2016-17 WVBA Winter Loss REPORT by Dewey M. Caron

At the March and April WVBA meetings I distributed paper copies and directed members to a web-based survey document in a continuing effort to define overwintering losses/successes of backyard beekeepers in Oregon. This was the 9th year of such survey activity. I received 282 responses from OR backyarders, keeping anywhere from 1 to 48 colonies; Willamette Valley members sent in 24 surveys, 4 fewer than the previous year; represented WVBA colony numbers were lower (124 vs 144 last year).

Overwintering losses of WVBA respondents was 54 colonies = 43 ½ %, slightly lower than the statewide loss of 48% (database of 282 OR backyarders.) Percent losses, determined by hive types, are shown in Figure 1 comparing WVBA with the statewide backyarders. WVBA member respondents started winter with 93 Langstroth 10-frame and 22 Langstroth 8-frame hives and 5 5-frame nucs; there were an additional 4 Top Bar hives (3 loss). Losses by hive type was essentially the same as statewide except nuc survival was greater for WVBA members.

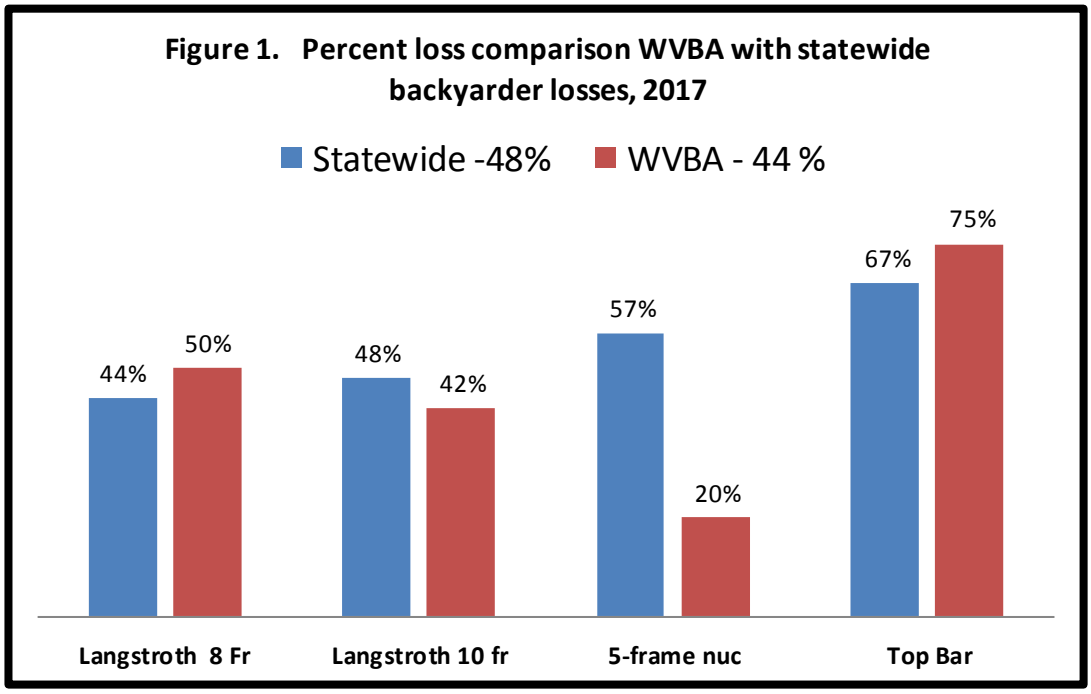
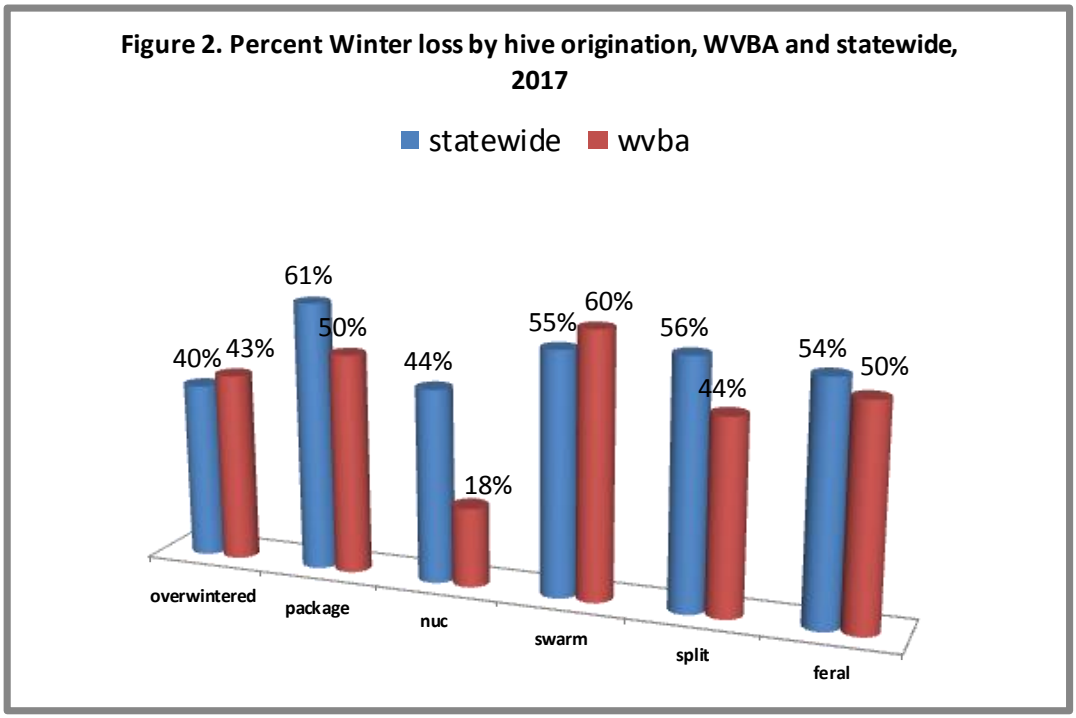


