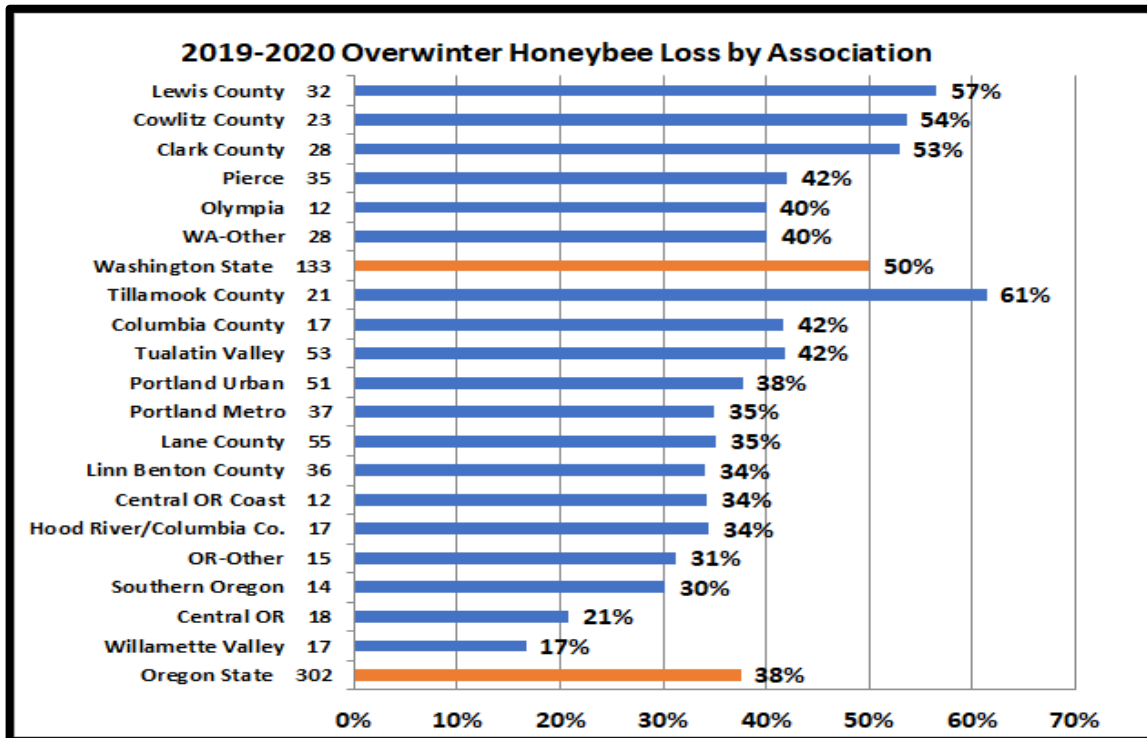


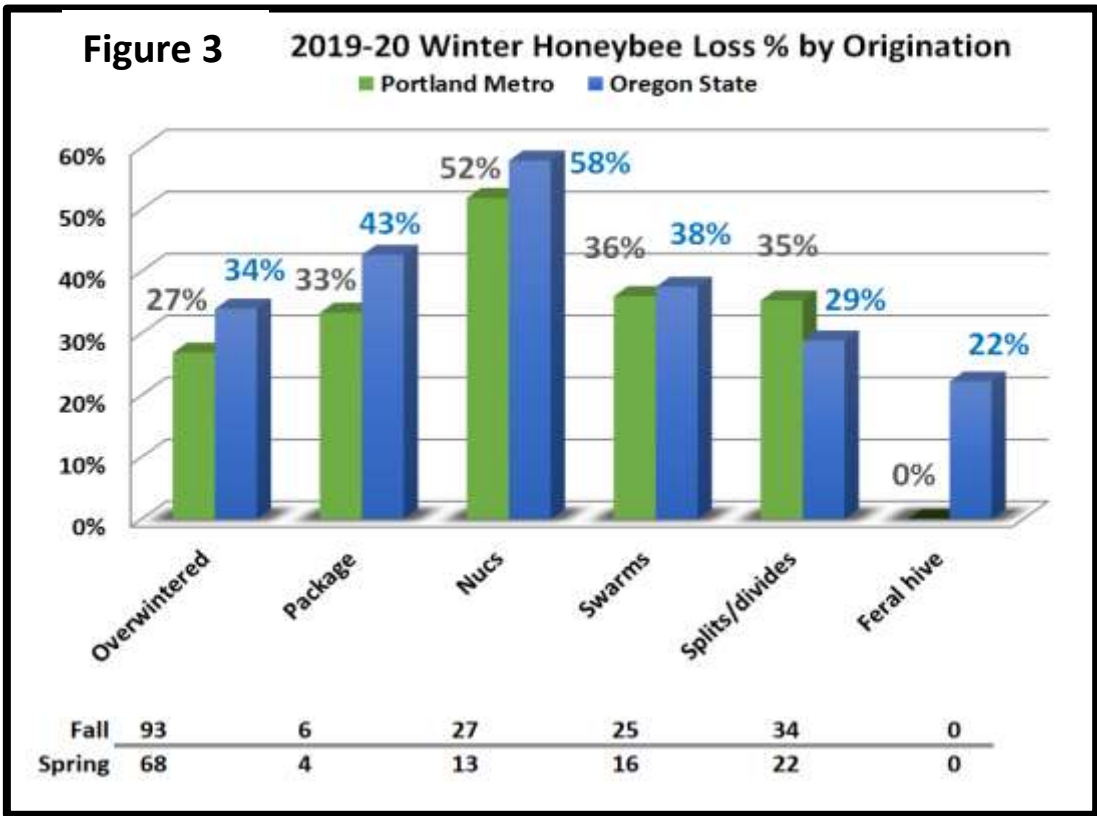
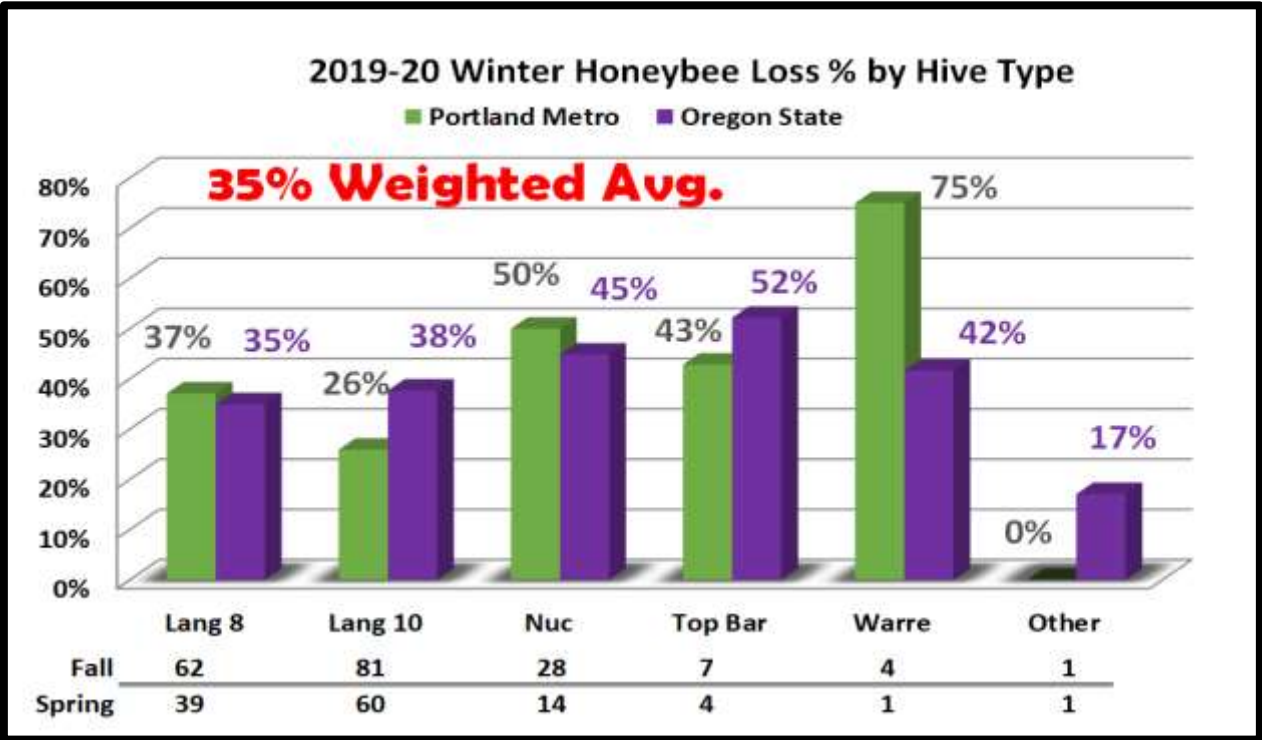
## 2019-20 Portland Metro Winter Loss by Dewey M. Caron & Jenai Fitzpatrick

