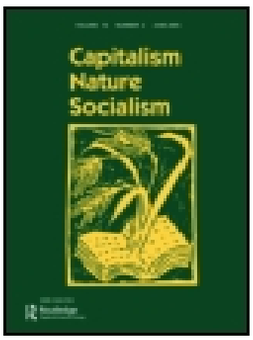

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Save the Bees? Agrochemical Corporations and the Debate Over Neonicotinoids in Ontario

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ABSTRACT

There is widespread scientific agreement that bees are in global decline of health and/or population due to multiple factors, including loss of habitat, lack of wildflowers, and pesticides. Throughout Europe and North America, a debate has been raging about the effects of neonicotinoid pesticides on bees and other pollinators. This debate not only involves farmers, beekeepers, agrochemical corporations, and government officials but it also has captured the imagination of everyday people who are concerned with the plight of pollinators. This has led to a growing demand that neonicotinoid pesticides be banned or restricted. In 2015 Ontario, the largest province in Canada put in place a partial ban on this class of pesticides. In this paper, I will argue that agrochemical corporations intervened in multiple ways in the debate about neonicotinoid pesticides in Ontario, potentially weakening the legislation. Agrochemical corporations were heavily represented in the Ontario Bee Health Working Group and were consulted by government ministries throughout the process. Industry groups also worked with large farmers' organizations to shape the narrative about the impact of a neonicotinoid ban on farmers. While the agrochemical industry has considerable power and influence, there exists some hopeful possibilities for an agroecological counter-narrative that posits small-scale farmers as stewards of biodiversity.

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KEYWORDS Political ecology; bees; pesticide regulation; agroecology; agrochemical corporations

Introduction

There is widespread scientific agreement that bees, both domesticated and wild, face declining health and/or population due to multiple factors including loss of habitat, parasites, lack of wildflowers, and presence of pesticides (Goulson et al. 2015). Throughout Europe and North America, a debate has been raging about the effects of neonicotinoids, a class of pesticides, on bees and other pollinators. Not only does this debate involve farmers, beekeepers, agrochemical corporations, scientists, environmentalists, and

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government officials, but it also has captured the imagination of the public who are concerned with the plight of pollinators. Recent research about the widespread defaunation of insects, what environmental writes George Monbiot calls an "insectageddon" (2017), adds urgency to the debate (Hallman et al. 2017). Concerns about pollinator loss have led to a growing body of research on the effects of neonicotinoid pesticides on bees and to demands that governments restrict or ban this class of pesticides. In 2013 the European Union (EU) imposed a 2-year moratorium on neonicotinoid use, and in 2015 the Ontario government imposed a partial ban on them.

In this paper, I will argue that, while important, the partial ban on neonicotinoids in Ontario does not go far enough to address the pollinator crisis, partly due to the role of agrochemical corporations such as Bayer CropScience and Syngenta, manufacturers of neonicotinoids, in the development of the policy. I will argue further that the agrochemical industry intervened in the debate around neonicotinoid pesticides in Ontario in order to shape and influence the process, most notably by forming powerful coalitions with large farmers' organizations such as the Grain Farmers of Ontario (GFO). In Part One I will outline the current research on the impact of neonicotinoid pesticides on bees, including the problems caused by the uncertainty inherent in complex ecosystems. In Part Two I will examine the process utilized by the Ontario government in the creation of the partial ban on neonicotinoids and investigate the heavy role played in it by the agrochemical industry. I will examine the coalition the agrochemical industry formed with the GFO and how this shaped the narratives deployed in the debate about a neonicotinoid ban in Ontario. I will conclude by arguing that corporate manipulation of the creation of public policy regarding pollinator health in Ontario is an indication of the overall functioning of the capitalist-industrial agricultural system. Challenging this system will require radical social movements led by a coalition of environmentalists, bee-centered beekeepers and small-scale farmers. This coalition can put forward an agroecological counter-narrative that acknowledges the uncertainty inherent in complex ecosystems and posits small-scale farmers as stewards of biodiversity, allowing for the simultaneous flourishing of non-human nature *and* people.

Theoretical framework

The theoretical framework for this paper is guided by a political ecology approach that examines the way in which the capitalist system and its associated structures of power affect interactions between humans and non-human nature at multiple scales and levels (Heynan and Robbins 2005; Robbins 2007). In particular, the paper is situated within an important body of literature that examines the effects of the capitalist-industrial agricultural system on people (Weis 2007; White et al. 2012; Friedmann 2005), non-human animals

– both domesticated and wild (Weis 2013; Boyd 2001), and Earth's natural cycles (Kloppenburg 2004; Moore 2010). Especially relevant for this paper is a critique of the depiction of industrial agriculture inputs and practices that are destructive to nature as "inevitable" or "unavoidable."

