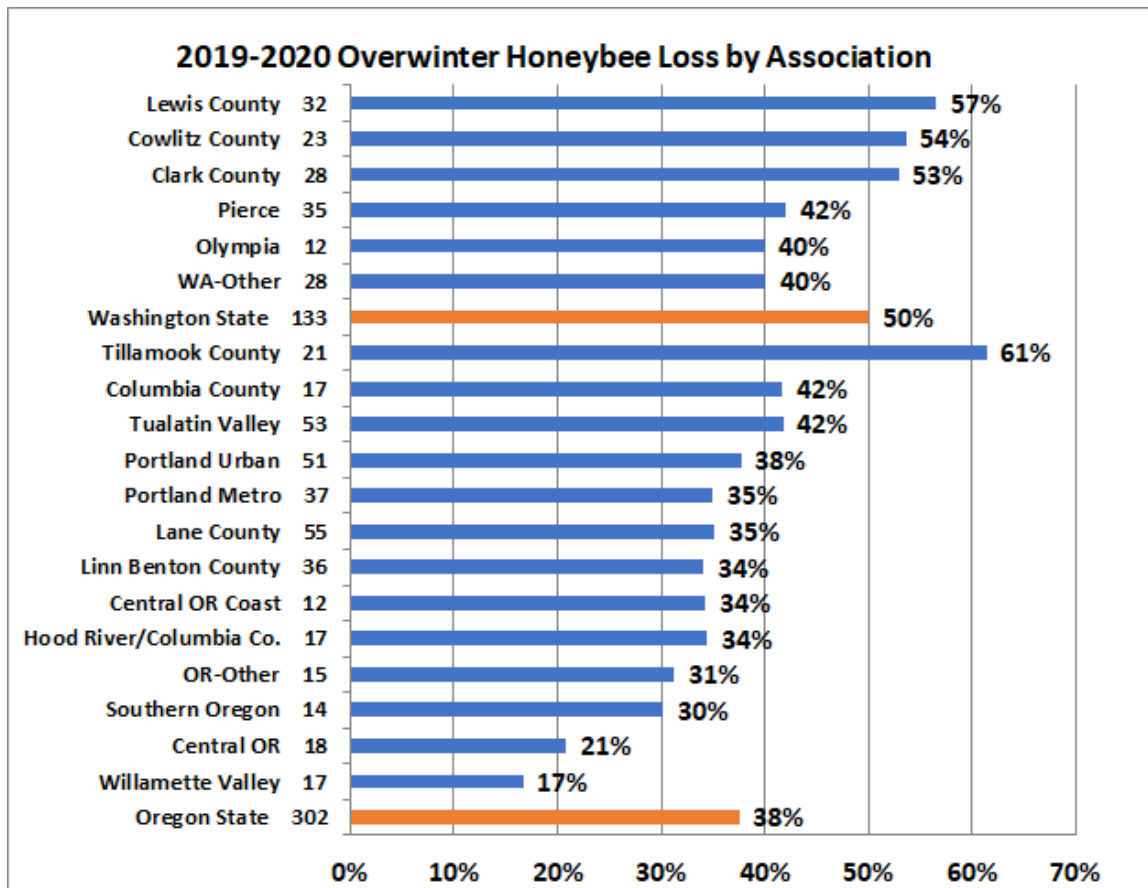
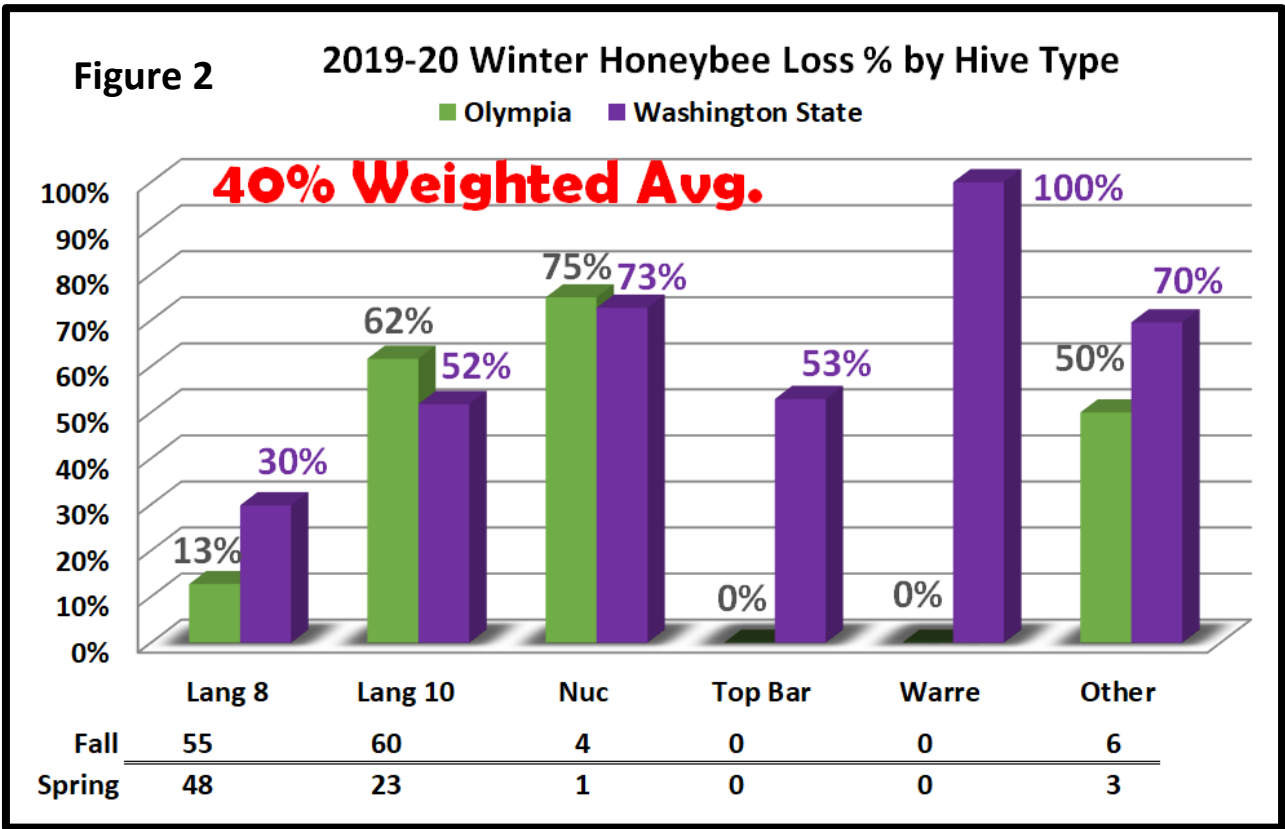


