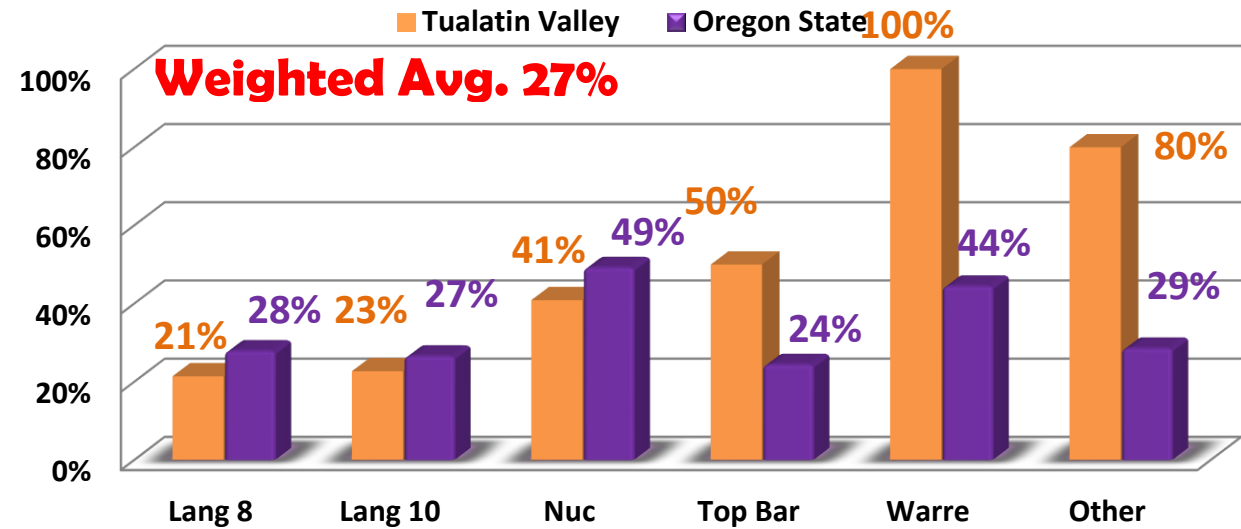


## 2021-2022 TVBA Winter Loss Report by Dewey M. Caron

Tualatin Valley Beekeepers were encouraged to complete a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon and Washington. This was the 13<sup>th</sup> year of such survey activity. I received 246, 82 fewer responses, from OR backyarders, keeping anywhere from 1 to 40 colonies; TVBA members sent in 43 surveys, 14 fewer than last year, reporting on 214 fall colonies. The TVBA response was the highest of all the clubs. Thank you.

**Overwintering losses of TVBA respondents =27 %**, the same level as last years Loss level was 13 percentage points lower than the 10-year average losses of 40% (statewide average =38%). Percent losses, determined by hive types were 21% Langstroth 8 and 23% for Langstroth 10 frames hives (Statewide 8-year average loss of 8 frame hives is 36% and Langstroth 10 frame hives=40%). Nuc losses (9 total) were 41% (statewide the average is 50). Of six Top bar hives three were lost (similar to statewide average). The single Warré hive did not survive (average statewide is 43% loss level) Two of the other hive types was a swarm (it did not survive) and a double 4 frame hive (it did survive). – the remaining three were not further identified.

### Winter Honeybee Loss % by Hive Type, 2021-22

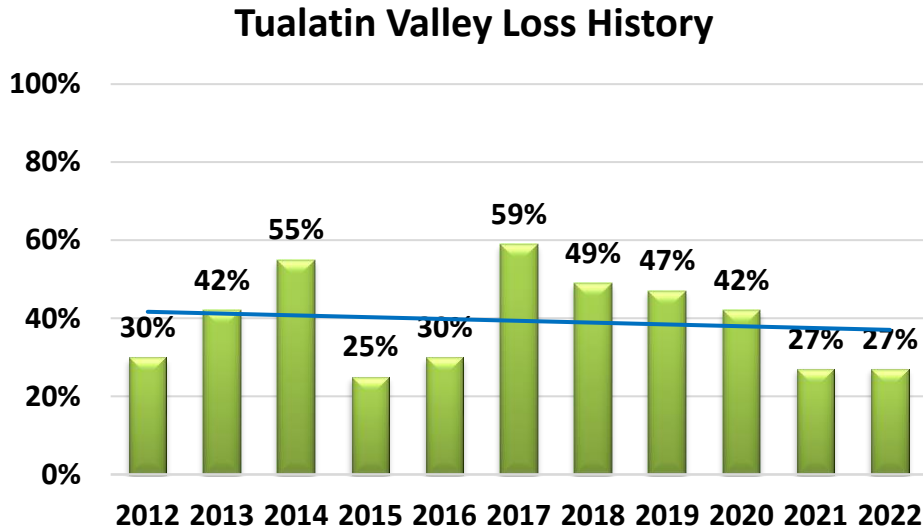


Fall	70	110	22	6	1	5
Spring	55	85	13	3	0	1

The attached figure below shows TVBA losses for past 11 years. Solid line is loss

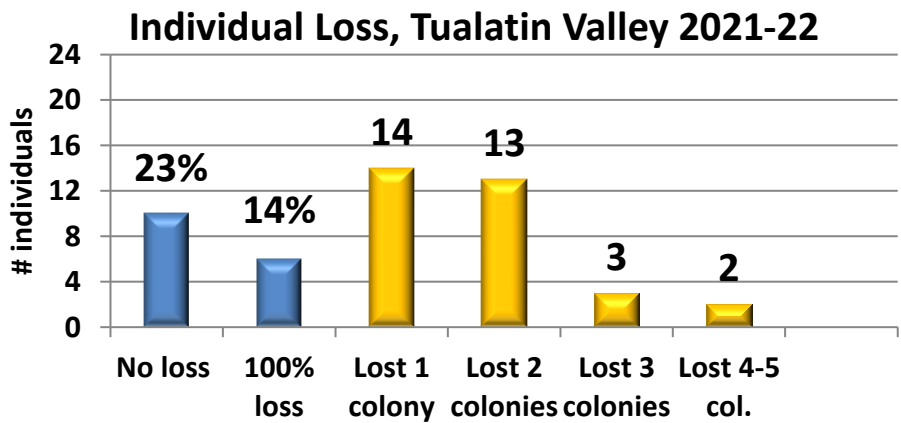
trend – with lower losses the 2-years, average losses have decreased to 39% and the trend line is downward.

