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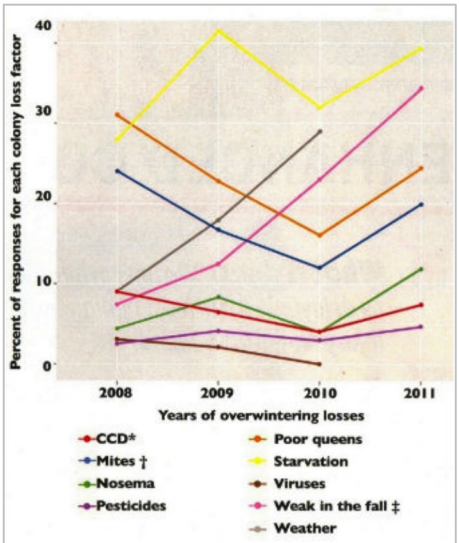
Monday, 22 September 2014 08:50

Bees and Pesticides - The Connection to Golf Courses

by Mario Lanthier, CropHealth Advising & Research. Kelowna, British Columbia
www.crophealth.com (http://www.crophealth.com)

Bees are dying. It has been all over the news this year. We are told there is a connection to pesticides. Is there a connection to golf courses? Let's review the most recent information and discuss possible implications for the industry. Expect to be surprised!

There are many factors that cause bee mortality over the winter. Beekeepers themselves report 9 different reasons, including varroa mites, Nosema fungi, poor nutrition and very cold temperatures. Direct exposure to pesticides is one reason reported by beekeepers. Annual surveys conducted in the USA indicate this factor may account for under 10% of honeybee losses.



(#1) About the chart: Causes of honeybee colony losses as reported by domestic-market beekeepers. Summary from annual surveys conducted by US Department of Agriculture and the Apiary Inspectors of America. Published in Good Fruit Grower Magazine, March 2014

The IPM Practitioner
Monitoring the Field of Pest Management
Volume XXX, Number 9/10, September/October 2008

Pesticides and Honey Bee Colony Collapse Disorder

By William Quarles

About one-third of all the food we eat requires animal pollination, and most of our fruits, vegetables, and nuts are pollinated by bees. Due to increased development, pesticides, and habitat destruction, native bees that pollinated many of our crops are in decline (Buchmann and Nabhan 1996). Crop production in the U.S. has shifted to large monocultures, pollinated almost entirely by commercially managed colonies of the

(#2) Credit: The IPM Practitioner (published in California), September 2008

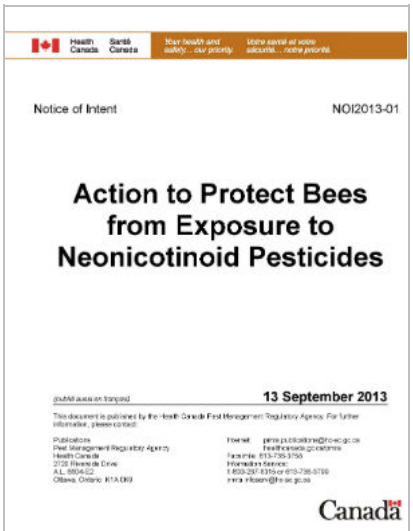
The problem is not new. Bee mortality has been happening for over 60 years, for many different reasons. What changed recently is the type of bee mortality. The discussion is not so much about dead bees that are visible but rather dead bees that are not seen. Beekeepers open their hives in the spring and note a large number of bees are missing. There are no dead bees inside or outside the hives. There are no opportunistic invaders inside the hives. The bees are not returning home and are presumed dead. The problem has been called "Colony Collapse Disorder" (CCD for those who like acronyms). It was first formally reported in France in 1994. A similar situation occurred in the United States in 2006 and in Germany in 2008. According to the Canadian Association of Professional Apiculturists, beekeepers expect losing 15% of their colonies over the winter. Over the past six years, the loss of honeybees across Canada has averaged 30% annually. Last winter, the loss of honeybee colonies was 25% across Canada and 58% in Ontario alone.