## Olympia beekeeper Losses 2019-20 by Dewey Caron

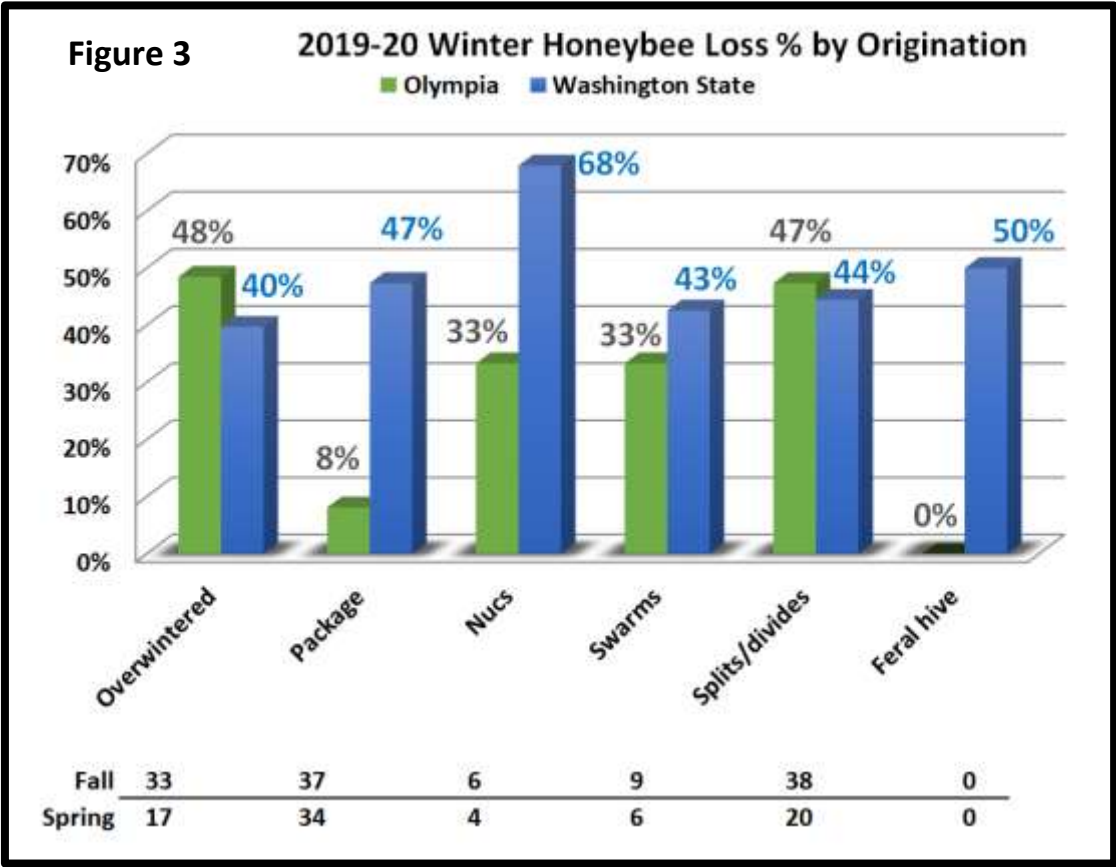
Overwintering losses of small scale Washington beekeepers was determined from information provided by 133 Washington backyard beekeepers with an electronic honey bee survey instrument [www.pnwhoneybeesurvey.com](http://www.pnwhoneybeesurvey.com). Statewide losses were 10 percentage points less than last winter. Twelve responses were obtained from Olympia beekeepers; losses (40%) were reduced from the previous two years. Figure 1 shows total WA & OR response. Or losses (38%) statewide were once again lower (by 12 percentage points) compared to those of Washington beekeepers.



The loss survey overwintering statistic was developed by our asking number of fall colonies and surviving number in the spring by hive type. Results, shown in Figure 2 bar graph, illustrate overwintering losses of Olympia respondents in comparison with other Washington beekeepers. Langstroth 8 frame hives did better than statewide while 10 frame had 10 percentage point greater loss level. Over the past two years 8 frame hive shave had better survival but only by a couple of percentage points; nucs have 1/3 heavier loss compared to standard hives .

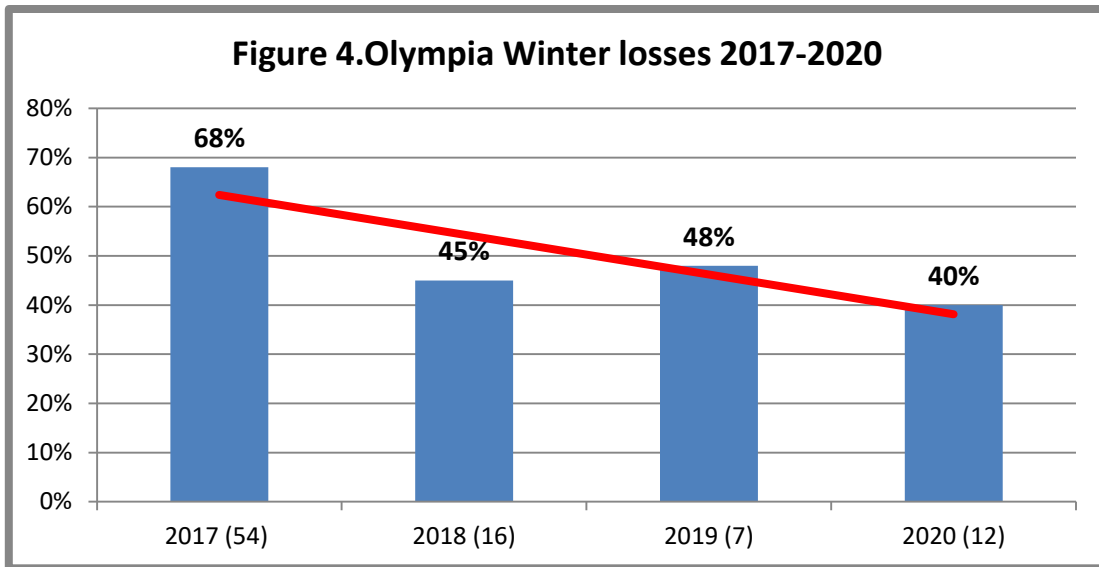


**Loss by hive origination:** We also asked survey respondents to list their loss by hive origination. The result is graphically presented below for the 12 Olympia respondents alongside

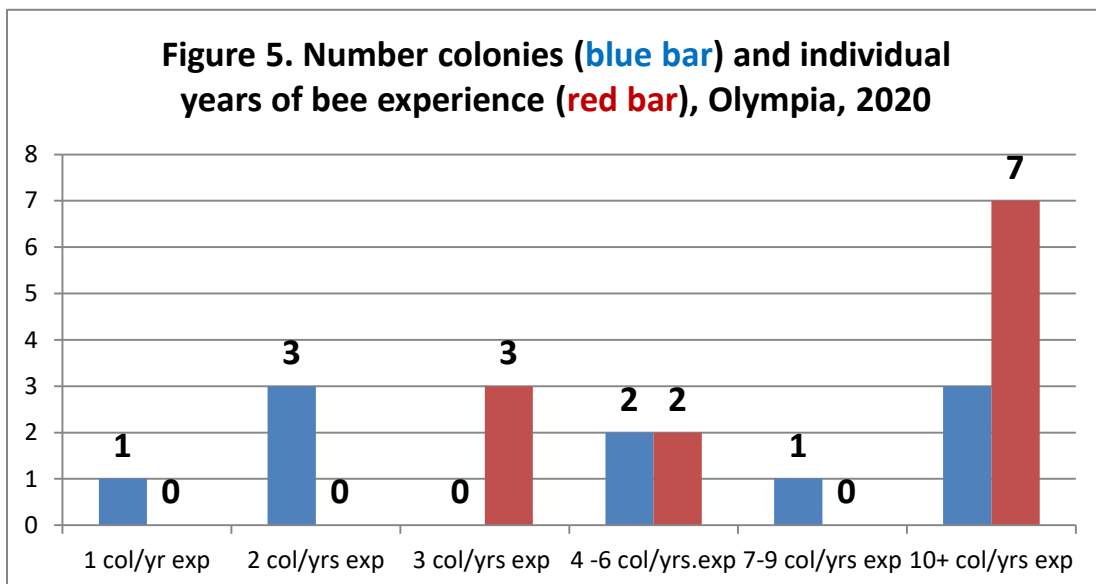


Washington State respondents. Overwintered colonies had higher loss level than statewide hives originating from packages, nucs and swarms did better.

