2017 Southern Oregon Winter Loss by Dewey M. Caron

SOBA and KBBA members were directed to a web-based survey document (posted at www.pnwhoneybeesurvey.com) in our continuing effort to define overwintering loss rates and successes, now the 9th spring survey. I received 282 responses from OR backyarders, plus 52 others from Washington beekeepers, keeping anywhere from 1 to 48 colonies. Southern tier beekeepers of Klamath Basin (KBBA) contributed 8 survey responses and Southern Oregon (SOBA) members returned 23 surveys, 1 more than last year.

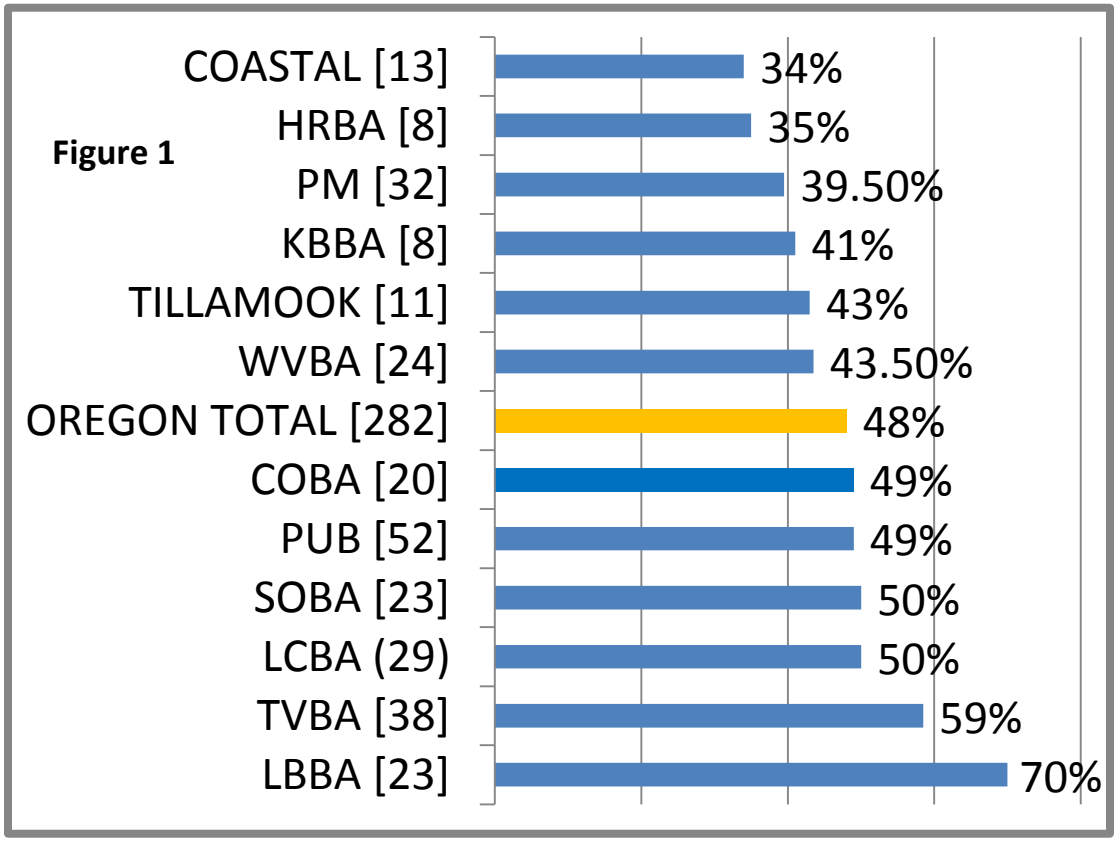
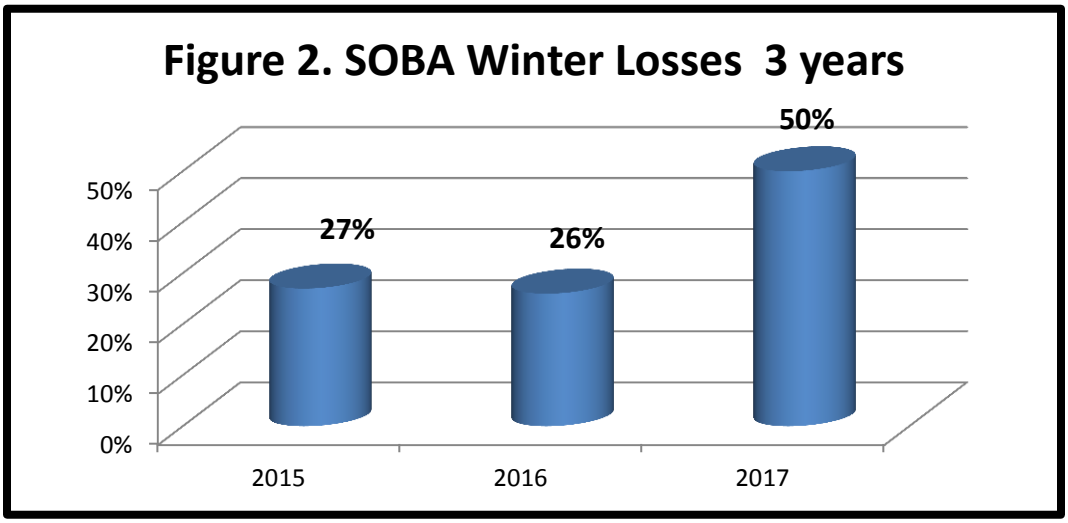
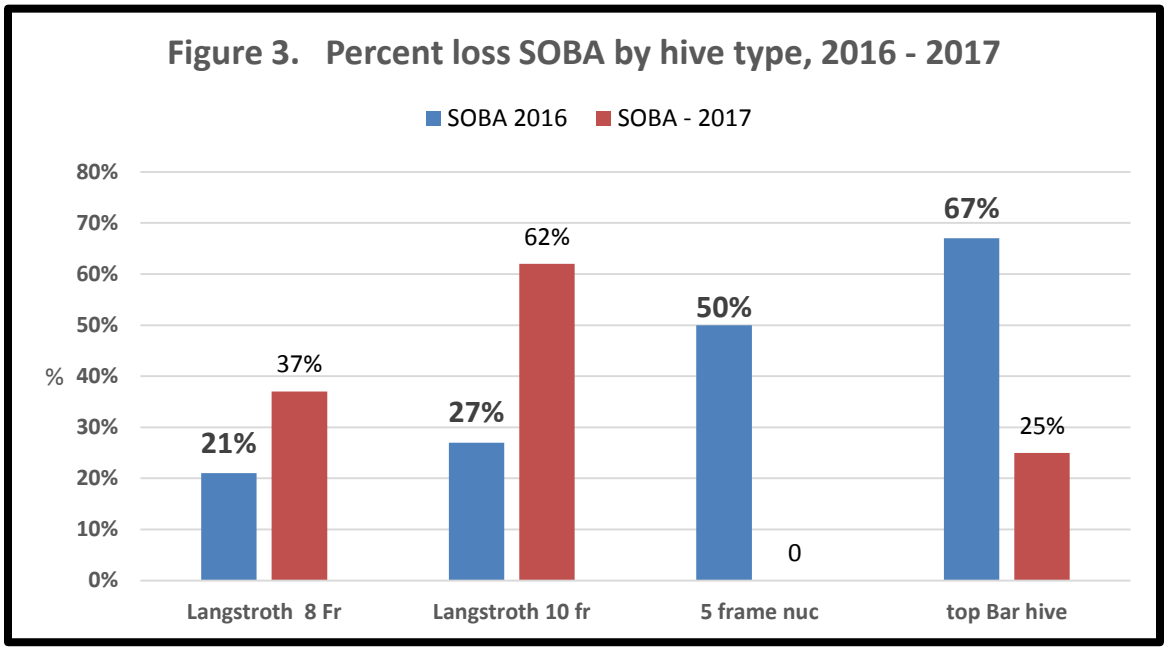


