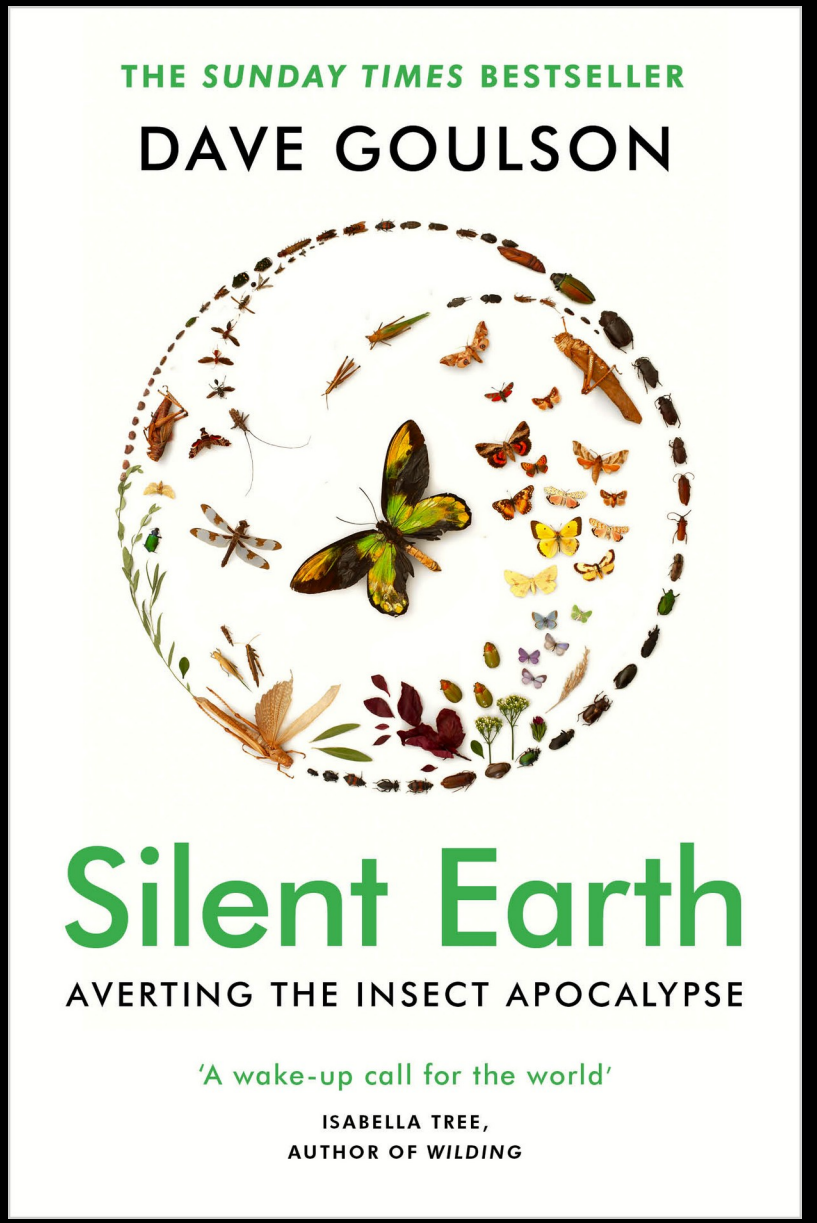
Pollinators & Pesticides





University of Sussex
@DaveGoulson








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Your produce choices
without bees



Hallmann, CA, 2017.
PlosONE 12: e0185809.

The author of THE SEA AROUND US *and* THE EDGE OF THE SEA *questions our attempt to control the natural world about us*

SILENT SPRING

Rachel Carson





Pesticides

3 million tons / yr globally and rising…

Neonicotinoids

25% of global insecticide market

Clothianidin
Thiamethoxam
Thiacloprid
Imidacloprid
Acetamiprid
Nitenpyram



Mainly used as seed dressing on arable crops.

Also sprayed on top fruit, soft fruit, and as a soil drench or granular formulation for turf / pasture.