In writing this article I aim to contribute to this literature by casting a lens on the ways in which the capitalist-industrial agricultural system harms insects, specifically wild and domesticated bees. I will examine the way in which one of the most powerful sectors of the capitalist-industrial agricultural system—the sector made up of agrochemical corporations—has shaped policy concerning neonicotinoid pesticides by forming coalitions with large farmers' organizations and manipulating narratives about farmers. By shaping pesticide policy and farmer narratives, the corporations involved are directly and negatively affecting pollinator health on a global scale.

Part one: the harm, complexity, and uncertainty of neonicotinoids

Neonicotinoids are a class of systemic pesticides regulated for use in Canada and most other countries in the world. In Canada, the active ingredients from the neonicotinoid class that are registered for use are imidacloprid, thiamethoxam, clothianidin, acetamiprid, and thiacloprid (Ontario Bee Health Working Group 2014). Imidacloprid seems to be the most heavily researched neonicotinoid, and the one most often implicated in harming pollinators and other animals. For example, it is the only neonicotinoid that the Canadian federal government is currently considering for restrictions due to the harm it causes to aquatic animals and waterways (Pesticide Management Regulatory Agency 2016).

According to the Ontario Ministry of Agriculture, Farming, and Rural Affairs (OMAFRA), neonicotinoids were first used in Canada in 1995 to control the Colorado Potato Beetle, which was afflicting potatoes, and the flea beetle, which was afflicting canola crops (Ontario Bee Health Working Group 2014). Less than 20 years later they are used on about 95 percent of corn crops and 55–60 percent of soybean crops in Canada (Ontario Bee Health Working Group 2014). Most of these crops are grown to provide livestock feed, not to directly feed people (Hamel and Dorf 2014). Neonicotinoids used in Canada are delivered through seed coating, injection into trees, and direct application. They are also widely used in household lice and flea treatments (Ontario Bee Health Working Group 2014).

Neonicotinoids are neurotoxins that affect insects by causing abnormal behavior, immobility, and death (Brandt et al. 2016). The neonicotinoid class of pesticides are distinctive in that they are both systemic and persistent. In this context, the word "systemic" refers to the fact that they spread to all plant tissues via the vascular system, including the pollen, nectar, and

guttation fluid (2016). "Persistent," in turn, means that neonicotinoids are present and accumulate in the environment through various pathways rather than quickly dissipate. Even when they are delivered as a seed coating, they can be found in soil, waterways, and nearby plants (Brandt et al. 2016; Krupke et al. 2012; Mogren and Lundgren 2016; Fairbrother et al. 2014). Neonicotinoids are water-soluble and can easily be absorbed through plants by both their roots and leaves (Goulson 2013). In recent research, there have been indications that neonicotinoids persist and accumulate in the soil for much longer than previously thought (2013).

Evidence of harm

There is a growing body of evidence that both domesticated (honey) and "wild" bees are negatively affected by neonicotinoid pesticides. While there have been some reports of immediate poisonings of bee colonies with neonicotinoids (Fairbrother et al. 2014), most of the effects on bees, due to neonicotinoid exposure, are thought to be sublethal, cumulating over time, with some researchers suggesting that toxic amounts of pesticide exposure could be reached in the field within days or weeks (Goulson 2013). Research has shown that cumulative neonicotinoid exposure can affect the learning, foraging, and homing abilities of both honeybees and bumblebees (Goulson 2013). One of the largest studies conducted on the effects of neonicotinoids on both honey and wild bees found that exposure to low levels of neonicotinoids may cause reductions in hive fitness that interact with a number of local environmental factors (Woodcock et al. 2017). The other environmental factors may include exposure to other chemicals such as fungicides and miticides, parasites, lack of diverse flowers for foraging, and extreme or unpredictable weather due to climate change.

Lab experiments have also demonstrated that neonicotinoid pesticides have a negative impact on the functioning of the immune systems of worker bees (Brandt et al. 2016). In honey bees, neonicotinoids have frequently been detected in bee bread (a mixture of pollen and honey, food for developing larvae) and honey (2016). Research in the United States on the wax and pollen of honey bee hives detected the presence at least one pesticide and 120 other agrochemicals in each hive (David et al. 2016). This indicates that honey bees in the field are chronically exposed to a complex mixture of pesticides and agrichemicals (2016). In fact, a recent study on honey bee exposure to neonicotinoids from corn crops found that "acute toxicity of neonicotinoids to honey bees doubles in the presence of a commonly encountered fungicide" (Tsvetkov et al. 2017). The study found that most neonicotinoid-positive pollen sampled in honey bee hives were from non-target plants, and not pollen from treated corn, indicating that neonicotinoids accumulate in the environment through drift as well as persistence in soil and waterways.