Figure 1

Overwintering losses of the 8 KBBA respondents was 41% (the losses reported by 3 KBBA members last year was the highest level of last year =80%), while losses of the 23 SOBA members (104 colonies total) was 50%, double the loss rate of the past two years but essentially the same as statewide OR backyard beekeeper loss rate (48%). Last year SOBA loss rate was 26%, lower than the statewide loss of 40% (database of 219 OR backyarders) and in 2015, SOBA loss of 27% was slightly below the statewide loss rate of 29%. See Figure 2. There is no obvious explanation for the doubling of SOBA losses compared to the previous two years or the reduction by half of KBBA losses from last year. KBBA sample size is not large (and was only 3 individual responses last year) and could help explain the large yearly difference.

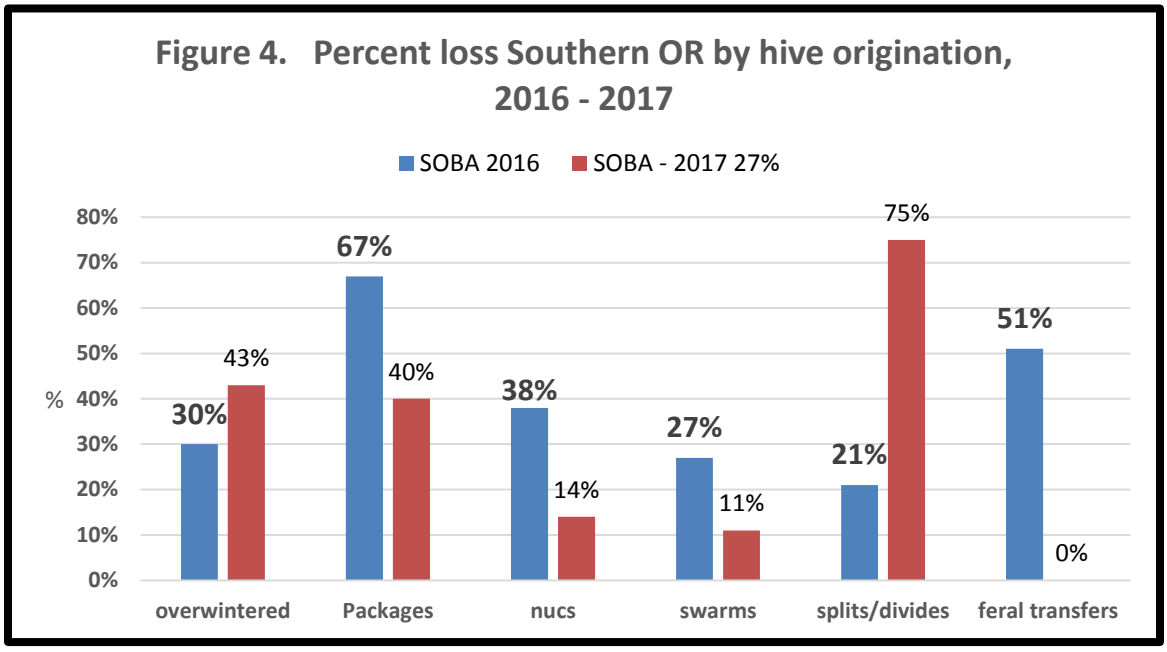


Percent loss was determined for Langstroth 8 and 10 frame hive types, 5 frame nucs and alternative Top bar and Warré hives, as well as category "other." Data shown in Figure 3 compares the past two years for SOBA beekeepers. SOBA members started winter of 2016-17 with 35 8-frame Langstroth hives and 60 10-frame hives, of which 23 died overwinter. This lost rate (62%) was considerably greater than the 48% loss rate of Langstroth 10 frame hives of the total 282 OR backyard respondents. There were 0 nucs reported this past yea; a single Warré hive survived and 6 of 8 top bar hives also survived (25% loss), a considerable improvement over the previous year 2/3rds loss of such hives.



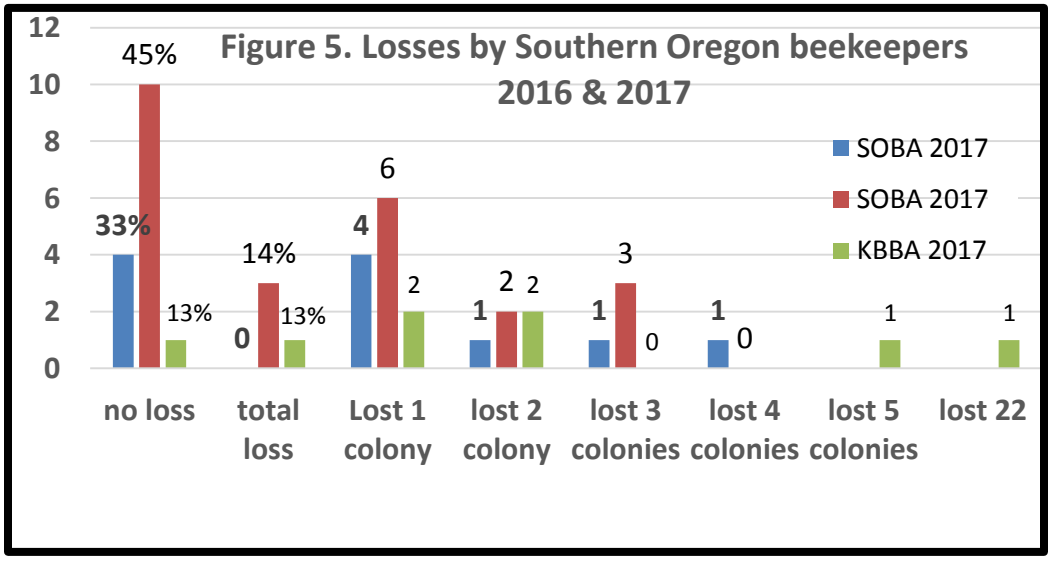
The survey also asked for hive loss by hive origination. Twenty one of 47 overwintered SOBA member colonies were alive in the spring (43% loss rate), slightly fewer compared to

statewide (34%) and for the previous year (30% loss). Of 5 package colonies reported by SOBA members, 3 survived whereas 6 of 7 nucs survived (14% loss rate), both better survival compared to the previous year. Sixteen of 18 swarms survived but only 4 of 16 splits. No feral colony transfers were reported this year. Figure 4 shows loss percentages for last two years.



