

Growing Flowering Plants That are Safe for Pollinators in the Yard and Garden

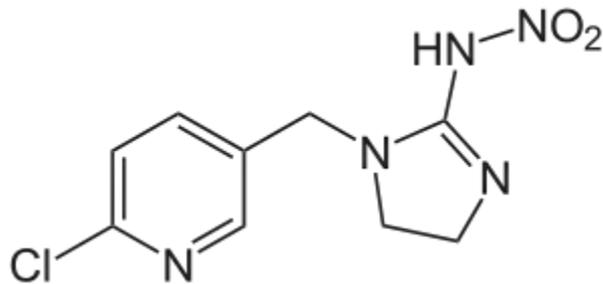
David Smitley, September 30, 2014

Michigan State University

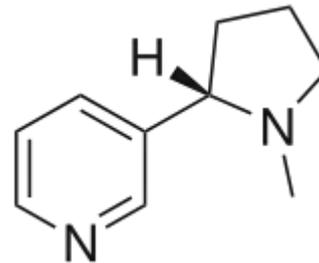


A type of sweat bee, one of 4,000 spp. of native bees in the USA

What are neonicotinoid insecticides? Neonicotinoids are a group of insecticides with a chemical structure that is similar to nicotine.



Imidacloprid



Nicotine

They are more selective (e.g. they have greater toxicity to insects than to mammals), and are less harmful than most older classes of insecticides. The most widely used neonicotinoid insecticide, imidacloprid, is less toxic to people than caffeine, and about twice as toxic as ibuprofen.

Neonicotinoid Insecticides Used for Pest Control on Ornamentals¹

Neonic insecticides given to bees orally	Honey bees Lowest lethal concentration		Honey bees lowest sublethal concentration		Bumble bees Lowest lethal concentration		Bumble bees lowest sublethal concentration	
	Acute (ppb)	Chronic (ppb)	Acute (ppb)	Chronic (ppb)	Acute (ppb)	Chronic (ppb)	Acute (ppb)	Chronic (ppb)
	Acetamiprid	442,000	ND	5,000	ND	ND	ND	ND
Clothianidin	>190	ND	24	ND	ND	ND	ND	ND
Dinotefuran	>380	ND	ND	ND	ND	ND	ND	ND
Imidacloprid	>185	0.10 >20	ND	24	ND	59	ND	10
Thiomethoxam	>250	ND	ND	50	ND	120	ND	100

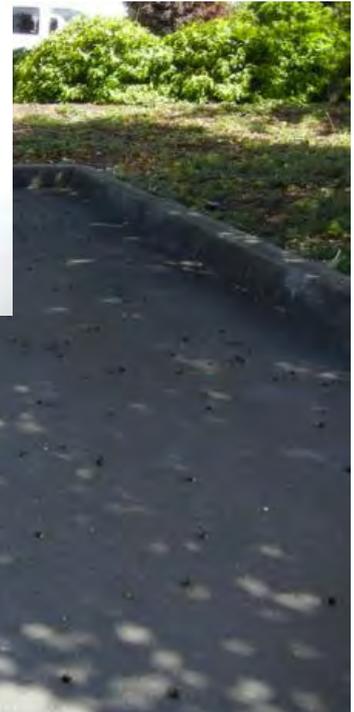
¹From the 2012 Xerces Society Report: 'Are Neonicotinoids Killing Bees?'

How Neonicotinoids and Bees Became a Crisis for Greenhouse and Nursery Growers: the Last 16 Months

Start: June 20, 2013

Buzzkill: Huge bee die-off in Oregon parking lot blamed on insecticide spraying
Grist.org, Oregon Public Broadcasting

- 25,000 dead bumble bees and honey bees found in the parking lot of the Wilsonville Target Store
- Linden trees in full bloom had been sprayed with Safari (dinotefuran)
- Scott Hoffman Black, executive director of the Xerces Society, said he has confirmed the bees died from pesticide poisoning. “Evidently they didn’t follow the label instructions. This should not have been applied to the trees while they’re in bloom.”



Feb 2014

Organic Consumers Association Website

Bee Science Articles

- 02/11/14 - [GMO Soybeans Are Bad for Mexico's Beekeepers](#)
- 02/20/12 - [Study Says Insecticide Used with GM Corn Toxic to Bees](#)
- 01/21/11 - [Call to Ban Pesticides Linked to Bee Deaths](#)
- 12/24/08 - [Bee Learning Affected by Eating Toxin from GE Corn](#)
- 08/26/08 - [New Research Finds Higher-Than-Expected Levels of Pesticides in Hives](#)
- 05/08/08 - [Honeybee Hives in U.S. Seeing Continued Decline](#)
- 05/05/08 - [Air Pollution Impedes Bees' Ability to Find Flowers](#)
- 09/07/07 - [Study Points to Virus in Collapse of Honeybee Colonies](#)
- 05/04/07 - [What's The Buzz? Scientists Explore Pesticide Poisoning of Bees](#)
- 04/26/07 - [Requiem for the Honeybee](#)

February 7, 2014

Join One of these Five Home Depot ‘Swarms’ to Help Save the Bees! Organic Consumers Association

For related articles and more information, please visit OCA's [Honey Bee Health page](#) and our [Millions Against Monsanto page](#).

If you live in **Eugene, Ore.**, the **Bay Area (Calif.)**, **Minneapolis, Minn.**, **Washington D.C.**, or **Chicago, Ill.**, you're in luck. You can join activists from the OCA and other bee-friendly groups to help deliver valentines to local Home Depot store managers with this message: "Give Bees Some Love! Stop Selling Bee-Killing Plants!" You can [download](#) your valentine, and add your own personal message. We even have [leaflets](#) you can print and hand out.



Feb 12, 2014: Organic Consumers Association Protest in Chicago

YouTube



[IM] Organic Consumers Association part of the national action to protest Home Depot and Lowes



mkchi kulti

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5,222

Feb 12, 2014



Organic Consumers Association Protest in Chicago at a Home Depot

March 2014



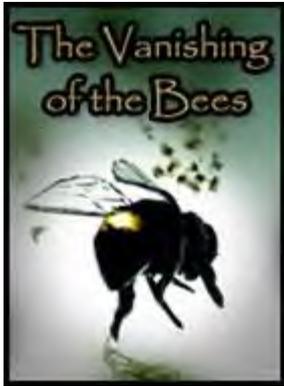
Buyers from Home Depot and Lowes contact nursery and greenhouse growers to announce that they may NOT be accepting plants treated with neonicotinoid insecticides, or that treated plants will need to be labeled.

How can they do that?

The large retail stores control the lion-size of the flower and nursery market. Contracts with these buyers are highly competitive and may involve millions of dollars in sales per year.



May 2, 2014



VANISHING OF THE BEES

Narrated by ELLEN PAGE



[A New Documentary Film Exploring "Colony Collapse Disorder" and the Fate of Agriculture](#)



May 2, 2014



Blog | Features | Press



ABOUT

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Feature Story

THE CASE OF THE VANISHING BEES

Pesticides & The Perfect Crime: In the widespread bee die-offs, bees often just vanish. One beekeeper calls it the Perfect Crime—no bodies, no murder weapon, no bees. What's happening to the bees?



Chris Jordan-Bloch / Earthjustice

The Case of The Vanishing Bees

Pesticides & The Perfect Crime: In the widespread bee die-offs, bees often just vanish. One beekeeper calls it the Perfect Crime—no bodies, no murder weapons, no bees. What's happening to the bees?



May 9, 2014

[Harvard School of Public Health](#) > [News](#) > [Press Releases](#)

Study strengthens link between neonicotinoids and collapse of honey bee colonies (by Dr. Lu)

For immediate release: May 9, 2014

Boston, MA — Two widely used neonicotinoids —a class of insecticide—appear to significantly harm honey bee colonies over the winter, particularly during colder winters, according to a new study from Harvard School of Public Health (HSPH). The study replicated a 2012 finding from the same research group that found a link between low doses of imidacloprid and Colony Collapse Disorder (CCD), in which bees abandon their hives over the winter and eventually die.



May 2014. 2nd Lu paper receives a lot of attention in the media

First paper: LU¹, WARCHOL² and CALLAHAN. 2012. *In situ* replication of honey bee colony collapse disorder. *Bulletin of Insectology* 65 (1): 99-106, 2012

Second paper: Lu C, Warchol KM, Callahan RA. 2014. Sub-lethal exposure to neonicotinoids impaired honey bees winterization before proceeding to colony collapse disorder. *Bulletin of Insectology* 67: 125–130.

Discussion of Lu papers

In a recent review, Cresswell suggests that “the field-realistic range of imidacloprid concentrations is assumed to be 0.7–10 $\mu\text{g L}^{-1}$ (*ppb*).

Dosages in first Lu paper: 20, 40, 200, or 400 ppb fed constantly to bees in sugar water. Also, symptoms of affected colonies may not match CCD.

Dosage in second Lu paper: 136 ppb fed constantly to bees in sugar water.

Concentration of imidacloprid or clothianidin in sugar water fed to bees continuously for 13 weeks is much higher than what is expected in the pollen of seed-treated field crops. But overall, these results are consistent with other papers where bees are fed neonicotinoid-tainted sugar water.

June 2014

Gardeners Beware 2014: Bee-Toxic Pesticides Found in “Bee-Friendly” Plants Sold at Garden Centers Across the U.S. and Canada

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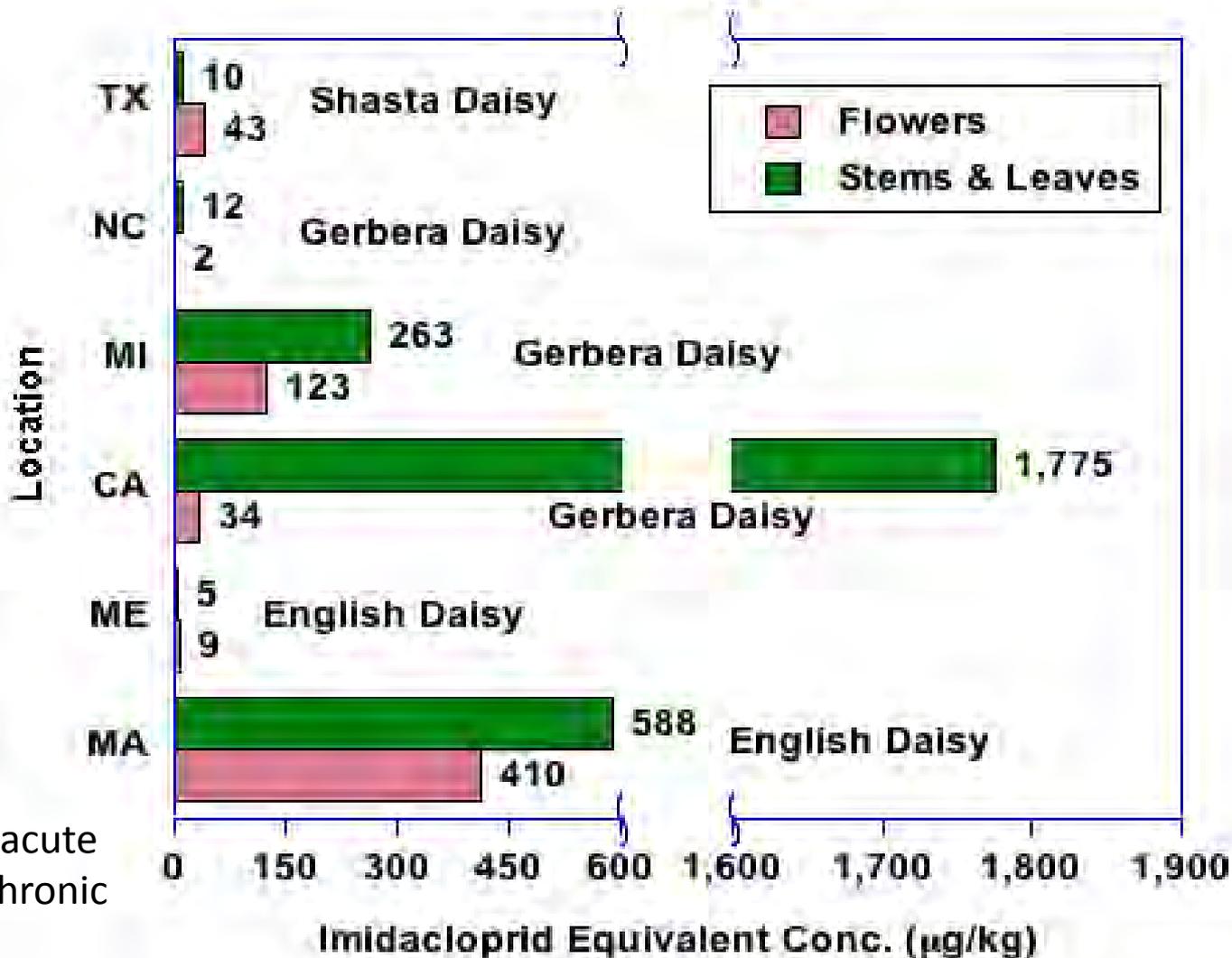


