

PROTECTING POLLINATORS

Bee Decline and the Future of Pollinators

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Find this presentation at www.wchance3.wordpress.com/handouts

IMPORTANCE OF BEE POLLINATORS



- ✖ 1/3 of our food crops are bee pollinated!
- ✖ Annual value to US ag from honey bee pollination is estimated at \$15 to 29 billion
- ✖ In California, the almond crop alone needs 1.3 million bee colonies, about half of all honeybees in the country.

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POLLINATE 130 FRUITS, VEGETABLES & NUTS



BREAKFAST WITH POLLINATORS



Breakfast Without Bees, Scientific American,
[Diana Cox-Foster](#), [Dennis vanEngelsdorp](#)

BREAKFAST WITHOUT POLLINATORS



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WINTER & EARLY SPRING LOSSES OF BEES

- ✖ Since 1880s – “Disappearing Disease”

- ✖ Related to hive health & the winter cold

- ✖ 1990s = 17 - 20%

2006/7 = 32%

2007/8 = 36%

2008/9 = 29%

2009/10 = 34%

2010/11 = 30%

2011/12 = 22 %

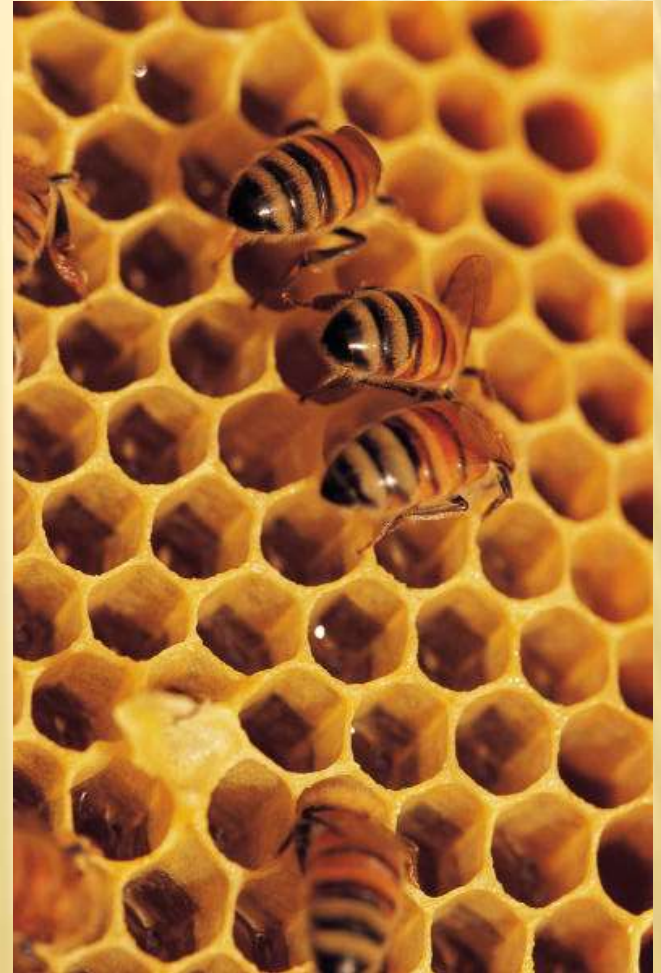
2012/13 = 31%

2013/14 = 23%

- ✖ Economic threshold for beekeepers < 19 %

COLONY COLLAPSE DISORDER

- ✖ Unexplained loss of adult bees in the active season of the year
- ✖ Live queen
- ✖ Bees gone but honey & brood intact
- ✖ Hives dwindle even in good conditions



