blocked SBB during winter; statewide loss rate was 37%; Gorge losses were 30%. One hundred fourteen individuals statewide (44%) did not block them during winter (never response), of which 5 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 18 percentage points.



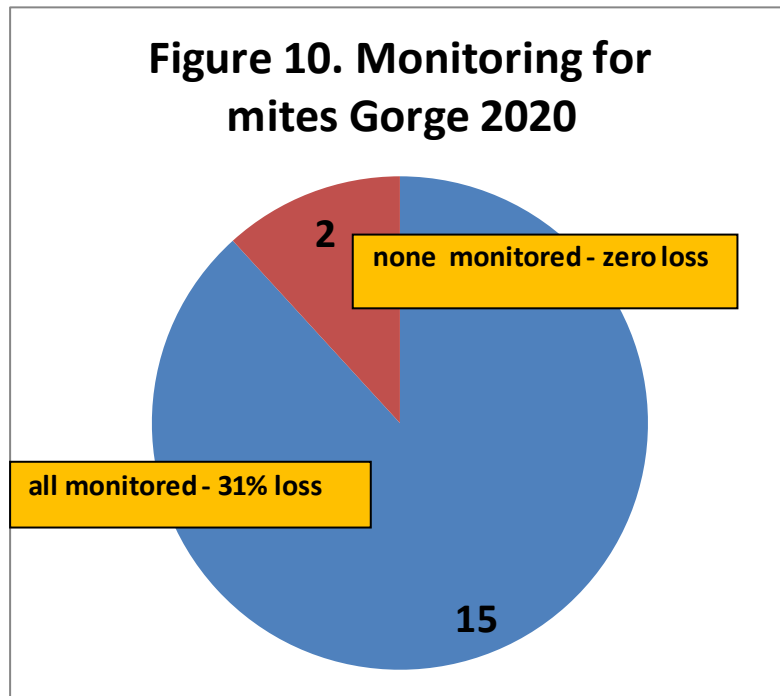
Comparing the always and sometimes left open with the closed in winter response reveals an average 10 percentage point difference (over 5 years) in favor of closing the SBB over the winter period for OR beekeepers. See Figure 9.

There is no good science on whether open or closed bottom boards 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 with 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 2019 year and/or overwinter 201-20, 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. 202 individual

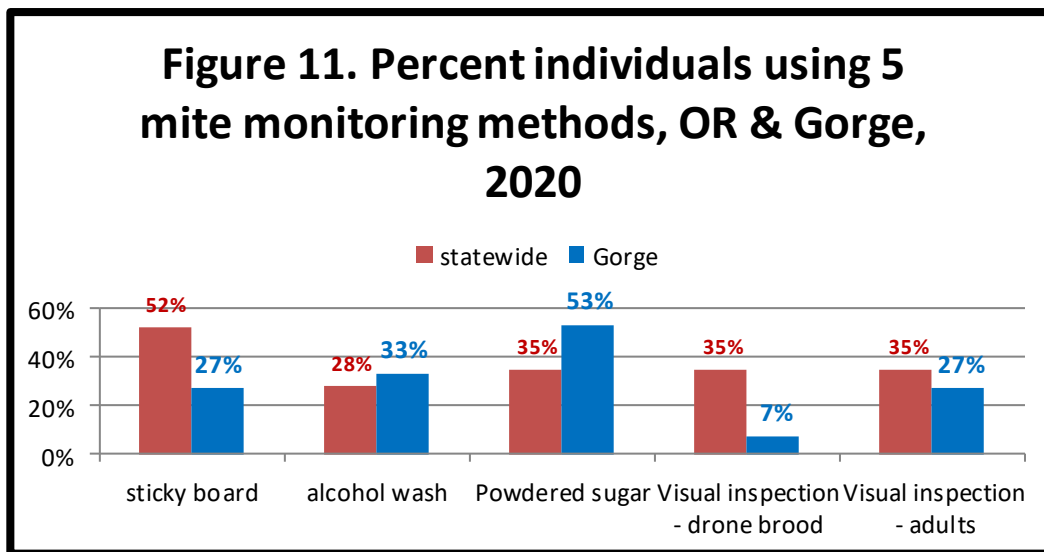
respondents statewide (67%), same percentage as previous year, said they monitored all their hives. Losses of those individuals monitoring was 33%. Sixty one (20%), 2 percentage points higher than last year, reported no monitoring; they had a higher loss rate of 49% loss. 38 individuals reported monitoring some of their colonies; they had a 16% loss. This past year, fifteen (88%) Gorge individuals monitored all their colonies; they had a lost rate of 31%. Two individuals (12%) did no monitoring and had no loss contrary to statewide results.