Report Summary (of a 60 page report):

- Plants were purchased from retail nurseries, including **Home Depot, Lowe's, Walmart, and Orchard Supply Hardware in 18 cities** across the U.S., as well as three provinces in Canada.
- They then sent the plants off to a laboratory to measure the presence and concentration of pesticides in the greenery.
- Testing showed that **51 percent of store-bought plants** had levels of a group of harmful pesticides known as neonicotinoids that were high **enough to kill honey bees, bumble bees, and other pollinators "outright."**

Gardeners Beware Report

Other Daisies



Oral LD50

- 180 ppb, acute
- 50 ppb, chronic

Determination of Imidacloprid Residue Concentrations in Seedless Watermelon Flowers

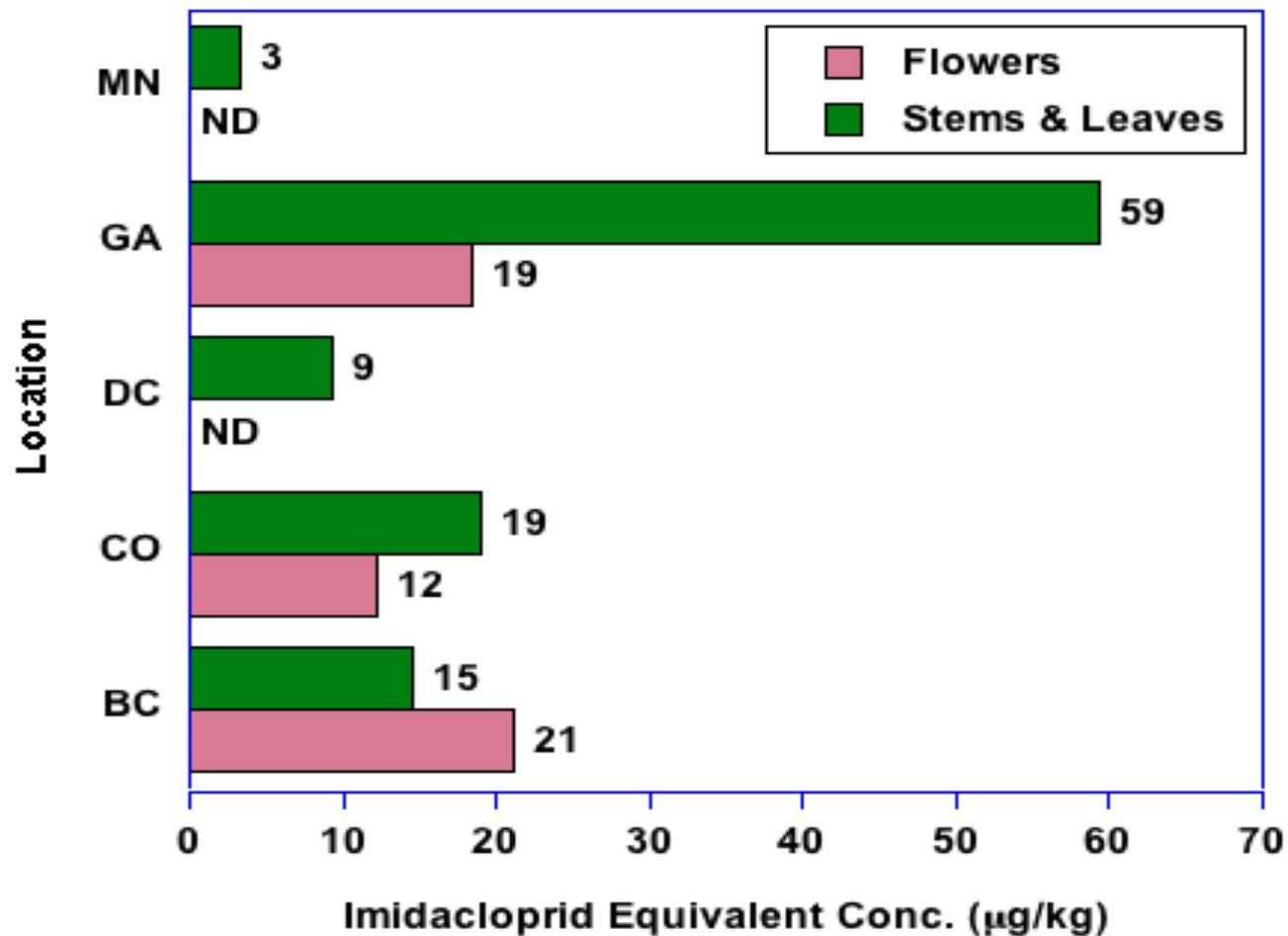
Galen P. Dively, Mike Embrey, Terry Patton, and Amy Miller
Department of Entomology, University of Maryland

Table 2. Summary of imidacloprid concentrations detected in flowers collected three weeks after peak bloom in treated replicate plots of seedless watermelon.

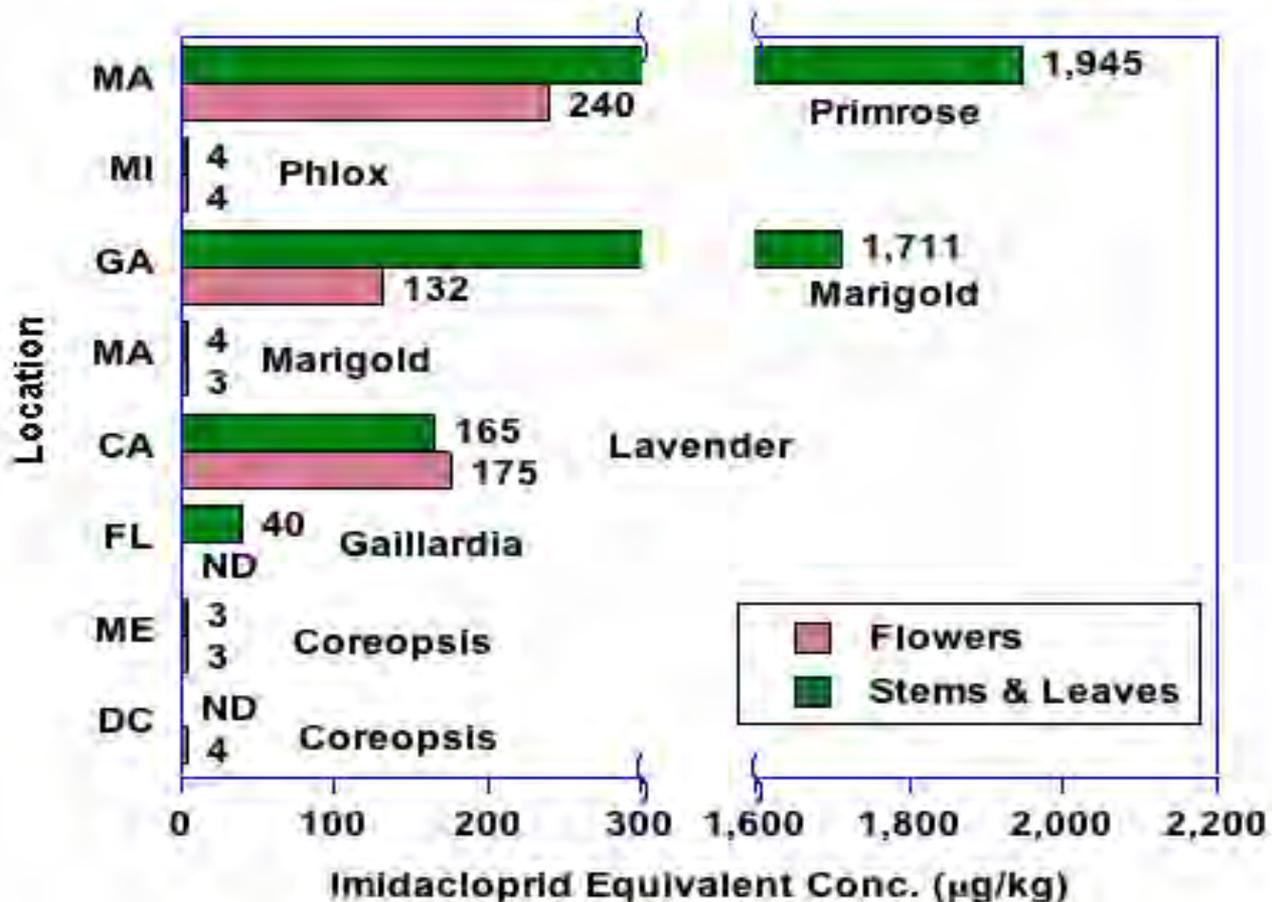
Flower type	Treatment regime	Type of sample ¹	Mean ppb of imidacloprid	SEM	Minimum	Maximum	
Staminate /pistillate (six replicate plots)	Single transplant drench at planting (7 oz/acre)	F	4.1	0.52	3.1	4.8	
		R	0.0	0.00	0.0	0.0	
	Split treatments (3.5 oz/acre at planting; 3.5 oz/acre 3 weeks later)	F	S/C	2.3	1.20	0.0	4.0
			F	3.3	0.37	2.8	4.0
		R	R	0.0	0.00	0.0	0.0
			S/C	0.7	0.67	0.0	2.0

¹ F = flower tissue (sepals, receptacle) excluding the male and female parts; S = Stamens (male parts of flower); P = Carpels (female parts of flower); and R = water rinsate obtained by washing the reproductive parts of the flowers.

Salvia



Other Plants



June 25, 2014 **Gardeners Beware Report Generates More News**

Pesticides found in plants purchased at Home Depot or Walmart can prove deadly for bees. By [Marina Koren](#) [Follow on Twitter](#)



Neonicotinoids have previously been [linked](#) to the country's shrinking bee population. Last June, more than 50,000 bumblebees, or about 300 colonies, were found dead or dying in a Target parking lot in Oregon.

