Neonicotinoid insecticides Impact Bees, Insects, Birds - the wider ecology

Bees pollinate 30%of all our food

Most wildflowers pollinated by bumblebees

Apples pollinated by bumblebees
All species of bumblebee are declining.

Without bees, no: plums, pears, apples, squash, tomatoes,
peppers, berries, nuts or wildflowers -
most crops now are lethal to bees and pollinators

Without bees - all these foods could disappear - but all these crops contain neonics lethal to bees.

Global Pandemic of Bee Deaths

USA **10,000,000** colonies died since 2003

Argentina **1.6 million** colonies in 2008

France **1 million** hives died 1992-2000

Germany - **10,000** in one week, 2008

U.K. **30 - 50%** colonies annually

Italy - **10,000+** colonies - Po Valley

Australia - large scale losses in 2010

Common factor in all cases: Neonicotinoids

A Quantum Leap

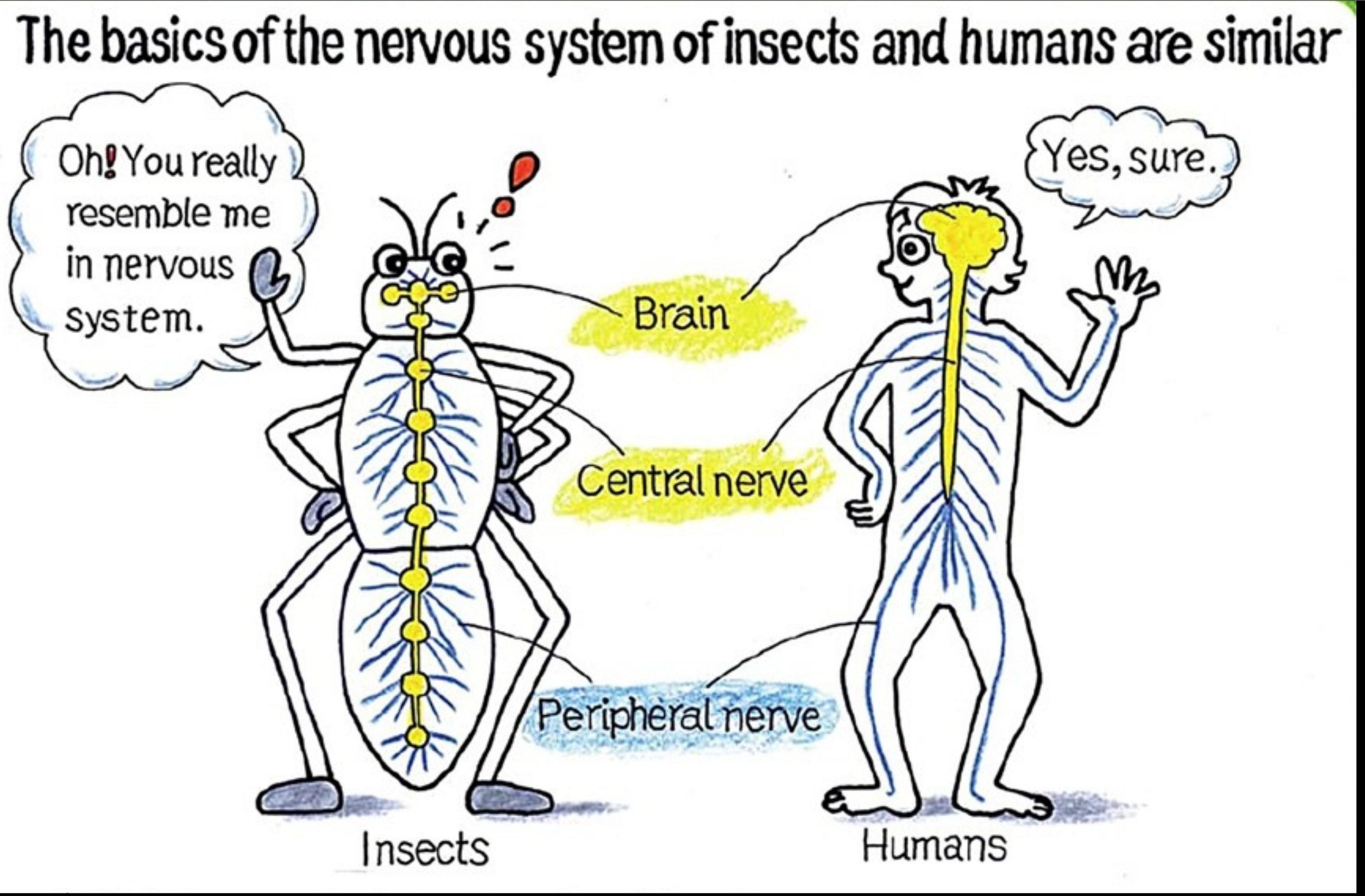
- **Systemic:** perfuse sap, leaves, nectar, pollen, fruit, grain
- **Neuro-toxic**: attack the nervous system & brain
- **Hyper-toxic**: 8,000 x more toxic to bees than DDT
- **Soluble**: migrate in water and persist in solution
- **Persist** in Soil: 1- 4 years average: 19 years (Clothian.)
- **Lethal to bees at 1-3ppb**; sub lethal at 0.1 ppb
- **Migrate** from crops into wild flowers on field margins.

- **Imidacloprid** -'Gaucho' 1992; **Clothianidin** - 2003
- **Thiamethoxam** - 'Cruiser' - 2010
- Used **PROPHYLACTICALLY** on 240 million acres in USA

Rising Toxicity of pesticides 1945-2003

Pesticide	Brand Name	Use	LD50 (ng/bee)	Toxicity DDT = 1
DDT	Dinocide	Insecticide	27,000.0	1
Amitraz	Apivar	Acaricide	12,000	2
Coumafos	Perizin	Acaricide	3,000	9
Taufluvalinate	Apistan	Acaricide	2,000	14
Metiocarb	Mesurol	Insecticide	230	117
Carbofuran	Curater	Insecticide	160	169
Lambda-cyhalothrin	Karate	Insecticide	38	711
Deltamethrin	Decis	Insecticide	10	2,700
Thiametoxam	Cruiser	Insecticide	5	5,400
Fipronil	Regent	Insecticide	4.2	6,429
Clothianidin	Poncho	Insecticide	4.0	6,750
Imidacloprid	Gaucho	Insecticide	3.7	7,297

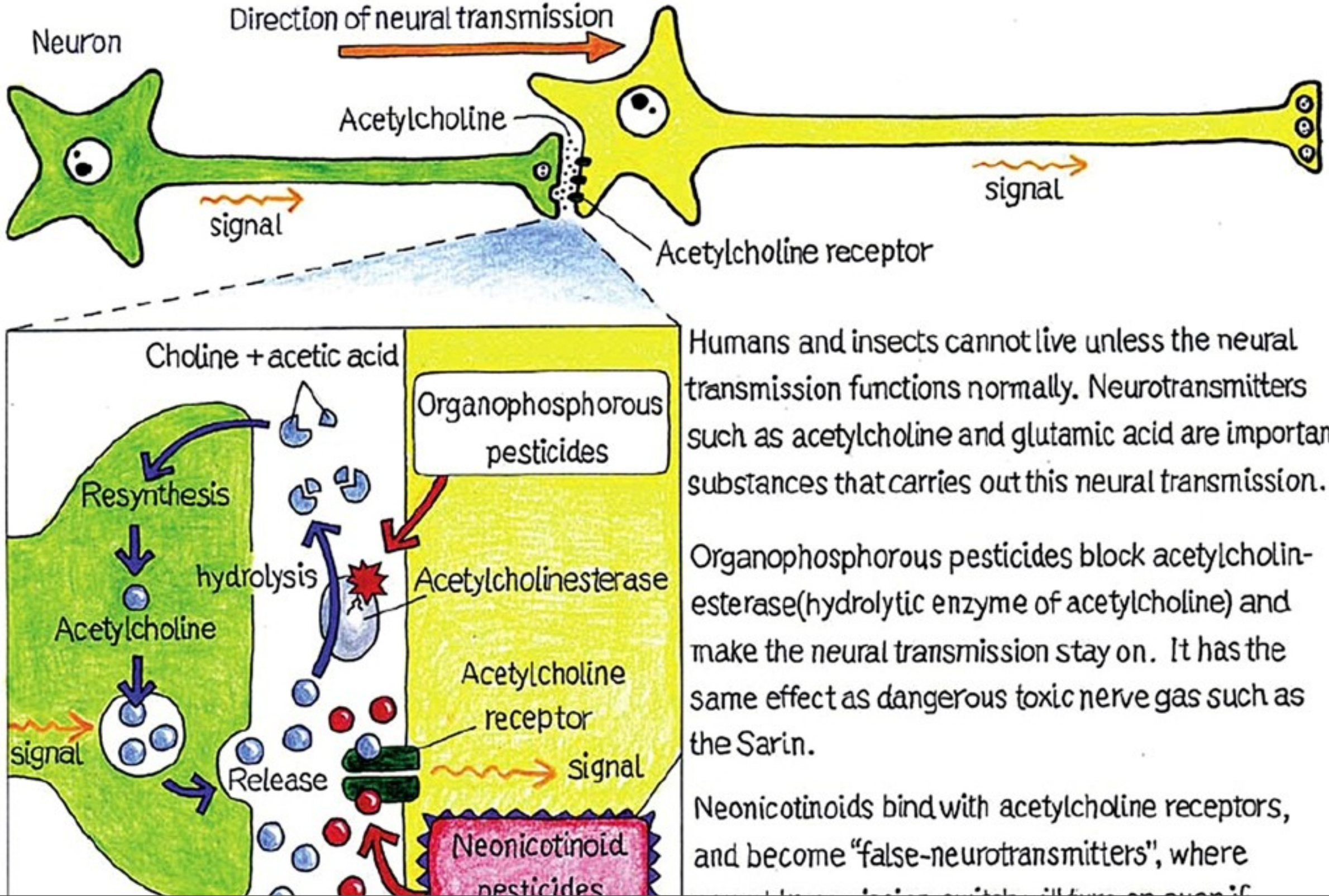
Source: Dr. J.M. Bonmatin, CNRS (France)



"Neonicotinoids attack neural synapses:
Cumulative: more exposure - more damage
Irreversible- damage is permanent

Neonicotinoid / Organophosphorous pesticides disrupt the neural transmission

Neural transmission mechanism through acetylcholine



Humans and insects cannot live unless the neural transmission functions normally. Neurotransmitters such as acetylcholine and glutamic acid are important substances that carries out this neural transmission.

Organophosphorous pesticides block acetylcholinesterase(hydrolytic enzyme of acetylcholine) and make the neural transmission stay on. It has the same effect as dangerous toxic nerve gas such as the Sarin.

