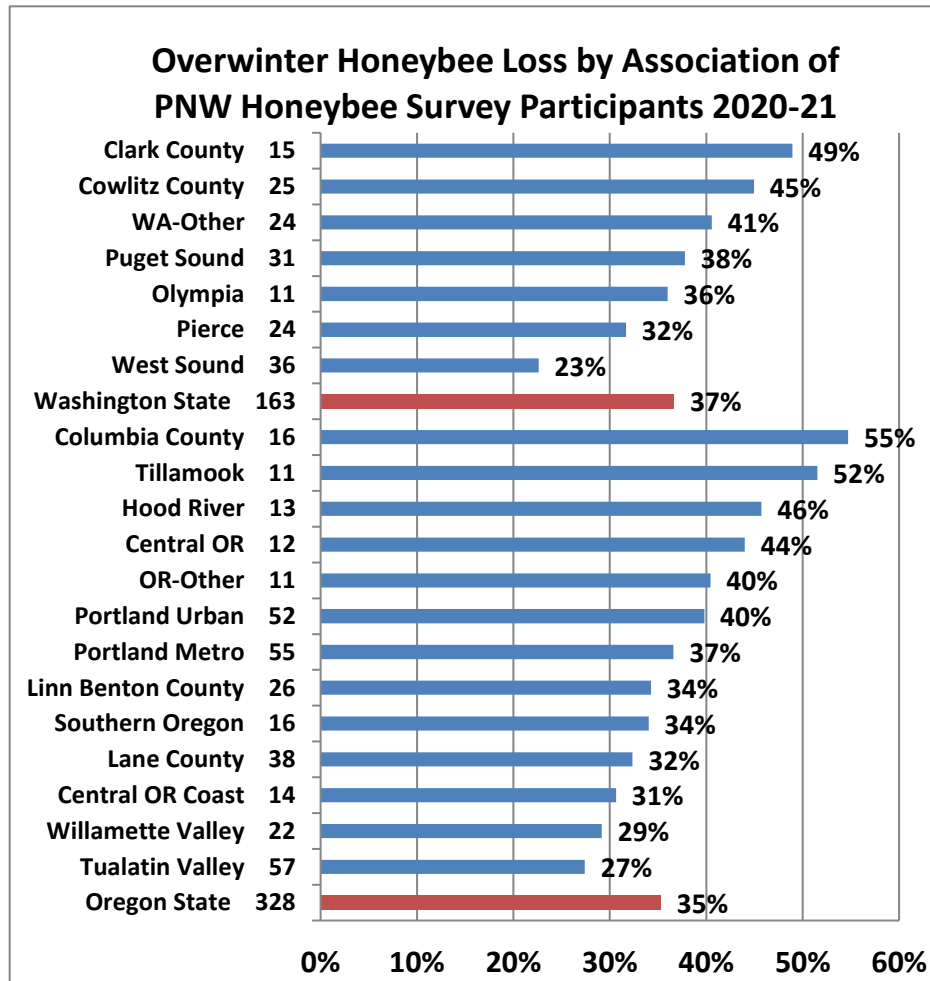


## 2020-2021 WVBA Winter Loss Report by Dewey M. Caron

WVBA members were encouraged to complete a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon. This was the 12<sup>th</sup> year of such survey activity. I received 368 responses from OR backyarders, keeping anywhere from 1 to 40 colonies; Willamette Valley members sent in 22 surveys, 6 more than last year, reporting on 168 fall colonies.



**Overwintering losses of WVBA respondents =29 %**, the 2<sup>nd</sup> best record of OR clubs. Percent losses, determined by hive types were 29% for both Langstroth 8 and 10 frames hives (= 86% of total number of hives) and 21% loss of nucs (only 14 reported as fall units by respondents). Of 6 top bar hives, 3 were lost, a single Warré hive was lost, and a single Styrofoam hive survived. See figure 2 below.

Loss 2020-21 rate was 10 percentage points higher than the previous year when WVBA had the lowest loss average of all Oregon clubs. The level is 6 percentage points below the average loss level of previous seven years (35%) and 11 percentage points below Oregon statewide 12-year average (40%). Number in ( ) is number of respondents. Dashed line shows the trend which obviously is in the right direction. The graphic for losses of WVBA members is shown on next page. Figure 3