September 2014 Home Depot Decision: Impact on Greenhouse and Nursery Growers

- In 2015 Home Depot is requiring a label in each pot of plants treated with a neonicotinoid insecticide.
- Two other retail store buyers have requested that no neonics be used but have not yet made a firm requirement



Questions Raised

- Is the widespread use of imidacloprid and other neonics causing the decline of managed honey bees? Impact on butterflies?
- Are flowering plants sold in garden centers harmful to bees because of the use of pesticides during production?





Several Key Papers Demonstrate
Negative Effects of Neonics Fed
to Bees at Field-Relevant Rates

REPORTS

Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production

Penelope R. Whitehorn,¹ Stephanie O'Connor,¹ Felix L. Wackers,² Dave Goulson^{1*}

Growing evidence for declines in bee populations has caused great concern because of the valuable ecosystem services they provide. Neonicotinoid insecticides have been implicated in these declines because they occur at trace levels in the nectar and pollen of crop plants. We exposed colonies of the bumble bee *Bombus terrestris* in the laboratory to field-realistic levels of the neonicotinoid imidacloprid, then allowed them to develop naturally under field conditions. Treated colonies had a significantly reduced growth rate and suffered an 85% reduction in production of new queens compared with control colonies. Given the scale of use of neonicotinoids, we suggest that they may be having a considerable negative impact on wild bumble bee populations across the developed world.

Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields

Christian H. Krupke^{1*}, Greg J. Hunt¹, Brian D. Eitzer², Gladys Andino¹, Krispn Given¹

¹ Department of Entomology, Purdue University, West Lafayette, Indiana, United States of America, ² Department of Analytical Chemistry, The Connecticut Agricultural Experiment Station, New Haven, Connecticut, United States of America

- **Most of the 92 million acres of corn planted across the U.S. this year will have been treated with either clothianidin or thiamethoxam as a seed treatment.**
- **Plants visited by foraging bees (dandelions) growing near these fields were found to contain neonicotinoids**
- **Dead bees collected near hive entrances during the spring sampling period were found to contain clothianidin**
- **We also detected clothianidin in pollen collected by bees and stored in the hive.**
- **Maize pollen from treated seed was found to contain clothianidin (3.5 ppb) and other pesticides; and honey bees in our study readily collected maize pollen.**

Extension publication by Iowa State:

Insecticidal Seed Treatments can Harm Honey Bees

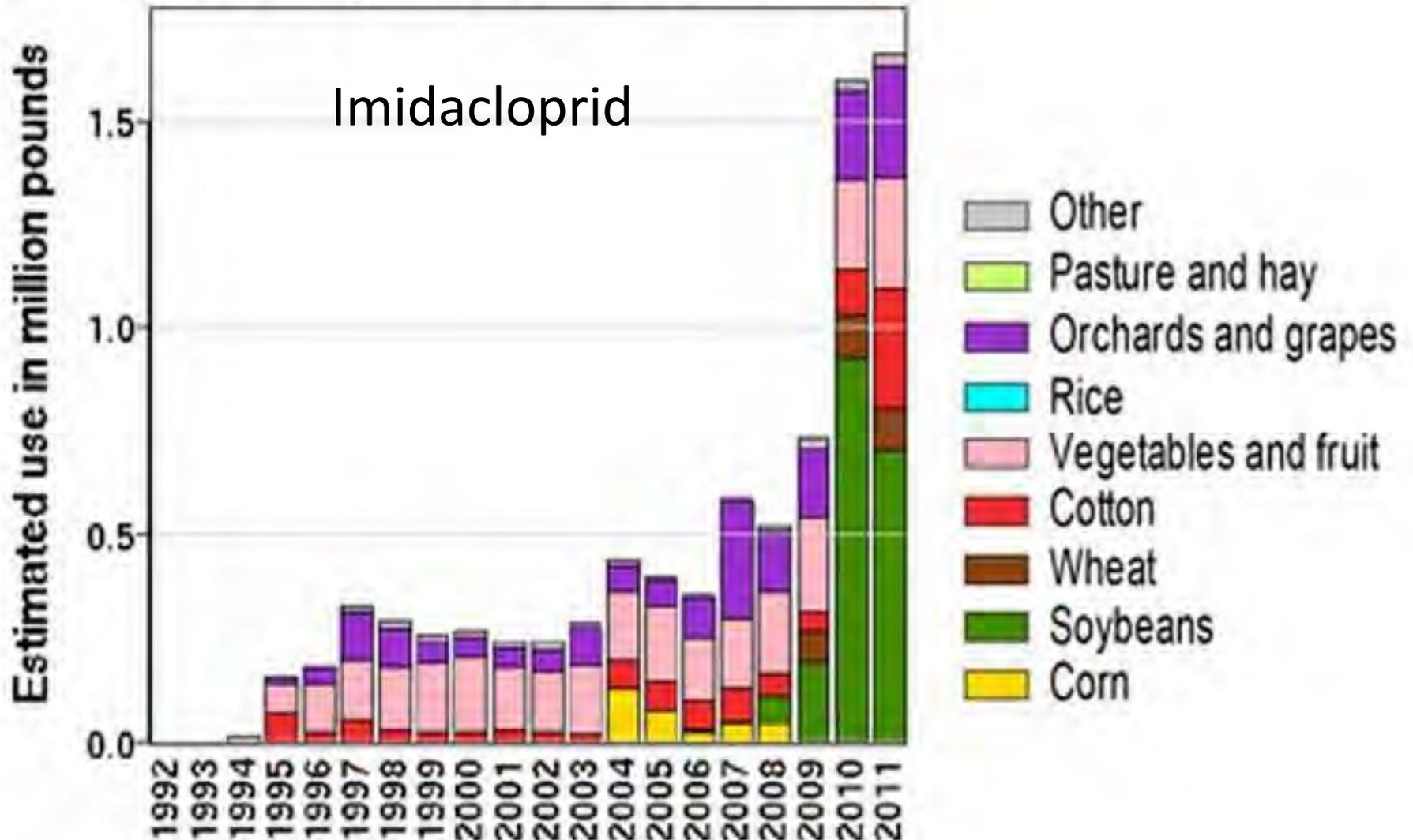
Erin Hodgson, Department of Entomology (ISU) and Christian Krupke,
Department of Entomology (Purdue)

<http://www.extension.iastate.edu/CropNews/2012/0406hodgson.htm>



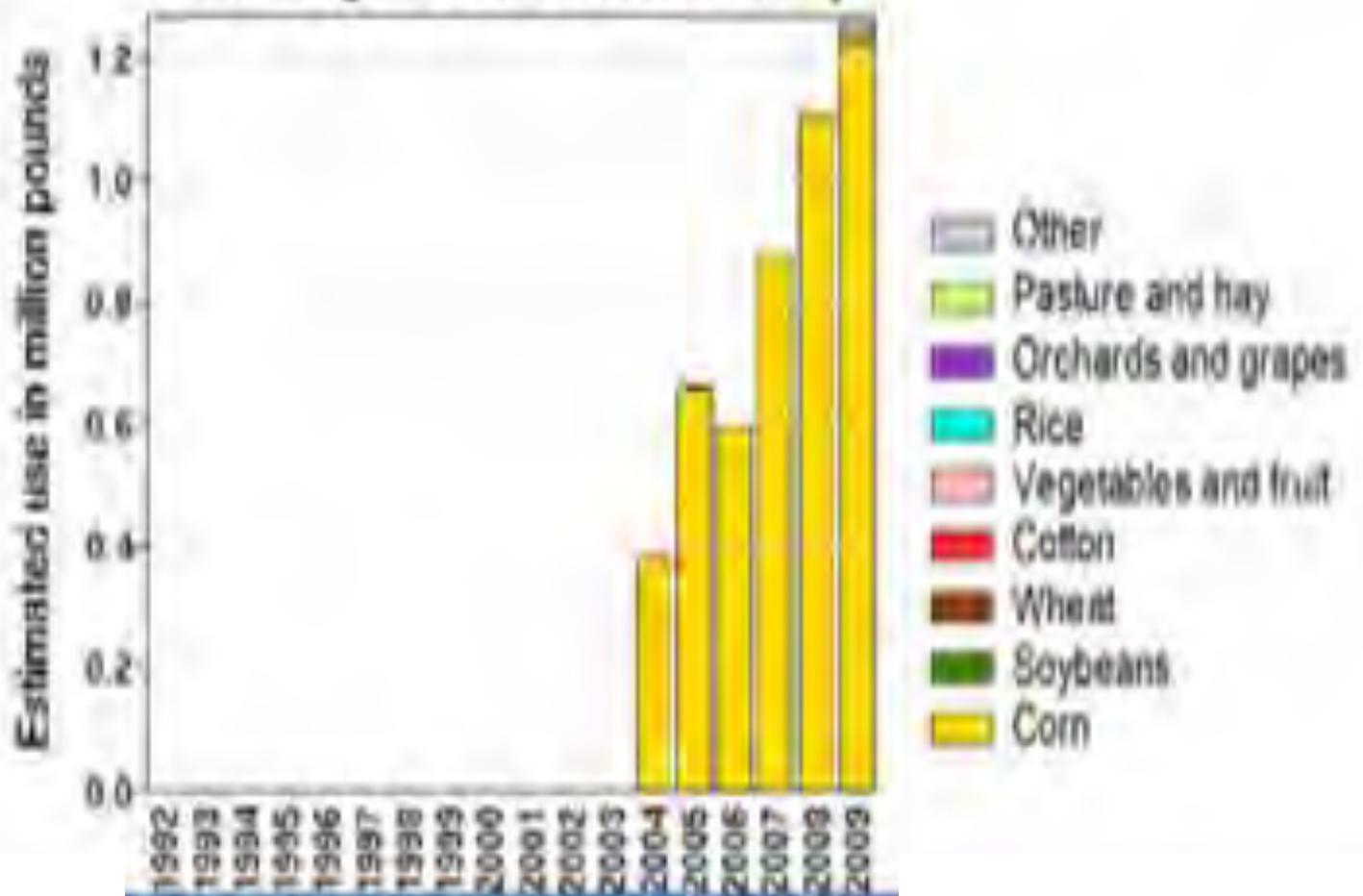
Figure 1. Bees exhibit neurotoxic symptoms when dosed with neonicotinoids. Dying bees have trouble flying, collecting food and getting back into the hive. Photo by John Obermeyer, Purdue Extension Entomology.

