PREVENT CANCER NOW

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Submission to
Health Canada, Pest Management Regulatory Agency
Regarding Pollinator Re-evaluations
Proposed Re-evaluation Decision PRVD2017-23 and Registration Decision PRD2017-17
Clothianidin and Its Associated End-use Products
and
Proposed Re-evaluation Decision PRVD2017-24 and Registration Decision PRD2017-18
Thiamethoxam and Its Associated End-use Products

Prevent Cancer Now is pleased that the Government of Canada is considering neonicotinoid insecticides ("neonics"). Present evidence argues strongly for more vigorous restrictions of all neonics. The following observations and recommendations are offered, based upon discussion below.

These latest in the ongoing succession of narrowly scoped reviews of individual neonics leave aside important considerations.

- **Missing pollinators**. At northerly latitudes (including all of Canada) flies are increasingly important pollinators, surpassing bees. Flies are also important bio-control species. No evidence is provided or discussed regarding impacts on these most important species, although *Diptera* are sensitive to neurotoxic insecticides;
- **Improving scientific methods**. Extensive tabulation of scientific evidence is welcome. Data tables highlight major uncertainties inherent in such environmental research, with wide variations and uncertainties in exposures, and concomitant exposures of controls. Incorporating further elements of systematic review methodology will facilitate and improve ongoing and future assessments. Meta-analyses and visualization, and systematic grading and weighing of data are logical next steps.
- **Metabolite assessment is missing**. Clothianidin and Thiamethoxam share metabolites. Although some major metabolites are tabulated, data on their toxicity is lacking, as is complete environmental breakdown information.
- **Cumulative/aggregate assessments must be considered**. Multiple pesticides and metabolites are the reality in agriculture and today's foods. Despite knowledge that mixtures are risky, mixtures are not addressed here or in general. Substitution of similar chemicals *will* occur when limited restrictions are put in place. Thus there is a need to achieve pesticide exposures that are as low as reasonably achievable **(ALARA).**

***Prevent Cancer Now* recommends:**

- **shorter registrations, ending in 2018 or at the latest 2019, for all neonicotinoid insecticides.**
- **support for research to identify and restore ecological pest control mechanisms; and**
- **support according to international best practices to transition to organic production.**

About Us

Prevent Cancer Now (PCN; www.preventcancernow.ca) is a national Canadian organization working to eliminate preventable contributors to cancer. PCN conducts research, provides scientific analysis and input to governmental consultations, and conducts public education to minimize hazardous exposures to agents that can contribute to the development of cancer. PCN scientists and medical experts provide information based on a broad understanding of scientific methodology and the biology of contributors to cancer. The focus on cancer is generalizable to other chronic diseases as commonly accepted that contributors to good health (e.g. healthy food) and to the development of cancer (e.g. toxicants in air, water and food) also affect incidence and prevalence of other environmentally-linked conditions.

Scientific Assessment

Over the years in the approaches to neonicotinoid insecticides ("neonics"), Health Canada's Pest Management Regulatory Agency (PMRA) has extended temporary registrations for decades,[1] and divided assessments over re-evaluations of narrowly scoped considerations. The current documents do not address human health directly, but *Prevent Cancer Now* is commenting because the approaches exhibit common scientific methodological flaws that limit applicability of conclusions. This could be compromising environmental and human health in Canada.

Scientific assessments are only as strong as the methods used to assemble and assess the data, and can be no stronger than the data availability and reliability. Health Canada, and the PMRA in particular, should carry out international best practices in systematic scientific review, so that the present claims of "weight of evidence" are transparently supported with the scientific evidence systematically presented along with meta-analyses when appropriate, grading of said evidence, and final weighing.[17] The current assessments are largely limited to confidential data that could only be accessed by the public after the final decision, hampering comments directly on the assessment. Subsequent use of the Reading Room with no means to access or manipulate data electronically is of very limited usefulness.

The conclusions reached during scientific assessments can be no more applicable to pressing concerns in the real world than the questions posed during reviews. Insects are impacted by all neonics, and all of the neonics have all been detected in Canadian honey.[2]

Extensive international efforts by independent scientists on the Task Force for Systemic Insecticides conclude that neonics should replaced with other approaches.[3,4,5]

Non-bee pollinators and beneficial insects

Although assessments are ostensibly considering "pollinators" in fact the focus is entirely on bees, and almost entirely on honey-bees. As well, only two chemically related neonicotinoid insecticides of six total marketed in Canada are considered.

The assessments do not consider the majority of pollinating species in Canada.