Neonicotinoids bind with acetylcholine receptors, and become "false-neurotransmitters", where

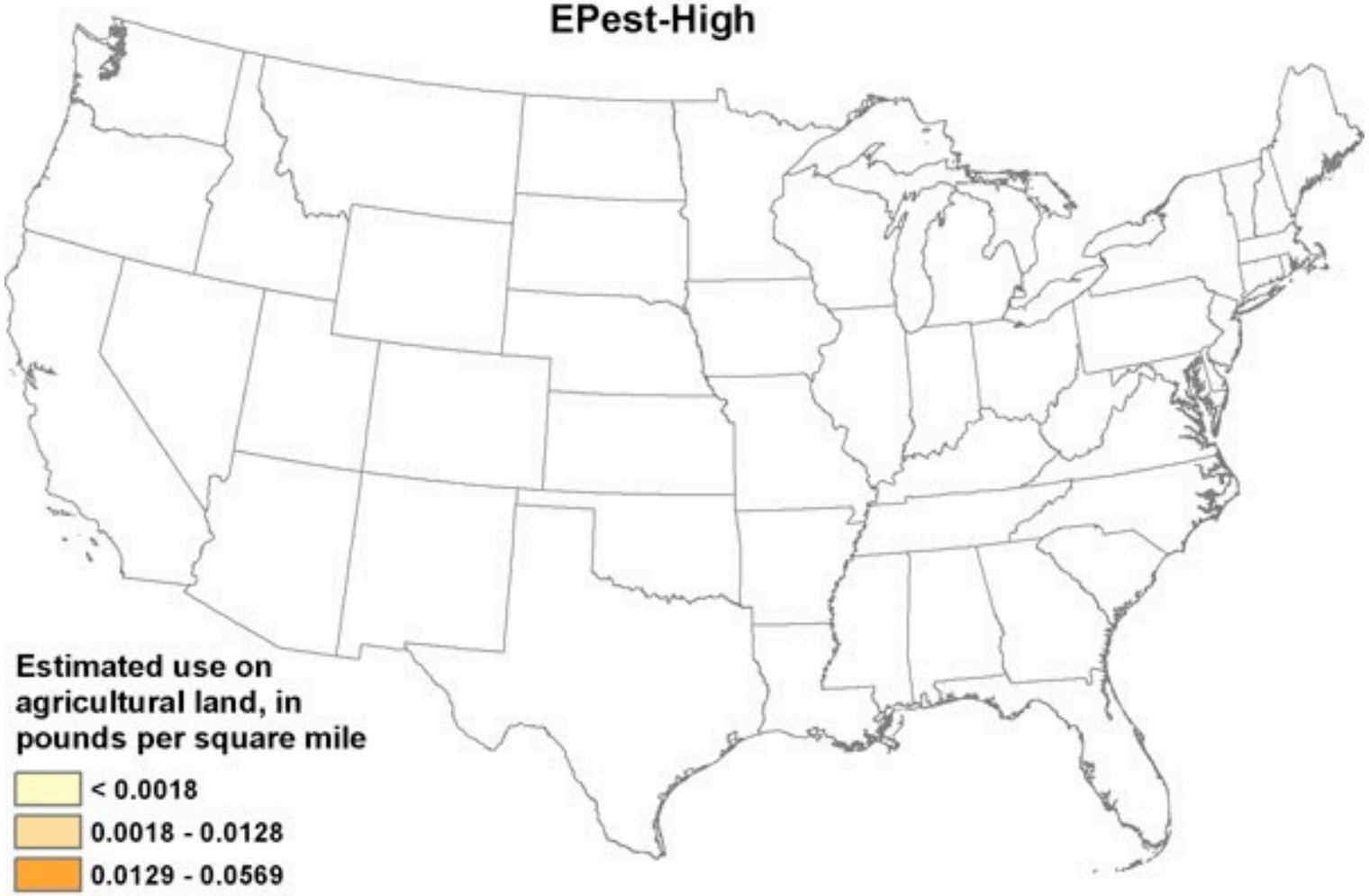
20,000 species of wild bees

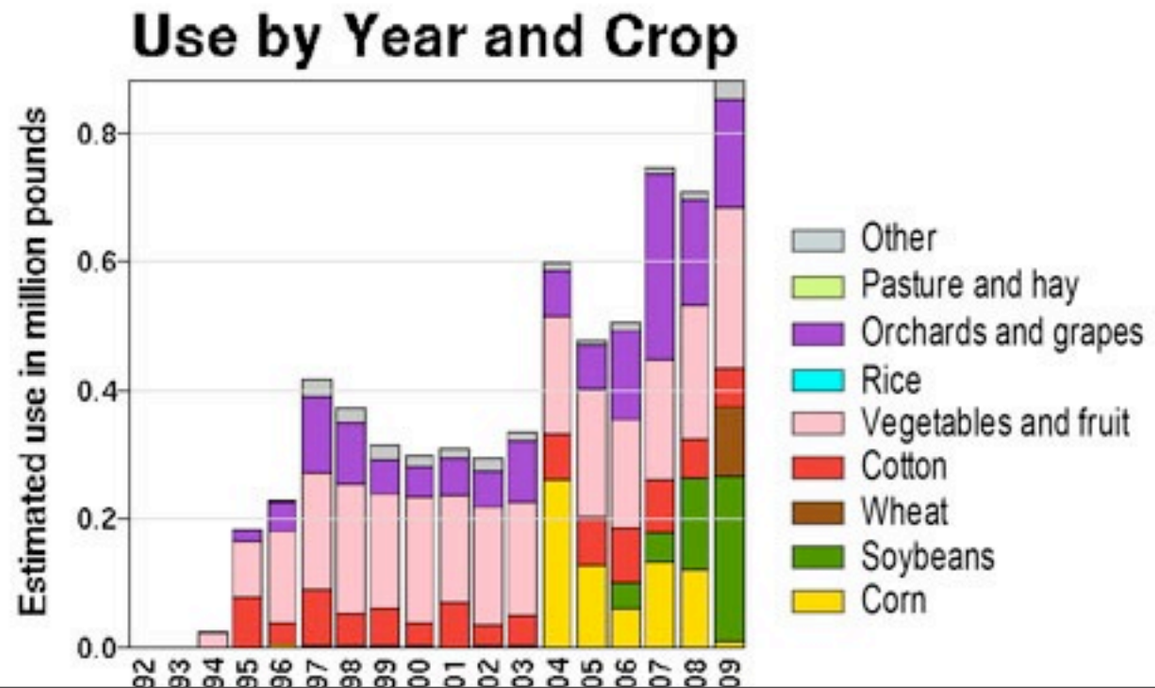
Mountain flora pollinated by bumblebees or native pollinators; too cold for honeybees

Berries, nuts, wild fruits
feed: birds, mice, deer in winter.
Entire wild-food chain endangered