What is the cause of Colony Collapse Disorder? At this time, nobody knows for sure. Many stresses are

(#3) Credit: Good Fruit Grower magazine, March 2014

implicated, including parasitic mites, viruses and cold winters. Is there an impact related to the use of neonicotinoid pesticides? Some scientists think the bees are made weaker after exposure to these pesticides and become more susceptible to mortality from other stresses. Neonicotinoids are pesticide products introduced in the 1990s for use in agriculture and horticulture. They have gained popularity because of their low toxicity to humans and their effectiveness against insect pests. European scientists were the first to make a connection. Italian scientists reported that bees exposed to neonicotinoid pesticides in the field later developed higher levels of virus infection after contact with Varroa mites. A restriction on the use of these products in France and Germany has coincided with a dramatic recovery in bee hive winter survival. In December 2013, a 2-year ban was imposed across Europe on any use of neonicotinoid pesticides on crops that may be visited by bees.

In Canada, the problem was raised by the Pest Management Regulatory Agency (PMRA) after reports of extensive bee mortality in Ontario and Québec in the spring of 2012 and again in 2013. The PMRA concluded that 70% of dead bees had residues of neonicotinoid pesticides, against a very low percentage in unaffected bees Interim measures were immediately implemented regarding the use of neonicotinoid pesticides for seed treatment of corn and soybean.



Notice of Intent NOI2013-01

Action to Protect Bees from Exposure to Neonicotinoid Pesticides

13 September 2013

Canada

(#4) Source: Document available at the website of Health Canada http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/_noi2013-01/noi2013-01-eng.php

(#5) Source: Document available at Friends of the Earth, website http://www.foe.org/beeaction

Bees and pesticides - environmental groups jumped on the story. In 2013, the US based "Friends of the Earth" reported that 54% of common garden plants purchased at retail stores contained neonicotinoid residues. In 2014, the group published a similar study for plants purchased in Canada.

AGRICULTURE

Home Depot to label plants with pesticide tied to bee deaths

ERIC ATKINS

Home Depot Canada Inc. plans to begin labelling plants that contain the pesticide that is blamed for the deaths of bees and other pollinators of crops and flowers.

The move, which mimics steps taken by the U.S. parent of the home improvement retailer and some of its rivals, comes amid new scientific evidence the neonicotinoid class of insecticides designed to ward off pests are contributing to declines in bee populations.

"We will be labelling our plants as they are doing in the U.S.," said Erika Botond, spokeswoman for Home Depot Canada, which has 180 stores in Canada, and is one of the country's biggest garden centres.

Neonicotinoids are used to grow corn, canola and soybean in addition to many flowers, fruits and vegetables. The pesticide, which is applied to the seed before planting or is sprayed on

Researchers at the University of Guelph fitted bees with radio transmitters to analyze the effects of neonics on the insects. OSCAR RAMOS-RODRIGUEZ

(#6) Credit: Globe and Mail, July 9, 2014

All these reports had repercussions. Earlier this year, Bailey Nurseries, one of the largest in the United States, announced it will "eliminate" all foliar treatments with neonicotinoid products. This past summer, Home Depot Canada

announced it will be "labelling plants that contain the pesticide that is blamed for the death of bees".

The Task Force on Systemic Pesticides

EMBARGOED TO: 00.01 CET 24 JUNE 2014

PRESS RELEASE

NEW FOUR-YEAR SCIENTIFIC ANALYSIS: SYSTEMIC PESTICIDES POSE GLOBAL THREAT TO BIODIVERSITY AND ECOSYSTEM SERVICES

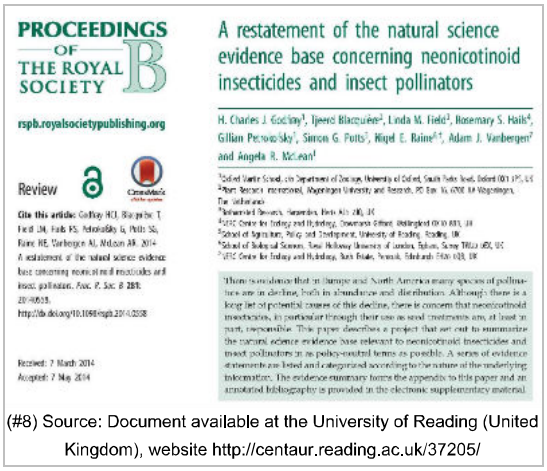
The conclusions of a new meta-analysis of the systemic pesticides neonicotinoids and fipronil (neonics) confirm that they are causing significant damage to a wide range of beneficial invertebrate species and are a key factor in the decline of bees.

