2017-18 PUB Winter Loss by Dewey M. Caron and Jenai Fitzpatrick

Overwintering losses of small scale Oregon backyard beekeepers were 38%, down 10 percentage points in 2017-2018, compared with the previous season loss (48%). A total of 303 responses, up 7% from 282 OR responses last year, were analyzed with the 2017-2018 statewide survey. Information on winter losses and several managements related to bee health were obtained with an electronic honey bee survey instrument developed within the PUB bee group wwwpnwhoneybeesurvey.com.

During the 2017-2018 overwintering period, 67 PUB members, up by 10 individuals (16%) from the previous year were utilized. Once again the highest response of all the OR and WA clubs was obtained from PUB (see reports on www.pnwhoneyeesurvey.com website).

Total overwintering losses of PUB respondents was 55%, which was 17 percentage points (32%) above the statewide loss of 38% (database of 303 OR backyarders). This loss level was 6.6 percentage points above the previous year and 2.6 percentage points higher compared to the four previous seasons (See Figure 2). PUB loss rate of 55% was highest of all other OR associations with 10 or more responses, as has been case in previous four of five survey years.

PUB losses were 55% of both Langstroth 8 and 10 frames hives; losses of top bar hives and "other" hive types were 70% and 71% respectively. Langstroth moveable frame hives (8/10 frame and 5 frame nucs) represented 82% of hives maintained; 20 fall Top bar hive (53% of total reported in state) losses (70%) were higher than statewide while losses of 8 fall Warré hive

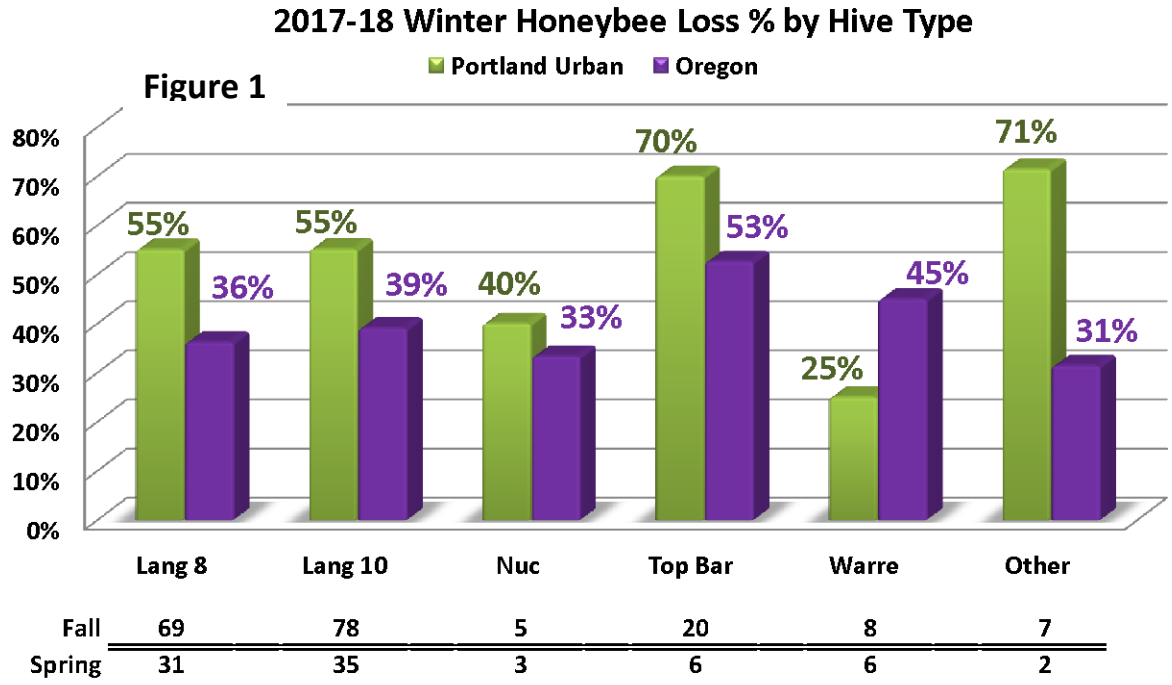


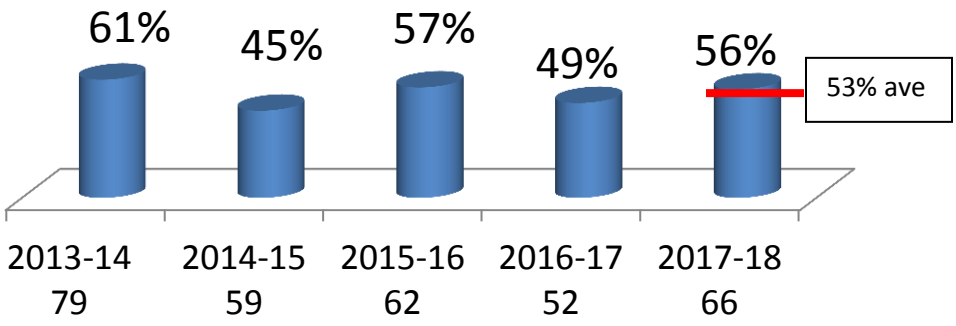
Figure 1

(40% of those reported in state) was lower than statewide. Seven "other" hives of PUB

members included insulated and tree hives – 18% of hive types reported by PUB members were alternative hives.