The pnwhoneybeesurvey.com is a continuing effort to define overwintering success of OR and WA beekeepers. This was the 11<sup>th</sup> year of such survey activity. I received 302 responses from Oregon backyarders and 133 from Washington beekeepers keeping anywhere from 1 to 45 colonies. Portland Metro (PM) members sent in 37 surveys reporting on 183 fall colonies. This is 15 fewer individual responses compared to last year. Figure 1 shows loss by individual clubs. Number in ( ) is number of responses for each.



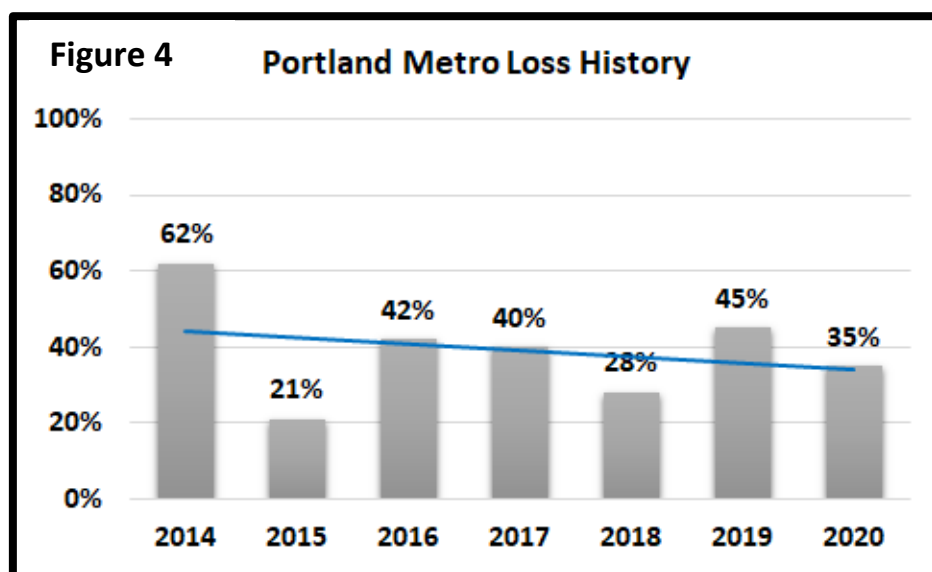
**Overwintering losses of PM respondents was 139 colonies = 35%.** This loss is 3 percentage points less than the statewide loss of 38% (database of 302 OR backyarders.) Percent losses, determined for 5 hive types, is shown in Figure 2 comparing PM with the statewide backyarders. PM member respondents with Langstroth 8-frame and 10 frames hives, 78% of total respondent colonies, had a 31% loss level. Nucs, 31% of total number of statewide nuc numbers, had higher (50%) loss but they were below the 82% nuc loss level of last year. The other hive type was identified as an observation hive it survived winter. Figure 2 below.

Figure 2 ↓



The survey also asked for hive loss by hive origination. Overwintered PM colony loss (27%) was slightly better compared to colonies established from package bees, nucs, or swarms and better than statewide loss. Only splits had a (slightly) higher loss compared to statewide results. See Figure 3 above for PM/statewide comparisons.

Losses this past winter for PM beekeepers were 10 percentage points below last year and 5 percentage points below the average of the last 5 years (40%). Figure 4 below. See [www.pnwhoneybeesurvey.com](http://www.pnwhoneybeesurvey.com) for last year's individual report for PM beekeepers.