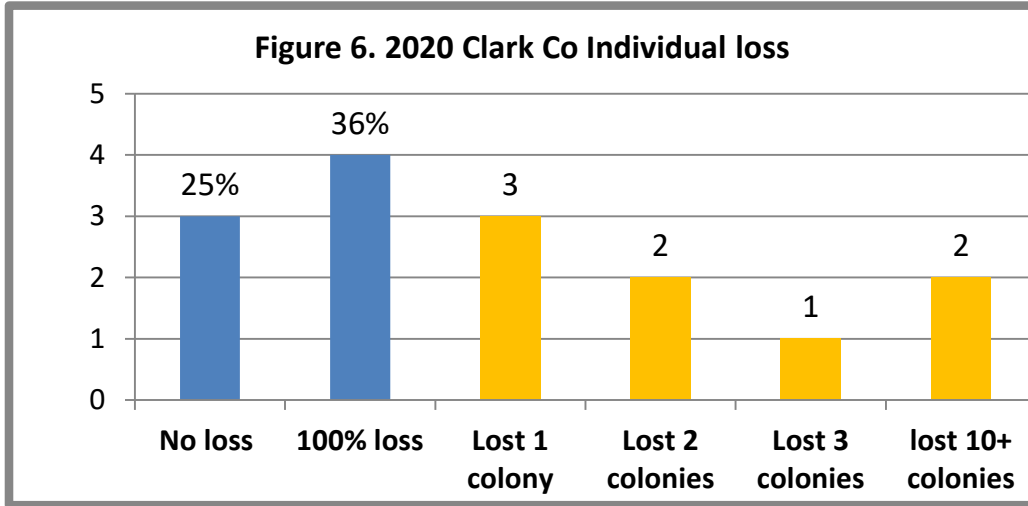
**Loss History** Losses this past overwinter were reduced from surveys the past three years. In 2016-17 the large response was the combined PNW survey plus club survey responses. Figure 4 shows number of Olympia responses ( ) and percent loss for past five seasons. Trend line in red.



The 12 Olympia respondents to the electronic PNW survey are shown in 1 Figure 5 colony number in blue bar and years experience in red bars for Olympia respondents. Greatest colony number was 45 and one individual respondent had 61 years of bee experience. For Washington most respondents had 1-3 colonies and had higher number with more years of experience. (See WA state report for comparison.)



**Colony Losses.** For the 12 Olympia beekeeper respondents, 3 individuals (18%) had no loss while 4 10 individuals - 33% loss all their colonies. Three individuals lost 1 colony, 2 individuals lost 2 colonies, 1 lost 3 and 2 individuals lost 10+ colonies. Heaviest loss was 20 colonies. Figure 6 below.



**Self-reported “reasons” for colony losses:** One survey question asked respondents to check the “reasons” for winter loss; multiple responses were possible. There were a total of 16 selections (2/individual) provided by Olympia respondents as the reasons for their overwintering losses. Three said don’t know. Weak in fall and varroa (4 individuals each – 50% of individuals listing probable loss reason), followed by starvation, yellow jackets and don’t know – 3 individuals each. Under other, 1 individual listed Nosema.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	Starvation	pesticides	Yellow jackets	Other
Olympia # %	4 (50%)	0	4 (50%)	1 (13%)	3 (38%)	0	3 (38%)	1 (13%)
Statewide %	18%	9%	17%	15%	9%	3%	10%	10%

**Acceptable loss.** When asked to choose an acceptable loss Olympia mirrored statewide respondents. Greatest % selection was 10%, (35% statewide). Medium number for Olympia was 15%-20%; statewide 20%.

	Don't know	None	5%	10%	15%	20%	25%	33%	50%	75%	100%
	0	0	5	1	1	1	3	1	0	0	

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**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. Olympia individual choices varied from zero to 75%, with medium of 25%. 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) and 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, 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 colonies are not as healthy as they should be.**

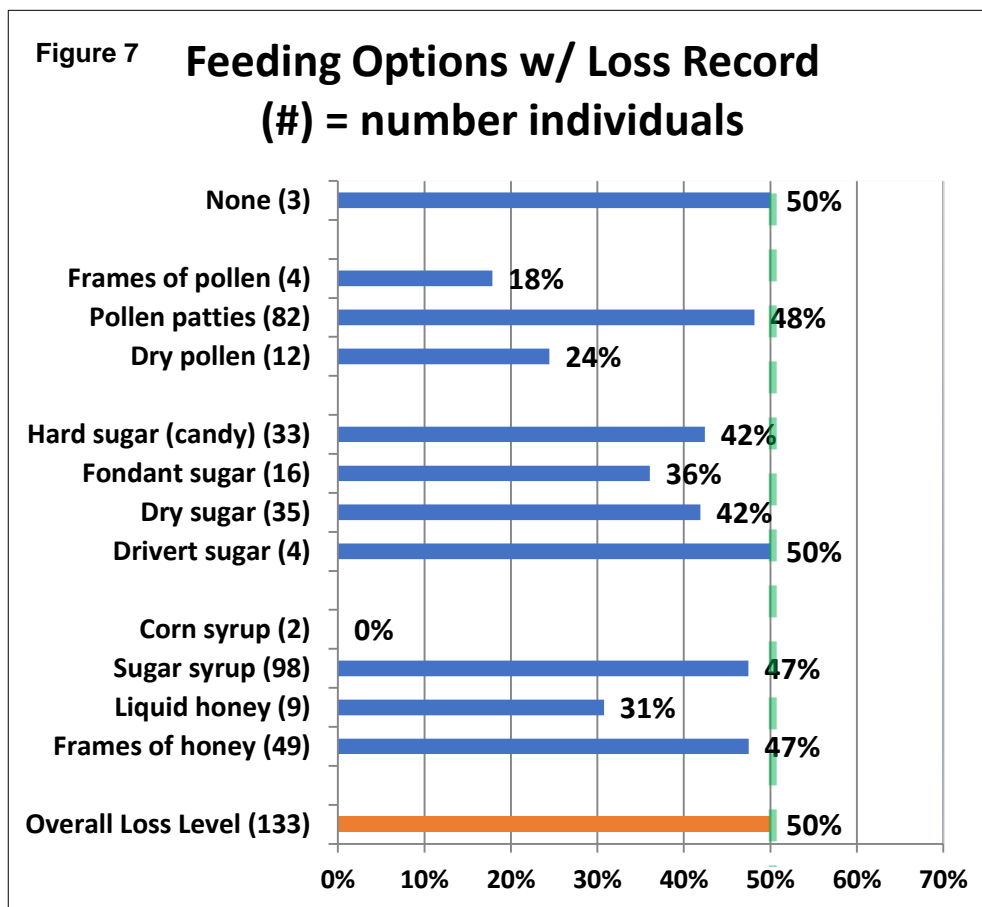
## **Part 2: Management selections and losses**

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 selection possible. With only 12 responses from Olympia beekeepers and such varying numbers of colonies analysis of managements is not very helpful. Consult statewide data results (133 Washington beekeepers) for more meaningful results.