Use by Year and Crop

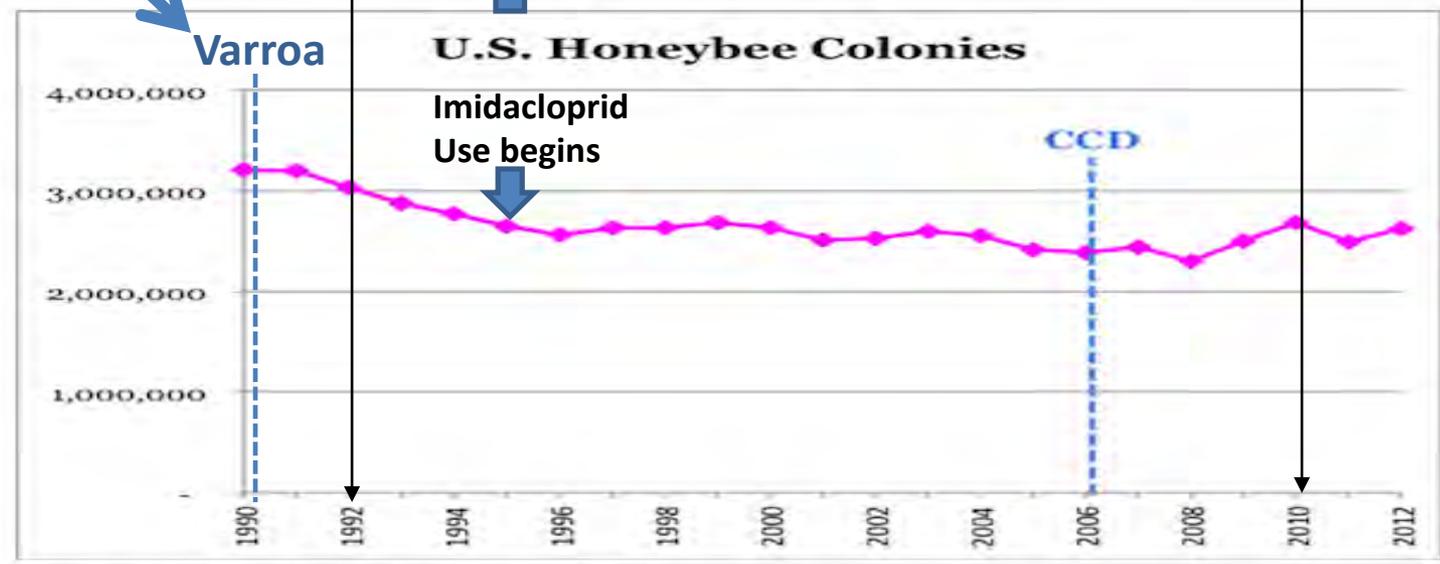
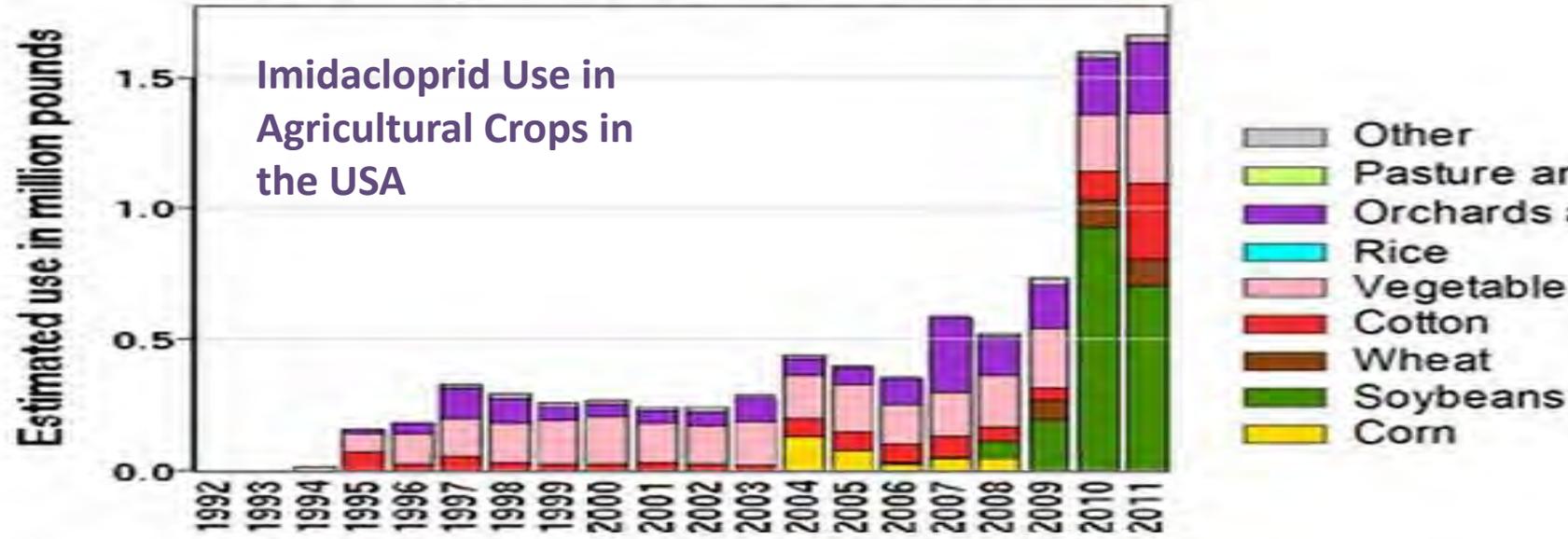


Clothioanidin

Use by Year and Crop



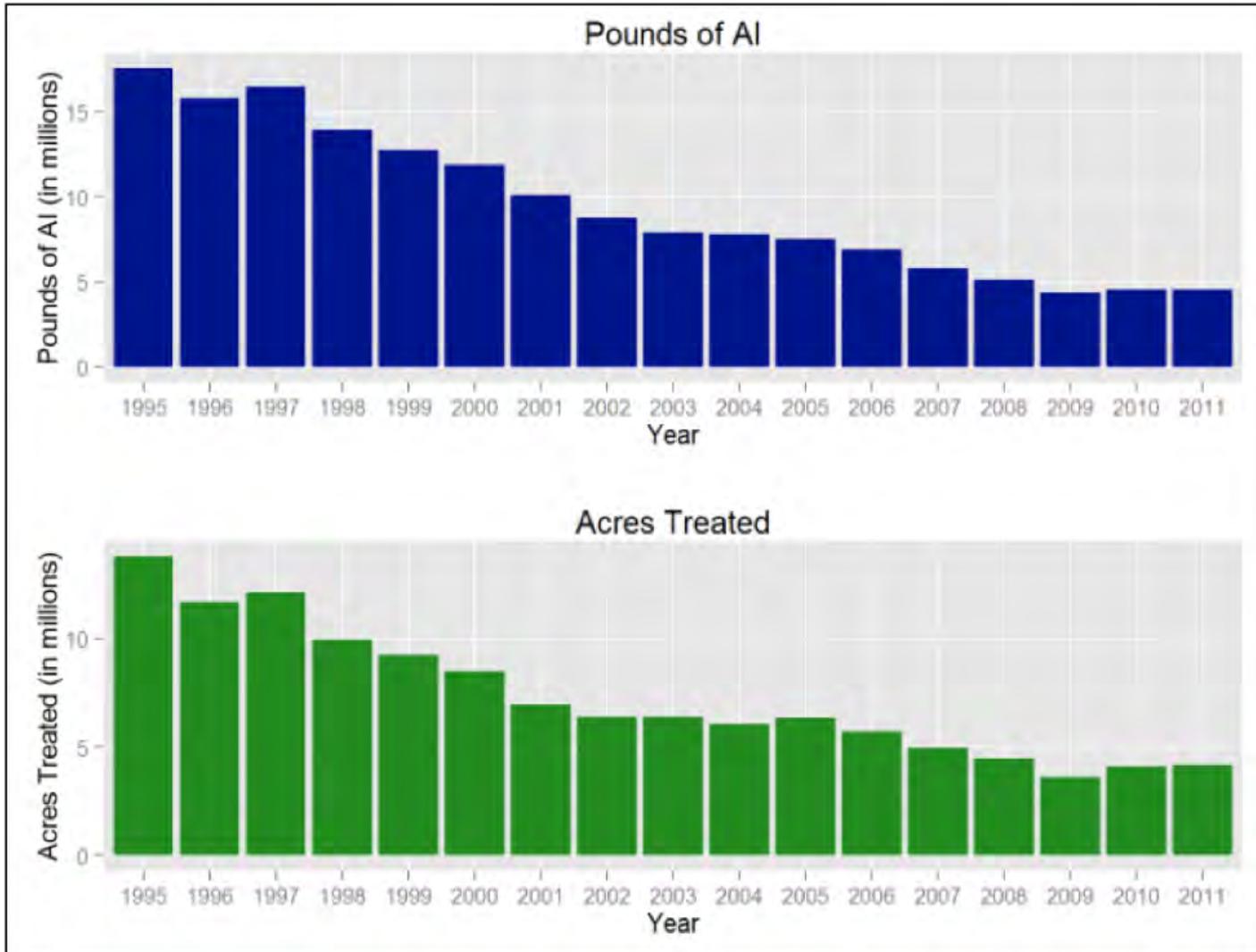
Use by Year and Crop



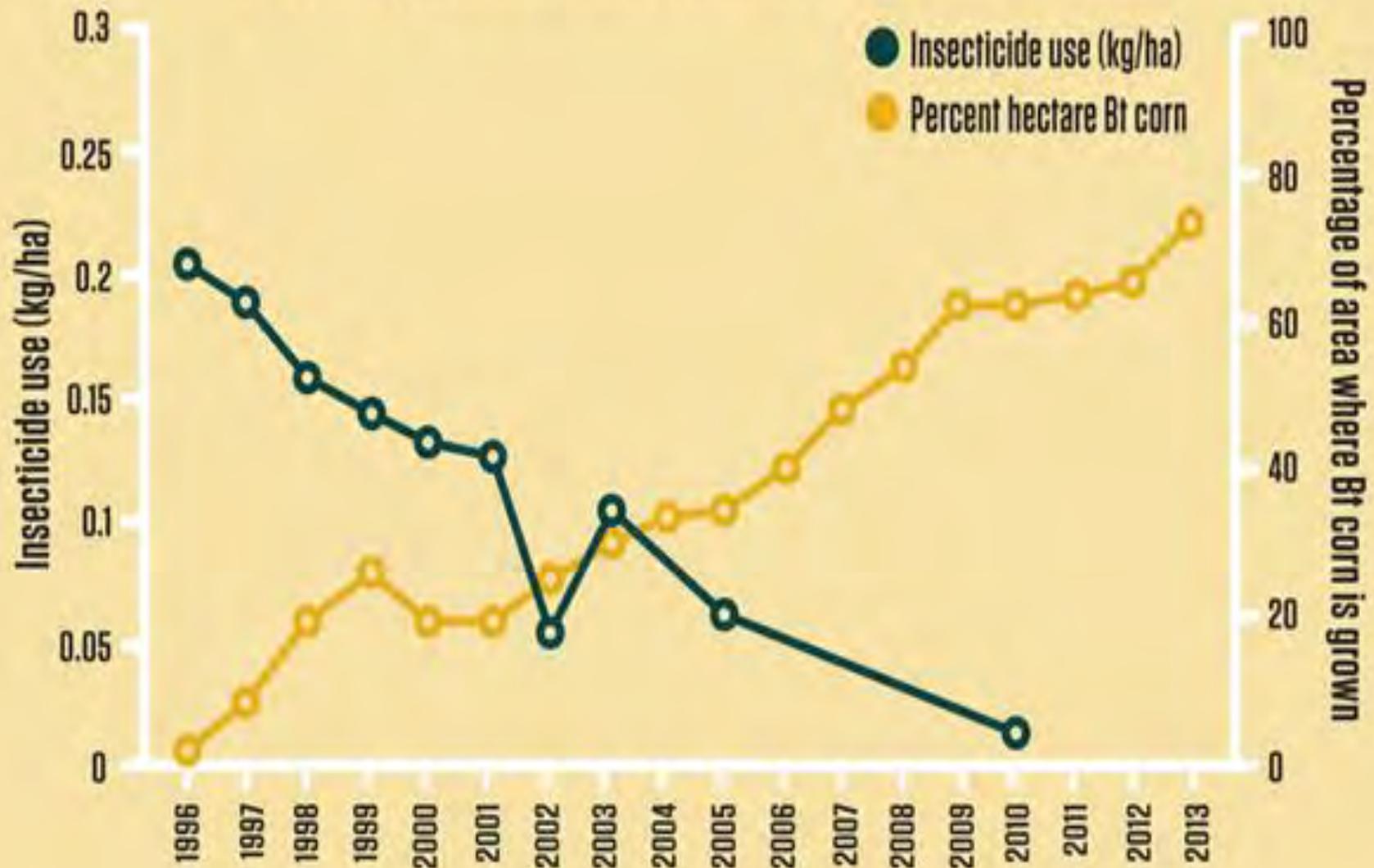
However, honey bee decline appears to have started before the widespread use of neonics.

