



# Bees, Pesticides, and Politics

## Challenges and Opportunities for Arboriculture Professionals

Daniel A. Potter, Professor Emeritus  
Dept. Of Entomology, Univ. of Kentucky

College of Agriculture, Food and Environment

1

### Early one June 2013 morning at an Oregon shopping center parking lot.....





2

### Shortly later, as shoppers begin to arrive...



The largest native bee kill ever recorded


3

↑ ↑      ↑ ↑

Oregon Dept. of Agriculture officers      Endangered species conservation biologists


4



5

### More backlash.....

Memorial Planned For Thousands Of Dead Bees In Wilsonville



6

**Bumblebee incidents result in pesticide violations**

Created on Friday, 03 January 2014 4:14 PM | Written by The Spokesman |

7 Like Share 2 Tweet 7 8-1 0

ODA completes investigations, issues enforcement actions

**KVAL.com**

News Weather Sports Politics Outdoors EVENTS KVAL-TV HEALTHY CONNECTION

**abcNEWS**

**State suspends pesticide operator's license after bee deaths**

By News Staff | Published: Jun 20, 2014 at 3:44 PM PDT | Last Updated: Jun 20, 2014 at 5:19 PM PDT

Home / News / Pesticide restricted after bee kill | Restriction in place for 180 days

Search News Facebook Twitter StumbleUpon Google

**Pesticide restricted after bee kill**  
Restriction in place for 180 days

By Shelby R. King | The Bulletin  
Published Jul 5, 2013 at 05:00AM

The Oregon Department of Agriculture announced last week a statewide restriction on 18 pesticide

7

**The Oregon bee kill resulted from a from a label violation**

“This product is **highly toxic to bees...** Do not apply or allow it to drift to blooming crops or weeds if bees are visiting the treatment area”

More prominent “Bee Hazard” box now required on pesticide labels

**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. (continued)

8

**Why all this attention on bees?**

**Swarm the EPA**  
Tell Congress to Ban Neonicotinoid Pesticides before They Devastate the U.S. Bee Population

Then, Join the Earth Day Swarm to Ban Bee-Killing Pesticides

**Gardeners Beware!**  
New Neonic Pesticides Found in "Bee-Friendly" Nurseries Sold at Garden Centers Nationwide

**Home Depot and Lowe's: STOP selling bee-killing pesticides!**

BEYOND PESTICIDES www.beyondpesticides.org  
Bee Action.org  
Friends of the Earth

9

**What challenges and opportunities does this issue pose for the Horticulture Industry?**

**Professional Land Care**

**Nurseries, Garden Centers**      **Golf courses**      **Home landscapes**

10

**Why care about bees?**

**Worldwide economic value of insect pollination is estimated at US \$260 billion!**  
- Updated from: Ecological Economics 2008

**Tomatoes**

**Melons, squash**

**Cherries**

11

**Without bees, they'll all be off the menu**

12

**Your breakfast.....**

With bee pollination      Without bees

13

In parts of China, heavy agricultural spraying has nearly wiped out local bees

14

Farm workers must hand-pollinate millions of flowers to get fruit!

Jar of apple pollen

15

The California almond industry alone requires use of 1.4 million honey bee colonies!

16

Why conserve urban bees?

**Bees pollinate our gardens and plants that provide food for urban wildlife**

17

**Honey bees are not native to America**

Brought here by early colonists in 1622

18

**Besides honey bees...**

**4000 species of native bees also provide pollination services in the USA!**



19

**Some Familiar Native Bees**



Sweat bees (Halictidae)



Mason, resin, & leafcutter bees (Megachilidae)



Bumble bees (Apidae)



Mining bees (Andrenidae)

20

**Bees and Wasps are not the same**



21

**Bees and Wasps are NOT the same**

**Bees feed their young on pollen and nectar**

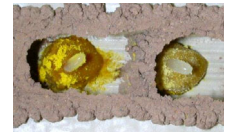


Fuzzy, with branched hairs



Feeding time!

Body adapted to carry pollen

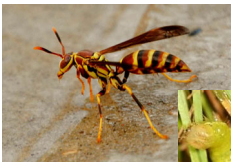


Mason bee nest

22

**Bees and Wasps are NOT the same**

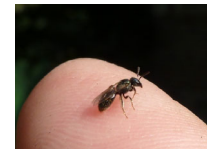
**Wasps have little to no hair**



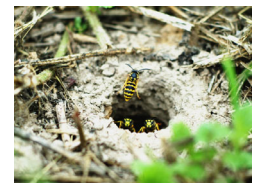
**Wasps feed their young on meat!**

23

**Honey bees are docile unless hive is threatened, and native bees rarely sting**



**Most stings in urban settings are from wasps!**



24

**Honey bees and native pollinators have been having a tough time of it**

The image shows a TIME magazine cover with the headline "A WORLD WITHOUT BEES" and a small illustration of a bee. Next to it is a poster titled "Protect Pollinators" featuring a grid of various colorful flowers and butterflies. A small graphic of a bee with the text "Help the bees" is overlaid on the bottom right of the poster.

