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Tohono O'odham Nation
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Re: Honey Bee Death and Colony Loss Report

Sun Apiaries is a honey bee farm located approximately 40 minutes west of downtown Tucson, Arizona in Avra Valley. Having trained over 400 people in the art of beekeeping, Sun Apiaries is currently in its 10th year of providing hands-on beekeeping education to the public. In 2016 we have successfully completed work with the United States Department of Agriculture through a Local Food Promotion Grant to establish honey bee education and honey production at the San Xavier Cooperative Farm (SXCF) on the Tohono O'odham Nation surrounding the San Xavier Mission. Additionally, through a Sustainable Agriculture Resource Education grant (SARE) we are working with University of Arizona Extension to assess the economics of instrumental insemination breeding vs. open-mating breeding specific to Africanized regions using various pure and hybrid strains of honey bees.

Since 2008 we have grown our business to collaborate with other farms for strategic placement of hives to serve as permanent out-yards and a source of crop pollination. The farms we work with share our values and desire to bolster local food production and the local economy. One of these farms is the San Xavier Cooperative Farm on the San Xavier District of the Tohono O'odham Nation.

Unfortunately, beginning in February/March of 2017 we have been experiencing what is perceived to be extensive damage to the hives nearest the more populated areas surrounding SXCF. Three separate instances have occurred in two bee yards, each containing between 20 and 35 colonies, where multiple hives have been killed. The following outlines the events along with actions taken to document the damage. Photos included with this report are only of those of the most recent event. Photos from earliest incident are available upon request.

1) February 24, 2017: Myself (Sun Apiaries owner, and two volunteers, recorded a series of 6 or 7 hives with extensive dead bees on the bottom board of the hive and immediately outside on the ground at the entrance. By late March a total of around eight dead colonies had been removed from the north yard (San Xavier Coop Farm Yard 1) SXCF1. Interestingly, a feral colony of honey bees occupying an old tractor just inside the north fence of the equipment area of the farm died of what appeared to be the same cause.
2) November 30, 2017: a series of hives in the north yard succumbed to death by the same symptoms noted earlier in the year. The time of the actual event is estimated to be around November 10th according to notes. Surviving colonies were given pollen patties (protein supplement) to aid recovery. The south yard (SXF2) appears to have only been lightly affected around the same time and were noted to be very healthy going into December. Around this same period SXCF employee Raymond Antone identified one feral colony close to the San Xavier Mission that appeared to have been greatly damaged (almost dead) due to the same causes. No

formal attempt to exterminate that colony by the home owner had been made previously. By the middle of March 2018, SXF1 lost all but two surviving colonies, most likely in large part due to the contamination suffered in November the previous year. Most of the pollen supplement given in late November had not been eaten, indicating that the hives were too damaged to resume brood rearing.

3) March 26th, 2018: SXF2 was discovered to have also been contaminated very recently - likely very late February or early March. On March 28th, 2018 at 11:30am, Environmental Protection Office Technician, Morgan Ashley, along with Gabriel Vega, San Xavier Cooperative Farm Manager assisted me in witnessing the apparent damage. It was demonstrated by shaking the combs in one affected colony, that a mass of wet, fresh nectar could be shaken out of the combs. It was stated that the amount of fresh nectar was abnormal given the estimated collection time of late February, and that Sun Apiaries had not been feeding sucrose syrup to colonies over the winter. According to records, a pollen patty supplement was given to all hives in November during the last harvest of honey, and that all of it had been consumed by healthy colonies shortly thereafter. There was no indication of pollen supplement in the hives during this inspection. A large mass of dead bees on the bottom board of the hive indicated that the bees died suddenly (see photo). In addition, pollen and capped honey was coated with fermenting fresh nectar indicating vomiting. Fermenting pollen was an indication that copious amounts of fresh nectar were vomited during the event, and that the hive was recently rearing fair amounts of brood at the time of death. In the presence of the EPO Technician, a frame was shaken to indicate the plentiful amount of wet nectar (high moisture content) that spilled out onto the hive stand. This indicated that the bees died suddenly since they did not begin to dry the nectar down to 16% moisture (honey) nor did they have a chance to make use of it for brood rearing activities. In addition, during the period surrounding the estimated time of death, it would have been highly unusual for enough excess nectar to be present in the environment that the bees would attempt to store as honey.