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

**FEEDING:** Olympia respondents checked 37 feeding options = 3.4/individual. Three state individuals made no selections – they had 50% loss but all Olympia embers made at least one choice. One selected a single choice (sugar syrup feeding) and had 100% loss level, 2 indicated 2 choices, 5 individuals (the greatest choice and also the median) made 3 choices and one each had 4, 6 & 7 choices – these 3 had 14% loss. Most common choice was pollen patties (9 individuals) and sugar syrup (8 individuals). Six individuals fed honey in frames and two frames of pollen. Two individuals fed dry pollen, 1 dry sugar 3 fondant and 5 sugar candy. One individual used corn syrup.

The number of individuals statewide (133 WA beekeepers) making that selection is in ( ), bar length indicates loss level of individuals doing this management. Those bar lengths to left of 53% (green dashed line) had better survival while those to right had greater loss level.

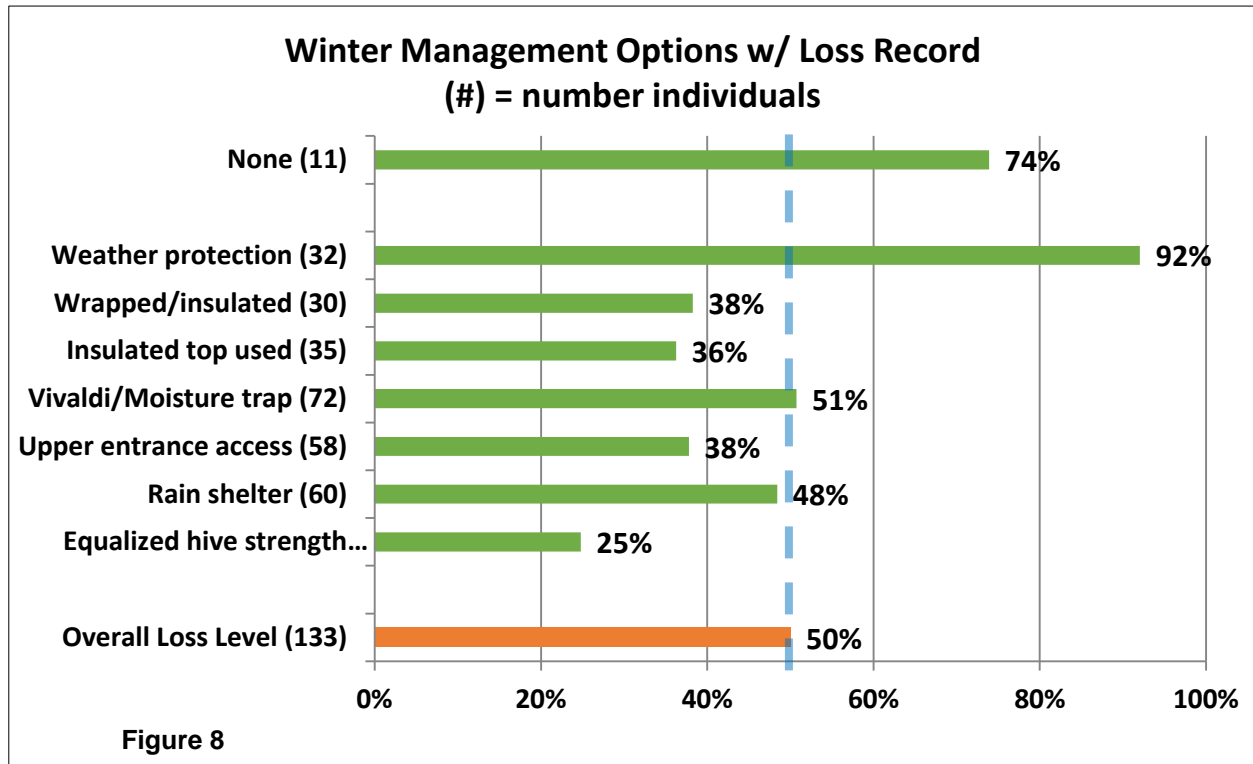


For the last 3 years of losses Washington statewide individuals doing no feeding had poorer survival all 3 years. Individuals that fed sugar syrup had marginal lower loss level in 3 of four years as did those using frames of honey to feed bees. Individuals feeding non-liquid sugar in the form of fondant and hard candy likewise had lower losses; hard candy improved survival in three of the four years. For individuals feeding protein, protein patty users showed slightly better survival in 3 of 4 years.

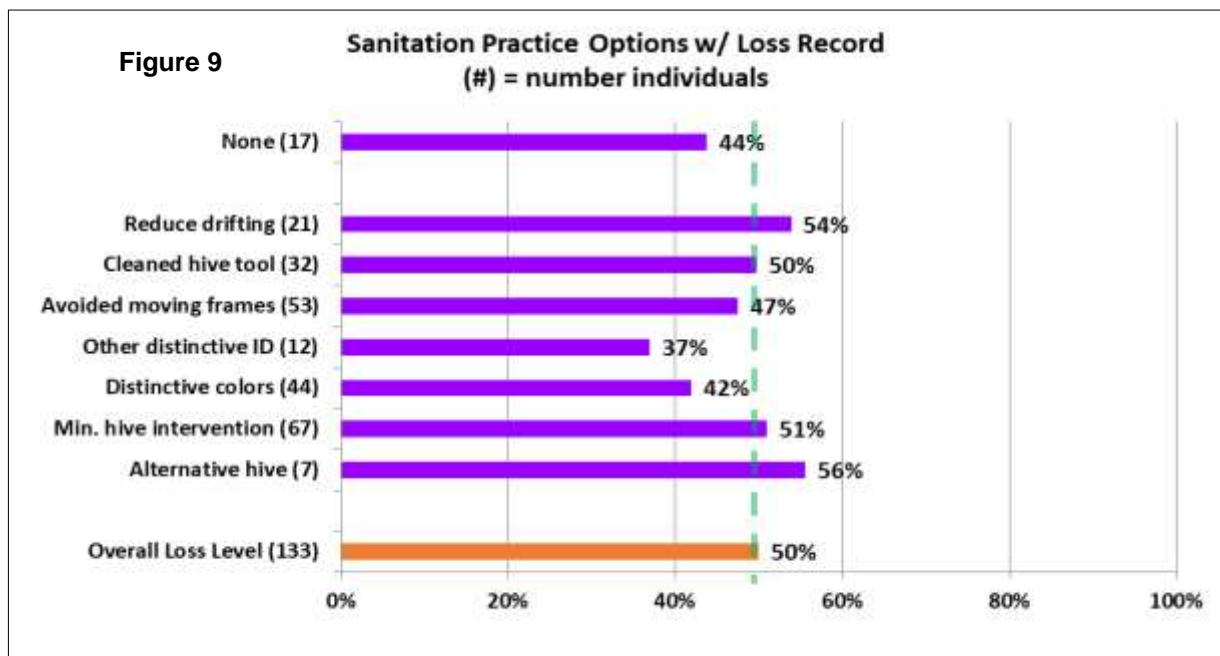
**WINTERING PRACTICES:** We received 36 responses (3.3/individual) about Olympia beekeeper wintering management practices (more than one option could be chosen). All individuals listed at least one wintering practices was done. One did one single thing (insulated top and their single colony survived), 2 respondents did 2, 4 had 3 choices, while 3 doing 4, 5 or 6 had 71% loss.