Figure 1. Percent loss comparison WVBA with statewide backyarder losses, 2017

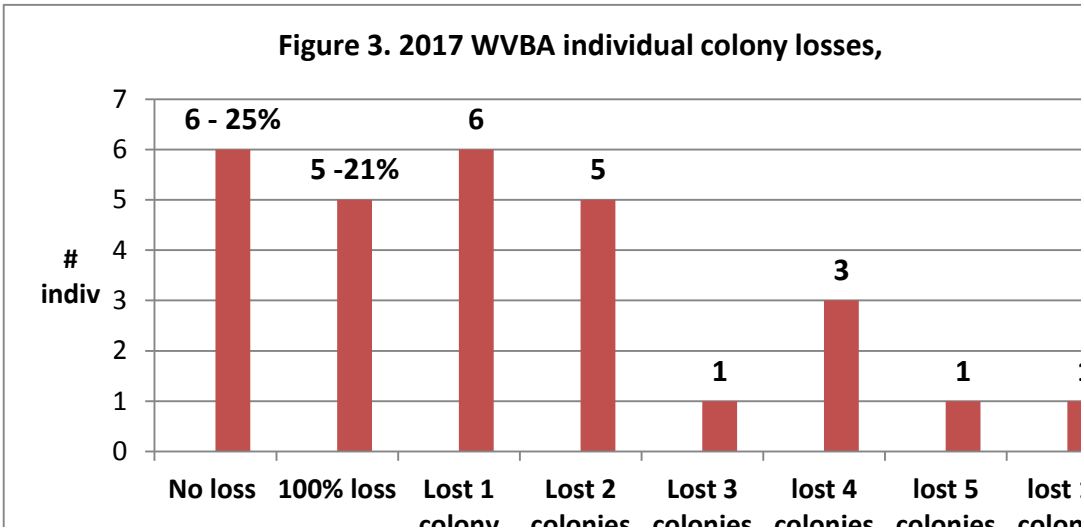
WVBA	**Fall**	**22**	**93**	**5**	**4**	**=**	**148 col**
	Spring	**11**	**54**	**4**	**1**	**=**	**94 col**

As with last season, WVBA losses were lower than statewide loss (by 4.5 percentage points).

The survey also asked for hive loss by hive origination. Thirty-seven of 66 overwintered WVBA colonies were alive in the spring (43% loss rate). Respondents reported very similar loss levels to the statewide Oregon beekeepers of newly established colonies, packages (only 4 reported by WVBA beekeepers – 2 survived), nucs (14 of 17 survived), swarm captures and feral transfers (only 6 of which 3 survived) with exception of much better success with nucs. Figure 2.

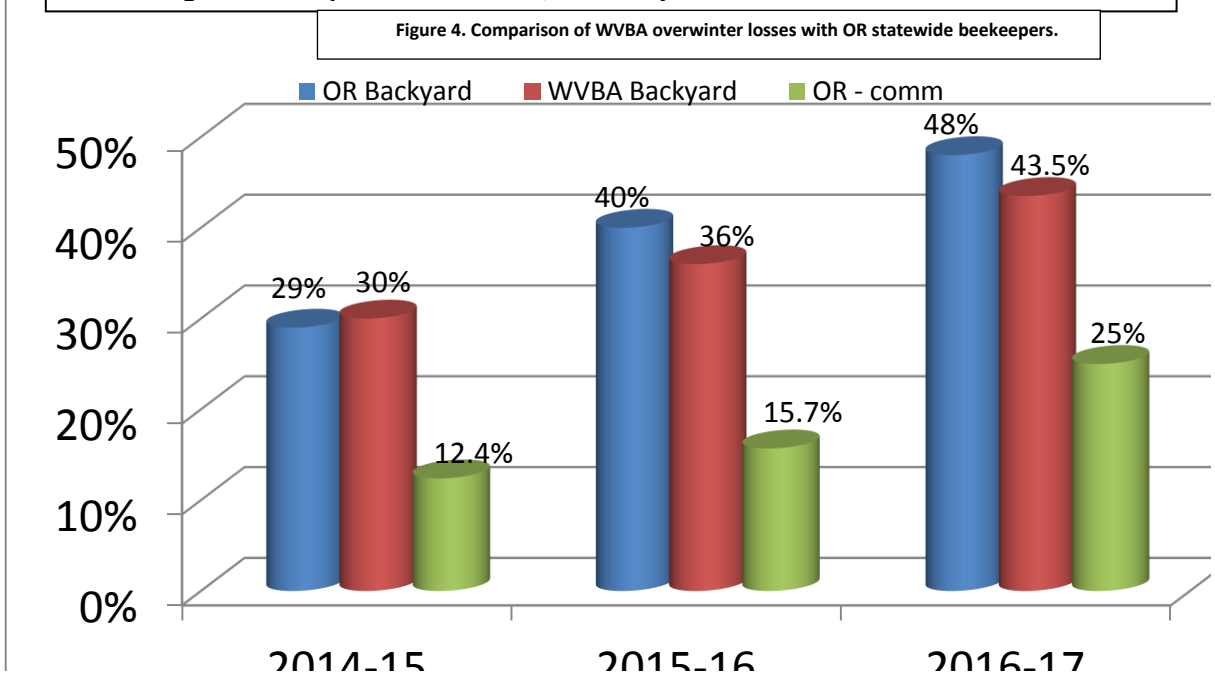


Not everyone had loss. Six individuals (40%) reported total winter survival; 5 individuals (21%) lost 100% of their colonies. Six individuals lost 1 colony, 5 members lost 2 colonies each, 1 lost 3 and 3 lost 4 colonies; one individual lost 17 colonies, the heaviest loss. Data shown graphically below in Figure 3. Forty-fifty percent indicated acceptable overwinter of zero to 10% and another 50% to 50% loss.

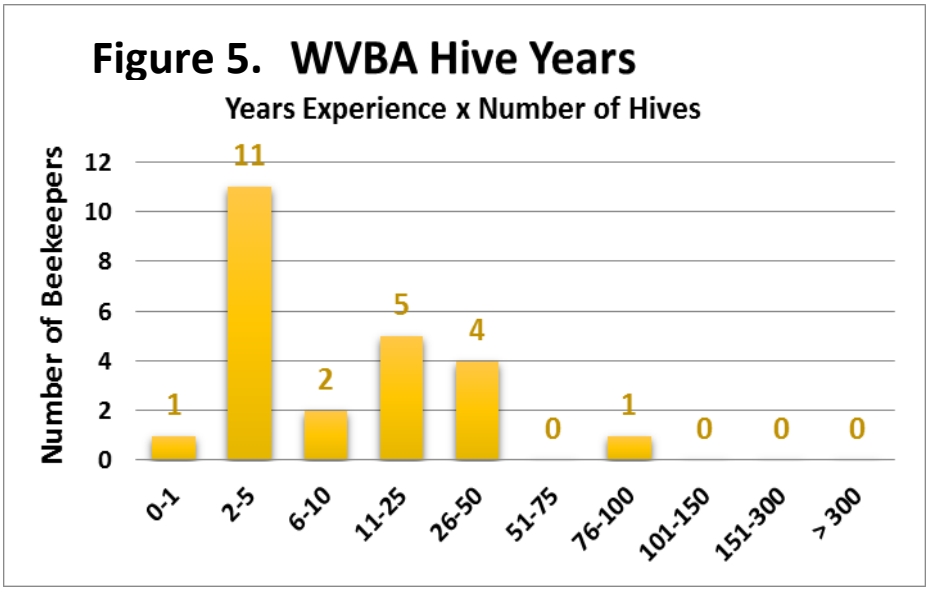


Compared with previous loss levels, the losses in 2016-2017 winter by WVBA backyarders were higher than the average of the previous two seasons by 10 percentage points (18% higher than la year. 38% higher than 2 years ago). As with last season, WVBA losses were lower than the statewide loss level (by 4.5 percentage points); commercial OR beekeepers have ½ the losses of backyarders.