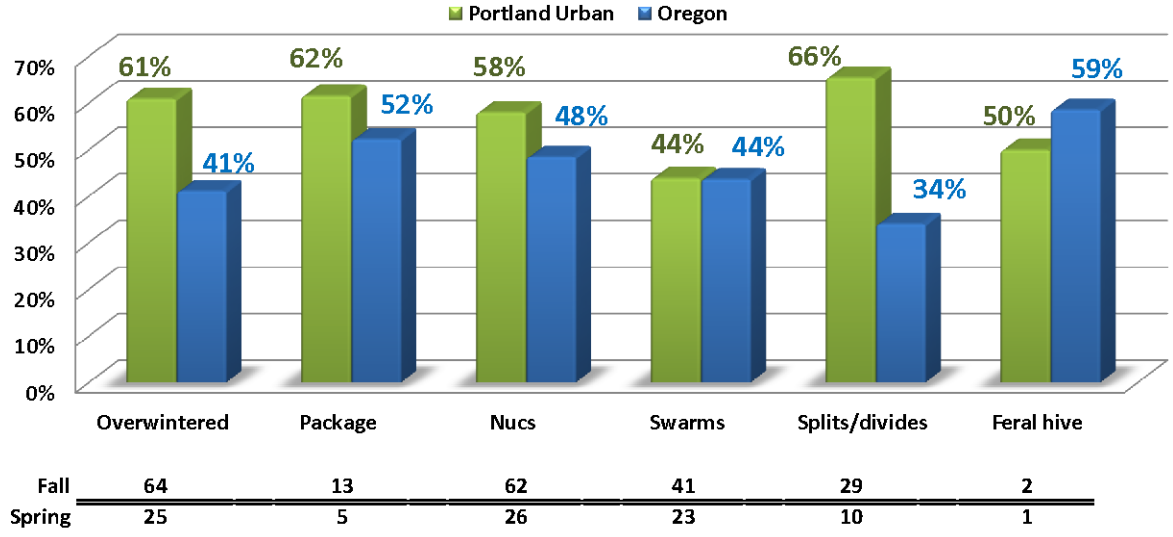
PUB losses this past winter (56%) were 3 percentage points higher than the average loss level for the four previous seasons (See Figure 2). Number of surveys returned (66 individual returns) was 2nd highest of past 5 years (number of returns below year in Figure 2).

Figure 2. PUB Member overwinter losses 2014-2018; numbers on lower line = # respondents

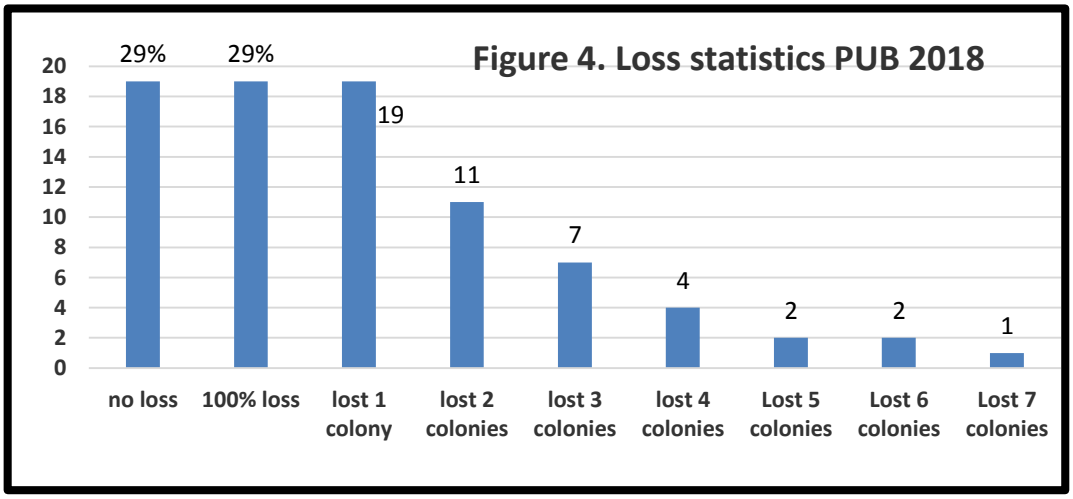


The survey also asked for **loss by hive origination**. Twenty five of the 64 overwintered PUB member colonies were alive in the spring (61% loss rate), one-third higher loss rate compared to statewide (41%). PUB member respondents reported highest losses for packages (62%) and splits (66%); nuc losses (58%) were similar to overwintered colony losses, with swarm losses the same as statewide (44%). One of two feral hives were lost. See Figure 3.

Figure 3 **2017-18 Winter Honeybee Loss % by Origination**



Over 1/3rd PUB respondents (fall colony numbers) keep 1, 2 or 3 colonies (35.5%); the largest number was 31. Not everyone had loss. Nineteen **PUB individuals (29%) reported total winter** survival while the same number had total colony loss. Nineteen individuals lost one colony (41% of individuals with loss); largest loss was 7 colonies. See Figure 4.



Ten individuals (15%) had two apiary locations three had 3 and one had four. Six individuals reported they moved bees during the year; three moved a short distance, one due to neighbor issues, one moved for better location and one moved new hive to Oregon from California.

Forty-five (71%) PUB respondents said they had a mentor available as they were learning beekeeping, two percent points greater than the 69% statewide response and 10 percentage points above the percent indicated last year.

PUB survey respondents reported a **range of beekeeping experience**. Thirty five individuals (55%) had 1 or 2 or 3 years of experience. Twenty-one individuals (33%) had 4 to 6 years, three (10.5%) had 7 to 9 years and five had from 13 to 33 years of experience, the largest number. Three years' experience was the greatest numeral response (14 individuals) and the median was 3, the same as the statewide response.