**Figure 3**



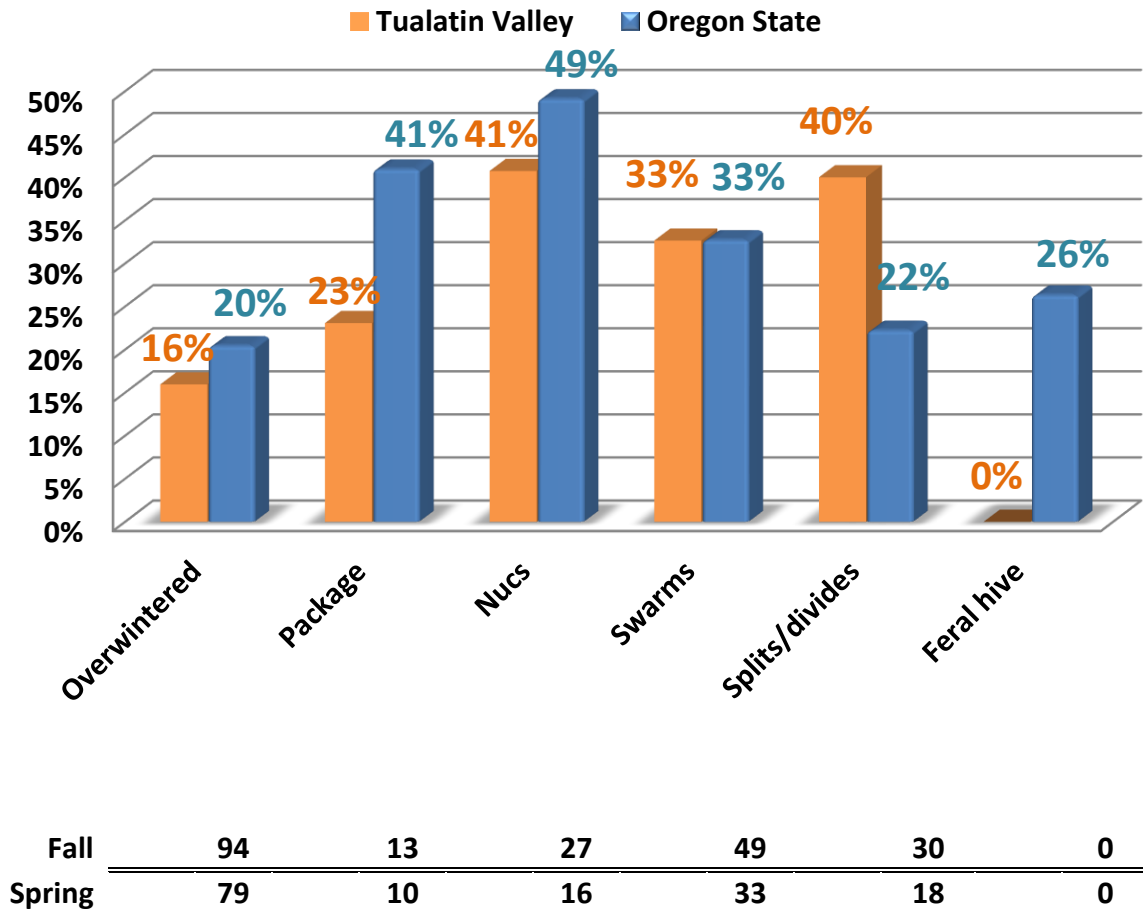
Not everyone had loss. In fact, 10 members reported NO LOSS (23% of survey respondents - total of 39 colonies) while only 6 respondents (14%) reported total winter loss of colonies (but this was only 9 colonies total). Fourteen individuals lost one colony, individuals lost 2 colonies followed by 3 individuals losing three, one lost four colonies and one lost 5 colonies. Highest loss by one individual was 5 colonies.

**Figure 4**



The survey also asked for hive loss by hive origination. The members reported 16% loss of previously overwintered colonies (compared to 20% statewide), 23% loss of the 13 packages (three did one survive) and 41% loss of nucs (16 survivors of 27 hived. Swarm loses were same as statewide (1/3<sup>rd</sup>), with splits having heavy loss by TVBA members, double that of statewide beekeepers.

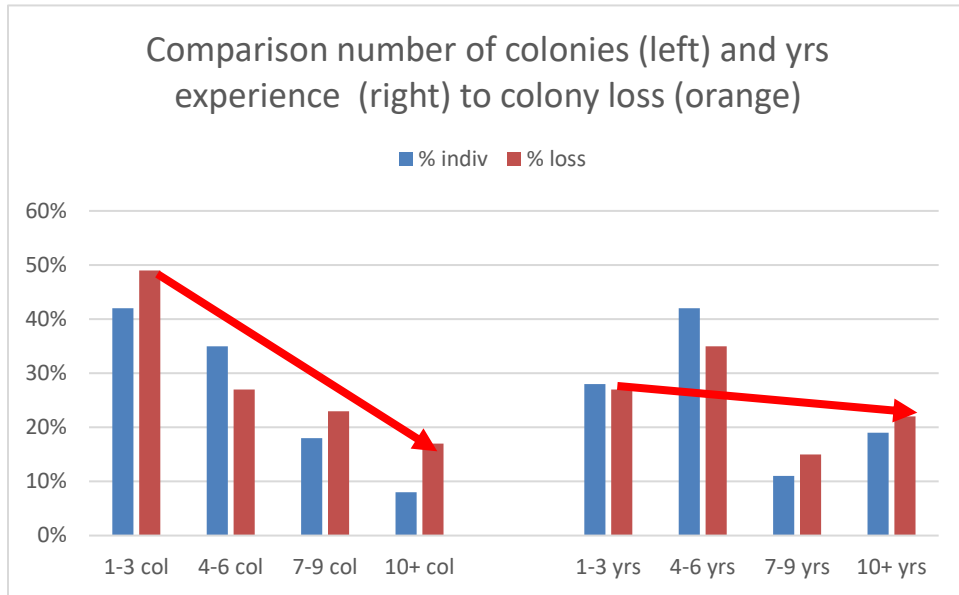
**Figure 5 Winter Honeybee Loss % by Origination, 2021-22**