Concern about the impact of systemic pesticides on a variety of beneficial species has been growing for the last 20 years but the science has not been considered conclusive until now.

Undertaking a full analysis of all the available literature (800 peer reviewed reports) the *Task Force on Systemic Pesticides* – a group of global, independent scientists - has found that there is clear evidence of harm sufficient to trigger regulatory action.

(#7) Source: Document available at The Task Force on Systemic Pesticides, website http://www.foe.org/beeaction

Studies in the scientific press were published in rapid succession this past year. In June, the European-based "Task Force on Systemic Pesticides" analysed 800 peer reviewed reports and concluded that neonicotinoids "are a key factor in the decline of bees". In July, the journal Functional Ecology published a paper on bumblebees foraging behaviour. The co-authors (including a Canadian researcher at Guelph University) concluded: "Our results show that neonicotinoid exposure has both acute and chronic effects on overall foraging activity."



PROCEEDINGS OF THE ROYAL SOCIETY B

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Review

A restatement of the natural science evidence base concerning neonicotinoid insecticides and insect pollinators

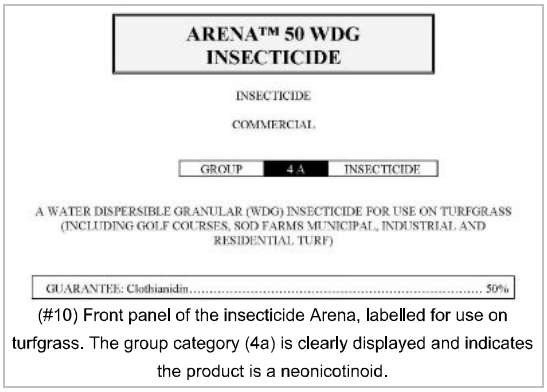
H. Charles J. Godfray[1], Tjeerd Blacquière[2], Linda M. Field[3], Rosemary S. Hails[4], Gillian Petrokofsky[5], Simon G. Potts[6], Nigel E. Raine[6,7], Adam J. Vanbergen[3] and Angela R. McLean[1]

(#8) Source: Document available at the University of Reading (United Kingdom), website http://centaur.reading.ac.uk/37205/

A comprehensive review of available scientific information was published earlier this year. An international panel of scientists called for "an evidence driven debate" on the topic. Said the lead scientist: "Pollinators are clearly exposed to neonicotinoid insecticides – but seldom lethal doses. We need a better understanding of the consequences of realistic sub-lethal doses to the insect individual, bee colony and pollinator population." Many persons claim that honeybees do not absorb enough neonicotinoids in the field to suffer ill effects, and these pesticides have replaced older products that were much more dangerous to the health of bees and humans.

(#9) More information about grouping of insecticides from the Insecticide Resistance Action Committee at the website http://www.irac-online.org/documents/moa-classification/?ext=pdf

What are the neonicotinoid pesticides? They are identified as Group 4 insecticides on the pesticide container. This group of insecticide products have systemic activity – they are absorbed by the plant and transported to untreated plant parts. Since their introduction in the 1990s, their use has expanded to comprise about 30% of the insecticide market. They are commonly used in food production and for seed treatment ahead of planting.



(#10) Front panel of the insecticide Arena, labelled for use on turfgrass. The group category (4a) is clearly displayed and indicates the product is a neonicotinoid.