The most common wintering management selected was upper entrance (8 individuals), followed by ventilation/use of a quilt box at colony top (7 individuals) wrapping (6 individuals) and rain shelter provision and insulation at colony top (5 individuals each). Wind weather protect was done by 4 and equalizing hive strength by one individual. Figure 8 shows number of individual choices for statewide and percent of each selection. Bar length below 53% (blue dashed line) had better than average winter survival.

Over the past three years a couple of winterizing management improved survival for Washington beekeepers. Those doing no winterizing had higher losses all 4 years. Equalizing hive strength in the fall demonstrated lower loss levels in all four recent winter periods (only 25% loss this past winter). Top insulation has demonstrated lower loss in three of the four years. Ventilation above the colony (Vivaldi Board/quilt box) demonstrated improved survival two of the four winters.



**SANITATION PRACTICES:** It is critical that we practice some basic bee sanitation (some prefer use of term bee biosecurity) in our bee care to help insure healthy bees. We received 24 responses for this survey question 2.2/individual. One individual said they did not practice any of the



offered alternatives; they had zero loss. Three individuals had 1, 2 and 3 selections each: one individual selected 5 and had 20% loss.

In three of four years doing none of these managements resulted in improved survival; this was the case this past winter when the 1 Olympic individual. Using an alternative hive resulted in lower losses in two of four winters. Providing hives with color and distinctive hive ID measures were helpful managements 2 of past 4 seasons but survival gain was minor.

## SCREEN BOTTOM BOARDS (SBB)

Although many beekeepers use SBB to control varroa mites, BIP and PNW surveys clearly point out they are not or at best not a very effective varroa mite control tool. In this recent survey 20 Washington individuals (16%) said they did not use screen bottom boards; they lost 78% of their colonies. Those 80 beekeepers using SBB on all of their colonies had 60% loss. The 24 individuals using SBB on some of their colonies had 34% loss. For Olympia beekeepers. 7 individuals used SBB on all their colonies and had 50% loss while the 5 not using them had 35% loss.

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

**Examining the five year average of SBB use, loss level of those using SBB on all or some of their colonies had a 42.8% loss level whereas for those not using SBB had loss rate of 44.2% (a 3% positive survival gain for those using SBB versus those not using them). They are very minor in improving overwinter survival.**

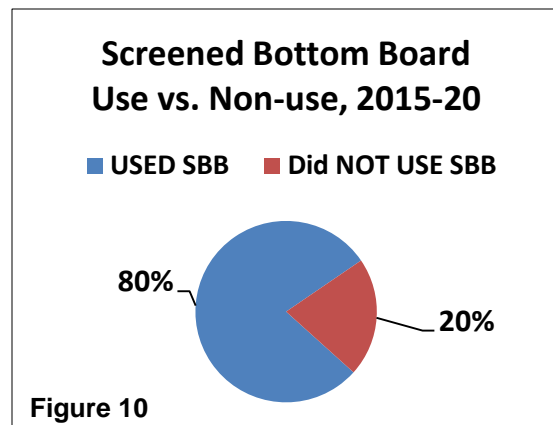


Figure 10

We asked if the SBB was left open (always response) or blocked during winter. This past season 66 individuals statewide (53%) said they always blocked SBB during winter. They had a 44% loss rate. Thirty six individuals (29%) said they never blocked SBB and had loss rate of 60%. Thirteen individuals (10%) blocked them on some of their colonies. Their loss rate was 79%. Six Olympia beekeepers said they always block and had 56% loss while the single individuals who never blocked had 88% loss

There is no good science on whether open or closed bottoms make a difference overwinter but some beekeepers "feel" bees do better with it closed overwinter. **Comparing the always and sometimes left open with the closed in winter response reveals a 16 percentage point difference in favor of closing the SBB over the winter period statewide and 22% advantage to Olympic members. This relationship has been consistent over the past five years averaging nearly a 10 percentage point advantage when the SBB is closed during the winter.** An open bottom, at least during the



active brood rearing season, can assist the bees in keeping their hive cleaner and promote good hive ventilation.

**Things that seem to improve winter success:** It should be emphasized that these comparisons are correlations not causation. They are single comparisons of one item with loss numbers. Individual beekeepers do not do only one management option nor do they necessarily do the same thing to all the colonies in their care. We do know moisture kills bees, not cold, so we recommend hives be located in the sun out of the wind. If exposed, providing some extra wind/weather protection might improve survival.

Feeding, a common management appears to be of some help in reducing losses. Feeding fondant sugar or a hard sugar candy during the winter meant lower loss levels. Providing frames of honey or sugar syrup, the most common selection, also meant slightly lower losses for some individuals but these basic managements are useful in other ways such as for spring development and/or development of new/weaker colonies besides insuring better winter survival.

Feeding protein in form of 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.

Winterizing measures that apparently helped lower losses for some beekeepers was equalizing strength, providing an upper entrance, a moisture trap (Vivaldi board or quilt box) and some attention to adding protection against the elements. Spreading colonies out in the apiary and painting distinctive colors or doing other measures to reduce drifting also appeared to be of some value in reducing winter losses. Avoiding movement of frames from one colony to another might also improve survival but the gain over what this interchange might accomplish might be greater than a minor advantage in survival.

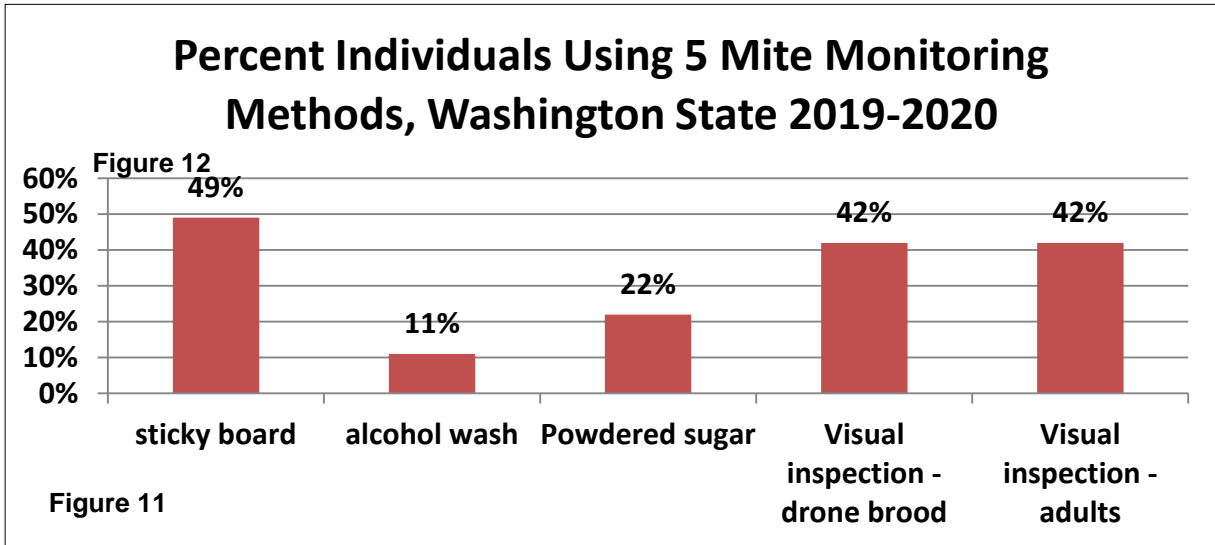
It is clear that doing nothing for feeding or winterizing or this past season in sanitation resulted in the heaviest overwinter losses.