There is widespread agreement that defaunation is occurring among wild bees throughout North America and Europe, with neonicotinoids being pinpointed as a potential cause. Information about the effects of neonicotinoids on wild bees is somewhat uncertain, although there has been some research done on bumblebees. Bumblebees are social insects like honey bees, maintaining small hives of about 500 bees. Most other wild bees are solitary and tend to have more specialized foraging patterns. For example, most wild bees forage over shorter distances than honey bees (Packer 2011). It is important to note that in the research of neonicotinoids the honey bee has been "used in the risk assessment to represent all types of bees and other insect pollinators" (PMRA), which some experts argue is inappropriate. Wild bees provide a high amount of pollination but they are not under the management of humans. There are some indications that wild bees are more vulnerable to the effects of pesticides and other factors, such as climate change, than honey bees (Goulson 2013). There have also been suggestions by some entomologists that the complexity of honey bee colonies may protect them from the negative effects of pesticides (Suryanarayanan 2015).

One study found that bumblebees who foraged wildflowers near treated crops had higher levels of pesticide contamination in their hives than nearby honey bees, mostly due to the shorter foraging distances of the former (David et al. 2016). Other studies have shown that neonicotinoid exposure has chronic and acute effects on the foraging activities of bumblebees which could be detrimental, over time, to colonies and species (Gill and Raine 2014). A study recently conducted by Woodcock et al. (2017) found that the negative impact of neonicotinoids on several species of wild bees were associated with the residues found in nests, which points to the problem with the persistence of neonicotinoids in the environment. A recent study found that bumble queens exposed to thiamethoxam, a widely used neonicotinoid pesticide, are less likely to initiate a new colony, with a 26% reduction (Baron et al. 2017). Baron et al. (2017) postulated that this reduction could, over time, dramatically increase the likelihood of population extinction.

Globally, there are over 20,000 different species of wild bees. Although the impact of neonicotinoids on wild bees is not fully understood and has not been fully addressed by many of the stakeholders, it is perhaps a more pressing and troubling issue than the impact on honey bees. Honey bees are managed by humans who breed them (often artificially, mimicking the techniques used in industrial livestock agriculture) and ensure their survival. It is hard (but not impossible) to imagine circumstances in which the domesticated honey bees will be made extinct. Wild bees are not managed by humans (with a few exceptions) and are more vulnerable to food and habitat loss.

Wild bees are not only essential for so-called "ecosystem services" due to pollination but they are also a vital part of ecosystems on every continent on Earth, except Antarctica. As leading entomologist Laurence Packer argues, the loss of wild bees could cause ecosystem collapse to an extent which we cannot comprehend (2011). Others argue that the complexity and uncertainty of bee decline may result in unpredictable ecological surprises or lead to malleable, novel futures (De Palma et al. 2016; Watson and Stallins 2016).[1] The protection of wild bees should be at the forefront of discussions about bans or moratoriums on neonicotinoids.

Scientific uncertainty

As Suryanarayanan and Kleinman (2017) point out, the essential factor in understanding the heavy influence of the agrochemical industry on the government regulation of pesticides is in how these corporations reinforce the idea that only one type of scientific evidence matters and, furthermore, that government action should only happen under conditions of *certainty*. The agrochemical industry conducts, funds, and otherwise supports scientific research that aims to find definitive evidence of harm—a direct cause and effect using scientific research in the field.

One of the main critiques used to argue against bans and moratoriums on neonicotinoid pesticides is that there is scientific uncertainty about the harm caused by this class of pesticides. They claim that the science is too complex and incomplete and therefore should not be acted upon. For example, in a study commissioned by Bayer CropScience, the authors call for an end to "hysteria" about pollinator decline and make an argument repeated by GFO representatives that

> The available data indicate that there may be effects to individual honeybees housed under laboratory conditions and exposed to unrealistically high concentrations of the insecticides. However, under field conditions and exposure levels, similar effects on honeybee colonies have not been documented. It is not reasonable, therefore, to conclude that crop-applied pesticides in general, or neonicotinoids in particular, are a major risk factor for honeybee colonies, given the current approved uses and beekeeping practices. (Fairbrother et al. 2014, 729)

This claim demands a certainty about exposure *in the field* that simply is not possible due to the nature of complex ecosystems. As Suryanarayanan argues,

> The practical challenges entailed in isolating the effects of the chemical in question from potentially confounding sources of environmental variability, require a high number of colonies, resources, and time to achieve sufficient statistical

[1]While this may true, it is important to consider the warning by Collard, Dempsey, and Sundberg (2015) who argue that creating abundant, multispecies futures requires a profound break with the capitalist system in order to prevent profound loss and destruction of life it engengers.