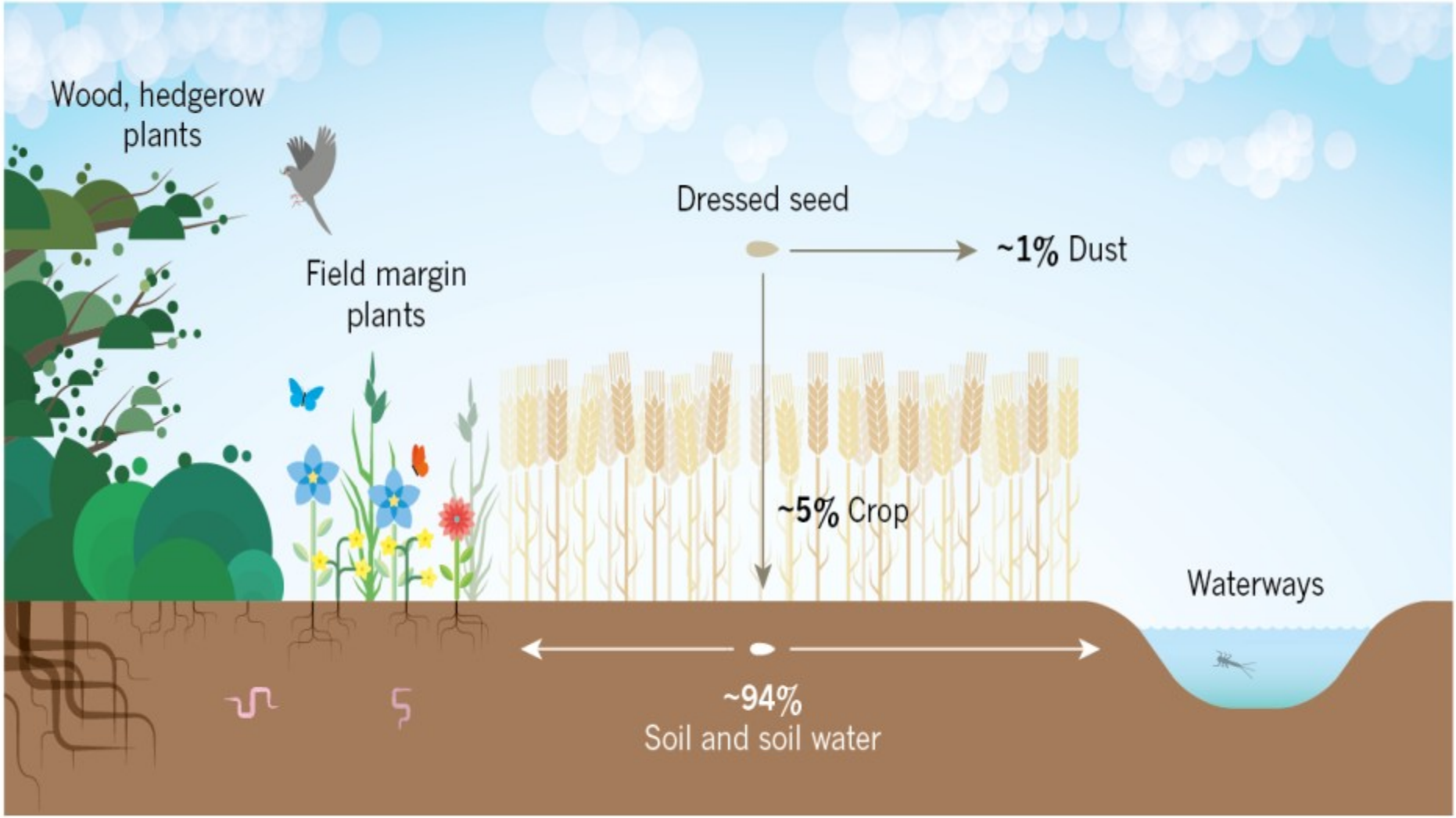


Toxicity

Compound	LD50 in honeybees
Imidacloprid	4 ng/bee (≈ clothianidin ≈ thiamethoxam)
Cypermethrin	160 ng/bee
Dimethoate	191 ng/bee
DDT	27,000 ng/bee



