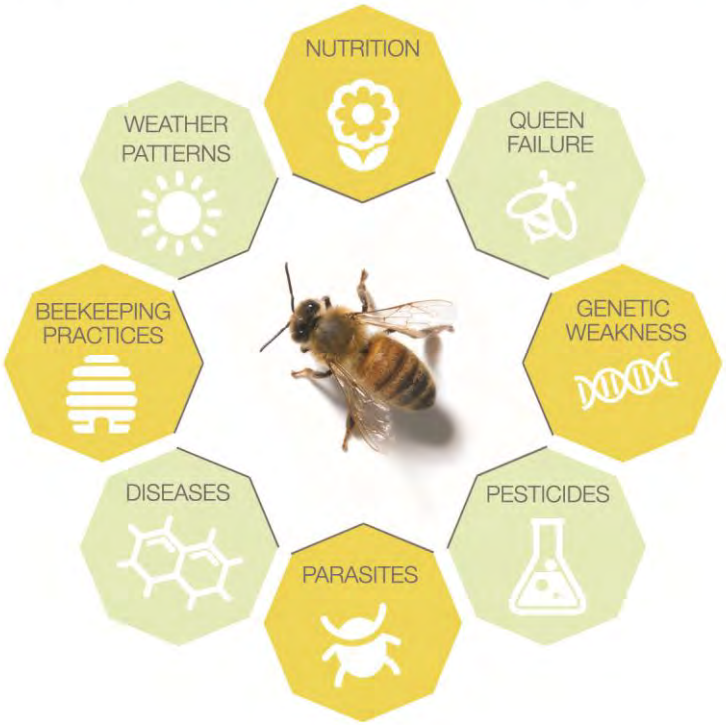
So What is Affecting Bee Health?

Multiple Stressors Affecting Bee Health



Scientists are focused on the interaction of multiple factors:

- Parasites (*Varroa*; tracheal mites)
- Nutrition deficiencies
- Diseases (Nosema; bacteria; viruses)
- Weather
- Beekeeping practices
- Pesticides (hives; agriculture)
- Genetic weakness
- Queen issues
- What about CCD?


Varroa destructor
Vampire of the bee world and
#1 enemy of honey bees
There are no “healthy” colonies

USDA/EPA Report on Bee Health*

May 2, 2013

The Varroa mite is "the single most detrimental pest of honey bees and is closely associated with overwintering colony decline."

Comprehensive assessment of major factors contributing to honey bee decline

- Multiple diseases associated with Colony Collapse Disorder, many of which are amplified by Varroa
- Urges adoption of best management practices to enhance bee health
  - Significantly improve genetic diversity in bees
  - Increase nutritional options
  - Continue understanding of pesticide impacts at field-relevant exposures

*This report was an outgrowth of the October 2012 National Stakeholders Conference on Honey Bee Health and attended by a wide range of federal and state officials, researchers and others concerned about honey bee colony decline

The Changing U.S. Honey Bee Industry

Previously: Honey and Hive Products

Increasingly: Pollination Services

Almond pollination requires approximately 1.6 million of the 2.6 million colonies in the U.S. and is a driver of the number of colonies

Artificial feeding in preparation for almonds

Apiculture is Agriculture Too

Fact or Fiction?

"*If the bee disappears from the surface of the Earth, man would have no more than four years left to live.*" - Albert Einstein

Alarmist rhetoric never uttered by Einstein

Honey bees are native to North America

Honey bees are non-native livestock and numbers respond to market forces

The health of honey bees threatens our nation's crops

Honey bees health is critical to our agricultural economy and can be improved

Colony Collapse Disorder is the most important disease facing honey bees

Neither beekeeper nor bee researchers consider CCD a key factor

Seed treatment and neonicotinoids are most responsible for bee losses

Most scientists agree that there are many factors affecting bee health, but exposure to agrochemicals does not appear to be a major one