> power. As a result, field experiments tend to be relegated to measuring the direct, causal effects of individual chemicals. (2015, 150)

Ecological complexity is inherent in diverse ecosystems. There cannot be certainty about exactly how pesticides harm bees in the field. As Hill (1965) argued, "All scientific work is incomplete—whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge" (300). The actually existing world is dynamic and complex and therefore scientific research about complex ecosystems is always incomplete. Watson and Stallins (2016) advocate for a framework that recognizes socio-ecological complexity in addressing issues such as species endangerment and extinction, which they believe will led to pluralistic approaches to crisis.

Suryanarayanan (2015) recognizes that socioecological complexity is bound in uncertainty, which, he points out, "stems not only from the biological complexity of interactions between assemblages of plants and pollinators, but also from the multiplicity of values represented by those for whom and by whom the policy is made" (150). Uncertainty is inherent in complex ecosystems, he concludes, and it must not hold us back from action, especially for issues in which a lack of action will potentially have more harmful results than acting incorrectly.

Part two: the business of policy-making

The growing body of research demonstrating the harm neonicotinoid pesticides cause to bees and other animals has led to increasingly urgent calls for governmental regulation. Based on an increasing body of scientific research and strong advocacy from coalitions of beekeepers and environmentalists, the EU put a moratorium on the use of neonicotinoids from 2013 to 2015.[2] The EU followed a precautionary principle—an approach in which they are willing to accept the responsibility of acting on incomplete science even if it turns out to be wrong (Suryanarayanan 2015). The Ontario government has taken a similar approach with their partial ban on 80% of neonicotinoid use in the province. While a precautionary principle is more appropriate for the complexity and uncertainty that affect bee health, I will argue that partial bans and temporary moratoriums have limited effectiveness due to the systemic and persistent nature of neonicotinoids, and so represent a "win" for the agrochemical industry, indicating the heavy influence this industry has on policy-making.

The Ontario Bee Working Group was established by the Ontario government in July 2013 to bring together a "group of experts to support the

[2]The European Food Safety Authority (EFSA) recently released their assessment on neonicotinoid harm to honey and wild bees, concluding that "Most uses of neonicotinoid pesticides represent a risk to wild bees and honeybees." (EFSA 2018). On April 27, 2018 the European Union voted to ban outdoor uses of three main neonicotinoids (European Commission 2018).

development and/or implementation of strategies to mitigate the risk to honey bees from exposure to neonicotinoid seed treatments on corn and soybeans" (Ontario Bee Health Working Group 2014). The members of the working group included staff of the Ministry of Agriculture and Rural Affairs Canada and the Ministry of the Environment. It also included an academic from the University of Guelph and representatives from the Ontario Beekeepers Association, the Ontario Federation of Agriculture, and the GFO. Interestingly, a representative each from Syngenta, Bayer CropScience Canada, Crop Life Canada, the Association of Equipment Manufacturers, and the Canadian Seed Trade Association also took part in the working group (Ontario Bee Health Working Group 2014). Collectively, these groups represent various facets of the capitalist-industrial agricultural system. Crop Life Canada, an affiliate of Crop Life International, is an especially important organization in lobbying efforts against pesticide bans. Crop Life Canada represents corporations that make up the two main sectors of the agrochemical industry: pesticides and biotech seeds. Their membership, as noted on their website as of October 30, 2017, is made up of the main corporations involved in the industry including Bayer CropScience, Dupont, Syngenta, and Monsanto. There was no representation in the Ontario Bee Health Working Group of small-scale farmers' organizations such as the National Farmers Union (NFU), or of organic farmers' organizations such as the Ecological Farmers Association of Ontario (EFAO) or the Organic Grower's Council (OGC).

The Ontario Bee Health Working Group made recommendations to the Ontario government in 2014 (Ontario Bee Health Working Group 2014). Only two of their thirteen recommendations represented strategies that are compatible with organic agriculture and that allow farmers to operate outside the reach of agrochemical corporations. It is also interesting to note that they recommended a *temporary* ban on neonicotinoids for the 2014 growing season but not a permanent ban. The agrochemical industry influence on the working group can be seen with comments calling for voluntary approaches instead of what they call "heavy-handed regulated and mandated solutions" (Ontario Bee Health Working Group 2014).