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%

Visual sampling method was used by one individual (drone brood), 5 used visual method of looking at adults and sticky boards were utilized by 4 individuals (27%). Powdered sugar sampling was used almost twice the level as alcohol wash. The comparison of statewide (red bars) and Gorge (blue bars) is shown in Figure 11 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.



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

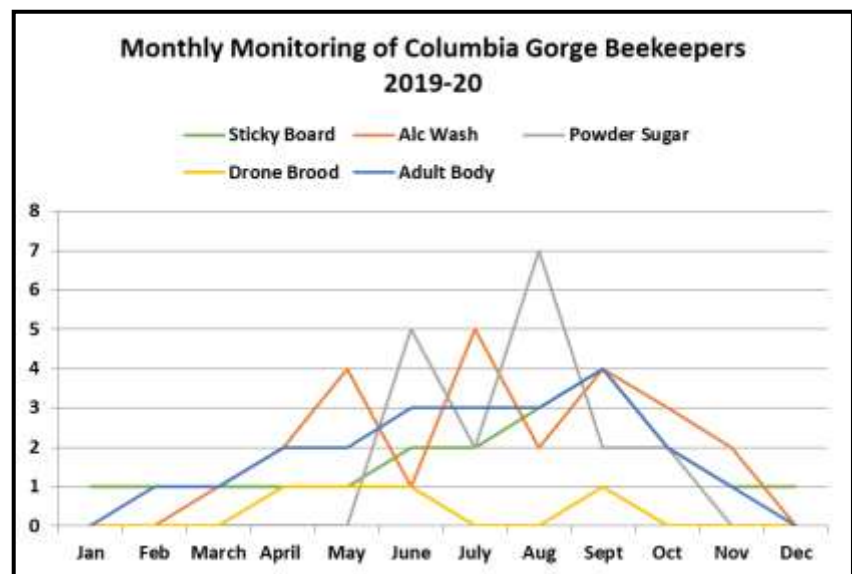


Figure 12

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 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 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 2-3% 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

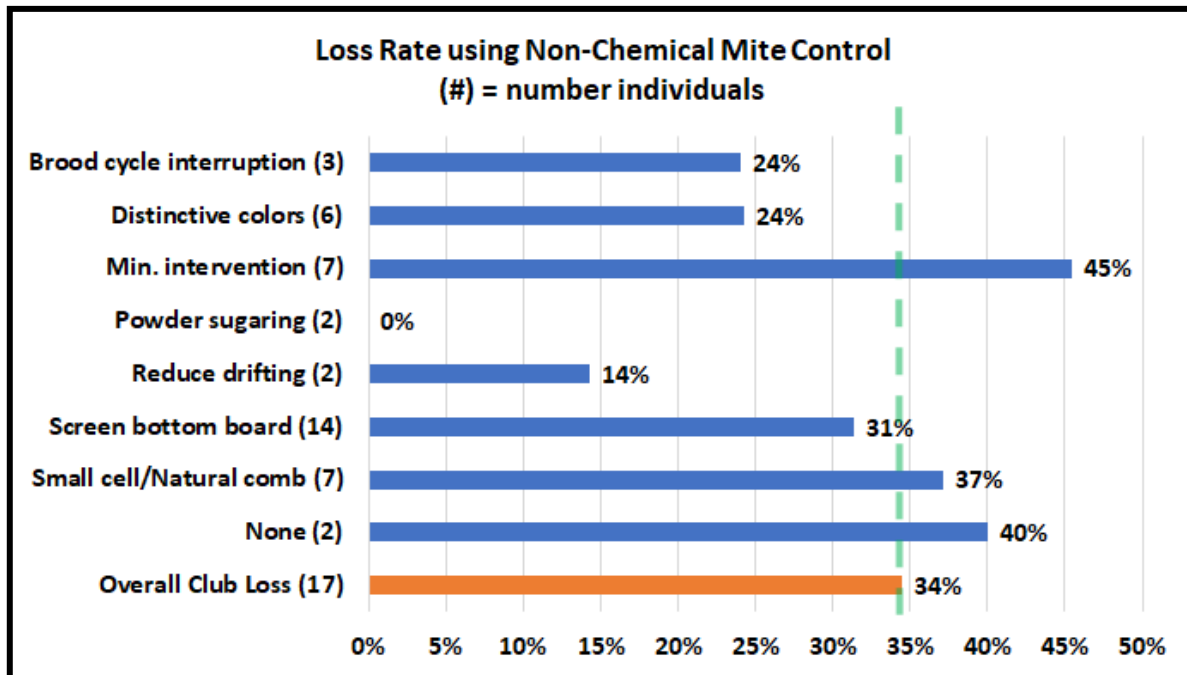
Non-Chemical Mite Control: Of nine non-chemical alternatives offered on the survey (+ other category), 2 Gorge individuals used one method, 5 used two, 4 selected three and 4 and 1 selected 5. Rate loss of those using one selection was 33% loss, for those using 2 it was 58%. The 3 individuals selecting 3 alternatives had loss rate of 37 %, while the 4 with 4 and 5 choices had 22% loss. Use of screened bottom board was listed by 14 individuals; they had slightly improved survival. Brood interruption (8 individuals) was followed in popularity by minimal intervention and small cell/natural comb, 7 individuals each. The selections are shown in Figure 13; number of individuals in (), bar length represents average loss level of those Gorge individuals using each method.