25

HOME NEWS RELEASES MULTIMEDIA MEETINGS PORTALS ABOUT

NEWS RELEASE 19-JUN-2019

**US beekeepers lost over 40% of colonies last year, highest winter losses ever recorded**

*Results point to a need for increased research, extension, and best management practices*

UNIVERSITY OF MARYLAND

f t y v s SHARE PRINT E-MAIL

A photograph showing several bees on a honeycomb structure.

26

**Why are honey bee populations struggling?**

The image shows a photograph of a dead honey bee on the left and a cartoon illustration of a bee with a worried expression on the right.

27

The **Varroa mite** is the greatest threat to honey bee health worldwide

**These parasites feed on vital bee tissues, and also transmit deadly bee diseases**

The image includes a close-up of a reddish-brown Varroa mite, a cartoon zombie character, and three photographs of honeycombs showing white mites and a bee.

28

**Yikes!!**

A photograph of a man in a white shirt carrying a large, dead, brown bee on his back. A thought bubble above him says "Yikes!!".

29

**Why are honey bees struggling?**

**Exotic bee diseases**

The image shows a bee with a severely deformed wing on the left and a dead bee with feces on the right.

**Deformed wing virus**

**Nosema fungus causes "dysentery" in bees**

30

### Why else are honey bees struggling?

Smithsonian.com

#### High Fructose Corn Syrup May Be Partly Responsible for Bees' Collapsing Colonies

High fructose corn syrup, the sugary compound in soda, is also fed to bees






**Real honey boosts baby bees' immune systems**

**Good**      **Not good**

31


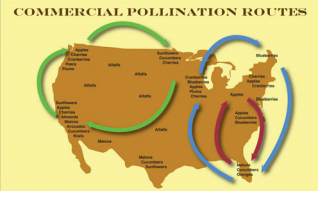

### Why are honey bees struggling?



32

### Why are honey bees struggling?

#### Travel stress!

33

### But, most honey bees in North America are managed as semi-domesticated livestock

So beekeepers can intensify their practices to compensate for colony loss



34

### Native bee populations are declining, in North America and worldwide. Why?

PNAS

#### Patterns of widespread decline in North American bumble bees

Sydney A. Cameron<sup>1</sup>, Jeffrey D. Lozier<sup>2</sup>, James P. Strange<sup>3</sup>, Jonathan B. Koch<sup>4</sup>, Niki Cordes<sup>5</sup>, Leellen F. Salter<sup>6</sup>, and Terry L. Griswold<sup>7</sup>

**Global pollinator declines: trends, impacts and drivers**

Simon G. Potts<sup>1</sup>, Jacobus C. Biesmeijer<sup>2</sup>, Claire Kremen<sup>3</sup>, Peter Neumann<sup>4</sup>, Oliver Schweiger<sup>5</sup> and William E. Kunin<sup>6</sup>


**Review**

**Cell**


35

### Why are Native bees declining?

#### Habitat loss!



Didn't I use to live here?



36

**70% of our native bees are ground-nesters**



37

**Many other native bees rear their young in cavities or hollow stems**



38

**Why are ALL bees declining?  
Environmental stressors**

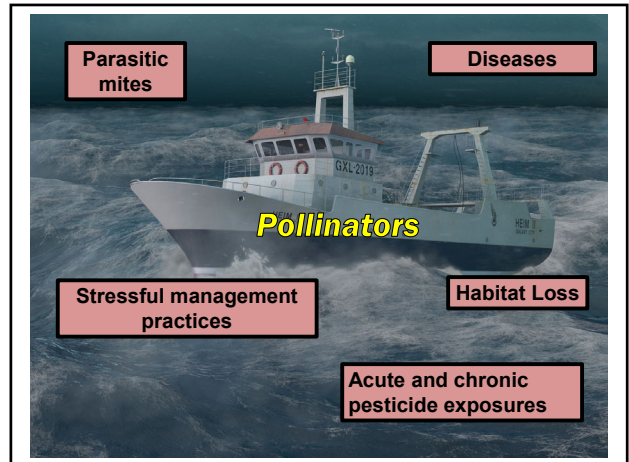


Less varied, less nutritious pollen & nectar



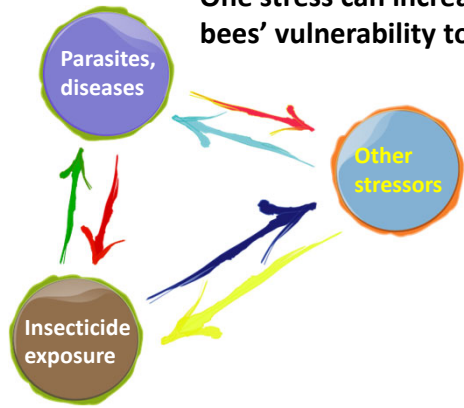
Acute or chronic exposure to pesticides

39



40

**One stress can increase bees' vulnerability to others**



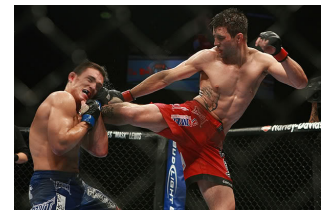
41

It is hard to recover from a concussion...