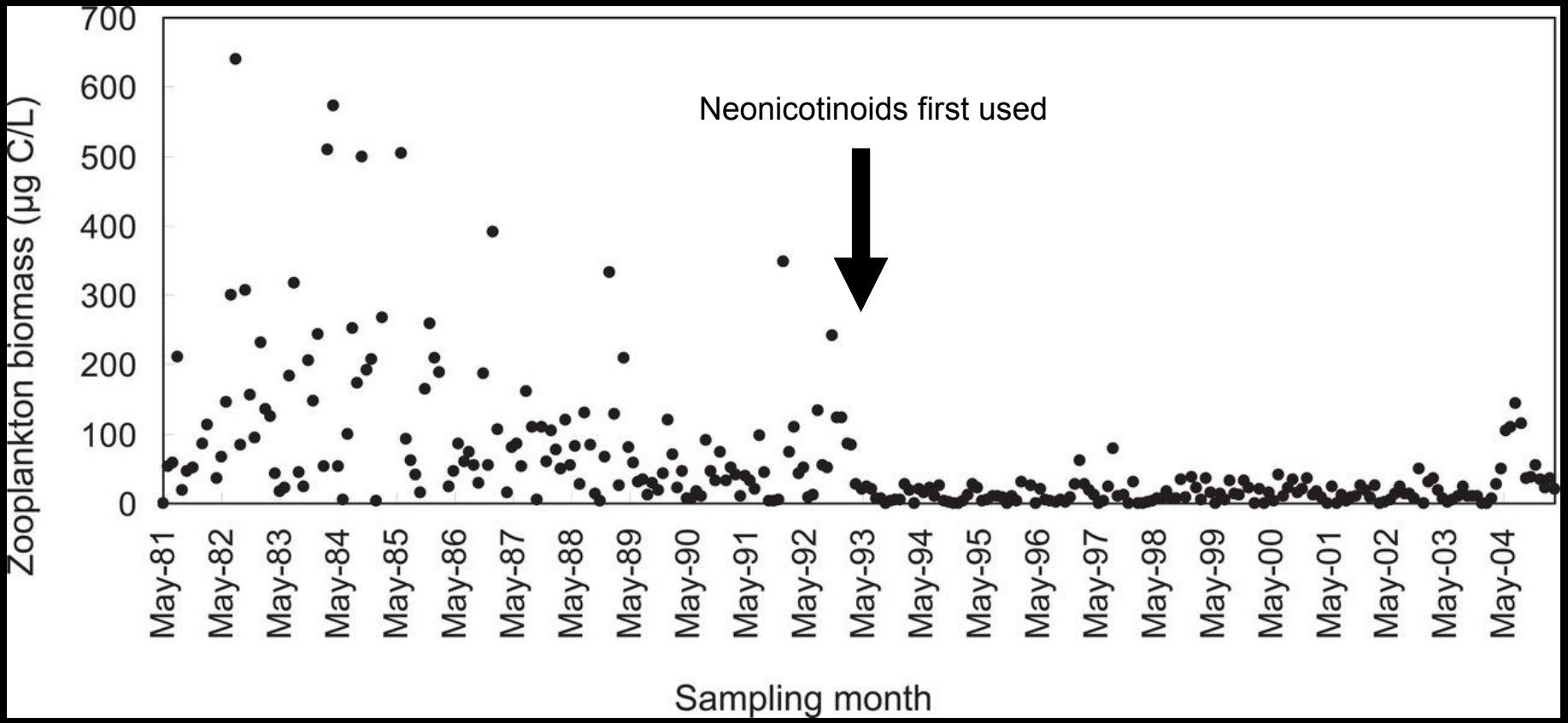
Environmental fate of neonic seed dressings