For Klamath Basin beekeepers (8 respondents) , there were 63 fall Langstroth 8 frame colonies with a 46% loss and 22 Langstroth 10 frame hives with a 27% loss; no nucs, Top bar or Warré hives were included by respondents. Overwintered colonies (32 of 45 survived, 29% loss) and swarms (13 of 18 survived, 28%) had the best success; four of six nucs, in contrast with SOBA numbers, died - the toughest winter survival.

Not everyone had loss. Ten SOBA individuals (45%) reported total winter survival; three individuals lost 100% of their colonies. Heaviest loss by a KBBA member was 22 colonies and 3 colonies by a SOBA member. Data for SOBA (two years) and KBBA shown graphically Figure 5.



The vast majority of respondents to the survey were new beekeepers. Fifteen SOBA respondents had 1, 2 or 3 colonies (68%) with 4 having 8+ colonies; the greatest fall colony number was 15. Three KBBA beekeepers had 2 fall colonies and one had 4 (50%) while 2 had more than 10 colonies. Ten of 22 SOBA members had 1, 2 or 3 years' experience (45.5%) and only 2 had more than 8+ year's experience, with 25 years the highest. Three KBBA survey returners had 3 years of experience, 2 had four and three had 6+; greatest experience was 8 years.

Three SOBA individuals had more than one apiary location and one KBBA did as well. One SOBA individual moved hives, but only a short distance on same property, while the largest KBBA respondent moved bees to CA for almond pollination.

When asked to indicate where the majority of their beekeeping education was received, both KBBA and SOBA highly valued the monthly bee meetings, compared to statewide responses. The Association classes of both associations were also ranked of great value. Bee mentors and Books, journals and magazines were also highly ranked. 71% of SOBA respondents said they had a mentor available in their early beekeeping education and all KBBA members did likewise, compared to 69% statewide.

Reasons for Losses

We asked individuals that had colony loss to estimate what the reason might have been (multiple responses were permitted). Of 276 statewide responses, 45 chose weak in the fall (16%), 40 selected Varroa mites (15%) and 14% said queen failure, plus I don't know. The 22 SOBA and 12 KBBA selections were led by poor wintering conditions (7 selections SOBA, 3 by KBBA). See additional selections (by number of individuals) in Table 1 for both groups.

	Poor wintering conditions	Weak in fall	starvation	Pesticides	Varroa mites	Queen failure	I don't know
SOBA	7	3	2	2	2	2	2
KBBA	3	2	2	2	1	2	0

Survey individuals are asked to indicate what might be an acceptable loss level. Among SOBA responses were zero (8 individuals), 10% (7 individuals), 25% (3 individuals) and 33% (5 individuals); KBBA survey takers said zero (2 individuals), 10% (3 individuals) 25% (1 individual) and one individual each of 50% and 100% loss elected as acceptable. Statewide, 47% felt 10% or less was acceptable and 10.5% stated 50% or higher was acceptable

Why do colonies die? There appears to be no single reason for loss and a good deal of variance in opinion as to what might be an acceptable loss level. Colonies in the same apiary may die for different reasons and loss levels vary from one season to the next. We are dealing with living animals which are constantly exposed to many different challenges, both in the natural environment and the beekeeper's apiary. The four MAJOR factors in colony loss are

thought to be mites, 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 has 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 explanation to 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 reason, colonies are not as healthy as they should be.

Management selections and losses

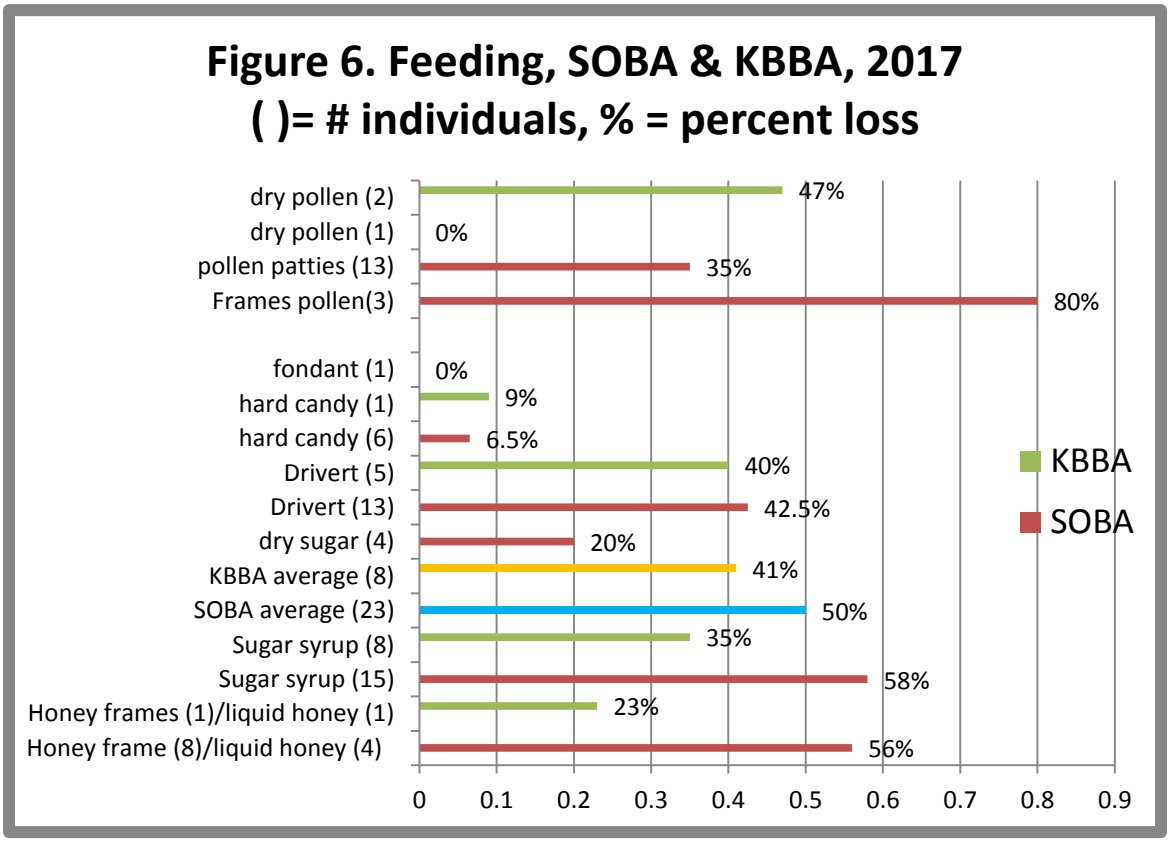
The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring techniques and mite treatment controls (such as screen bottom board use, drone brood removal efforts, etc.) and chemical mite controls used. Individuals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

For the larger data base of OR beekeepers, feeding dry sugar or hard sugar/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 mites with alcohol wash or powdered sugar and use of several of the chemical mite control options did likewise. See this analysis in the OR beekeeper report; www.pnwhoneybeesurvey.com.