At approximately noon on 3/28/2018 one hive exhibiting acute symptoms was removed from the apiary, bagged, and placed in freezer storage for possible screening to determine the cause of death. Additional photos of various frames were taken in an effort to record any possible disease such as foulbrood or chalkbrood. No evidence has yet to be seen at the base of cells, and the brood under cappings appear to be too decomposed to determine whether mites were an underlying cause. Samples of comb containing nectar and pollen, along with a sample of dead bees placed in a vial with alcohol, were taken and frozen for further future analysis.

Of further interest is that hives have been moved continuously between the home yard in Avra Valley (25 miles northwest) and the SXCF. Processed combs from the home yard have been exchanged with those from SXCF indicating no transfer of diseases. Most all hives at SXCF are also of varying degrees of Africanized hybrid strain which thus far have not needed continual treatments against varroa mites since our alcohol wash assays have shown that mites have not been affecting overall performance of the colonies. Average honey per production colony from SXCF during the summer of 2017 was measured to match stated 2015 USDA statistical records for the area of almost 50 lbs per colony.

In all it is estimated that an approximate total of 30 colonies have been killed since early 2017, and that an additional 30-40 hives were damaged to the point that their expected population strength cannot recover in time to produce a honey crop for 2018. A typical harvest of honey per hive is estimated to be 50 lbs at a retail price of $10 per pound. A hive, if strong in population, may also produce another hive for the following year at a value of $500 after work and materials are taken into account. Although it is difficult to put a dollar figure on the amount of damage sustained so far, the estimates for loss are as follows:

30 full grown hives lost = 30 x $500 = $15,000 hives

1500 lbs honey = 1,500 x $10/lb retail = $15,000 expected honey loss

30 hive splits = 30 x $250 = $7,500 new hives

Additional 30 hives sickened = $15,000 expected honey loss

Total estimated year loss = $52,500

This report is an effort to establish a basis for further investigation of possible honey bee livestock poisoning through some unknown substance up to a few miles away from the San Xavier Cooperative Farm. The evidence so far indicates that a large amount of contaminated high sugar content liquid has been in the area recently at times when 1) natural nectar forage is low in quantity, causing honey bees to forage at further distances, and 2) when the majority of commercial honey bee colonies are not present in they are still in California completing pollination of the global almond crop. Sun Apiaries has yet to send any colonies from SXCF on pollination contracts to California and has overwintered honey bee colonies on SXCF since 2013.

After reading through USDA literature of possible causes, it does not appear that a disease or poisonous plant pollen is the cause. Broad agricultural spraying also appears unlikely since a specific subset of hives were affected. In addition, SXCF does not use regulated pesticides and is a registered Certified Naturally Grown and Organic farm. The likelihood that nearby feral colony was exterminated leaving contaminated honey for other hives to rob out is low since capped honey is relatively immune to contamination during winter. Only SXCF1 and SXCF2 experienced the most severe damage while SXCF3 seems to be low in strength but so far has not exhibit the same catastrophic symptoms as the other two yards. SXCF3 is furthest from the most populated residential and commercial areas and approximately 2.0 miles southwest and 0.75 miles west of SXCF1 and SXCF2, respectively. All signs so far indicate an adulterated concentrated sugar point-source that was exhausted by the honey bees within a day or two during a time when little natural nectar forage was available.

At this time, without funding to run scientific tests in a sanctioned laboratory specializing in the detection of foreign contaminants, I am of the opinion that the damaged is being caused by some sort of insect specific contamination, and that this contaminant is likely being used in a way to target honey bees in the area. This report will be updated with further findings in the event laboratory analysis of samples can be arranged.

The following signatures affirms that those present to view the damaged colonies on 3/28/2018 have reviewed this report and agree with the contents herein.

_____ _____

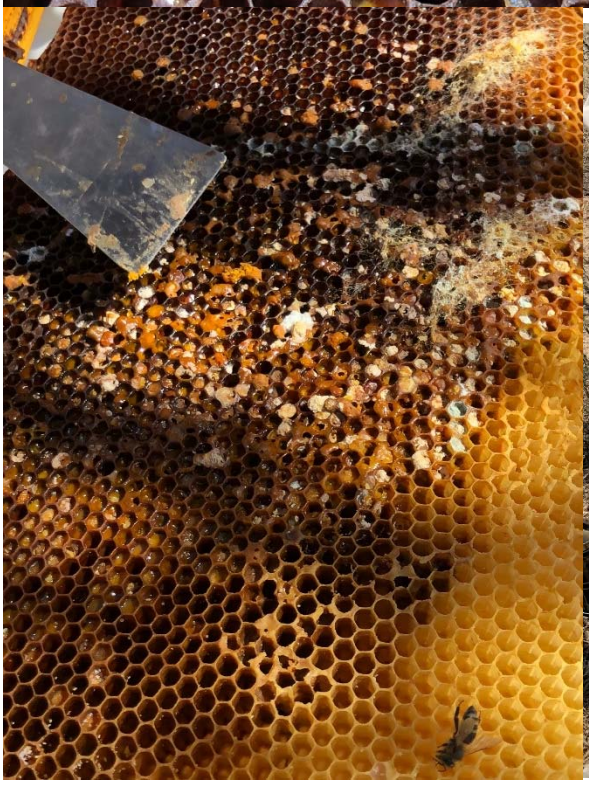
Jaime de Zubeldia, Owner Date
Sun Apiaries