Reason for loss: We asked individuals that had colony loss to estimate what the reason might have been for their colony losses. Multiple responses were permitted. Of 44 PUB member responses (85 total choices - 1.9/individual), 18 individuals selected varroa mites (41% of respondent choice), 10 individuals said don't know, 11 individuals indicated weak in the fall and queen failure (25% of respondent choice each), 7 chose yellow jackets and 5 poor wintering and CCD each. Other reasons indicated included pesticides and robbing (3 each), starvation, beekeeping error and too much moisture (2 each) and choices indicated by one individual each were flooding, too little honey, bear, rodent, absconding and cold snap.

Acceptable loss: Survey respondents were asked reason for loss. Selections shown below in table.

	Zero	5%	10%	15%	20%	25%	33%	50%	75%	100%
	10	3	2	3	7	11	10	9	2	3

There is no easy way to verify reason(s) for colony loss nor an acceptable loss level. 50% percent of PUB beekeepers felt 25% or less was acceptable while statewide 15% loss was the median selection. Colonies in the same apiary may die for different reasons. Doing a dead hive examination is the first step in seeking to attempt to resolve why we experience such heavy losses. The PUB apiary at Zenger lost their Warré hive before the fall and both Top Bar hives did not survive winter. I did a Dead hive examination workshop April 15th; one colony died in the fall, likely from BEE PMS and the other died between March 15 and April 15 from starvation. See this report on the PUB website or elsewhere under reports here in the PNW website.

More attention to colony strength and possibility of mitigating winter starvation will help reduce some of the losses. Effectively controlling varroa mites will definitely help reduce losses – see the analysis of survival following management practices in following section and in report on statewide losses.

Why colonies die? Major factors in colony loss are thought to be mites and their enhancement of viruses especially DWV (deformed wing virus), pesticides, declining nutritional adequacy/forage and diseases, especially viruses and Nosema. 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 reasons, colonies are not as healthy as they should be.

Management selections and losses

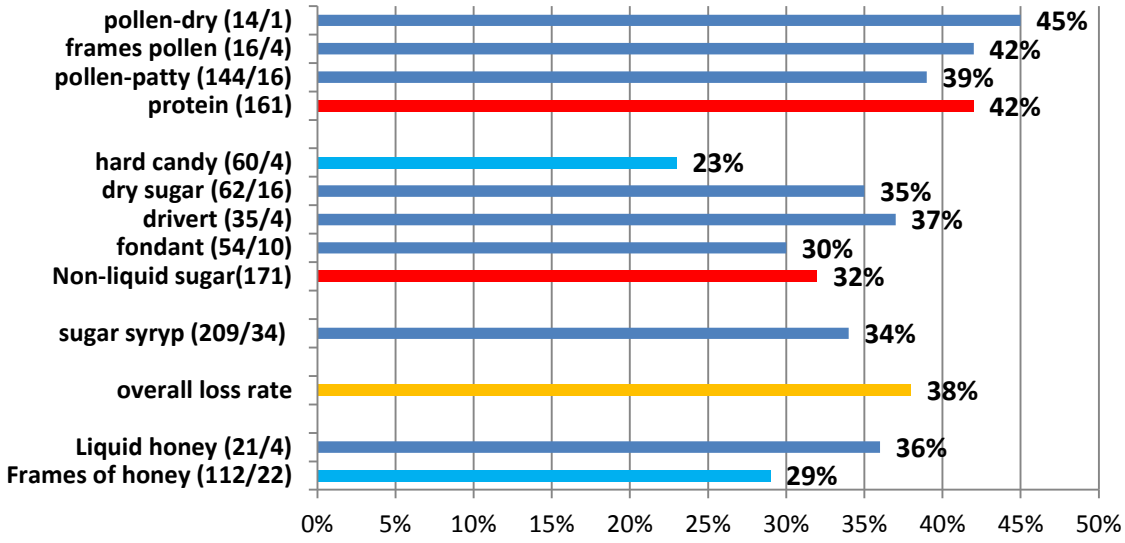
The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring and both techniques (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls used. Individuals could check none or more than one response; most PUB and OR beekeepers most often do not do just one thing/management to their colony (ies) to control mites toward improving overwintering success.

PUB survey respondents checked 115 feeding options = 2.4/individual, only 0.1 less per individuals compared to statewide. Nine individuals (8%) selected a single choice, 19 individuals

had 2 choices, (the medium number), 17 had 3 choices, 3 individuals used 4 choices and 1 had 5. The last 4 individuals (4 & 5 choices) had a 54% loss level, just 2 percentage points difference than overall PUB member loss. Fourteen individuals said they did NO FEEDING. They had a 55% loss level. These both illustrate that feeding management is not a strong determinant for overwintering success

The results of individuals statewide and within PUB, numbers in ( ), feeding compared to loss level statewide is shown in Figure 7. Statewide, 209 individuals said they used sugar syrup. They had a 34% loss rate, slightly lower than the overall average of Oregon backyard beekeeper losses of 38%. Thirty four PUB individuals (71%) indicated they fed sugar syrup. Slightly more than ½ this number of statewide respondents (112 individuals), said they fed frames of honey – their lost level (29%) was 9 percentage points better than the overall loss rate; 22 PUB individuals fed frames of honey. The 21 individuals who fed liquid honey, 4 of them PUB beekeepers, had 36% loss level, similar to overall losses.

Figure 5. Feeding bees (numberstatewide/PUB) w/ corresponding % loss rate statewide, OR Beekeepers, 2018



Statewide Individuals that fed non-liquid sugar collectively had a lower loss level of 32%. Most useful would appear to be hard candy (60 individuals said they supplied their bees with hard candy and had 23% winter losses) and feeding of fondant sugar (54 individuals feeding fondant had a 30% loss level). Among PUB members 16 individuals fed dry sugar, 10 fed fondant and 4 hard candy.