FEEDING: There were 68 total SOBA responses to the inquiry on feeding colonies (3/individual). Two SOBA individuals did not do any of the options offered; the loss level of this group was 25%; all KBBA beekeepers selected responses, 23 total (2.9/individual).

Statewide, eighteen (18) individuals (10%) managing Langstroth hives did not do any of the options offered; they had a 75% loss of colonies (compared to 48% overall losses); 5 top bar hive owners who indicated doing no feedings lost 81% and two Warré hive owners who checked no feedings lost all of their Warré hives.

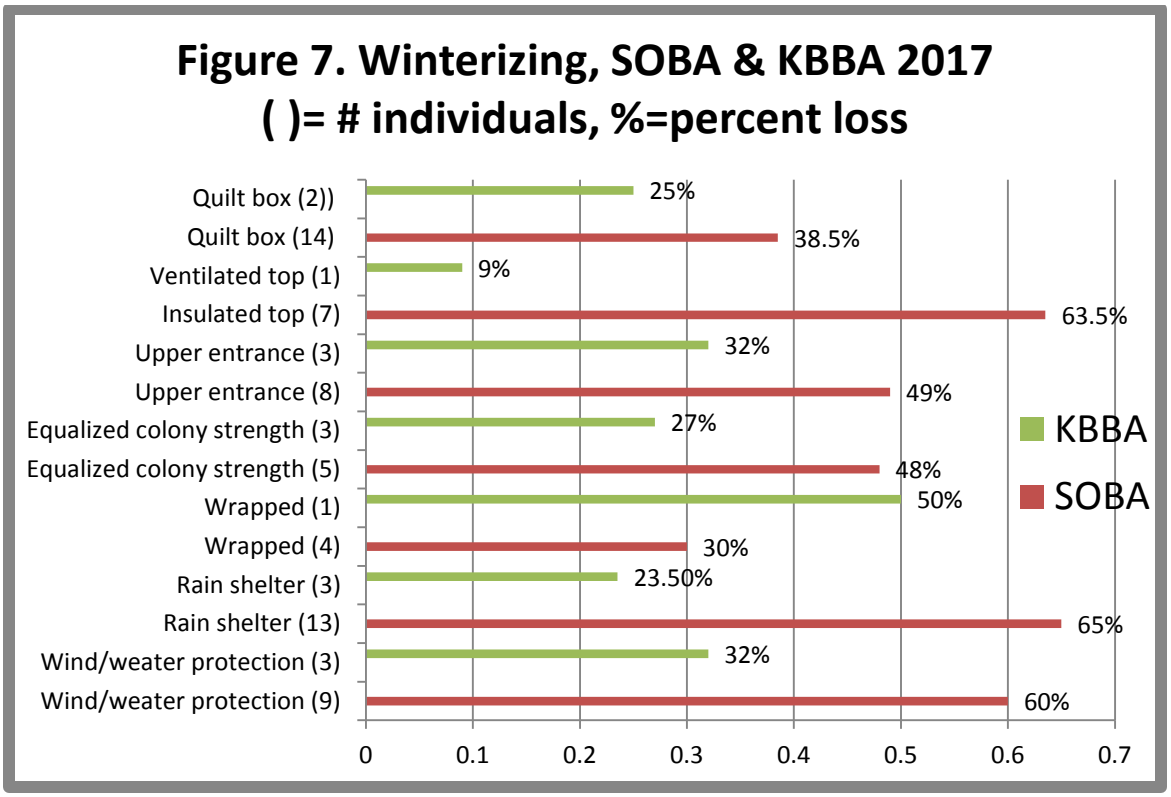
As shown in Figure 6, the KBBA feeding of liquid honey (one individual) resulted in a low loss – a data 'outlier'; the one individual feeding frames of honey had a 50% loss. Statewide there was no advantage to feeding honey or sugar syrup. In contrast, feeding dry sugar as drivert (except for KBBA members) or dry sugar or as hard candy all helped improve success overwinter. One individual fed fondant to four colonies and they all survived (=0% loss). Statewide, dry sugar and hard candy improved success. Feeding pollen dry or as patties improved survival both for SOBA and statewide beekeepers (but not for the 2 KBBA individuals).



WINTERING PRACTICES: We received 60 responses about wintering management practices from SOBA members (3/individual - more than one option could be chosen). Three SOBA members made no choices, their winter loss was 30% and 2 of the 8 KBBA members had no selection; their loss rate was 55%. Figure 7 shows data of wintering management for SOBA and KBBA respondents.

The two most common wintering managements selected by SOBA members was ventilation/use of a quilt box/lid insulation (14 individuals) 28%of total and rain shelter (13 individuals). Wind/weather protection (9 individuals), upper entrance (8 individuals), and insulated top (7 individuals) were also common choices. For KBBA individuals, 3 individuals each selected quilt box, rain shelter, equalizing colony strength and upper entrance. SOBA individuals made 60 choices (3/individual) while KBBA members had 17 choices (2.8/individual).

As shown in Figure 7, the small number of respondents resulted in widely varying losses. Use of a quilt box improved survival for both Association members and a number of selections by KBBA individuals seems to show improved survival. However one individual with 50% of Langstroth 10 frame colonies had only a 9% loss and checked four selections (i.e. wine/weather protection, Equalized colony strength, upper entrance and a ventilated top), skewing the data toward less loss. Statewide only use of a quilt box added to top of colonies improved survival.



