

Føre-var men alt for sent?
**EUs forbud mot
neonikotinoider**

Prof. Dr. Jeroen P. van der Sluijs



The RECIPES-Project

The objective

The RECIPES project aims to reconcile innovation and precaution by developing tools and guidelines ensure the precautionary principle is applied while still encouraging innovation.

The RECIPES project will work closely with different stakeholders through interviews, workshop and webinars.

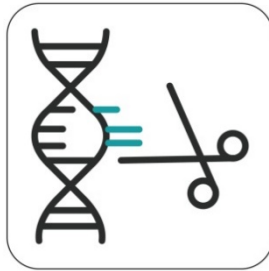
To this end, RECIPES will

- 1 Analyse legal and policy initiatives on the precautionary principle at the international, European and national level and describe the emergence of an 'innovation principle'
- 2 Examine the application of the precautionary principle in eight specific cases
- 3 Develop scenarios for the future of the precautionary principle taking into account innovation
- 4 Introduce mechanisms for public involvement in scientific and technological decision-making
- 5 Create tools and guidelines to the precautionary principle to help policymakers and other stakeholders to assess risks and take into account innovation.

"REconciling sScience, Innovation and Precaution through the Engagement of Stakeholders"

<https://recipes-project.eu/>

Case studies



CRISPR gene drives
Rathenau Institute



GMOs
ARC



Financial risks
HU Berlin



Neonicotinoid insecticides
University of Bergen



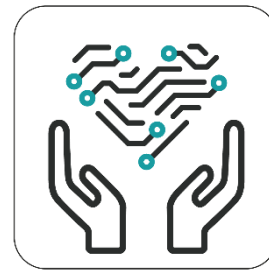
Nanotechnologies
(OEAW)



Glyphosate
Maastricht



Endocrine disruptors
Maastricht University



Artificial Intelligence
Rathenau Institute



Micro plastic
Maastricht University



RECIPES is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 824665. Views and opinions expressed in this course are purely those of the lecturer and may not in any circumstances be regarded as stating an official position of the European Commission.

Prinsipper i miljøretten

- *Kurativ modell*
Forurensers betaler-prinsippet
- “det er bedre å forebygge enn å helbrede”
Prevensjonsprinsippet
- “heller føre var enn etter snar”
Føre-var prinsippet

Paradigmeskifte fra ***a posteriori***-kontroll (civil liability as a curative tool) til ***a priori*** risikostyring (anticipatory measures)

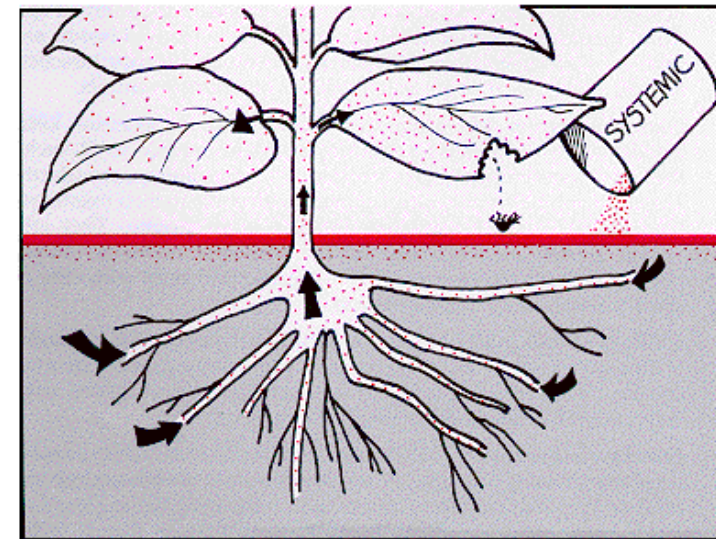
Systemic insecticides (neonicotinoids) & bees



Toxicity of neonicotinoids

Pesticide	®	Use	LD50 (ng/honeybee)	Toxicity index relative to DDT
DDT	Dinocide	insecticide	27000	1
Amitraz	Apivar	insecticide / acaricide	12000	2
Coumaphos	Perizin	insecticide / acaricide	3000	9
Tau-fluvalinate	Apistan	insecticide / acaricide	2000	13.5
Methiocarb	Mesurool	insecticide	230	117
Carbofuran	Curater	insecticide	160	169
λ-cyhalothrin	Karate	insecticide	38	711
Deltamethrine	Decis	insecticide	10	2700
Thiamethoxam	Cruise	insecticide	5	5400
Fipronil	Regent	Insecticide	4.2	6475
Clothianidine	Poncho	Insecticide	4.0	6750
Imidacloprid	Gauche	Insecticide	3.7	7297

Toxicity of insecticides to honeybees compared to DDT. The final column expresses the toxicity relative to DDT. (Source: Bonmatin, 2009)



Systemic = crop takes it up into its plantsap: chemical makes plant toxic from inside



1962



The world of **systemic insecticides** is a weird world, surpassing the imaginings of the brothers Grimm — perhaps most closely akin to the cartoon world of Charles Addams. It is a

ELIXIRS OF DEATH

33

world where the enchanted forest of the fairy tales has become the poisonous forest in which an insect that chews a leaf or sucks the sap of a plant is doomed. It is a world where a flea bites a dog, and dies because the dog's blood has been made poisonous, where an insect may die from vapors emanating from a plant it has never touched, where a bee may carry poisonous nectar back to its hive and presently produce poisonous honey.