Figure 4. Comparison of WVBA , OR Backyarder losses & OR Commercial losses



Typical of the statewide data the WVBA respondents are largely new beekeepers. 54% of WVBA respondents had no or only 1 or 2 spring colonies; the largest number was 10. Seventy (70%) had 1, 2 or 3 years of experience with only 8% indicating 10 or more years' experience; 43 years was the longest. When years' experience are multiplied by spring hive numbers the graphic hive years shows the respondents largely new beekeepers and managers of small number of colonies.



One individual had more than one apiary location. Two individuals moved bees during the year, one for pollination, one due to home relocation.

When asked to indicate where the majority of their beekeeping education was received, WVBA respondent numbers indicted Online reading & videos slightly greater than bee club meetings, bee mentors, and books, journals and magazines. Bee mentors (21%) and the OR Master beekeeping program (10%) were of comparable value. Response information graphically in Figure 6. Two-thirds (67%) said they had a mentor available as they were learning beekeeping the same as statewide.

We asked of individuals that had colony loss to estimate what the reason might have been, Varroa mites, queen failure and poor wintering conditions (all 18%) were the most common choices followed by weak in fall and starvation (5 individuals each). I don't know and yellow jackets (2 individuals) were also indicated; CCD and Nosema had a single response each. See Figure 7 below.

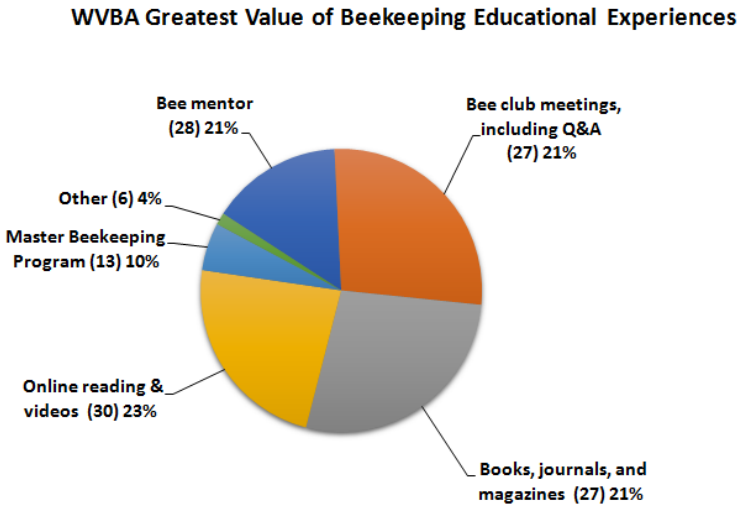
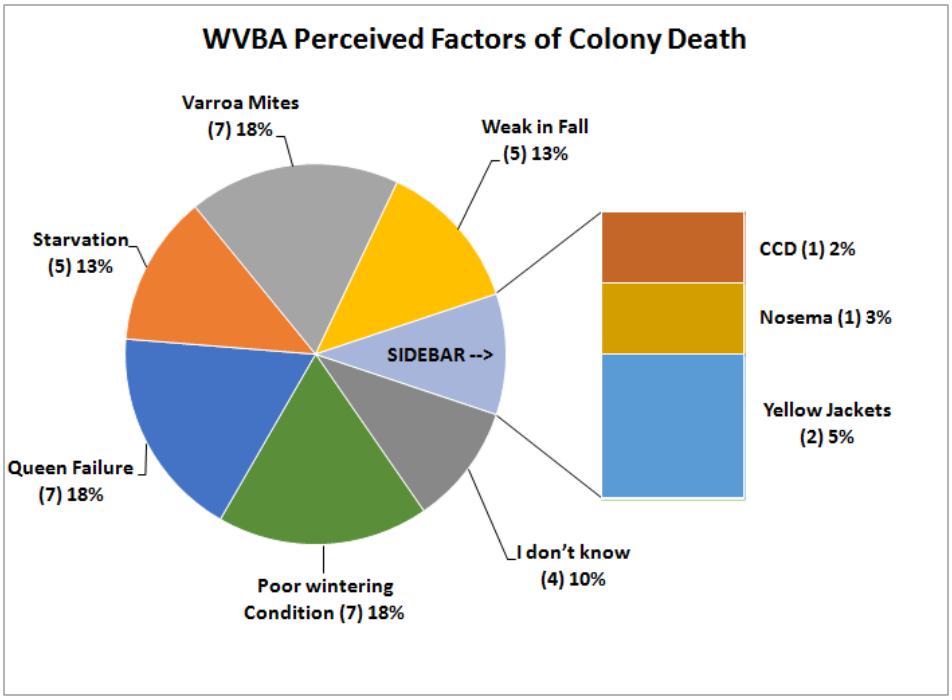


Figure 7.



When asked opinion as to an acceptable loss, 6 individuals said zero and all but two indicated up to 25%.

Why do colonies die? There is no single reason for loss and a good deal of variation 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. Could our longer, colder winter have been a factor this past year? It was an added stressor.

The four major factors affecting losses are thought to be mites, pesticides, declining nutrition adequacy of the environment and diseases, especially viruses and Nosema. Management, either failure to do something or doing things incorrectly, remains a factor in overwinter losses. What effects alteration to the bee's natural environment and other external factors play in colony losses are not at all clear.

Langstroth wrote about the importance of taking losses in fall management saying if the beekeeper neglects such attention to his/her colonies 45% loss levels may occur, depending upon variable environmental conditions. It can be argued that losses of 30, 40, 50% or more might be "normal." Older, more experienced beekeepers recall when loss levels were 15% or less. Honey production fluctuates each year but, once again, it seems to be declining on average. Numbers of U.S. bee colonies have declined since the 1940s, returning to numbers for 100 years ago but worldwide numbers of bee colonies are steadily increasing.

There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are excessive for all the issues facing honey bees in our current environment.