Ssymank et al., report that at all Canadian latitudes more *Diptera* (flies) than *Hymenoptera* (bees) are responsible for pollination.[6] Species and roles of flies in pollination and impacts of insecticides represent large data gaps in Canada. In the PRVDs, "*Diptera*" and "flies" only refer to pest species, indicating that the Pest Management Regulatory Agency did not consider impacts on these species. Although beneficial roles such as eating aphids, are well known, the "value" of insecticides does not include assessment of losses of natural bio-control species. A research study demonstrated that soy yields were decreased with neonicotinoid applications because the insecticide residues in the slugs killed predatory beetles.[7] This observation was generalized to arthropod predators and parasitoids, in a 2016 meta-analysis of over 1000 observations of abundance of natural enemies associated with and without neonicotinoid seed coats, or pyrethroid insecticides.[8] Agriculture Canada and the Canadian Wildlife Federation are currently cooperating on research on pollinators other than bees.

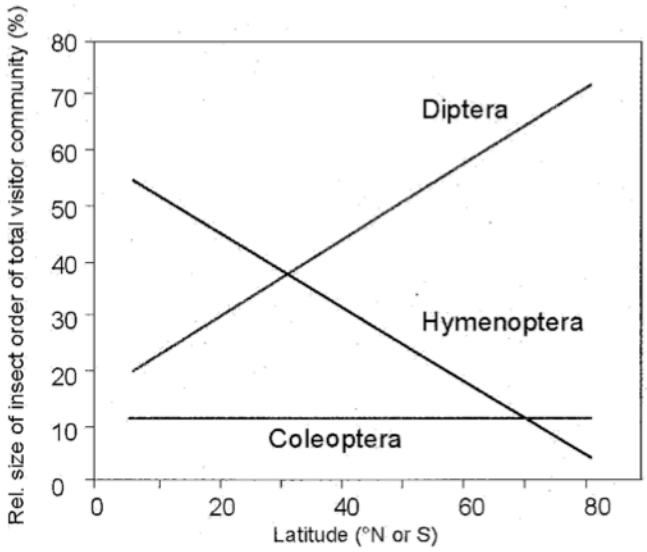

Figure: Relative importance of flies (Diptera), bees (Hymenoptera) and beetles (Coleoptera) in plant-flower visitor systems depending on latitude, modified from Kanstrup and Olesen (2000); presented by Ssymank et al. [6]

PCN supports the phase-out of all neonicotinoid-like insecticides (see Table 1). We note that three related chemicals are not presently labelled in Canada, and should not be entertained – nitenpyram, nithiazine and fipronil. Concerted actions on all systemic insecticides are necessary because:

1. chemical properties and common metabolites are shared by these systemic insecticides (meaning the chemicals permeate the plant), and other systemic insecticides (e.g. organophosphate insecticides) share the same target in the synapses in the nervous system; and
2. there is a high probability that in the case of restrictions or banning of some neonicotinoid insecticides that only concerted action will avert substitutions with other toxic insecticides with a variety of adverse impacts. The option with the best potential outcomes for ecological and human health are to focus on research and support for organic agriculture.

Both insecticides are quite persistent in the environment, with thiamethoxam breaking down into clothianidin, with insecticidal activity lasting one season or longer. Although "half-life" generally refers to a parent compound, the large number of metabolites take years to break down and dissipate. Some metabolites are more toxic to mammals or other creatures than the parent compound; some break down

into insecticidal metabolites. Commonalities in persistence, mechanisms of action and breakdown products argue that no neonicotinoid would be a good substitute for another.

The Parliamentary Standing Committee on Agriculture and Agri-Food held a hearing in March 2017 regarding another neonicotinoid, the most prevalent – imidacloprid. It was stated by Pierre Giovenazzo, Professor, Sciences apicoles, Centre de recherche en sciences animales de Deschambault, Université Laval, that Canada has not been self-sufficient in bees since 2011. Packets containing queen bees must be imported annually. This potentially disastrous trend merits strong, prompt actions, particularly when the persistence of the implicated pesticides renders environmental and pollinator recovery a long-term proposition. To many Canadians, this fact, along with extensive research linking pollinator decline to persistent systemic insecticides,[9,3,10] should be sufficient to spur strong actions.

Substitution

The current proposal is to restrict methods of application of two of six neonicotinoid-like insecticides currently registered in Canada (Table 1). When chemicals are restricted, a crucial consideration is what will be used in their place. Canada has a sorry history of restricting well-known toxicants when they have reached excessive concentrations in an environmental compartment, but permitting similar chemicals to be substituted. There are no gains in environmental quality or public health, and the net result may only be that commercial enterprises are enriched when older, more commonly available chemicals are off the market and more expensive options are substituted. Some examples of unfortunate substitutions under the purview of Health Canada and inaction in the face of hazardous unnecessary products (albeit not the PMRA), include:

- bisphenol-A was banned from infants' products (but not from other sources of exposures in plastics and fragranced products), whereas common bisphenol substitutes can be just as estrogenic;[11]
- a succession of persistent, endocrine disrupting flame retardants have been permitted, and then banned once environmental levels reached unacceptable levels;[12] and
- endocrine disrupting chemicals such as antimicrobials triclosan and triclocarban; ultraviolet light absorbing organic sunscreen ingredients; and phthalates in diverse plastics, and cosmetics and other scented products, as described in our submission regarding the Canadian Environmental Protection Act (pp 16-18).[13]

The only way not to prolong serious environmental and agricultural impacts is by restricting and phasing out all neonics in a similar fashion, on one time-line.