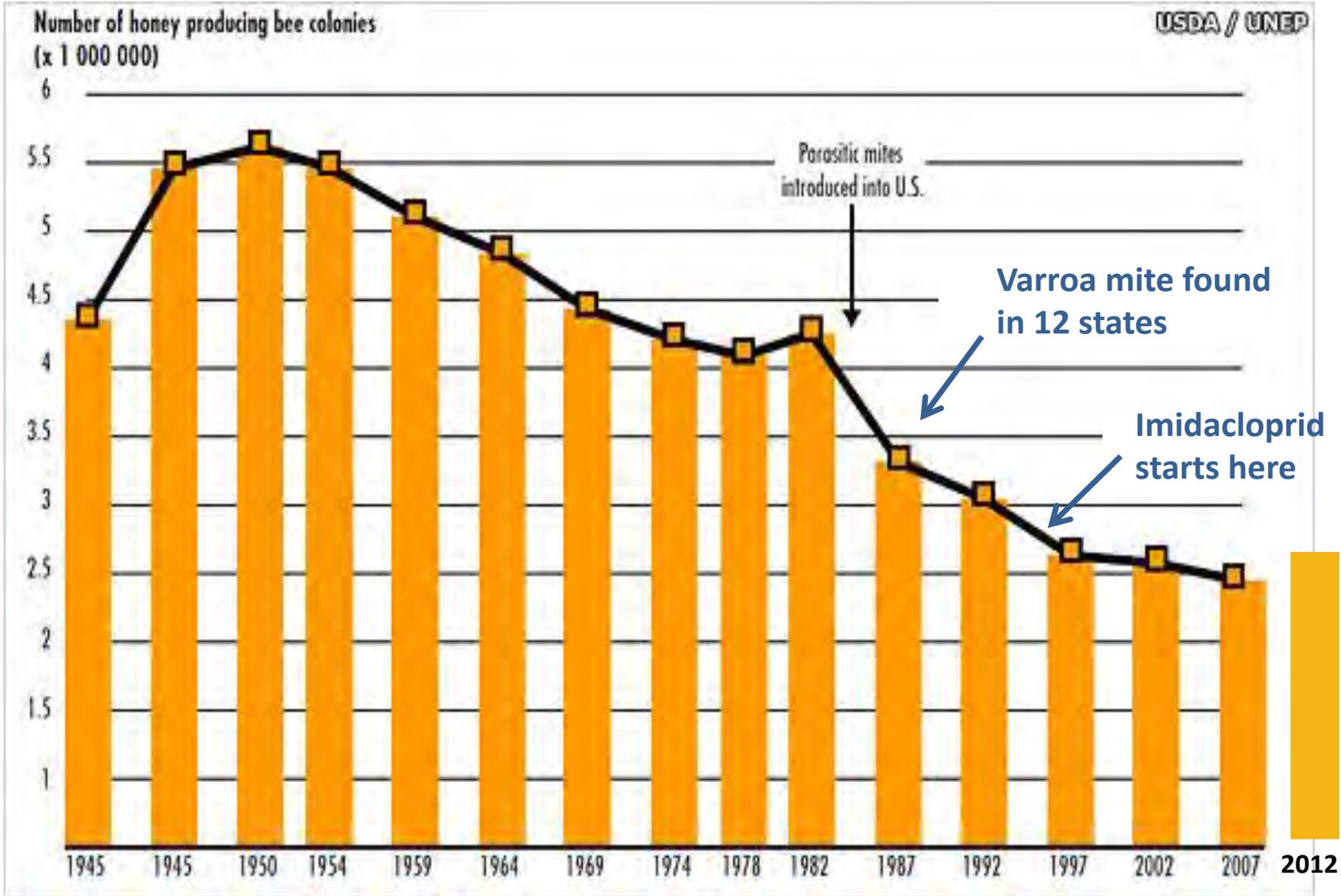
Source: USDA NASS Honey Production Report

As the use of neonics increased by 0.8 million pounds from 1995 to 2009, the use of carbamates and organophosphates decreased by 20 million pounds. Randy Oliver



Bt corn uptake and insecticide use in U.S. corn fields





1950

1970

1990

2010

Dietary traces of neonicotinoid pesticides as a cause of population declines in honey bees: an evaluation by Hill's epidemiological criteria

James E Cresswell^{1,*},
Nicolas Desneux² and
Dennis vanEngelsdorp³

Pest Management Science

[Volume 68, Issue 6](#), pages 819–827, June 2012

* 72 papers cited. Most of them are journal articles report the results of experiments with bees that relate to the neonic pesticide issue directly or indirectly.



Criterion	Brief description	Score
1. Experimental evidence		- 1 Mixed results
2. Coherence	Fails to contradict established knowledge	+ 3
3. Plausibility	Probable given established knowledge	+ 2 Yes
4. Analogy	Similar examples known	+ 3 Yes
5. Temporality	Cause precedes effect	- 4 Years do not match
6. Consistency	Cause is widely associated with effect	- 4 Poor geographic match
7. Specificity	Cause is uniquely associated with effect	- 5 No
8. Biological gradient	Monotonic dose-response relationship	- 4
9. Strength	Cause is associated with a substantive effect	- 2 Weak

CONCLUSION: Dietary neonicotinoids cannot be implicated in honey bee declines, but this position is provisional because important gaps remain in current knowledge.

The United Kingdom Report

An assessment of key evidence about Neonicotinoids and bees

March 2013

- **Three recent studies with neonicotinoids showed sub-lethal effects on bees**
- **These results contrast with a growing body of evidence from field studies that fail to show an effect of neonicotinoids when bees are allowed to forage naturally in the presence treated crops.**

The Australia Report

Overview report on bee health and the use of neonicotinoids in Australia

February 2014

- **The introduction of the neonicotinoids has led to an overall reduction in the risks to the agricultural environment from the application of insecticides.**
- **Australian honeybee populations are not in decline, despite the increased use of neonicotinoids in agriculture and horticulture since the mid-1990s.**

USDA Bee Research Lab



Extensive research on Colony Collapse Disorder suggests that there are many causes of this syndrome, with the most important causes being the interaction of several bee diseases with other stressors (USDA ARS 2014). **At this time neonicotinoids are NOT considered to be a primary cause of Colony Collapse Disorder.** However, recent research indicates that bees exposed to neonicotinoid insecticides may have suppressed immune systems, which could make them more susceptible to some bee diseases (Di Prisco et al. 2013).

Bee Lab Objectives:

1) diagnosing and mitigating disease, 2) reducing the impacts on bees of pesticides and other environmental chemicals, and 3) improving bee health through better nutrition

What do the Beekeepers Think?

<http://scientificbeekeeping.com>

Randy Oliver



As Dr. Eva Crane...has pointed out “the best that beekeepers can hope for, in the light of the great need to kill pest insects, is an acceptable level of mortality among their bees.”

Beekeepers realize that in order to get locations, that they need to get along with the landowners, who are often farmers (or friends of the farmers). If the beekeeper raises a stink, he may lose his welcome. So in general, commercial beekeepers accept the occasional bee kill as a normal cost of doing business.

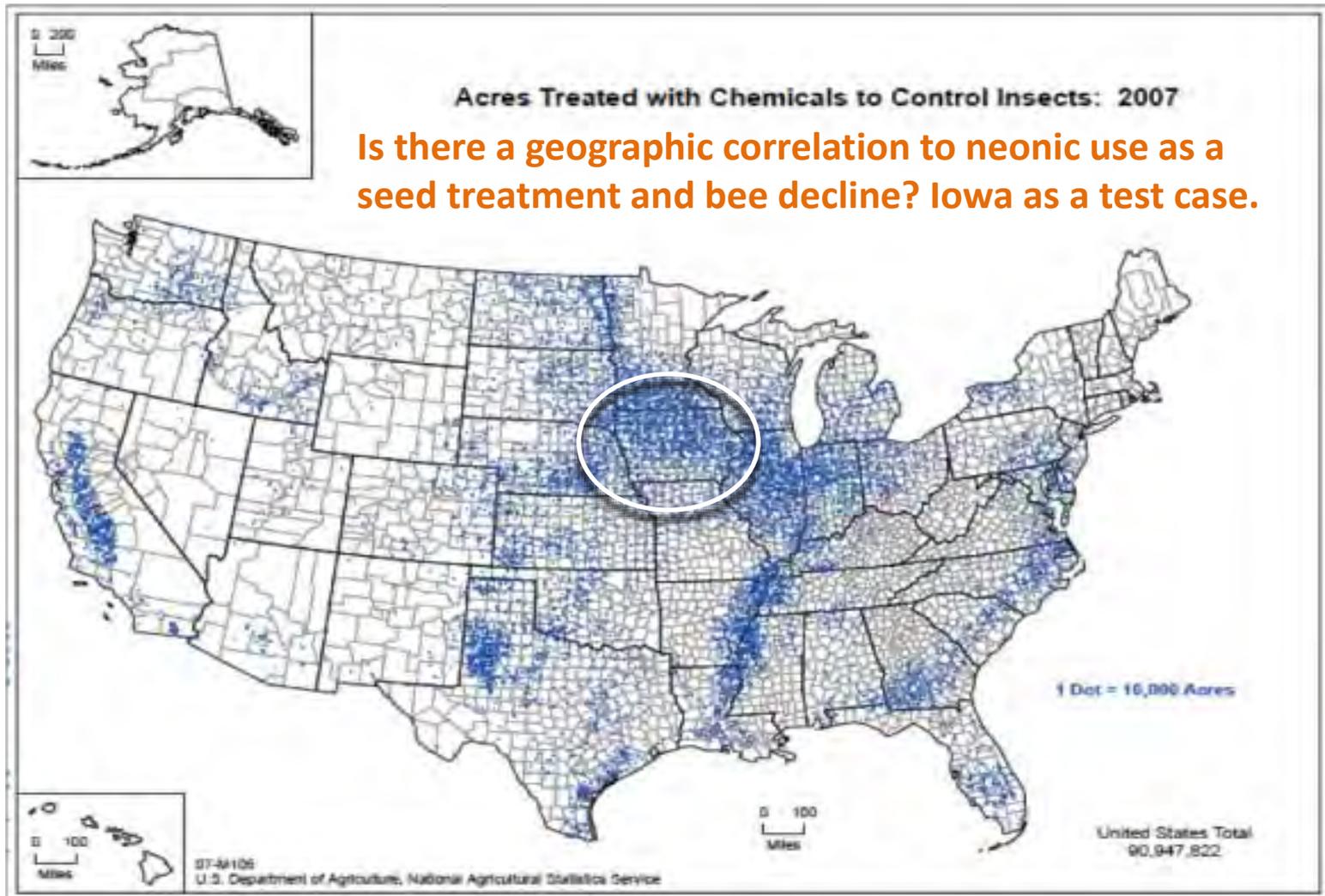


Figure 2. If you add up all the blue dots (each representing 10,000 acres treated with insecticides), it's easy to see why in some areas it's hard for beekeepers to find "safe" places for their hives. Source USDA.