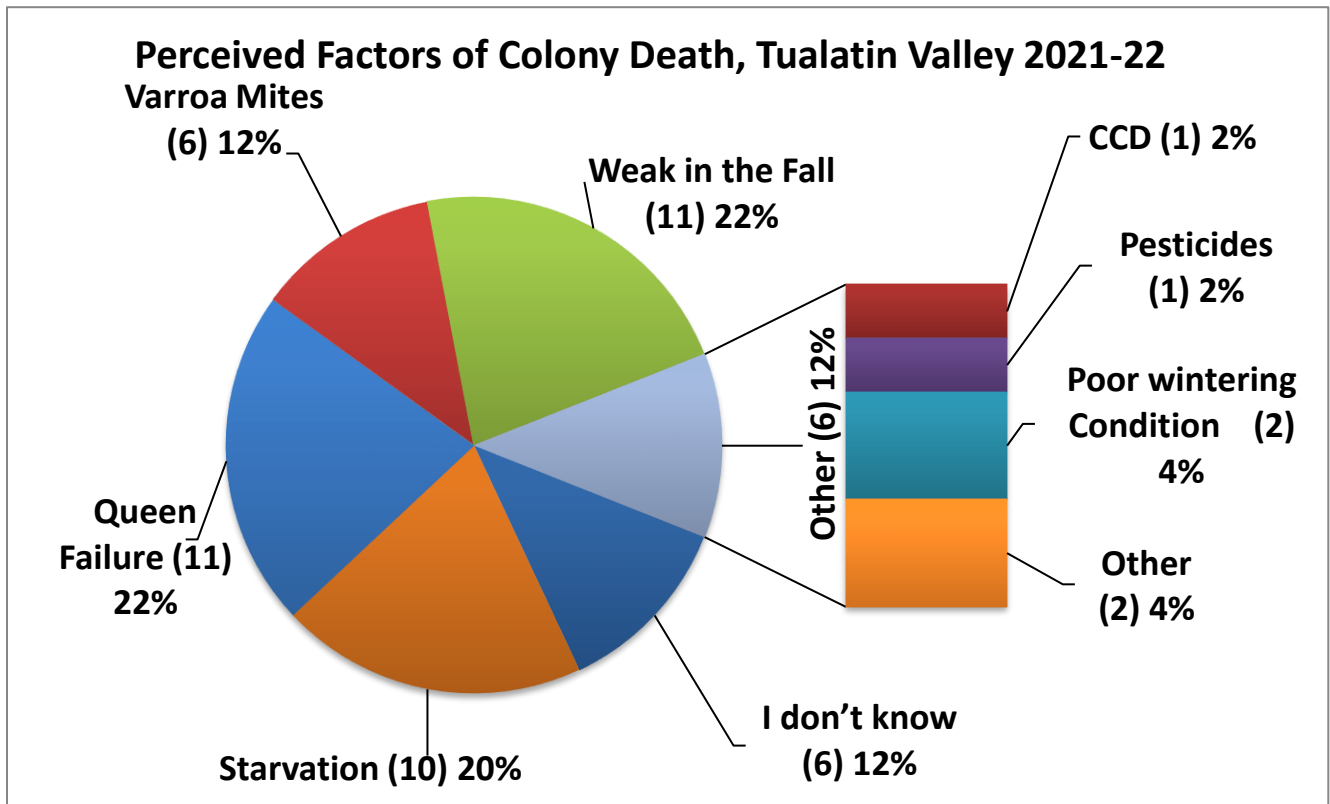
Typical of the statewide data, the TVBA respondents are largely new beekeepers. 18 of 43 TVBA respondents(42%) had 1 to 3 fall colonies, another 35% had 4 to 6 colonies while 8 respondents (19%) had 7 or 8 colonies and 4 individuals (9%) had 10-18 colonies– maximum number for any respondent was 18 colonies. As colony numbers increase percent of colony losses decrease (49% loss for those with 1-3 colonies while loss of those with 10+ was 17%.

The TVBA beekeepers are also typical of statewide in years experience. Twelve individuals had 1-3 years experience (loss level 27%), 18 had 4-6 years experience (loss level 35%), five had 7 to 9 years (loss level 15%) and 8 respondents had 10+ (22% loss level). Fifty years experience was the largest number of years experience. Colony losses did not decline with higher of experience (see Figure 6).

**Figure 6**



**Reasons for Colony Loss/Acceptable loss**



**Figure 7**

We asked of individuals that had colony loss to estimate what the likely reason(s) might have been, Multiple responses were permitted. Eleven individuals said queens (33% of those with loss, 22% of selections) of those having losses (recall that 10 individuals had no loss) and 11 individuals said weak in the fall closely followed by 10 individuals who said starvation (20% of selections). Six said Varroa mites (25% of individuals, 12% of total choices) the same number who indicated I do not know. See Figure 7 above.

When asked about an acceptable level of loss (acceptable not defined – discretion of individual respondent), four individuals (9%) said none. The greatest selection was 25 by 11 individuals. Twenty percent was the median. Four individuals said 50% loss was acceptable. See numbers below in table.

Acceptable Overwinter Loss per 43 Beekeepers in Tualatin Valley during 2021-22											
Loss level	5%	10%	15%	20%	25%	33%	50%	75%	100%	None	Other
#	3	7	2	9	11	3	4	0	0	4	0
%	7%	16%	5%	21%	26%	7%	9%	0%	0%	9%	0%

### Why do colonies die?

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

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 TVBA and OR 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:** TVBA survey respondents checked 128 feeding options = 3/individual (statewide it was 2.9/individual). Three individuals selected a single choice (they had a 11% loss), 11 indicated 2 (32% loss), 13 made 3 choices (median number – 34% loss), 11 individuals indicated 4 choices (22% loss) and 4 individuals had 5 selections – they had a 19% loss level. Percent colony losses are presented for feeding options with numbers of TVBA members indicating doing the management in ( ). Bar lengths of left of 27% (green dashed lines) indicate better than average survival while those to right had heavier than average losses. The one person doing nothing had total loss – but only had a single colony.