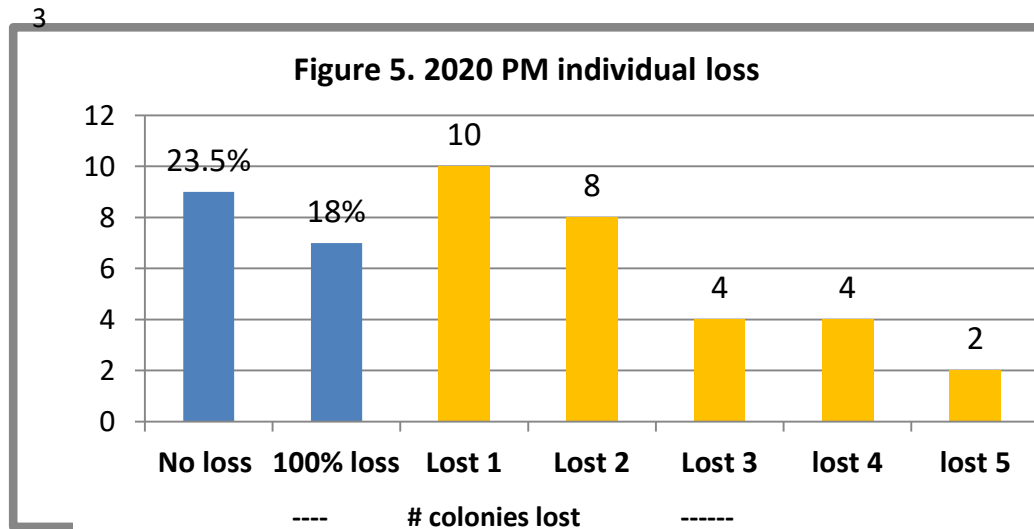
### Who are the survey respondents?

The PM respondents to the electronic survey managed up to 22 fall colonies. Five individuals had 1 colony, 11 respondents had 2 colonies (the greatest number) and 4 individuals had 3 colonies (54 % of total respondents, had 1, 2 or 3 colonies), 8 individuals had 4 to 6 colonies, 4 had 7-9 colonies and 4 individuals had 10+ colonies. When loss levels were compared, the 1-3 colony owners had a 50% loss and the 10+ individuals had 15% loss of colonies in 2019-20 overwintering period.

Ten individuals (26% of respondents) had 1, 2 or 3 years of experience; 15 individuals (39½% of total respondents) had 4 – 6 years' experience (medium number = 5). Twelve individuals had 7-9 years experience and 6 had 10+ years with 47 the greatest. When loss level was correlated to experience, the 10 individuals with 1-3 years experience had 58% loss level, those with 10+ years experience (5 respondents) had only a third as high a loss level -20½%.

Seventy six (76%) of PM beekeepers had an experienced beekeeper mentor available as they were learning beekeeping. This percentage was up from 73% the previous year.

Not everyone had loss. Nine PM individuals (23½%) reported total winter survival; unfortunately 7 individuals (18%) lost 100% of their colonies. Greatest loss was one colony (10 individuals). Individual loss data is shown graphically below in Figure 5.



Two individuals moved hives during the season, 1 for pollination and one because they moved to new residence.

### Reasons for Colony Loss/Acceptable loss

We asked individuals that had colony loss (9 individuals – 23.5% - had no loss) to estimate what the reason might have been for their loss (multiple responses were permitted). There were 49 total listings for PM, 1.7/individual. Eleven individuals listed varroa (22% of respondent choices), followed by queen failure, weak in fall (20% each) and starvation (18%). Two individuals chose don't know. Choices were very similar to last year and to statewide responses. Table compares PM with % statewide selections.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	CCD	Yellow jackets	Other
Portland (#)	11	2	10	10	9	3	1	3
Metro (%)	(22%)	(4%)	(20%)	(20%)	(18%)	(5%)	(6%)	(5%)
Statewide %	24%	3%	15%	16%	11%	4%	6%	13%

Survey individuals are asked to indicate what might be an acceptable loss level. Three individuals said none, 52½% said 0 to 15% (the median (middle) selection). Three PM responses said 50% was an acceptable loss level.

## **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. PM individual choices varied from zero to 50%, with medium of 15%.

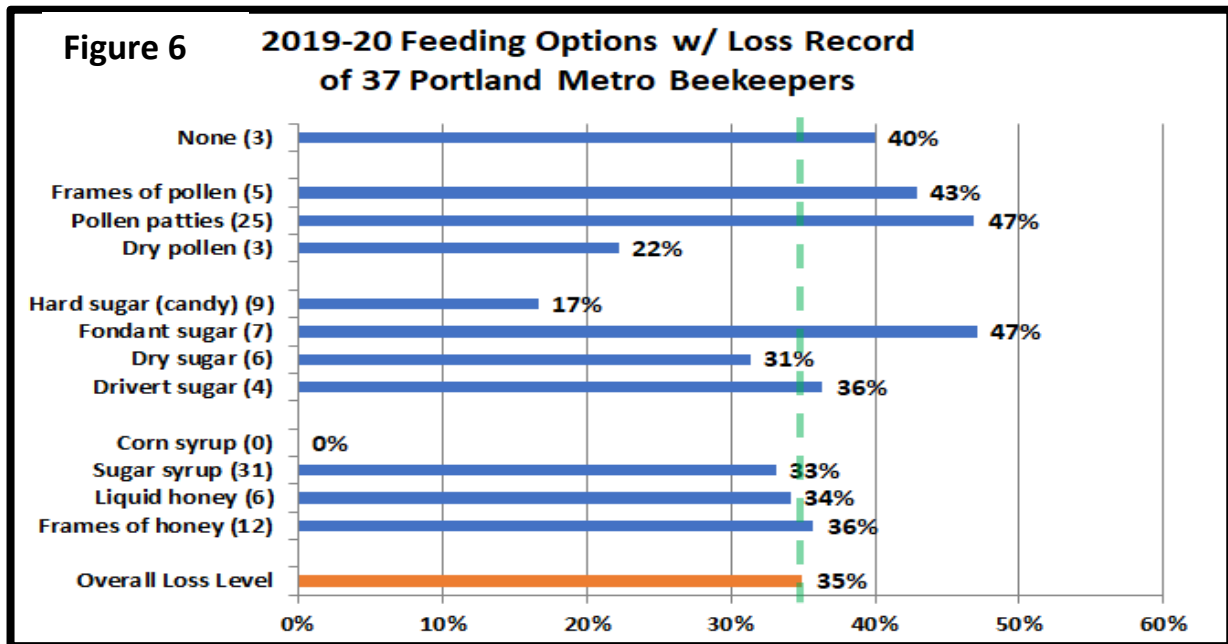
Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticides in the agricultural environment weakens colonies. Yellow jacket predation is a constant danger to weaker fall colonies, Management, especially learning proper bee care in the first years of beekeeping, remains a factor in losses. 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 PM beekeepers often do not do just one thing/management to their colony (ies) to control mites toward improving overwintering success. This analysis however is 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:** PM survey respondents checked 106 feeding options = 3.1/individual (statewide it was 2.9/individual). Three individuals selected none; their loss was 40%. Four individuals selected a single choice, (all sugar syrup feeding - they had a 72% loss), 7 chose 2, 13 had 3 choices (greatest number and medium- loss rate was 22%), 3 individuals indicated both 4 and 5 choices, 2 elected 6 and one indicated 7 – these 10 individuals with more selections had 28% loss. Doing more definitely helped improve survival.