NEONICOTINOIDS

A worldwide survey of neonicotinoids in honey

E. A. D. Mitchell,^{1,2*} B. Mulhauser,² M. Mulo, ^{1†} A. Mutabazi,^{3‡} G. Glauser,³ A. Aebi^{1,4}

Growing evidence for global pollinator decline is causing concern for biodiversity conservation and ecosystem services maintenance. Neonicotinoid pesticides have been identified or suspected as a key factor responsible for this decline. We assessed the global exposure of pollinators to neonicotinoids by analyzing 198 honey samples from across the world. We found at least one of five tested compounds (acetamiprid, clothianidin, imidacloprid, thiacloprid, and thiamethoxam) in 75% of all samples, 45% of samples contained two or more of these compounds, and 10% contained four or five. Our results confirm the exposure of bees to neonicotinoids in their food throughout the world. The coexistence of neonicotinoids and other pesticides may increase harm to pollinators. However, the concentrations detected are below the maximum residue level authorized for human consumption (average \pm standard error for positive samples: 1.8 ± 0.56 nanograms per gram).


<https://science.sciencemag.org/content/358/6359/109/tab-pdf>

Honningbie-helse er feil ramme



Eggleggende høns er ingen god målestokk for fuglehelse i jordbruksområder. **Honningbien** er heller ingen god målestokk for bier/pollinerende insekter.





NOT IGNORANCE, BUT
IGNORANCE OF IGNORANCE,
IS THE DEATH OF KNOWLEDGE

Routledge International
Handbook of
Ignorance Studies

Edited by Matthias Gross and Linsey McGoey

Undone science (Hess, 2015)

Blindflekker produseres systematisk gjennom skjevfordeling av makt. De som tar til orde for reform hindres ofte av **mangelen på forskningsstøtte og økonomisk sterke motparter som ofte kan støtte seg på tilgjengelig forskning.**

Epistemic injustice: wrong done to someone in their capacity as a knower (Fricker 2007)

Timeline neonic case

- 1991 Imidakloprid introduseres på markedet
- 1994 Tidlige varsler i Frankrike
- 1999 Første forbud (solsikker)
- 2002 EFSA blir etablert
- 2003 CST-rapport Frankrike $PEC \gg PNEC$
 - <https://controverses.sciences-po.fr/archive/pesticides/rapportfin.pdf>
- 2004 Forbud i Frankrike (mais)
- 2013 EU forbyr 3 neonikotinoider i avlinger attraktive for bier
- 2018 EU forbyr all utendørs bruk i avlinger
- 2019 EU forbyr tiakloprid

Kunnskapskontroverser

Industry & regulatory science	Academic research	Contested issue
Does not translocate to flowers	Detected in pollen and nectar at ppb level.	Limit of detection
Key risk indicator is Acute Toxicity (+some times 10d chronic)	Sublethal effects are crucial	2003 CST PEC>>PNEC = No Go!
Honeybees	Wild bees	Resilience of honeybee colony >> wild bees
Field tests can overrule lab tests	Field tests used are flawed by design & lack statistical power	Reproducibility
Assess single applications of single substances, assume 1 time exposure	Holistic, all applications together, all neonics together, year round exposure	> 1000 allowed applications of 6 neonics
Allow for recovery of hive after single exposure	Year round exposure makes recovery irrelevant	Recovery
What is field realistic: what industry reports based on models and standard experiments	What we measure in the field.	Invalid assumptions
Emissions based on models with assumptions	Measured levels of pollution proofs models wrong	Invalid assumptions