If you are also being kicked in the head



Varroa mites, diseases, management stress, habitat loss



Insecticide exposure

42

Public perception is that **pesticides, esp. neonicotinoid insecticides** are the main cause of bee decline

43

Neonicotinoids are a class of synthetic insecticides

They are much *less* toxic to humans and other mammals than to insects

Homeowner products with neonicotinoids

44

Neonicotinoids are important tools in urban land care

Imidacloprid <b>MERIT 2F</b> INSECTICIDE	Clothianidin <b>Arena</b>	Thiamethoxam <b>Meridian</b> INSECTICIDE	Dinotefuran <b>Safari</b> INSECTICIDE
--	------------------------------	--	---

45

Neonicotinoids are relatively persistent in plants, providing extended pest control

Emerald ash borer

White grubs

46

Neonicotinoids are **systemic insecticides**

They move upward in the plants' vascular system to all parts of the plant

47

Systemic applications are often more practical and less hazardous than sprays

**This.....** **Or this...**

48



**Systemics are the most effective available tools for managing many tree pests, incl. invasive ones**

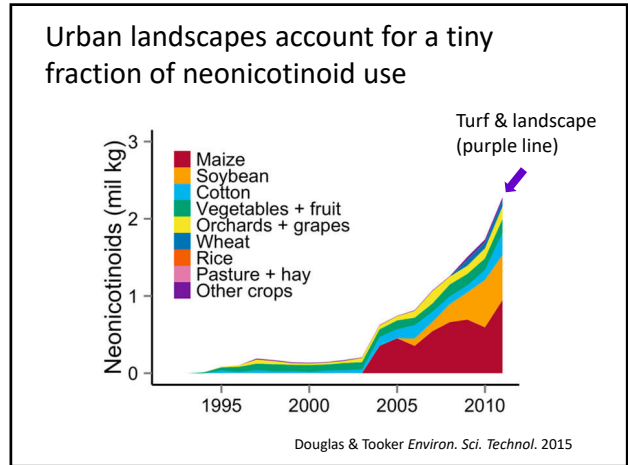
Hemlock woolly adelgid

Spotted lanternfly

Emerald ash borer

Calico scale

49



50

**But... outdoor urban pest control is “low-hanging fruit” in debates about pesticides**

Seattle Bans Neonicotinoids!

BREAKING NEWS  
MARYLAND BANS NEONICOTINOID INSECTICIDES FOR RESIDENTIAL USE  
MARYLAND BECOMES FIRST STATE IN THE NATION TO ENACT MAJOR RESTRICTIONS ON NEONICS

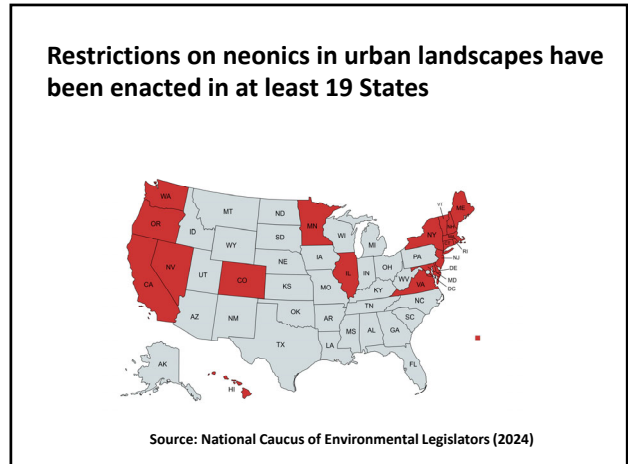
GOOD JOB, MARYLAND. NOW, TO FULLY PROTECT THE BEES AND THE BUTTERFLIES, AND OURSELVES, WE NEED TO BAN ALL USES OF NEONICS.  
BAN BEE-KILLING NEONICS

LOCAL 5 STATE | Printed January 3 | Updated January 4

**Portland council votes 9-0 to ban synthetic pesticides in city**

Hadlock Field, Riverside Golf Course and 5 athletic field will be the only exempt properties when the ordinance takes effect July 1.