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

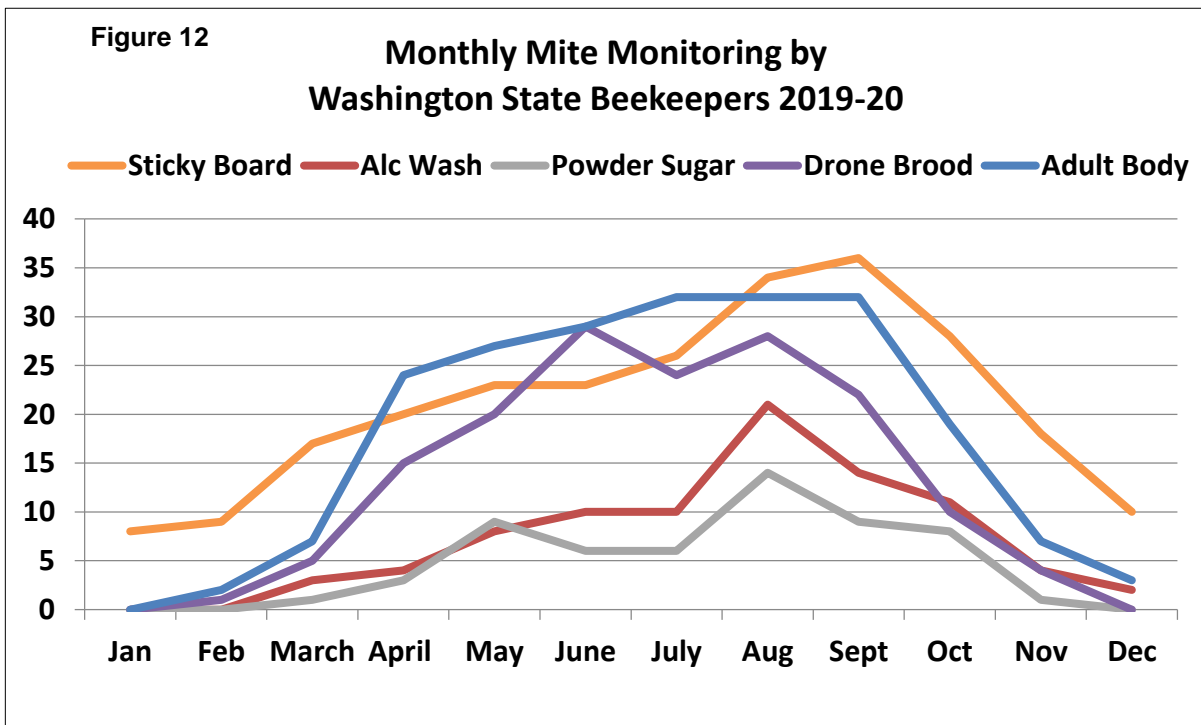
### **Mite monitoring/sampling and control management**

We asked percentage of Washington hives monitored for mites during the 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. Eighty six individual respondents statewide (65%) said they monitored their hives. Losses of those individuals monitoring was 44%. Thirty three (25%), reported no monitoring; they had a higher but only single percentage point higher loss rate of 45%. Thirteen individuals monitored some with loss rate 70%. For Olympia members, 7 monitored all and had 29% loss while the 3 that did no monitoring reported 67% loss.

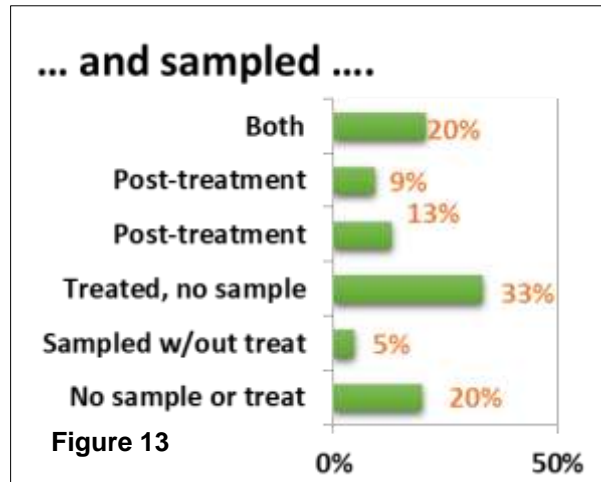
In order of popularity of use, Sticky boards and alcohol wash were used by 6 individuals, 67% of total 9 respondents who did some monitoring of colonies, zero individuals indicated powdered sugar, 2 said they examined drones visually and 3 adult bees. Figure 11 shows statewide data.



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



The most common sampling of respondents in 2019-20 was treated but did not sample (33% individuals) followed by both and not sampling nor treating. Thirteen indicated sampling pre and 9% post. Selections shown in Figure 13 to right are statewide; for Olympia 3 treated but not sampled. Sampling both pre and post was 4 individual - post alone was 3 individuals and pre alone or post only 1 individual. A single individual sampled but then did not treat.

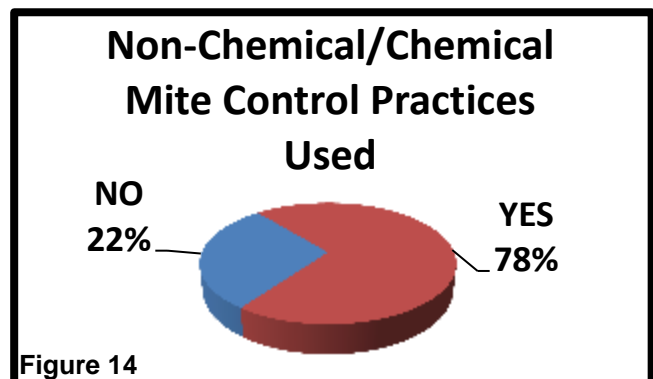


**It is important to KNOW mite numbers.** Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that picking out the mites can be hard, especially for new beekeepers) but sticky boards used for a day can help confirm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