Feeding of protein did not seem to help lower winter survival this past season (but there might be other good reasons for supplementing protein in bee colonies). Statewide, all 3

feeding options exhibited losses higher than overall losses. Four PUB members fed frames of pollen, 16 fed pollen patties and 1 fed dry pollen.

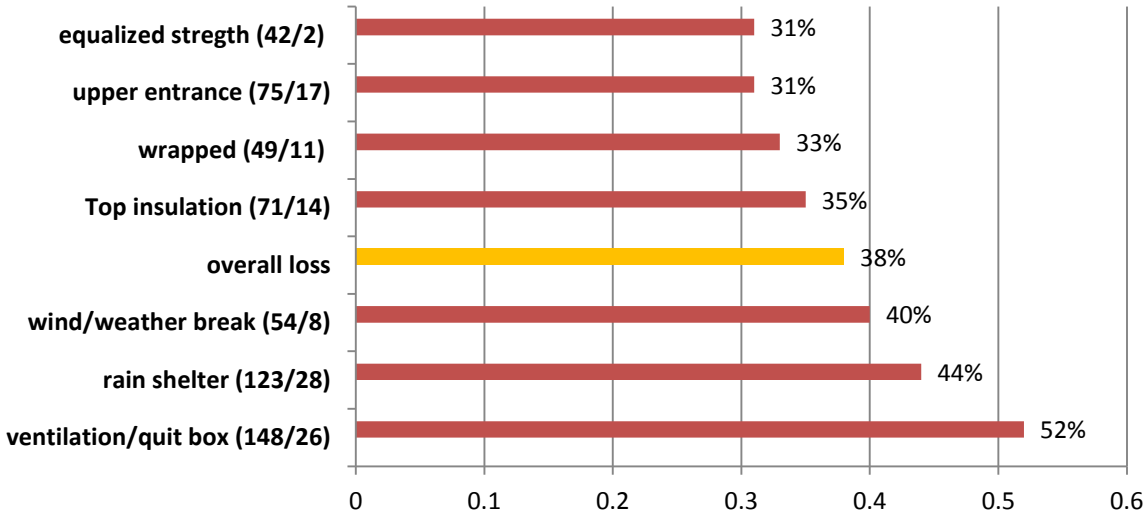
WINTERING PRACTICES: Five PUB individuals (9%) were among the thirty seven (15%) individual statewide respondents indicating none of the wintering practices was done; Statewide individuals doing none of the winterizing managements had a 43.5% winter loss compared to overall of 38% while the 5 PUB members had 43% winter loss compared to overall PUB member losses of 55%

Statewide there were 588 responses from OR beekeepers on wintering management practices (more than one option could be chosen). PUB beekeepers had 108 choices (2.0/individual which was 0.7 below statewide). For those PUB beekeepers indicating some managements, 10 did one single thing (20%), 26 did 2 (which was the medium), 6 did three and 7 did 4. Those PUB members indicating 4 managements had 52% loss level. This number and the 43% loss level of those doing nothing shows how winterizing, like feeding, is not a strong determinant of overwintering success.

The two most common wintering managements selected was ventilation/use of a quilt box at colony top (148 individuals statewide and 26 PUB) and use of a rain shelter (123 individuals statewide, 28 PUB respondents). Figure 8 shows number of individual choices for statewide and PB members in (/) and percent loss of each selection statewide. Upper entrance and equalizing hive strength were the 2 selections that had lowest losses and those who wrapped also showed higher survivorship (33%) compared to overall loss rate. For PUB individuals, 17 used upper entrance, 2 equalized hive strength and 11 indicated they wrapped colonies

Combining an upper entrance, insulation at top and a ventilation board (alone or in combinations with other managements) users did have a slightly lower winter loss rate last year. The variety of indicated choices of these wintering selections demonstrates that OR and PUB backyard beekeepers are taking extra measures to help colonies survive winter conditions.

Figure 6. Winter managements, OR Beekeepers 2018.