Figure 2 Winter Honeybee Loss % by Hive Type, 2020-21

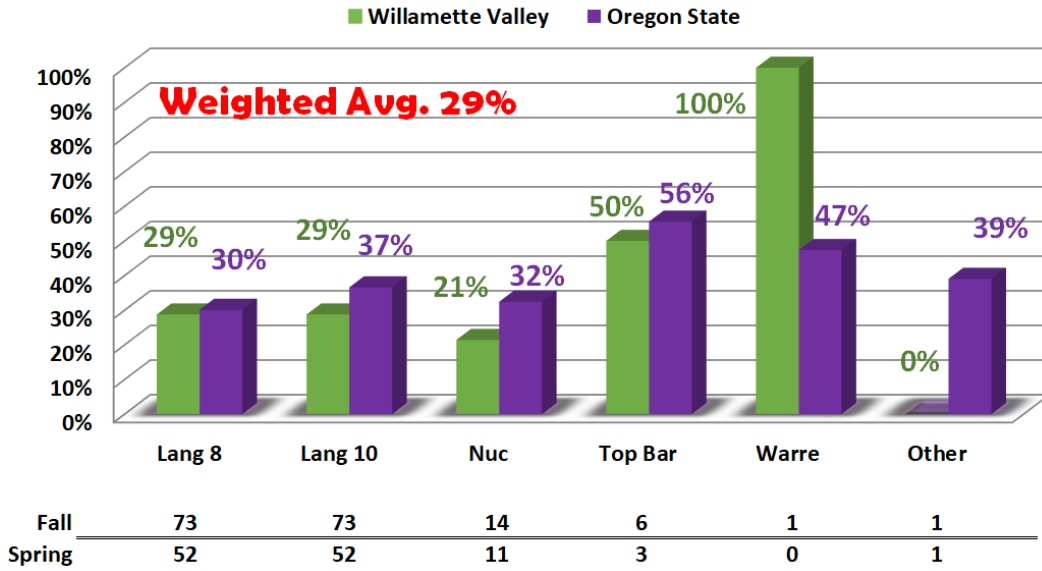
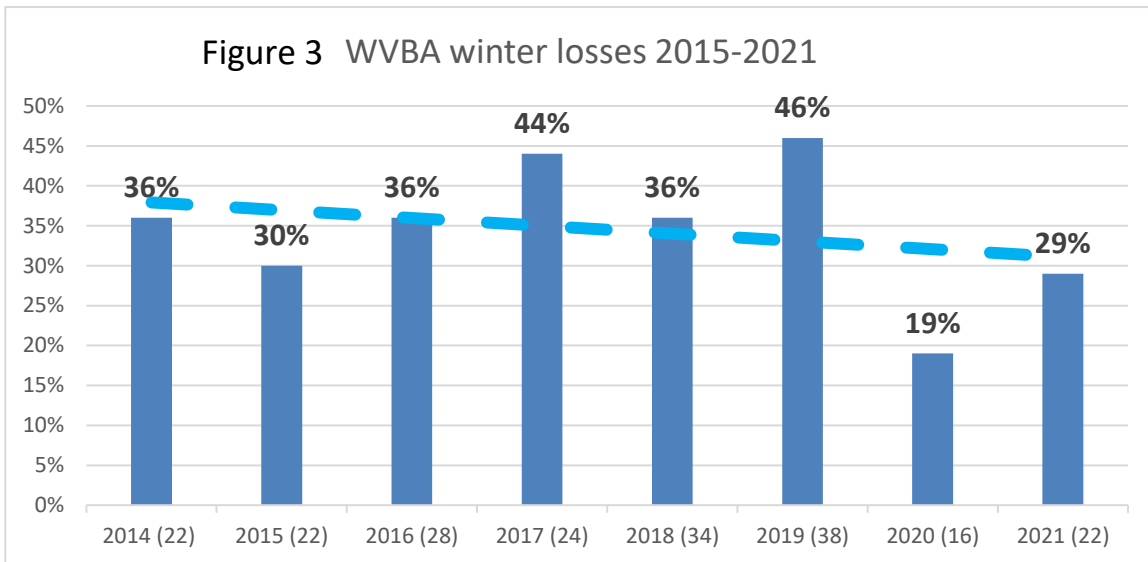
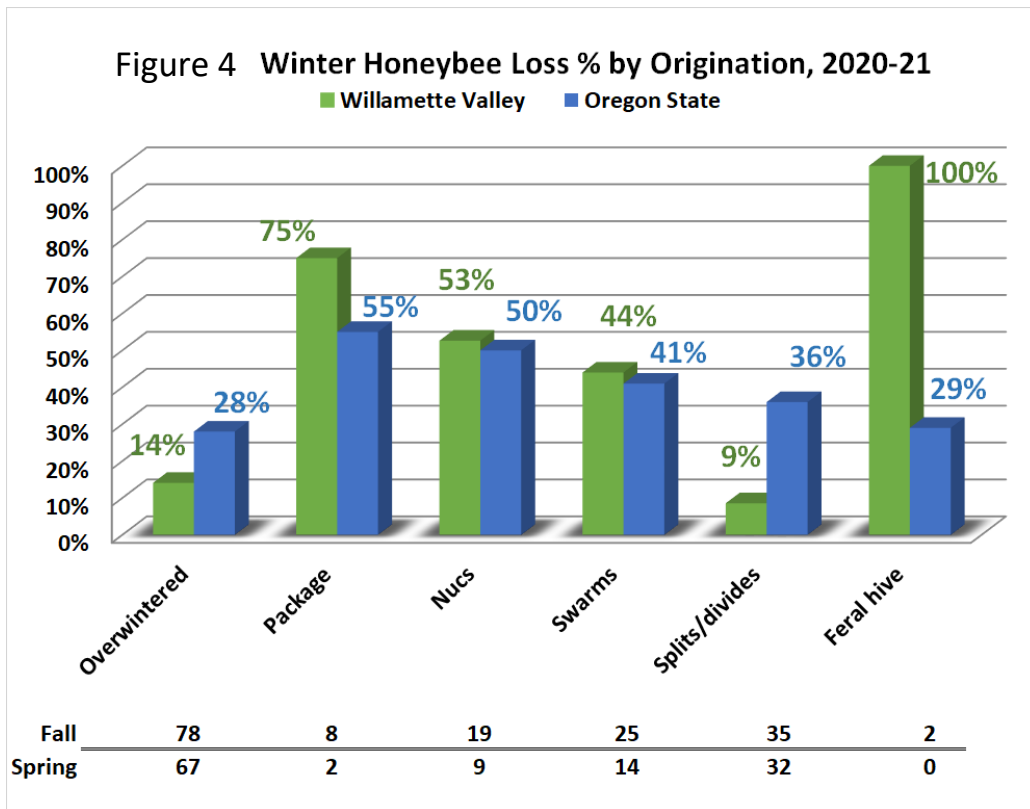


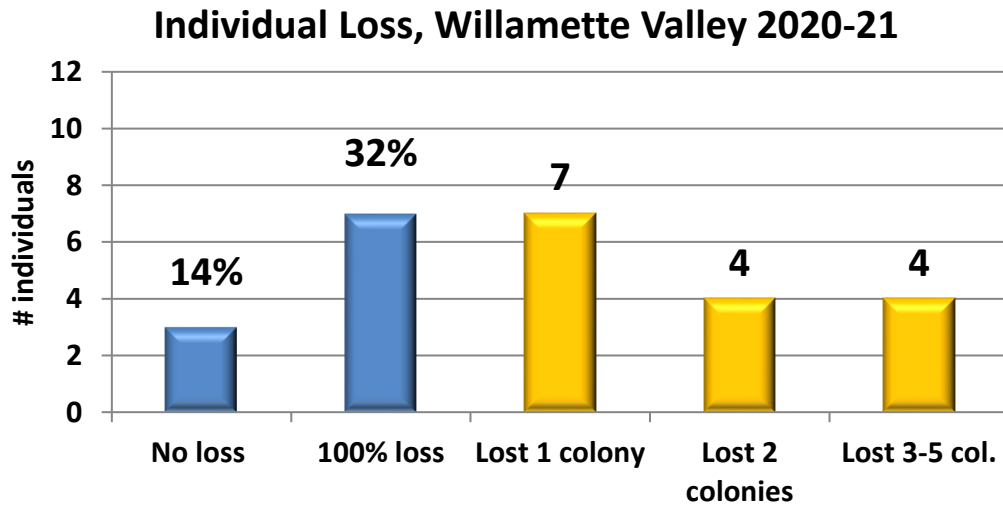
Figure 3 WVBA winter losses 2015-2021



The survey also asked for hive loss by **hive origination**. The members reported 14% loss of previously overwintered colonies, a heavy 75% loss of the 8 packages, while nuc (53%) and swarm (44%) losses were intermediate. Most impressive was only a 9% loss of 35 splits. Figure 4.



Not everyone had loss. Three individuals (36 colonies) had total survival had total survival Seven WVBA individuals (32%) reported total colony loss (12 colonies total). Heaviest loss was of one colony. One individual lost 17 colonies. Figure 5.