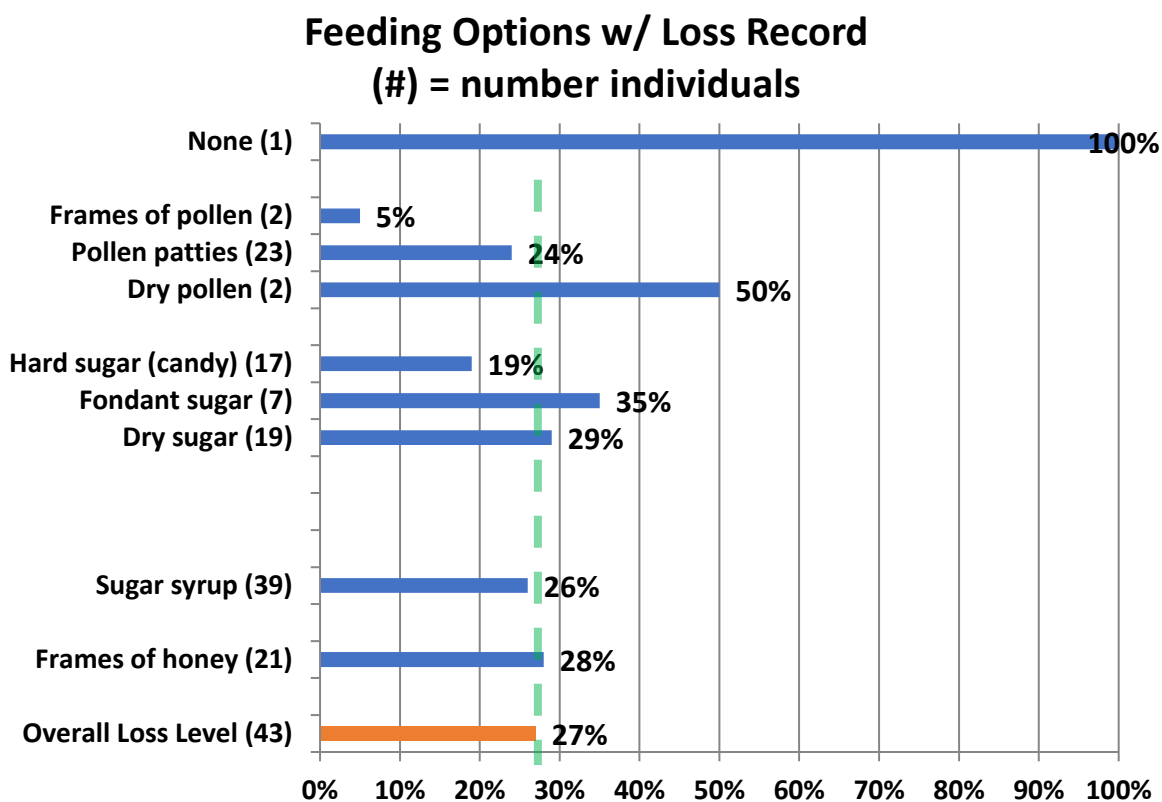


Figure 8

Sugar syrup and frame of honey feeders had average losses. Frames of pollen and a pollen patty feeders had better survival but the two dry pollen feeders (total of 4 colonies) lost ½ over winter. Statewide syrup feeders had experienced a 5-percentage point lower average loss level over the past 5 years. 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 five of six past winter seasons statewide; fondant feeders had better survival 3 of the 6 past winters while hard candy feeding individuals show better survival each year. For individuals feeding protein, the protein patty users statewide showed better survival 5 of 6; dry pollen feeders had better survival in three of the past six years, though losses for these three years were close to the overall yearly average.

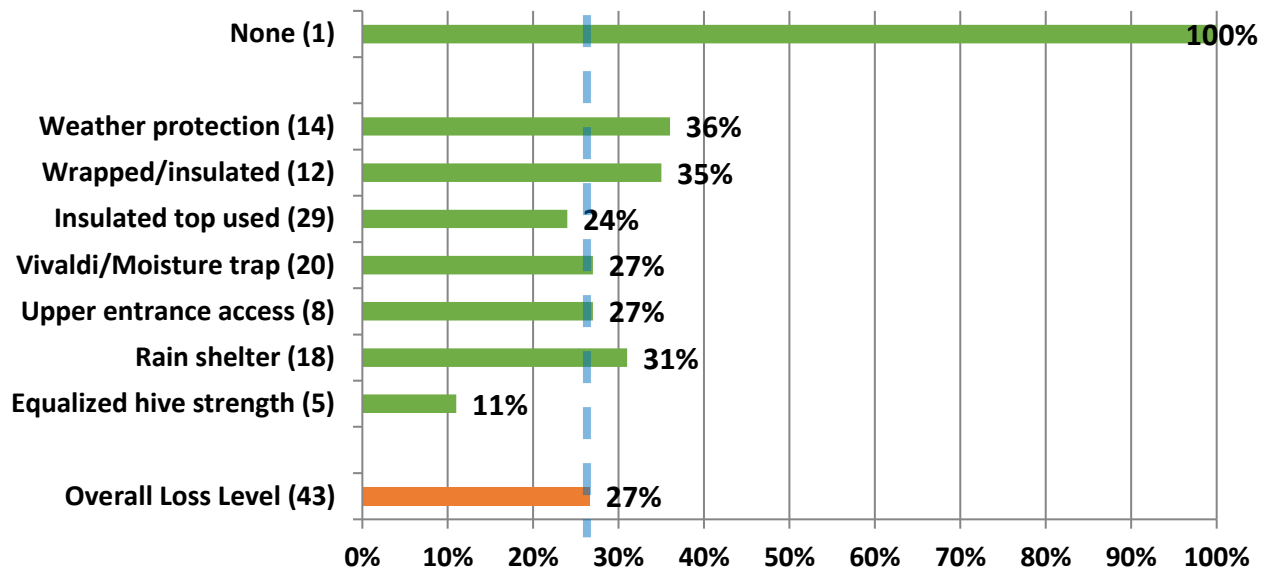
**WINTERING PRACTICES:** One TVBA individual reported doing no winterizing (same individual who did no wintering; they had loss level of 100% (but had only one colony); statewide over the past five years, individuals that did no winterizing practice (average 12% of individuals) averaged 41.5% loss compared to 39.2% overall average loss, only a 2.3 percentage point poorer survival rate. Multiple selections were possible and in fact the 42 TVBA members averaged 2.6/individual. Twelve individuals chose a single management and had a 24% loss level, nine chose 2 (36%) loss, 10 had 3 selections (19% loss), seven had 4 (26%) while the four individuals checking 5 had a 43% loss level. This was a strange distribution as usually more selections resulted in lowered losses.