Management selections and losses

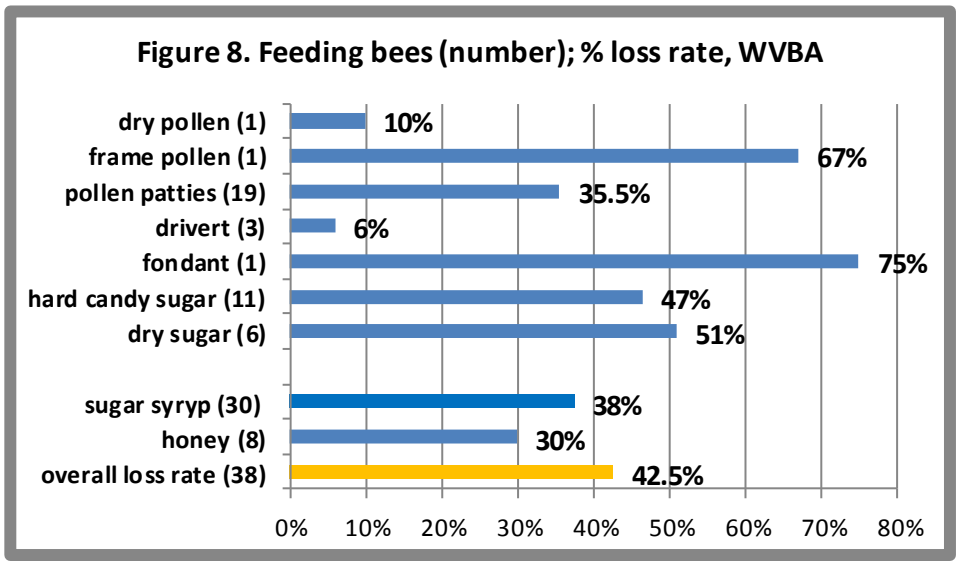
The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring and both mite control techniques (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls used. Individuals could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

For the larger data base of OR beekeepers, feeding dry sugar or candy board, as well as adding top insulation, a moisture absorbent feature at top of colony and/or an upper entrance resulted in significantly fewer losses. Screen bottom board usage, monitoring with alcohol wash or powdered sugar for mites and use of several of the chemical mite control options did likewise. See this analysis in the OR beekeeper report; www.pnwhoneybeesurvey.com. Comparisons to WVBA data results are included in this narrative.

For WVBA, with 38 respondents, analysis of managements excludes four top bar hives of two individual beekeepers (only 1 survived of 4 total). Both individuals had langstroth hives which are included in the data analysis. The one individual with nucs also managed Langstroth hives

FEEDING: Among WVBA respondents, 71 options (3.1/individual) were checked; the highest number was 6 choices selected by 1 individual; 1 individual selected 5, 8 selected 4 choices and 4 selected a single choice (3 of which were sugar syrup feeding); 1 WVBA respondent checked none – they loss all 6 colonies 100% loss. Eight individuals (33%) indicated they fed honey (7 as frames, 1 as liquid); their overwinter loss was 30%. all but three individuals (20=87%) fed sugar syrup; their loss rate was 37.5%, both slightly better than the WVBA average of 42.5% loss (Langstroth hive owners only, including the nuc owners but excluding the top bar hive data). Statewide 79% of OR beekeepers fed sugar syrup and 41.5% fed honey but in neither case were loss levels different from the statewide loss level of 48%

OR Individuals who fed a form of dry sugar did have lower loses. Statewide, those beekeepers who fed hard sugar candy and those feeding dry sugar (but not drivert or fondant) had better winter survival; among WVBA respondents, 3 individuals using fondant sugar had a 6% loss but those who fed the hard sugar candy, dry sugar or fondant had higher than average loss rates.

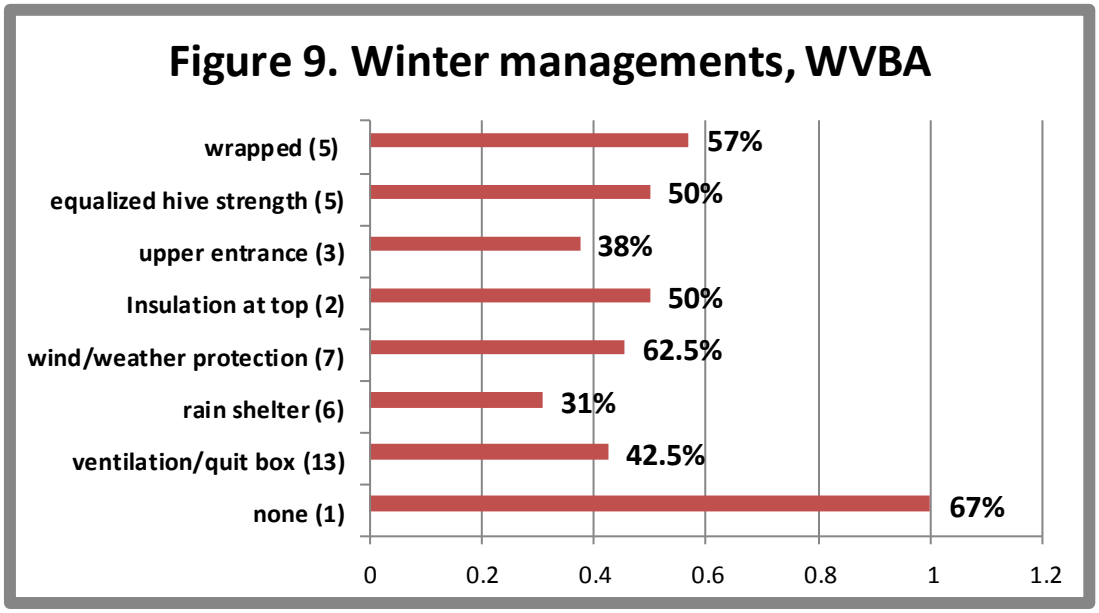


Feeding protein as dry pollen or pollen patties meant better survival for OR beekeepers; for WVBA beekeepers the same was true;, the 19 individuals who fed pollen patties had a 35.5% loss rate, an improvement in survival compared to total 38 TVBA respondents while single dry pollen feeder had only a 10% loss (1 of 10 colonies).

It appears feeding protein, dry pollen or a pollen patty, improves survivorship. Also feeding dry sugar or a hard sugar candy, typically the sugar feeding method most appropriate during later fall or over the winter period, improved survivorship statewide but not for WVBA individuals. Fondant feeding by s single individual did improve their survivorship but not for the larger data statewide. Feeding can apparently improve overwinter survival.

WINTERING PRACTICES: Statewide 538 responses about OR beekeeper wintering management practices were indicated (more than one option could be chosen). Forty-six individuals, 17.5% of the respondents, indicated they did not do any of the several listed wintering practices; these individuals had a 49.5% winter loss compared to overall of 48%. Among the WVBA respondents, there were 53

choices indicated (2.3/individual); two individuals each had 5 and 4 selections; 4 had 3 selections and 7 had only a single choice. One WVBA individual had no selection; they lost their one colony, 100% loss.