Goulson, D. 2014. *Nature*, doi:10.1038/nature13642

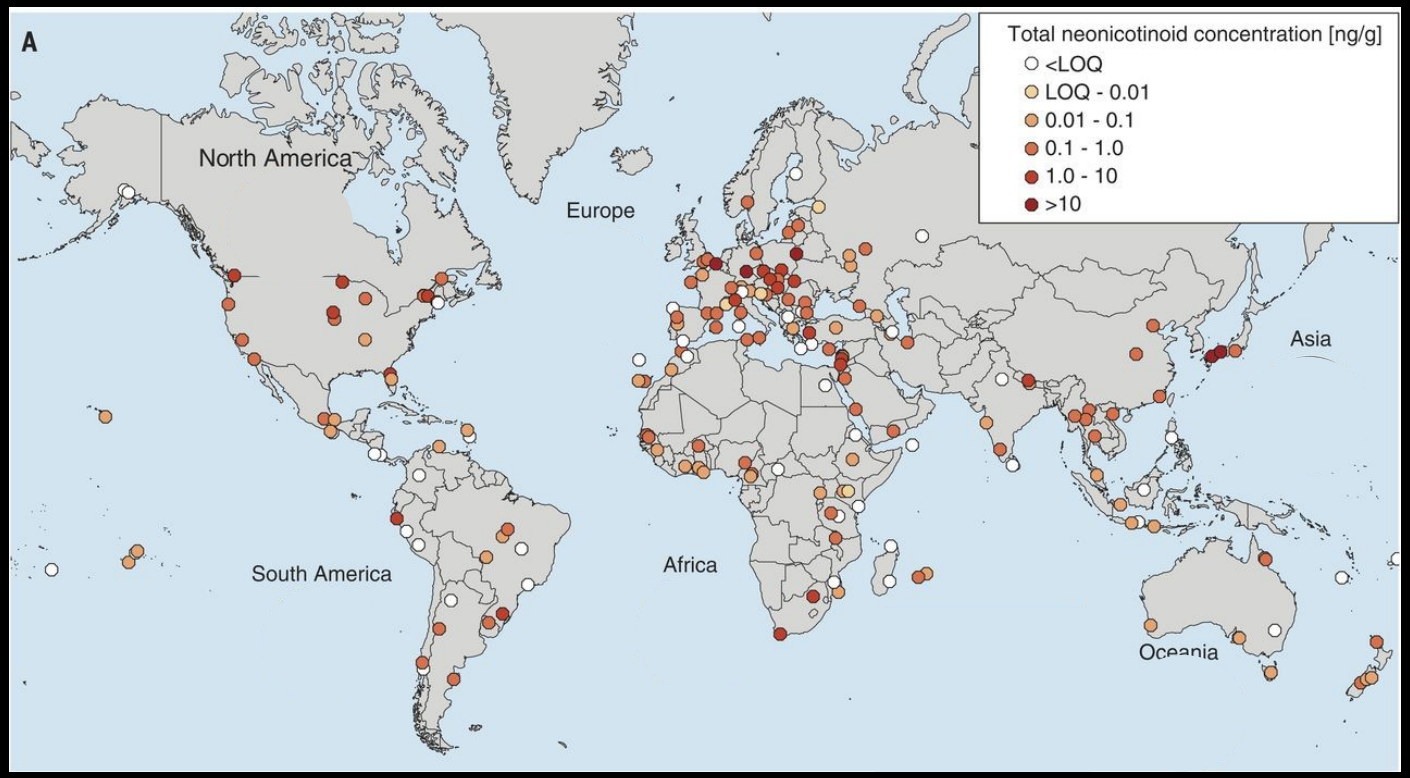
Zooplankton in Lake Shinji, Japan





Yamamuro et al. 2019 Science 366: 620-623

Neonicotinoid insecticides in honey





Mitchell et al. 2017 Science 358: 109-111





Whitehorn et al, *Science* 2012



Simulated bumblebee nest being near rape field:

Dosage: Imidacloprid, 0.7ppb in nectar, 6ppb in pollen

Fed bumblebee nests for 2 weeks on:

a) Nectar, pollen (control)

b) Nectar, pollen + field realistic imidacloprid (low)

