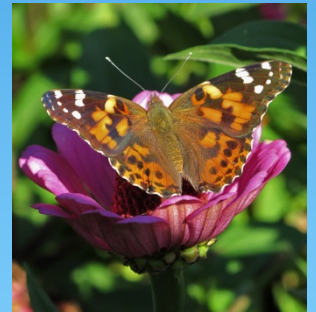


Pesticide Use Patterns in Maine

Including Neonicotinoids*



Henry Jennings
Maine Board of Pesticides Control

* Because a lot of attention has been directed toward neonicotinoids

Talk Outline

- * US Pesticide Usage Summaries
- * Maine Pesticide Use Patterns
 - * Major Pesticide Use Sectors
 - * Current Pesticide Use Patterns by Sector
 - * Which Uses Are Important to Bees
 - * So Where Should We Focus Our Energy?



What is a pesticide?

- * "Pesticide" means any substance or mixture of substances **intended for** preventing, destroying, repelling or mitigating any pests and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant.



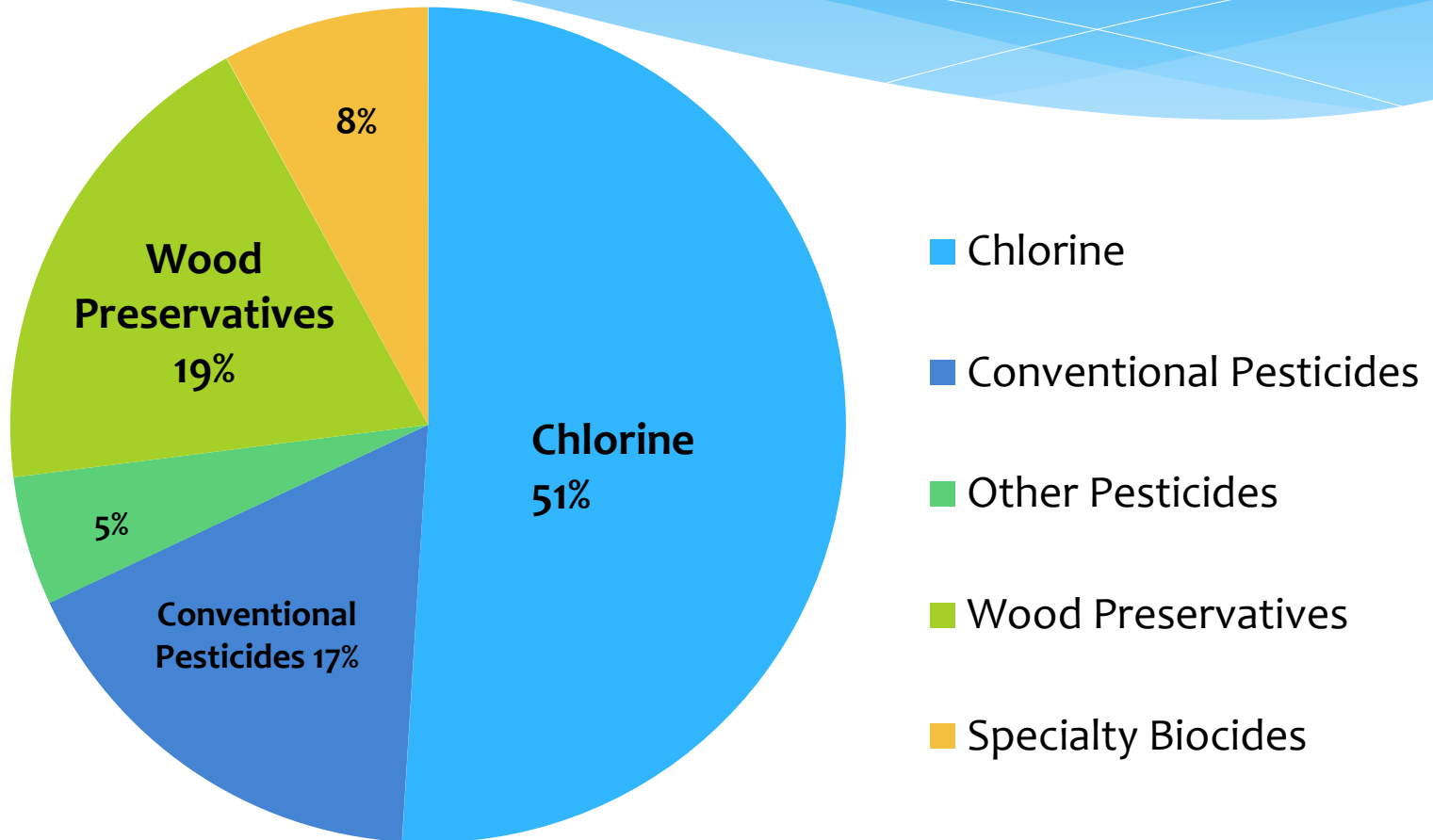
2007 US Pesticide Usage Conventional Pesticides vs. Non-Conventional