Estimated Agricultural Use for Imidacloprid , 1993

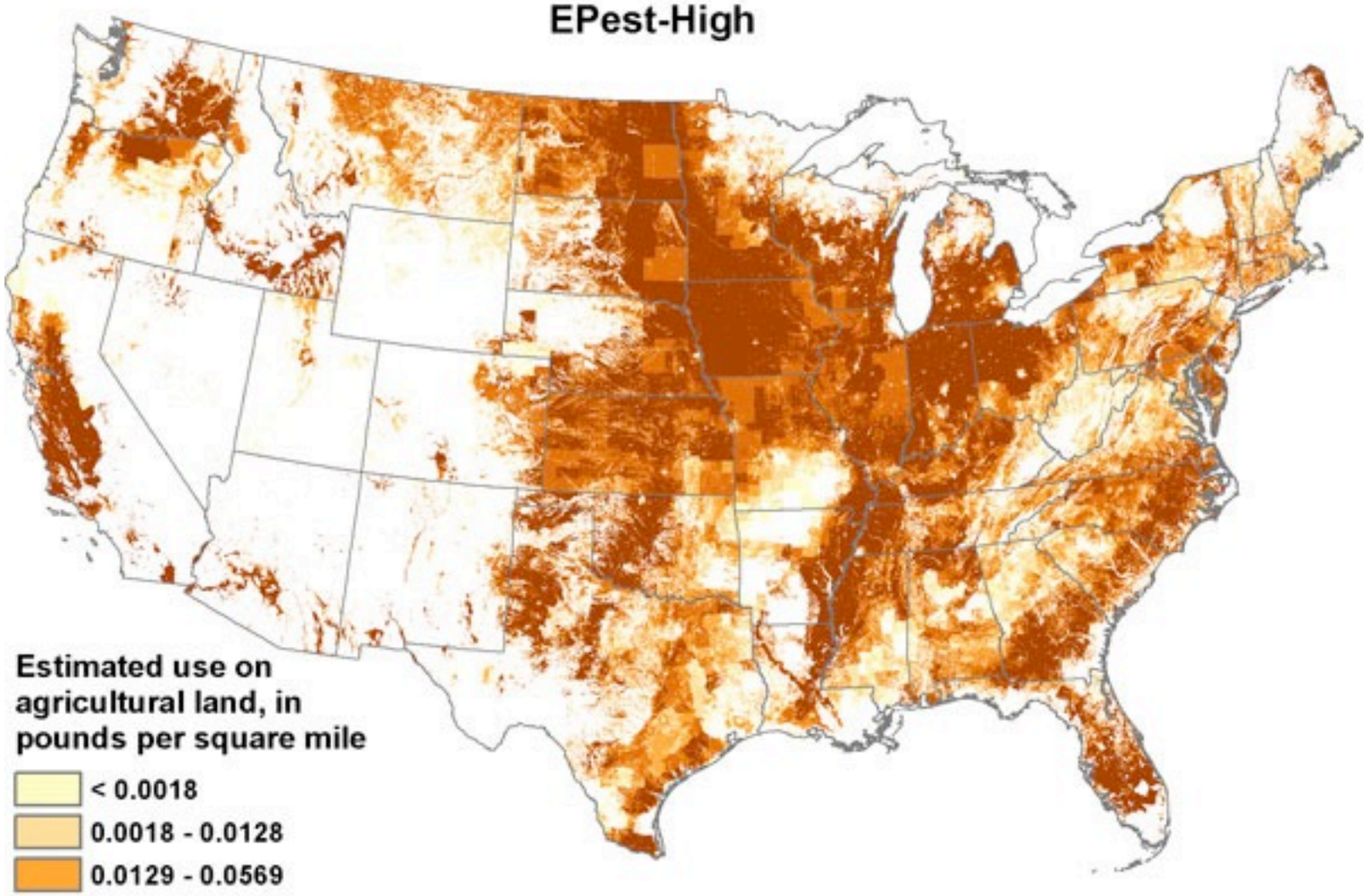
EPest-High



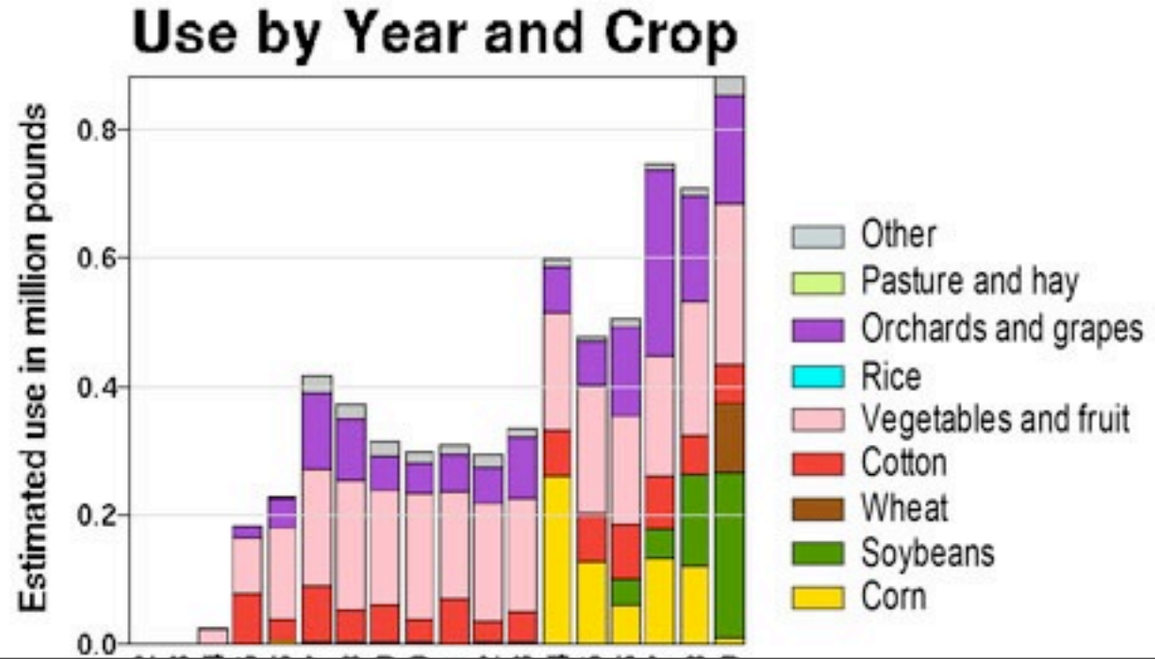


Estimated Agricultural Use for Imidacloprid , 2009

EPest-High

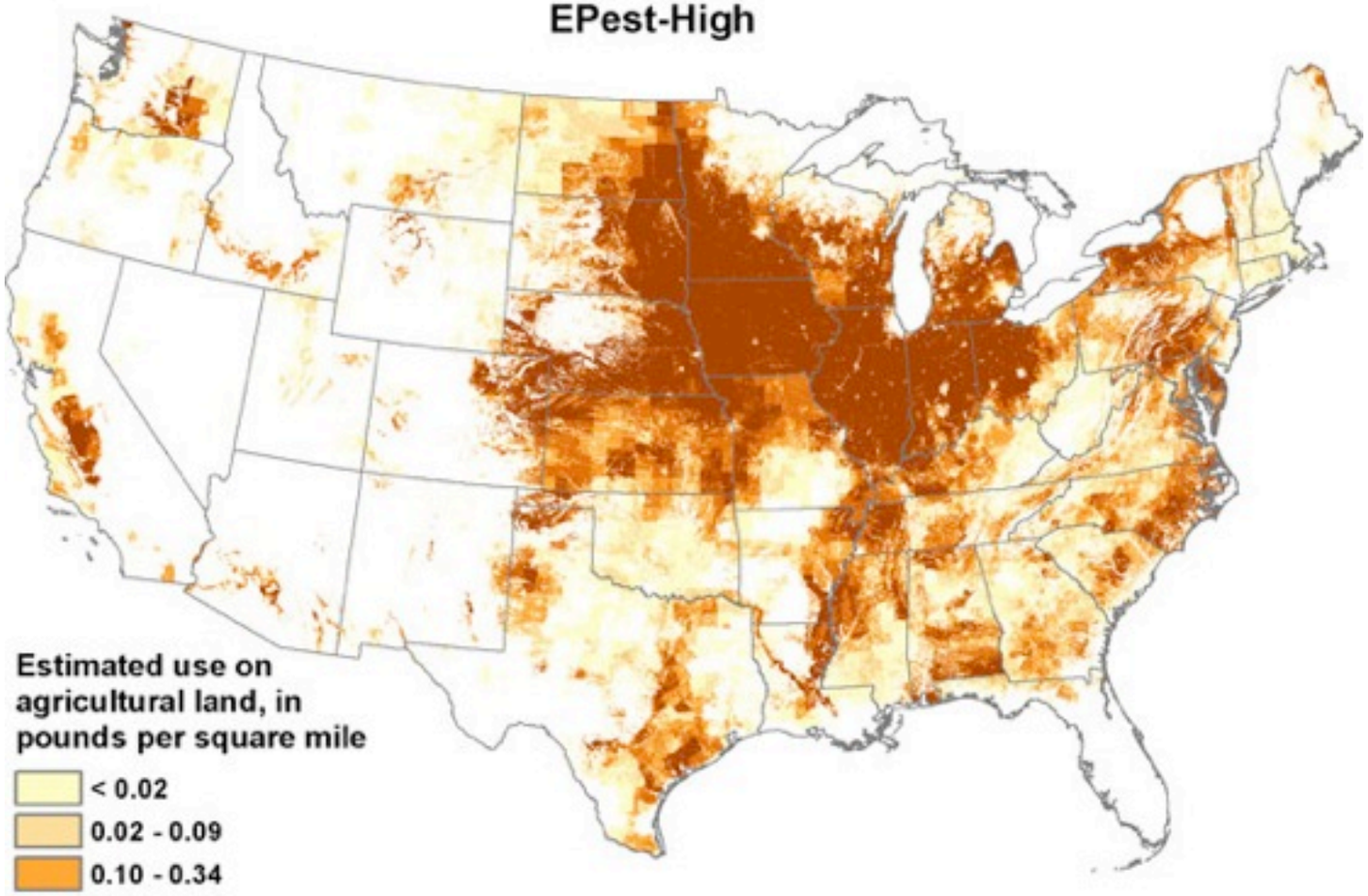


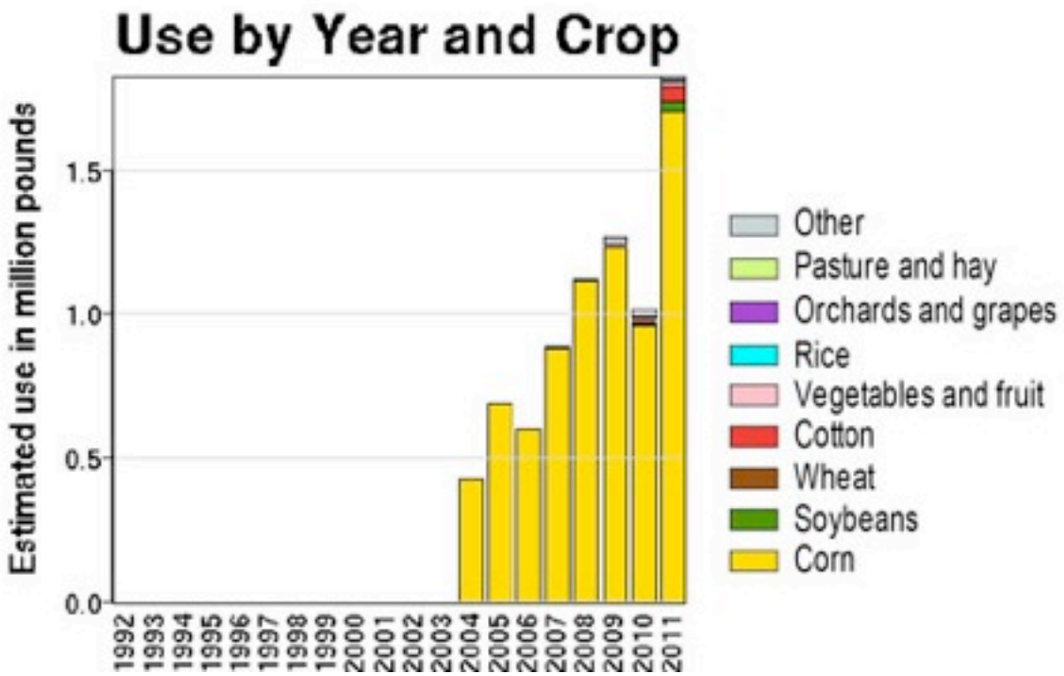
Use by Year and Crop



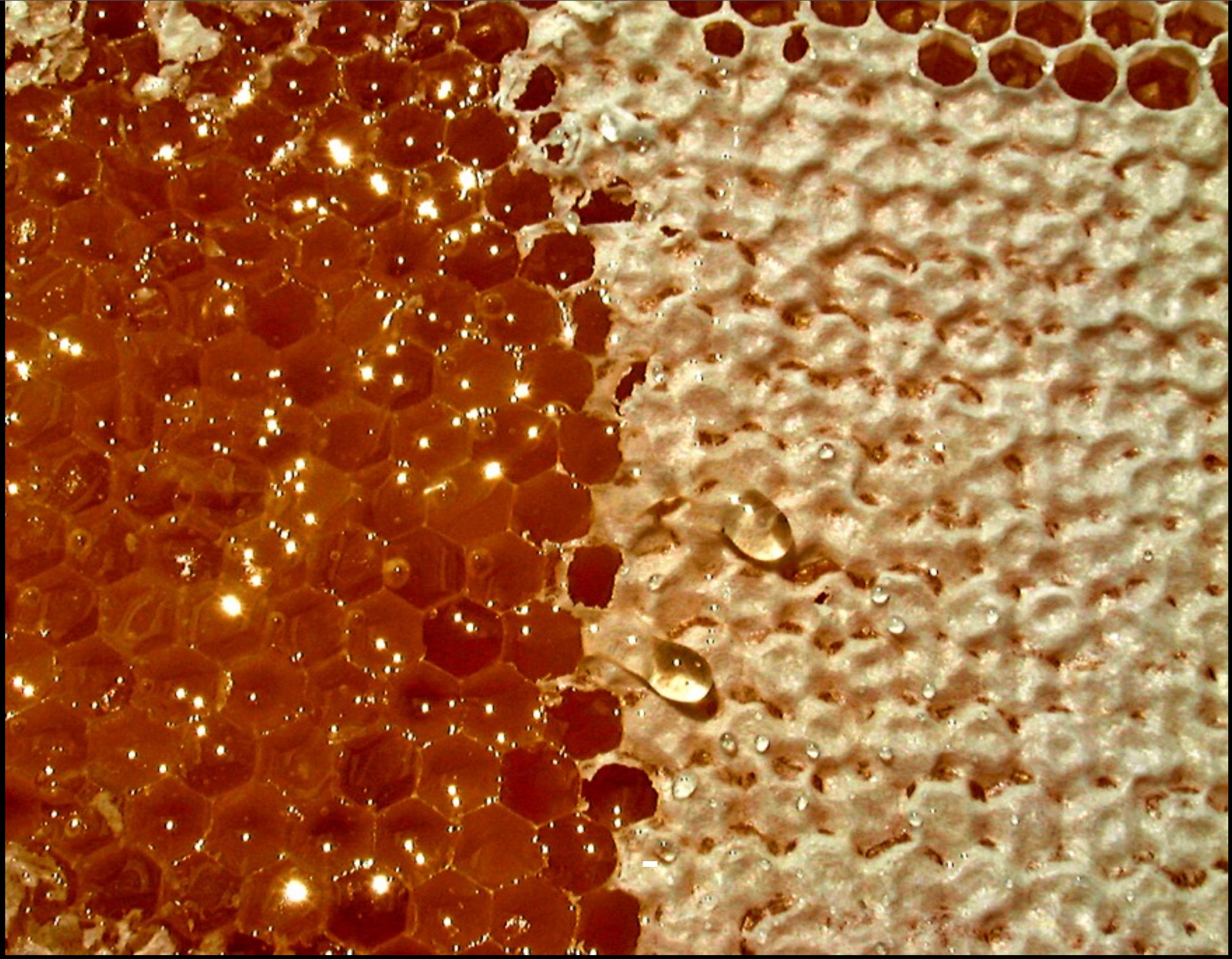
Estimated Agricultural Use for Clothianidin , 2011

EPest-High





From 1994 -2001 my bees were healthy;
I did not live near industrial mono-cultures of wheat
barley, corn, maize or oilseed rape (canola)



‘Ambrosia’