Four of the non-chemical alternatives had reduced losses this past year for gorge beekeepers. Two individuals, each having one colony, did powder sugaring and had no loss; the two who reduced drifting by spreading colonies had 14% loss. Brood cycle interruption (8 individuals) and painting distinctive colors (6 individuals) each had 24% loss rate, a 10 point percentage improvement.

Three of the non-chemical alternatives have demonstrated reduced losses statewide 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.

Figure 13



Chemical Control: For mite chemical control, 3 Gorge individuals used No Chemical treatment (18% of total Gorge respondents; statewide 20% used NO chemical). These 3 individuals had total loss 0%. Those 14 using chemicals used at rate of 1.9/individual; five used a single chemical, 6 used 2 and 3 individuals used 3. Loss levels were zero for those using one choice, 41% for those utilizing two and 25% for those with 3 selections. All except the three individual with no selections (100% loss) and those 6 using MAQS had improved survival this past year. Oxalic acid drizzle did not improve survival either.

Consistently the last 4 years five different chemicals have helped beekeepers improve survival. These are: essential oil 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 those who mix oxalic acid into shop towels (7 individuals) have heavier losses - 54%.) and ApiLifeVar (36% average loss level over last four years). The formic acid MAGS formulation level is same as average loss level (43%). 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 one CG individual using Formic Pro had only 20% loss (lost one of 5 fall colonies).