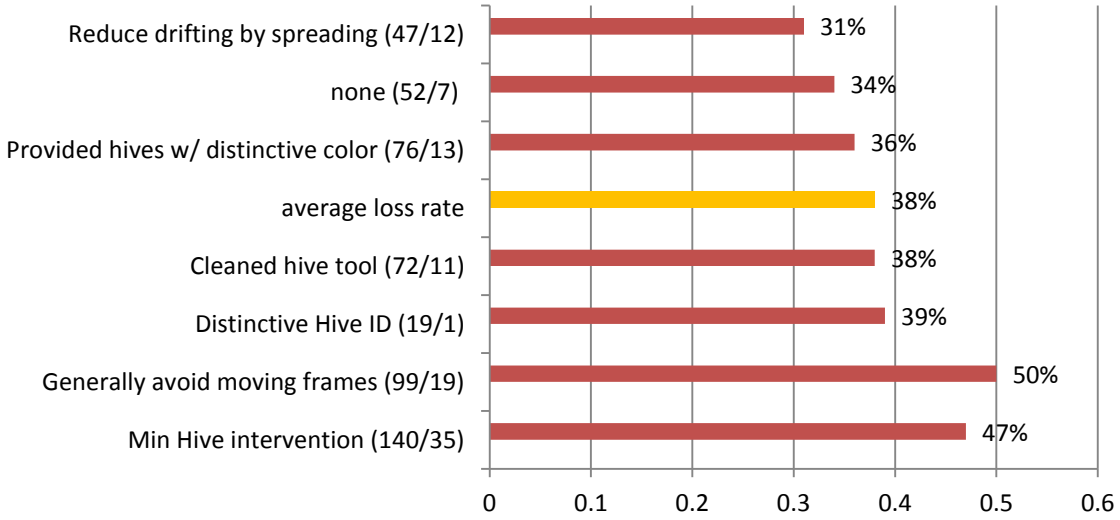


SANITATION PRACTICES: It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We can do more basic sanitary practices to help insure healthy bees. We received 525 responses for this survey question statewide, 54 were PUB member responses. Fifty two individuals statewide (22%) and 7 among PUB (10%) said they did not practice any of the 6 offered alternatives. Loss rate statewide (34%) was slightly less than the overall loss rate of 38%; for PUB respondents loss rate was 65%, 10 percentage points above the overall rate. Fourteen PUB members had 1 selection, 12 made 2 choices, 14 selected 3 managements and 2 had 4 choices. Statewide there were 2.1 selections per individual; for PUB it was 1.7 selections/individual.

Minimal hive intervention (138 individuals, 35 of them PUB beekeepers) was the most common option selected. 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 improve winter survival, the loss rate for this group statewide was 47%. Last year it also did not show better survival. The management of generally avoiding moving frames also did not seem to reduce losses and in fact showed the highest loss rate statewide at 50%; 19 PUB individuals indicated this management.

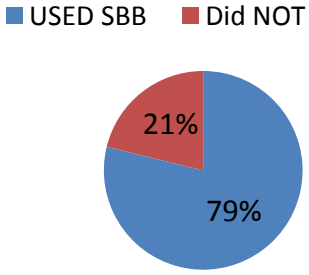
The two sanitation choices that did seem to improve survival was reduce drifting by spreading colonies out and providing hives with distinctive ID /doing other hive ID measures. For PUB respondents, 12 did managements to reduce drifting and 1 did something to provide distinctive ID. Last year providing hives with distinctive colors showed slightly lower loss rate. See Figure 7. Number in (/) is number statewide/number PUB individuals.

Figure 7. Sanitation measures (/)= # individuals statewide & PUB, bar length = 2018 loss %, statewide OR Beekeepers



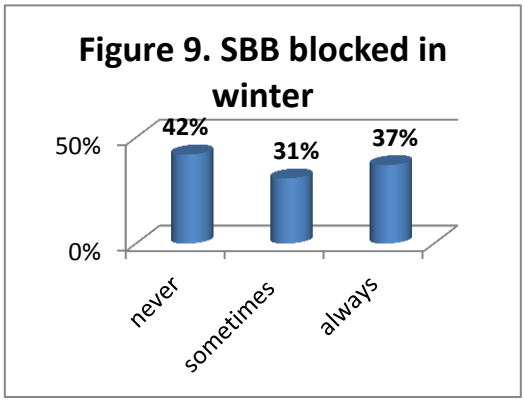
SCREEN BOTTOM BOARDS: Although many beekeepers use SBB to control varroa, BIP and PNW surveys clearly point out they are not a very effective varroa mite control tool. In this recent survey 63 individuals (20%) statewide said they did not use screen bottom boards of which 12 (23%) were TVBA members. In 4 PNW survey years, 21**% said they did not use SBB and 79% did use SBB on some or all of their colonies.** See Figure to left. The loss rate for the 80% (77% in PUB) who used SBB on some or all of their colonies, was 38% statewide, one percentage point better than the non-users (39%). Figure 8.

Figure 8. 4 year average % use vs non-use SBB



This one percentage point difference means that in the PNW surveys there have been differences of 1, 2 and 13.4 percentage points larger (3 of 4 years) i.e. better survival, and for

the fourth year 8 percentage points lower survival. **The four year average of SBB use, 41.3% loss level of those using SBB on all or some of their colonies and 43.4% for those not using SBB (a 5% positive gain), illustrates how they are very minor in improving overwinter survival.**



The survey asked if the SBB was left open (always response) or blocked during winter. This past season 23% of individuals statewide (PUB 40%) said they always blocked SBB during winter; statewide loss rate was 37%. One hundred fourteen individuals statewide (44%) did not block them during winter (never response), of which 19 individuals (42% of PUB response rate) were PUB members. Statewide never responders had a 42% loss rate, 4 percentage points lower than the average of three previous years. Forty four individuals (17%, 18% PUB) blocked them on some of their colonies. Their loss rate statewide was 30.7% which was 10.2 percentage points higher than the three year average. **Comparing the always and sometimes left open with the closed in winter response reveals a 10 percentage point difference in favor of closing the SBB over the winter period for OR beekeepers.** See Figure 9.

There is no good science on whether open or closed bottoms make a difference in overwinter but some beekeepers "feel" bees do better with it closed overwinter. Four years of comparison shows those closing the screen during winter did have a 10 percentage point improvement in colony survival. An open bottom, at least during the active brood rearing season, can assist the bees in keeping their hive cleaner.