Honey is a ‘Perfect’ food

The Last Honey Harvest
10 kg from ten hives in 2006
it *should* have been 200kg

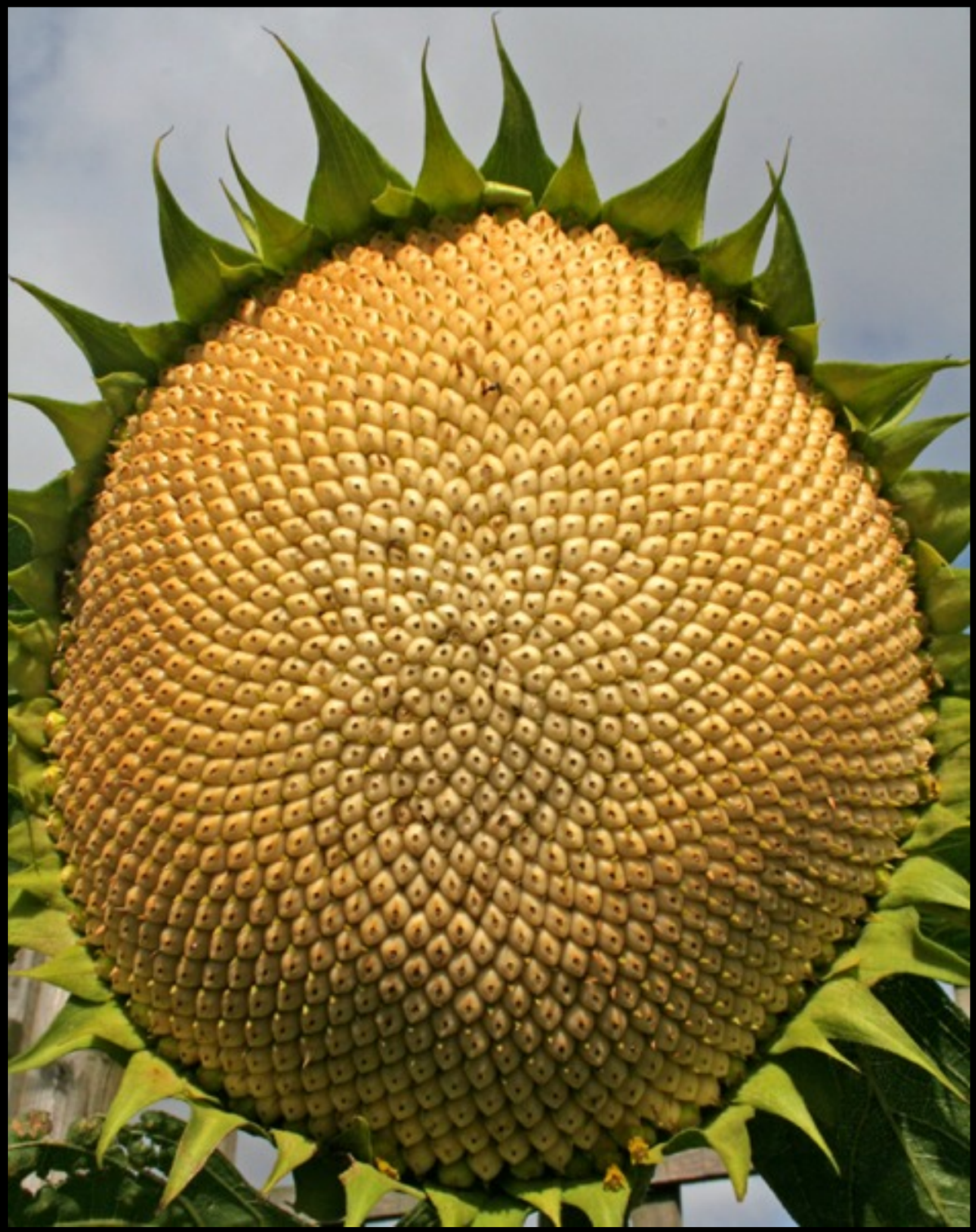
Female workers live 6 weeks

Individual Immune system is weak:

Social immune system is strong

Neonics destroy social behaviour

Queen should live 3 years; lays 1500 eggs per day
Eats her own weight each day - including pesticide
Damaged by slow, chronic, sub lethal poisoning.



Sunflower Oil Seeds

Every seed pollinated by a bee

Every seed may be toxic

240 million acres of US crops treated with neonics
Corn, wheat, canola, cotton, berry & orchard fruits,

Oilseed rape and barley near my home.
All treated with neonicotinoids -
Wildflowers killed with Herbicide
Ecological desert for bees & wildlife

36 different pesticides in wax and pollen

Average: 4 pesticides in any pollen load

Bees are swimming in an **OCEAN of poison**

Toxic Pollen stored in the comb

Consumed over many, many months

No testing for chronic or sub lethal effects

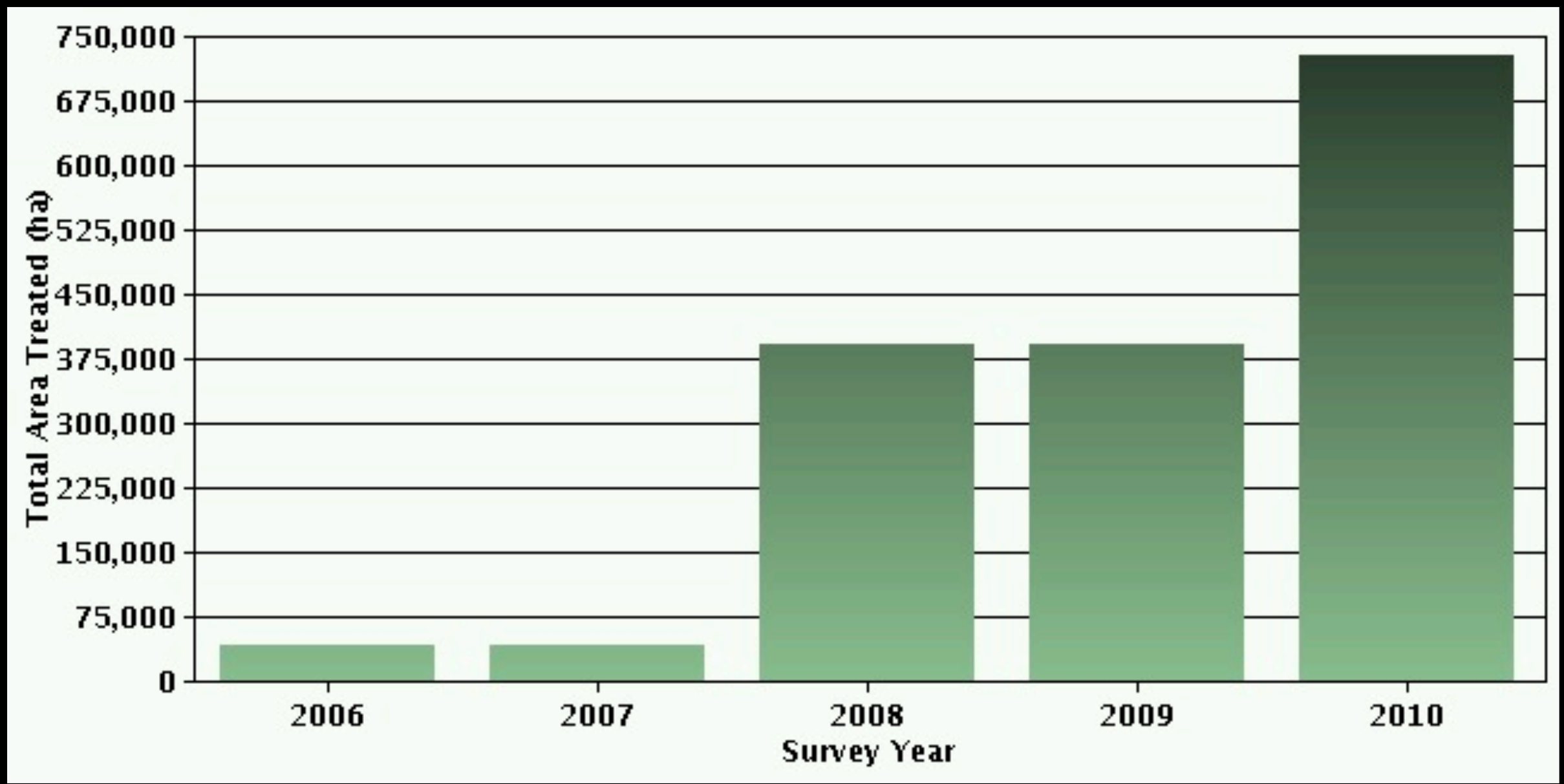
1994: French Sunflowers treated with Imidacloprid;

1, 000,000 bee colonies died

France banned neo-nics in 2000. EU banned in 2013

No ban in USA, UK ….

Clothianidin replaces Imidacloprid: 2006-2010



Systemic: present in roots, sap, stem, leaves, flower, nectar, pollen

Highly toxic to bees - approx 7,000 times more toxic than DDT

Highly persistent in some soils: - Half Life of 19 years on clay soils (EPA)

Leaches into ground water and surface water - highly persistent in water

REGULATORY CAPTURE

In 2003, America's EPA licensed *Bayer's Clothianidin* to be used on corn and oilseed rape. But the EPA's OWN scientists had advised AGAINST registration:

"Clothianidin is highly toxic to honey bees on contact Potential for toxic chronic exposure to bees through nectar and pollen.

Effects of this toxic chronic exposure may include lethal and/or sub-lethal effects in the larvae and reproductive effects in the queen."

"Clothianidin is a systemic insecticide that is persistent and mobile . . . . and has potential to leach into ground water, as well as run-off to surface waters."

Clothianidin was licensed ILLEGALLY -
IT NEVER MET THE CONDITIONS FOR LICENSING

‘The Staff of Life’ now contains Neurotoxins

We all now have an “Acceptable Daily Intake”

Neonicotinoids; Lethal to insects, birds & humans?

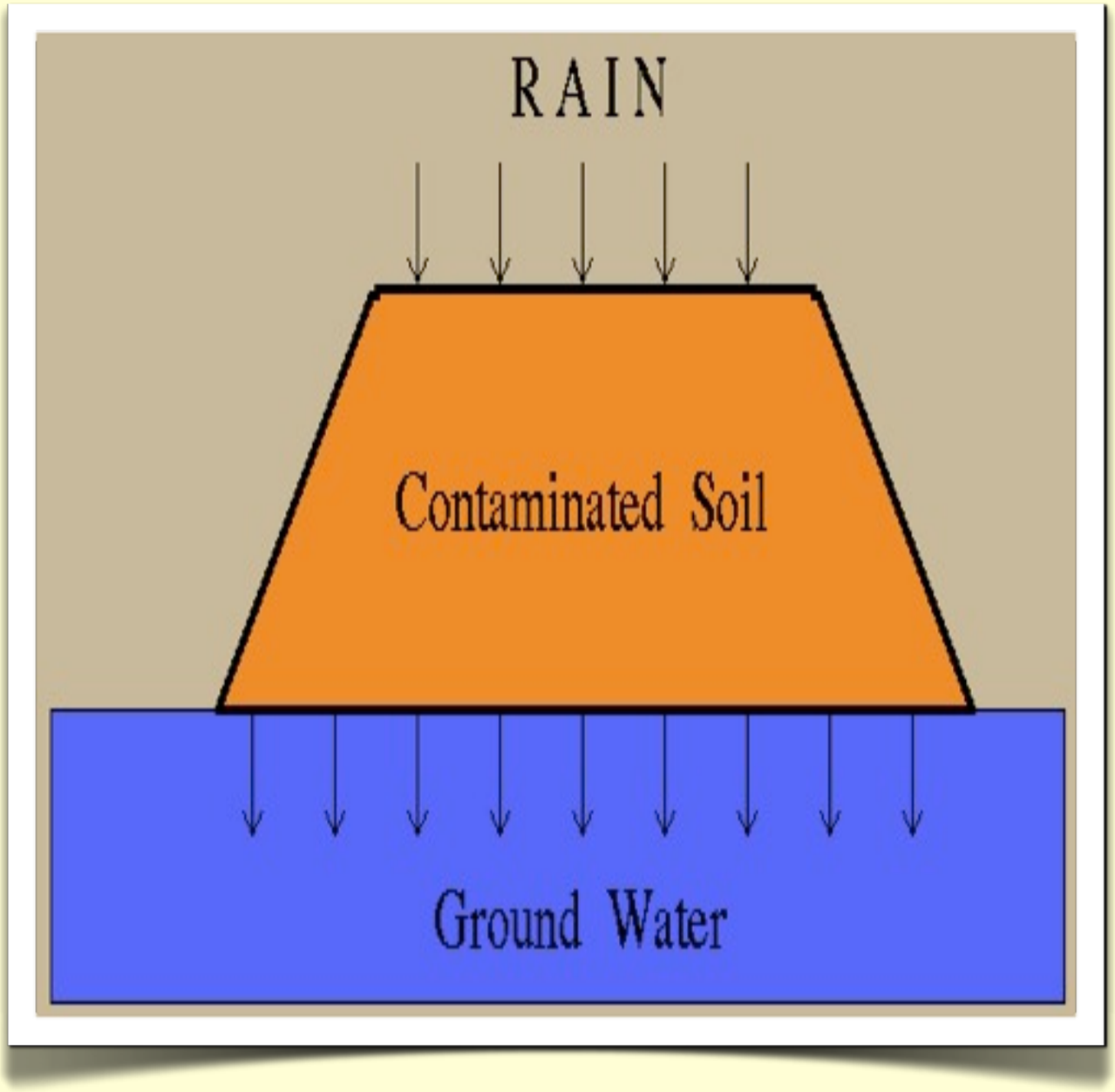
Billions of Dutch tulips exported to UK, USA
All poisonous to bees - Neonicotinoids

Almost all garden centre plants laced with Neonics.
Lawns, Golf Courses, Playing Fields