The two most common wintering managements selected were use of a Vivaldi/moisture trap/quilt box at colony top (20 individuals, 48%) but it was at the average for TVBA total losses. Use of insulated top was selected by 29 individuals and they had a 5 percentage point gain in survival. The 5 individuals equalizing hive strength had the best winter survival now two years in a row.

Over the past five years individuals that did no winterizing practice (average 12% of individuals) averaged 41.5% loss compared to 39.2% overall average loss of last 5 years, only a 2.3 percentage point poorer survival rate. Only 2 winterizing managements improved survival all 5 years – wrapping (28.2% lost rate, a 11-percentage point improvement) and upper insulation (30.8%, an 8.4-percentage point improvement). Vivaldi/quilt box, upper entrance (most Vivaldi boards have an upper entrance built into the equipment) and wind/weather protection had only slightly improved survival rates and were not noted in all past 5 years. Equalizing hive strength was the best management to improve survival the past two years, although few individuals indicated they did this management.

## Figure 9

**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 insure healthy bees. TVBA beekeepers had 111 responses 2.9/individual. Forty-one individuals statewide including 5 TVBA individuals (12%) said they

**Sanitation Practice Options w/ Loss Record**  
 (#) = number individuals

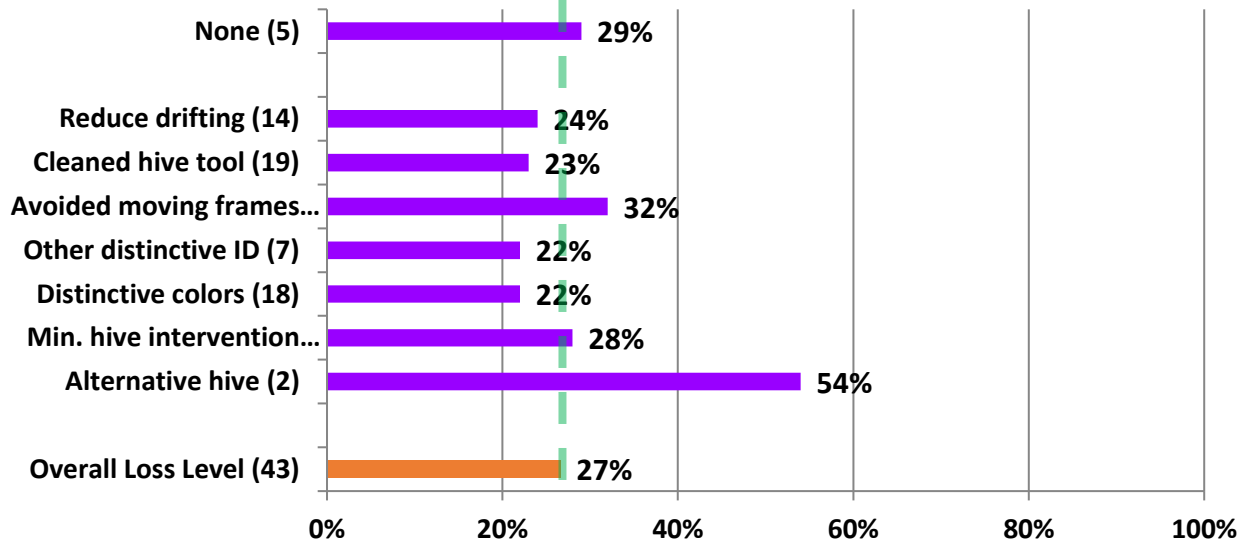


Figure 10



did not practice any of the 6 offered alternatives (had loss rate of 29%). Loss rate statewide was 72%; over past four-years those indicating doing none had a 52.5% percent loss rate, 10+ percentage points higher than the average statewide loss rate of 42% over the same time period. Seven TVBA members had 1 selection (loss rate 26%), 10 made 2 choices (18% loss), 9 made 3 choices (35% loss), five individuals had 4 (50% loss) and six had 5 or 6 selections; they had a 18% lose rate.

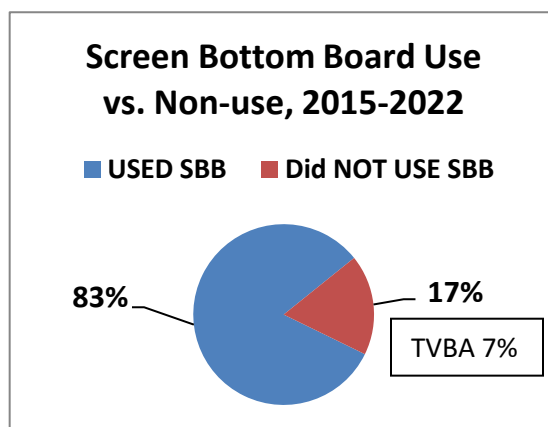
Minimal hive intervention (25 individuals) was the most common option selected, as it has been for the last 4 years. It could be argued that less intervention might mean reduced opportunity to compromise bee sanitation efforts of the bees themselves and that excessive inspections/ manipulations can potentially interfere with what the bees are doing to stay healthy. This option however did not demonstrate improved winter survival; the loss rate for this management statewide the past 5 years was 45.1%, 7.8 percentage points above the average 5-year loss of 37.3% loss rate compared to those individuals that did nothing.

Avoiding moving frames and reducing drifting were the two sanitation choices that demonstrated better average survival statewide the past five years – 5-year loss rate was 34.8% for not moving frames which is 2.5 percentage points better survival (this year it was 5 percentage points poorer survival for TVBA members) and 32.2% for reducing drifting a 5 percentage point improvement in survival. Other distinctive measures to reduce drifting had a 5 point improvement in survival this year; it has been a good sanitation in past years as well. Overall sanitation appears to be relatively minor toward improving survival.