Declining bee health is a mystery and we do not know what to do to improve it

We do and we should

Neonicotinoids and Bees

bee care

Poncho
Gaucho
Cruiser
Admire
Platinum
others

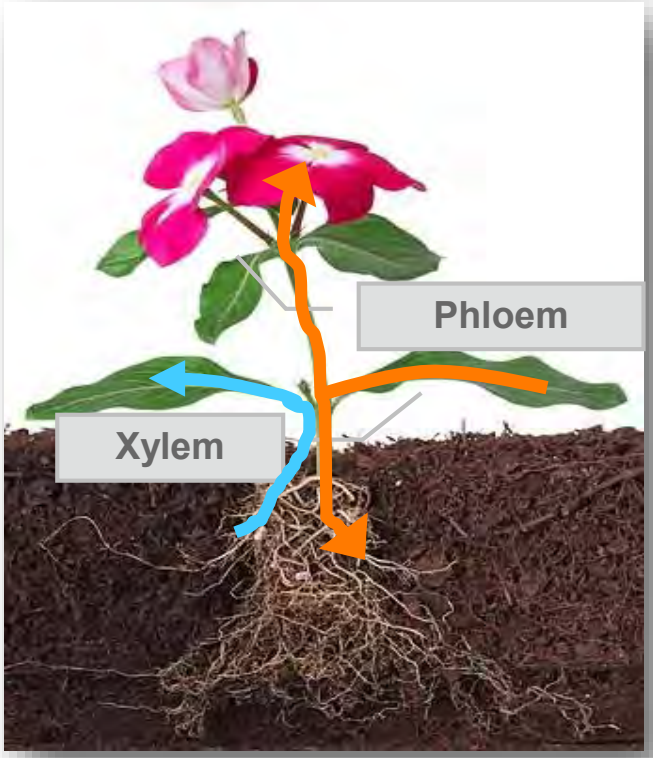
Selective Insect Control & Systemic Movement

Xylem moves water

- Neonicotinoid mobility high in xylem
- Residues move to leaves and shoots, particularly early growth
- Protects young plants from sucking insects

Phloem moves sugars

- Neonicotinoid mobility low in phloem
- Low residues in nectar and pollen
- Minimizes risks to bees in nectar and pollen



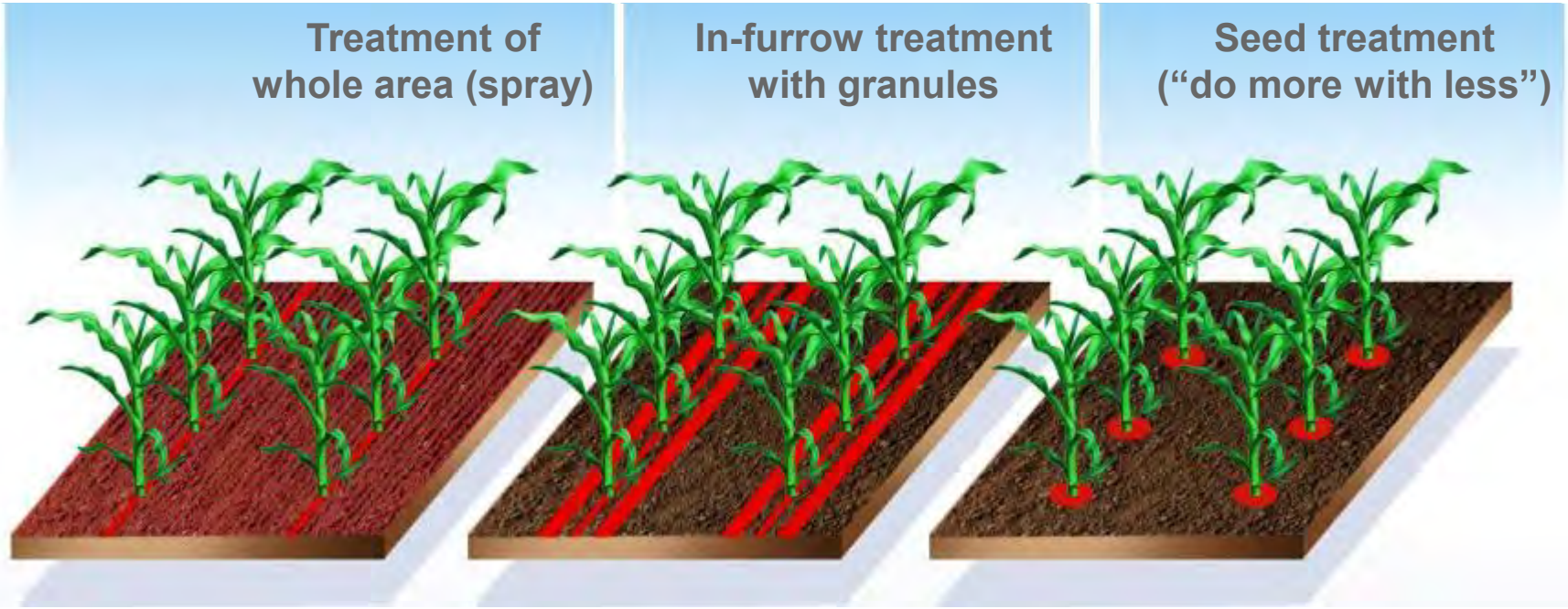
Neonicotinoids Are Vital For Sustainable Agriculture