Next steps

With Canadian pollinators hanging in the balance, now is the time to break this treadmill, to act on the entire family of persistent systemic pesticides, and to reassess approaches to pest control in agriculture.

More sustainable agriculture is necessary to feed the world, according to two recent reports, the European Parliamentary Research Service report, "Human health implications of organic food and organic agriculture" [14] and the United Nations Report of the Special Rapporteur on the right to food.[15]

These reports highlight that current national regulations are not protecting human health and the environment from hazardous pesticides, that these pesticides have not, overall, reduced crop losses in the long term, and that these chemicals threaten the water and soil, biodiversity, pollinators and human health. Organic agriculture results in foods with higher nutrient content, lower levels of the highly toxic carcinogen cadmium in grains, and of course lower pesticide residues.[16] The United Nations Rapporteur states that human rights to adequate food and health are not met with the use of hazardous pesticides in agriculture. A model that is being met with considerable success in Italy is for the government to provide what amounts to "crop insurance" to farmers shifting to organic practices.[5]

In conclusion, PCN supports the phase-out of systemic insecticides. In this situation, equally harmful substitutions are highly likely, with no health or environmental benefits apparent from limiting only some of the six chemicals indicated in Table 1.

Given that:

- Canada has had to import bees since 2011;
- the strong evidence linking persistent systemic insecticides with pollinator decline;
- serious deficiencies in the scope of "pollinators" considered; and
- the fact that bioeffects are not quickly reversed when persistent chemicals are involved,

it is not an understatement to say that this is a critical issue of food security. The national government would be wise to follow the example of Quebec, and the advice of the United Nations Rapporteur and many others before, to shift gears to rapidly build expertise and capacity in organic agriculture.

Finally, the PMRA must improve its searching, review and scrutiny both of the scientific literature and chemistry in the course of evaluation and re-evaluation of pesticides.

Sincerely,

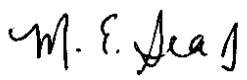

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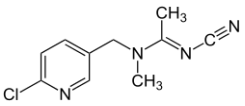
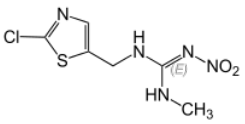
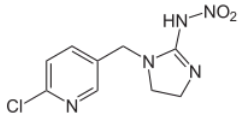
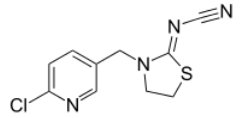
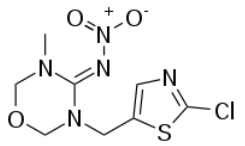
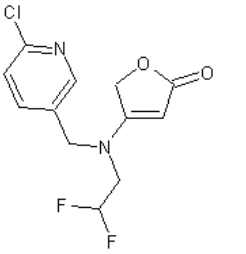
Table 1. Canadian-Registered Neonicotinoid-like Insecticides (2017). 2-chloropyridine moieties are encircled.

Neonicotinoid	Labels registered on PMRA Label Search (2017)	Uses	Structure
Acetamiprid	4 labels – Nippon Soda Company	Seed treatment, flowable, granules	
Clothianidin	16 labels – Bayer, Valent, Syngenta *NOTE: Clothianidin is a metabolite of Thiamethoxam*	Seed treatments; cockroach bait + indoors; granular; mixtures with other insecticides or fungicides	
Imidacloprid	91 labels	Indoor, outdoor, seed treatments, tree injection, crop, flea&tick&lice products for pets; mixtures	
Thiacloprid	1 label for Calypso; Bayer Cropscience	For pome fruit	
Thiamethoxam	22 labels 21 Syngenta; 1 Elanco Many with other chemicals (e.g. Cruiser Vibrance Quattro has 5 active ingredients) http://pr-rp.hc-sc.gc.ca/1_1/view_label?p_ukid=81908642 *NOTE: Thiamethoxam breaks down into Clothianidin*	Seed treatments, flowable granules, wettable granules, fly bait, etc.	
Flupyradifurone	2 labels; Bayer Cropscience Inc.	Suspension or solution for fruit, vegetable and field crops	

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