Testimony on S.B. 231 (Raised) An Act Concerning Pollinator Health

Testifier: Dr. Kimberly A. Stoner, Associate Scientist, Connecticut Agricultural Experiment Station, New Haven.

I appreciate the work of the committee to identify actions the state government can take to improve pollinator health. Pollinators carry out an essential function in natural ecosystems, since it is estimated that over 75% of all flowering plants rely on animal pollinators for sexual reproduction. In economic terms, we have in Connecticut 556 farms producing fruit, nuts, or berries with a value of over $27 million, plus 398 farms producing pumpkins. All of these farms, and additional farms producing other fruiting vegetables, are dependent on pollinators every year for ensuring the quantity and quality of their products. According to a recent national survey, Connecticut beekeepers lost 57% of their honey bee colonies last year, after several years of losses around 50% per year. In addition, Connecticut appears to have lost 2 of our 14 species of bumble bees, and 2 additional species have not been collected in the state for several years, with all these losses apparently occurring in the 1990s to early 2000s.

This bill presents several opportunities to strengthen pollinator health, but I would suggest some changes and provide some additional information:

1. This bill proposes in Section 12 that the Connecticut Agricultural Experiment Station develop a citizen's guide to model pollinator habitat. I believe that expanding diverse pollinator habitat is of critical importance, and I would be willing to lead that effort, but would ask for the deadline to be extended from August 1 of this year to Jan. 1 2017 or later.
2. In Sections 10 and 11, the bill proposes ways to encourage pollinator habitat on state protected farmland within existing programs. I support that approach because planting pollinator forage in areas that are not at risk from pesticides is one of the most effective actions the state can take. This approach could be extended to roadways, with the assistance of the manual being developed by John Campanelli and Dr. Julia Kuzovkina of the University of Connecticut for New England Departments of Transportation. According to John Campanelli, there are Federal funds available for establishment of native plants as pollinator habitat.
3. Section 1 calls on CAES and DEEP to develop best management practices for reducing risk to pollinators from dust released from treated seed at planting. A model for best management practices exists, as developed by the province of Ontario: http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_fact-fiche/pollinator-protection-pollinisateurs/index-eng.php
4. Section 2 prohibits the use of the neonicotinoids on linden or basswood trees. I would support this provision since several bumble bee kills have been associated with the use of neonicotinoids on lindens. The neonicotinoids most highly toxic to bees (by the definition below) have been prohibited for use on trees in the genus *Tilia* (linden and basswood) in Oregon: http://www.oregon.gov/ODA/programs/Pesticides/RegulatoryIssues/Pages/PollinatorIssues.aspx

5. The bill would classify all neonicotinoids as restricted use (Section 3). Neonicotinoids vary greatly in their toxicity to bees, and I would support designation of those neonicotinoids which are "highly toxic to bees" as restricted use pesticides. "Highly toxic to bees" is defined by the US Environmental Protection Agency as those with an LD_{50} of 2 micrograms per bee or less.
6. Section 4 is overly broad. Neonicotinoids are used for controlling termites and controlling fleas on dogs and cats – among other uses which do not pose a hazard to pollinators. If the intent is to restrict outdoor uses by homeowners during the blooming season, designating the outdoor formulations of highly toxic neonicotinoids as restricted use pesticides would accomplish that goal throughout the year.

Written background:

People are most familiar with honey bees as pollinators, but we have 349 species of bees in Connecticut, most of which are pollinators, plus many other species of flies, wasps, beetles, moths, and butterflies that carry out pollination. I will focus on bees because they are responsible for the vast majority of crop pollination and because they are the insects I study.

Keeping a diversity of native bees healthy is essential because these bees provide the base of pollination services. In my research on pumpkin and squash pollination, 85% of the bee visits to flowers are from bumble bees and squash bees with only 15% from honey bees. Dr. Bryan Danforth and his students at Cornell have identified over 100 species of bees visiting apple blossoms. Honey bees are important because they can be moved into a crop, such as apples or blueberries, with a short pollination window, but they are a supplement to a thriving local diversity of native bees.