<http://scientificbeekeeping.com> Randy Oliver

Honey yield per hive in Iowa, where GM crops are most intensively used, 1974 – 2010. Randy Oliver

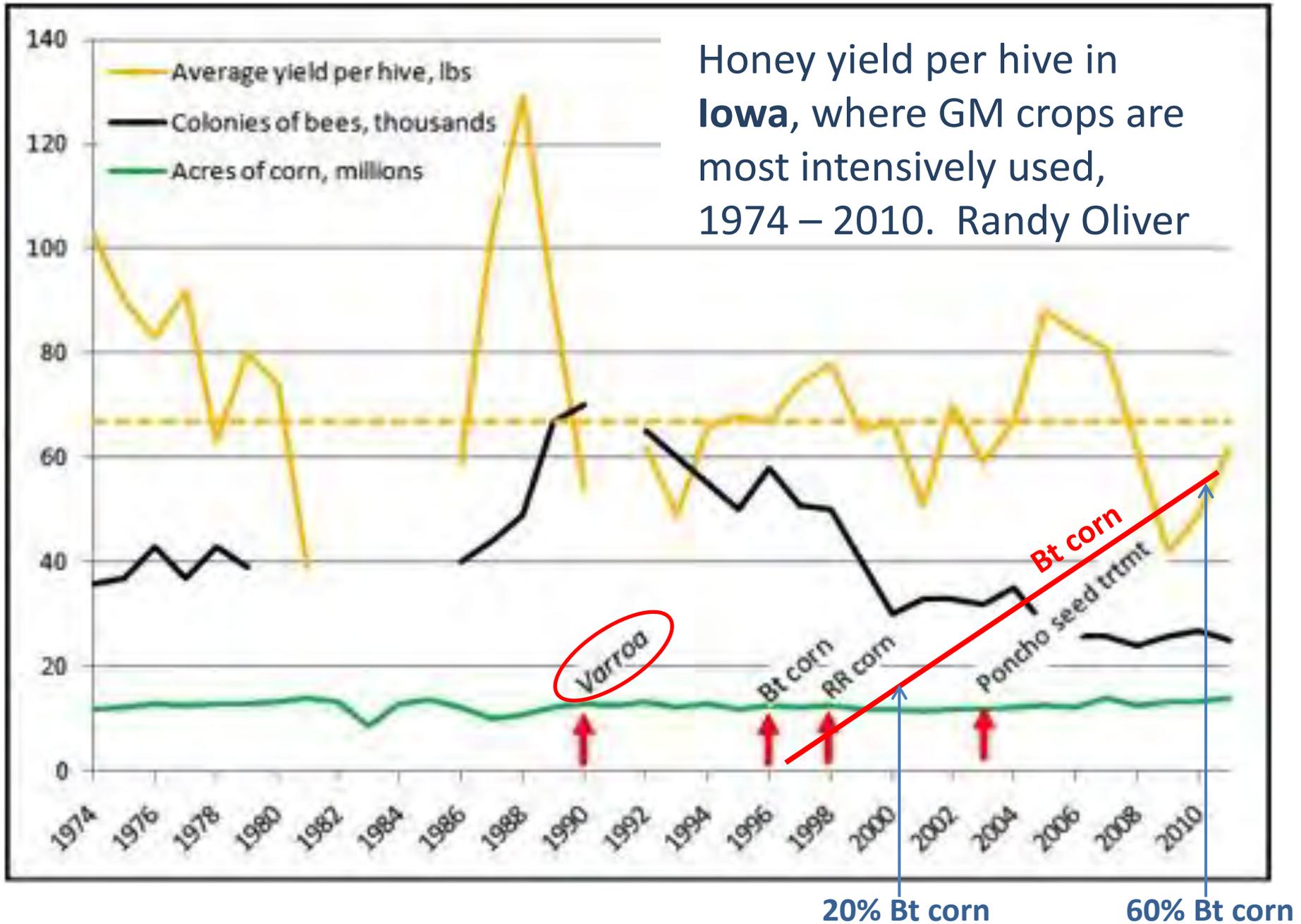


Figure 4. A bee kill in an almond orchard this spring. Surprisingly, no insecticides were involved! These bees were killed by a tank mix of herbicides, spray oil, and liquid fertilizer. A number of colonies were killed outright and others were weakened. <http://scientificbeekeeping.com> Randy Oliver



Investigation of honey bee winter mortality in Ontario

Ontario
Ministry of
Agriculture

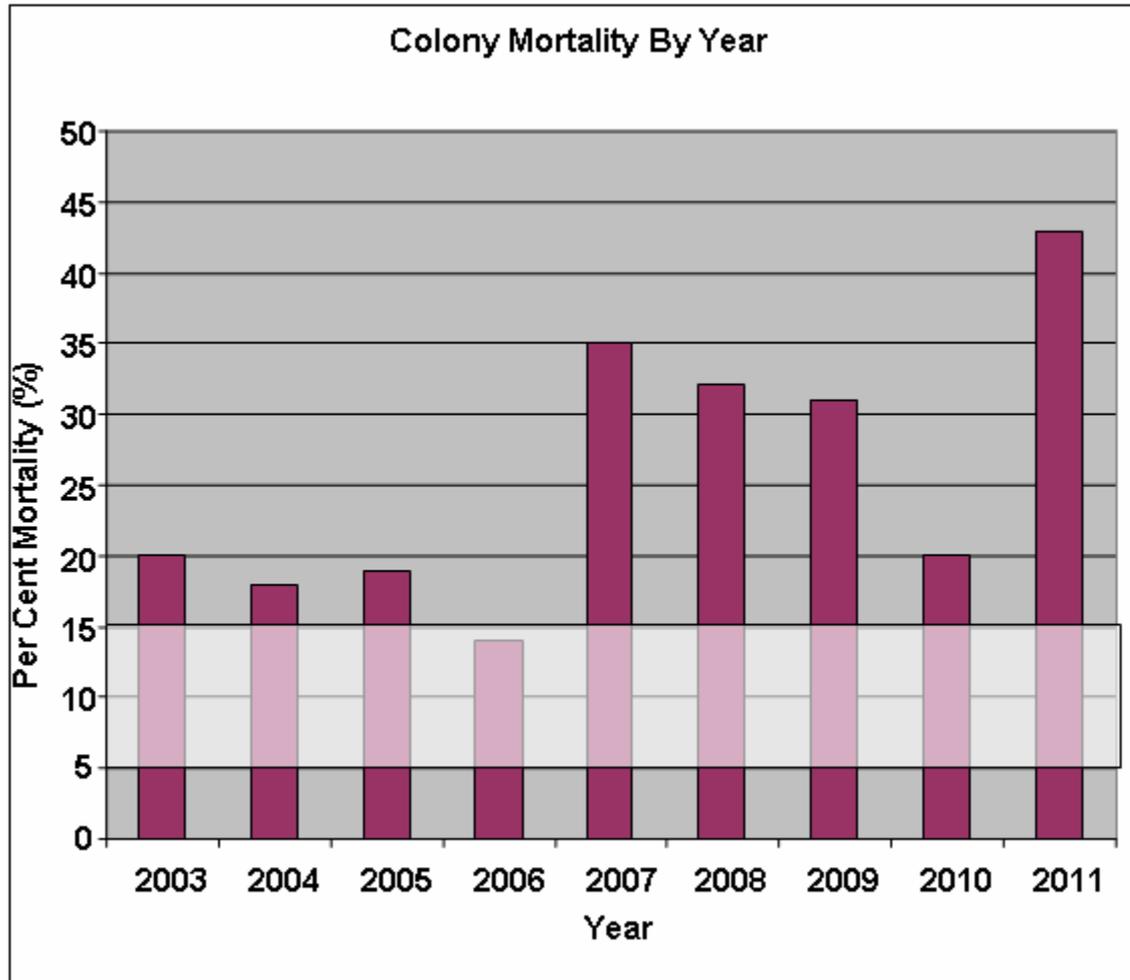


Figure 1: Estimated mortality of honey bees in Ontario. The light colored horizontal bar represents the normal level of mortality derived from a literature review.

Beekeeper Survey - 2011 Winter Loss Report for Apiculture in Ontario

Based on research from the University of Guelph (Guzman et al., 2010) and reports and field observation from other provinces (Currie et al., 2010), **varroa is still the main factor** in colony mortality. The overall virulence of *Nosema ceranae* in honey bees is somewhat unclear and there are many other pathogens such as viruses that have a further impact on honey bees.

Paul Kozak

Provincial Apiarist

Ontario Ministry of Agriculture, Food and Rural Affairs

Email: Paul.Kozak@ontario.ca



Overall: How much do trace amounts of neonics in the pollen and nectar of crops planted with treated seed impact bees? Unresolved. An equivalent concentration in sugar water fed to bees causes problems, Purdue study found clothianidin in bee pollen, but field data showing decline of colonies due to seed-treated field crops is still lacking.

What about planter box dust during planting? Definitely a problem if bees visit weed flowers along the edge of field at planting time or shortly after.



What About Neonic/DMI Synergism?

Insecticide	Fungicide pretreatment	LD50 ($\mu\text{g}/\text{bee}$)
Acetamiprid	None	7.07 ↓
Acetamiprid	Propiconazole	0.07
Thiacloprid	None	14.6 ↓
Thiacloprid	Propiconazole	0.03
Imidacloprid	None	0.018 ↓
Imidacloprid	Propiconazole	0.012