The Ontario government also launched a period of public consultation in 2014 and 2015 in which individual beekeepers and farmers, as well as concerned citizens, were invited to give feedback on the proposed partial ban (Ontario Ministry of Agriculture and Rural Affairs 2016). In 2015 the government announced their decision for a partial ban. The partial ban in Ontario began on July 1, 2015, with the restriction on the sale and use of treated seeds, although, given that most farmers would have already purchased their seeds for the season, this restriction would only have affected farmers beginning in the 2016 growing season. The partial ban took full effect in 2017, with the goal of having only 20% of farmed acres in Ontario treated

with neonicotinoids (Ontario Government 2016). To this end, farmers are required to take free training on Integrated Pest Management (IPM) provided by the Ontario government and must justify their usage of neonicotinoid pesticides with soil testing to assess the presence of grubs and larvae of destructive insects (Ontario Ministry of Agriculture and Rural Affairs 2016). In 2015 the GFO took the Ontario government to court in an effort to halt the partial ban, a battle they lost in April 2016 (Van Brenk 2016).

Corporate-driven farmer narratives

In the creation of the Ontario neonicotinoid legislation, and in the public campaign that ensued, the main farmers' organization represented was the GFO. The GFO represents 28,000 corn, soybean, and wheat farmers in Ontario who collectively cover over five million acres of farmland (Grain Farmers of Ontario 2015). The main narrative used by the GFO is that of the struggling family farmer who cannot afford an insect infestation and so must use neonicotinoids until better technology is created to reduce harmful impact on pollinators, waterways, and other aspects of the natural world. They further argue that the science is too *uncertain* and *incomplete* to risk harming farmers and, by extension, farming communities. For example, Mark Brooks, chair of the GFO, stated to the *London Free Press* that "we're trying to deal with this idea of lower yields, less income and how they're going to impact our farming incomes in light of lower commodity prices as well. It puts a significant strain on our operations" (Van Brenk 2016).

The GFO argues strongly that the government should take a position of non-interference in matters of what seeds and pesticides farmers use on their crops. In response to the Ontario government's initial proposal for a partial neonicotinoid ban, they call on the government to "abandon the goal to reduce neonicotinoids by 80% in Ontario and support an agri-industry led approach that will work for the complexities of both grain farming and bee keeping" (Grain Farmers of Ontario 2015). In the media coverage surrounding their court case, the GFO repeatedly invoked the right of autonomy of farmers from government "interference." Eric Gillespie, a lawyer for the GFO, was reported as telling the court that "the farmers are not opposed to pesticide regulations, but … the new set of rules is unworkable and infringed [upon] farmers' right to use their land as they want" (Atkins 2016).

The GFO repeatedly point to a study they commissioned with Crop Life Canada from the Conference Board of Canada that claims that corn and soybean farmers could lose more than $630 million in revenues due to restrictions on neonicotinoids (Grant, Knowles, and Gill 2014). The authors of the report claim this would cut the province's revenue by $440 million (2014). This contrasts with other reports commissioned by the GFO where they speak of the positive impact of neonicotinoid reduction, claiming it will

"lower production costs and increase economic competitiveness for growers, strengthen relationships with trade and marketing partners, and reduce negative environmental impacts" (Grain Farmers of Ontario 2015). Their main argument is that any reduction in neonicotinoid use should be *voluntary* and tied to technological "innovations" in farm machinery to reduce dust from seed sowing. There is no actual evidence presented that voluntary reductions or machine technology will have a positive impact on pollinators. Nor does the study address the growing concern and scientific evidence for the contamination of waterways by neonicotinoids.

The GFO claim that they will be harmed by the legislation with no benefit to pollinators. For example, the *London Free Press* stated in an article that "corn and soybean growers say the rules will rob them of yield without improving pollinator health" (Van Brenk 2016).[3] The GFO continually claims that there is little or no evidence to show cumulative harm to pollinators. For example, in their comments on the partial ban, they state they have been willing to work with the Ontario government "despite never seeing the data to support the assertion that there is a direct correlation between bee mortalities and neonicotinoids beyond the acute exposure that farmers are already actively addressing" (Grain Farmers of Ontario 2015). In an attempt to cast uncertainty and doubt on the neonicotinoid ban, the GFO argued that there are multiple factors negatively affecting honey bees (Grain Farmers of Ontario 2015). As mentioned earlier, this is a noncontroversial statement, agreed upon by most entomologists and beekeepers (Goulson 2013).