The most common wintering management selected (13 WVBA members) was ventilation/use of a quilt box at colony top. Figure 9 shows number of individual choices and percent of each selection for WVBA beekeepers. Statewide, using a quilt/ventilation box slightly improved survival (45% loss rate versus 48% overall) while for WVBA it did not. Use of rain shelter (103 OR individuals) did not improve winter survival but the 6 WVBA members who used a rain shelter had a slightly lower loss rate (31% compared to the WVBA average. Upper entrance providers had slightly lower loss, 38%.

The varieties of choices of these wintering selections demonstrate that backyard beekeepers are taking extra measures to help colonies survive winter conditions. It would appear that several winterizing managements might slightly improve winter survival and reduce beekeeper losses; for WVBA beekeepers, the only improvement (compared with 42.5% average loss) was with use of an upper entrance and a rain shelter.

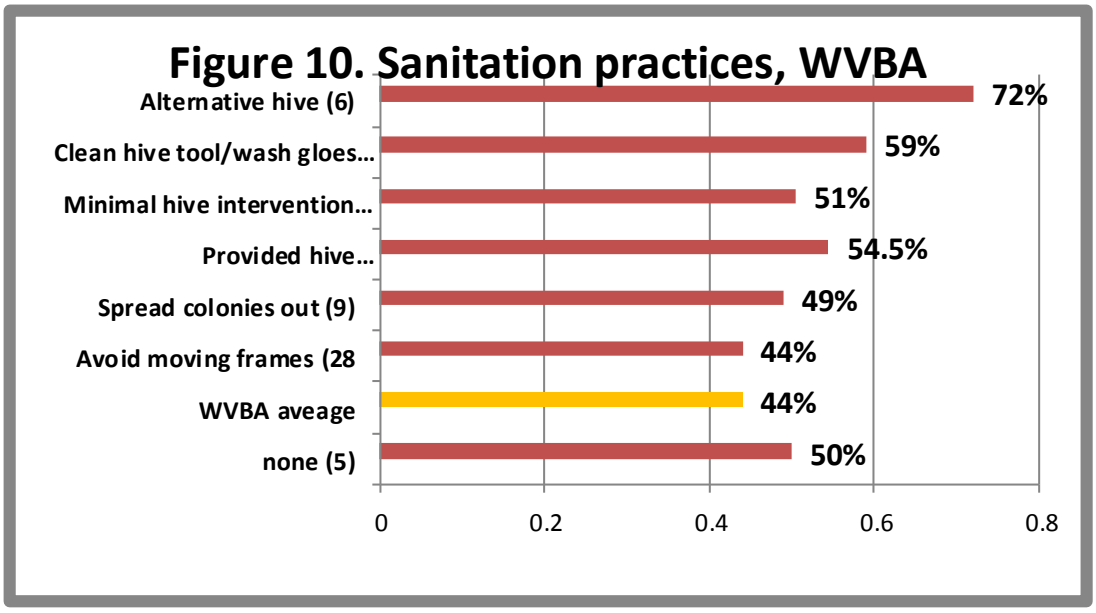
SANITATION PRACTICES: It is critical that we practice some basic sanitation (some prefer use of term bee biosecurity) in our bee care. We should do more basic sanitary practices to help insure healthy bees. We received 512 statewide responses for this survey question. Fifty one survey takers (18%) said they did not practice any of the 6 offered alternatives; they had a loss rate of 46% compared to overall rate of 48%. For WVBA respondents, there were 103 choices indicated (2.3/individual); 3 individuals had 5 selections and 6 had 4 choices while 10 had a single selection (8 where minimal hive intervention). Five WVBA individuals (10%) checked none; their winter loss rate was 50%.

Minimal hive intervention (28 individuals) was the most common option selected along with avoiding moving frames between colonies (also 28 individuals). 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 with frame movement between colonies could potentially interfere with what the bees are doing to stay healthy. These two options however did not improve winter

survival of statewide beekeepers; the 28 WVBA individuals marking minimal hive intervention had a loss rate of 50.5%, while those not moving frames had a 44% loss rate, neither an improvement over the average loss rate of 44%.

Statewide the two hive sanitation choices that showed improved survival was providing hives with a distinctive ID + cleaning hive tool/washing gloves regularly; loss rate of this first option was 43% and hive tool cleaning was 41%, both slightly lower than the statewide loss of 48%. For WVBA, 19 individuals indicated they gave their hives a distinctive ID and they had loss of 54.5%. The 14 individuals who reported cleaning hive tool/washing gloves regularly had a loss rate of 59%. Figure 10 shows number of individual choices in ( ) and percent loss of each selection. Results show these sanitation managements while commonly utilized did not, by themselves, reduce losses

SCREEN BOTTOM BOARDS: Seventeen of 24 WVBA individuals (71%) used screen bottom boards; 5 individuals who did not use SBB (with Langstroth hives) had an 84% loss rate. Statewide the 50 individuals not using a SBB, also had a higher winter loss rate, 58%, compared to



194 individuals (69%) using them on 100% of their colonies - they had a loss rate of 45%. Six WVBA beekeepers that blocked the screen during winter (always response) had a 33% survival rate compared to 10 individuals who indicted they never blocked the screens over the season (48% loss rate). Those individuals who sometimes blocked the screen had a 19% loss. Statewide there were no differences whether screens were left open or blocked in winter.

When use of screen bottoms was compared to non-use, there was a 5 pecentage point difference in improved survival overwinter thd previous survey year (271 PNW beekeeper respondents) and a 12.5 ercentage point improvement this year among OR beekepers (282 individuals). The difference was even larger (better survival) for Willamette Valley beekeepers.

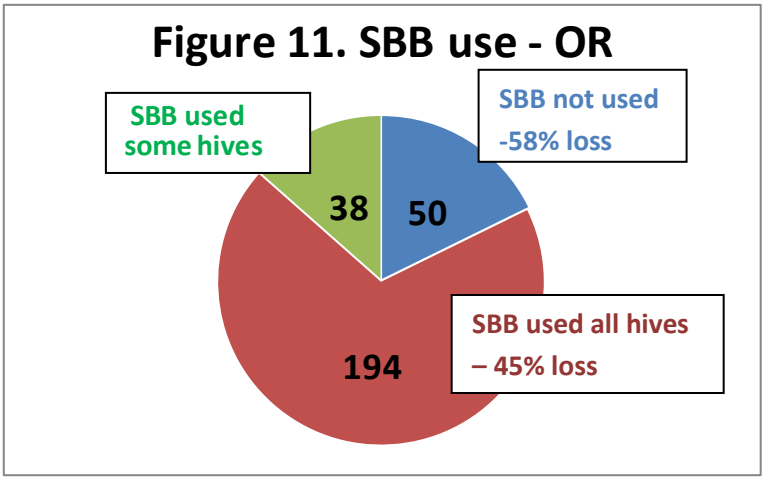
It does appear there may be an advantage to use of screen bottoms.