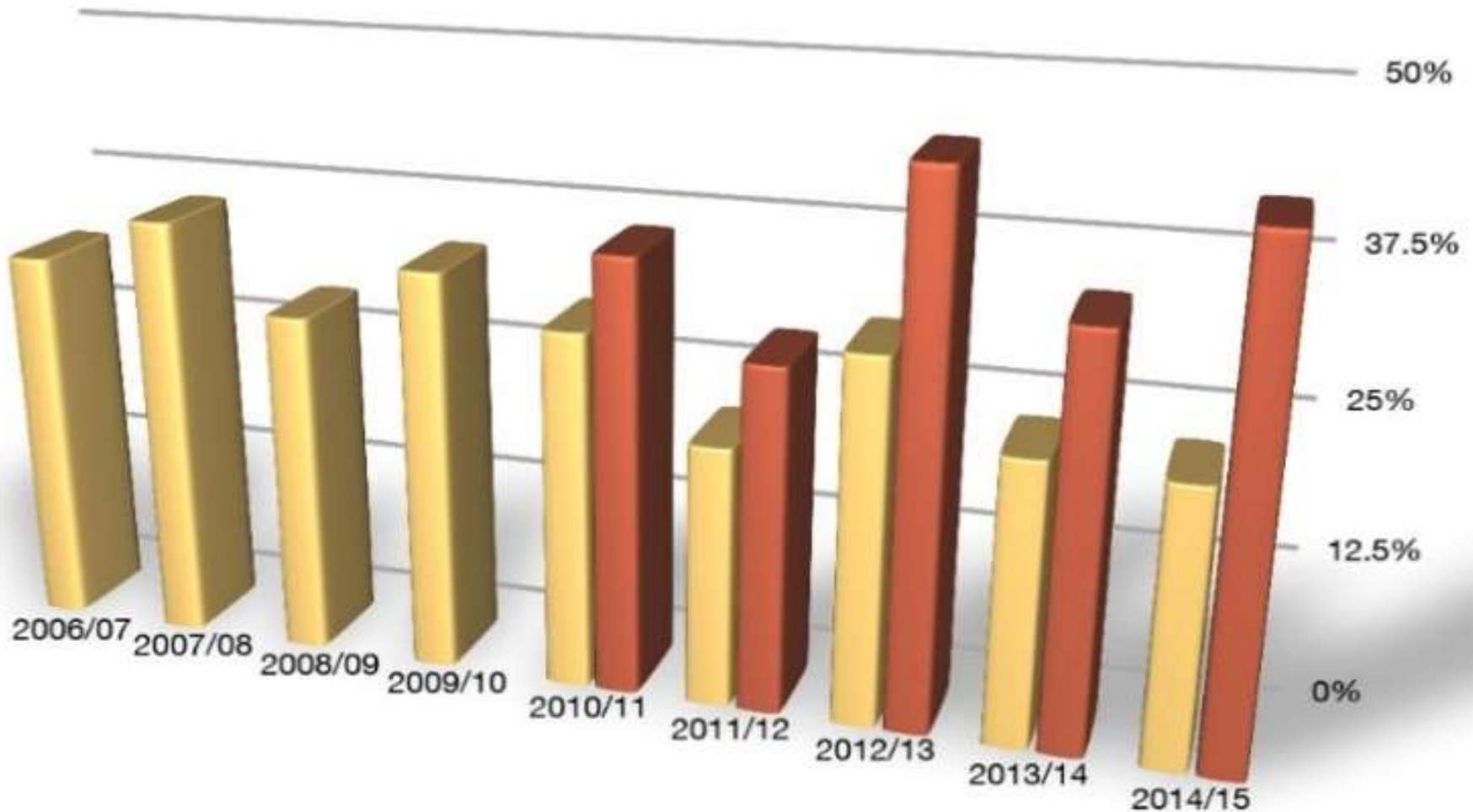
WINTER LOSS ON THE DECLINE BUT ...



Honey Bee Losses

Winter Loss

Annual Loss



LOTS OF THEORIES ON BEE LOSS

- ✖ Nutrition & management
- ✖ Stress
- ✖ Diseases
- ✖ Parasites - Mites and hive beetle
- ✖ Pesticides
- ✖ Cell towers, GMOs etc.