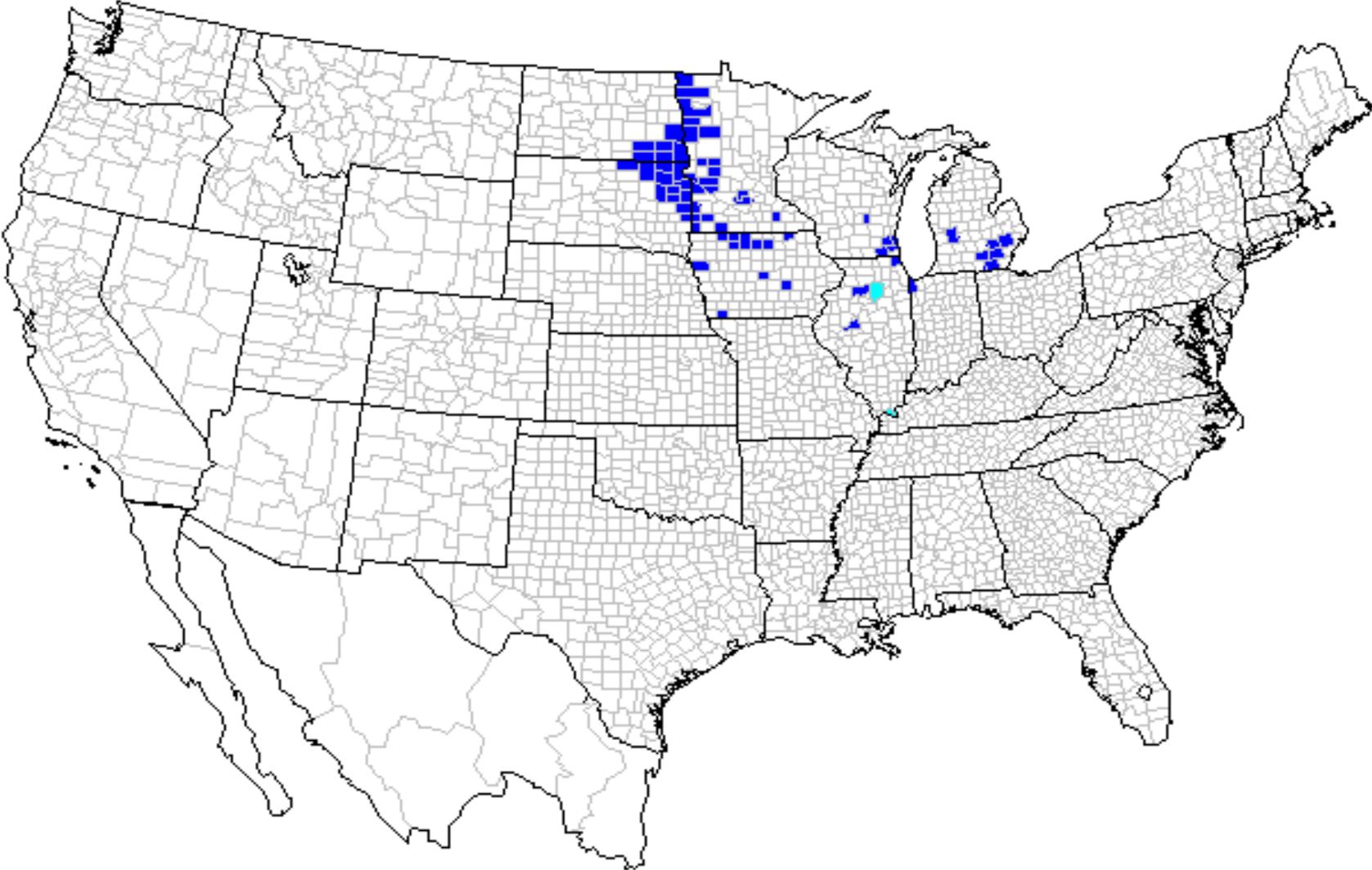
- **DMI pretreatment makes Acetamiprid and Thiacloprid as toxic to bees as imidacloprid (otherwise they are 200-fold less toxic).**
- **Little effect on imidacloprid**

T. Iwasa et al. / Crop Protection 23 (2004) 371–378

What about endangered species of butterflies?
Example: The Poweshiek Skipper

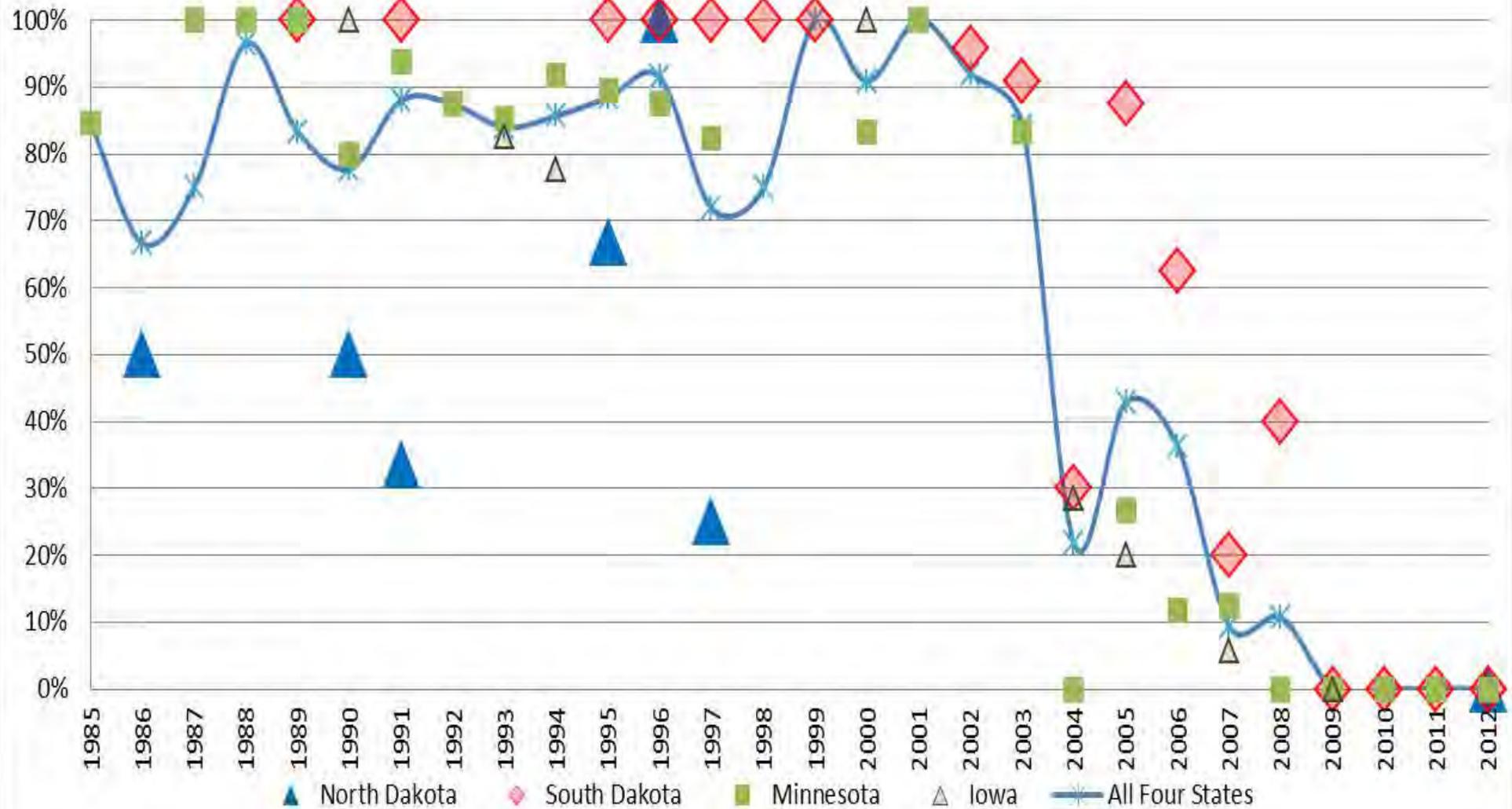


Recent Activity of Poweshiek Skipperling



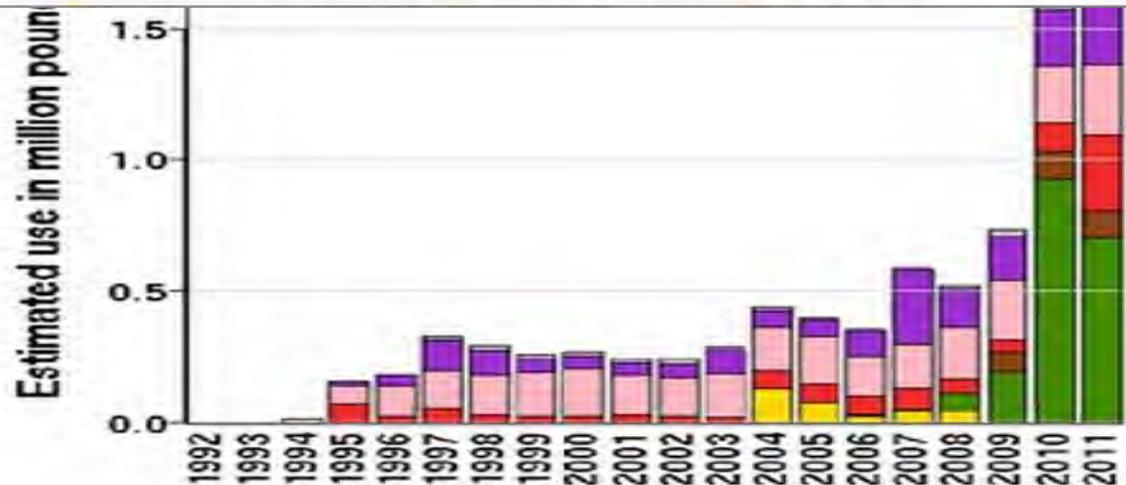
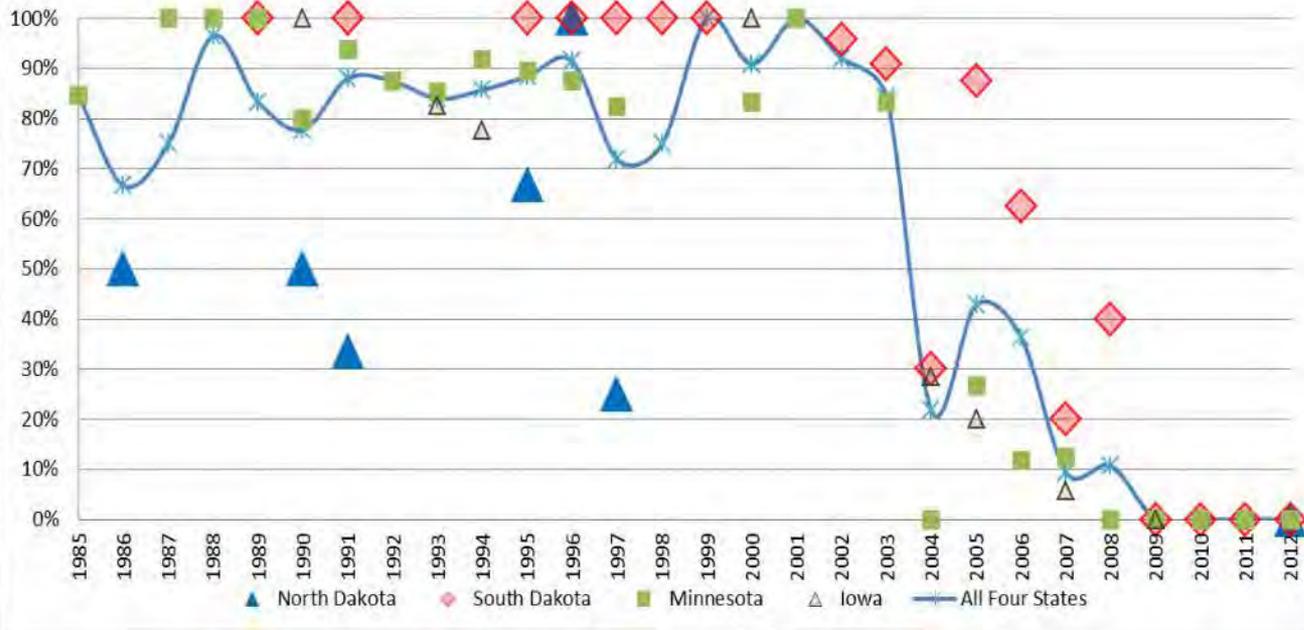
Percent of Sites with Positive Detections in Iowa, Minnesota, North Dakota and South Dakota

Poweshiek skipperling
for survey years $n_{\text{sites}} > 1$



Percent of Sites with Positive Detections in Iowa, Minnesota, North Dakota and South Dakota

Poweshiek skipperling
for survey years $n_{\text{sites}} > 1$



So, the role of neonics in causing bee decline is being intensely debated and researched without a clear answer at this point.