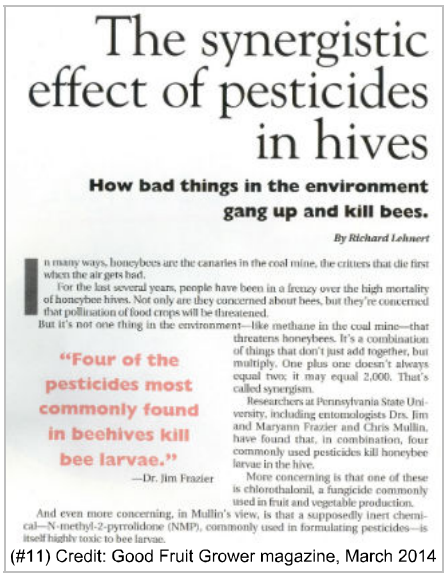
In Canada, six active ingredients of neonicotinoids are now registered for commercial use. Neonicotinoid insecticides registered for use on turfgrass are Merit, Quali-Pro Imidacloprid, Arena and Clothianidin.

Trade name	Active ingredient	Year registered	Label uses	Registrant
Admire	imidacloprid	1995	Food crops and Christmas trees	Bayer
Merit	imidacloprid	1998	Greenhouses and Turfgrass	Bayer
Intercept	imidacloprid	2003	Greenhouse and Nursery	Bayer
Quali-Pro Imidacloprid	imidacloprid	2009	Turfgrass	Makhteshim
Ima-Jet	imidacloprid	2014	Tree injection	Arborjet
TriStar	acetamiprid	2002	Ornamentals	Nippon
Assail	acetamiprid	2002	Food crops	Soda
Actara	thiamethoxam	2006	Food crops	Syngenta
Flagship	thiamethoxam	2013	Ornamentals and Nursery	Syngenta
Calypso	thiacloprid	2007	Fruit trees	Bayer
Clutch	clothianidin	2009	Food crops	Valent
Arena	clothianidin	2009	Turfgrass	Valent
Clothianidin	clothianidin	2009	Turfgrass	Valent
Closer	sulfoxaflor	2013	Food crops	Dow

Partial list of commercial insecticides registered in Canada that are made from neonicotinoid active ingredients. Source: Pest Management Regulatory Agency website at http://www.hc-sc.gc.ca/cps-spc/pest/registrant-titulaire/tools-outils/label-etiq-eng.php (http://www.hc-sc.gc.ca/cps-spc/pest/registrant-titulaire/tools-outils/label-etiq-eng.php)

The story does not end with neonicotinoid insecticides. Researchers are now examining the impact of pesticides used in sequence. They call it "synergy", the combined action of two agents that together increase each other's effectiveness. In this case, one plus one does not equal two – it may equal 7. Fungicides are not normally a threat to bees, but they may act as synergists and increase the toxicity of insecticides by a factor of seven. Researchers at Pennsylvania State

University have found four pesticides which kill honeybee larvae in the hive. One product is chlorothalonil, sold as Daconil and Bravo. Adult bees are not killed by direct contact but take pollen with fungicide residue into the hive to feed the larvae.



The synergistic effect of pesticides in hives

How bad things in the environment gang up and kill bees.

By Richard Lehnert

In many ways, honeybees are the canaries in the coal mine, the critters that die first when the air gets bad.

For the last several years, people have been in a frenzy over the high mortality of honeybee hives. Not only are they concerned about bees, but they're concerned that pollination of food crops will be threatened.

But it's not one thing in the environment—like methane in the coal mine—that threatens honeybees. It's a combination of things that don't just add together, but multiply. One plus one doesn't always equal two; it may equal 2,000. That's called synergism.

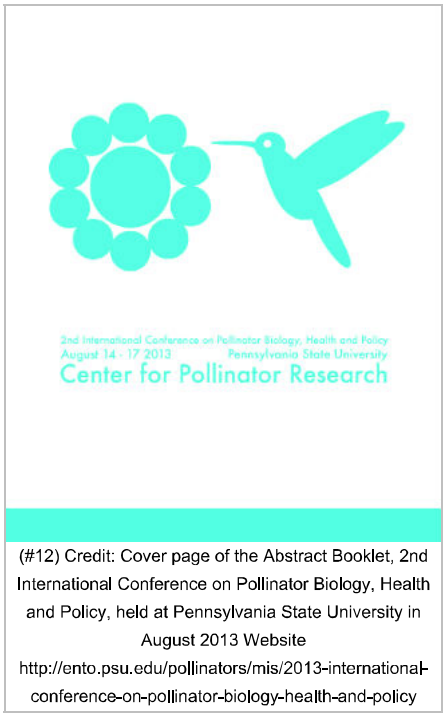
"Four of the pesticides most commonly found in beehives kill bee larvae."
—Dr. Jim Frazier

Researchers at Pennsylvania State University, including entomologists Drs. Jim and Maryann Frazier and Chris Mullin, have found that, in combination, four commonly used pesticides kill honeybee larvae in the hive.