BEE DECLINE DUE TO SEVERAL FACTORS

- ✗ <http://tinyurl.com/beesGA>
- ✗ Parasitic Varroa mites
- ✗ Viruses spread by mites (Israeli acute paralysis virus)
- ✗ Pesticides
 - + External
 - + Internal – miticides interact with other pesticides to create toxic interactions
- ✗ Habitat & forage decline

Protecting Georgia's Pollinators



A state plan for promoting a large,
healthy and diverse pollinator workforce

Jennifer Berry, Kris Braman, Keith Delaplane, Mike Evans,
Phillip Roberts and Alton Sparks

Limited / monotonous floral resources

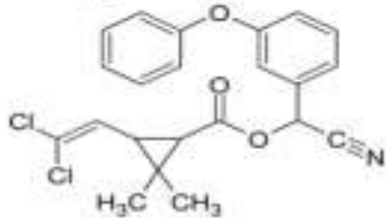
Lack of alternative forage may increase exposure to pesticides



Poor diet compromises immunity

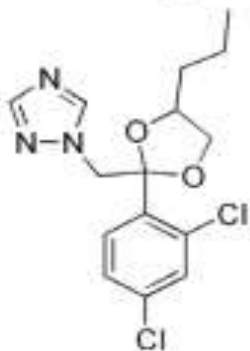
Immune response energetically costly

Pyrethroids



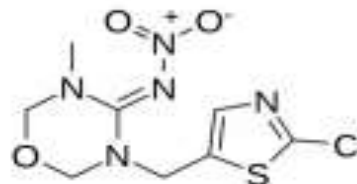
Fungicides increase toxicity

EBI Fungicides



Fungicides act synergistically to increase toxicity

Neonicotinoids



Pesticide exposure affects disease tolerance and susceptibility

Parasites + Pathogens



VARROA MITE



UGA1321060

UGA1317031

Scott Bauer, USDA Agricultural Research Service, Bugwood.org

VARROA MITE

External parasite

Kills hive within 2 to 3
years

Reproduces in brood
cells

Spreads from bee to bee

Carries Israeli Acute
Paralysis Virus

Control is difficult





WILD BEES IN NY DEVELOP RESISTANCE TO DISEASE AFTER EXPOSURE TO VARROA MITES

From *Entomology Today* Aug 20, 2015

NEONICOTINYL INSECTICIDES?

- ✗ Some media & special interest groups identify neo-nicotinyl insecticides as the sole cause
- ✗ Science does not support this assumption
- ✗ Neo-nics have been responsible for highly visible bee kills
- ✗ Pesticide label changes to protect bees
- ✗ CCD not a problem in Australia where neo-nics are used regularly on bee pollinated crops!

NEO-NICOTINYL INSECTICIDES

[HTTP://EDIS.IFAS.UFL.EDU/PI117](http://edis.ifas.ufl.edu/PI117)

Common name	Trade names
Acetamiprid	Acetamiprid®, Assail®, Tristar®
Clothianidin	Acceleron®, Arena®, Belay®, Celero®, Clutch®, Nipsit Inside®, Poncho®
Dinotefuran	Alpine®, Dinotefuran®, Safari®, Scorpion®, Venom®
Imidacloprid	Admire®, Advantage®, Gaucho®, Merit®, Premise®, Touchstone®
Thiamethoxam	Cruiser®, Platinum®

NEO-NICOTINYL INSECTICIDES

[HTTP://EDIS.IFAS.UFL.EDU/PI117](http://edis.ifas.ufl.edu/PI117)

Neo-nics originally selected in part due to low toxicity to mammals – but not to bees!

Table 2. Neonicotinoid pesticide wildlife toxicity ranges.

Common name	Bird acute oral LD ₅₀ (mg/kg)*	Fish LC ₅₀ (ppm)**	Bee LD ₅₀ [†]
Acetamiprid	PNT	PNT	MT
Clothianidin	PNT	PNT	HT
Dinotefuran	PNT-MT	PNT	HT
Imidacloprid	MT	MT	HT
Thiamethoxam	ST	PNT	HT

Honey bees were fed with imidacloprid-dosed pollen patties, like the one seen here.
Photo by Galen Dively.