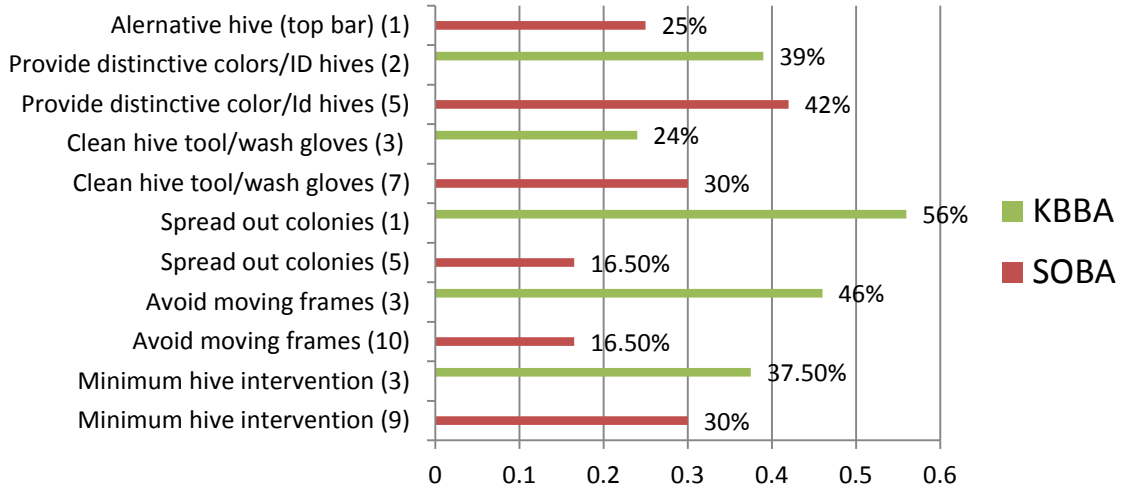
SANITATION PRACTICES: It is critical that we practice some basic sanitation in our bee care. We probably do too little to help insure healthy bees. SOBA members provided 37 responses for this survey question (2/individual) and KBBA 12 selections (also 2/individual). Five SOBA individuals (22%) said they did not practice any of the 8 offered alternatives; they had a loss rate of 89%. Two KBBA individuals (25%) did not check any alternatives and had a loss of 44%.

The two most common SOBA selections were Avoid moving frames (10 individuals, 57% of total individuals excluding those who had none) and minimal hive intervention (9 individual responses). Less intervention means less opportunity to compromise sanitation of a hive; needless inspections/manipulations can only interfere with what the bees are doing to stay healthy. As caring bee stewards we should believe we can do our inspections without necessarily compromising bee colony health.

Virtually all meaures helped improve survival for SOBA individuals whereas none except cleaning hive tool/frequently washing gloves showed improvement for KBBA members.

Apiary site selection and colony configuration within the apiary, although not commonly used, are additional important sanitation management choices. Anything we might do to give colonies distinctive “addresses” has been shown to reduce drifting of adult bees and helps to reduce incidence of disease and mites.

Figure 8. Sanitation SOBA & KBBA, 2017
( ) = # individuals, % = percent loss



SCREEN BOTTOM BOARDS: In the survey we asked what percentage of hives had screen bottom boards and whether they were blocked during the winter. Statewide 18% said they did not use screened bottoms and this sub-set had the highest loss rate. Five SOBA beekeepers (22%) said they did not use them and they lost 81% of their colonies; two KBBA beekeepers did not use them and their loss rate was 48%. Statewide 69% used them on all their hives with a 45% loss rate; 14 SOBA individuals that used SBB on all their hives had a 32.5% loss and 5 KBBA members who used them on all their hives had a loss rate of 29%. The majority statewide (51%) and SOBA beekeepers (65%) left them open over the winter period (never response). Eighteen percent (18%) statewide and 4 SOBA (and KBBA) beekeepers closed them during the winter. Figure 9 shows statewide number of users on all colonies (69%) and loss of individuals using on all and no colonies. Data for SOBA & KBBA members on left.

SOBA

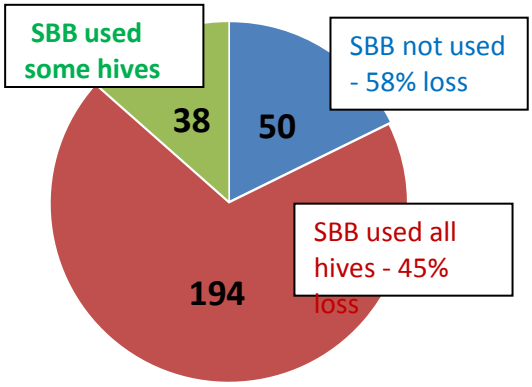
14 Used on all hives - 32.5% loss

5 did not use - 81% loss

KBBA

5 Used on all hives – 29% loss

Figure 9. SBB use - OR individuals



3 used none or some – 49% loss

There was no difference whether bottom boards were closed or left open in loss/ survivorship. There is no good science on whether open or closed bottoms make a difference in overwintering success but some beekeepers "feel" bees do better with them closed overwinter. An open bottom, at least part of the year, can assist the bees in keeping their hive cleaner. **When SBB use is correlated with colony losses, a small advantage is gained with their use.**

Managements 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 frequently do only a single management nor do they necessarily do the same thing to all the colonies in their care. Smaller numbers, as in local associations, are sometimes widely skewed and it is more difficult to show significance within local groups with the smaller data base.

We do know moisture kills bees, not cold, so we recommend hives be located in the sun, out of the wind and, when exposed, provided with some extra wind/weather/rain protection to improve survival. Using screened bottom boards and leaving them open (or closed as per your preference) for ventilation helps reduce losses as well. Use of insulted tops/quilt box with moisture collector such as burlap, straw, old towels, etc. with extra top ventilation and a top entrance, especially as it may help vent excess moisture, is also of potential benefit in reducing winter losses.

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 improve overall survival.

Mite monitoring/sampling and control management

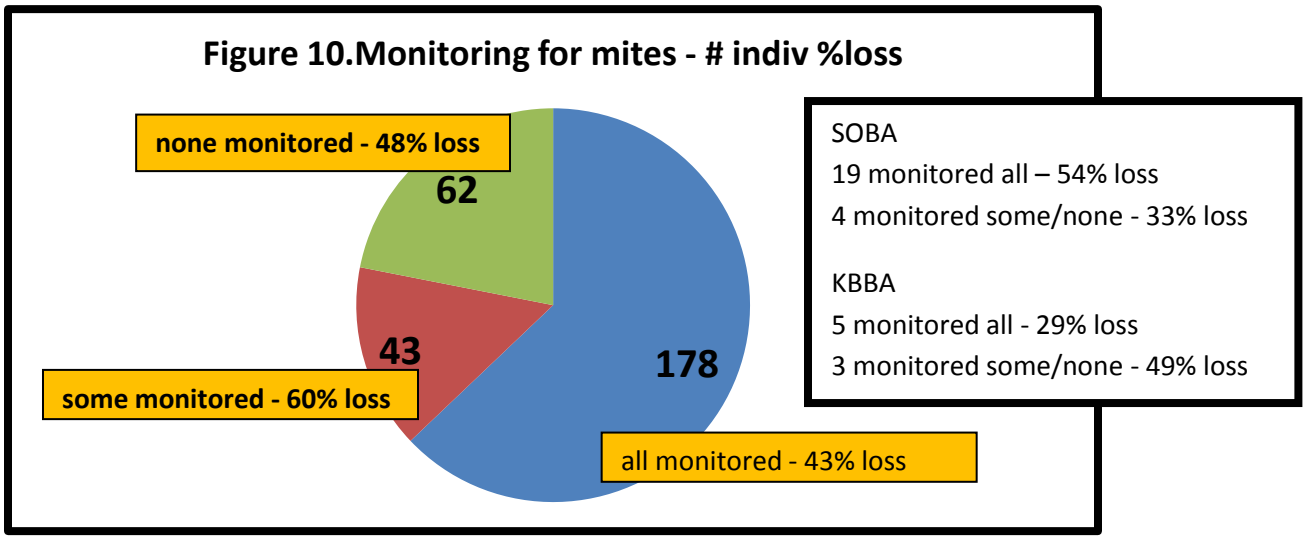
All OR bee hives have or will have varroa mites. It is important to know **how many mites are present.** Knowing how many mites provides an estimate of approximate risk of mites elevating colony losses for the time of year the sampling is done and, when sampling is started in July and continued into 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, what method was used, including when (month) it was employed. Statewide, 178 individual respondents (63%) said they