51



52

**Although *urban* pest control is *not* the reason why bee populations are declining ....**

**...that does not mean that our insecticides are harmless to bees!**

53

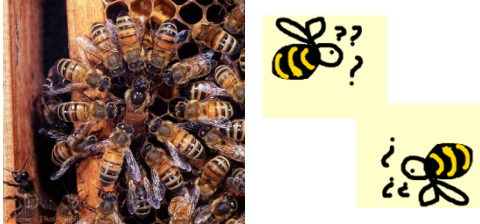
**Bees can potentially be exposed via contact or systemic transference into pollen and nectar**

SYSTEMIC

54

**At high enough dosages:**


Neonicotinoids and pyrethroids can kill bees outright, or impair colony function



55

**Fact:**

All commercial insecticides that could have saved these trees are systemic, and intrinsically bee-toxic



**Before (2006)** **After (2009)**

**Emerald Ash Borer: Toledo Ohio**


Photos: D. Herms

56

**Difficult Questions...**


*Is there an acceptable threshold for bee hazard from insecticides?*

*If so, how should it be balanced against the pest management benefits ?*



57

**Between the Devil and the Deep Blue Sea...**



**Growers and Land Care Professionals**

**Managing Pests** **Safeguarding Pollinators**

58

**What are some BMPs for safeguarding bees when applying insecticides?**



59

**My lab studied how to manage insect pests of lawns and landscapes without harming bees**

ECOTOXICOLOGY

**Hazards of Insecticides to the Bumble Bees *Bombus impatiens* (Hymenoptera: Apidae) Foraging on Flowering White Clover in Turf**

JEROME A. GELS, DAVID W. HELD, and DANIEL A. POTTER<sup>1</sup>

Department of Entomology, University of Kentucky, Lexington KY 40546-0001

OPEN ACCESS | <https://doi.org/10.1371/journal.pone.0144444> | [PMC4444444](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4444444/) | [PubMed 24444444](https://pubmed.ncbi.nlm.nih.gov/24444444/) | [PLOS ONE](https://www.plosone.org/journal/pone.0144444)

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

Jonathan L. Larson, Carl S. Redmond, David A. Potter<sup>1</sup>

Department of Entomology, University of Kentucky, Lexington, Kentucky, United States of America

**MOWING MITIGATES BIOACTIVITY OF NEONICOTINOID INSECTICIDES IN NECTAR OF FLOWERING LAWN WEEDS AND TURFGRASS GUTTATION**

JONATHAN L. LARSON,<sup>1</sup> CARL S. REDMOND,<sup>1</sup> and DANIEL A. POTTER<sup>1\*</sup>

Department of Entomology, University of Kentucky, Lexington, Kentucky, USA  
\*Department of Entomology, University of Kentucky, Lexington, Kentucky, USA  
<sup>1</sup>Present address: [larson@unl.edu](mailto:larson@unl.edu), University of Nebraska-Lincoln, Lincoln, Nebraska, USA

**Environmental Toxicology**

**Uptake and Dissipation of Neonicotinoid Residues in Nectar and Foliage of Systemically Treated Woody Landscape Plants**

Bernadette M. Mack,<sup>1</sup> Stefania Bondarowicz,<sup>2</sup> and Daniel A. Potter<sup>1\*</sup>

Department of Entomology, University of Kentucky, Lexington, Kentucky, USA  
<sup>1</sup>Present address: [macb@unl.edu](mailto:macb@unl.edu), University of Nebraska-Lincoln, Lincoln, Nebraska, USA

60

**Hazard = Toxicity x Exposure**

High exposure  
High hazard

Low exposure  
Low hazard

61

**Model system for lawn studies:**

White clover intermixed with cool-season turf

62

**Evaluating Colony Health**

63

**The research showed...**

**Direct exposure to neonics or pyrethroids on flowering lawn weeds is harmful to bees!**

64

**What are some Best Management Practices (BMPs) to reduce bee hazard from neonics?**

Mow off or control flowering weeds before treating for grubs

Granular formulations pose less bee hazard than sprays

- Larson et al. (2013) PLOS ONE
- Larson et al. (2014) Ecotoxicology
- Gels et al. (2002) J. Econ. Entomol.

65

**Importantly, our work showed that ...**

**Chlorantraniliprole (Acelepryn®)** is effective against pests and also non-hazardous to bees

**Hooray!**

66

We've done similar studies with woody landscape plants

Environmental Toxicology

**Uptake and Dissipation of Neonicotinoid Residues in Nectar and Foliage of Systemically Treated Woody Landscape Plants**

Bernadette M. Mach,\* Svetlana Bondarenko,<sup>†</sup> and Daniel A. Potter\*\*

\*Department of Entomology, University of Kentucky, Lexington, Kentucky, USA  
<sup>†</sup>Valent U.S.A., Dublin, California