WVBA

5 SBB not used – 84% loss

17 SBB used all hives – 32.5% loss

2 SBB used some hives – 19% loss



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 necessarily do only one management nor do they necessarily do the same thing to all the colonies in their care. Analysis of the individual club reports, such as here for WVBA responses, may not be truly characteristic of the total OR beekeepers. Looking at the larger data base is more instructive.

We do know moisture kills bees, not cold, so we recommend hives be located out of the wind, in the sun, and, when exposed, providing some extra wind/weather/rain protection might improve survival. Use screened bottom boards leaving them open (or closed as per your preference) for ventilation. Use of insulted tops/quilt box with moisture collector such as burlap, straw, old towels, etc. with extra top ventilation to vent the moisture is also a good idea and helps improve survival. Feeding bees either sugar syrup or honey from other disease-free hives helps insure enough food stores during early fall management. Once fall rains start, halt syrup feeding and switch to feed dry sugar or a hard sugar candy to avoid adding additional moisture stress to colonies. Finally, it would seem prudent to review basic sanitation measures, as anything we can do to help reduce sick bees and improve colony health, will likely improve overall survival.

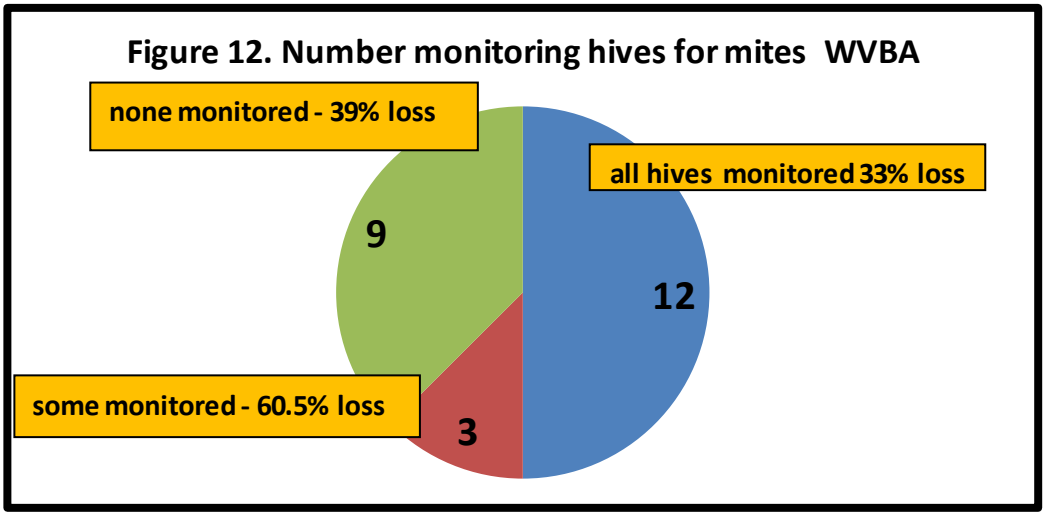
Mite monitoring/sampling and control management

All OR bee hives have or will have varroa mites. It is important to know **how many mites are present.** Knowing how many mites provides an estimate of approximate risk of mites elevating colony losses for the time of year the sampling is done and, when sampling is started in July and continued into October, for the overwintering period. Mites are not the only pest/predator/pathogen than can seriously weaken or kill colonies but studies point to their being the most significant.

MITE MONITORING: To know how many mites, beekeepers need monitor/sample hives for mites. The PNWhoneybeesurvey asks percentage of OR hives monitored for mites during the 2016 year and/or 2016-17 overwinter, whether sampling was pre- or post-treatment or both and, of the five possible mite sampling methods, when and what method was used. Statewide, 178 individual

respondents (63%) said they monitored all their hives and this group had a 43% loss. The 62 individuals (22%) who reported they did no monitoring had the statewide average loss of 48% while the 43 individuals who monitoring some of their colonies had a 60% loss.

The comparable numbers for WVBA respondents was 12 individuals (50%) who monitored all their hives had a 33% loss rate (for Langstroth hive keepers); three individuals who monitored some of their hives had a 60.5% loss while the nine individuals (37.5%) that did NO monitoring had 39% loss rate.



When asked how the hives were monitored, the 15 individuals who indicated they did monitor (some or all hives) had five choices. Four individuals selected only a single method. Choice selections were from 4 who used sticky boards to 8 who used Alcohol wash and visual looking on adults in colony. Those 8 individuals using powdered sugar had a 48% loss and the 7 using Alcohol had a 41% loss rate – the last method being the only two of the 5 choices for which WVBA users had better survival. WVBA members indicated they monitored pre-treatment (9 individuals – had 43% loss rate), post-treatment (1 individual who had a 67% loss) and both pre-and post-treatment (5 individuals who had a 43% loss).

The nine individuals who checked 'did not sample' checked two other choices in this question. Five individuals said they did sample but did not treat, but were unable to check which sample method was used due to the (faulty) construction of our survey instrument. This group had a 54.5% loss. Those four individuals who said they treated but did not sample had a 32% loss.

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). Visual sampling also is not accurate: most mites are not on the adult bees, but in the brood. Even looking at drone brood is not effective; if done, look at what percentage of drone cells had mites.

See Tools for Varroa Monitoring www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of how best to do sugar shake or alcohol wash sampling. The Tools guide also includes suggested mite levels based on the adult bee sampling. A colony is holding its own against mites if the mite sample is below 2% in spring (i.e. 2 mites/100 adult bees) and below 5% (no more than 5 mites to 100 adults) later in the year.