In many ways, the narrative of farmers used by mainstream farming organizations seems to have failed in this debate because they, particularly the GFO, did not want any compulsory restrictions on neonicotinoids (Grain Farmers of Ontario 2015). After the Ontario government announced the decision for a partial ban on neonicotinoids, CBC reported on May 12, 2016 that the GFO launched a campaign to encourage their members to speak out against it on social media ("twitter bomb") and through lobbying their MPPs.

However, the GFO, along with the agrochemical corporations, had already won a victory in that the ban was only partial and the Ontario government has no future plans to institute a full ban. Yet the systemic and persistent nature of the neonicotinoid class of pesticides means a partial ban will not stop the harm they cause—these pesticides will continue to find their way into the bodies of non-targeted insects, the soil, and waterways (Krupke et al. 2017;

[3]The question of whether a ban on neonicotinoids affects yields is highly contested. Some research has shown little to no loss of yields (Goulson 2013), while other research, for example by Dewar (2017), shows a loss of oilseed rape in the UK after the EU partial ban on neonicotinoids. Some claim that a ban on neonicotinoids will make it impossible for humans to achieve the 70% growth in agricultural production purported to be needed by 2050 (Walters and Didham 2016). However, this predicted growth is based on a steep increase in a meat-centred diet, which is not necessary for adequate human nutrition and is associated with a variety of serious ecological problems (Weis 2013).

Mogren and Lundgren 2016; Fairbrother et al. 2014). The EU moratorium was only designed to protect bees and therefore only applies to plants that are flowering. Neonicotinoids can still be used on a variety of crops including potatoes and some cereals (Gross 2014). Upon examination, then, these partial bans and moratoriums are not nearly as sweeping as they seem, or as effective as the need to be. As advocates of pollinator health have noted, the strong lobbying conducted by Bayer CropScience and other agrochemical corporations has weakened the responses of governments worldwide (Martin 2015).

In fact, in the lead-up to the Ontario government's decision to partially ban neonicotinoids, the GFO formed a strong public advocacy coalition with several agrochemical corporations, resulting in the creation of front groups and websites such as *Bees Matter*. With their offers of free organic seeds, these websites confuse people who are genuinely concerned about the pollinator crisis. *Bees Matter* is a partnership of agrochemical corporations including Bayer CropScience, Syngenta, Monsanto, and Dupont, industry groups such as Soy Canada and the Canola Council of Canada, and the GFO. It claims to be interested in promoting the health of honeybees and does so primarily by encouraging people to grow pollinator-friendly gardens. However, it contributes to a portrayal of the capitalist agriculture industry as trying to do what is best for both people and bees. As of July 4, 2017 the flashy *Bees Matter* website claimed that

> In recent years, farmers and scientists have worked more closely with beekeepers to keep their hives healthy. Whether this has meant developing new products to benefit honey bees or *changing the way they use current products* to better protect honey bees, the results have been *innovative and collaborative strategies to mitigate risk* (italics in original).

The statement above is interesting because it avoids mentioning pesticides or neonicotinoids, even though it is clearly referring to them in discussing "current products" and "innovative and collaborative strategies to mitigate risk." Furthermore, a romanticized, imaginary relationship between farmers and bees is presented on the website with statements such as, "But farmers aren't just protecting honey bees. They're also providing honey bees with pollen. Canola, for example, is one of the best flowering plants for bees, with a balance of protein and amino acids necessary to support a healthy hive." There is no mention of the potential dangers of pollen from neonicotinoid-treated canola or about the lack of forage (a problem they identify elsewhere) due to monocultures of crops such as canola, soy, and corn. The website goes on to state that, "In many cases, beekeepers and farmers have a mutually beneficial relationship in which the bees, like livestock, are brought to the farm in order to graze on the pollen of the farm." There is also no mention that wildflower forage on farms using neonicotinoid

pesticides may do more harm than good especially to wild bees who gather pollen and nectar from native, "weedy" plants (David et al. 2016).

The *Bees Matter* website acknowledges bees are in trouble but claims it is due to a lack of forage and to parasites that attack them. Nowhere on the slick website are pesticides mentioned. For people visiting the website, often to take advantage of the offer of free wildflower seeds, it is very hard to find information about who runs and funds *Bees Matter*. This is only one example of an industry-funded organization that seeks to portray industrial agriculture as bee-friendly and to confuses concerned people about the role it plays in harming both wild and honey bees.

Deconstructing the "Family farmer"

The concept of the family farmer struggling to make ends meet in a hostile economic environment is powerful and evocative, and was utilized in the GFO's struggles against the partial ban and in the work of the advocacy coalition. But what exactly is meant by the term "family farmer," as used by the members of the agrochemical coalition and, most importantly, in the public campaigns they launched? Statistics Canada's (2017) report on the 2016 Agricultural Census states that, while most farm operations are in some sense family-run, "the number of corporate agricultural operations continues to grow."