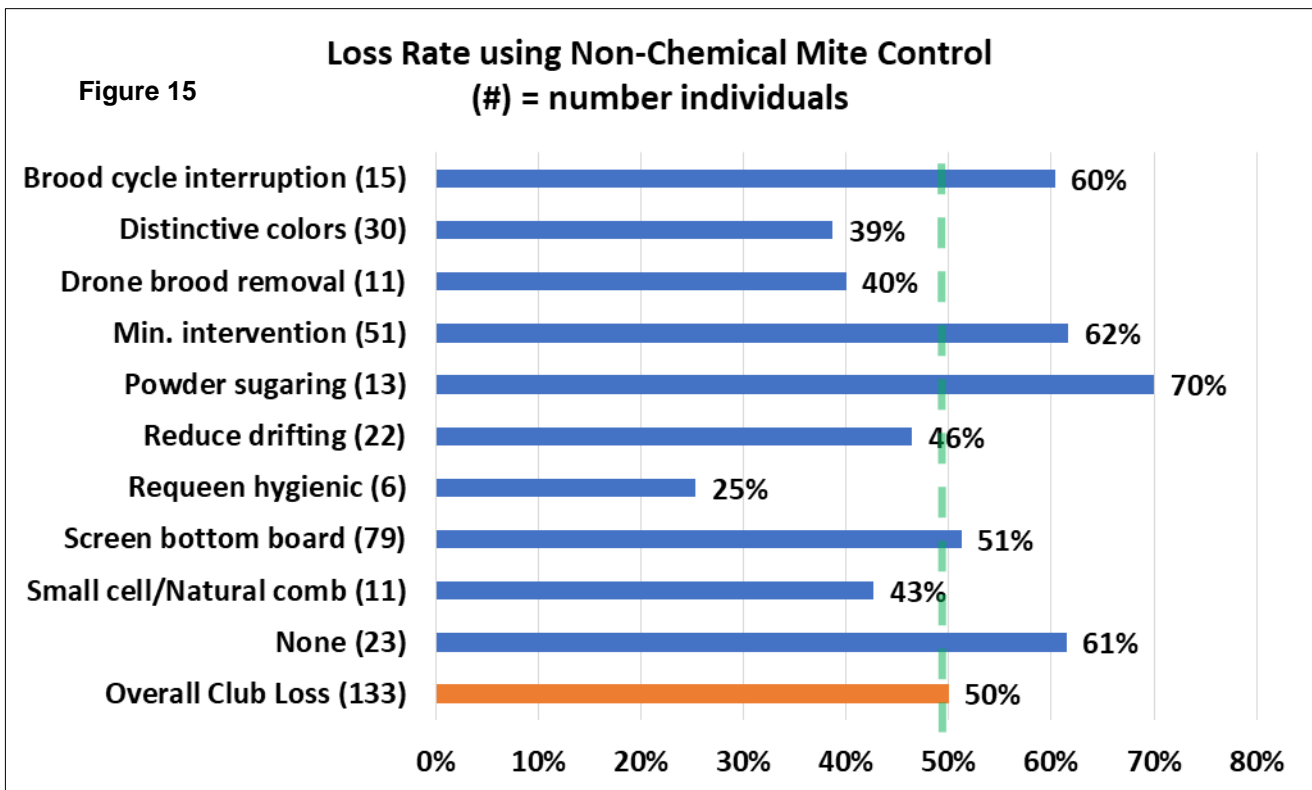
The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Two Olympia individuals (22%) said they did not employ a non-chemical mite control and 2 individuals did not use a chemical for mite control (one of the same individual). See Figure 14. Those 2 individuals who did not use a non-chemical treatment reported a 33% winter loss, while those who did not use a chemical control lost



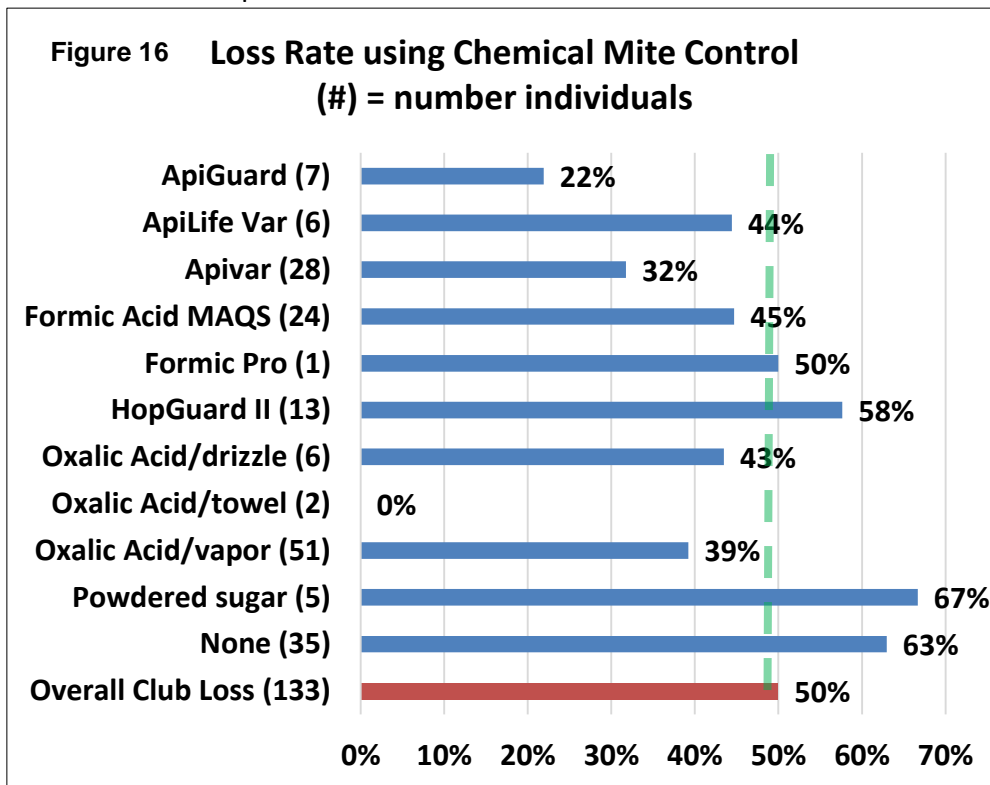
50% of their colonies. The individual options chosen for non-chemical and chemical control are discussed below.

**Non-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey (+ other category,) 3 individuals used one method and had a 75% loss, 2 used two (100% loss level), 3 used three (53% loss) and one used 5 (20% loss). Figure 15 shows number of individuals statewide in ( ), bar length represents average loss level of those individuals using each method. Those to left of **green dashed line** had better than average survival. For Olympia responses there were 21 total selections, 2.3/individual. Use of screened bottom board was listed by 6 individuals. The next most common selection was minimal hive inspection (4 individuals). Three individuals each used brood break and reduce drifting while 2 individuals each used distinctive colors and small cell/natural comb; one said they requeened with hygienic stock.