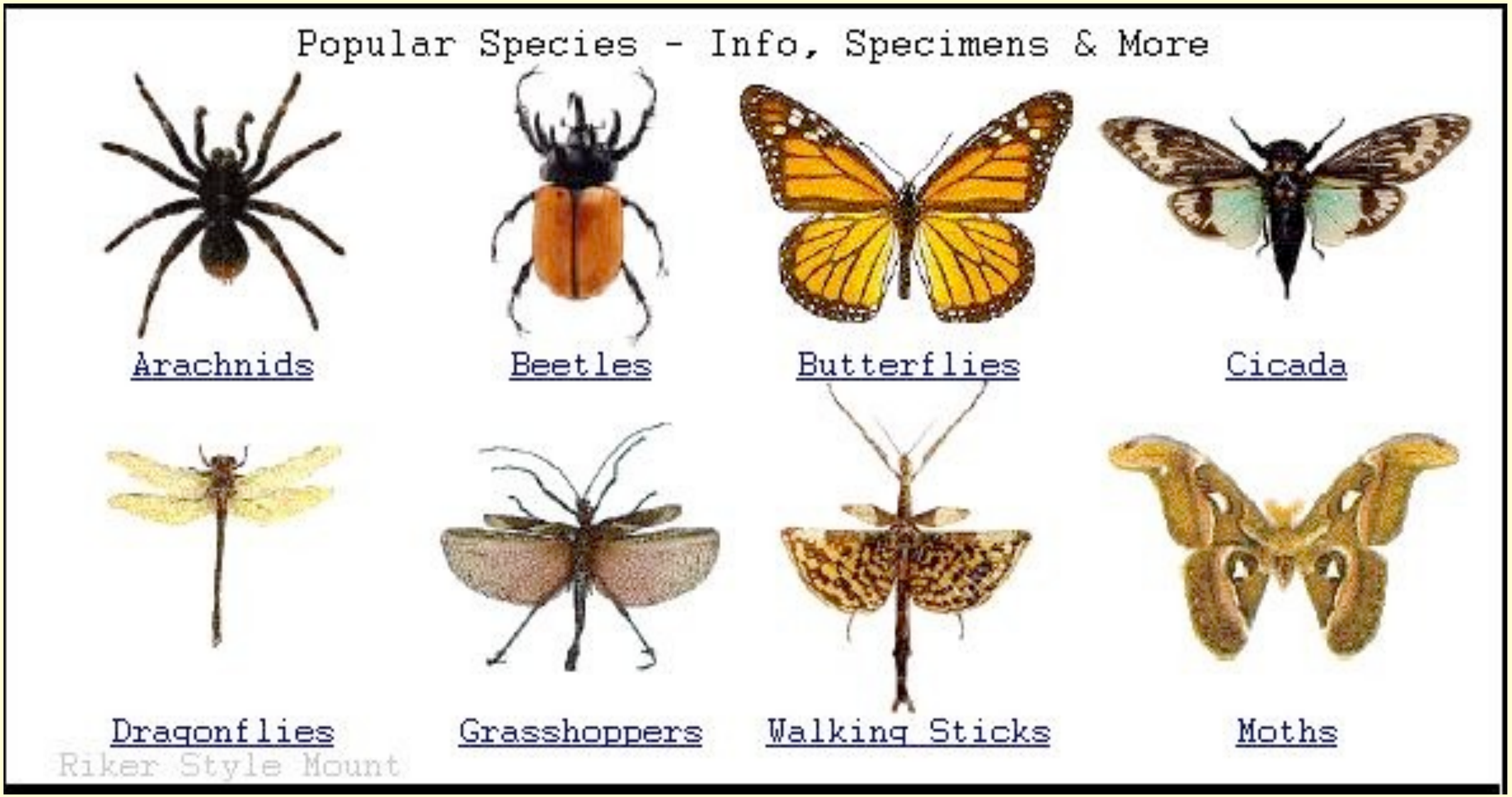
Imidacloprid is persistent and mobile in soil & prone to leaching

- Imidacloprid has potential to leach to ground water. In addition, high solubility and mobility are concerns for transport to surface water by dissolved runoff

- Imidacloprid is persistent in soil. The shortest half-life was 107 days in turf-covered soil in Georgia, but in Minnesota corn field soil the imidacloprid concentration did not decline for one year after treatment

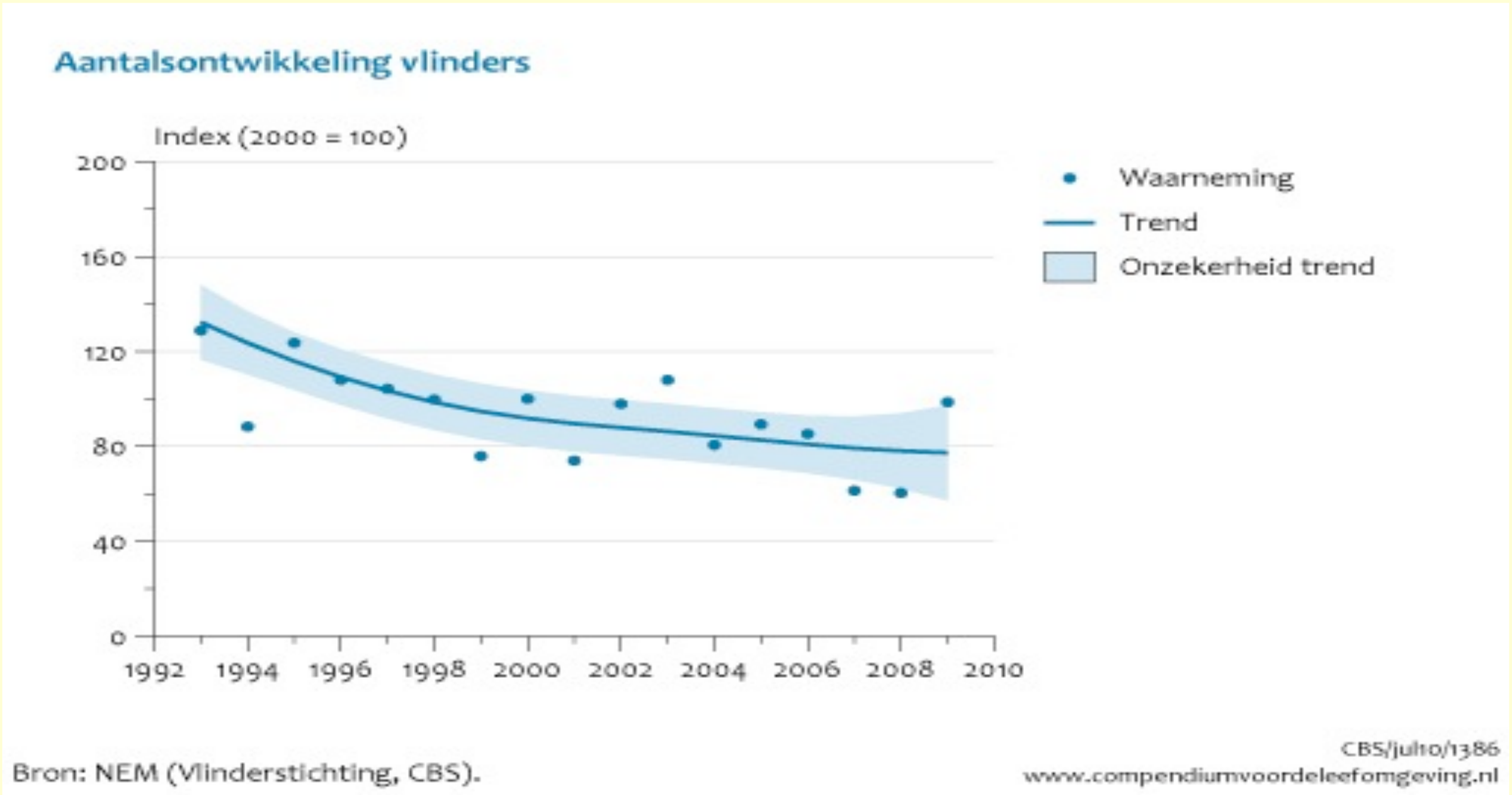


Toxicity of neonicotinoid insecticides to Arthropods



Holland: **Strong decline of butterflies** since the introduction of neonicotinoid insecticides

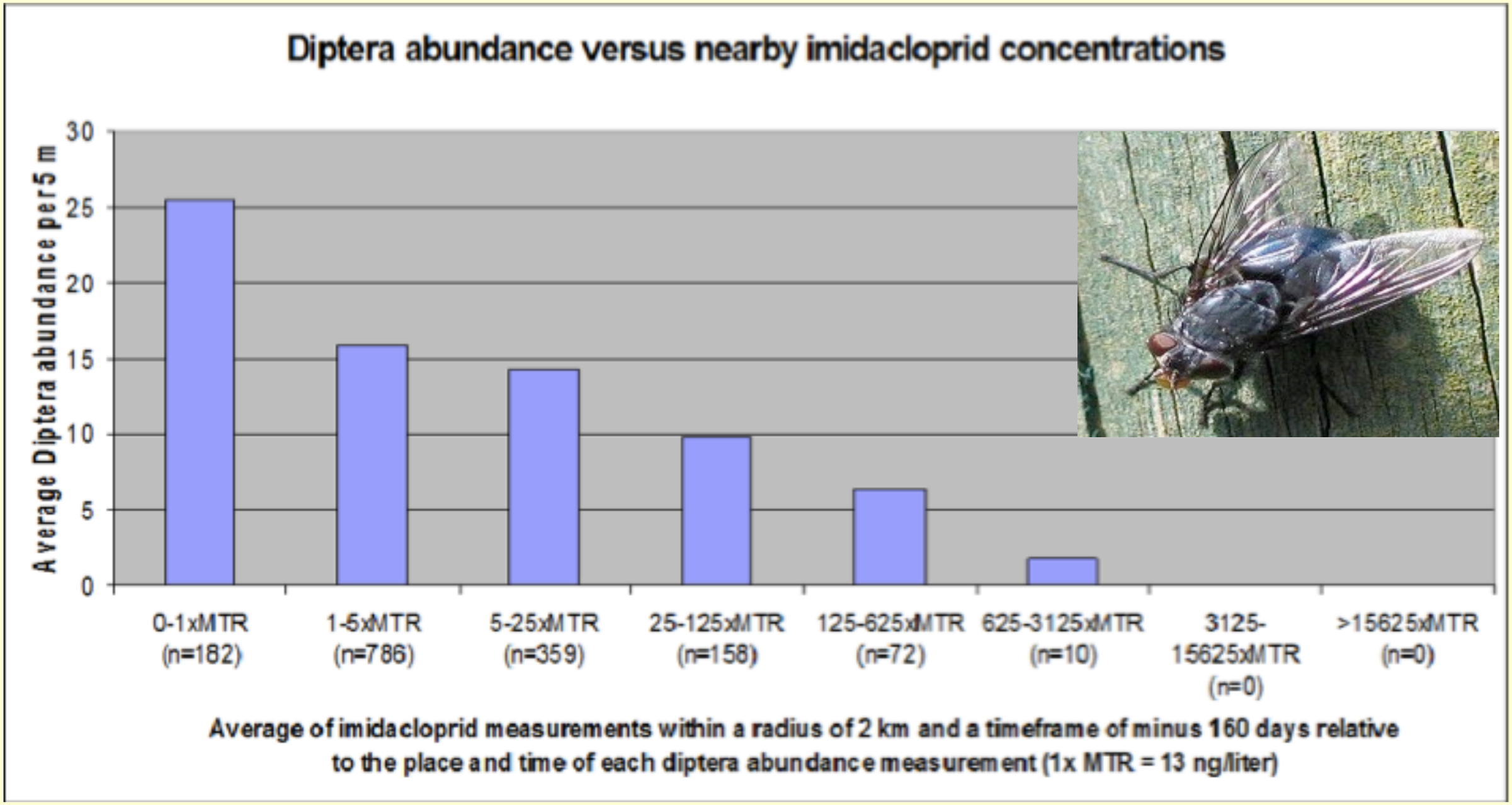
Netwerk Ecologische Monitoring (Vlinderstichting, CBS)



Bron: NEM (Vlinderstichting, CBS).