**Figure 5**

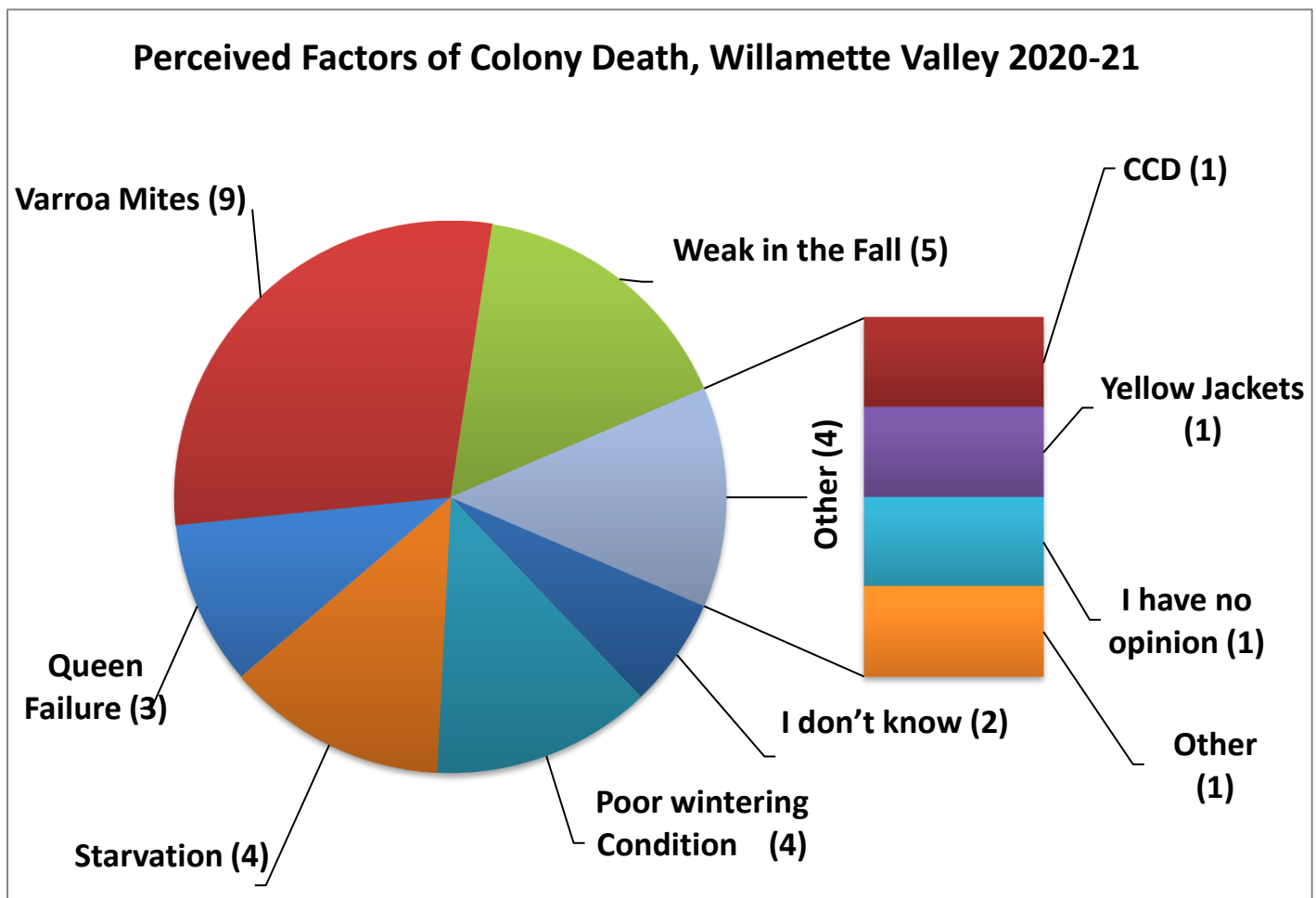
Atypical of the statewide data, the WVBA respondents had colony ownership skewed toward 10 or more colonies (7 individuals) and had no first-year beekeepers and only 3 respondents with more than 10 years experience (see state report for comparison). Eleven individuals had 1 to 3 colonies and had 70%

loss. Three individuals had 6 or 7 colonies and had 11% loss, 5 individuals had 10-18 colonies and had 14% loss while 2 individuals with more than 25 colonies experienced a 43% loss. One individual with large colony count had heavy loss skewing the data. Statewide and in most clubs as colony count increases the percent colony loss decreases.

Consistent with statewide data as years of experience increase the loss level does not decrease. This was the case for WVBA members. There were no first-year beekeepers completing a survey. Six individuals with 2-3 years experience had 53% loss, the 5 individuals with 4 years of experience had 20% loss (the lowest loss level), the 6 individuals with 5 to 7 years experience had 26% loss and the 3 individuals with 10+ years experience had 47% loss.

We asked individual why they thought they lost their colony. Multiple responses were possible. Nine of 19 respondents said varroa mites, followed by 5 who said weak and 4 each indicating starvation and poor wintering. Three indicated queen issues. Statewide queen issues as perceived loss reason was third in listing just behind weak in fall. Varroa mites was the number one listing statewide as well as for WVBA members.

**Figure 6**



We asked about acceptable loss. Twelve individuals said 10% or less was acceptable while 4 said 25%<sub>4</sub>

to 50% was acceptable. The other was a don't know. Statewide median acceptable loss level was 20%.

Acceptable Overwinter Loss per 22 Beekeepers in Willamette Valley during 2020-21											
Loss level	5%	10%	15%	20%	25%	33%	50%	75%	100%	None	Other
#	3	5	3	2	1	1	2	0	0	4	1
%	14%	23%	14%	9%	5%	5%	9%	0%	0%	18%	5%

## Why colonies die?

There is no effortless way to verify reason(s) for colony loss. Colonies in the same apiary may die for varied 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.

Major factors in colony loss are mites and their enhancement of viruses especially DWV (deformed wing virus) and declining nutritional adequacy/forage and diseases. Pesticide exposure 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 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.