- A total of 147 million USA acres are planted with neonicotinoid-treated seeds

2010 Seed Treatment**	
	% of Total Acres Planted with Treated Seeds
CROP	Total Neonicotinoids (Clothianidin, Imidacloprid, Thiamethoxam)
CANOLA	100%
CEREALS	42%
CORN	94%
COTTON	42%
RICE	51%
SORGHUM	75%
SOYBEANS	32%
SUGAR BEETS	65%

** *CTN 2010 Seed Treatment Market Report.*

Neonicotinoid Seed Treatments



- 1% of a field is treated compared to broadcast spray
- 94% of seed corn in the U.S. is treated with neonicotinoids
- Yield increase of 6 to14 bushels per acre (value: $2-5 billion)
- 3.3 million new acres would be required to replace lost yields

2012-2013 APHIS National Honey Bee Survey Report

KAREN RENNICH[1], GRACE KUNKEL[1] SAMUEL ABBAN[3], RACHEL BOZARTH[1], HEATHER EVERSOLE[1], JAY EVANS[3], EVA FORSGREN[1] , VIC LEVI[3], DAWN LOPEZ[3]SHAYNE MADELLA[1], *JEFF* PETTIS[3] , DENNIS VANENGELSDORP[1] , and ROBYN ROSE[2]

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A total of 792 (32 statesx24 samples/state, plus the extra 24 samples for California) samples representing 6,336 colonies are expected at the completion of this survey. To date,

beeinformed.org
2012-2013 APHIS National Honey Bee Survey

2012-2013 APHIS National Honey Bee Survey Report

Pesticide	LOD	Prevalence	Average Detection if positive for target	Range if positive for target
	(ppb)	%	(ppb)	(ppb)
Chlothianidin	1	1.5	27.7	5.5 - 62.8
Coumaphos	1	33.6	65.3	1.1 - 6260