## SCREEN BOTTOM BOARDS (SBB)

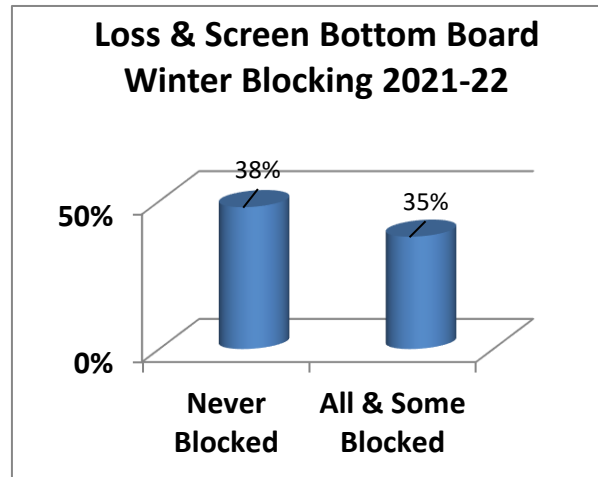
Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In this recent survey 3 individuals (7%) said they did not use screen bottom boards. Average non-use statewide is 17%, vs 83% use, on some or all colonies over the 7-year period. Figure 11 right.

This past overwintering season, the 3 non-SBB users lost 6 of 9 fall colonies for 67% loss. The TVBA beekeepers using SBB on all or some of their colonies had 25% loss. This is a significant difference. However, examining the six-year average of SBB use statewide, loss level of the 83% using SBB on all or some 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, 71% (29 TVBA individuals) , said they always blocked SBB during winter; 4 individuals said they blocked some of the SBBs and 8 individuals (20%) said they never blocked. Those who never blocked had 31% loss while those who did always (24%) or sometimes had a 29% loss rate. Statewide those who blocked always or sometimes had a slight advantage **in favor of closing the SBB over the winter period to improve survival.** Figure 12 right.



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. This was especially true for TVBA members this past winter.

**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, 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 colonies are in an exposed site, providing some extra wind/weather protection and wrapping/insulating colonies might improve survival.

Feeding, a common management, appears to be of some help 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 yields lower losses for some individuals. Such feeding management is of great value for spring development and/or development of new/weaker colonies as well as for colony rearing of bees to overwinter. 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. To determine if feeding might help monitor what sources your bees are visiting and manage accordingly.

Winterizing measures that apparently helped lower losses for some statewide beekeepers were a moisture trap (Vivaldi board or quilt box) and upper insulation and 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 2021 year and/or overwinter 2021-22, 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. Statewide 163 individual respondents (66%), seven percentage points below the previous year, said they monitored all their hives. Losses of those individuals monitoring was 37%. Forty-five individuals (15%) reported no monitoring; they had a higher loss rate of 42% loss. 38 individuals reported monitoring some of their colonies; they had a 27% loss. Statewide averages are shown in table below.

	<b>ALL Colonies Monitored % individuals</b>	<b>% loss</b>	<b>SOME Colonies Monitored % individuals</b>	<b>% loss</b>	<b>No colonies Monitored % individuals</b>	<b>% loss</b>
2022	66%	37%	15%	27%	18%	42%
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%
6 year loss ave		39%		36%		47%

Monitoring for TVBA was 29 individuals (67%), same percentage as statewide monitored all their colonies – they had a 25% loss level. Seven monitored some with 41% loss. However, the 7 (16%) that did no monitoring had only a 22% loss, reverse of statewide average last year and for the 6 previous years. Monitoring alone has been shown to improve winter survival although TVBA numbers do not support that this year.

Individuals indicated use of 1.9 monitoring techniques on average. In total choices, in order of popularity of use, 20 individuals used Sticky boards, 62,5% of 32 individuals who did some or all monitoring of colonies. Twenty-three individuals used alcohol wash to monitor (72% of total number of

individuals who monitored), and only 7 individuals (22% of individuals) used powdered sugar monitoring; visual inspection of drones (5 individuals) and visual inspection of adults (10 individuals) were also indicated., the use of sticky boards has decreased in use and alcohol wash has increased in use.

Whatever technique used most sampling to monitor mites was done in July – September, as might be expected since mite numbers change most quickly during these months and sampling results key control decisions. Figure 13 below illustrates monthly sampling of the five methods from last year.

### Monthly Monitoring of Tualatin Valley Beekeepers 2020-21

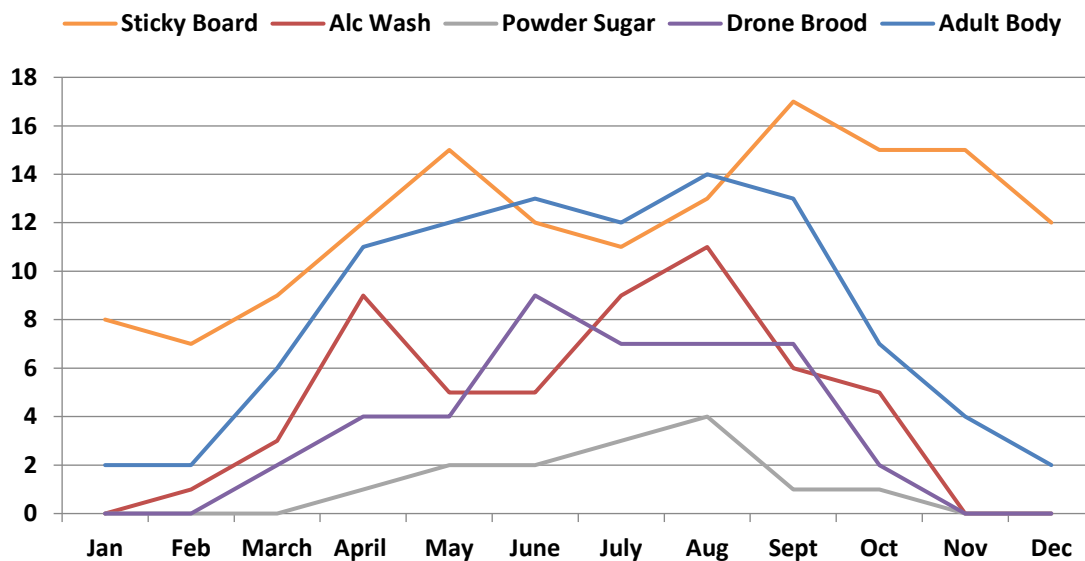


Figure 13

The most common sampling of respondents is both pre- and post-treatment (18 individuals - 42%). Treating but not sampling was practiced by 13 individuals (13 individuals – 30%). Five individuals said they neither sampled nor treated, 1 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 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 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 challenging 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

