Ontario Federation of Agriculture

Comments on the Ontario Discussion Paper:

Pollinator Health – A Proposal for Enhancing Pollinator Health and Reducing the Use of Neonicotinoid Pesticides in Ontario

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The Ontario Federation of Agriculture (OFA) is pleased to provide its comments on the Ontario discussion paper titled: *Pollinator Health – A Proposal for Enhancing Pollinator Health and Reducing the Use of Neonicotinoid Pesticides in Ontario* (Ontario, 2014).

OFA fully recognizes the importance of a healthy pollinator population. Honey production itself is a valuable economic contributor across rural Ontario while the farm sector depends on native and managed pollinators to improve the quality and yield of many crops.

As such, OFA strongly supports the development of a comprehensive pollinator health strategy addressing the complex and multiple factors affecting the health and population of both native and managed pollinator species. This work must begin immediately.

However, OFA wishes to express its serious concern with the approach of the Ontario government to isolate one stressor as the primary factor contributing to pollinator health issues, and proposing an unworkable regulatory strategy to curb the use of neonicotinoid (NNI) treated seed.

In the comments that follow OFA will develop its views on:

- The need for and content of a Comprehensive Pollinator Health Strategy
- Our perspective on the economics of NNI use
- Practical concerns with the regulation of NNI-treated seed; and
- A proposal to move towards measurable improvement in pollinator health while developing a systematic and measured approach to NNI use.

References to the discussion paper will be cited frequently as well as to other work on the subject of pollinator health.

Pollinator Health - the Stressors

The Ontario government has acknowledged that the health of pollinators is challenged by many factors and has proposed to develop a plan to improve pollinator health. OFA fully supports this initiative and will work with industry and government to achieve a practical and workable pollinator health strategy.

Such a strategy must identify and address the numerous factors that are acknowledged as having an impact on pollinator health. The literature on pollinator health is unequivocal in demonstrating that the complexity of the issue:

- No single contributing factor to bee deaths has been identified (USDA, 2012)
- Bee deaths result from a complex set of stressors and pathogens (APVMA, 2014), and
- Researchers are increasingly using multi-factoral approaches to study causes of CCD (USDA, 2012, Krupke et al., 2012).

The Canadian Association of Professional Apiarists' (CAPA) most recent report provides a similar message, stating that:

- *The future of beekeeping will depend on a multi-factoral approach to address risks associated with honey bee health and industry development and sustainability in Canada (CAPA, 2014).*

This complexity is recognized in the discussion paper, where it is noted that:

> *"The growing science on pollinator health tells us that declines in pollinator health are related to a number of complex relationships that **act together** to reduce populations."* (p. 1; emphasis added)

However, the paper then suggests there are four stressors affecting pollinator health. OFA maintains that the grouping of several identified stressors into only four categories provides a disservice to the development of a comprehensive pollinator health strategy by oversimplifying the complexity described above. Each and every one of the stressors must be clearly explored to better understand how they "act together" to reduce pollinator populations.

For the purposes of pollinator health, for example, diseases are distinct from insect pests. For this reason, the OFA argues that there are at least nine, rather than four stressors. They are:

- Bee habitat loss
- Bee nutrition
- Exposure of bees to pesticides used in crop production
- Exposure of bees to pesticides used in hive management
- Climate change impacts on bees
- Weather-related impacts on bees
- Bee diseases
- Insects, and fungi that attack bees
- Bee genetics

Adding to the complexity is that the above stressors may have different impacts on native pollinator populations than on managed bee populations.

With respect to managed bees, annual reports from CAPA and USDA's Agricultural Research Service on winter honey bee mortality provide some insight on the importance beekeepers and apicultural specialists place on the above factors.

For example, the CAPA (2007) report indicates national wintering losses of 29%, compared to 37% for Ontario and 60-70% for Niagara. Identifiable causes were:

- Ineffective control for the parasitic mite *Varroa destructor*
- Unusual fall and winter weather; and
- A late, wet spring.

A similar report generated in the USA (van Englelsdorp et al., 2007, pp.2-3) for the same time period reported national losses of 31.8%. While the American survey was not designed to determine the cause of winter losses, respondents were asked to identify what they thought were contributing factors. The five reasons cited most often, in rank order, were:

- Starvation
- Insects (e.g. *Varroa* and *Tracheal* mites)
- Weather
- Weak colonies in the fall
- Genetics

Steinhauer et al. (2014, p. 16) drew on two field studies to support four factors identified in a survey of American beekeepers in 2013. As a result of the survey the following self-reported factors were identified as contributing to bee losses:

- Colony weak in the fall
- Starvation
- Queen failure; and
- *Varroa* mites

These findings were buttressed by an Ontario field study (Guzman-Novoa et al., 2010) that identified *Varroa* mites, reduced fall bee populations and low food reserves as leading causes of colony mortality, and by a study conducted in the eastern United States (van Engelsdorp et al., 2013) that identified queen losses as a major risk factor contributing to colony mortality.