Surface water contamination with Imidacloprid correlates with a reduced Diptera (Flies & Midges) Abundance

van Dijk, T., M.Sc. Thesis, Utrecht University, Juli 2010



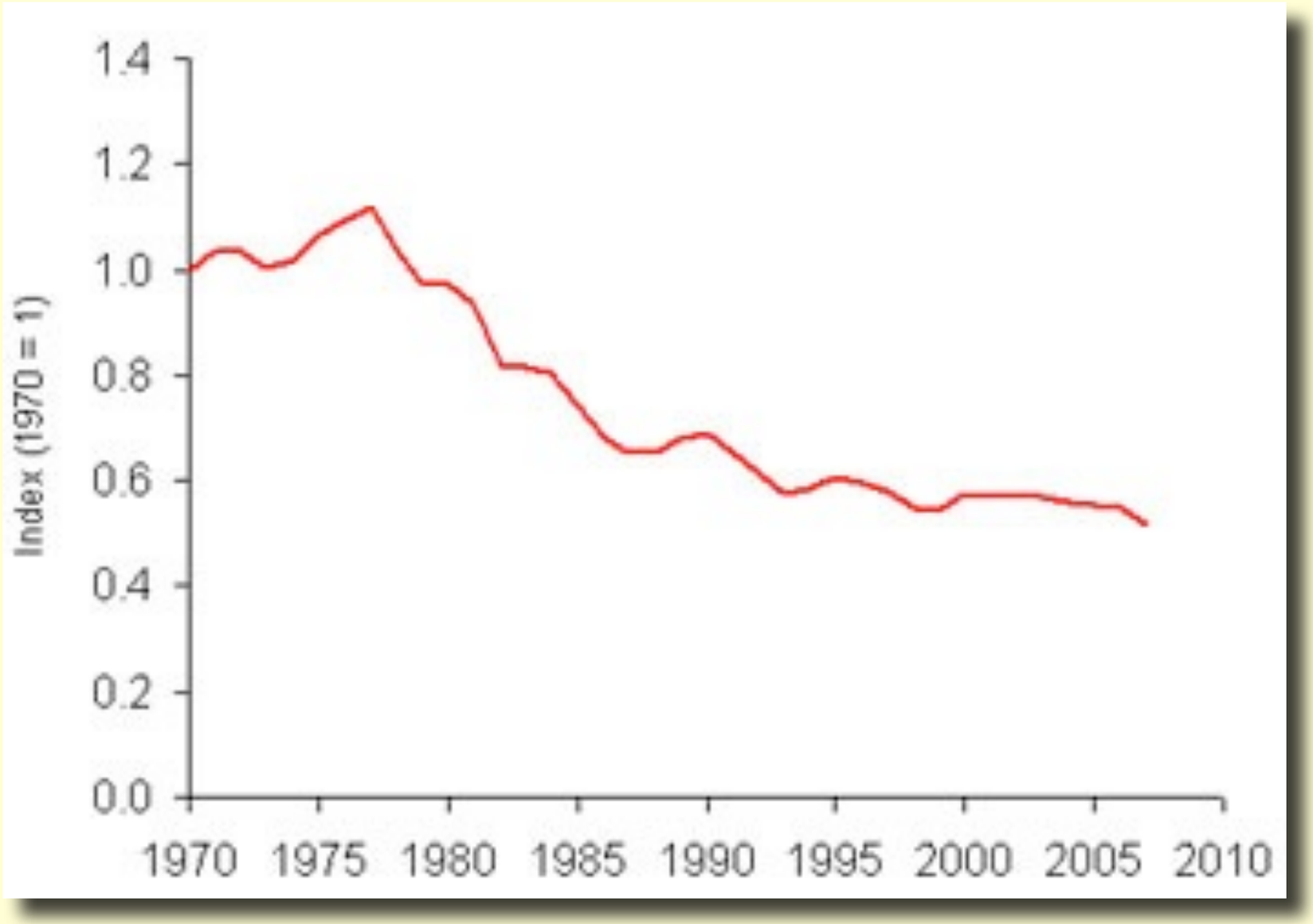
American Bird Conservancy Report - April 2013

"A single corn kernel coated with a neonicotinoid can kill a songbird,"

"One grain of wheat treated with imidacloprid -- can fatally poison a bird.

As little as 1/10th of a neonicotinoid-coated corn seed per day during egg-laying season is all that is needed to affect reproduction."

UK Farmland Bird Decline: 1970 - 2010



Decline of 19 farm-bird species in the UK

- **Turtle Dove, Corn Bunting, partridge & Tree Sparrow crashed 80%**
- **Skylark, House Sparrows and Starlings by** over **50%**.
- **Average 48 % decline of these 19 species since 1970.**

DDT & Neonics cause: Eggshell Thinning & Dead in Shell Chicks

www.disasterinthemaking.com

The systemic insecticides:
a disaster in the making

Author Dr. Henk Tennekes | Artwork Ami-Bernard Zillweger

Persistent negative effects of pesticides on biodiversity

F. Geiger et al. (2010) Basic and Applied Ecology 11, 97-105

- "In a Europe-wide study in eight West and East European countries, we found important negative effects of agricultural intensification on **wild plant, carabid and bird species diversity**.

- Of the 13 components of intensification we measured, use of **insecticides** and **fungicides** had consistent negative effects on biodiversity.

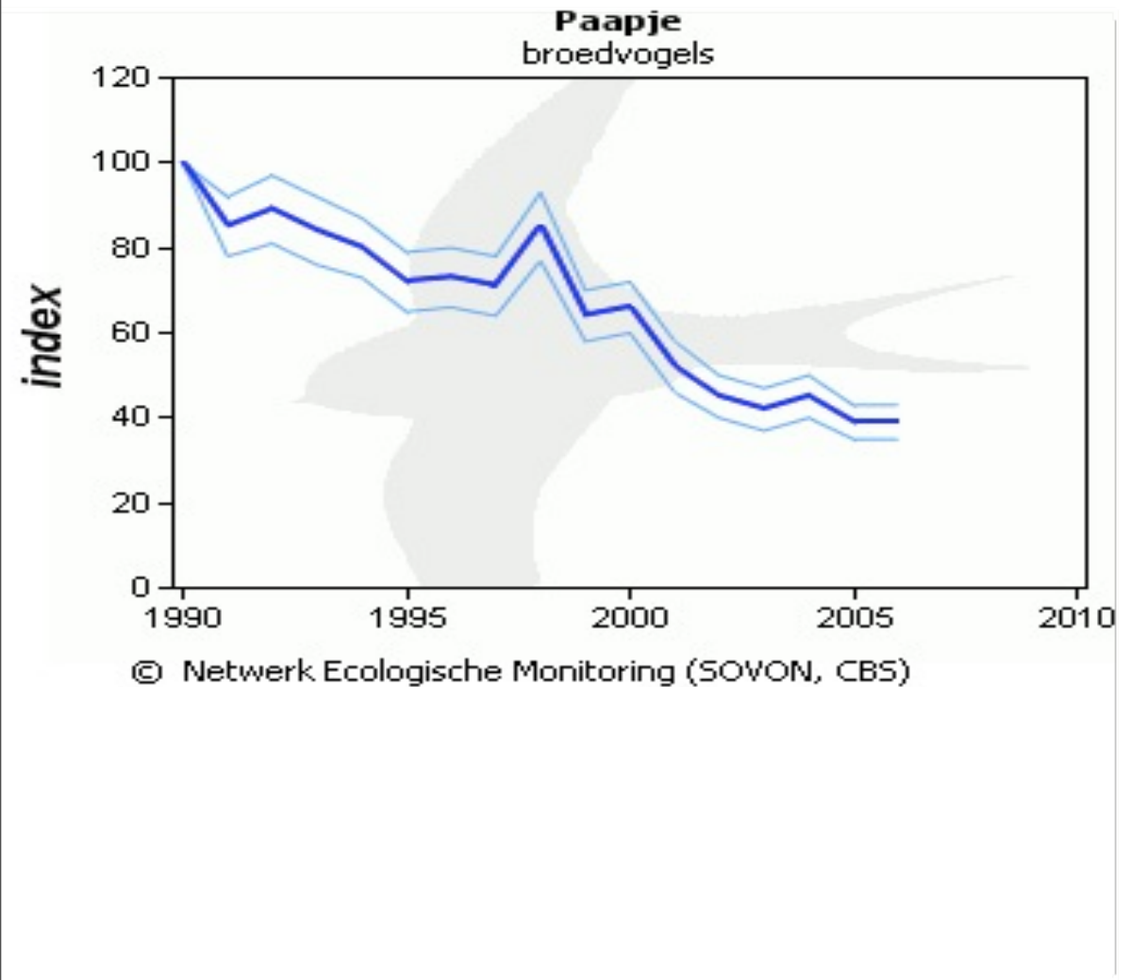
- Insecticides also reduced the biological control potential"

Extinction of the Corn Bunting and Ortolan Bunting since neonicotinoids (1990)

Bron: NEM (SOVON, CBS).

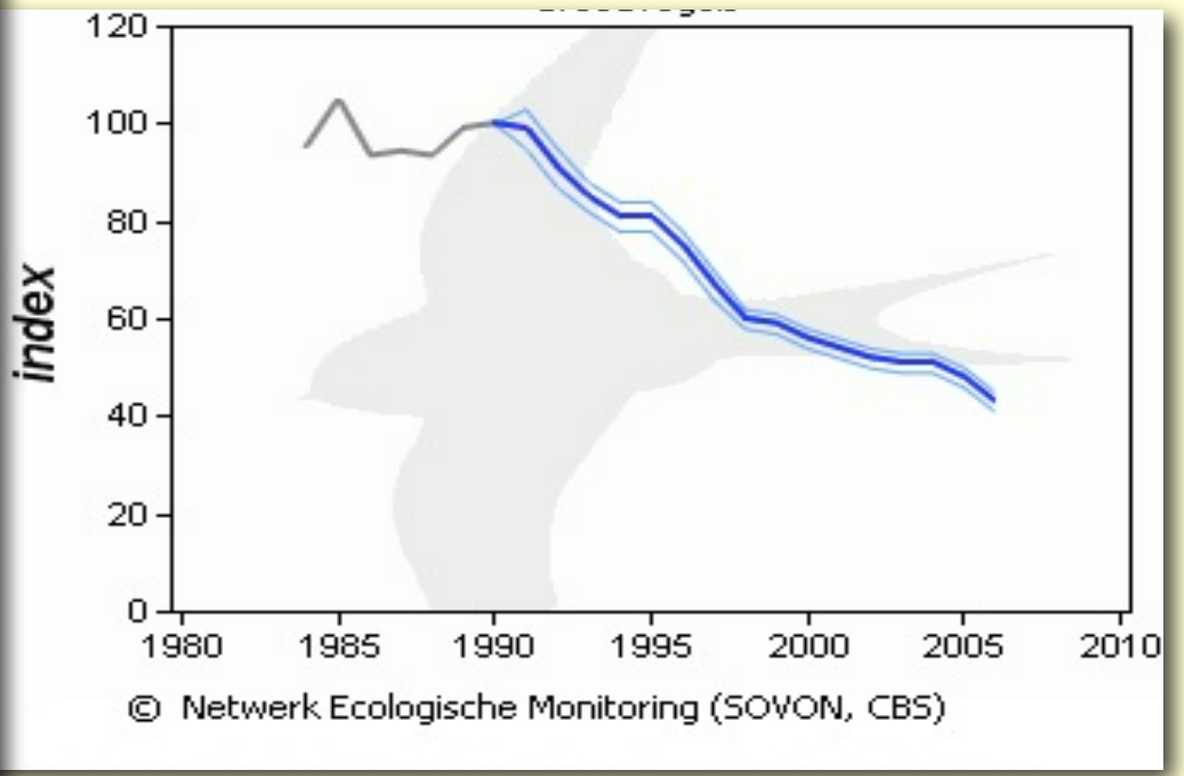
CBS/nov09/1189
www.compendiumvoordeleefomgeving.nl

