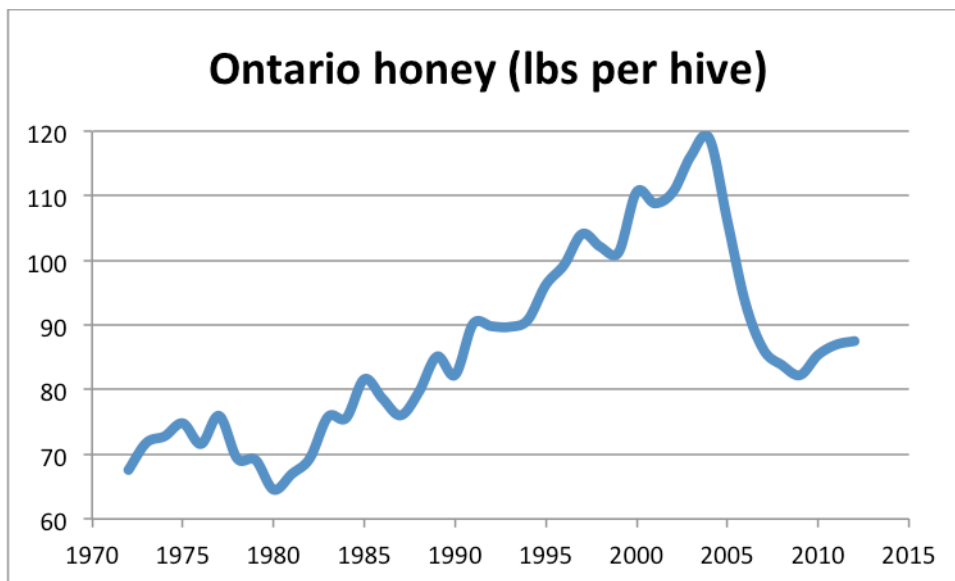


Response to “An Open Letter to Ontarians” Clement Kent, Ph.D.

“An Open Letter to Ontarians” appeared as a full-page ad in many Ontario newspapers recently. The ad, supported by a number of pesticide manufacturers, is a response to the Ontario government’s plan to ban seed treated with “neonicotinoid” pesticides – chemicals that imitate the effect of nicotine in attacking nerves in the brain of insects, but which unlike nicotine break down only slowly in the environment.

The ad includes a cheery graphic titled “Ontario Bee Colonies are Growing”. This is a clever distraction from the real story: that honeybee colonies die at a high rate over winter and in the spring in areas where neonicotinoid-treated corn seeds are planted. Let’s look at the facts.

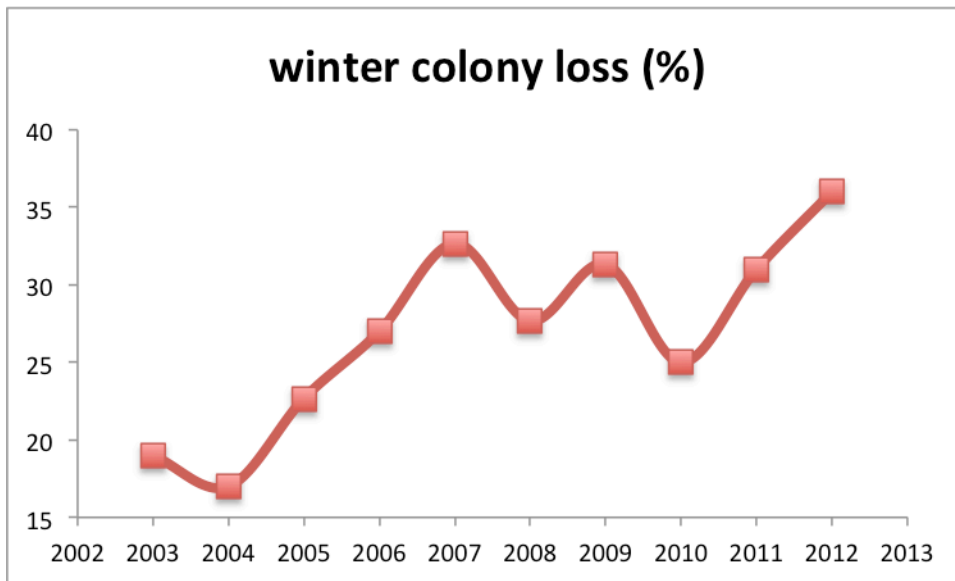
First, there are other factors that challenge honeybee health. Foremost is the spread of a blood-sucking mite called “Varroa” which directly damages bees and indirectly worsens the problem by spreading viruses between bees. There’s no doubt that varroa is a problem, but it arrived in Ontario in the 1990’s and beekeepers have learned to manage it. But, pesticide companies and other prefer to point to varroa (a.k.a. “parasites”) as the main problem facing bees. How can we figure out who is right?



I made the chart above using data from StatsCan on how much honey commercial beekeepers in Ontario harvested per hive each year from 1970 to the present. Honey production is, like many other farm activities, very dependent on the weather, so I used a moving five year average to make the trends clearer. You can see that there is a small, temporary dip in the late 1990’s when varroa mite arrived, but that the 25-year trend of beekeepers getting more and more skilled at managing

their hives continued after a short pause. The peak of the trend is in 2003. In 2004, neonic-treated corn seed was introduced to Ontario and by 2008, all corn seed from major companies had neonic treatments. During this time, Ontario honey production dropped dramatically.