<http://www.epa.gov/opp00001/pestsales/>

Pesticide Group	Millions of Pounds Active Ingredient
Conventional Pesticides	857
Other Pesticides	266
Specialty Biocides	389
Chlorine Used in Water Treatment	2,609
Wood Preservatives	954
Total	5,085

2007 US Pesticide Usage

Usage by Group



2007 US Conventional Pesticide Usage

in Millions of Pounds (EPA)

* Herbicides	531	47 %
* Insecticides *	93	8 %
* Fungicides	70	6 %
* Other	439	39%
* Total	1,133	100 %



*17% conventional pesticides X 8%
insecticides = 1% of pesticide use

US Conventional Pesticide Use

2007 US Conventional Pesticide Usage by Sector (Millions of Pounds)

	Herbicides		Insecticides		Fungicides		Nematicides Fumigant		Other		Totals	
	Lbs	%	Lbs	%	Lbs	%	Lbs	%	Lbs	%	Lbs	%
Agriculture	442	83	65	70	44	63	108	81	25	83	684	80
Ind/Com/ Gov	46	9	14	15	19	27	24	18	4	13	107	12
Home & Garden	43	8	14	15	7	10	1	1	1	3	66	8
Total	531	100	93	100	70	100	133	100	30	100	857	100



Agricultural Pesticide Sales in Maine

- * Historically fungicides have dominated agricultural sales
- * Herbicides are next
- * Insecticides:
 - * In 1984 it was all organophosphates and carbamates
 - * Synthetic pyrethroids began showing soon after
 - * Imidacloprid arrived in 1994



Major Conventional Pesticide Use Sectors in Maine

* Agriculture

- * Blueberries 60,000 acres
- * Potatoes 54,000 acres
- * Small Grains 45,000 acres
- * Field Corn 25,000 acres
- * Broccoli 6,000 acres ?
- * Apples 3,000 acres
- * Mixed Vegetables 6,000?
- * Horticulture
- * Certified Organic Production
 - * 41,000 acres*
 - * 459 farms*

* Other Use Sectors

- * Commercial
 - * Structural
 - * Lawn & Ornamental
 - * Mosquito & Tick
- * Forestry
- * Homeowner
- * Rights-Of-Way
- * Industrial

*Includes dairy and maple operations

Pesticide Use in Maine Agriculture

- * Blueberries – fungicides before bloom, insecticides when berries are ripe, some neonics very late in the year if at all
- * Potatoes – neonics at planting, insecticides starting in mid-July, fungicides multiple times
- * Small Grains – no insecticides used, but fungicides may be on the rise
- * Field Corn – most seed is treated but at rates that protect the roots and seedlings
- * Broccoli – insecticides before harvest, no neonics – no flowers either
- * Apples – multiple insecticide and fungicide applications, some neonic use before bloom
- * Mixed vegetables/berries – neonics on some cucurbits at planting, berries often require some pesticides, sweet corn at tassel



Organic Agriculture

- * Presumably involves more row covers and fewer pesticide applications
- * Bt and neem shouldn't be an issue for bees
- * *Pay attention to:*
 - * Pyrethrin is highly toxic but very short lived
 - * Spinosad is highly/moderately toxic to bees
 - * Copper Sulfate is highly toxic to bees



Commercial Application

- * Insecticide Use

- * Structural

- * Single & Multi-family Residences, Food Processing, Restaurants, Commercial & Institutional Buildings