## Management selections and losses

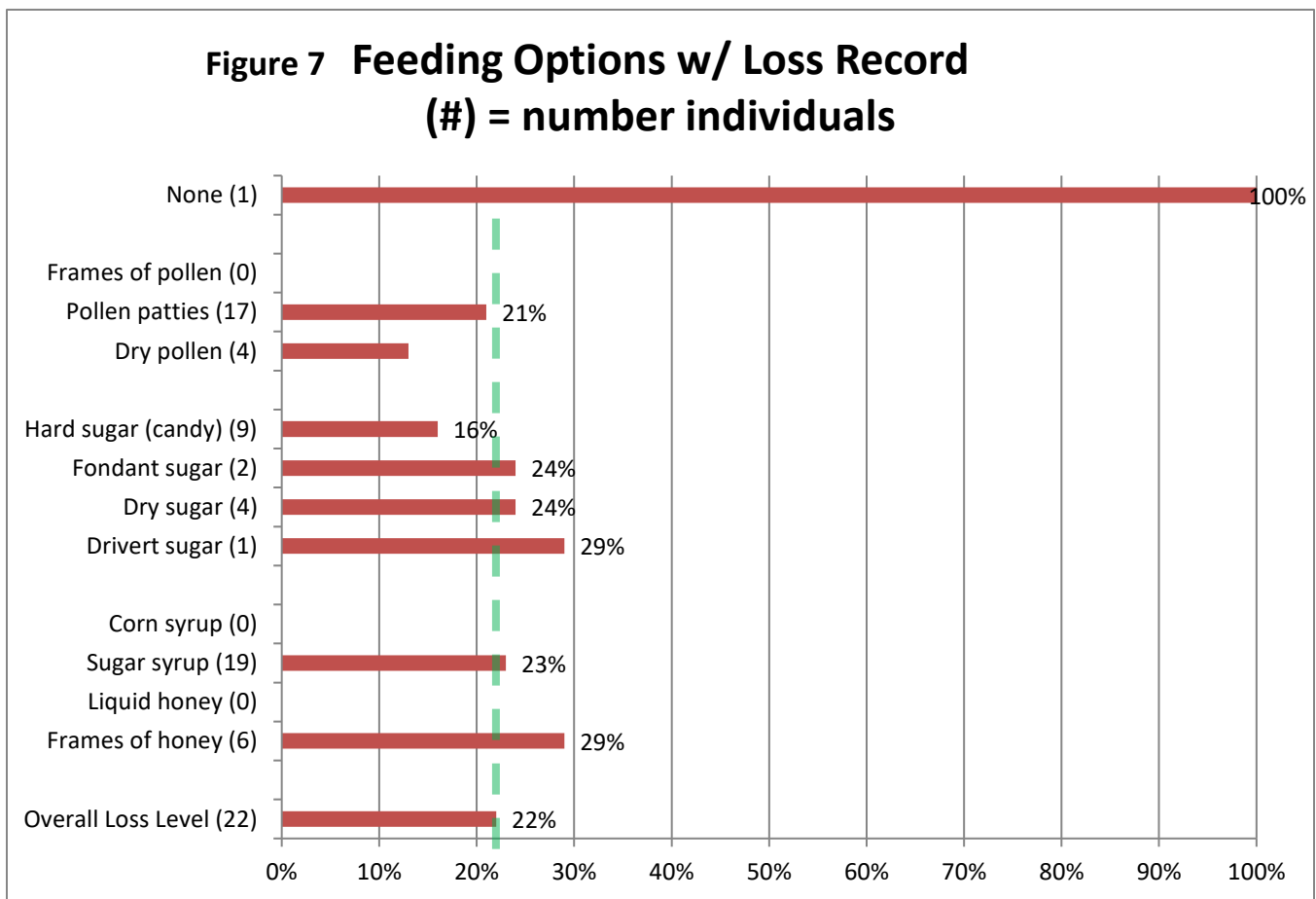
We asked in the survey for information about some managements practiced by respondents. The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, mite monitoring, both non-chemical and chemical mite control techniques and queens. Respondents could select multiple options and there was always a none and other selection possible. This analysis seeks to compare responses of this past season to previous survey years.

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

**Note:** the one individual with the large colony numbers and heavy loss (68%) is an outlier and will not be included with the analysis of managements. Data of the remaining 21 WVBA individuals will be compared to statewide losses – this individual is included in the statewide analysis. When this record is removed overall rate drops to 22%.

**FEEDING:** The 21 WVBA survey respondents (minus the one with large loss) checked 59 feeding options = 3/individual (statewide it was 2.9/individual). One individual indicated no feeding (had 1 colony) and lost it = 100% loss. Four individuals selected a single choice (sugar syrup) and had 29% loss (same as average). Four individuals indicated 2 feeding selections and had 35% loss (2 selected pollen patty and sugar syrup (33% loss), 1 pollen patty and honey (22% loss) and the 4th selected sugar syrup and hard candy (100% loss). Six individuals indicated 3 choices (19% loss), five of which combined pollen patty, sugar syrup with dry or hard sugar. Six had 4 and 1 had 5 choices and they had a 19% loss. The individual with the heavy colony loss (lost 17 colonies -68%) made 6 choices. Clearly doing more feeding choices helped decrease loss and improve survival.

The choices, with number of individuals making that selection is in ( ) in Figure 7; bar length indicates loss level of individuals doing this management. Those bar lengths to left of 35% **green dashed** marker had better survival while those to right had greater loss level.



Fourteen individuals statewide, 1 a WVBA member, said they did NO FEEDING. The WVBA individual lost the single colony = 100% loss level, statewide loss level was 40% loss. For individuals indicating one or more feeding managements, feeding sugar syrup (19 individuals) and pollen patties (17 individuals) were the most common feeding option of respondents. Their loss rates were same as overall WVBA average. Feeding hard sugar (16%) and dry pollen (13%) showed the best survival rates.

Summary: Statewide for the last 5 years statewide (average loss rate = 41%), individuals doing no feeding had 6 percentage point higher losses (average 47%) i.e. poorer survival, compared to average loss rate of 41%. Average percent doing no feeding = 8% of individuals).

Individuals statewide that fed sugar syrup had a 6-percentage point lower loss level (average for the 5 years); for WVBA sugar syrup feeders had a 6-percentage point improvement in survival. Those feeding honey (as frames or liquid) had lower loss only during 2 of the past 5 years. Individuals feeding non-liquid sugar (in any of the forms) had lower losses four of five past winter seasons, as WVBA members did this past winter.