I made similar charts for each province. The three provinces with the largest corn production – Ontario, Quebec, and British Columbia – all show the same collapse in honey yields at the same time. None of the provinces with low corn production show this. The fact that honey production drops at the same time as neonic-treated corn is introduced, but not when varroa mites arrived, suggests the “parasites are the real problem” argument is just plain wrong.



But, you could argue that maybe some other factor happened to come along between 2004 and 2008. Maybe beekeepers were less interested in harvesting honey because they made more money shipping hives to New Brunswick to help pollinate the blueberry crop? Certainly this has been an increasing trend, because as one blueberry farmer said “we’re just not seeing the native pollinators anymore, so we need the honey bees”. But although this may be a contributing factor, the chart above (based on information from OMAFRA and using 3 year moving averages to show trends) shows that with the introduction of neonic-treated corn, the winter loss rate of Ontario beehives doubled. In the same period, wild honeybee colonies in the US crashed, showing that it wasn’t just trucking hives around that was the problem.

These losses make it very difficult for beekeepers to stay in business. Costs have skyrocketed – both in materials to replace the lost colonies and in people time.

A good source for more information is the testimony of Dan Davidson, president of the Ontario Beekeepers Association, and Jean-Pierre Chapleau of the Fédération des

apiculteurs du Québec to the Senate committee on Agriculture and Forestry a year ago. It's online at the Parliament of Canada web site. For example, the "Open Letter" ad says that "Here in Ontario, real-world research consistently demonstrates that responsible use of neonicotinoid seed treatments does not result in honey bee colony health issues". By contrast, M. Chapleau says:

"Normally, established [industry research] protocols involve plots that are too small and an insufficient number of hives. [...] That is the protocol Bayer is using to prove that neonics are not harmful to foraging. They place 5 hives in front of 4 hectares of canola fields, and use bees that forage throughout hundreds of other hectares. To give you an idea of how scientific statistics work, when you have just 5 hives, you need a lot of major problems to find a significant difference between treatments."

Both the ad and M. Chapleau are probably referring to two studies published in 2014 by Prof. Cynthia Scott-Dupree of the University of Guelph. One study put a few honeybee hives in 5 fields of neonic-treated canola and 5 untreated fields and found no ill effects. As M. Chapleau pointed out, statistics with only 5 repetitions of variable data typically won't find a significant difference. Dan Davidson of the OBA pointed out in his testimony that neonic levels in canola flowers are typically lower than in corn pollen, so finding no ill effect of canola exposure doesn't speak to what corn does. For this paper "*Funding of all expenses for this study was through Bayer CropScience*" – even the student researchers who did the field work were paid by Bayer.

In the second study Prof. Scott-Dupree did indeed put bee hives in corn fields during the tasseling period and concluded that exposure to treated corn "poses low risk". But, the bees used were *bumblebees* not honeybees, and as the study admits, the bumblebees did not consume much corn pollen, preferring instead wild plants nearby. Furthermore, although they claim low risk, their study showed that when examined a month after exposure, there were 25% fewer workers in colonies exposed to treated corn. Lastly they showed that other native bees fed much more heavily on the corn pollen.

So, one study exposed honeybees to canola instead of corn, a second study looked at effects of corn on bumblebees rather than honeybees – and these are cited by the "Open Letter" ad as "real-world research"!

By contrast, if we look at studies by scientists not paid by Bayer, we find mounting evidence of long-term, sub-lethal effects of neonics at the levels bees encounter them in the field. For example, a just-published Scottish study of bumblebees showed quite conclusively that "real-world" levels of neonics accumulate in the parts of bee brains used for learning and memory and make the nerves sluggish and unable to function at full capacity. This ties in with the many other studies in major scientific journals showing that these sublethal effects on forager bees mean less food is brought to the hive, even though bees are not dropping dead.

Let's finish this off by trying to get some perspective. I think we can look at neonics in several ways:

1. It's clear that high levels of neonics on treated corn (and perhaps soy) are highly damaging to managed honeybee colonies and to other pollinators. A ban on treated corn seed in Ontario seems eminently justified to me.
2. As even Scott-Dupree's work shows, neonics in corn pollen are fed on by native bees, bumblebees, and honeybees. Removing this source of neonics in bee diets by using untreated seed is important, as work like the Scottish study shows, to prevent losses due to confused/sluggish foragers and the accompanying losses in colony weights, honey, etc.
3. The jury is still out on whether the exposure to neonics from treated canola seeds is enough to damage bee health. Personally, I believe we should reduce all neonic use, but it's possible that neonic reductions could be phased in for crops like canola, giving breeders and farmers time to adjust their management of crops.

Clement Kent, PhD is a senior scientist at the Howard Hughes Medical Institute in Washington D.C. Dr. Kent studied genomics, behaviour and evolution as a PhD student in biology at the University of Toronto. Following that, he spent four years as a Postdoctoral Research Fellow at York University.