- Environ. Tox. Chem. 2017

67

**Collecting Nectar and Foliage for Residue Analyses**

PhD student Bernie Mach collecting flowers

Prepping flowers

Twigs with blooms mounted in tubes

Centrifugation

Nectar from 200-300 flowers extracted per tube

68

**The research showed:**

**Bee-toxic neonic residues can persist for at least a year in nectar of trees and shrubs**

**So, don't use them on bee-attractive plants** unless there is no other way to protect them

69

**Fortunately, relatively few plant species in urban landscapes meet all 3 criteria**

70

**HIGH HAZARD AREA**

**LOW HAZARD**

Linden      Crabapples      Conifers      'Kwanzan' cherry

'Single' roses      Hawthorn      Hybrid roses      Lilac

71

**What are some "bee-friendly" alternatives to neonics?**

**Chlorantraniliprole: Reduced-risk Insecticide for Controlling Insect Pests of Woody Ornamentals with Low Hazard to Bees**

Carl T. Redmond and Daniel A. Potter


Abstract: Landscape professionals need target-selective insecticides for managing insect pests on flowering woody ornamentals that may be visited by bees and other insect pollinators. Chlorantraniliprole, the first anthranilic diaminopyridine insecticide registered for use in urban landscapes, selectively targets the receptors that regulate the flow of calcium to central muscle connections in caterpillars, plant-feeding beetles, and certain other phytophagous insects. Designated a reduced-risk pesticide by the United States Environmental Protection Agency, it has a favorable toxicological and environmental profile, including very low toxicity to bees and most types of predatory and parasitic insects that contribute to pest suppression. Chlorantraniliprole has become a mainstay for managing turfgrass pests, but little has been published concerning its performance against the pests of woody ornamentals. Researchers evaluated it against pests spanning five different orders: adult Japanese beetles, evergreen bagworms, eastern tent caterpillars, bristly root-knotting sawfly, hawthorn lace bug, oleander aphid, boxwood pyralid, oak leucania scale (crackers), and boxwood leafminer, using real-world exposure scenarios. Chlorantraniliprole's efficacy, speed of control, and residual activity as a foliar spray for the leaf-chewing pests was as good, or better, than provided by industry standards, but sprays were ineffective against the sucking pests (larvae, aphids, or scales). Root soil drenches in autumn or spring failed to systemically control boxwood pyralids or leafminers, but autumn drenches did suppress root-knot damage and Japanese beetle feeding the following year. This study indicates that chlorantraniliprole can be an effective component of integrated pest and pollinator management programs on woody ornamentals.

**Key Words:** Anthranilic Diaminopyridine Insecticide; Boxwood Leafminer; Boxwood Pyralid; Bristly Root-knotting; Chlorantraniliprole; Eastern Tent Caterpillar; Evergreen Bagworm; Hawthorn Lace Bug; Japanese Beetle; Oak Leucania Scale; Oleander Aphid; Pollinators.

72

**Acelepryn<sup>®</sup>**  
Insecticide

**Highly effective for caterpillars, beetles, and sawfly larvae**



*But not very effective against the sucking pests; including lace bugs, aphids, or scales*

73

**Chlorantraniliprole recently went off patent**  
*Less expensive generics will be available in 2025*

**Acelepryn<sup>®</sup>**  
Insecticide




**THE WAIT IS OVER.**  
**DIAMID™ T&O**  
THE ACELEPRYN™/DURENTIS™ ALTERNATIVE IS HERE.



74

**Examples of synthetic insecticides that should pose relatively low bee hazard *so long as they're not used on plants in bloom***

**Distance<sup>®</sup>**  
INSECT GROWTH REGULATOR

**Talus<sup>®</sup> 70DF**  
Insect Growth Regulator

**Confirm<sup>®</sup>**  
2F INSECTICIDE

**Talstar<sup>®</sup> P**  
PROFESSIONAL INSECTICIDE  
(And other pyrethroids)

**Lepitect<sup>®</sup>**

**TRISTAR<sup>®</sup>**  
30 SG INSECTICIDE

75

**Handout Posted on Conference Website**

**Protecting and enhancing pollinators in urban landscapes**  
for the US North Central Region



May 2019  
MSU Extension bulletin E3314

By David Smitley, Michigan State University Department of Entomology; Diane Brown, Rebecca Fineran and Erwin Stone, Michigan State University Extension; Jay K. Lavie, Michigan State University IPM; Paula M. Stenroos, University of Maryland Department of Entomology; Daniel A. Herms, The Davey Tree Expert Company, Kent, Ohio; and Cristel L. Palmer, IR-4 Project Rutgers University.

**Introduction**  
Most of the fruit and vegetables we eat would not exist if we did not have honey bees and native bees to pollinate the flowers they developed from. Wildflowers, and most flowering trees and shrubs must also be pollinated by bees to produce fruit and seed. In addition to providing critical pollination services, some of our pollinators like monarch butterflies, swallowtail butterflies and hummingbirds are valued as wildlife that we enjoy in the yard and garden.