More concerning is that one of these is chlorothalonil, a fungicide commonly used in fruit and vegetable production.

And even more concerning, in Mullin's view, is that a supposedly inert chemical—N-methyl-2-pyrrolidone (NMP), commonly used in formulating pesticides—is itself highly toxic to bee larvae.

(#11) Credit: Good Fruit Grower magazine, March 2014



(#12) Credit: Cover page of the Abstract Booklet, 2nd International Conference on Pollinator Biology, Health and Policy, held at Pennsylvania State University in August 2013 Website http://ento.psu.edu/pollinators/mis/2013-international-conference-on-pollinator-biology-health-and-policy

At the 2013 International Conference on Pollinator Biology, Health and Policy, held at The Pennsylvania State University, one study found blue orchard bees and alfalfa leaf-cutter bees had trouble finding their own nests after foraging in outdoor fields that researchers sprayed with the fungicides Rovral (iprodione) or Pristine (pyraclostrobin and boscalid).

Beekeepers file suit against pesticide makers

Controversial neonicotinoids at heart of $450-million action

(#13) Credit: Globe and Mail, September 4, 2014

This story will not go away. In early September, beekeepers in Ontario filed a lawsuit seeking $450 million in damages, alleging unrecoverable costs and lost profits as a result of neonicotinoid use on plants and crops. In the United States, the Environmental Protection Agency has a target date of 2015 to complete its

review of neonicotinoid pesticides and their impact on bees. That means many years with more discussion and studies, each conclusion being slightly different than the previous one.

(#14) To reduce bee exposure to pesticides, control blooming weeds such as dandelion before applying insecticides to near-by plants.

The use of neonicotinoid insecticides on turfgrass is limited in British Columbia. The concern with these products is larger in Eastern Canada where the products are applied to control European chafer, Japanese beetle and other insect pests. Still, the topic is now in the general press and a cause for concerns by members of the public. Bees are important and everybody wants to see a healthy bee population. Golf course superintendent would be wise to stay informed on the topic and implement measures to address the expected public concerns

(#15) Drift management is important to protect bees. Pesticide applicators must have a sound understanding of their equipment and the impact of weather conditions on the transport of pesticide particles away from the target area.

What is there to do? Remain alert to new information on the topic. The story will remain in the news until firm conclusions can be made. It is likely the neonicotinoid insecticides will continue to be available. However, their use will be scrutinized or restricted and the registration of new active ingredients will be severely delayed. In the meantime, many suggestions can be made to persons currently using pesticides.

1) Reduce the use of neonicotinoid insecticides. In some situations, other less-toxic products can be used. If no replacement is available, prompt action is required by industry officials to register alternative products.

2) Avoid spraying plants in bloom with either insecticides or fungicides. The flowers will likely be visited by foraging bees. The less exposure to pesticides, the better for the bees.

3) Avoid drift to near-by plants and standing water. Bees may drink from standing water and bring to the hive the contaminated water.

4) Provide alternate habitat. Food and nesting sites away from pesticide treatment areas will provide a refuge for bees and reduce their potential exposure to pesticide residue.

For a PDF of this article, click on attachment link below.

(#16) Many publications offer useful suggestions to reduce bee poisoning. This publication from Oregon State University is available at the website http://wasba.org/how-to-reduce-bee-poisoning-from-pesticides-pnw-591/

Download attachments:

- Article_for_Turfgrass_News_Bees_and_Pesticides_Lanthier_CropHealth_Advising__Research_draft_0915.pdf (/component/k2/item/download/32_0f3277ae119577ff9cc9cc70e5437949)
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