In none of the above lists is there specific reference to neonicotinoid-treated seed as a significant contributor to bee mortalities. However, the CAPA (2013) report does make reference to the fact that many Ontario beekeepers expressed concern that exposure to neonicotinoids during the spring and summer seasons contributed to hives being lost the subsequent winter.

OFA notes that recent CAPA reports (CAPA, 2013; CAPA, 2014) describe progress being made among Canadian beekeepers to control *Varroa* mites using chemical and cultural means. The reports state that:

> *The development and use of new methods of Varroa control in an integrated pest management (IPM) framework is essential to the sustainability of mite control for the beekeeping industry in Canada.*

The reports further state that:

> *Beekeepers' awareness of these principles and the adoption of best management practices that incorporate good food safety practices are regarded as the future direction for this industry.*

Clearly, each and every one of the identified stressors to pollinator health must be addressed as part of a comprehensive Pollinator Health Strategy. And an enormous amount of investigative work is required if the strategy is expected to have any impact on natural pollinators.

Bee Health Working Group, 2013:

In response to high bee mortality incidents the Ontario government established an industry populated Bee Health Working Group in 2013. The focus of the group was to develop strategies to mitigate the risk of exposure to NNI-treated seed on corn and soybeans.

This narrow mandate addressed a growing public concern that pollinator health was susceptible to NNI exposure. In other words, the group was mandated to address a single contributing factor to bee health; thus ignoring the complexity of the issue, as stated above.

The report of the group (OMAFRA, 2014) presented 13 options to reduce or minimize the impacts of NNI treated seed on honey bee health. Several of the options have been implemented and others are in action for the 2015 planting season. The Bee Health Working Group had many successes:

- Grain farmers and apiculturists have become more aware of the issue and are working to share information on location of bee yards and NNI use
- Non-treated seed is more available and given consideration
- Pest evaluation checklists are available as a key component of an Integrated Pest Management system
- The seed industry has reduced the concentrations of NNI on treated seed
- Farmers and suppliers have developed and implemented practices to reduce contaminated dust during planting including:
    - Converting to the PMRA mandated fluency agent; and
    - Adoption of deflector technology to reduce dust

The majority of the points above were articulated in a PMRA (2014[a]) bulletin on the responsible use of insecticide-treated seed. The adoption of these recommendations in the 2014 growing season coincides with a significant reduction in mortality in Ontario hives. PMRA (2014[b], p.4) has reported that the number of bee death incident reports during planting was 70% lower in Ontario in 2014 than in 2013. PMRA cautions, however, that a direct correlation to the risk mitigation measures cannot be made because the cold wet spring in southwestern Ontario in 2014 meant that corn was planted later and less intensively than in previous years, possibly influencing the reduction in the number of incidents.

Even with the PMARA cautions this observed reduction in managed bee mortalities suggests the industry has made a significant improvement in managing a bee health stressor that is within its control.

Changes undertaken by corn and soybean producers and their input suppliers are concurrent with improvements in Varroa control by beekeepers. This has all coincided with a significant increase in the number of Ontario bee colonies, the volume of honey production and the value of honey production.

It remains to be seen (and measured) if this positive outcome translates to a corresponding improvement in over-winter mortality rates. Correlation may not be a simple matter, however, given the other variables (stressors) affecting bee health.

OFA reiterates the importance of expanding the focus beyond the work of the Bee Health Working Group to address each of the nine identified stressors.

Literature on bee health describes *Varroa* mite as the single most detrimental pest to beekeepers and associates it with overwintering colony declines in North America (USDA, 2012, p.6; CAPA, 2014), Europe (EFSA, 2013), the Middle East and Japan (UNEP, 2010, p. 8). Indeed, UNEP (2010, p.8) characterizes Varroa as the most serious global threat to apiculture.

Given that *Varroa* mites have been cited as the primary contributor to bee deaths on a global level, and given that Canadian beekeepers appear to be better managing the risk associated with *Varroa* mites, the OFA strongly recommends that the Ontario government monitor and assess the effectiveness of this advancement. The importance of controlling *Varroa* mite cannot be overstated.

An effective pollinator health strategy will benefit from investment from municipal, provincial, and federal levels of government.