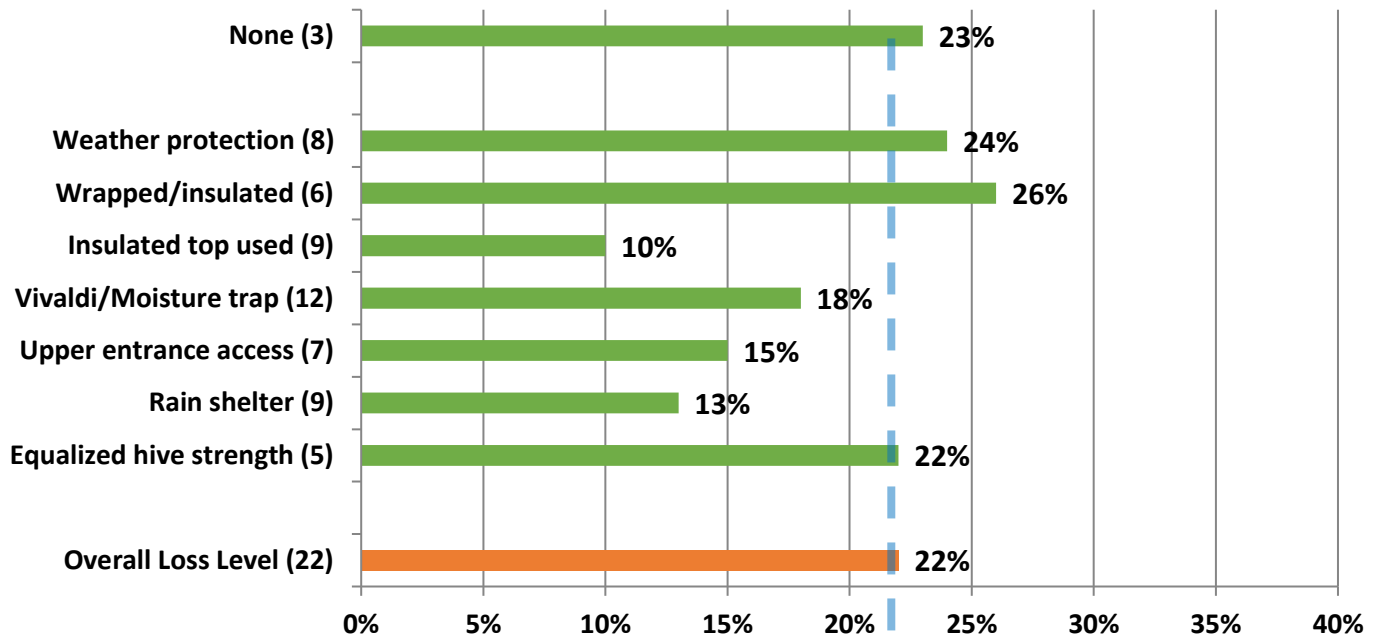
For individuals feeding protein, only the protein patty users showed better survival all 5 years; dry pollen feeders had much better survival in two of the past five years with losses the remaining three years, including the past one, close to the overall yearly average. Dry pollen feeders have had better survival some years, as WVBA individuals did this year.

**WINTERING PRACTICES:** We received 56 responses (3.1/individual, statewide-2.9/individual) regarding WVBA beekeeper wintering management practices (more than one option could be chosen). Three individuals indicated they did none. They had a 23% loss compared to 22% average of the 21 respondents. These 3 were part of 42 statewide individuals (13%) of the respondents indicated doing none of the several listed wintering practices; collectively these individuals had a 39% winter loss, 4 percentage points higher loss than overall loss of 35%. For those indicating some managements, three did one single thing, (33% loss – only the individual using the ventilated board had loss 9%, other than total loss), 5 indicated 2 selections (32% loss – upper entrance and ventilated board had 19% loss, the best of the selections), 3 did three (60% loss, the one individual not included also indicated 3 selectins and had 68% loss), and 7 individuals had 4 or 5 selections for only a 11% loss. No one combination was dominant. More managements practiced generally resulted in better survival as there is no one practice of winterizing that greatly improves survival.

The most common wintering management selected was ventilation/use of a quilt box at colony top 18% loss, 4 percentage points lower than WVBA average. Figure 8 shows per cent of individual choices and bar length shows percent winter loss of each selection. Bars to left of green dashed line means better survival than overall. Wrapping, weather break, equalizing colony strength were less advantageous.

Over the past four years statewide individuals that did no winterizing practice (average 13.4% of individuals) averaged 46% loss compared to 42% overall average loss of last 4 years, a 4-percentage point poorer survival rate. Only 2 winterizing managements improved survival all 4 years – wrapping (29% lost rate, a 13-percentage point improvement) and upper insulation (32%, a 10-percentage point improvement). Vivaldi/quilt box (38%), upper entrance, also 38% (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection (36%) had only slightly improved survival rates. Average loss rate for last 4 years statewide was 42% (9.5 percentage points greater than the average loss rate for WVBA.

**Figure 8 Winter Management Options w/ Loss Record**  
 (#) = number individuals



**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 39 responses for this survey question 2.2/individual (statewide it was 2.5). Three individuals selected none and had 50% loss. These 3 were among the 64 individuals statewide who said they did not practice any of the 6 offered alternatives; they had a loss rate of 72% compared to overall rate of 35%. Over past four-years statewide those indicating doing none had a 52.5% percent loss rate, 10+ percentage points higher than the average loss rate of 42% over the same time period.

Thirteen WVBA individuals had 1 selection with 22% loss (average for the 21 WVBA individuals); the lowest losses were 3 individuals who indicated cleaning hive tool (10% loss) and 2 who indicated generally avoiding moving frames (16% loss). There were 5 individuals with 2 choices (16% loss level) and 1 that did 3 (0 loss), 1 did 6 and 1 selected 7 choices – collectively they had 20% loss level. As with feeding and winterizing managements, several actions improve survival.

Minimal hive intervention (142 individuals) was the most common option selected, as it has been for the last 4 years. It could be argued that less intervention might mean reduced opportunity to compromise bee sanitation efforts of the bees themselves and that excessive inspections/ manipulations can potentially interfere with what the bees are doing to stay healthy. This option however did not demonstrate improved winter survival; the loss rate for this group statewide the past 3 years was 49.5%, 7.5 percentage points above the average 4-year loss of 42%. For WVBA this selection by 7 individuals had a 41% loss, double the average WVBA loss rate last year it demonstrated a 6-percentage point improvement. The 19 individuals who

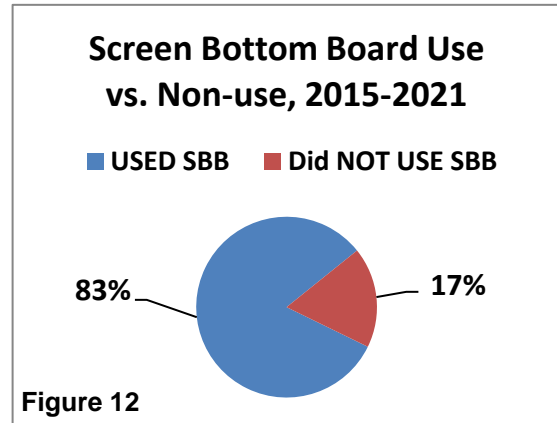


indicated cleaning hive tool had a 19% loss, 3 percentage points better than average; it was one of the best in reducing losses last year as well. Distinctive hive colors offered improved survival last year and was the single alternative that improved survival with a 13% loss level, 9 points lower than average.

## SCREEN BOTTOM BOARDS (SBB)

Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a highly effective varroa mite control tool. In this recent survey 11% statewide said they did not use SBB in last 7 years. Average non-use is 17%, vs 83% use, on some or all colonies statewide. For WVBA 3 individuals (of 21- 14%) said they did not use SBB. Figure 12 right.

This past overwintering season, the 3 non-SBB users had double the loss rate of those using SBB. Examining the six-year average of SBB use, loss level of the 83% using SBB on some or all of their colonies had a 36% loss level whereas the 17% not using SBB had loss rate of 40%, a 4-percentage point positive survival gain for those using SBB versus those not using them. Screen bottom boards offer a minor improvement for overwinter survival.