The Whinchat: now rarely seen on Dutch farmland



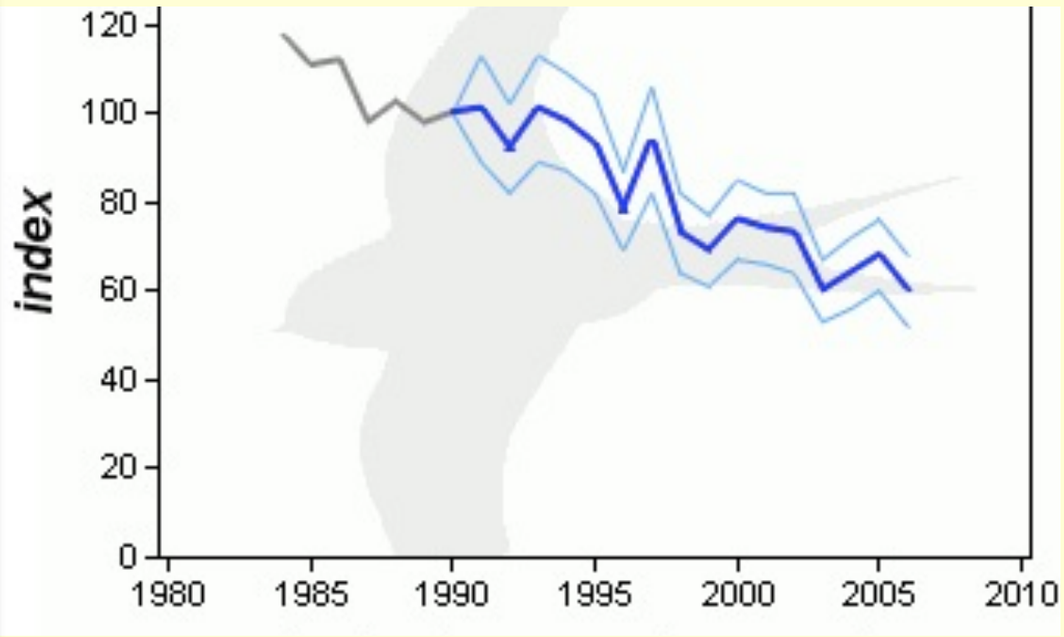
Netwerk Ecologische Monitoring (SOVON, CBS)

Oyster-catcher: the ‘National Bird of Holland **will be extinct by 2020 at current rate of decline**



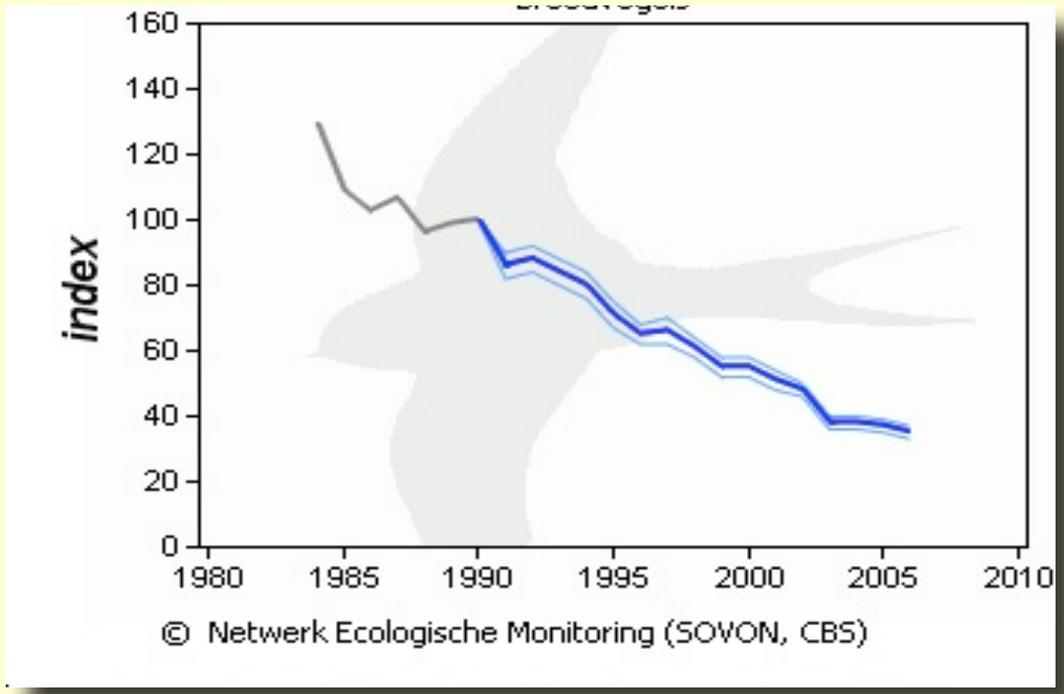
Oystercatchers feed on mud invertebrtes, but Neonics kill the earthworms and other creatures

Starling
50% decline in Holland & UK



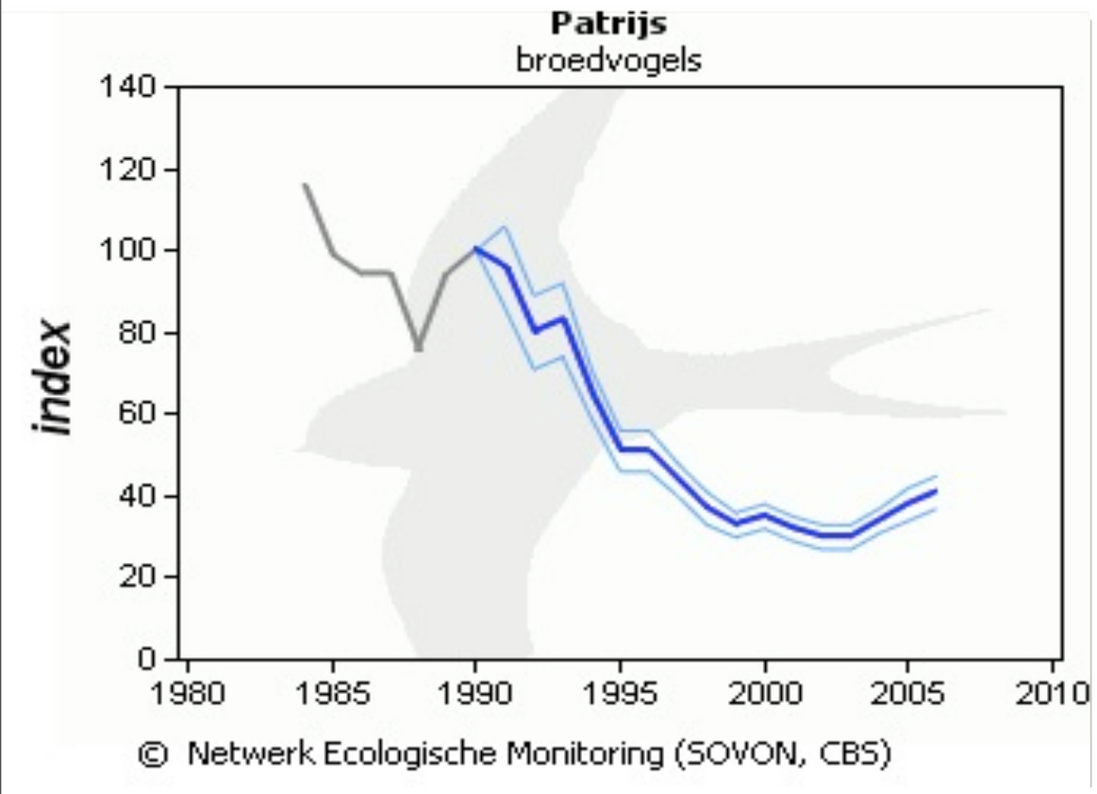
Flocks of 10,000 starlings were once common now increasingly rare

Skylarks: 60% decline in Holland (80% loss in the UK since 1970)



Skylarks need caterpillars to feed their chicks;
No caterpillars = no Skylarks.

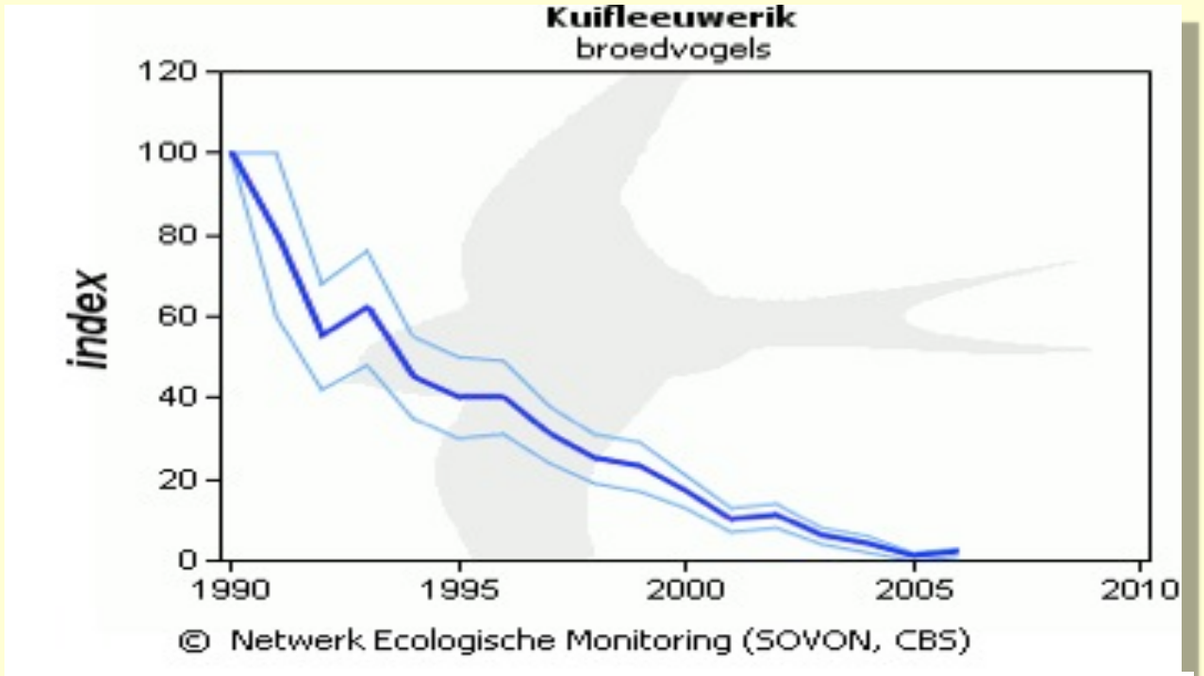
Grey Partridge is in steep decline
In Holland and UK (90%+)



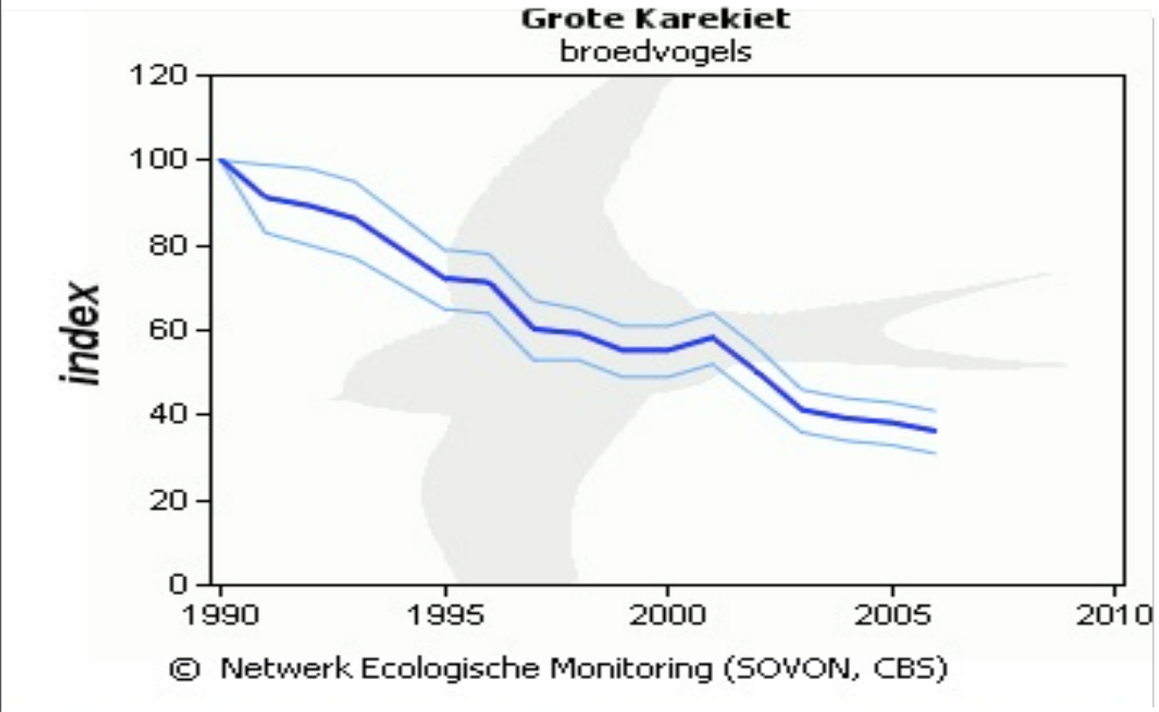
Netwerk Ecologische Monitoring (SOVON, CBS)