**Pollinators in urban landscapes**  
Most plants need pollination to reproduce and grow fruit. While some plants are wind-pollinated, many require assistance from insects, bats, hummingbirds or other animals. Without pollinators, we would have

**Michigan State Extension Bulletin E3314 (30 pages)**

76

**Lots of folks are about pollinators**



My granddaughters Adele and Evie; Halloween 2017

77

**Pollinator-friendly land care is good for the industry**

Springhouse Gardens  
**POLLINATOR DAY**  
Sat, July 8, 2017  
10 am to 2 pm



Local garden center abuzz about bees; Rose Floral a 'real leader' in being 'pollinator friendly'



national pollinator garden network

78

**The best way to help urban pollinators is to give them more and better food!**

79

A single tree or shrub can provide 1000s of flowers with high-quality pollen and nectar

**Kentucky yellowwood**

**Summersweet (Clethra)**

80

**Listmania!**

81

**We sampled 75 species of woody landscape plants**  
Five sites (replicates) per plant species

82

**3 years, 375 sample sites!**

**Residential, commercial, & institutional landscapes**

**Arboreta**      **Cemeteries**      **Street trees**


83

**We compared plants' attractiveness to bees by timed "snapshot counts"**


**We then collected 50 bees from each of 5 sites per plant species (18,750 total bees, 250 per plant species)**

84



### Different woody ornamentals attract unique bee assemblages



**Flowering crabapple**




**Fuzzy Deutzia**





85



### Diversity of bee visitors varies by plant species



*Chelosoma philadelphi*




**Mock Orange (*Philadelphus*)**  
Native


**Chaste Tree (*Vitex*)**  
Non-native

86



### Different woody ornamentals attract unique bee assemblages



**Flowering crabapple**




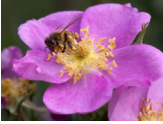
**Fuzzy Deutzia**


87

### Flower Form Matters!

**Good!**






**Prairie rose**




**Hydrangea paniculata**

**Pretty useless**

**Hybrid tea rose**



**Hydrangea arborescens**

88

### Are natives best for bees?

*Attracting Pollinators to Your Garden Using Native Plants*



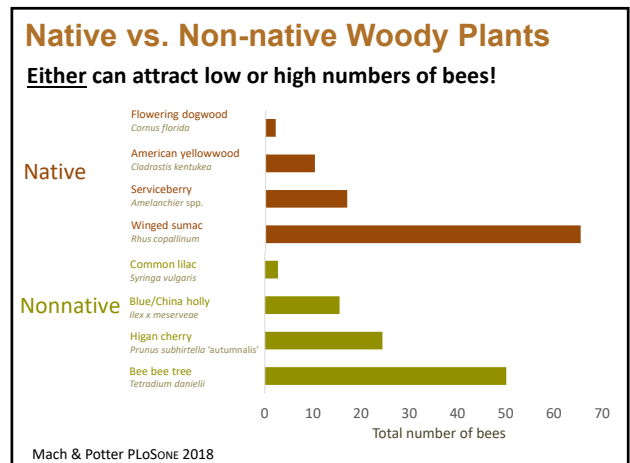

**SUPPORT NATIVE BEES**

**NATIVE PLANTS FOR SUN AND MEDIUM-DRY SOILS**

**PLANT NATIVE PLANTS**

PolinatorsNativePlants.com  
facebook: PolinatorsNativePlants  
Instagram: PolinatorsNativePlants

89



90

Honey bees and monarch on Seven Sons Flower tree (non-native) in September



91

**Question:**

*Do native woody plants provide higher quality nectar or pollen than non-natives?*

**Answer:**

*Both can provide quality food for bees and other pollinators*

- Mach & Potter 2018



Virginia spiraea (native)



Glossy abelia (non-native)

