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Hello, my name is Nat Shambaugh and I am a chemist who retired in 2016 from the Vermont Agency of Agriculture after spending 30 years testing for pesticides as part of the pesticide regulatory program in Vermont. In addition to being involved in most major regulatory investigations concerning pesticide misuse in Vermont for the last 30 years, I was involved in helping set up both groundwater and surface water monitoring programs for the VAAF. In 2017, after retirement, I was hired by the Lake Champlain Basin Program to put together a compilation of known information on organic contaminants in the surface waters of the Lake Champlain Basin. I also presented a preliminary risk assessment based on this information at the recent Lake Champlain Research Conference.

I want to thank you for taking up the issue of pollinator protection in Vermont, my wife is a hobby beekeeper so I am very interested in honeybee and pollinator issues in general, but today I would like to discuss the use of neonicotinoids (“neonics”) as seed treatments on corn and soy.

As you know, neonics are currently used on virtually all conventional (not organic) corn planted in Vermont as well as much of the conventional soy. It has become the norm to plant neonic treated seeds, without evidence of a pest problem. The report to the legislature from the Vermont Pollinator Protection Committee stated as one of their conclusions:

***“Pesticides used in Vermont should be based on need, not used prophylactically.”***

In fact, the Preamble to the Vermont Pesticide Regulations (1991), from the Agency web page states:

***“The goal of these pesticide regulations is to encourage the use of the most environmentally responsible approach to effective pest management. The Vermont Agency of Agriculture, Food and Markets believes that with the knowledge and use of Integrated Pest Management (IPM) skills and soil/water conservation techniques currently available this goal will be achieved.”***

The current widespread, prophylactic use of neonic treated seeds is contrary to IPM practices, and contrary to the stated goal of pesticide regulation in Vermont. The Pollinator Protection Committee discussed requiring scouting for pests prior to use of neonic treated seeds. I believe pest scouting or other IPM techniques should be required **BEFORE** any use of treated seeds.

There is widespread concern that the use of neonic seed treatments is contributing to the decline of honeybees and other pollinators because of their ubiquitous use and extreme toxicity. Because of the subtle nature of chronic toxicity it is difficult to demonstrate cause and effect in free-living insects such as honeybees.

Compelling evidence of widespread harm to pollinator populations from neonics in Vermont is sparse. There is growing evidence however of a different, ***current and ongoing harm*** from neonic seed treatments and other neonic uses. The USEPA, in their recent preliminary risk assessment for clothianidin (a neonic commonly used to treat seed corn) found both acute and chronic risk to birds ***and*** mammals from eating treated corn seeds. ***In addition, evidence in Vermont and across the world points to a problem with neonicotinoids entering our streams and rivers at levels acutely toxic to aquatic insects, the basis for much of our fisheries.***

Neonicotinoids are insecticides which are taken up by the plant and incorporated into its tissues, making the entire plant poisonous to insects. This is made possible by the fact that these chemicals are extremely water

soluble. Unfortunately research by USGS and others is showing that since neonics are highly water soluble they are showing up in surface waters wherever they are used. In addition, being insecticides, they are extremely toxic to the aquatic insects in our rivers and streams. Since neonics all target the same nicotine receptors in insect nerves, and bind irreversibly, they act synergistically and the effects build up over time. This may be why it is difficult to demonstrate chronic toxicity.

In 2018 the USGS published a survey of neonics in surface waters of the Great Lakes region, where they found neonics in 100% of samples within a large agricultural watershed. In this study they also found that 24% of all samples had imidacloprid above the EPA chronic threshold.

The USEPA is currently reviewing neonic uses for their effect on both pollinators and aquatic insects. The draft aquatic risk assessment for the neonic IMIDACLOPRID found potential risk (based on computer modelling) to aquatic insects from ALL uses of Imidacloprid. They found the lowest risk to be associated with use of neonics on treated seeds. Because seeds are planted below ground, the models conclude that there will be minimal surface water runoff from the seeds and therefore minimal effect on aquatic insects.

