Statement presented to the Maryland Pesticide Reporting and Information Workgroup;
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Thank you for the opportunity to address this meeting. I am speaking on behalf of many Maryland beekeepers, our honeybees, and other pollinators of Maryland's crops and flora. Though my information is based on honeybee research, the effects that I will note are not limited to honeybees alone. Honeybees may well be the new canary in the coal mine, and their loss should speak to all of us.

In the calendar year 2012, 31% of all honeybee colonies in the US died. In the State of MD, last year's hive losses approached 50%. These losses at varying levels have been happening for a decade at least. No business model can sustain such losses and remain viable. Beekeepers in Maryland are concerned. And farmers should also be concerned because, if this continues, it will impact their business as well ours. Most importantly, it will impact our food supply.

Our modern industrial mono-crop agriculture doesn't simply rely on honeybees, it requires honeybees. Honeybees are flower-specific, and will therefore pollinate an entire field of a single crop. No other pollinator will do this. One third of our food, including crops that are a major livelihood for Maryland farmers such as apples, peaches, squash, pumpkins and many others, require bee pollination for successful fruiting.

So, we have more than 30% hive losses yearly for more than a decade, and 1/3 of our food chain potentially is affected by these losses. Yet we don't know why it is happening.

Research is on-going as to why this is happening. Much of the work comes from the University of MD, Penn State University, the University of Delaware and the national USDA bee lab is in Beltsville, MD. Maryland beekeepers benefit from this close proximity.

But needed research regarding on-the-ground impacts is stymied because we lack specific data to guide monitoring studies on what may be impacting hives in our region.

Research is pointing to 4 areas of major concern for honeybees. In the written text submitted to this panel, I will briefly address all 4:

- The first is honeybee genetics and breeding practices. Honeybee queens, the ovaries of the hive, these days may last a season, two at best, when they used to last 4-5 years. I am involved in a queen rearing project through PSU that is working on this issue, using the only tool we have available at our level – cross- and back-breeding successful surviving queens, including the use of artificial insemination of queens. To date, we don't know why this genetic weakness is happening.
- The second area of concern is habitat loss due to land use practices, federal subsidies for ethanol production, farm subsidies and farm economics. By example, farmers, homeowners and state road crews are planting and mowing wall to wall, leaving no residual habitat for pollinators. These factors combine to create food deserts for bees,

forcing them to travel farther to sustain the hive. We know this is adding to colony stress and in some cases to starvation, particularly in early spring.

- A third area of concern is diseases of bees, and hive pests that are disease vectors. Given global trade and national transport networks, we are exposed to new diseases and pests in a way that we were not 30 years ago. At this point, beekeepers are almost required to use certain legal and well tested chemicals and medication within the hive to maintain them at an economically viable level, and this is ubiquitous in the industry. However, this is not what is killing the bees.
  - The most important area of concern for this panel is that of the "cides"; pesticides, insecticides, fungicides, herbicides, and the associated growth regulators and other adjuvants. Though by regulation these are not supposed to be applied when bees are foraging, application technology often allows pesticide drift, and that has been shown to contaminate non-crop forage areas or even neighboring crops when bees are foraging on them.

  Secondly, the introduction of systemic pesticides such as the neonicotinoids , and GMO pesticides such as BT, or Bacillus Thuringiensius, allows sub-lethal but potentially cumulative pesticide dosage in pollen and nectar, the food sources for honeybees and other pollinators.

  Finally, laboratory and certification testing is often done using a single chemical to find the dosage that proves lethal to 50% of the population tested over a short time. This is called the "LD-50" dose. But this testing does not show the longer term effect on the lives of the remaining bees, or the long term effect on the bees at sub-lethal dosage levels. Most importantly, it does not show the effect in actual usage, where multiple chemicals are often applied together. In some cases it has been found that this mutuality increases the LD-50 up to 7000 times. In other words, the application mix as both recommended and applied can be 7000 times as effective at killing bees as any one of the individual chemicals. The certification of these chemicals is based on testing them one by one, over the short term, to LD-50 dosage. This often does not reflect the way they are used, nor does it reflect the sub-lethal effects that have recently been highlighted by a UMD study showing the deleterious affect of a fungicide on the bees' ability to navigate. Most disturbing, bees that ate pollen contaminated with fungicides were three times as likely to be infected by a particular parasite. The UMD scientists also identified eight pesticides associated with increased risk of infection by that parasite though the pesticides were not lethal at that level themselves. This study shows the interaction of multiple pesticides is also affecting bee health even at sub-lethal dosages. Note that fungicides are a class of chemicals that was supposed to have no affect on bees at all when they were certified. This shows that certification is not a final judgment – just what the European Union is questioning in the recent banning of two neonicotinoid pesticides for two years, well after original certification, while new testing goes forward. But any testing becomes moot if the data is not available for study. This point is exactly why we need the database of chemical use as applied.

How does this affect beekeepers in MD? I called the MD State Bee Inspector last week, and he told me that in the last three years, the State of MD has not verified a single case of pesticide poisoning of bees. There were only three cases reported. Why only three, and why were they not verified? Though beekeepers know by site the effect of a pesticide kill (thousands of dead bees

outside the entrance of the hive in a single day – and this has happened to at least two members of our local Baltimore County club last year alone), the testing as to which pesticide may have caused the death costs at least $200 – per pesticide tested. With hundreds of registered pesticides in use in Maryland, there is no way researchers working on the issue would be able to afford this sort of testing. However, if a database existed of what pesticides were used on a given day within the average forage range of honeybees, the number of possible chemicals to be tested for would be reduced considerably, allowing a more affordable and fine-grained testing.

This is a complex issue. Most beekeepers are realistic. We are not looking to ban the chemicals used in agriculture or the lawn care and pest control industry. However, what we don't know is, in fact, killing our bees and hurting all of us when it impacts the future of our food supply. We are hobbled in our ability to learn because the information that is legally required is not currently available to guide research. Certified applicators and farmers are required to keep detailed records at their place of business of what they have applied, where and when and at what amounts. This information is specific to absolute location. The information, in theory, already exists, but not in a way it can be used to guide essential monitoring studies regarding linkage of specific pesticides to specific hive losses, or on various application technologies and methods. We know the bees need to be in those fields in order that we all eat. But we cannot keep killing the bees and not know why. This is why beekeepers agree that we need comprehensive data on pesticide usage that researchers can easily access via the internet in a timely manner. In order for the data to be useful to our industry, the data needs to be both complete and specific, and the more specific the location the more useful the data.

To sum up, out of the 4 areas of concern I have mentioned, we cannot say one is more important than another, nor can we say absolutely how they are linked. But without the data, we cannot know. While there are multiple factors in bee death, we beekeepers know firsthand that the application of pesticides is a potent factor we can learn to manage more effectively. In order to do that, we need the visibility into how these chemicals are specifically used, not simply how they are approved. A detailed database of pesticide applications would provide us that information.

Thank you for your time. I appreciate the opportunity to speak for our industry – and for our hard working ladies in their hives.