Percent colony losses are presented for feeding options with numbers of PMBA members doing the management in ( ). Bar lengths of left of 35% (green dashed line) indicates better than average survival while those to right had heavier than average losses. The 3 individuals feeding dry pollen had better survival than those feeding protein patties or frames of pollen. Likewise individuals feeding non-liquid sugar, hard candy or dry sugar realized improved survival versus overall for PMBA members.

Thirty one individuals (91% of individuals who did some feeding) said they used sugar syrup. They had a 33% loss rate, slightly lower than the overall PM loss level of 35%; individuals feeding frames or liquid honey had losses just below or above the overall average.

Summary statewide: For the last 4 years (average loss rate=43% average losses), **individuals doing no feeding had annual losses 12.6 percentage points higher than average overall losses.**

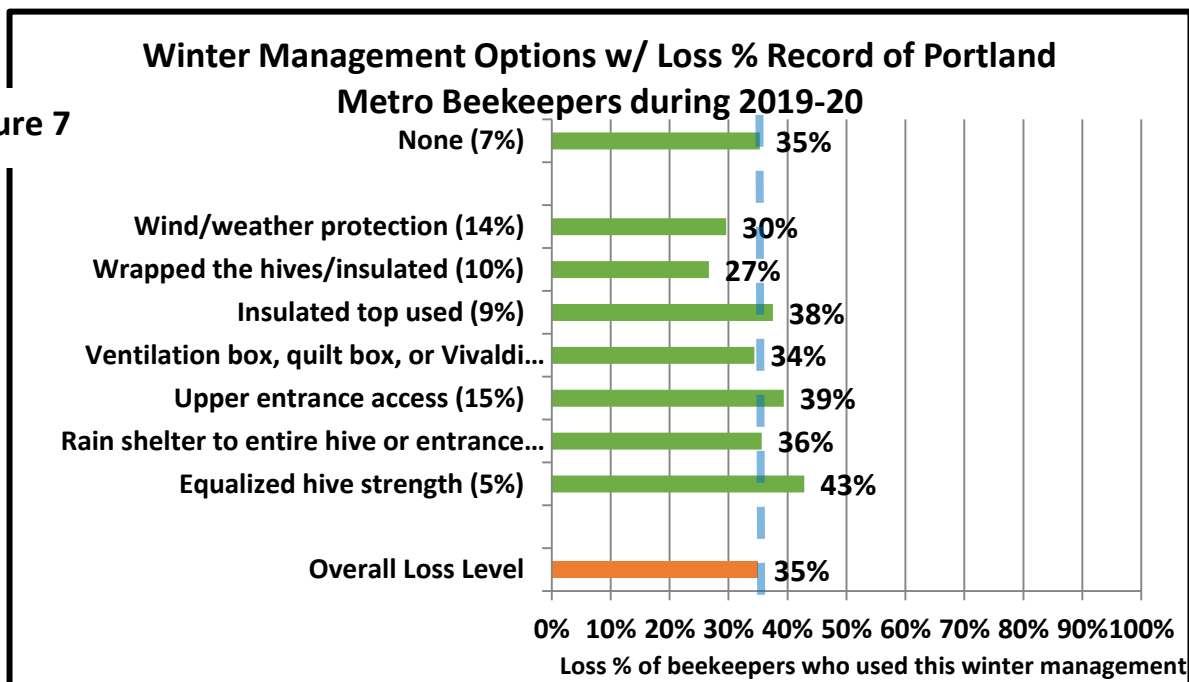
Individuals statewide that fed sugar syrup had a 7¾% lower loss level (average for the 4 years). Those feeding honey (as frames or liquid) had lower loss only during the 2018 and this

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 of 4 winters 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 (37<sup>3</sup>/<sub>4</sub>%).

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

**WINTERING PRACTICES:** Seven PMBA individuals (19%) reported doing no winterizing; they had loss level of 35%; statewide these 7 were among 37 individuals (12½% of