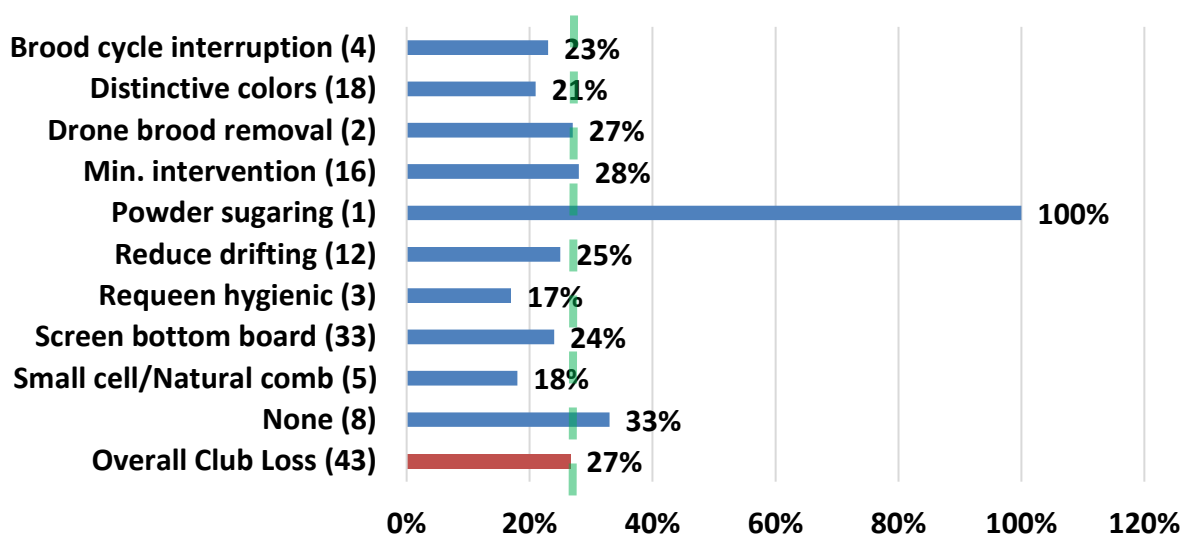
The survey asked about non-chemical mite treatments and also about use of chemicals for mite control. Eight individuals (19%) said they did not employ a non-chemical mite control and six individuals (14%) did not use a chemical control. See Figure 20. Those 7 individuals who did not use a non-chemical treatment reported a 33% winter loss, 5 percentage points greater than average TVBA loss while those who did not use a chemical control lost 29% of their colonies. The individual options chosen for non-chemical control are discussed below.

**Non-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey (+ other

**Figure 14**

#### Loss Rate using Non-Chemical Mite Control

(#) = number individuals



category,) 7 individuals (20%) used one method – all screen bottom boards (28% loss), 12 used two (31% loss, the median number, 8 used three (27% loss), 5 used 4 (21% loss) and 3 used 6 (17% loss).

Use of screened bottom board was listed by 33 individuals (94% of total respondents who reported using a non-chemical control). Their loss was 24%, 3 percentage points below average for total losses by TVBA members. The remaining selections, with the exception of powder sugaring (a single individual who lost their only colony) all improved or matched overall survival. Requeening with hygienic bees and small cell (2 and 3 individuals respectively showed the best survival). The use of the selections are shown in Figure 20; 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.

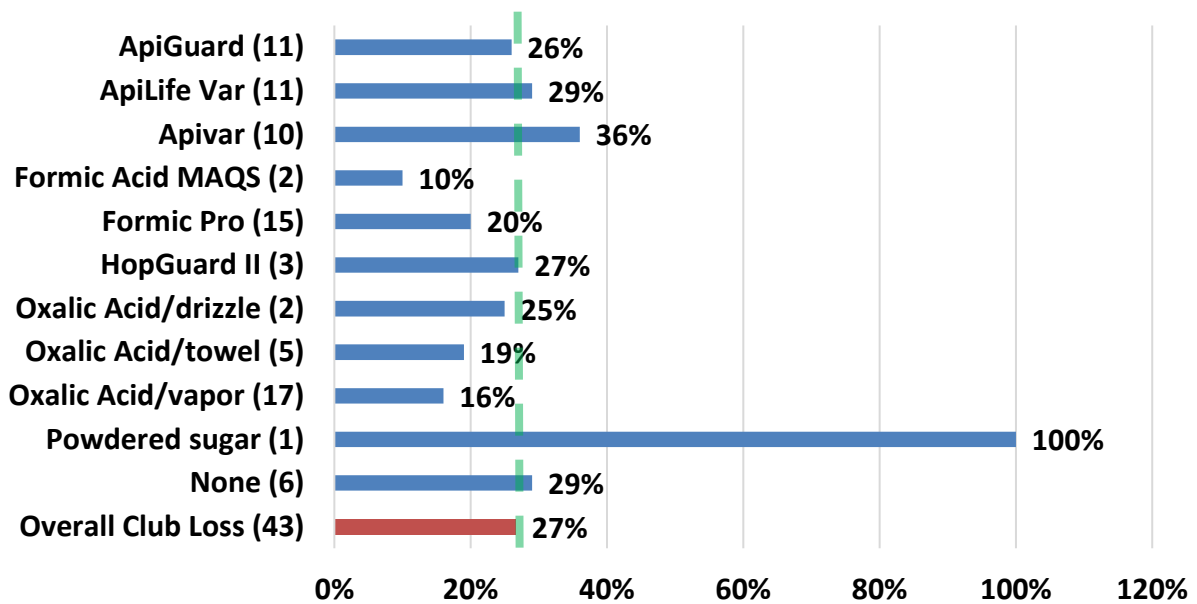
38 individuals (76% of total respondents) listed use of screened bottom board. Their loss was 32%, 5 percentage points above average for TVBA. The remaining selections, with the exception of powder sugaring (a single individual) and requeening with hygienic queens (2 individuals) all improved survival. Brood cycle interruption (11 individuals) showed the best survival (12%). The use of the selections are shown in Figure 14; 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.