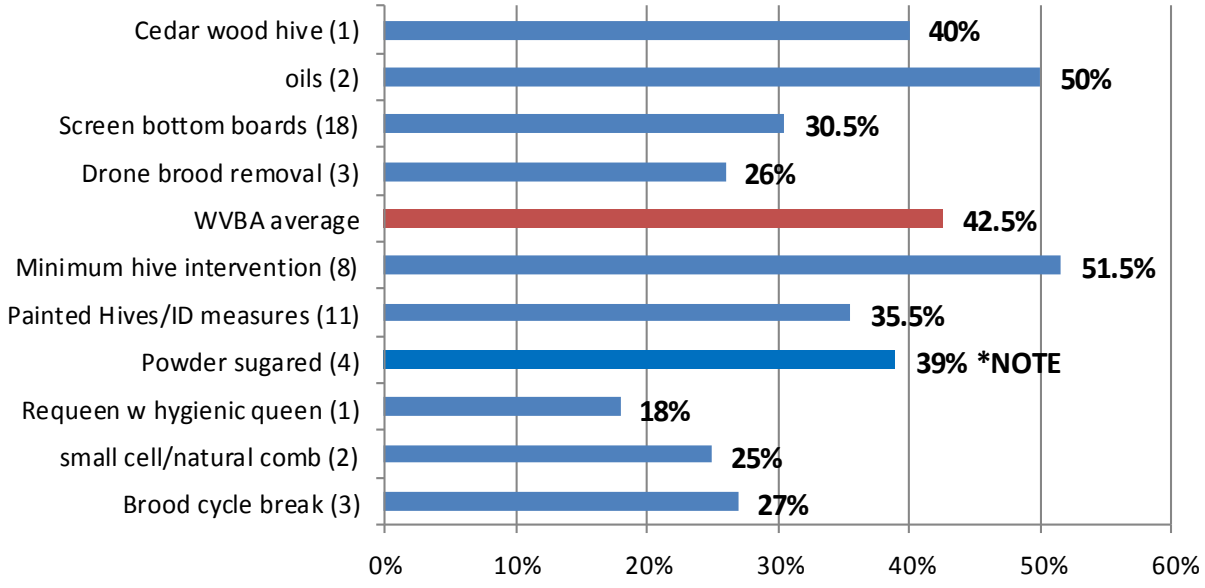
MITE CONTROL: The survey asked about use of several non-chemical mite treatments and also about use of chemicals for mite control. Four Willamette individuals, 17%, did not use a non-chemical control though all used a chemical control; they had a 75% loss. Six individuals did not use a chemical control (though all used a non-chemical treatment) and had a loss rate of 70.5%. **Controls work.**

NON-CHEMICAL CONTROL: Respondents were offered 8 alternative, non-chemical mite treatments and could use a blank "other' to indicate any additional techniques used (3 'other' were listed). Of these non-chemical alternatives offered on the survey, use of screened bottom boards was selected by 200 individuals (71%) statewide and these individuals had slightly lower overwinter loss (45% compared to 48% average loss). Eighteen WVBA member respondents (90%, excluding the 4 who said none) indicated use of SBB with a loss rate of 30.5%, considerably lower than the 42.5% average loss of Langstroth hive users, including 5-frame nucs.

WVBA members checked 55 selections (2.3/individual) with one individual with 6 selections, one individual had five and four had four selections each. Three had a single selection with two of those SBB. After SBB, painting hives a color/other distinctive ID measures was the selection of 11 members and minimal hive intervention/inspection the choice of 8 individuals. All remaining treatments were used by 4 or fewer individuals. Figure 12 shows the number of WVBA individuals in ( ) with the selection and the bar representing their loss. It is evident that a number of the treatments seem to have helped reduce winter losses.

NOTE: Four individuals selected powder sugaring as a chemical treatment and their loss (41%) was very similar to those checking this choice under use of powder sugar as a non-chemical (39%), indicating a small possible advantage for those using this alternative compared to average WVBA losses.

Figure 12. WVBA Alternative mite controls

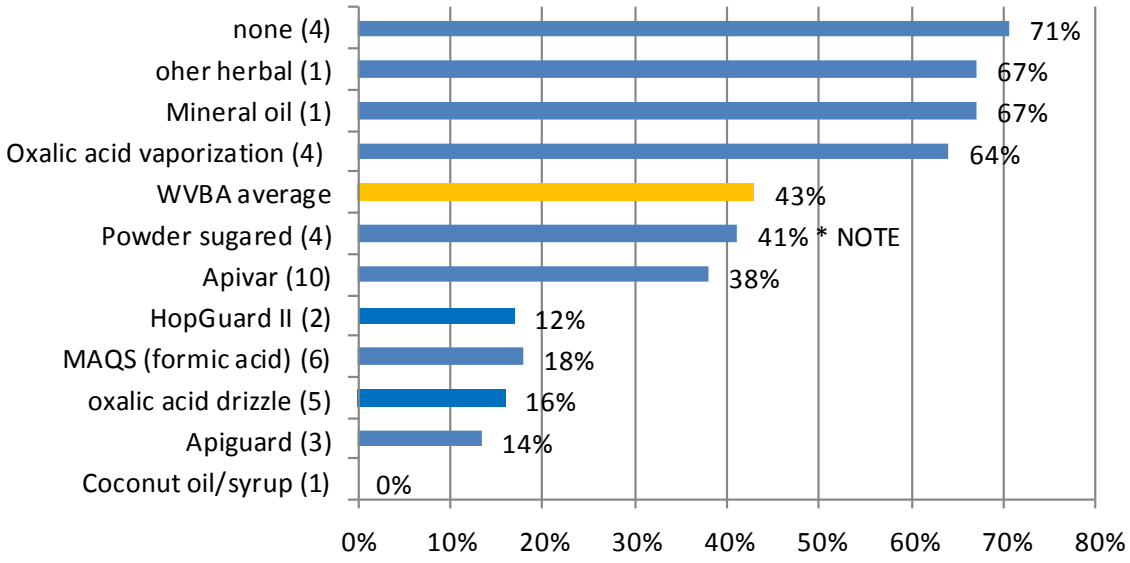


CHEMICAL CONTROL: Use of a chemical control was indicated by 215 (76%) statewide OR beekeepers, 18 of them WVBA members. MAQS (formic acid) was the most common selection both statewide and for Willamette members (but only 6 individuals used it), followed by Oxalic acid drizzle (5 individuals). The six individuals using MAQS had a loss rate of 18% and the five Oxalic acid drizzle users had a loss of 16%. The two individuals using HopGuard II also had very low losses (17%), mainly as one individual with 10 colonies had total survival. Figure 13 illustrates the number of users (in ( ) after selection) and their loss rate expressed as percent (and bar length).

There were 37 total selections (2.1/individual). One individual used 4 materials and 5 individuals used 3 different materials. There were 7 individuals using only a single material – 3 of them Apivar. Among the 'other' chemicals added, one individual indicated mineral oil and another said 'other herbal' but both had loss of 2/3rds of their fall colony number. One individual used 2 products, Apivar and Coconut oil in syrup, and had no loss of their 3 colonies (0% loss).

See NOTE on powder sugaring above.

Figure 13. WVBA Chemical mite controls



Two WVBA individuals treated with fumigillian and lost only a single colony of 13 overwintered.

What works? The non-chemical alternative of drone brood removal is a non-chemical treatment that can be used during spring buildup and breaking the brood cycle, with requeening, especially if hygienic queen stock or local selected stock is used to replace removed queens, can also keep mite numbers at manageable levels in most bee colonies. Both are a lot of work and new beekeepers should not seek to use such techniques until they have a better understanding of bee colony life cycles and

queen event behaviors in colonies. Both drone brood removal and break in brood cycle resulted in loss rate below the average for WVBA beekeepers.