monitored all their hives. Comparing losses of those individuals monitoring all their hives, alongside those not monitoring, as well as those who indicated they monitored some of their hives, reveals a 43% loss of those 178 individuals monitoring all their hives, the 62 individuals (22%) who reported they did no monitoring had the statewide average loss of 48% loss while the 43 individuals who monitoring some of their colonies had a 60% loss. **Monitoring helps!**

The comparable numbers for SOBA was 19 individuals (82.5%) monitored all their hives and had a 54% loss rate. The four individuals monitoring some or none of their hives had a 33% loss, opposite the statewide numbers. For KBBA respondents the results were similar to statewide results – the 5 individuals monitoring all their hive had a 29% loss while the 3 who monitored some or none of their colonies had a 49% loss. Figure 9 below illustrates the statewide data with SOBA and KBBA data in sidebar.

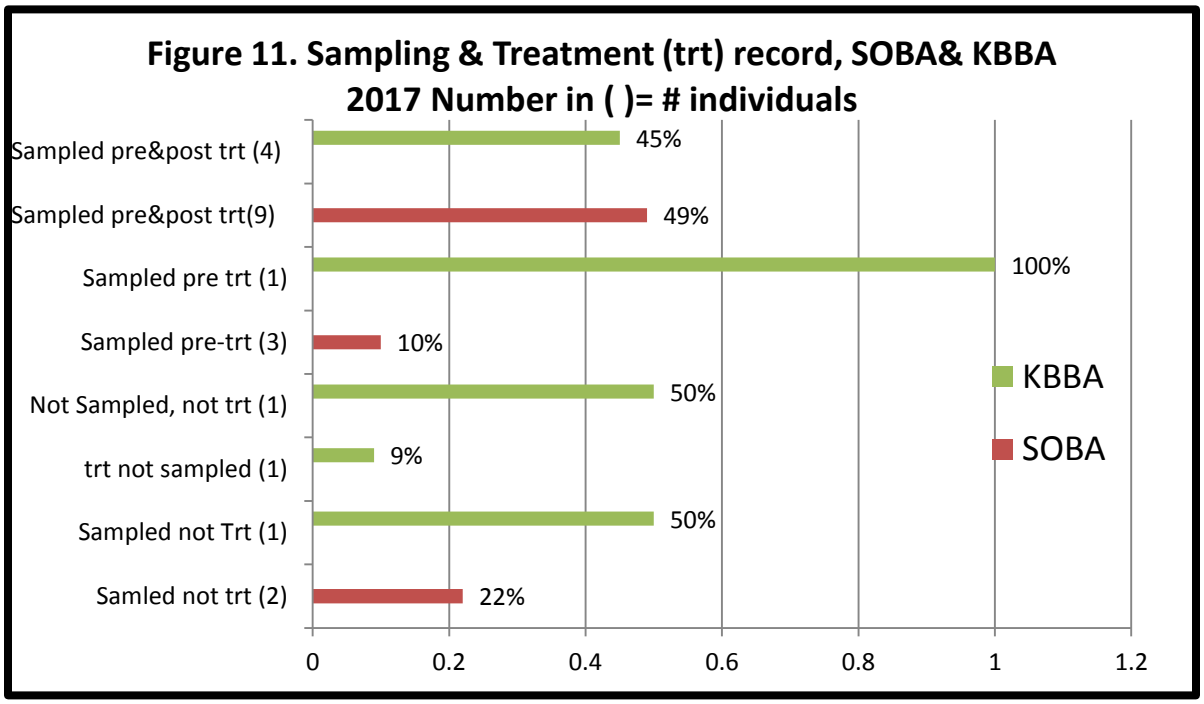
Figure 10.Monitoring for mites - # indiv %loss



Three SOBA individuals did no monitoring and 7 individuals used a single monitoring method. Statewide. users of powdered sugar and alcohol washing individuals had lower losses but among SOBA the two individuals using powdered sugar had a 77% loss; the 12 individuals using alcohol wash had lower losses of 41.5%, compared to average SOBA loss (50%). For KBBA, 2 individuals used no monitoring and 2 used only a single monitoring method. No alcohol wash was included for KBBA while the 4 who did powdered sugar had a 36% loss, better than average for members.

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 is not accurate; most mites are not phoretic on the adult bees, but reproducing within the brood cells. Even looking at drone brood is not effective; if done, look at what percentage of drone cells had mites.

The data collected when sampling was done (several options were included in survey) is shown in Figure 11. For statewide sampling both pre- and post-treatment had the lower loss but this was not the case with SOBA or KBBA members. For SOBA, sampling pre-treatment and sampling but not treating had the best survival.



Pre-treatment can help with control decisions and checking on control effectiveness by post-treatment monitoring is important. Most effective sampling methods are the sugar shake and alcohol wash methods.

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.