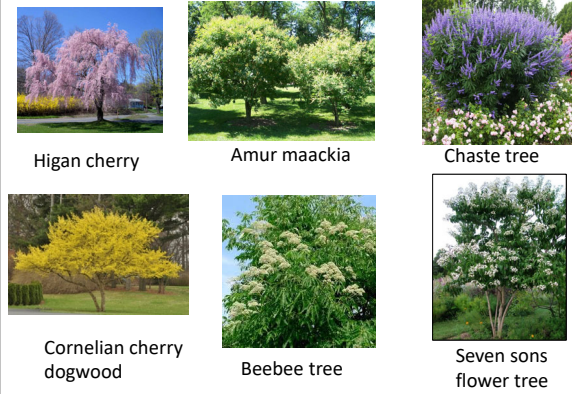
92

**Examples of Bee-Attractive Native Trees**



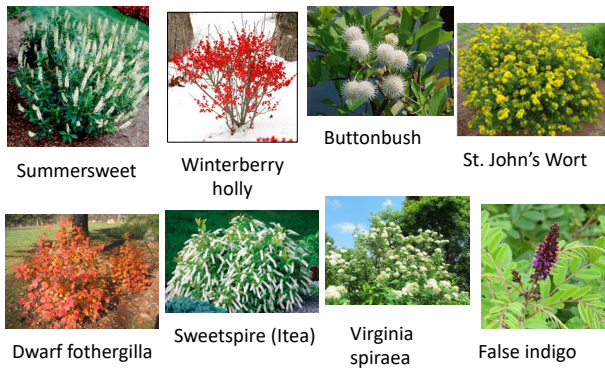
93

**Examples of Bee-Attractive Non-native Trees**



94

**Examples of Bee-Attractive Native Shrubs**



95

**Examples of Bee-Attractive Non-Native Shrubs**



96



### Many of the best “bee magnets” are also nearly pest-free!

False Indigo    St. John's Wort    Fuzzy sumac    Chaste Tree

Glossy abelia    Seven-Son Flower    Amur Maackia    Black gum

97

### How to Build a Bee-Friendly Landscape (Choose some from each column)

Spring	Early Summer	Late Summer
Serviceberry	Bottlebrush buckeye	Bee bee tree
Crabapple	Climbing prairie rose	Winged sumac
False Indigo	Clethra	Glossy abelia
Eastern redbud	Hydrangea paniculata	Seven son flower tree
Cornelian cherry	St. John's wort	Chaste tree
Winter king hawthorn	Winterberry	Devil's walking stick
American yellowwood	Golden rain tree	Buttonbush
Foster's holly	Amur maackia	
Flowering cherry	Virginia spirea	

98

### Diversify landscapes, emphasizing native plants

Including some non-invasive non-natives can buffer pollinators from seasonal gaps in floral resources

Early spring    Spring/Summer    Autumn

Cornelian cherry dogwood    Bottlebrush buckeye    Seven sons flower tree

99

### Wind-Pollinated Trees Also Help Bees

#### Early-season Pollen Sources are Important

Maples (red, sugar, sycamore, Japanese, others)    Oaks (all species)

Elms (American, Chinese, others)    Filbert/Hazelnut

100

### New “Trees for Bees” handout posted on conference website!

**Trees for Bees**  
 Bee-attracting trees and shrubs that bloom in spring and early summer.

**Why care about bees?**  
 Bees are essential for pollinating many of the plants we eat. They are also important for the health of our ecosystems.

**Examples of bees on trees (all photos © Heather Palm, used with permission):**

1. Honey bee on Japanese loquat
2. Honey bee on Amur maackia
3. Honey bee on Black gum
4. Honey bee on Black locust
5. Honey bee on Blackberry
6. Honey bee on Blackberry
7. Honey bee on Blackberry
8. Honey bee on Blackberry
9. Honey bee on Blackberry
10. Honey bee on Blackberry

101

### Pollinator plants: good for business!

**ROCK BRIDGE TREES**  
 Trees Grown On Purpose For A Purpose    615-841-3664

**TREES FOR BEES**  
 ROCK BRIDGE TREES

102

Marketing opportunities for growers and retailers

**SUPPORT THE POLLINATORS**

MasterTag is offering a...  
**POLLINATOR IDENTIFYING TAG**

- Easy to order in low quantities.
- Attractively designed tag identifies pollinator friendly plants.

**Springhouse Gardens**  
**POLLINATOR DAY**  
 Sat, July 6, 2014  
 10 am to 1 pm

103

**Integrated Pest and Pollinator Management (IPPM)**

A few real-world examples

**SMARTER PEST MANAGEMENT**  
**Pollinator Protection for Cities and Campuses**

IPPM is a holistic approach to pest management that seeks to balance the needs of pollinators and pest control. It involves a combination of practices that support pollinators and reduce pest pressure. This approach can help growers and other stakeholders in the landscape to manage pests more effectively while supporting pollinators.

Optimization should be done in cities, towns, and campuses to support bees, butterflies, and other wildlife. Many outdoor spaces—open parks and school grounds to residential and public buildings, when you make the decision to support pollinators, you should strive to incorporate IPPM practices.

104

**Customer freaks out about a honey bee swarm in a tree - wants you to spray it**

*What should you do?*

105

**Why do honey bees swarm?**

**It's how they propagate the species**

When a colony gets big enough, it splits and the queen flies off, taking a portion of the colony with her to find a new home.