Five of the non-chemical alternatives demonstrated reduced losses this past year statewide – requeening with hygienic queens has not been showing better survival in previous years while drone brood removal (11 individuals) and painting hives distinctive colors has resulted in better survival in each of past three survey years. Small cell/natural comb likewise has not been demonstrating better survival although this year there was a 7 percentage point improvement in survival for the 11 individuals using this technique; for Olympia loss of those selecting this option was 51%



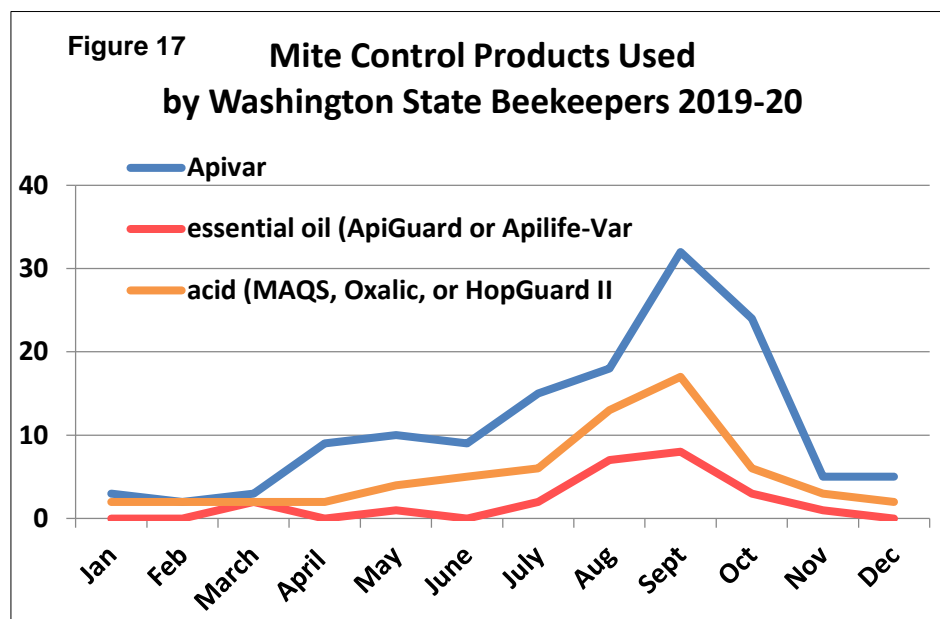
**Chemical Control:** For mite chemical control, 2 Olympia individuals used NO chemical treatment; these individuals had a 50% loss level. Those using chemicals used at rate of 1.8/individual. Three individuals used one chemical (2 used Oxalic acid vaporization and 1 used and had 53% loss, five used two (65% loss) and 1 used 3 (with no loss). Statewide it shows that it takes more than one chemical to improve success.



The two most common Olympia choices was Oxalic acid vaporization (8 individuals). Apivar and formic acid MAQS were used by 3 members; Apiguard and Hopguard were used by one each. Figure 16 illustrates number of users ( ) statewide and bar length indicates the loss rate for those using that chemical.

Consistently the last 3-4 years five different chemicals have helped beekeepers realize better survival. The essential oils Apiguard and ApiLifeVar have consistently demonstrated the lowest loss level. Apiguard has a 31% better survival and ApiLifeVar has a 30% better survival record over past 4 years. Apivar use, the synthetic (amitraz), has demonstrated a 29% better survival over past 4 years (2016-19). Oxalic acid vaporization over past 3 years has a 13% better survival. Formic acid demonstrated a 14% better survival but this product has changed and how we use it is changing so this information is more difficult to tease out of the data.

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 17. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals.

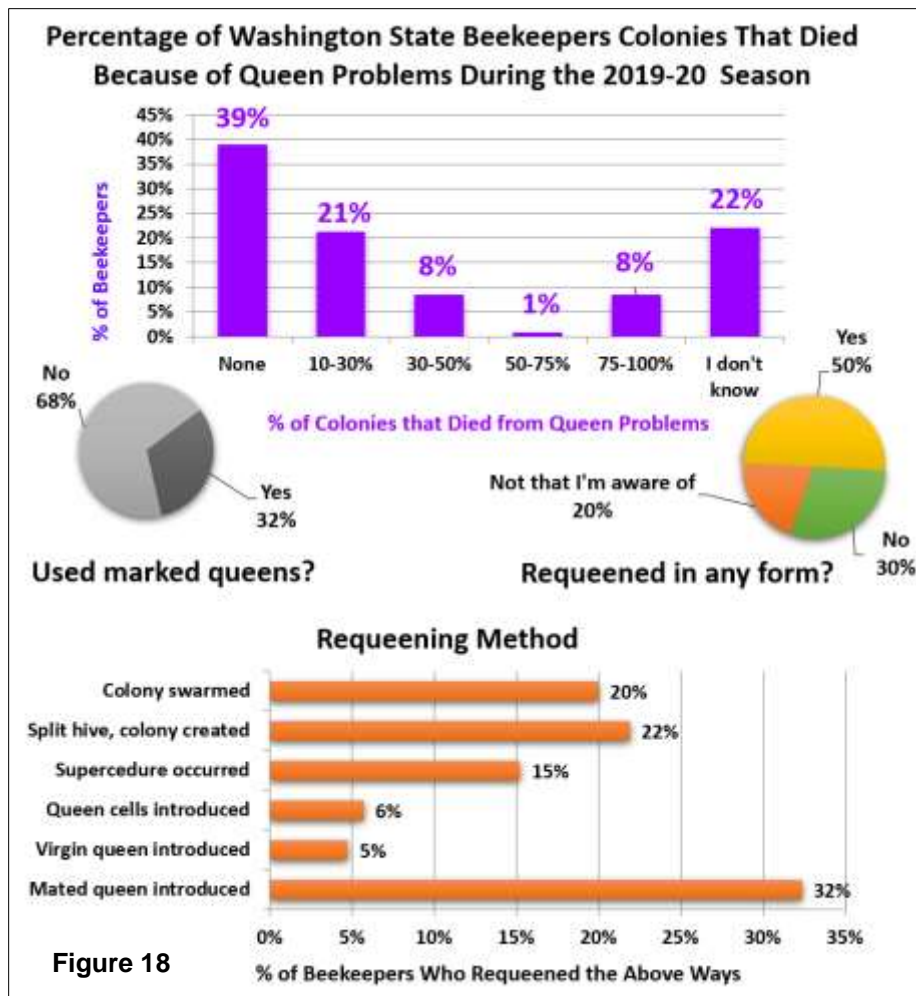


## Queens

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. Statewide forty six individuals (39%) subdivided queen related issues from 10 to 100% of their hives; the majority (25 individuals) indicated 10 to 30%. Forty six individuals also said none; an additional 26 individuals (22%) said they didn’t know. The number of respondents and percent losses statewide of each is shown in Figure 18 to left. For Olympia 4 Individuals said no queen issues and 1 didn’t know. Four individuals said queen were an issue, 2 at 10-30%, 1 30-50% and the last one at 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. Only 4 individual 36% said yes, 7 said no they didn’t have marked queens. The related question then was ‘were your hives requeened in any form?’ to which 69% (8 individuals) said yes, 2 individuals said no and one indicated ‘not that that I am aware of.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. The question “How did bees/you requeen“ received 142 responses (more than one option could be checked. Twenty three individuals indicated they requeened with a mated queen and they had a 51% loss level, seven used a virgin queen (43% loss) and 8 used a queen cell (45% loss). A higher percentage (54 instances vs 38) said the bees requeened via Supersedure (15 instances, 46% loss), splitting (21 individuals, 63% loss) or swarming (18 individuals, 42% loss). With the exception of use of mated queen and splitting, loss levels were very similar. For Olympia respondents 3 used mated queens 2 used a virgin queen and 2 indicated use of queen cells. An equal number (7) said their bees requeened via supersedure (3 persons), 2 each via splitting and allowing bees to raise new queen and via swarming.



## 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 reporting losses of the larger scale WA beekeepers not the backyarders (Figure 5). Reports for individual bee groups with 18 or more respondents are customized and posted to the PNW website.

We intend to continue to refine this instrument each season and hope you will join in response next April. If you would like a reminder when survey is open please email us at [info@pnwhoneybeesurvey.com](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 June 2020