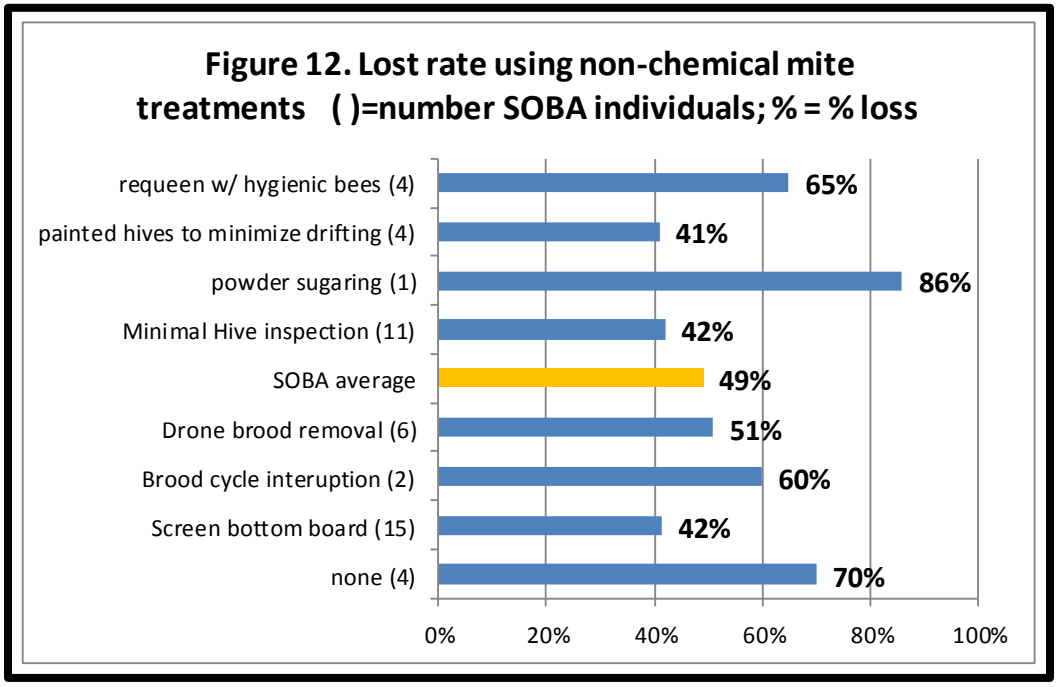
Use of medications and control treatments

We asked about general non-chemical mite treatments and also about use of chemicals for mite control. The two (25%) KBBA members who did not use any chemical control had a 67% loss; three SOBA members did no control but only had a 23% loss

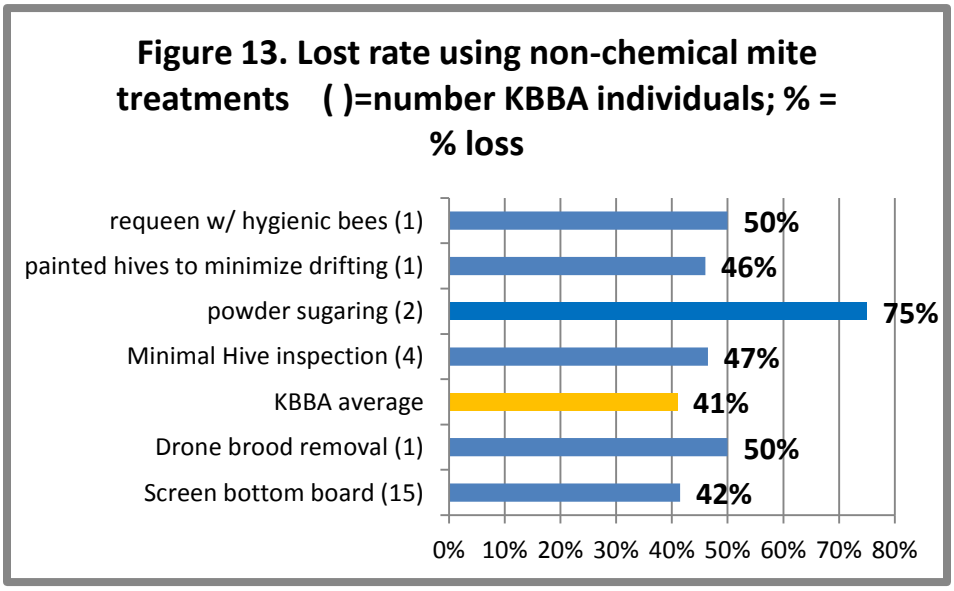
NON-CHEMICAL CONTROL: Respondents were asked about alternative, non-chemical mite treatments employed. Of seven non-chemical alternatives offered on the survey **use of**

screened bottom board was listed by 200 individuals (71%) statewide. They may offer a slight advantage in slightly lower losses (45% loss compared to average 48% statewide losses).

For the SOBA respondents who checked at least one choice (more than one selection was permitted), screen bottom boards followed by minimal hive intervention were the most popular choices (as they were statewide). More than half of the individuals checked both SBB and Minimal intervention. Users of both had losses below the average for SOBA – 15 SOBA individuals (79% of total with a choice) checked SBB and had a 41.5% loss and the 11 checking minimal hive intervention/inspection had 42% loss rate. Individuals who indicted they painted their hives colors to minimize drifting also had better survival. The 19 individuals with at least one choice made 43 total selections (2.3/individual). One individual had 6 selections and another four. Six made a single selection with minimal hive intervention or SBB. (Figure 12).

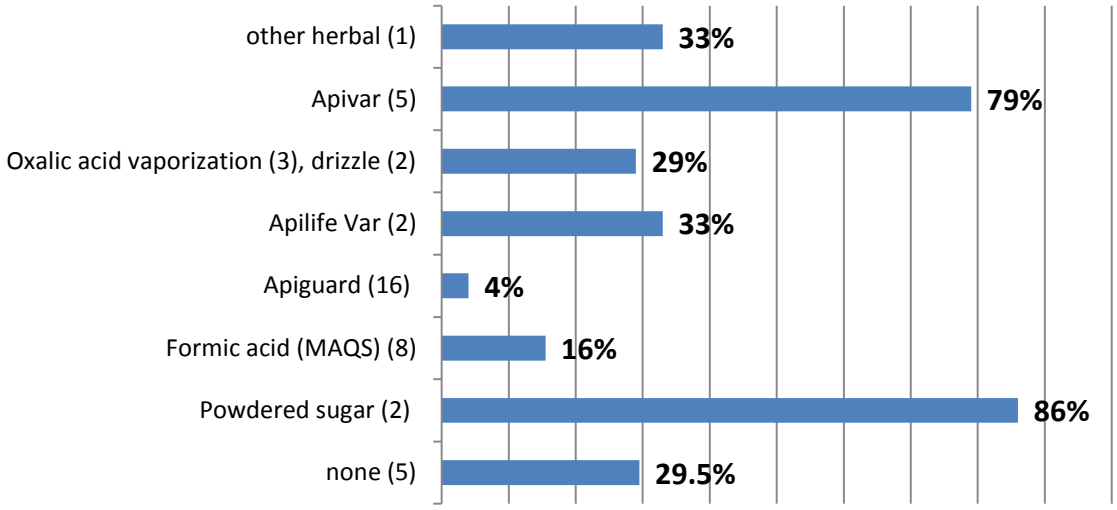


For the 8 KBBA respondents there was no treatment that proved effective.