The Crested Lark:
now **extinct** in Holland

Netwerk Ecologische Monitoring (SOVON, CBS)

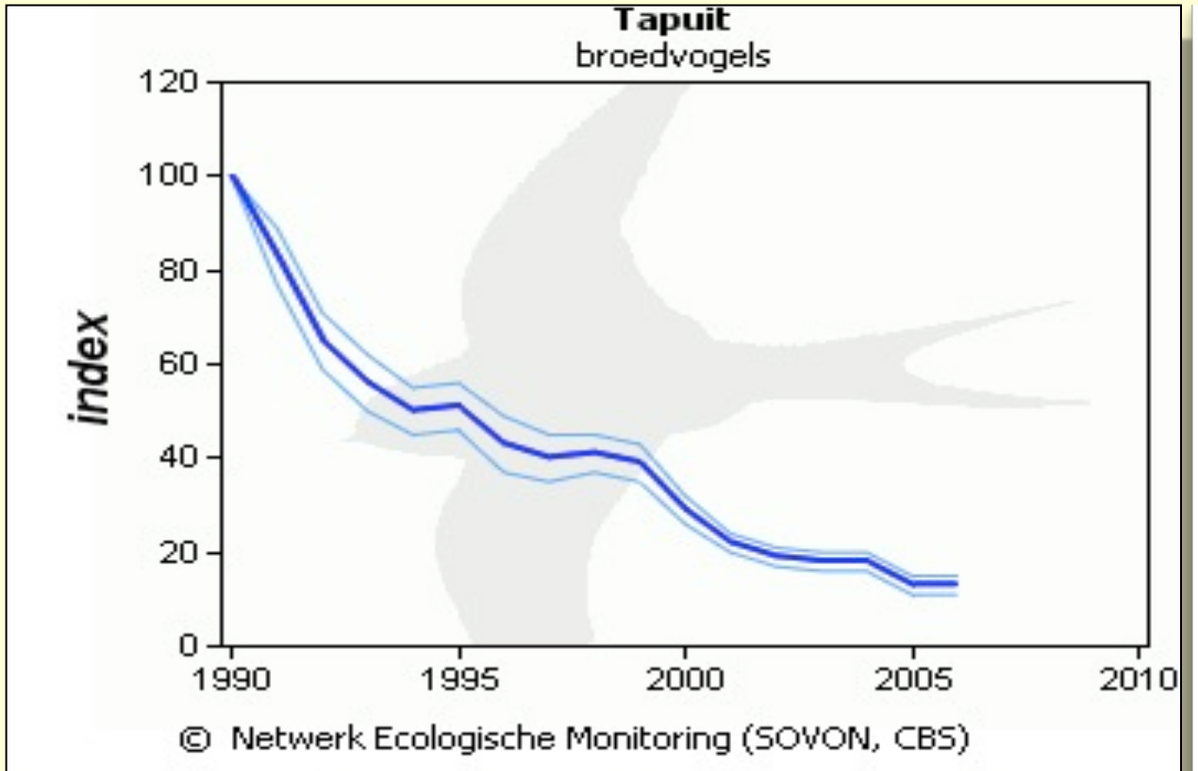


Great Reed-Warbler: endangered in Holland



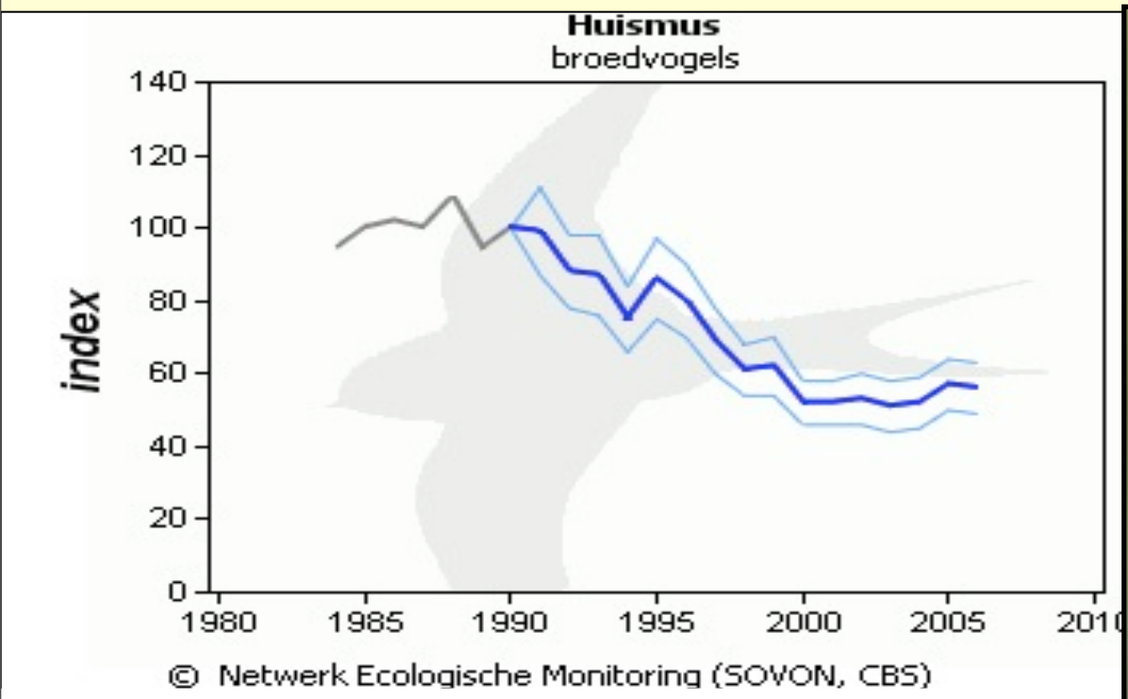
Northern Wheatear:
nearing extinction in Holland

Netwerk Ecologische Monitoring (SOVON, CBS)



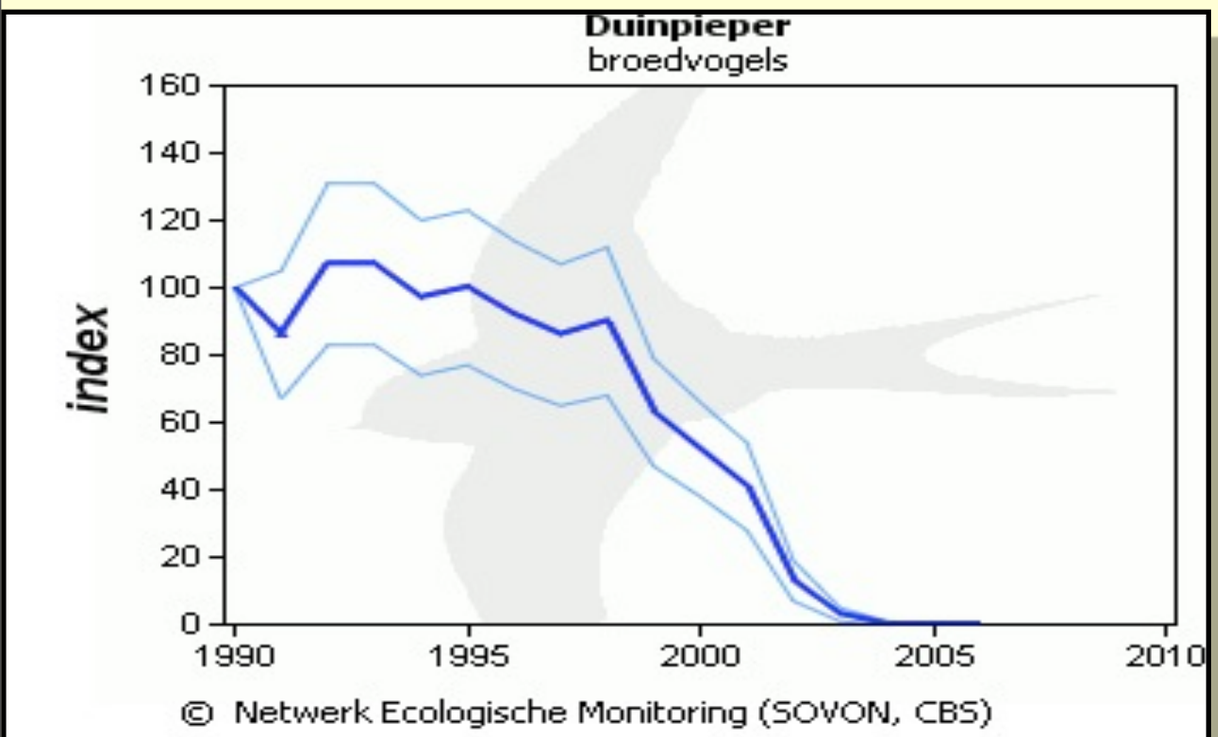
House Sparrow: Steep decline in Holland & UK

Netwerk Ecologische Monitoring (SOVON, CBS)



Tawny Pipit: now extinct in Holland

Netwerk Ecologische Monitoring (SOVON, CBS)



Global Wildlife AIDS Hypothesis

Immune Deficiency triggered by Neonicotinoids

in: bees, birds, frogs, bats. And what about humans?

Pesticide use maps, animated

Posted on February 1, 2014 by Tom

Recently the United States Geological Survey released a huge database of Pesticide Use Maps that map the use of 459 pesticides from 1992-2011.

These animated maps record usage of the three most widely used neonicotinoids: Clothianidin, Imidacloprid and Thiamethoxam.

These animations show the sudden explosion of these pesticides across the American landscape.

Seed treatments were NOT included in these calculations, and yet seed treatments are the most widely employed pesticide delivery system in history. You would think that the EPA, in its efforts to protect mankind and the environment, would want this usage tracked, but instead is pressing to have these seed treatments exempted from the category of “pesticide use”, so that there would be no data kept on these massive uses.

Click on each of the maps below to see them animated.

Clothianidi (2003-2011)

Imidaclopri (1993-2011)

Thiamethoxa (1999-2011)

Conclusions

- The mode of action of neonicotinoid insecticides derives from almost complete and **virtually irreversible blockage of postsynaptic nicotinic AcetylCholine-Receptors (nAChRs) in the central nervous system of insects**
- **The toxicity of neonicotinoids to arthropods is reinforced by exposure time**. Their dose:response characteristics are strikingly similar to those of carcinogens. Thus, **there may not be a safe level of exposure**
- **Imidacloprid is persistent and mobile in soil and prone to leaching**
- The contamination of surface water with imidacloprid is massive in some parts of Holland and USA, Canada
- Of the 13 components of agricultural intensification, only the use of **insecticides and fungicides had consistent negative effects on biodiversity** (wild plant, carabid and bird species)
- **Surface water contamination with Imidacloprid correlates with reduced Diptera (Flies & Midges) abundance**
- **Strong decline of butterflies since the introduction of neonicotinoid insecticides**
- **Many invertebrate-dependent bird species (in very different habitats) are declining, some are now extinct**