We asked if the SBB was left open (always response) or blocked during winter. This past season, 2 individuals (3 colonies) responded that they never blocked, and they lost all 3 colonies (100% lost). Statewide those who blocked always or sometimes had a 35% loss rate. while those who never blocked had a 38% winter loss, a 3-percentage point difference, a slight advantage **in favor of closing the SBB over the winter period to improve survival**. Screen bottom board use has a slight survival advantage. For those using SBB, the advantage appears to be to close, partially or completely, the screen over the winter period.

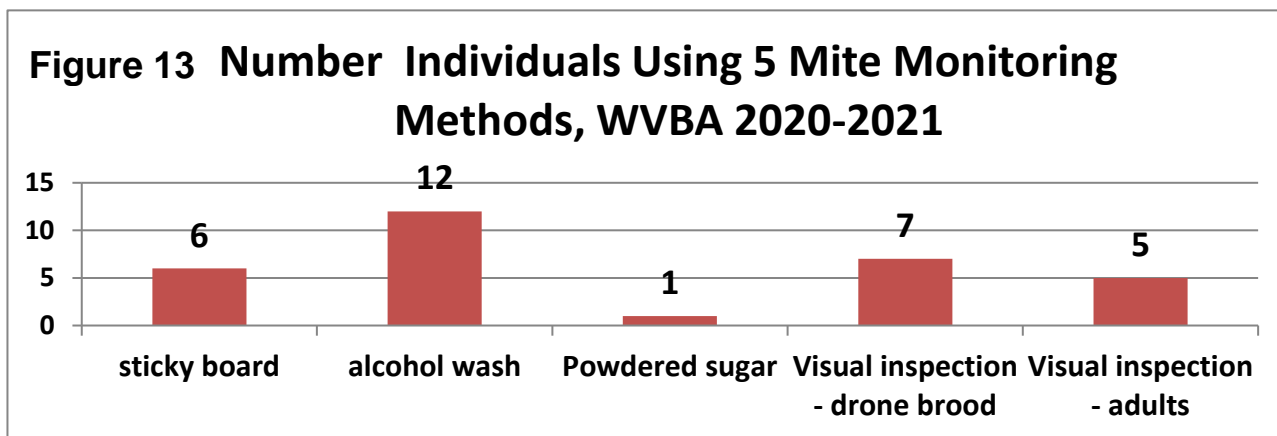
## Mite monitoring/Sampling and Control Management

We asked percentage of hives monitored for mites during the 2020 year and/or overwinter 2020-21, 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. Three individual respondents (14%) said they did not monitor – they had a 33% loss, 11 percentage points over average loss. Statewide losses of those individuals monitoring were 34 % and those reported no monitoring had a higher loss rate of 36% loss.

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. Five-year difference is 8 percentage point better survival monitoring all colonies. The 13-15% who monitored some colonies was variable.

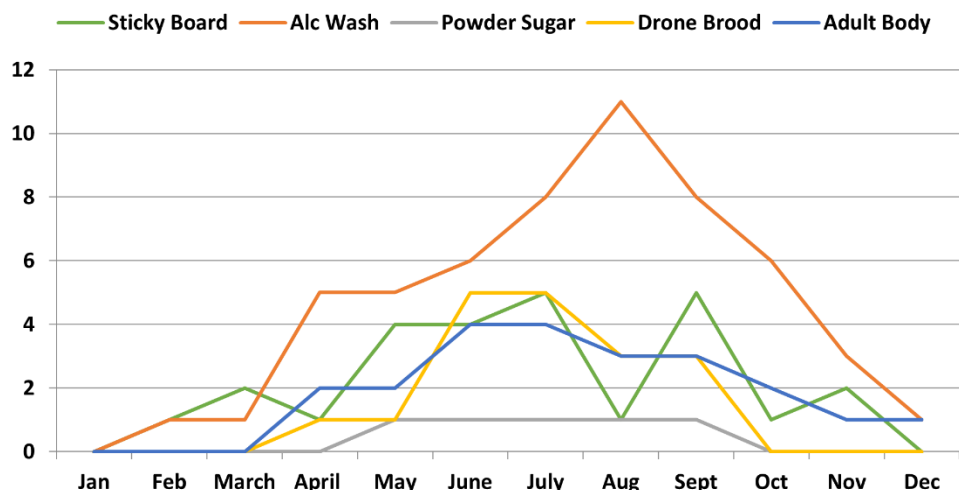
	ALL Colonies Monitored % individuals	% loss	SOME Colonies Monitored % individuals	% loss	No colonies Monitored % individuals	% loss
2021	73%	34%	11%	36%	17%	36%
2020	67%	33%	13%	16%	20%	49%
2019	67%	51%	15%	50%	18%	59%
2018	63%	38%	14%	26%	26%	49%
2017	63%	43%	15%	60%	22%	48%
5-year loss avg		40%		38%		48%

Individuals indicated use of 1.6 monitoring techniques on average. In total choices, in order of popularity of use, alcohol wash was used by 12 of 19 respondents (63%), drone brood monitoring by 7 individuals, sticky boards were used by 6 individuals, 5 individuals indicated looking on adults and 1 said they used powdered sugar shake. Statewide 37% used alcohol wash to monitor so WVBA is much improved in use of major method of monitoring mites. In past 5 years, statewide the use of sticky boards has decreased and both alcohol wash and powdered sugar shake have increased in use.



Whatever technique used most sampling to monitor mites occurred in July – September, as might be expected since mite numbers change most quickly during these months and sampling results key control decisions. Figures 14 right illustrates monthly sampling five methods.

**Monthly Monitoring of Willamette Valley Beekeepers 2020-21**



The most common sampling of respondents is both pre- and post-treatment. Sampling pre-treatment percentage has been decreasing but for WVBA it was greater than post treatment sampling. Treatment without sampling has been steadily increasing.

### ... and sampled ...

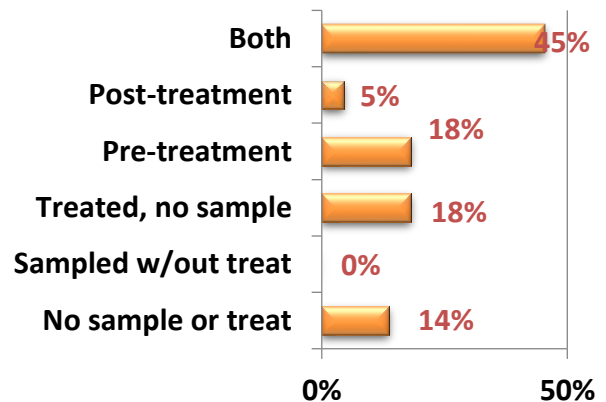


Figure 15

**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 counting the mites can be hard, especially for new beekeepers). Sticky boards used for a single day pre- and post-treatment can help confirm the effectiveness of a treatment, if numbers drop post treatment. Visual sampling is not accurate: most mites are not on the adult bees, but in the brood, especially when there is a lot of brood and the adult mites are NOT on the adult body where they can be observed (over 90% are on the lower abdomen, tucked within the overlapping bee sternites). Sampling for mites on drone brood is also not effective as a predictive number but is 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](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 the treatment itself.