Due to the nature of farming in Canada, a more useful distinction should be made between large-scale family-run *farm businesses* and small-scale farmers. These two groups of people have very different interests, especially in relation to the agribusiness industry. While farming revenues continue to grow, the number of farmers in Canada is falling. According to Statistics Canada (2017), from 1966 to 2016 the *number* of farms halved (430,000 down to 193,492) while the *size* of farms doubled from about 400 to 820 acres per farm. Currently, the highest proportion (32.9%) of Canadian agricultural operations grow oilseed and grains, a category that includes corn and soy grown primarily as livestock feed (Statistics Canada 2017).

As mentioned earlier, corn is one of the most heavily treated crops in Ontario, with 95% of corn seeds being infused with neonicotinoids (Ontario Bee Health Working Group 2014). According to Statistics Canada, in 2011 corn accounted for 61.7% of seeded area in Ontario and ranks as the number one crop in the province and number three crop in the country (Hamel and Dorf 2014). Even though bees do very little pollination of corn, neonicotinoids have been found in high amounts in wildflowers forage near treated corn crops (David et al. 2016). A recent study by Tsvetkov et al. (2017) of bee exposure to neonicotinoids through proximity to corn crops in Ontario, Quebec, and Indiana, found that "honey bee colonies near corn

are … chronically exposed to [neonicotinoids] for a substantial proportion of the active season in temperate North America."

It is also important to note that corn grown in Ontario is mostly grown as livestock feed (Hamel and Dorf 2014) and not directly fed to people. Corn grown in Ontario is intimately connected to the agrochemical industry at all levels, from the seed to the final product. As the Ontario Beekeepers Association (2014) notes:

> Farmers requesting the latest high production hybrids have been sold a bundled all-in-one product containing BT, fungicide, root worm protection and neonicotinoid pesticide coating. Seed and pesticide companies Monsanto (Dekalb), Dupont (Pioneer), Bayer and Syngenta control the manufacturing and distribution of Ontario corn, soy, wheat and canola seeds and neonicotinoid pesticide treatments.

Until the partial ban, there were few options for non-organic farmers in Ontario to grow grains—especially corn—that would not have already been coated with neonicotinoids. Agrochemical corporations are deeply embedded in the everyday practices of most non-organic farmers. In fact, farmers are tied to agrochemical companies from seed to harvest due to the tying of biotech seeds with chemical inputs. Family-run or not, large-scale corn farms represent corporate agriculture in Canada. It is troubling, then, that agribusiness organizations and mainstream farmer's organizations had a total of seven seats on the Ontario government's working group on bee health, while small-scale farmers had none.

Beyond neonicotinoids: the potential of an agroecological counter-narrative and movement

As demonstrated in this paper, agrochemical corporations such as Bayers CropScience have a prominent place as stakeholders in the development of policy on pesticide use and regulation in Ontario. One way the industry attempts to intervene in policy-making regarding pesticides is by forming coalitions with large farmers' organizations such as the GFO, helping to craft a narrative about the negative effects of a pesticide ban on "family farmers." Corporate manipulations of public policy-making over the banning of neonicotinoids is just one example of the power and influence of agrochemical corporations. In response to these manipulations, there is need and potential for a powerful agroecological counter-narrative grounded in social movement struggles and representing a coalition between small-scale farmers, *bee-centred* beekeepers[4] (Moore and Kosut

[4]Although there is considerable disagreement about what these methods should and do entail, bee-centred beekeeping stands in stark contrast to large-scale, commercial beekeeping which Nimmo (2015) refers to as the "apis-industrial complex."

2013), scientists,[5] and environmentalists. This is especially important in Canada, as Health Canada has recently initiated a re-evaluation of three neonicotinoid pesticides: imidacloprid, clothianidin, and thiamethoxam (Pest Management Regulatory Agency 2017).

Watson and Stallins (2016) warn that campaigns focused on a ban of neonicotinoid, have the potential to fall into a "reductionist regulatory narrative." It is clear that a neonicotinoid ban *alone*, will not "save" bees or even dramatically improve their health. The use of honey bees in pollination can be considered a biological override to mask what Tony Weis (2010) calls the accelerating contradictions of capitalist-industrial agriculture. Used to pollinate monocropped fields in the wake of a native pollinator decline, honey bees are, as Watson and Stallins argue, a "rescue pollinator" (2016, 229). Even though honey bees play a pivotal role in capitalist-industrial agriculture, they, like their wild counterparts, are deeply harmed by it, especially by the intensification of capitalist-industrial agriculture, which began centuries ago and has been deepening significantly since the 1950s (De Palma et al. 2016).