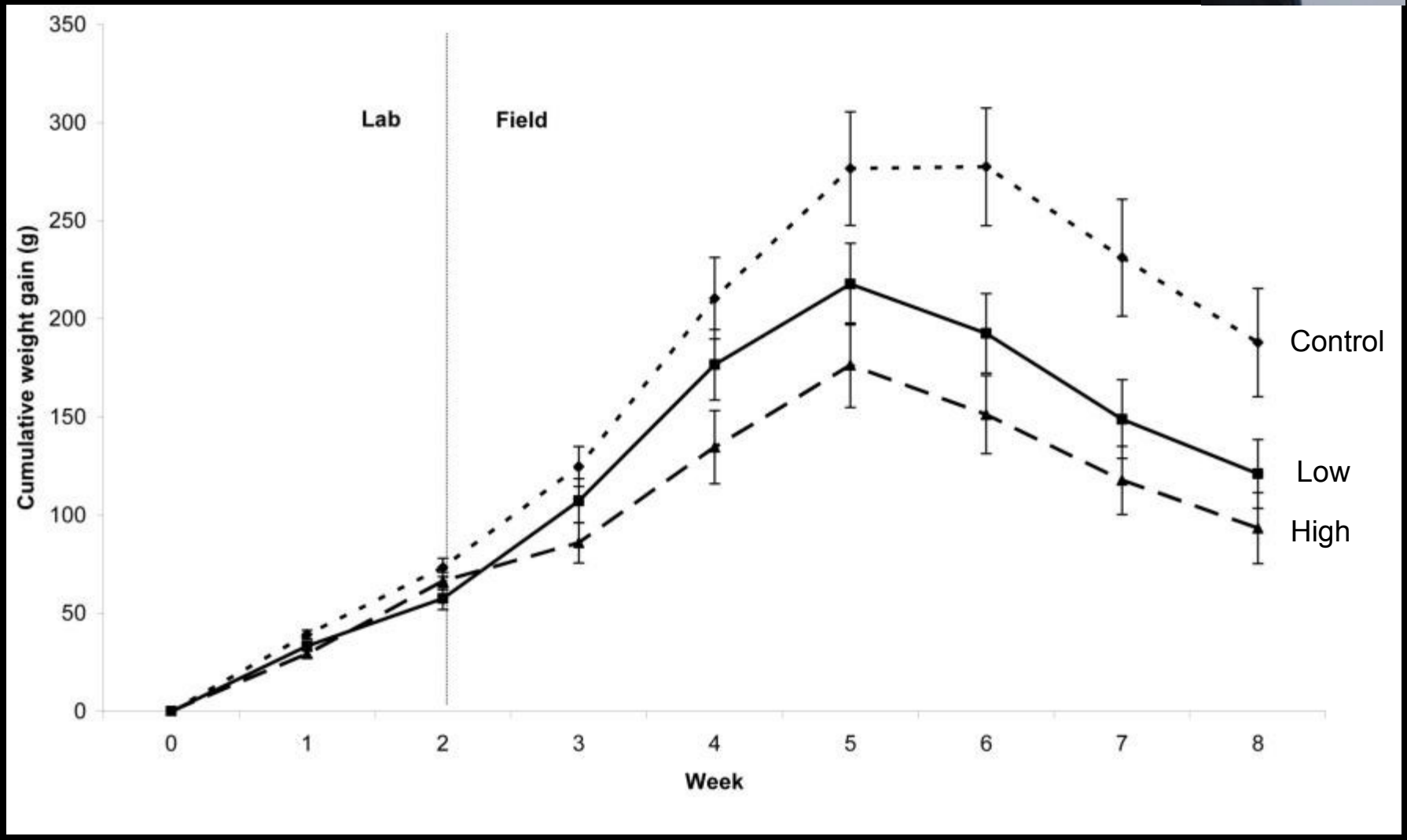
c) Nectar, pollen + 2 x field realistic imidacloprid (high)

After 2 weeks, nests placed in the field…..