Figure 7

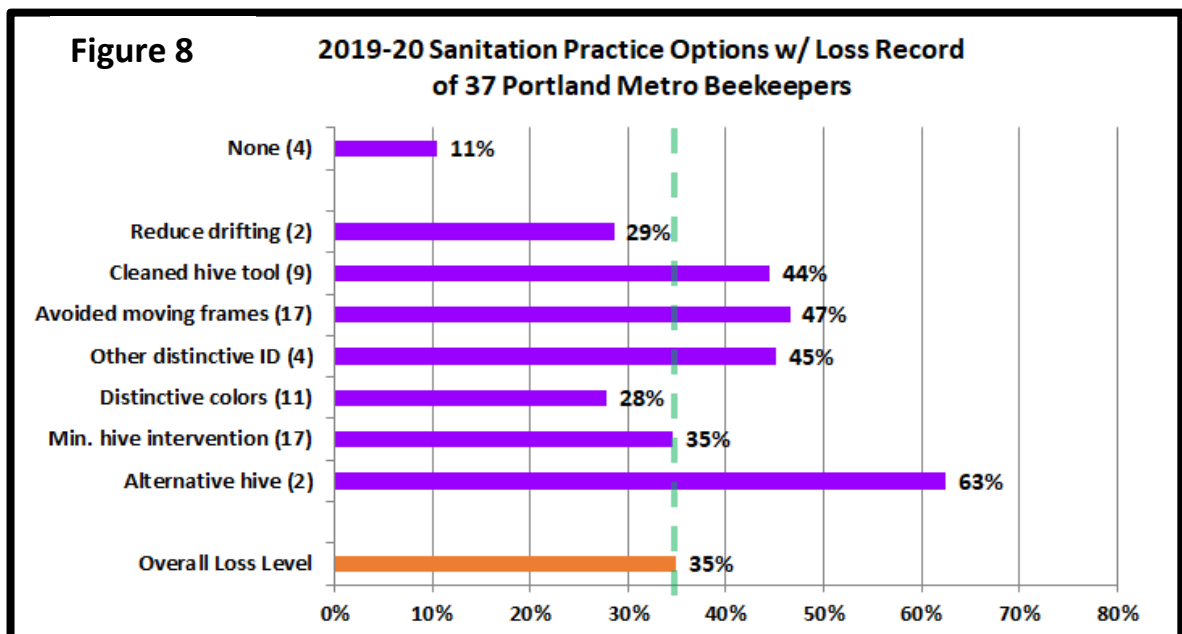


overall statewide respondents) that indicated none of the several listed wintering practices; statewide losses were 50% for those doing no winterizing managements, 12 percentage points higher than overall state loss of 38%. Multiple selections were possible and in fact the 30 PM members averaged 2.8/individual (2 tenths above statewide 2.6/individual). Four individuals chose a single management and had a 63% loss level, 8 individuals chose 2 Selections, 11 chose 3 - (highest number and medium – their loss level was 42%) while four individuals checked 4 and 5 individuals made 5 selections; they had a 33% loss level.

The most common wintering managements selected by PM respondents was use of a quilt box (Vivaldi board) at colony top (25 individuals). Figure 7 shows number of individual choices for PMBA members in ( ) and percent loss of each selection. The 10 PMBA individuals who wrapped hives/insulated had the best survival (27% loss, 8 percentage points better than average PM loss) and wind/weather protection (14 individuals - 30% loss).

Over the past three years, individuals statewide that did no winterizing practice (average 13 1/3% of individuals) averaged 48% loss compared to 41% overall average loss of last 3 years, a seven percentage point poorer survival rate. Only 2 winterizing managements improved survival all 3 years – these were wrapping (30 % lost rate, an 11 percentage point improvement) and upper insulation (32 %, a 9 percentage point improvement). Vivaldi board (38 %), upper entrance, also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (also 38%) only improved survival rates by 3 percentage points.

**SANITATION PRACTICES:** It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care to insure healthy bees.



PMBA beekeepers had 62 responses 1.9/individual. Four individuals did none. These 4 were among the 42 statewide individuals (14%) indicating they did not practice any of the 6 offered alternatives. Loss rate statewide was 52%, fourteen percentage points higher than the overall



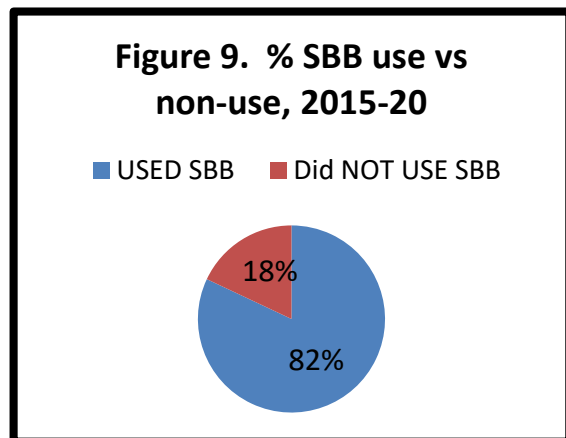
loss rate of 38%; for PM the 4 individuals doing nothing had only an 11% loss rate. Thirteen PMBA members had 1 selection (loss rate 28%, most were minimal hive intervention), 12 made 2 choices (the medium – loss rate was 44%), 7 had 3 choices and 1 selected 4 items- those with 3 and 4 selections had a 52% loss rate.

Minimal hive intervention (145 individuals, 17 of them PMBA beekeepers) was the most common option selected along with generally avoiding moving frames (also 17 PMBA members). Neither improved PM member survival. The two sanitation choices that did seem to improve survival were provided hives with distinctive colors (28% loss) and reduce drifting by spreading out colonies (29% loss).

Avoiding moving frames was the only sanitation choice statewide that demonstrated better survival the past three years - loss rate was 35% compared to overall rate of 41%, a minor 6 percentage point difference. Avoiding moving frames (40% last 3 years) plus distinctive hive address via painting (also 40%) had but a single percentage point advantage over last 3 years. It is clear that sanitation, while it might make sense, does not result in better survival.

## Screen Bottom Boards

Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly



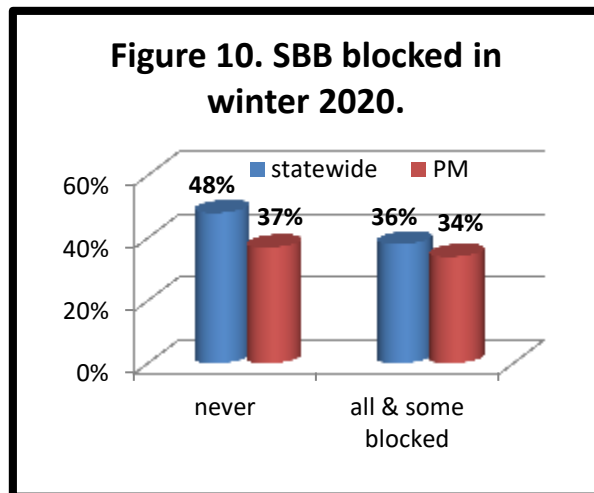
point out they are not a very effective varroa mite control tool. In the recent survey 30 individuals statewide (10%) but only one PM person said they did not use screen bottom boards. This was the lowest percent of respondent non-use of SBB in last 6 years.

Average non-use is 18% vs 82% use on some or all colonies over the 6 year period. Figure 9 shows 6-year data.