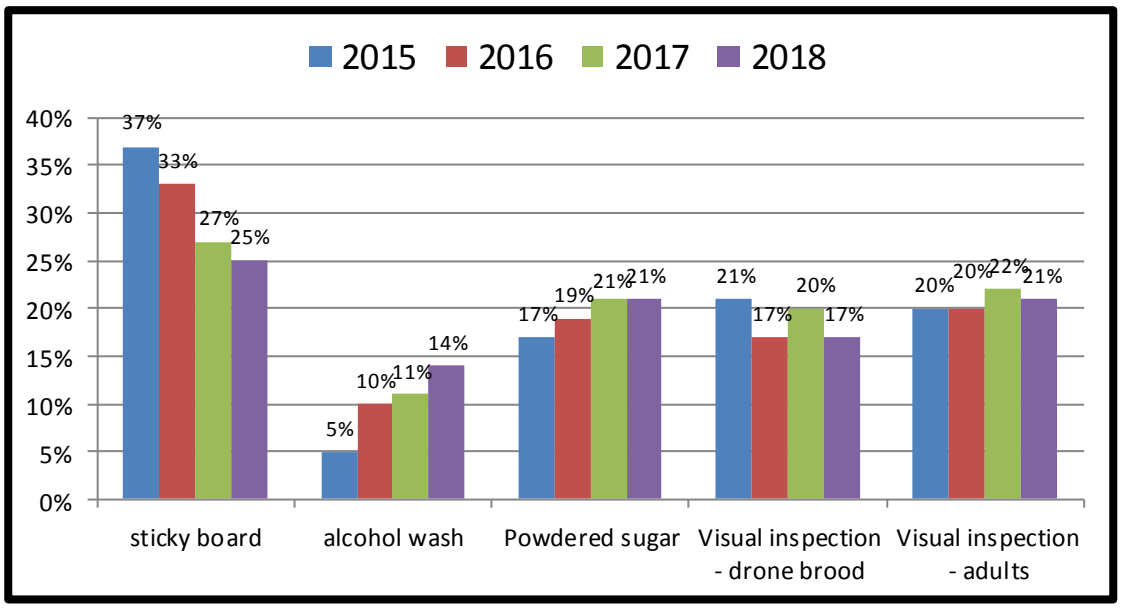
Mite monitoring/sampling and control management

We asked percentage of Oregon hives monitored for mites during the 2017 year and/or overwinter, 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, 184 individual respondents (63%), said they monitored all their hives. For PUB members, 32 individuals (60%) monitored all their hive. Losses of those individuals monitoring was 38% statewide and 60 by PUB members. Seventy seven (22%) statewide and 19 PUB members reported no monitoring; statewide there was a higher loss rate, 49% but for PUB members a lower loss rate, 54%. 33 individuals statewide monitored some of their colonies; they had a 26% loss; for the 3 PUB individuals monitoring some of their colonies the loss rate was 17%. Smaller sample size does not agree with larger statewide data. See Table below.

	ALL colonies monitored	SOME colonies monitored	NO colonies monitored
Statewide	43% loss	26% loss	49% loss
PUB	60% loss (32 indiv)	17% loss (3 indiv)	54% loss (19 indiv)

The previous year those individuals monitoring all colonies (178 individuals) had a 43% loss while those 62 individuals not monitoring had a 48% loss. Thus for past 2 survey years there was an average advantage with monitoring of 8 percentage point lower losses (48.5% no monitoring vs 40.5% loss total monitoring), This means there is a 20% advantage (lower losses) to those monitoring.

In order of popularity of use statewide, Sticky boards were used by 110 individuals (25%), which has continued to decrease in use popularity, followed by 95 individuals using powdered sugar monitoring (21%), and visual inspection of adults, both 21%. Visual inspection of drone brood was done by 72 individuals=17% and alcohol wash was reported by 61 individuals =14%.



Powdered sugar shake and alcohol wash are both increasingly being used; they are the preferred monitoring methods that best estimate the size of the mite population. Sticky boards are useful to check the treatment efficacy when used post treatment. Among PUB members 20 individuals (50% of individuals) used Sticky boards, 6 (15%) used alcohol wash, 23 individuals

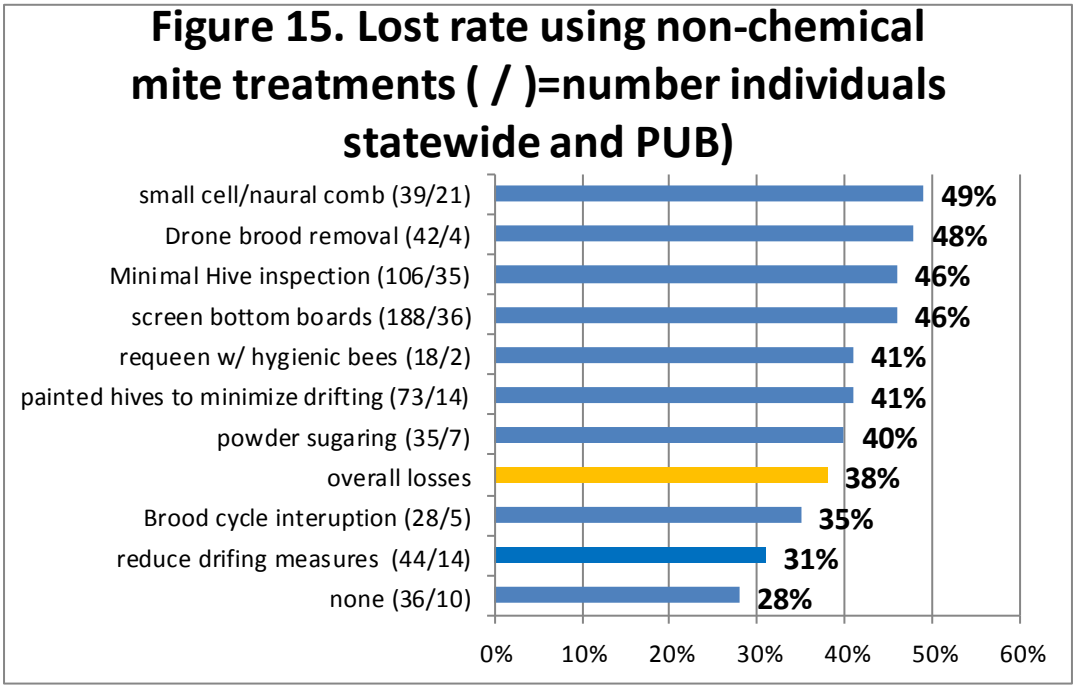
(58%) used powdered sugar, 14 (35%) used monitoring of drones and 20 (50%) monitored adults for mites (numbers are greater than 100% since multiple methods were utilized).