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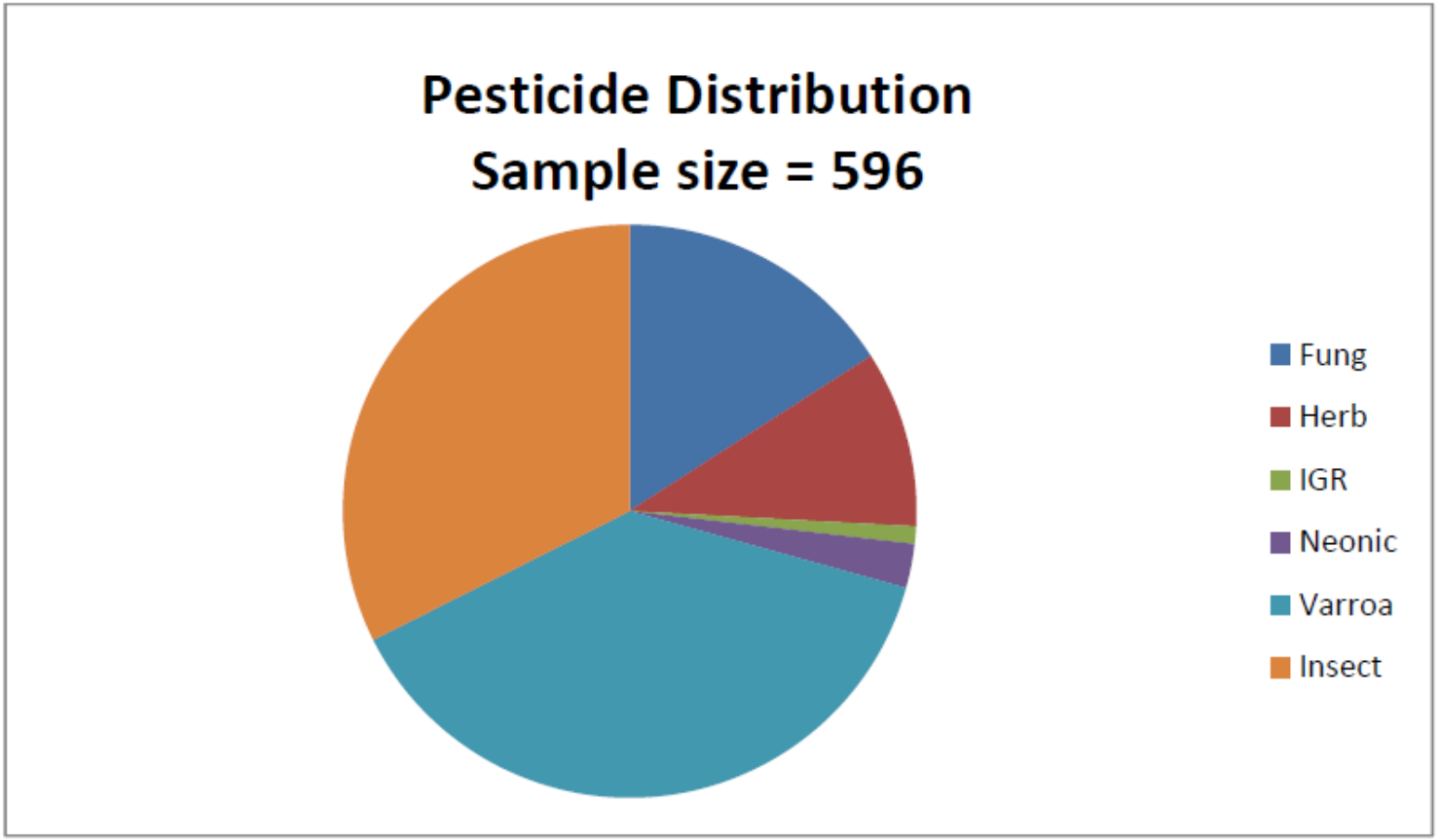

Figure 20: Classification of types of pesticide detected in pollen samples through 2014 .

Risk to Bees (Canola Example)

- Canola is attractive to bees: nectar and pollen source
- Virtually all seed used in hybrid seed or commodity canola production is treated with a neonicotinoid (clothianidin or thiamethoxam)
- Commercial beekeepers bring large numbers of bees to the canola fields each year for pollination of hybrid seed
- In recent years, overwintering losses in hybrid canola areas in Canada (Alberta) have been lower than the national average
- No greater effect on bee colony health has been reported by Alberta beekeepers due to this production process