Three of the non-chemical alternatives have demonstrated reduced losses over past 6 years. Reducing drifting such as spreading colonies (31% loss average for 4 years – question not asked in 2016-17 survey) and brood cycle break (34.5% average) have consistently year after year demonstrated somewhat better survival than average loss (37% average loss last 4 years and 39% loss last 6 years respectively 37%). Different colony colors in apiary 37.7% average loss and drone brood removal (38.7% average loss) were just slightly better than average 6-year loss (39%). Some non-chemical control alternatives demonstrate an advantage on one or two years (such as small cell/natural comb this past season) but overall show no improvement.

**Chemical Control:** For mite chemical control, 6 individuals (18% of total respondents) used NO chemical treatment. They had a loss level of 29%. Those using chemicals used at rate of 2.1/individual. Twelve individuals used one chemical (had 53% loss level), 16 used two (22% loss level), four used 3 (11% loss) and five used 4 or 5 (28%). Loss levels are frequently observed to decline with heavier usage statewide but not this year for TVBA.

### Figure 16

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



Eleven respondents (30%) indicated they used ApiLifeVar of only 19 using it statewide. It provided 2 percentage point difference in survival for TVBA and for statewide users. In the past this has proven to be more effective. Oxalic acid vapor was used by 17 individuals (49%) and it gave a 7-percentage point improvement over average survival. So did the Oxalic acid other application (using towel or sponge) but drizzle (used by just 2 individuals) was not as effective. Formic acid provided better survival for TVBA members (10% loss level for 2 individuals using MAGs and 20% loss level for the 15 individuals using Formic Pro).

Consistently the last 5 years five different chemicals have helped beekeepers improve survival. The essential oil Apiguard (average 6-year loss level 30.5%), Apivar (31.2% average 6-year loss level), Oxalic acid vaporization (31.3% average loss level over last 6 years – in contrast the oxalic acid drizzle average of last 5 years is 37.8% loss level which is 0.4 percentage points above the 5-year average of 37.4%), ApiLifeVar (34.4% average loss level over last six years) and formic acid MAGS formulation 39.4% loss level the last 6 years. Average loss level has been 39.2% the last 6 years. The formic acid extended OAE absorbing oxalic acid and glycerin into sponges had better than average survival. Formic Pro has steadily increased in use – it looks very promising at a 25.3% loss level the past three years (when average loss was 36.5%).

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 17 for last year. Further review is needed to determine if the timing of treatments was more

effective than at other times for the various chemicals.

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

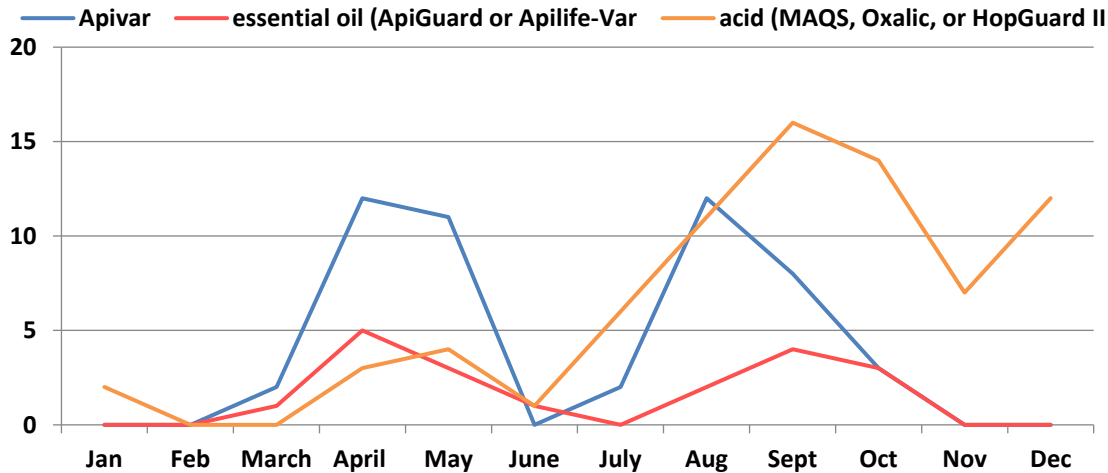
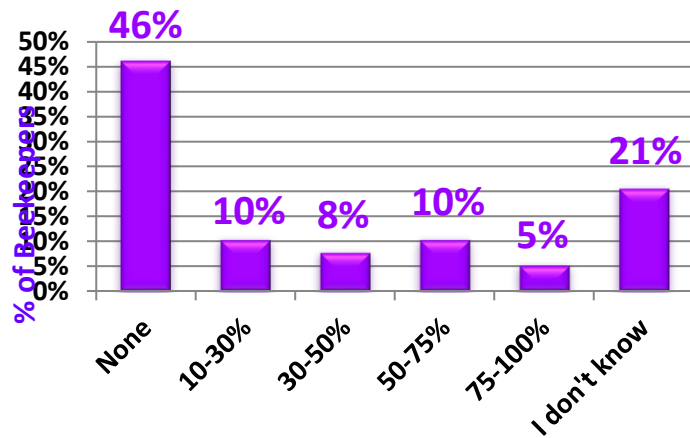


Figure 17

### 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. Fourteen individuals indicated queen problems, 18 said none (rest did not know).



% of Colonies that Died from 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. Thirteen (30%), only 4 percentage points greater than last year, said yes. The related question then was ‘were your hives requeened in any form?’ to



which 44% (19 individuals) said yes, 35% (15 individuals) said no and the remainder that responded (9 individuals) said '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" permitted multiple responses. Ten respondents indicated their bees were requeened with a mated queen, 2 used a virgin queen and 3 said via queen cells. Eight individuals said they split (divided) hives, and equal number said the bees superseded (2) or swarmed (6 individuals).

### **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 (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 July 2022