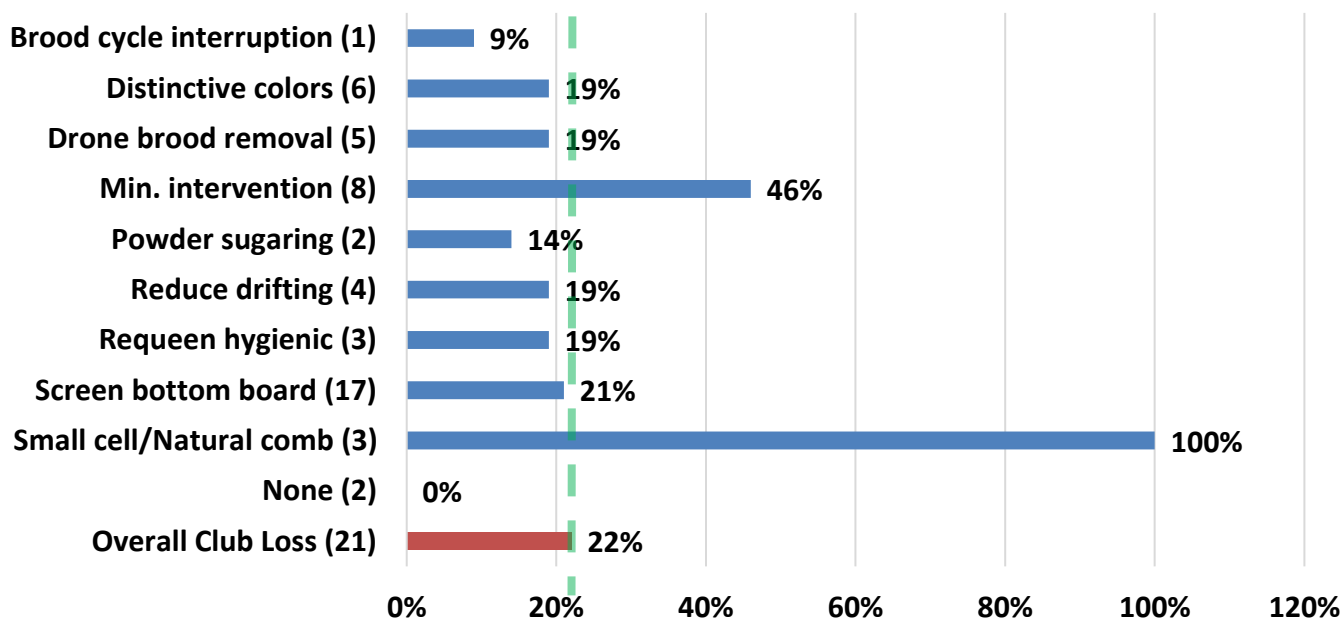
## Mite Control Treatments

The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. There were 46 choices, 2.4/individual. Fourteen percent (14%) of statewide respondents, 2 WVBA members, said they did not employ a non-chemical mite control and 19% statewide and 3 WVBA individuals did not use a chemical control. Those 45 individuals who did not use a non-chemical treatment reported a 48% winter loss; the 2 WVBA members (4 colonies) had no loss. Statewide survey respondents who did not use a chemical control lost 61% of their colonies; 57% loss for WVBA. 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,) 6 individuals used one method, 2 used two, 9 used three, and 2 used 4. Individuals using a single method had 21% loss rate (4 of the 6 were use of Screen bottom boards (16% loss), those using 2 had a 67% loss rate (both selected minimal hive inspection and SBB), those with 3 had a 27% loss (5 used Drone brood removal and SBB + one other – 19% loss). The 2 using 4 had 30% loss.

**Loss Rate using Non-Chemical Mite Control**  
 (#) = number individuals

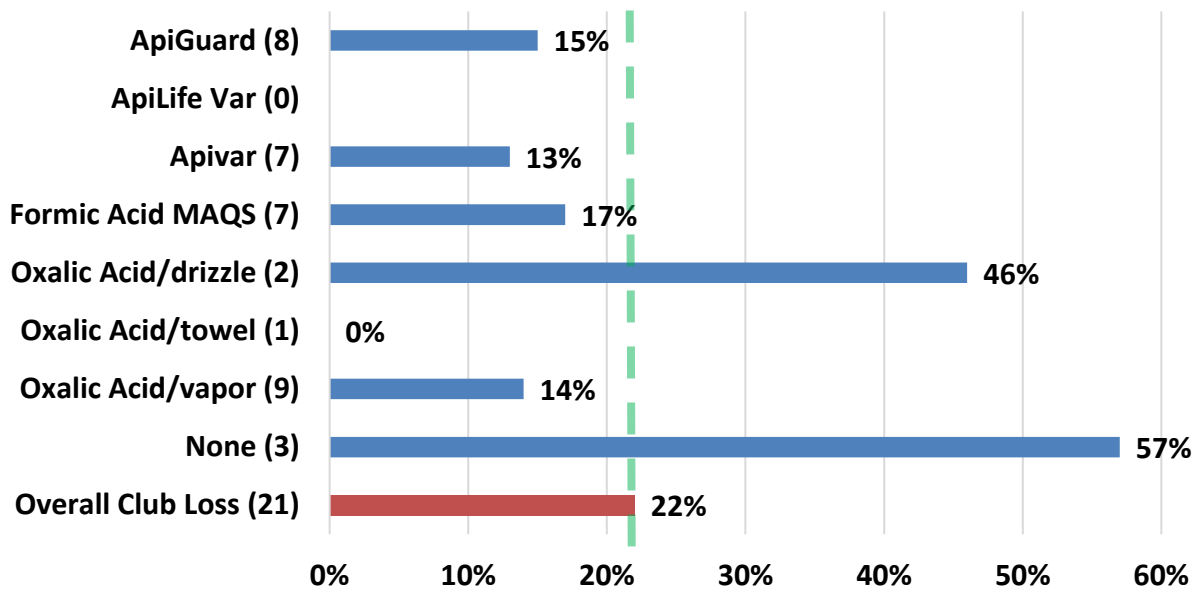


Use of screened bottom board was listed by 17 individuals (80% of respondents vs 67% of total statewide respondents). The use of the remaining selections are shown in Figure 16; number of individuals in ( ), bar length represents average loss level of those individuals using each method. Those left of **green dashed** line had improved survival. It is clear that none of the choices are so robust as to result in reduced losses except the one individual who did brood cycle reduction and the 2 who used powdered sugar. (Powdered sugaring has not been providing reduced losses statewide).