Earlier this year the USDA (2014[a]) made $3 million available to farmers in the states of North Dakota. South Dakota, Minnesota, Wisconsin, and Michigan to provide floral forage habit on their property for the benefit of pollinating species.

This expenditure directly relates to the habitat and nutrition stressors. The proposed 2015 USDA budget included $71 million for pollinator health activities through multiple USDA agencies. While only $50 million was approved, that is still a sizable investment to combat what the USDA budget document refers to as a "…multi-faceted problem" (USDA 2014[b], p.48). This is a component of the discretionary funding of USDA and will be used to: recognize farmer contributions

- Enhance pollinator health research through public-private grants
- Strengthen pollinator habitat in core areas
- Double the acres in the Conservation Reserve Program dedicated to pollinator health; and
- Increase funding for surveys to determine the impacts on pollinator losses.

With this level of government support, albeit scaled to the Canadian situation, much could be accomplished with respect to improving pollinator health.

The Economics of NNI:

The discussion paper notes at page 15 that: *"Pesticides are a necessary tool for Ontario farmers…"* and at page 9 that: *"For some crops, NNIs are currently the only registered insecticides available for some pests."*

Page 9 of the discussion paper further notes that the introduction of seed treatment was considered an advancement due to efficiency, effectiveness and their ability to protect the plant underground.

Page 6 informs that: *"The insecticide is often placed directly on the seed and then acts systemically (taken up throughout the plant tissue and so makes part of the plant potentially toxic to insects)."*

Indeed, Jeschke et al. (2010) states that it is because of the systemic nature of NNIs that they are considered to be among the most effective insecticides available for the control of a wide range of sucking and chewing, above-ground, insect pests including:

- Aphids
- Whiteflies
- Leaf hoppers
- Plant hoppers
- Thrips
- Moths
- beetles and
- Weevils

Because of this, specific benefits of NNI-treated seed noted in the scientific literature include:

- Plants are continuously protected throughout most of the growing season without the need for repeat insecticide applications via spraying
- NNI is not susceptible to UV light degradation or 'wash off' during rain events
- No NNI surface residue on the crop and therefore a lower probability of unintended environmental contamination.

The efficiency and effectiveness of NNI-treated seed has, no doubt, contributed to its adoption across much of the corn and soybean acres in Ontario. Aside from the practical implications of Integrated Pest Management solutions (see below: 'Integrated Pest Management – in Practice') farmers were provided an opportunity to significantly reduce pest risk and crop loss by incorporating NNI-treated seed into their agronomic plan.

The economics of treated versus untreated seed has been reviewed. At least one study (AgInfomatics, LLC) reviewed over 1500 field studies spanning 20 years (1993 – 2014). It was determined that NNI provided substantial yield increase (alternatively, avoided yield decreases) across 8 crops including corn and soybeans. For corn the improvement was up to 20% while soybeans showed a 3 to 1 return on investment in using NNI-treated seeds.

The economic attraction along with the convenience and belief that NNI products offered a significant improvement in environmental stewardship and applicator safety makes it clear why NNI has become the treatment of choice.

Nonetheless, Ontario farmers have demonstrated a willingness and intention to reduce pesticide usage where practical. Significant reductions over the past number of years have been achieved by adapting to new technology and agronomic practice.

It is fair to say, based on past experience that if NNI are determined to be unnecessary, Ontario farmers will not use them.

Integrated Pest Management – in Practice:

The discussion paper posits that Integrated Pest Management is the key to a significant reduction in the use of NNI-treated seed.

Integrated Pest Management (IPM) is described on page 10 of the discussion paper as:

> *A multidisciplinary approach to managing agricultural pests in a manner that is environmentally sustainable and economically viable. It uses all available strategies to reduce pest damage. This approach emphasizes pests prevention and promotes the integration of cultural (e.g. site selection, cultivar selection, crop rotation, sanitation), mechanical and biological solutions along with chemical control strategies. IPM reduces the reliance on pesticides to manage crops.*

This definition is consistent with the definition used in a best management practices (BMP) publication entitled Integrated Pest Management and published almost 20 years ago (OMAFRA, 1996). That BMP describes IPM as:

> *…a new approach to managing pests that involves aspects of more than one control method – cultural, biological or chemical – in a program that is both economical and environmentally sound.*

While both the discussion paper on pollinator health and the BMP recognize chemical pest control as an element of IPM, it is clear in both that an objective of IPM is to only use chemical pest control when necessary.