Unfortunately, the models cannot take into consideration export of neonics (and other water soluble pesticides) by way of tile drains. For many years the VAAFME has been investigating pesticide runoff from agricultural fields. In the last several years they have begun investigating export from agricultural fields by way of tile drains. It appears that, because neonics are so water soluble, they migrate down toward groundwater with rainfall and are exported in tiles from tiled fields. The table below summarizes a bit of the VAAFME neonic results, along with results for atrazine, nitrogen and phosphorous for comparison:

COMPOUND	EPA ACUTE	EPA CHRONIC	MAX JEWETT	MAX
	BENCHMARK (PPB)	BENCHMARK (PPB)	BROOK (PPB)	TILE (PPB)
THIAMETHOXAM	17.5		1.73	1.31
CHLOTHIANIDIN	11	1.1	<b>1.37</b>	<b>4.17</b>
IMIDACLOPRID	0.385	0.01	<b>0.07</b>	<b>1.12</b>
ATRAZINE	< 1.0		114	37
TOTAL P	N/A	N/A	1060	272
NITRATE-N	N/A	N/A	28.4 (ppm)	57.5 (ppm)

As you can see, the neonics (and atrazine) are routinely being found in streams near corn fields and are in fact exceeding toxic concentrations. **Tile drains are acting as a conduit for neonic transport to our surface waters at levels exceeding acceptable thresholds.** The exposure of aquatic insects to neonics by way of tile drain effluent has not been considered during the current EPA review. In fact, EPA concluded based on their modelling, that **no** clothianidin would enter surface waters after planting treated seeds.

In conclusion, based on USEPA, USGS, and other reviews, not just pollinators, but birds, mammals and aquatic insects are all at risk from use of neonics in general and seed treatments in particular. ACT 99, “An Act Relating to Regulation of Treated Article Pesticides”, passed by the legislature in 2016 enabled the Secretary of Agriculture to regulate treated seeds. To date he has chosen not to. Under Act 99, the VAAFME is authorized to regulate seed treatments: “upon the recommendation of the Pesticide Advisory Council”. Currently the VPAC will not prioritize investigating seed treatments until directed to by the Secretary. Therefore no progress is being made

on investigating the possible environmental effects of neonic seed treatments in Vermont. Because of this, I suggest that this committee include in H. 688 language directing the Secretary to consult with VPAC as per ACT 99.

I commend you for taking up this issue and I hope you will consider the following specific comments and recommendations:

### **H. 688**

- 1) I agree with making neonics restricted use, restricting to agricultural use, mandating reporting treated seed use, and banning use on ornamentals. ***I would suggest you add language banning importation into Vermont of ornamental plants previously treated with neonics outside Vermont.***
- 2) Direct VAAFMM along with UVM Extension to develop IPM scouting protocols, and BMPs to accompany them, require IPM pest scouting before treated seeds may be used. Implement BMPs by 1/1/21.
- 3) Until Scouting protocols are developed and implemented, require that only lowest concentration neonic treated seeds available be sold in Vermont. There is no evidence that treating seeds with higher doses of neonics has any benefit.
- 4) ADD: *“By 9/1/18, Under Sec. 7, and as per Act 99, the treated article bill from 2016, The Secretary shall direct VPAC to review current knowledge of the environmental consequences of neonic seed treatments and make recommendations to the Agency on which, if any, pesticides, uses, crops, etc. should be regulated, restricted, banned.”*
- 5) Sec 930 A(2)(b): Change “Pollinator Damage Compensation Fund to: “Pesticide Damage Compensation Fund”. Change language to: “compensate a person if application any pesticide or treated article containing pesticides results in...” This would create a fund to reimburse people for any damage due to pesticide use, not just neonics. Given that there are essentially no known, documented cases in Vermont of **provable** damage to bee colonies from neonicotinoids in the last ten years, the fund as currently proposed would rarely be used. It would be a better use of registration fees to create a fund to compensate victims of any pesticide damage.

### **H. 678.**

H.678 addresses the issue of agricultural tile drains. From the above discussion, it is clear that agricultural tile drains may be an issue for other agrichemicals than phosphorous. It is important, in this age of limited state dollars, to make the best use of those dollars. Therefore, any investigations of nutrient export via tile drains, must include an inventory and map of known tiled fields and tile exits. All agrichemicals such as nitrogen and pesticides, not just phosphorous, must also be considered when determining the costs and benefits of tiled fields. Therefore I suggest the following specific changes to H. 678:

- 1) Add inventory and mapping of existing and proposed tile drains/fields, as proposed in H. 242
- 2) Wherever “nutrients” is mentioned, replace with “agrichemicals” or “nutrients and other agricultural chemicals”
- 3) Move up the dates. I believe requiring pre-filing by 12/1/2019 and rulemaking initiation by 7/1/2020 should give the Agency adequate time to develop RAPs.