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). SBBs are very minor in improving overwinter survival.**

We asked if the SBB was left open (always response) or blocked during winter. This past season 21 PM respondents (57%) always or sometimes blocked their SBBs. They had a 34% loss. Those who said they never blocked (16 individuals in PM) had a 37% winter loss, a 3 percentage point difference. **Comparing the always and sometimes left open with the closed in winter (all closed + some closed) response reveals a 3 percent greater loss for PMBA; statewide respondents had a 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 minor 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. Portland Metro 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 were a moisture trap (Vivaldi board or quilt box) and upper insulation, plus

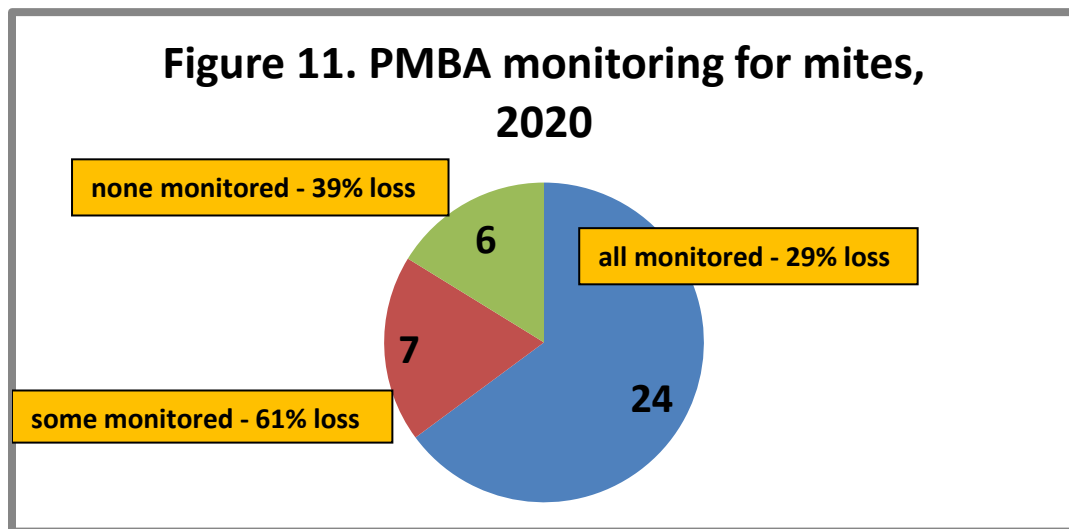
wrapping the colonies (or otherwise adding some insulation to provide added protection against the elements). Spreading colonies out in the apiary and doing other measures to reduce drifting also appeared to be of some value in reducing winter losses. Avoiding movement of frames from one colony to another 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, 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.

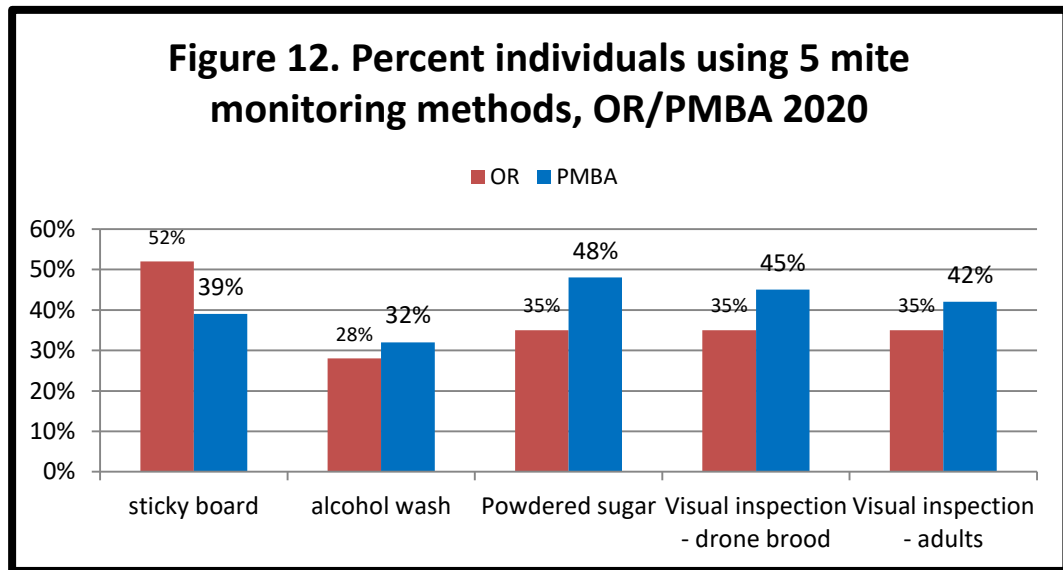
### **Mite Monitoring/Sampling and Control Management**

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 PMBA, 24 individuals (65%) monitored all colonies; they had 29% loss. Seven individuals monitored some colonies; they had a 61% loss level. Six individuals (16%) did no monitoring and they had a 39% loss. See Figure 11. Statewide 82% said they monitored all or some of their hives (losses =51%); 18% reported no monitoring (loss rate = 59% loss).

In order of popularity of use, sticky boards were used by 39% of total PMBA respondents (of those 84% who monitored (as shown above, 16% did no monitoring), 32% of individuals used alcohol monitoring and 48% used powdered sugar monitoring; these latter two were higher from statewide as were visual inspection of drones and adults. 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 12 red bars are statewide responses and blue is PMBA 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

	<b>ALL Colonies Monitored</b> % individuals	% loss	<b>SOME Colonies Monitored</b> % individuals	% loss	<b>No colonies Monitored</b> % 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%

who monitored all colonies compared with those who monitored none. The 14-15% who monitored some colonies was variable but 4 year average mirrors those who monitored all colonies.

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 by months each of the 5 sampling methods were used.