There is also a worry that the banning of neonicotinoids may result in the use of even more harmful pesticides. Davis (2017) points out that, historically, banning pesticides has led to the creation of new classes of pesticides, not a shift towards less pesticide use. This provides a compelling argument that the neonicotinoid debate should be a jumping off point for the building of radical social movements that both disrupt and build viable alternatives to industrial-capitalist agriculture.

These radical social movements can challenge the intervention of agrochemical corporations in debates about neonicotinoids by promoting a counter-narrative portraying small-scale farmers as caretakers of the land who have an interest in the health of pollinators and ecosystems. This narrative is most strongly voiced in Canada by the NFU, a voluntary, national organization of small-scale farmers, representing both conventional and organic farmers. Although some farmers belong to both the GFO *and* the NFU, the NFU is unique among farm organizations in Canada in advocating for "people's interests against corporate control of our food system" (National Farmers Union 2016). The NFU is aligned with the international peasants' rights movement as represented by *La Via Campesina*, which organizes around agroecology, food sovereignty and social justice, with a strong orientation against the capitalist-industrial agricultural system (Martinez-Torres and Rosset 2010).

The NFU-Ontario chapter presents the agroecological counter-narrative very clearly in a submission to the Ontario government about the banning of neonicotinoids:

[5]On June 1, 2018 233 scientists released a statement calling for the global restriction of neonicotinoid pesticides in *Science* (Goulson 2018).

> We advocate for agricultural practices that are economically, socially and environmentally sustainable and built on the principles of food sovereignty. By working with and building our own knowledge and skills of agro-ecology we strive to protect the many organisms, including bees and wild pollinators, which provide economic benefits to our farms and contribute to a more beautiful countryside. (National Farmers Union 2014)

This is in line with the kinds of changes to agricultural policy promoted by leading entomologists. As Dave Goulson (2013, 11), a world-renowned bumble bee researcher argues:

> If we want to ensure healthy populations of honeybees, bumblebees, and other wild pollinating insects upon which we depend for our crop production, and more generally if we wish to support the healthy, diverse ecosystems upon which our future health and well-being depend, then we need to find ways to produce food in a sustainable way which incorporates the needs of biodiversity.

In their recent submission to Health Canada about the proposed nation-wide ban of imidacloprid, the NFU argues that food sovereignty, which they define as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems," should be the framework for Canada's agriculture policy (National Farmers Union 2017). The NFU are clearly using the neonicotinoid debate to challenge the influence and power of agrochemical corporations.

This is especially important at a time when Earth faces an unprecedented defaunation of insect life that could cause widespread ecosystem collapse (Hallman et al. 2017). It is essential that advocates of pollinator health and biodiversity confront and complicate the agrochemical narrative, which also entails confronting the neoliberal capitalist agenda. As Suryanarayanan (2015, 150) argues,

> the contemporary regulatory process that renders the issues of pollinators in relation to pesticides in narrow econometric terms is the outcome of a much broader agenda of neoliberalization … policymaking on pesticides has tended to systematically privilege the interests and values of agribusiness over others.

How can an agroecological counter-narrative translate into action? The agroecological counter-narrative can prevent pollinator advocates from sliding into the false dichotomies of agrarian past vs. modern realities, urban vs. rural and farmer vs. environmentalist. In their place, it can promote the interests of urban and rural people as aligned against agrochemical corporations, and it can cast small-scale farmers as environmental stewards at the forefront of struggles against capitalist-industrial agriculture. An agroecological counter-narrative can push past the boundaries of national borders through ongoing alignment with *La Via Campesina*, to challenge the global dominance of agrochemical corporations. The harmful effects of neonicotinoids on

pollinators and other insects do not stop at national borders and neither should the struggles against them.

Advocates for pollinator health and biodiversity must go further than partial bans and moratoriums to ensure the mutual flourishing of pollinators alongside people. We know we face an uncertain future full of ecological surprises, many of them negative. In the face of this uncertainty we can build *interspecies alliances* between bees and people that allow for abundant futures (Best 2003; Collard, Dempsey, and Sundberg 2015). An important starting point for these alliances is the emergence of an international agroecological counter-narrative and movement that imagines a relationship between humans and bees in which nurturing biodiversity and ecosystem health are as much the work of farmers as tending crops. This would mean a societal shift to valuing people *and* bees over profit, and to a commitment to supporting farmers in their work as the caretakers of biodiversity.

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