- * Turf

- * Golf Courses

- * Tick & Mosquito

- * Ornamentals

- * Other Pesticide Use Sectors

- * ROW

- * Industrial

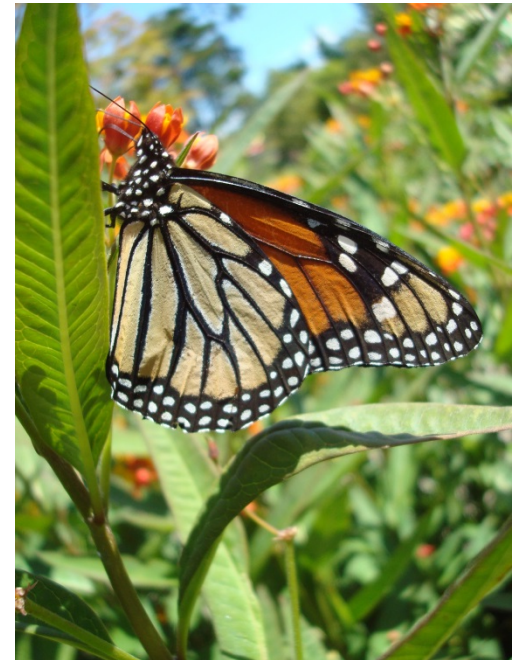
- * General Vegetation Management

- * Forestry



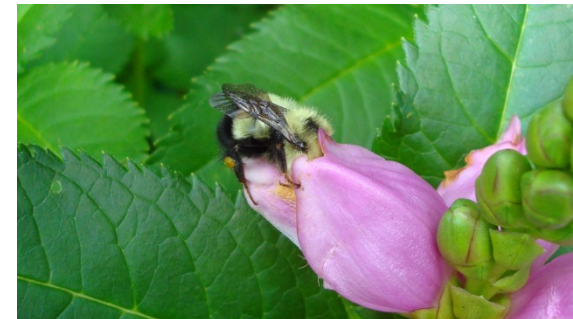
Commercial Application

- * Structural Insecticide Use – dominated by pyrethroids and pretty much irrelevant to pollinators
- * Turf Insecticide Use – a fair amount of neonic use for grub control – but risks to pollinators should be low
- * Golf Courses – similar to turf with the addition of fungicides on green and tees – risks should be low
- * Ticks and mosquitoes – dominated by bifenthrin and some cypermethrin – low, dense vegetation at lawn perimeter is the most commonly targeted area
- * Ornamentals – there isn't a large volume of insecticide used in this sector, but imidacloprid is common



Commercial Application

- * ROW – all herbicides
- * Industrial (non-structural) – almost all herbicides
- * General Vegetation Management – all herbicides
- * Forestry – currently all herbicides, spruce budworm is on the way



Home & Garden (Homeowner) Use of Pesticides

8% of Conventional Pesticide Use, but 15% of the Insecticide Use

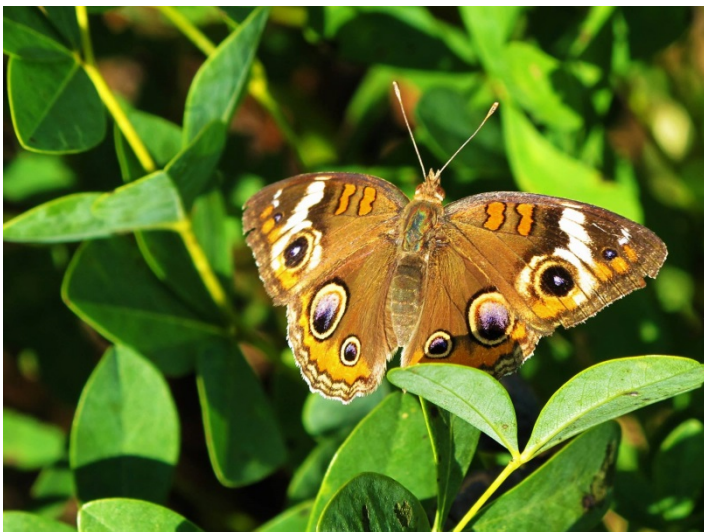
National Data

- * 67% herbicides
- * 22% insecticides
- * 11% fungicides

Qualitative Estimate of Insecticides Sold *

Active Ingredient	Number of Units Sold
Bifenthrin	18,000
Cypermethrin	12,000
Carbaryl	10,000
Chlorantraniliprole	7,500
Imidacloprid	2,500
Pyrethrins	2,100

* 2013 Maine Sales Reports



Greenhouses & Nursery

- * These businesses involve – among other things – flowering plants, shrubs and trees
- * Consumers don't want infested plants
- * We know neonics are used some in this industry
- * Some growers are focusing on the use of beneficial insects
- * The BPC doesn't have very good data on this industry



So Where Do We Focus Our Efforts?