Among the chemical treatments available to treat varroa mites, use of all chemicals except uncommon materials and Oxalic acid vaporization resulted in lower overwinter losses by WVBA beekeepers. Statewide the Oxalic via vaporization outperformed (lower loss rate) the drizzle method. (see www.pnwhoneybeesurvey.com). Statewide, Apilife Var did exhibit lower losses for statewide users (16 individuals, 24% loss rate) but none of the WVBA member reported using it.

The chemical treatments, to a greater or lesser degree, have limitations that may affect usefulness, just as do the non-chemical treatments. We need to learn how to use such tools more effectively. Materials that can be used effectively include acids such as formic acid (Mite-Away Quick Strips, or MAQS – especially the ½ dose treatment) and Oxalic acid or the Hopguard II product when there is little or no brood present, essential oils Apiguard or ApiLife Var, under narrow temperature conditions and the highly effective synthetic miticide, Apivar (amitraz).

All have possible serious negative effects to the beekeeper applicator and they can contaminate the beeswax and honey of the hive. Only use of MAQS is permitted when supers are on colonies. It is important to follow label directions. There may be significant queen or brood losses with many of the chemicals and post treatment sampling is strongly recommended to insure a mite control, non-chemical as well as chemical, has worked as expected.

It is clearly evident that use of several chemical mite control materials reduced overwinter losses and improved survival. The non-chemical techniques may help reduce losses and several seemed to help WVBA beekeepers. As for using more than one, and which ones to use during a season, there appears to be NO one best combination. Control choices should be driven by monitoring, seasonal considerations and an estimation of size of mite population.

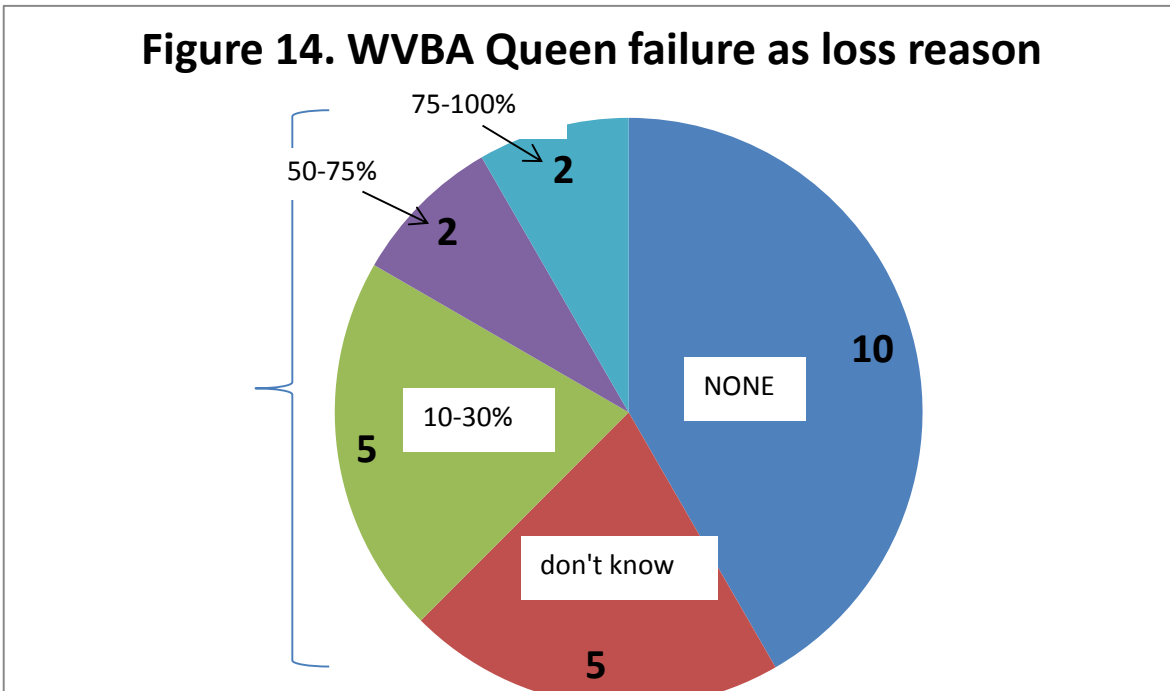
Queens

The PNW honey bee survey asks individuals with overwinter loss to what they attribute their loss. Fifty-five of the 282 OR respondents (13%) attribute at least some of the loss of their colonies to queen failure; among WVBA respondents, 7 individuals (18% of total listings – Figure 7) listed queen failure as one of the contributing reasons for their losses.

However, with the health and welfare of the queen (the 'heart of the hive') critical to bee hive development and success, we also have a survey section just covering queens. We ask specifically what percentage of colonies might have been lost to queen related issues. For the total OR respondents, 127 (47%) said none and 66 respondents (24%) checked 'I don't know.' Twenty-nine percent (29%), double the number who listed it as a possible reason for winter loss, responded that queen loss might have been a factor in colony losses statewide.

Among WVBA respondents, 10 individuals (42%) said none of their losses were likely due to queen failure and 5 said they did not know. Nine WVBA individuals (37.5%), 2 more than in previous self-reported reasons for loss, did attribute possible winter losses to queen failure, slightly higher compared to the percent statewide. This last response required an estimate of the approximate percent of colony loss that might be attributable to queen failure. Five individuals said 10-30%, 2 indicated 50-75%, and two said 75-100% of their loss could be due to queen failure.

Six of the 10 individuals who said they had no loss indicated they had colonies with marked queens while 5 of 9 who reported that queen failure could be responsible for winter loss also had marked queens.



One non-chemical management technique to reduce mite buildup in a colony is to requeen/break the brood cycle so we also asked about how managed colonies are requeened. Eight WVBA individuals said their colony (ies) did not requeen and 4 said they did not know if their colony (ies) requeened. Thus 12 WVBA respondents (50%) reported their colony (ies) did requeen. Loss level of this group was 57.5% compared to a 42.5% loss rate of those who said NO their colonies did not requeen.

Two individuals said colony queen replacement was via supersedure, one split the colony to allow it to requeen, two introduced queen cells and 7 added a mated queen. Those introducing a mated queen had a 33% loss while all the 5 other had 67-83% loss rate. Queen events can be significant in colonies not overwintering. Mated queen introduction can apparently reduce those potential losses.

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 and individuals are encouraged to examine that data base as well. Reports for individual bee groups are customized. As they are completed they will be posted by the name of the group. Additionally analysis will be performed and these reports will be posted to pnwhoneybeesurvey as they are completed.

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 with "REMINDER" in the subject line. We have a blog on the 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