The most common sampling of respondents statewide in 2017-18 was both pre and post-treatment (34%), as was the case the previous year. Sampling just pre-treatment was similar each year but sampling just post treatment, also practiced at a similar level both years, showed a lower loss level similar to both pre and post treatment sampling. Other sampling treatment/sampling combinations exhibited higher loss levels than the overall mean (38%). The option 'Neither Sampling nor treating' had the highest loss level (60%) with 'Sampling and not treating' (52% loss level of those using this approach) also exhibited a loss level above the mean. Both these selections showed the greatest 2-year variation.

Among PUB respondents 9 indicated both, 2 just post, 9 pre-treatment (16%) with same number indicating treated but did not sample. 19 individuals (33%) did NOT sample or treat; they had the highest loss level statewide. None sampled but did not treat was the 2nd highest among statewide beekeepers in loss level.

The survey asked about both non-chemical and chemical mite treatments. Statewide 36 individuals, (14.5%) said they did not employ a non-chemical mite control; 10 were PUB members (17%). Among the statewide beekeepers 90 individuals (29%) did not use a chemical control; 32 were PUB members (60%). Statewide those who did not use a non-chemical treatment reported a 28% winter loss, a lower loss rate than those who did use a non-chemical control. This paradox is explained perhaps by individuals relying too heavily on those control techniques. In contrast, those individuals statewide who did not use a chemical had a 63.5% loss rate, compared to overall loss rate of 38%.

N**on-Chemical Mite Control:** Of nine non-chemical alternatives offered on the survey (+ "other" category) use of screened bottom board was listed by 188 individuals statewide and 36 PUB beekeepers. The next most common selection was minimal hive inspection (114 individuals statewide and 35 PUB members). Usage of the remaining 7 selections are shown in Figure 15. Number in (/) is first number of statewide individuals with this choice and second number is number of PUB members. Bar length shows the loss rate of those individuals statewide in percent.



Listed among the "other choice were treatments such as oil/sugar mix, soya/garlic mix, local queens, isolation, and limiting hive size. One PUB member added capturing wild swarms.

Other than doing nothing (10 percentage points lower losses level in both of past two survey years statewide), two of the non-chemical alternatives, brood cycle interruption (28 individuals 5 in PUB), loss level 35% statewide and managements to reduce drifting such as spreading colonies in apiary (44 individuals, 14 PUB members), with 31% loss statewide were managements that showed losses below the overall loss rate.

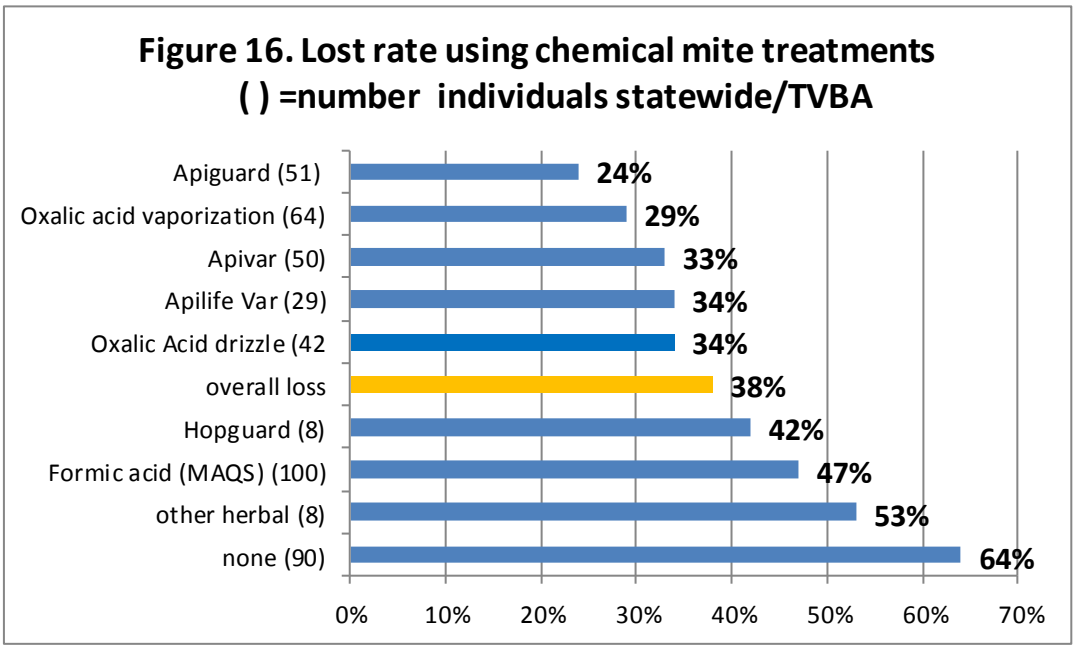
Chemical Control: For mite chemical control, 100 OR Beekeepers (47% of total chemical users) indicated they most commonly utilized MAQS, formic acid: the management of Oxalic acid vaporization (64 individuals, 30%) was 2nd most commonly employed; 12 PUB members used Formic acid (MAQS) and 7 used both Oxalic acid vaporization and Oxalic acid drizzle. Statewide oxalic acid users had loss rate that was 9 percentage points below overall and year before it was 14 percentage points below overall average statewide for vaporization and for Oxalic acid drizzle losses statewide were 4 percentage points below overall this season: last year it was 7 percentage points lower.