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

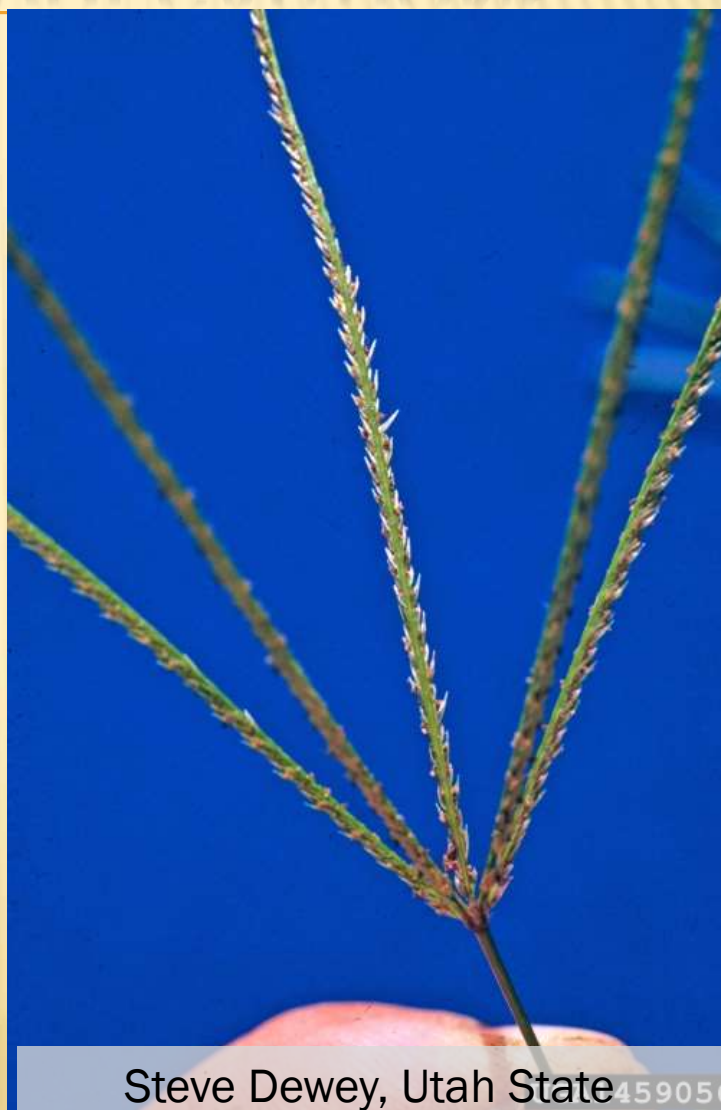
Assessment of Chronic Sublethal Effects of Imidacloprid on Honey Bee Colony Health

Galen P. Dively , Michael S. Embrey, Alaa Kamel, David J. Hawthorne, Jeffery S. Pettis



NEO-NIC (PESTICIDE) USE PRECAUTIONS

- ✗ Do not treat blooming or pre-blooming plants (does turf bloom?)
- ✗ Be careful of drift
 - ✗ Liquids
 - ✗ Dusts from seed treatments
- ✗ Use correct formulation & rates
 - + Avoid WP, Dusts, Flowables
 - + Use Granules, Baits



'BEE SAFE' PEST CONTROL

- ✗ Apply so as to avoid bees foraging on plants
 - + Avoid early morning & when bees are flying
- ✗ Labels have changed for many pesticides in the last few years
 - Read them again!
- ✗ Use pesticides with lower bee toxicity



LOW TOXICITY, QUICKLY DEGRADABLE PESTICIDES

www.ent.uga.edu/bees

Entomology: UGA Honey Bee Program: Bees, Beekeeping, and Pollination

Pollination: Table of Insecticides and Miticides

Table¹ of common insecticides and miticides and their relative risk to honey bees. Never spray during bloom periods unless it is absolutely necessary. If treatment is unavoidable, choose a product with a high LD₅₀ and short residual. If a more toxic chemical is required, choose a residual under 8 hours and spray at night.

Active Ingredient	Trade Names	Risk class ²	LD ₅₀ ³	Residual ⁴
chlorpyrifos	Dursban, Lorsban	I	0.11	5 hours to 6 days
cyhexatin	Plictran	III	NA	<2 hours
cypermethrin	Ammo, Cymbush	III	NA	<2 hours to >3 days
diazinon	Diazinon	I	0.37	<1 day to 2 days
dicofol	Kelthane	III	NA	<2 hours
dicrotophos	Bidrin	I	0.3	1 day to 1 days
diflubenzuron	Dimilin	III	NA	<2 hours to 6 hours