### Monthly Monitoring of Portland Metro Beekeepers 2019-20

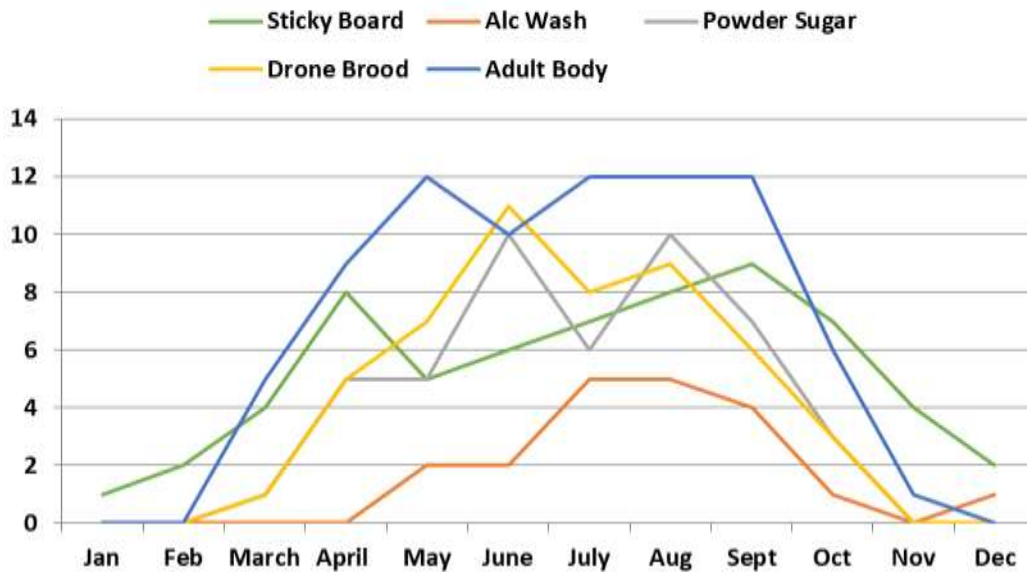


Figure 13

**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); 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 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](http://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 2-3% 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 high number of mites or treatment itself.

## Mite control treatments

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Four PM individuals (11% - statewide percentage 12%) said they did not employ a non-chemical mite control and 7 individuals (11%), did not use a chemical control (statewide=24%). Those PMBA individuals who did not use a non-chemical treatment had a 42% loss; statewide reported a 50% winter loss. Seven PMBA members not using a chemical control had a loss rate of 59%; statewide lost rate=69%.The individual options chosen for non-chemical and chemical control are discussed below

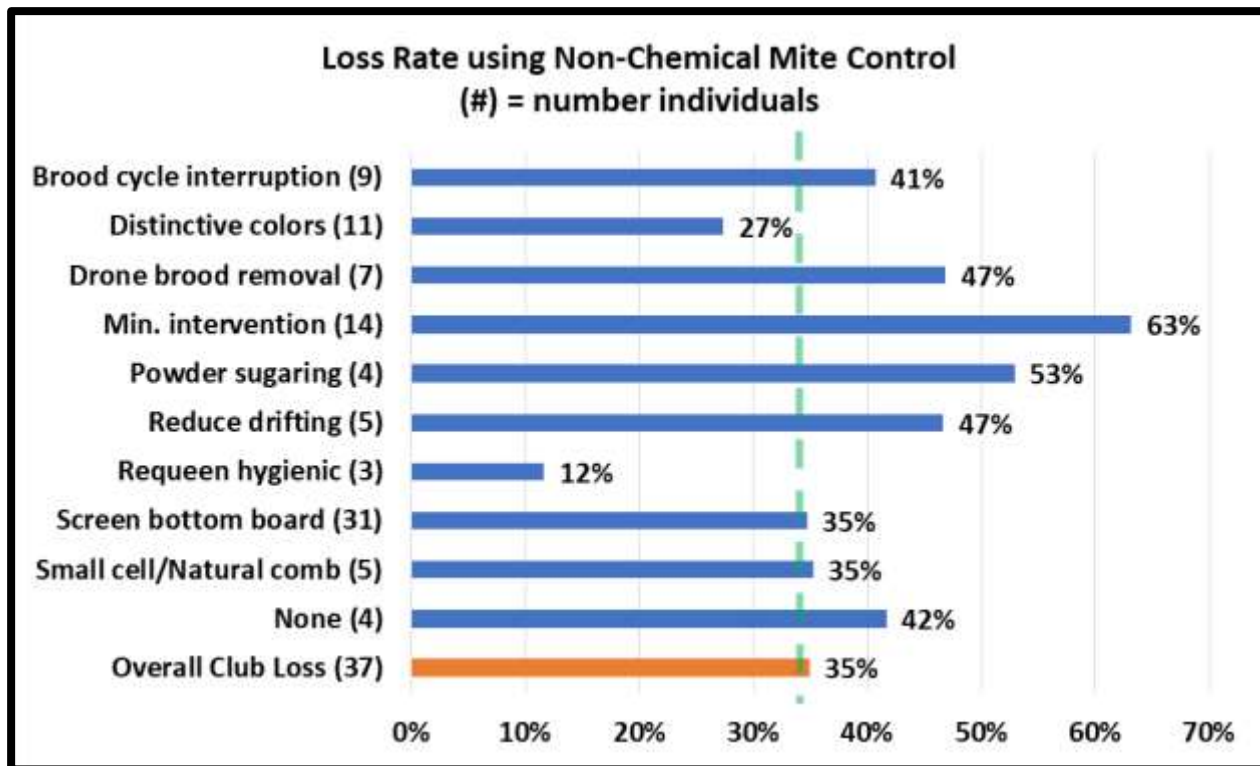
**Non-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey (+ other category,) 8 individuals used one method (18% loss), 6 used two (39% loss), 12 used three (33%) and 6 did 4, 5 or 6; they had 45% loss. The selections are shown in Figure 14; number of individuals in ( ), bar length represents average loss level of those individuals using each method.

Use of screened bottom board and minimal hive inspection (31 and 14 individuals respectively among PMBA respondents) were most common. SBB users had 35% loss, the average PM loss, while minimum intervention had nearly double the losses. Requeening (3 individuals) and distinctive hive colors (27% loss) were the 2 managements showing the best survival.