Keeping honey bees is difficult here. According to the annual Bee Informed survey, CT beekeepers lost 57% of their hives from 2014 to 2015 (https://bip2.beeinformed.org/geo/). This comes after a series of years when losses were about 50% each year. The total number of hives and beekeepers registered with the Connecticut Agricultural Experiment Station has not decreased in recent years– in fact it is increasing – because beekeepers have ways of making up their losses and because so many people want to keep bees. We currently have 1370 beekeepers with 7085 hives registered in the state. But it is difficult for those who keep bees as a business – those who move their bees to farms to provide pollination – to stay in business when they lose a large percentage of their bees each year.

The scientific consensus is that the continuing honey bee losses are due to complex of factors. The Varroa mite (*Varroa destructor*), which came into the state in the late 1980s, parasitizes honey bees directly and also transmits viruses among honey bees. This is the biggest problem, but additional factors are the loss of foraging habitat (in our state, decreasing open grassland and pasture with mixed flowers over a long season), and exposure to pesticides. Honey bees are exposed to pesticides inside the hive, used against the Varroa mite, and in the environment. Beekeepers rely on the state apiary inspector, Mark Creighton of the Connecticut Agricultural Experiment Station, and beekeeping organizations that follow current research for information

about how to apply pesticides in the hive that are effective against mites without doing too much harm to the bees.

There is also reason for concern about bumble bees. In Connecticut, we historically had 14 species of bumble bees. Of those 14 species, two are now believed to be extirpated in the state, one is considered threatened, and another has not been collected in the state in recent years. (http://www.ct.gov/deep/cwp/view.asp?a=2702&q=323478&deepNav_GID=1628) All these losses have been since the late 1990s to early 2000s. We do not know if the total abundance of bumble bees have changed – there is some evidence that some species of bumble bees may be increasing in abundance. As with losses of honey bees, the recent decline in diversity of bumble bee species is a national and international phenomenon, as well as a local one, and the spread of new pathogens causing disease, loss of foraging habitat, and pesticides have all been suggested as causes.

Because bees are insects, broad-spectrum insecticides used against other insects can also harm bees. Neonicotinoids, some of which are very highly toxic to bees, and which can persist in plants and soils for long periods after application, have drawn the vast majority of attention, but other insecticides, including organophosphates, carbamates, and pyrethroids have also been implicated in bee kills. Considerable information about the toxicity of many classes of pesticides, the length of time they remain toxic, and the circumstances under which they have killed bees, are in the publication "How to Reduce Bee Poisoning from Pesticides" from the agricultural extension services of several states in the Northwest. (http://pesticidestewardship.org/PollinatorProtection/Documents/How%20to%20Reduce%20Bee%20Poisoning%20from%20Pesticides_PNW.pdf)

With respect to neonicotinoids, information on bee kills that are clearly attributable to neonicotinoids come from two sources: 1. Reports from hundreds of beekeepers in Canada of honey bee kills associated with planting dust from seed treated with the neonicotinoids thiamethoxam, clothianidin, or imidacloprid: http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_fact-fiche/neonicotinoid/neonicotinoid-eng.php, and 2. Reports of bumble bee kills associated with use of neonicotinoids (including dinotefuran and imidacloprid) on linden trees: http://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/PesticideNewsletterSpring15.pdf

The state apiary inspector at CAES currently investigates honey bee kills and delivers samples to the CAES Analytical Chemistry department to quantify pesticide residues. In none of the bee kills investigated in recent years has there been evidence indicating that pesticides were the cause.

While there is considerable research indicating more subtle sublethal effects of neonicotinoids on bee health, including increased susceptibility to the pathogen *Nosema ceranae* and to some of the viruses transmitted by Varroa mites, there is also controversy about the extent to which those sublethal effects affect overall colony performance at the levels to which bees are exposed in the field.

My own research, in partnership with Dr. Brian Eitzer of the Analytical Chemistry Department of CAES commonly detected low levels (1-5 ppb) of imidacloprid in pollen collected by honey bees, but spikes above 20-25 ppb, the level recent research indicates would cause significant effects on honey bee colony health, are rare. (Stoner, K. A., & Eitzer, B. D. (2013). Using a Hazard Quotient to Evaluate Pesticide Residues Detected in Pollen Trapped from Honey Bees (*Apis mellifera*) in Connecticut. *PloS One*, *8*(10). e77550. doi:10.1371/journal.pone.0077550 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0077550)