In the case of corn and soybean production it is helpful that the arbitrary targets of 80% reduction in NNI-treated acreage are "aspirational" since there is little data on the degree to which IPM solutions may need to resort to chemical applications. Chemical application is to be used to "limit insect damage to below threshold levels" or, importantly, to limit the **assessed risk of insect damage** to below threshold levels.

NNI treated seed enabled the virtual elimination of risk but is deemed to be a prophylactic measure given it is not applied in response to a direct assessment of pest risk.

Fundamentally, NNI use is only needed and effective when there are threshold or higher levels of soil-borne pests present in a field. The issue then is, of course, how to determine if threshold levels are present with some degree of certainty.

Field scouting techniques, including wireworm bait traps and visual assessments during fall and spring are used to assess risk as part of an IPM approach. The reliability of these techniques is affected by winter weather conditions, soil temperatures and other factors. In the case of ground to be planted to corn and soybeans, it is not clear if fall scouting provides an accurate assessment for the following spring, or if spring assessment under variable soil temperatures and usually under rushed planting pressures provides a sufficiently accurate risk assessment. These challenges are well documented in the IPM BMP (OMAFRA, 1996). In particular, the BMP indicates that:

> …for some crops and pests, extensive research is needed to develop systems that are specific to each growing area.

Scouting is not foolproof and does present risks in that damage may still occur in fields declared below threshold levels. Anecdotal evidence suggests significant damage has occurred in 'clean' fields. Because most of the damage affects the plant roots, no other subsequent treatment will salvage the crop.

This demonstrates the attraction of NNI use in a precautionary sense.

Nonetheless, a balance must be struck, based on risk, between the use of NNI to protect crops and its potential effect on pollinators. Farmers have long demonstrated their environmental ethic when it comes to the judicious use of pesticides and are interested in reducing pesticides as much as plausible given the need to protect and maximize their crop investment.

IPM systems for corn and soybeans are in the process of being developed but have not had the benefit of longitudinal studies to validate their efficacy. As noted, anecdotal evidence suggests the risk of total failure is a very real risk.

The IPM work of Baute et al (2014) is much appreciated by corn and soybean producers, and it fulfills one of the recommendations of the Ontario Bee Health Working Group. However, the guidelines presented need to be validated under Ontario field conditions using longitudinal field trials designed for that purpose.

It is critical that the grain industry work with government and experts (e.g. CCAs) to further develop IPM systems for corn and soybeans using field trials under a multitude of conditions. Concurrently, farmers will need to be trained in the development and use of IPM. This training could become a component of the Grower Pesticide Certification Program that Ontario farmers successfully lobbied for in the 1980s.

Proposed Regulatory Approach:

The discussion paper proposes the Ontario government institute regulation in order to reach the aspirational target of an 80% reduction in NNI-treated corn and soybean acreage by 2017. It notes that, in terms of timing, the regulatory system would be implemented in July 2015 in preparation for the Spring 2016 growing season. This is because, it says, farmers order their seeds in the fall.

This quick change in agronomic practice by regulation does NOT provide sufficient time to enact an effective IPM system designed for corn and soybean production in different regions of the province. Recall that IPM involves the "…*integration of cultural (e.g. site selection, cultivar selection, crop rotation, sanitation), mechanical and biological solutions along with chemical control strategies"* (Ontario, 2014).

Moving to a full-on IPM approach tailored to corn and soybean production will take years for a farmer to develop. Crop rotation and tillage practices require planning. Consequently, farmers ordering seed this fall will most likely opt for a risk-reducing strategy and order NNI-treated seed. This seed will come from local seed dealers or from out-of-province distributors.

The discussion paper clearly demonstrates on page 14 the long list of unanswered questions about IPM assessments. It is doubtful that a practical assessment methodology can be finalized, let alone implemented to meet the suggested regulatory targets. The timing of the

proposed regulatory approach is simply impractical. It is not possible to have validated, regionally specific answers to these questions by the 2016 growing season.

Another major problem with the regulatory approach proposed by Ontario is its failure to be informed by PMRA studies on NNI. Specifically, PMRA (2014[b], p.3) has categorically stated that:

> Although neonicotinoid pesticides are currently used extensively on many crops in Canada, the only situation where high numbers of bee mortalities have been directly linked to neonicotinoid pesticide use is through exposure to dust from some types of planting equipment while planting neonicotinoid treated corn and soybean seeds.

The direct link between bee mortalities and dust generated during the planting of NNI-treated corn and soybeans is reinforced several times in the PMRA (2014[b]) update. It is clear that PMRA scientists believe there is evidence that fugitive dust impacts negatively on bee health, but that there is not sufficient evidence to link bee mortalities during the overwintering period with sub-lethal exposure to NNI in the previous foraging season.