_____ _____

Gabriel Vega, Manager Date
San Xavier Cooperative Farm

_____ _____

Morgan Ashley, Environmental Technician Date
Environmental Protection Office
Tohono O'odham Nation Department of Public Safety

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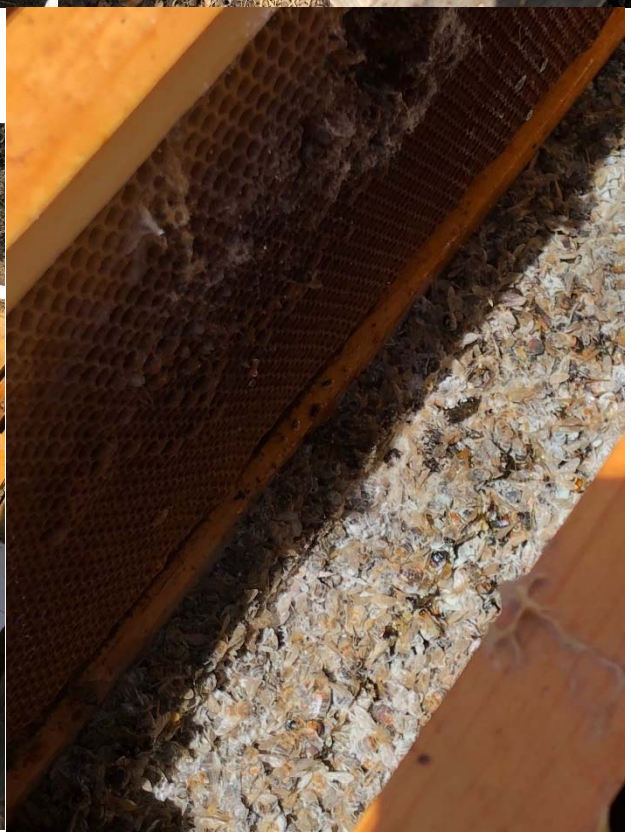


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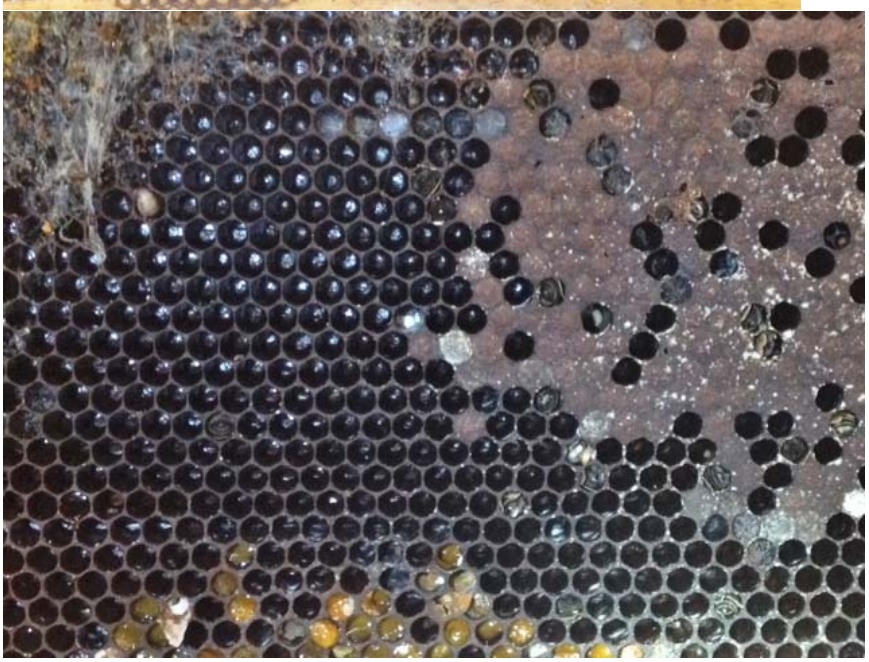


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