Three of the non-chemical alternatives statewide have demonstrated reduced losses over past 5 years. Reducing drifting such as spreading colonies (33% loss average for 3 years – question not asked in 2016-17 survey) and brood cycle break (36% average) have consistently year after year demonstrated better survival than average loss (41%). Different colony colors in apiary and drone brood removal were both 41%, 5-year average. Some non-chemical control alternatives demonstrate an advantage in one or two years, like powdered sugaring for 2 WVBA members this year but overall, no improvement.

**Chemical Control:** For mite chemical control, 62 individuals (19% of total respondents) used NO chemical treatment statewide; 3 were WVBA members. Statewide loss level was 52%; 57% for the 3 WVBA members Those using chemicals used at rate of 1.9/individual. Seven individuals used one chemical (had 48% loss level the 2 using MAQs had 26% loss, the 2 using Apivar had 33% loss), seven individuals also used two (17.5% loss), three used 3 or 4 and had 11% loss. Loss levels declined with combining uses.

**Figure 17 Loss Rate using Chemical Mite Control (#) = number individuals**



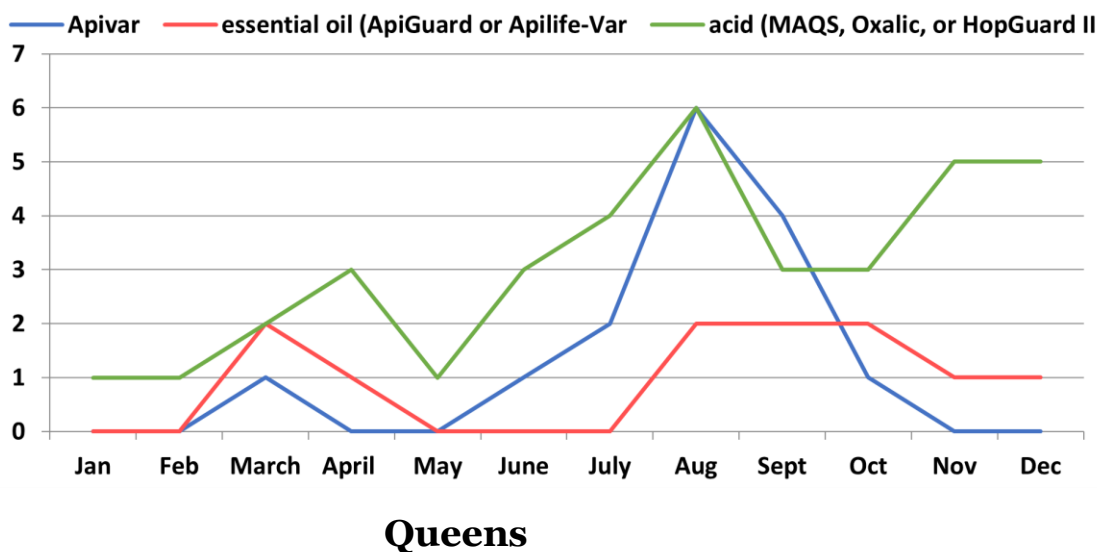
It is clear that WVBA members can obtain even better survival than the 22% average with four chemicals. All four chemicals improved survival. The one using Oxalic acid towels was one of 9 statewide to indicate use of this non-legal product but it has not improved results, perhaps due to variation in preparation and use. Formic Pro has looked particularly good statewide the last 3 years (25.3% loss 3-year use average) but the single user in WVBA had 100% loss (3 colonies).

Consistently the last 5 years statewide five different chemicals have helped beekeepers improve survival. The essential oils Apiguard (average 5-year loss level 31.6%), Apivar (32% average 5-year loss level), Oxalic acid vaporization (32.6% average loss level over last 5 years – in contrast the oxalic acid drizzle average of last 4 years is 40% loss level), ApiLifeVar (34.4% average loss level over last five years – but not used by any WVBA members) and formic acid MAGS formulation 39.4% loss level the last 5 years. Average loss level statewide has been 41% the last 5 years. Those who mix formic into shop towels have heavier losses.

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 22 for 2020-21 season. The elevated level at end of year represents Oxalic acid use. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals.

Figure 23

### Mite Control Products used by Willamette Valley Beekeepers 2020-21

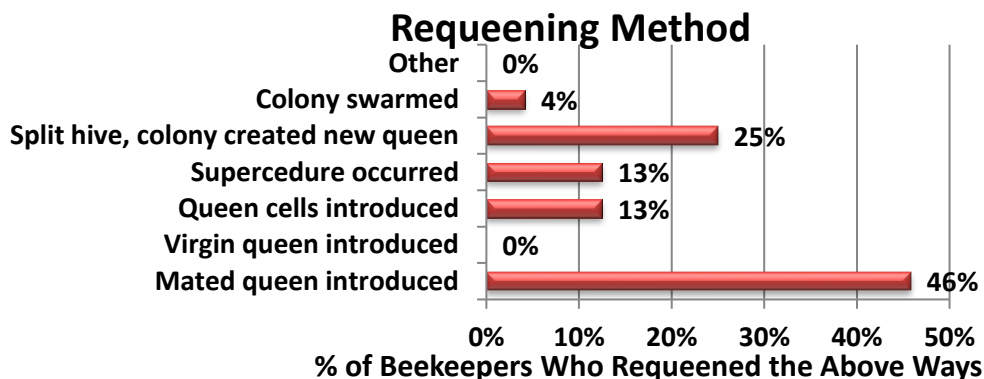


### Queens

We hear lots of issues related to queen “problems.” Recall under the question asking the reasons why colonies didn’t survive that 3 individuals noted queen issues as one of their selections (Figure 6). In Section 8 of the survey, we asked what percentage of loss could be attributed to queen problems. Response was not particularly good, only 11 individuals, responded. Two said non, 6 said didn’t know and 3 indicated yes. One said 10-30%, one 30-50% and the last 50-75%.

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. Equal numbers, 11 each said yes and no they had marked queens. The related question then was ‘were your hives requeened in any form?’ to which 12 individuals said yes, 5 said no and the remaining 5 said ‘not that that I am aware of.’

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” are shown in the final graph below. Nearly one half were requeened with a mated queen (vs 33% statewide), 25% split (divided) hives, nearly 20% indicated it was the bees that requeened via swarming and superseding. Thirteen percent introduced queen cells.



## Closing comments

This survey is designed to ‘ground truth’ the larger, national Bee Informed loss survey. Some similar information is additionally available on the BeelInformed website [www.beeinformed.org](http://www.beeinformed.org) and individuals are encouraged to examine that data base as well. Recall that the BeelInformed survey is measuring the larger scale OR beekeepers not the backyarders (See *American Bee Journal* April 2020 article by Dewey). 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 August 2021