OFA believes that the discussion paper places insufficient emphasis on the importance of reducing or eliminating fugitive dust as an effective way to manage pollinator health risks associated with NNI-treated seed. Many strategies to manage fugitive dust have been implemented and more are in the development stages (Nuyttens et al. 2013). A regulatory framework for NNI should definitely involve managing fugitive dust associated with planting those regulations will involve a range of agricultural input suppliers as well as corn and soybean growers.

Conditions of Sale:

The discussion paper postulates several conditions imposed on buyers and sellers of treated seed. The conditions to be imposed on sellers present a regulatory burden that will, no doubt, cause many to exit the business.

A comprehensive review of the proposed regulation of the seed industry will be left to industry participants who better know the intricacies of their business. However, OFA does wish to make on observation about the proposed regulation of seed sales.

The discussion paper notes that farmers order seed in the fall. However, the regulatory conditions will require that untreated seed is always an option, presumably if an IPM plan suggests, in the spring, that a non-treated seed is an option (or vice-versa). Consequently the Ontario government is proposing to regulate a duplicative inventory requirement. This will ensure seed companies and/or dealers are left with unsold inventory, potentially in very significant volumes – by regulation.

Ontario Federation of Agriculture Recommendations:

The issue of pollinator health is complex, affected by numerous stressors. One identified stressor is the impact of pesticides and, particularly the historic application methods of corn and soybean neonicotinoid-treated seed. Recent changes have been made in management practices and awareness that coincide with positive improvements in pollinator mortality rates. More work is required.

It is critical that Ontario find a realistic balance within a Pollinator Health Strategy to recognize the economic reality of the use of NNI versus pollinator health impacts.

The OFA offers the following recommendations to progress towards improved pollinator health in Ontario:

1. **Ontario industry and government immediately work to develop a comprehensive Pollinator Health Strategy addressing each of the nine identified pollinator health stressors which will include:**
    a. **Determination of the relative contributions of, and mitigation strategies for, different stressors leading to species declines including exposure to pesticides, poor nutrition, parasites and other pests, toxins, loss of habitat and reduced natural forage, pathogens, and unsustainable management practices;**
    b. **Expansion of the collection and sharing of data related to pollinator losses, technologies for continuous monitoring of honey bee hive health, and use of public-private partnerships, as appropriate, to provide information on the status and trends of managed hive losses**
    c. **Assessment of the status of native pollinators, and modeling of native pollinator populations and habitats;**
    d. **Development of affordable seed mixes, including pollinator-friendly plants, for maintenance of honey bees and other pollinators, and guidelines for and evaluations of the effectiveness of using pollinator-friendly seed mixes for restoration and reclamation projects;**
    e. **Identification of existing and new methods and best practices to reduce pollinator exposure to pesticides, and new cost-effective ways to control bee pests and diseases;**
    f. **Targeting of resources to areas of high risk and restoration potential; and,**
    g. **Prioritization of plans for restoration of pollinator habitat, based on those areas that will yield the greatest expected net benefits.**

2. **Given that fugitive dust from vacuum planters is associated with acute bee mortalities at the time of seeding NNI-treated seed, additional technological changes to reduce the risk associated with fugitive dust must be pursued, including:**
    a. **Better adhesion of pest control products applied to seed and optimization of the application rate of pest control product to seed**

b. **Modification of seed drilling technology through installation of effective air deflectors with a goal of reducing dust by as much as 99%**
c. **Regulation and stewardship of seed quality standards. (In the Netherlands it is 0.75g of dust per 100,000 seeds; in France it is 4g per 100 kg of seed.)**
d. **Managing seed bags and totes**

3. **Industry, universities and government must collaboratively develop and test IPM systems for corn and soybean production, and concurrently develop IPM training modules for incorporation into the Grower Pesticide Certification Program. IPM system use should be phased in over the course of several years with NNI reduction usage measured and monitored. The voluntary IPM approach would replace the proposed regulated reduction approach.**

4. **OMAFRA and Agricorp needs to develop an NNI reduction risk management program, in collaboration with Certified Crop Advisors. The program would provide a compensation vehicle for growers suffering undue losses on implementation of a verified IPM system. The program would be available for a period of five years.**

5. **The government of Ontario needs to establish practical regulations governing the safe use and handling of treated seed that do not compromise or jeopardize the seed distribution network across Ontario. This should be done in collaboration with the seed industry.**

The Ontario Federation of Agriculture looks forward to working with government and our industry colleagues in implementing constructive action to improve pollinator health in Ontario.

OFA
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