Whitehorn et al, *Science* 2012

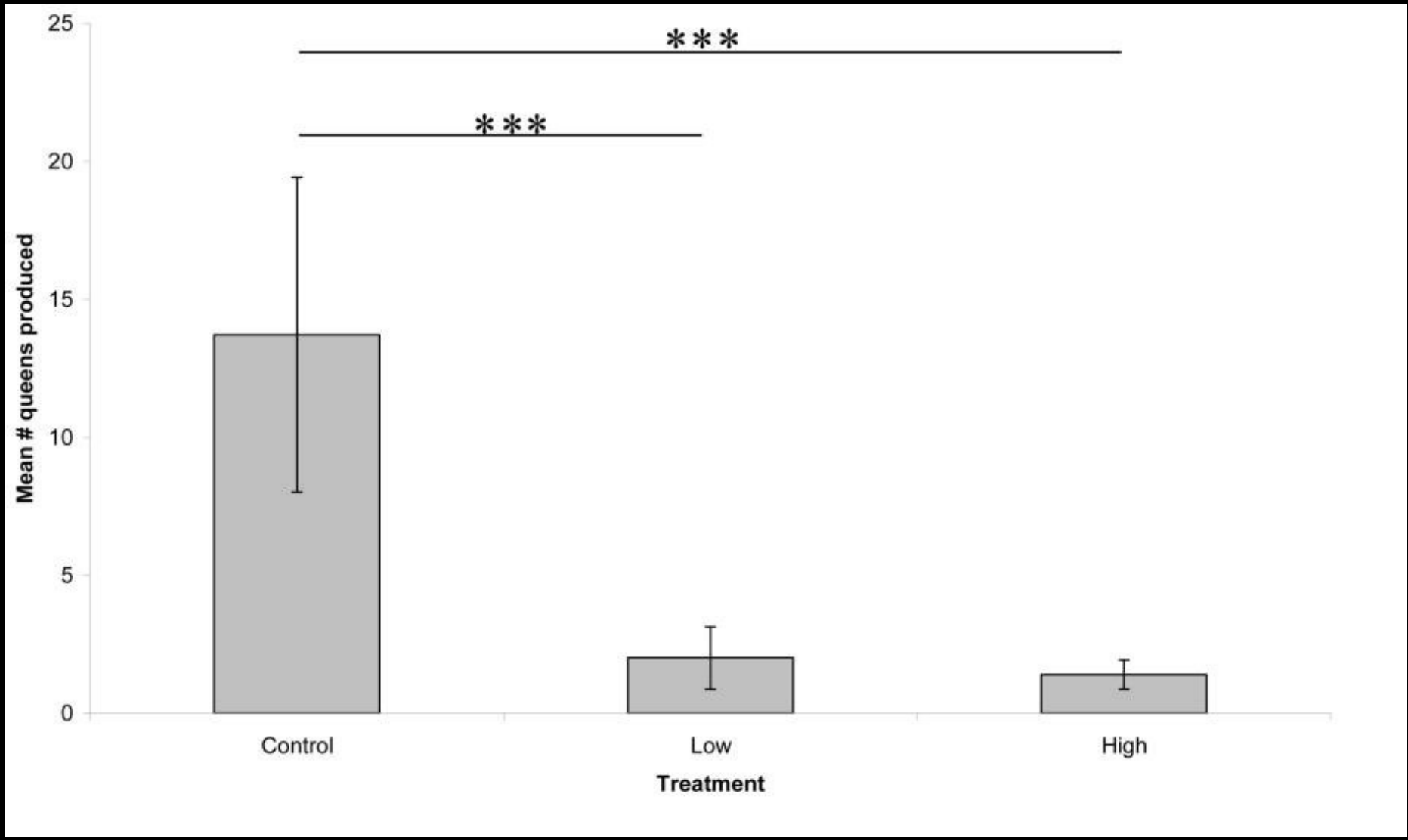






Whitehorn et al, *Science* 2012





Neonicotinoid usage/ pollution levels strongly correlate with:

- Declines in diversity and abundance of aquatic invertebrates in Netherlands - Van Dijk et al. (2012)
- Rates of insectivorous bird decline in Netherlands - Hallmann et al. (2014)
- Frequency of death of honeybee colonies in UK - Budge et al. (2015)
- Rates of decline of UK wild bees Woodcock et al. (2016)
- Rates of decline of farmland butterflies in UK & California, Gilburn et al. (2015); Forister et al. 2016.











YouTube



Talk: The plight of insects, and how you can help (May...

3.5K views • 5 months ago