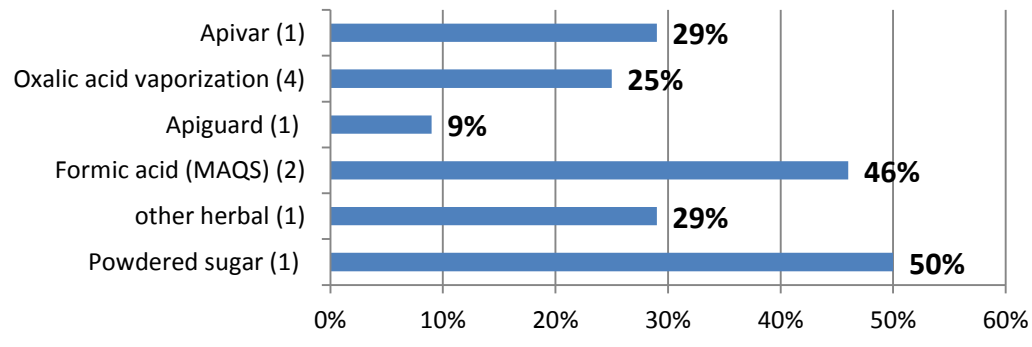
Chemical control: Five SOBA individuals said they did not use any of the chemicals; they had a 29.5% loss rate. Apiguard (essential oil thymol), Apivar (amitraz) and MAQS (formic acid) were the most commonly used materials. Apivar, in contrast to statewide did not show a reduced loss but all other chemical treatments, except powdered sugar, did lead to a reduced loss compared to average (50%) SOBA Loss. Comparison of SOBA chemical use in Figure 14.

Figure 14. SOBA Lost rate using chemical mite treatments
( ) =number individuals, % loss



For KBBA beekeepers all but powdered sugar and Formic acid resulted in better survival compared to 43% average loss of 8 respondents.

Figure 15. KBBA Lost rate using chemical mite treatments
( ) =number individuals, % loss



What works? Alternative of drone brood removal is a non-chemical treatment that works in most colonies during spring buildup. You can buy a drone foundation frame or put a shallow frame into a standard brood box and have bees construct drone cells below the shallow bottom bar. The colony doesn't need that many drones so you harvest them in capped stage to discard with their mites. This technique only works during spring buildup.

Breaking the brood cycle, with requeening, especially if hygienic queen stock or local selected stock is used to requeen or 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.

There is a wide array of chemical treatments available to treat varroa mites. A chemical is often the best choice when colony mite populations are high as they can be very effective. Materials that can be used include acids such as formic acid (Mite-Away Quick Strips, or MAQS – especially the ½ dose treatment) and Oxalic 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. There may be significant queen or brood losses with many of the chemicals and post treatment sampling is recommended to insure the control has worked as expected.

Among the 219 Oregon survey respondents, 89 individuals indicated they did not use any chemical controls; they had a loss rate of 59%. Apivar, the synthetic amitraz chemical, was used by 43 individuals and they had a much better survival rate with only a 23% loss rate (the 4 Apivar users in SOBA did not have reduced losses). Twenty one individuals used ONLY Apivar, 15 used 2 chemical materials, 5 used 3 chemicals and 1 each used 4 & 5 chemicals. MAQS (Formic acid) was used by 42 individuals and they also had a significantly better survival rate with a lost rate of 23%; among the 42 individuals, 17 used ONLY MAQS, 16 used 2 chemicals, 9 individuals used 3 and 1 each used 4 & 5 chemicals (for 2 MAQS users of KBBA there was not a reduced loss with use of this chemical).

The essential oil Apiguard was used by 32 individuals and they had a 26% loss; 14 individuals used ONLY Apiguard, 10 used 2 chemicals, 7 used 3 and 1 used 5 chemicals (loss rate of Apiguard users in both SOBA and KBBA were extremely low). Oxalic acid was used by 30 individuals; they had a loss rate of 35%; 7 of these individuals used ONLY Oxalic acid, 15 used 2 chemicals, 7 used 3 and 1 used 4 (Oxalic acid vaporization lead to significantly lower losses by both KBBA and SOBA members). Powdered sugar was the chemical choice of 16 individuals; their loss rate was 29% for the 16 individuals, 7 used ONLY PS, 2 chemicals were used by 3

individuals and 4 used 5 chemicals. The six individuals who indicted use of powdered sugar in the two southern tier associations had from 50% to 86% losses – it definitely did not work.

Thus chemical use rather clearly improved overwintering of Oregon beekeepers. Significant numbers of individuals used more than one chemical. How such integration of chemicals with non-chemical alternatives or mixing of different chemicals needs to be more clearly determined. It is important to follow label directions. Consult Tools for Varroa Management from Honey Bee Health Coalition, available for free download from OSBA website or www.honeybeehealthcoaltion.org/varroa.

Six individuals of 144 that responded statewide (4%) indicated they treated with terramycin for foulbrood disease, none from SOBA. Thirty individuals (21%) indicated use of Fumigillin for Nosema disease control; four SOBA members using a Nosema antibiotic last year but none this past season. Two individuals in SOBA used a tracheal mite chemical (Mite-a-Thol and grease patties with combined loss rate of 33%, better than average.

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 both SOBA and KBBA respondents, 2 individuals in each association 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 reason for winter loss, responded that queen loss might have been a factor in colony losses.

Among SOBA respondents, 11 individuals (58%) said none of their losses were likely due to queen failure and they had a 65% loss rate. Four (21%) said they did not know, with loss of 23%) and four individuals, double the number who specifically listed queen failure as one of the possible reasons for overwinter (loss rate of 52%). This last response required an estimate of the approximate percent of colony loss that might be attributable to queen failure; two individuals said 10-30%, and the other two listed 75-100% of their loss could be due to queen failure.

Our subsequent question asked “Did you, or did your hive requeen, in any form during the year”. Of 23 responses, 5 (22%) said no and 4 said ‘Not that they were aware of’ (17%); their loss rate was 32%. The 14 indicating yes had a 58% loss. Four of these 14 said they had marked queens.

For the 14 responses to the question” If you did requeen, how did you do it,” five said requeening was via swarming and two via supersedure. Five individuals introduced a new mated queen, one introduced queen cells and the last individual split their hive so the bees might requeen.

Queen stock is a key to eventually not having to do constant mite control. SOBA president John Jacob Old Sol has been working on finding bees better suited for the local habitat. WSU and the USDA lab in Louisiana have significant efforts underway seeking bees that are more mite tolerant/resistant. Russian bees have better ability to resist mites as does proven hygienic stock. WSU’s program with imported semen is yielding bees with improved hygienic behavior to remove mites. Mixing local stock with hygienic stock seems to be working.

For KBBA respondents two individuals said no their colonies did not requeen and one said they didn’t know; they had loss rate of 38%. For those 5 indicating yes, 2 said 10-30% and one 30-50% of loss could be attributed to queen loss (other two didn’t estimate); their loss rate was 62.5%. Three total had marked queens, of which two said they didn’t know if their queen was replaced?? Two said their colonies did not requeen and one indicated “No not that I am aware of.’ For the five where queen replacement occurred, one indicated supersedure, three used a mated queen to introduce and one split hive to permit rearing of a new queen.

CLOSING COMMENTS

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 consider adding your voice to the survey in a subsequent season. Dewey Caron July 2017

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