NEW CHEMISTRY TO LIMIT BEE INJURY



Altus™



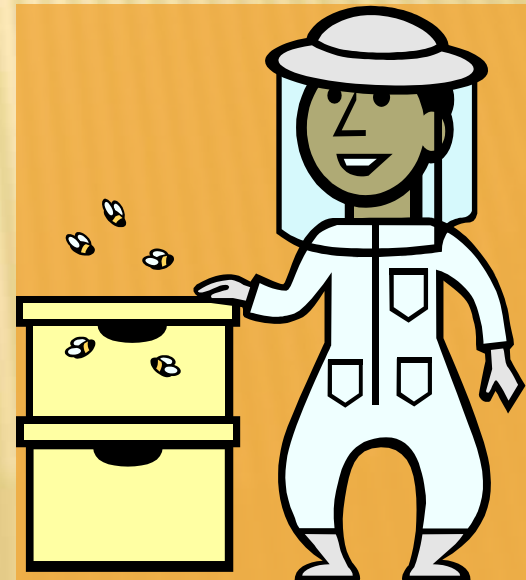
- ✖ Flupyradifurone – inspired by natural plant product stemofoline
- ✖ EPA certified reduced risk product
- ✖ Less toxic to bees - Apply even at bloom
- ✖ Controls sucking pests to 4 - 6 weeks, 4 hour REI, Ornamental plants
- ✖ New chemistry reduces risk of resistance

PROTECT POLLINATORS FROM PESTICIDES

- ✖ Work with beekeepers when scheduling pesticide applications
- ✖ Place apiaries in safe area (4 miles)
- ✖ Look for the Bee Alert flag!



<http://tinyurl.com/beesGA>



PLANT FOR THE BEES

- ✖ Trees - red maple, tulip poplar, sourwood
- ✖ Shrubs – azalea, buddleia,
- ✖ Annuals - bee balm, sunflower, asters
- ✖ Perennials – purple coneflower, milkweed, phlox,
- ✖ Fruits – apples, blueberries
- ✖ Vegetables – squash, pumpkin, watermelon, canteloupe



SOIL NESTING BEES



www.ent.uga.edu/bees

- ✗ Blueberry bees
- ✗ Squash bees
- ✗ Leave areas undisturbed
- ✗ Avoid spraying them!
- ✗ May occur in large numbers in an area for a sort period of time – but they will leave!
- ✗ Usually not aggressive

SUMMARY

- ✖ Bee decline is a real problem with no one simple answer!
- ✖ Everyone must make a difference
- ✖ Support local beekeepers, use pesticide cautiously and plant for the bees
- ✖ For more info - Contact your local UGA Extension Office 800-ASK-UGA1

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GA Department of Agriculture
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**CERTIFIED
CROP ADVISER**

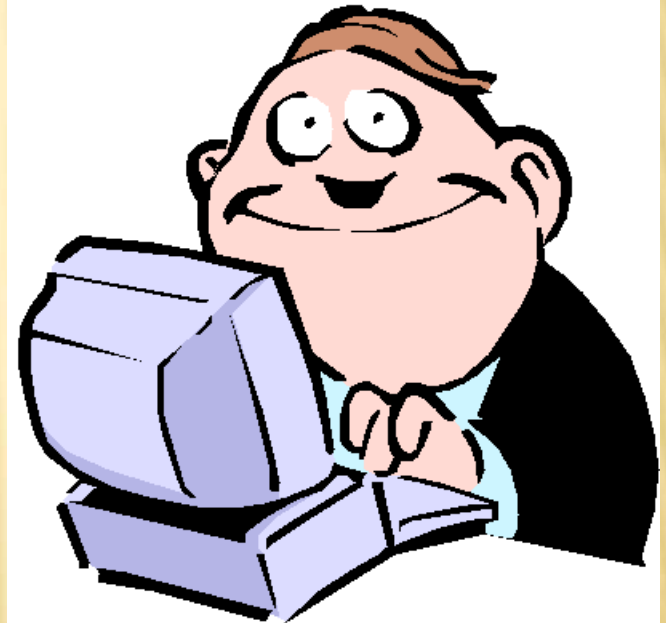
TN, AL, SC or FL credits



TENTATIVE LOCATIONS & DATES

- Cumming – May 3
- Valdosta – June 14
- Savannah - July
- Byron (near Macon) – August
- Newnan - September
- St Simons Island – October
- Roswell – November
- Augusta – December

**I can earn many types
of credits at one
training!**



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