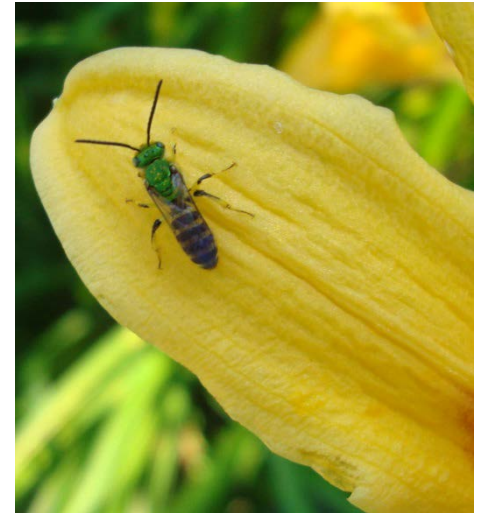
- * 70 % of insecticides are used in agriculture
 - * Focus on applications that could result in residues in/on the flowers
 - * Persistent & systemic insecticides
 - * Fungicides and insecticides together
 - * Reduce drift to adjacent flowering plants
 - * Spraying when bees aren't foraging in the area helps
 - * Improve communication between growers and beekeepers



So Where Do We Focus Our Efforts?

Insecticide Use by Professional Applicators

- * 15% of insecticide use is by professional applicators
 - * A significant percentage is applied in, on, and around structures
 - * A significant percentage is used on turf – should be low risk as long as clovers are mowed off
 - * Part is used for mosquito and tick control – watch out for flowering plants
 - * A relatively small part is used on trees and shrubs – but it's worth giving some additional thought



Home & Garden Insecticide Use

15% of the insecticide use

- * Based on the products purchased in Maine, we think:
 - * The bifenthrin is primarily ant control around structures
 - * The imidacloprid is probably turf related
 - * Carbaryl would be used on gardens
 - * This is a good sector to do some work on



Which Pesticide Uses Are Important to Bee Health?

Focus On:

- * Conventional Pesticides
 - * Primarily Insecticides
- * Used outdoors
- * That may affect flowering plants
- * Or bees while they're foraging

Not so concerned about:

- * Herbicides aren't generally considered toxic to bees
- * Many fungicides are classified as relatively non-toxic to bees*
- * Pesticides that aren't applied to flowering plants and do not drift to flowering plants

* But is synergy an issue?

Pesticide Toxicity to Bees

Highly Toxic

- * Organophosphates
- * Carbamates
- * Pyrethrins and Pyrethroids
- * Neonicotinoids
- * Copper Sulfate

Relatively Non-toxic

- * *Bt* & most biologicals
- * Chlorantraniliprole
- * Flonicamid
- * Thiaclopyrid
- * Insect growth regulators
- * Neem
- * PBO
- * Many fungicides

A Big Picture Look

Where to focus our efforts

- * We need more research because the precise role of pesticides in bee decline is still quite unclear
- * We need better communication between beekeepers and pesticide applicators
- * We should continue with education & promotion of best management practices with:
 - * Agricultural producers
 - * Tick & mosquito applicators
 - * Ornamental applicators
 - * **Homeowners! (15% the insecticide use)**



Be careful what you ask for

All Insecticides vs. Organophosphates (in millions of pounds)

	lbs	lbs	% of All Insecticides
1980	228	131	57
1985	161	114	71
1990	121	85	70
1991	114	82	72
1992	116	84	72
1993	115	79	69
1994	124	83	67
1995	125	80	64
1996	116	75	65
1997	112	73	65
1998	103	66	64
1999	126	91	72
2000	122	88	72
2001	105	73	70
2002	130	59	45
2003	115	46	40
2004	114	46	40
2005	104	40	39
2006	99	37	38
2007	93	33	35