But it doesn't matter- the public eye has been focused on garden center plants, and we need to grow plants that are safe for bees and other pollinators

Note: Greenhouses in Europe are exempt from the temporary ban on neonicotinoids



What Do We Know About the Safety of Neonics Used on Greenhouse and Nursery Plants?



John Ascher



©Alex Wild

- Two studies with ladybird beetles and butterflies on soil drenched nursery plants by Vera Krischik



- Two studies with clover in turf by JL Larson, CT Redmond, DA Potter



- Two experiments with greenhouse-grown flowers for garden centers by Smitley



From Krischik, UMinn: Nursery plants treated with Marathon soil app.

2011 Imidacloprid residue plants



Dose in mg/soil	Dead bees on Agasatche	<i>Agastache</i> spp. nectar ppb	<i>Asclepias</i> spp. nectar ppb	<i>Esperanza</i> spp. nectar ppb	<i>Rosa</i> spp. pollen ppb
0	0.6b	6b	3c	0c	26b
25	0.6b	52b	80c	8c	36b
50	0.5b	133b	175bc	21c	30b
300 1X 3 gal pot	1.1ab	1973b	1568bc	106c	95b
600 2X 3 gal pot	2.4a	5265ab	2950b	276b	332b
1200	2.4a	9335a	8337a	9162a	720a
	F=3.2, 0.01	F=3.7, 0.017	F=25.8, 0.0001	F=166, 0.0001	F=5.7, 0.0025

Landscape rates of soil-applied imidacloprid translocated to flowers reduces survival of *Coleomegilla*, *Hippodameia*, and *Coccinella* ladybeetles, but not *Harmonia* ladybeetles, *Danaus plexippus*, and *Vanessa cardui*, butterflies

Vera A. Krischik, Mary Rogers, Garima Gupta, and Aruna Varshey

- Survival and fecundity of both butterfly species was not reduced in free-ranging or force-fed experiments (0 ppb (C), 15 ppb (1X), or 30 ppb (2X) imidacloprid) experiments.
- However, butterfly larval survival was significantly reduced on 1X and 2X imidacloprid treatments
- Three (*Coleomegilla maculata*, *Harmonia axyridis*, and *Hippodamia convergens*) of the four lady beetle species had significantly reduced survival at day 12 from both 1X and 2X treatments.



J Insect Conserv
DOI 10.1007/s10841-014-9694-9

ORIGINAL PAPER

Pollinator assemblages on dandelions and white clover in urban and suburban lawns

Jonathan L. Larson · Adam J. Kesheimer ·
Daniel A. Potter

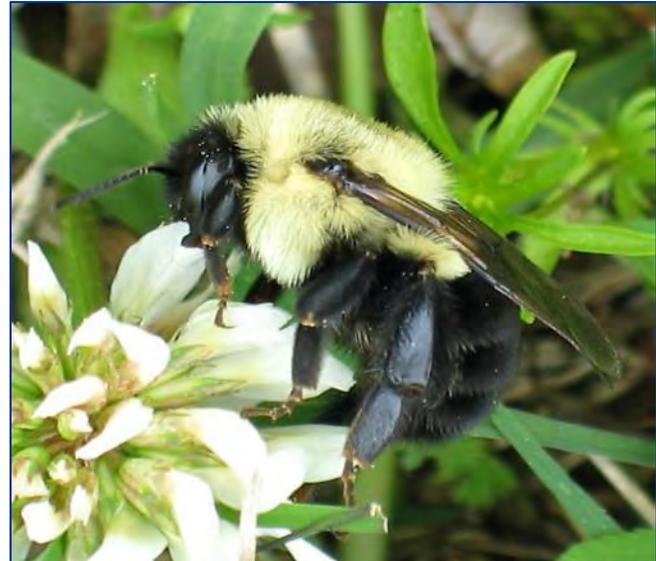
- More than 50 spp. of pollinators found on dandelions and white clover in lawns

Received: 30 January 2014 / Accepted: 30 August 2014
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Objectives of Potter Study

- Evaluate hazards of lawn insecticides to bees in the field
- Find ways to reduce the risks of harm



Assessing Insecticide Hazard to Bumble Bees Foraging on Flowering Weeds in Treated Lawns

Jonathan L. Larson, Carl T. Redmond, Daniel A. Potter*
Department of Entomology, University of Kentucky

1. PLoS ONE 8(6): e66375. doi:10.1371/journal.pone.0066375
2. Larson, Redmond & Potter 2014; *Environ. Tox. Chem.*

naturespotted.wordpress.com



Results of Kentucky Study

When bumble colonies were caged 24 h after turfgrass with clover was sprayed, and kept their for 2 weeks:

- **For Clothianidin- the number of foraging bees was reduced by 75% and no new queens produced (compared with 35 queens in control plots)**
- **For chlorantraniliprole (Acelepryn)- No difference from control treatment**
- **For lawns mowed before spraying- No effect on the bees**



For Garden Center Plants:

What are the biggest potential problems for bees if neonicotinoids are used?

- Spraying open flowers during the last few weeks before shipping (with any insecticide).
- Soil drenches in greenhouses with imidacloprid, primarily used in hanging baskets
- Soil drenches of flowering trees (*Tilia*) in nurseries or in yards for Japanese beetle, etc.



Three Experiments With Greenhouse and Nursery Plants

Smitley, MSU

- 1. Evaluate the impact of an imidacloprid soil drench applied to 12” diameter hanging baskets**
- 2. Determine the amount of dislodgable residue of imidacloprid on flowers purchased in a garden if the flowers received a foliar spray of imidacloprid at 1, 2 and 4 weeks prior to the shipping date.**
- 3. Determine the impact of an imidacloprid soil drench applied around the base of *Tilia* trees after petal-fall on bumble bees the following year.**

Experiment I:

**Imidacloprid
applied to
hanging baskets
as a soil drench**



Methods:

- Hanging baskets were drenched at 4 weeks before shipping
- 5 weeks after the drench plants were put in screen cages with colonies of bumble bees
- Bumble bees remained in screen cages for 3 weeks
- Colonies were counted three times, at 1, 3 and 6 weeks after being put in screen cages







The only way to count bumble bees is to paint each one when it is counted!



Counting bumble bees in the cold room with a red light



Photo by Cristi Palmer

Bumble Bees Per Colony After Soil Drench With Imidacloprid or Water (Control)

Date	Treatment	Number of Bees Counted Per Colony	New Queens Produced Per Colony
July 14	Imidacloprid	105	
July 14	Control	133	
July 28	Imidacloprid	87	
July 28	Control	96	
August 18	Imidacloprid	22	0.6
August 18	Control	18	1.0

Results:

- No significant differences in the total number of bees counted on any sample date
- No differences in number of queens produced at the end of the summer

Problems:

- Poor survival of all colonies *after* being put into the field

Questions:

- Are there any sublethal effects?
- How important is nutrition (flowers available)



Experiment II

- Determine the last time that foliar sprays can be applied to open flowers, and still be safe for bees
- Flowers were sprayed with imidacloprid at 4, 2 and 1 week before shipping.
- Flowers were sampled 1 week after the shipping date



Weeks Before Shipping	Plant Type	Olefin (ppb)	Imidacloprid (ppb)
1	Portulaca	70	110*
1	Verbena	0	70
1	Salvia	20	200
1	Marigold	0	0.6
2	Portulaca	0	0
2	Verbena	30	430
2	Salvia	30	0
2	Marigold	0	0
4	Portulaca	0	0
4	Verbena	0	0
4	Salvia	0	0
4	Marigold	0	0

*Data are means of 10 replications

Results of Experiment II

- Dislodgable residues were measured on 4 types of flowers
- > 20 ppb were only found on dislodgable residue samples from flowers sprayed 1 or 2 weeks before shipping.
- ❖ Conclusion- Avoid spraying open flowers the last 2 weeks before shipping.

Note: Samples were also collected for whole-flower tissue analysis pending funding of the Specialty Crop Block Grant.



Can we make guidelines that if followed can be used to label plants as bee-friendly?

Yes, guidelines will be based on the first year of on-going research, and they will include:

- Do not spray flowers in the last 2 – 3 weeks before shipping
- Do not apply soil drenches of imidacloprid to hanging baskets any later than 5 weeks before shipping. Do not exceed the label rate.
- Do not use imidacloprid soil drenches on flowering trees and shrubs attractive to bees.
- Read bee warning information on pesticide labels and avoid practices that are harmful to bees.





We're glad you care about bees. We do too.

A brief timeline:

- Honey bee decline began in the early 1950s.
- A sharp decline was noted when parasitic mites were introduced to the U.S. around 1987.
- The decline has continued since 1995, when the neonicotinoid class of insecticides was put into use, but the rate of decline did not change.
- Up to 50,000 bees were accidentally killed in an Oregon parking lot near the Xerces Society headquarters in 2013. This became the rallying point for anti-pesticide activists.
- A 2014 study by Harvard School of Public Health linked low doses of neonicotinoids to Colony Collapse Disorder, which was widely spread by media.
- Additional studies show mixed results with the conclusion that pesticides, including neonics, may have an impact on bee decline, but the primary causes are the varroa mite, lack of food, and other factors.
- Michigan State University conducted specific research* in 2014 and then made recommendations for greenhouse growers that produce flowering annuals.

*Research compiled by Dr. David Smitley (MSU) is located here: http://www.ent.msu.edu/directory/david_smitley

What are neonicotinoids? Neonicotinoids are a class of insecticides that are similar in structure to nicotine and a *significant improvement* over earlier insecticides because they are *more targeted and less harmful* to humans and non-targeted insects, including bees. This class of insecticide is used to protect crops from whitefly, Japanese beetle, emerald ash borer, and other insects.

In response, WenkeSunbelt Greenhouses has devised a proactive plan of action:

- Reduce or eliminate the use of neonicotinoids. Hanging baskets and poinsettias are our only crops that could potentially need them.
- Follow the MSU recommendations:
 - Avoid spraying open flowers during the last 2-3 weeks of production, prior to shipping
 - Avoid drenching during the last 5 weeks of production, prior to shipping
- Follow the new EPA Bee Advisory Guidelines
- Fund research with MSU and AmericanHort
- Preventative scouting and maintaining weed-free facilities

Remember... This research has also shown that bees and other pollinators benefit from having flowers as a food source. ***Our plants are truly Bee Friendly!***

THE NEW EPA BEE ADVISORY BOX

On EPA's new and strengthened pesticide label to protect pollinators

PROTECTION OF POLLINATORS



APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. of this product onto beehives can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:

<http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state/tribe, go to: www.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.



The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.

Next slide

Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>



From the new ‘bee box’ on EPA pesticide labels:

“The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA’s new label will help protect pollinators”.

If bee-friendly management strategies are followed then-

Planting annual flowers, perennial flowers, and flowering trees and shrubs should help bees by providing more food for them. Encouraging wildflowers and flowering weeds is also good for bees.



Media Attention to Bee Issues Also Has Some Benefits:

- People are more aware of the role of pollinators and their diversity
- Where flowers are present, bees are indicators of the health of the insect community. Protecting bees protects all beneficial insects and biological control.



This Power Point file can be downloaded at:
http://www.ent.msu.edu/directory/david_smitley