Apiguard had the lowest loss rate of 24% of all the chemical choices, 14 percentage points lower than the overall loss rate of 38%. It was used by 51 individuals (of which 9 were

PUB individuals, the 2nd most commonly indicted Chemical treatment by PUB. Last year Apiguard users had a loss rate of 38%, which was 10 percentage points lower than overall rate.

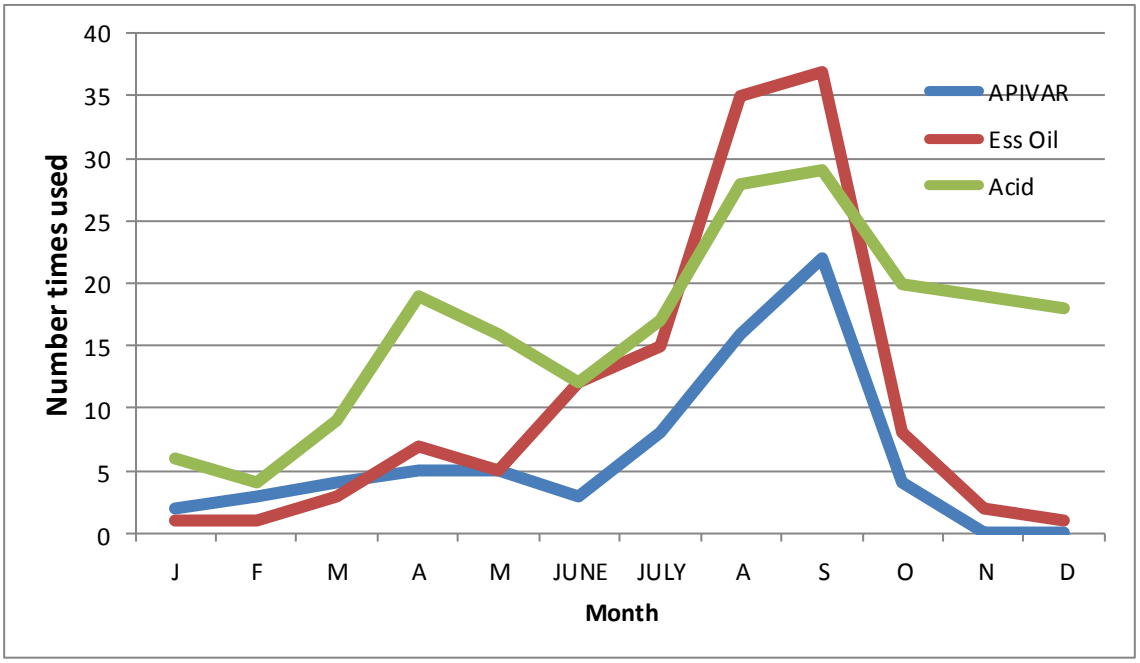
Apivar also had a lower loss rate by users statewide (35%) but this was elevated compared to the previous 2 survey seasons (27% loss 2016-17 and 23% loss rate 2015-16). It was used by 5 individuals within PUB. ApiLife Var, used by 29 individuals (increase from 16 last year) had a loss rate of 34% (10 percentage points greater than last year); among PUB membership respondents only a single individuals used ApiLifeVar.

Chemical use was 2.3/individual statewide and 1/8 choices/individual in PUB. 104 individuals (48.5%) statewide and 20 individuals (67%) indicated use of a single compound, 33% used two statewide 9 in TVBA (32%), up 4 percentage points from last year, 16% used three statewide (last year 15%) of which a single individuals was a PUB member; 4 individuals statewide used 4 chemcials and one used 5 chemical treatments but none were in PUB. The individuals stateweide that used 5 had zero losses and the 4 that used 4 had 9.5% losses.



Under other, PUB members listed other herbal use of powdered sugar.

The monthly use of Apivar (blue line), essential oil (red line) or an acid (green line) is shown in Figure 21 for 2016-17 season. Further review is needed to determine if the timing of treatments was more effective than at other times for the various chemicals



Antibiotic use

Thirteen individuals statewide (4%) used Fumigillan (for Nosema control); their loss rate was 52% none were PUB members. Two individuals (one less than last year) indicated use of terramycin; none in PUB

Queens

We hear lots of issues related to queen "problems". Under the choices asking the reasons why colonies didn't survive 62 individuals statewide (17%) and 11 (25%) PUB respondents selected queen failure as one of their selections. In Section 8 of the survey we asked what percentage of loss could be attributed to queen problems. 48% (129 individuals statewide, 26 PUB respondents said none. An additional 61 individuals (22%) statewide, and 14 in PUB said they didn't know. Of 81 individuals statewide and 19 of PUB, (15% statewide 24% PUB) said queen failure could have been responsible for 10-30% of their loss; 1 PUB member checked 30-50% and four indicated 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. Eighty one (up 7 from previous survey year) (29% stateside, 13% PUB) said yes. The related question then was did you or your bees replace their colony queen? Forty-three percent statewide (121 individuals) said yes, 36%

said no and the remainder ‘not that that I am aware of. For PUB respondents, 30% said yes, 30% said no and 20 individuals (32%) said not they were aware of.

One technique to reduce mite buildup in a colony is to requeen/break the brood cycle. The question “How did bees/you requeen“ received 197 responses (more than one option could be checked) statewide of which 28 were PUB members. Statewide over one-third of respondents indicated their bees were requeened with a mated queen. Bees did their own requeening more commonly via swarming than supersedure according to respondents. For TVBA members 8 introduced mated queen, 9 swarmed/superseded and 5 requeened via splitting.

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 2018