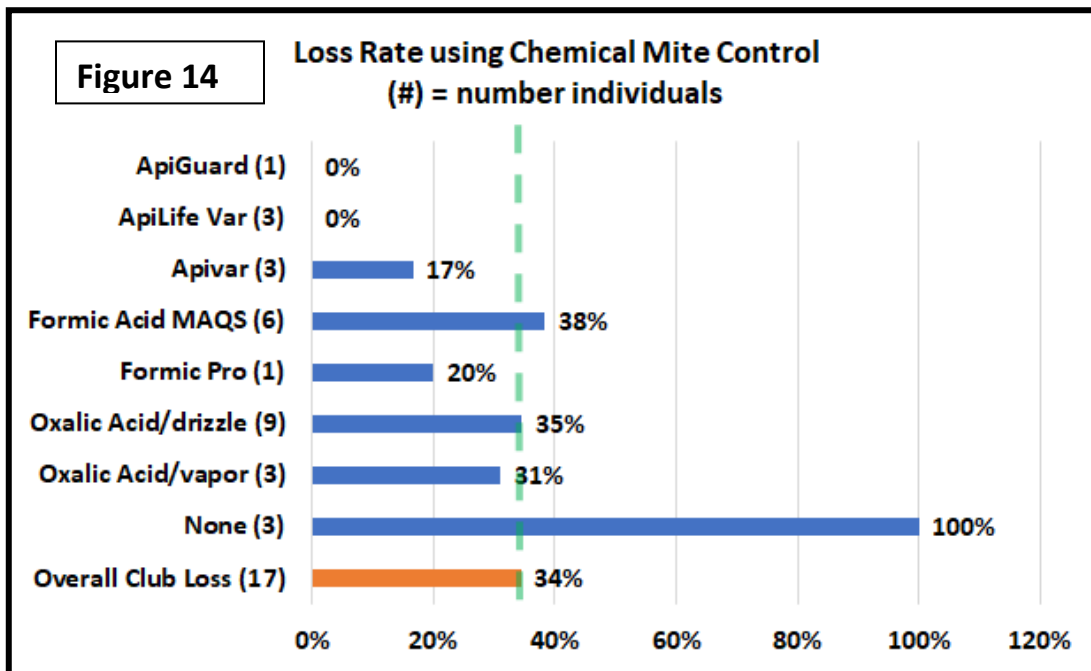
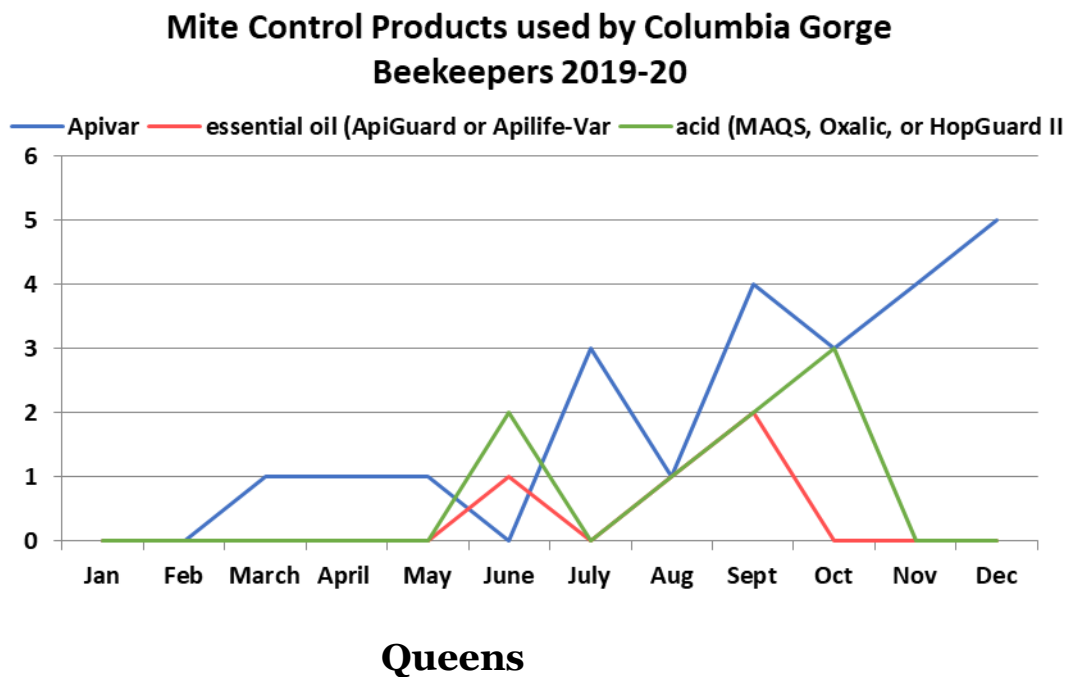


Figure 15 illustrates monthly use of the chemical treatments by gorge members.



We hear lots of issues related to queen “problems”. Statewide ninety six individuals (32%) subdivided queen related issues from 10 to 100% of their hives. One hundred fifty said

they had no queen problems (50%); an additional 56 individuals (19%) said they didn't know. For Gorge respondents four said zero problems and 3 said don't know. For the 5 indicating yes 3 said 10-30% problems and 2 said 30-50% queen problems.

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. Ninety two individuals (31%), an increase of 3 percentage points from last year, said yes. Nine gorge respondents said yes they had marked queens, 8 said no. The related question then was did you or your bees replace their colony queen? Forty-five percent statewide (135 individuals) said yes, 33% said no and the remainder 'not that that I am aware of.' For CGBA it was 7 yes, 4 no and 6 not that they were 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 224 responses. One-third of respondents indicated their bees were requeened with a mated queen more than one half (58%) indicated their bees requeened via swarming (22%), supersedure (16%) or emergency rearing (20%). In Columbia Gorge 4 individuals used mated queen and 2 queen cells while an equal number said the bees did their own requeening via spitting and bees reared their own and swarming (3 individuals each). 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. 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 2020