106

The swarm rests while scout bees look for a tree hole or other place to make a new home


**Swarms rarely stay in place for more than a day or so**

107

**While scouts are looking for a new home, swarms may make brief stopovers in strange places**

108

**What should you do?**

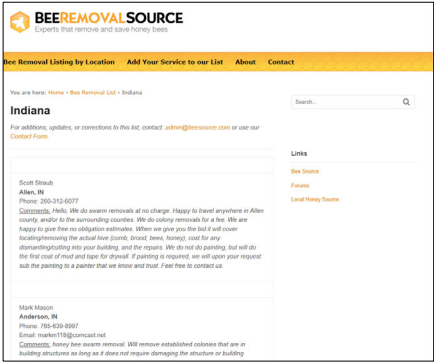


Reassure customer that swarming bees are not looking to attack you

Leave them alone – they'll be gone soon

Or, call a beekeeper – many will come remove swarm for free

109



**And 130 more listings!**

110

**UK Football Stadium – first day of Spring Practice.**



Get rid of those those %\$!\* bees!!

111

**Beekeeper to the rescue!**




112

**Tulip poplars at UK Football Stadium 2 days before first home game – all is NOT well!**



113

**Tuliptree scale insect infestation with their sugary fecal matter (honeydew)!**



114

### So.... should you spray these trees for bees?



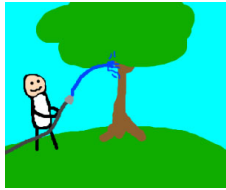
115



116

### How did UK's arborist solve the problem?

Hosed down trees to remove honeydew



Soil injection next spring after bloom



117

### Customer is afraid of bees and wants you to spray this tree to get rid of them

*What should you do?*



118

### Spraying that flowering tree would be a label violation!




**Environmental Hazards**  
This pesticide is extremely toxic to fish and aquatic invertebrates. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Care should be used when spraying to avoid fish and reptile pets (aquarium ornamental ponds).  
To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help to avoid run off to water bodies or drainage systems.  
This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow to drift to blooming crops if bees are foraging the treatment area.



**Do not apply this product or allow to drift to blooming plants if bees are foraging the treatment area**

**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. (continued)

119

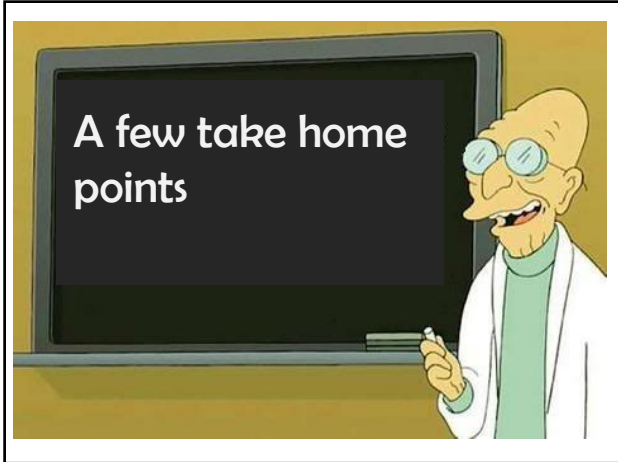
### *What should you do? Reassure client....*

Bees on flowers are not aggressive

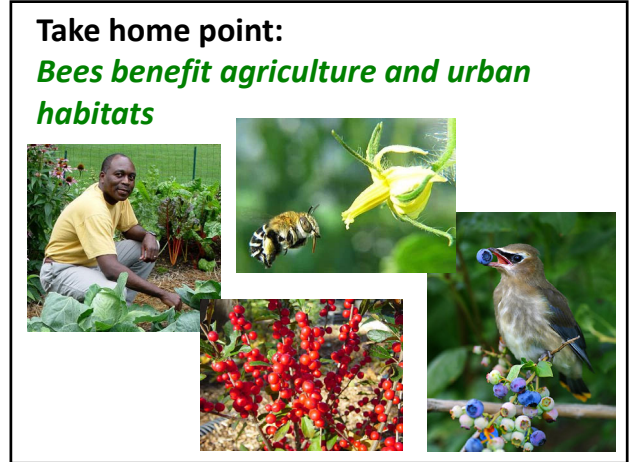
Tree will only bloom and attract bees for a week or so – then they'll be gone



120



121



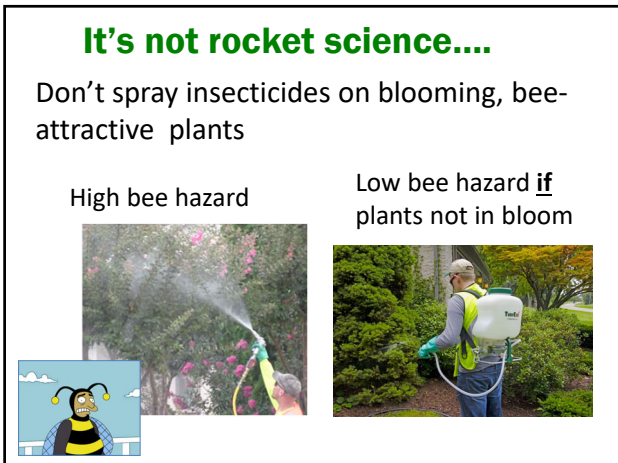
122



123



124



125



126