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) have demonstrated better survival. Drone brood removal average loss for 4 years 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 14

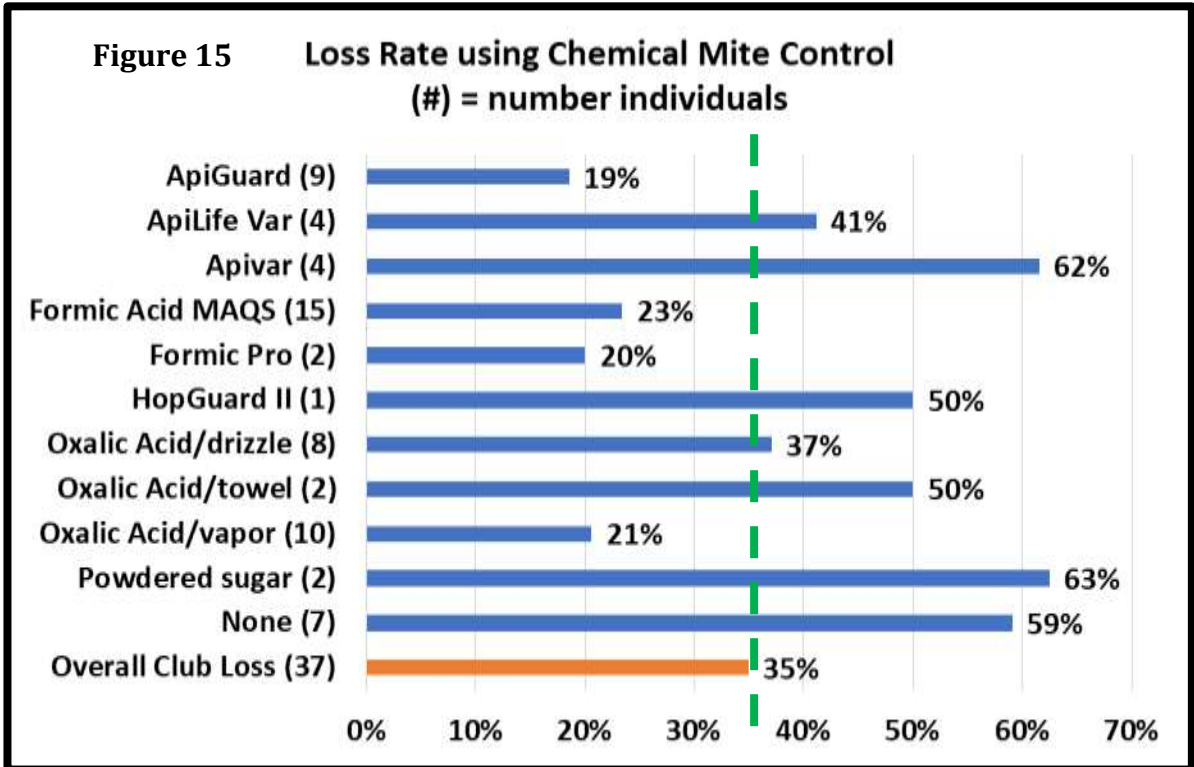




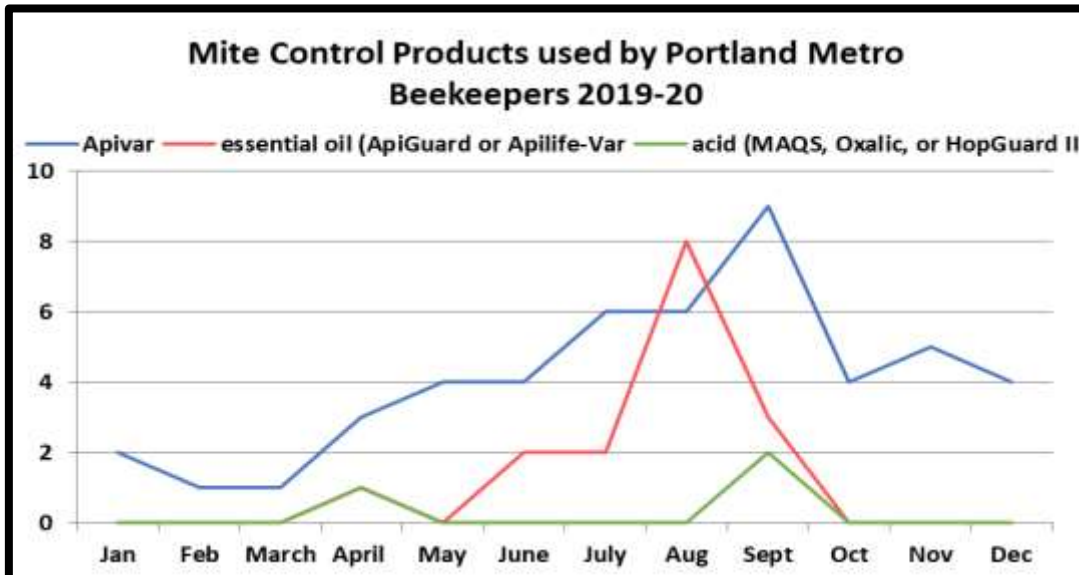
**Chemical Control:** For mite chemical control, 99 statewide individuals (24% of total respondents) used NO chemical treatment; 7 PM individuals (19%) used no chemical treatment. Those PM individuals using chemicals used at rate of 2/individual. Among Portland Metro respondents, 10 individuals (33%) used one chemical (they had a 61% loss), 11 used 2 (30% loss) and 9 used 3 (21% loss). It seems use of more than one chemical is beneficial.

One hundred fifty OR Beekeepers (23% of total chemical uses) indicated they most commonly utilized MAQS, formic acid. This was also the most commonly used material for Portland Metro beekeepers (15 individuals). For PM users, loss rate was 23% loss. Most beneficial were Apiguard (9 users) Formic Pro (2 users) and Oxalic acid vapor (10 users).

Consistently the last 4 years five different chemicals have helped beekeepers improve survival. These are: 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). Those who mix oxalic acid into shop towels have heavier (54%) losses. The formic acid MAGS formulation has 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 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”. Twelve PM individuals (44%) said they did not have any queen issues and 3 (11%) said they didn’t know. Six individuals of the 12 individuals who said they did have queen issues checked 10-30% and 3 checked 30-50%. One said 50-75% and 2 75-100%. Statewide, 50% said none and 19% said they didn’t know.

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. Thirteen individuals said yes (35%) and 24 (65%) said no. Statewide 31% said yes. The related question then was did you or your bees replace their colony queen? Twenty two (59%) said yes, seven did not know and 8 (22%) 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 ten individuals who used a mated queen and 4 who used queen cells. The remainder said their colonies requeened naturally via supersedure (8 individuals), split and raised their own queens (also 8 individuals) and 9 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](http://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](mailto:info@pnwhoneybeesurvey.com) with “REMINDER” in the subject line. We have a blog on the [pnwhoneybeesurvey.com](http://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