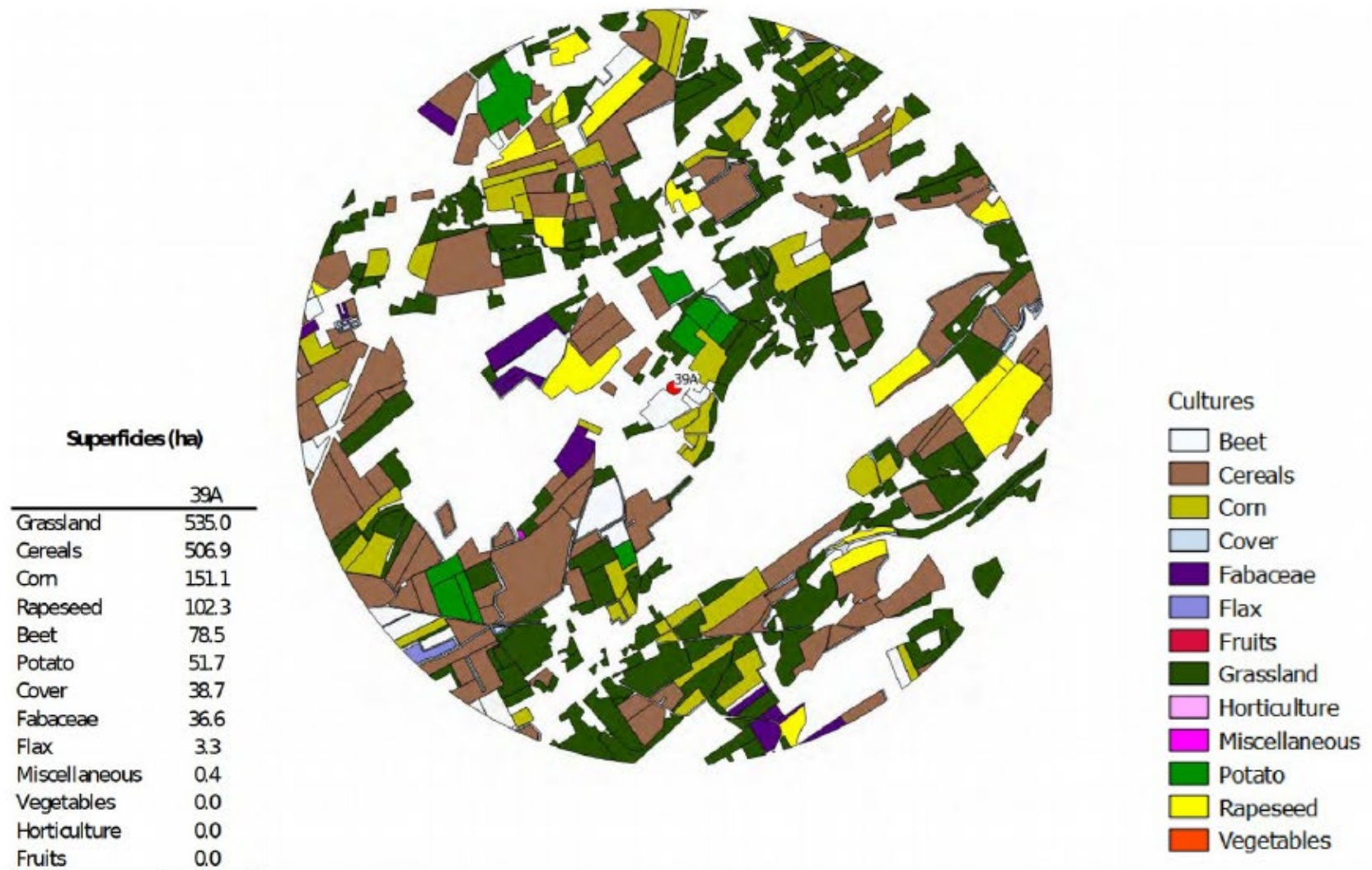
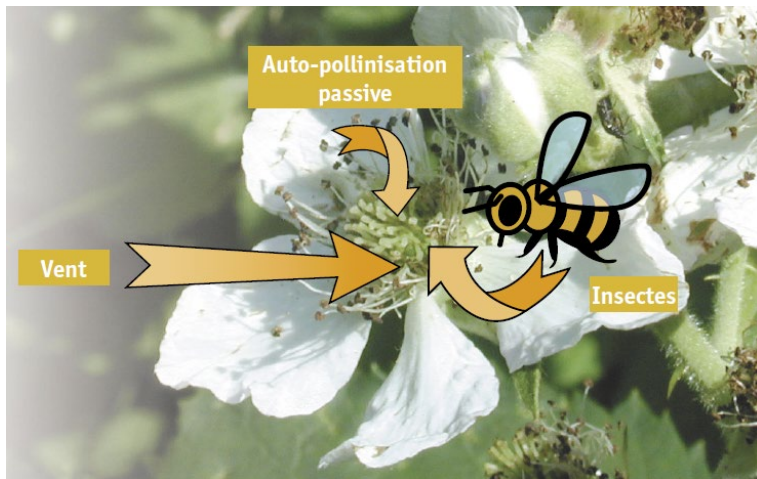


Figure 1.1 – Example of land use in a circumference of 3 km radius around an apiary (red dot)

Source: Noa Simon Delso, 2017. Fungicides and bees: a history of the unexpected. PhD thesis. University Louvain la Neuve, Belgium

Pollinatorer er viktige

- 90 viktige avlinger (35% av verdens matproduksjon) avhenger av pollinering
- Viktige næringsstoffer: 90-100% fra pollinerte avlinger (vit C, antioksidanter, lycopem, β -tokoferol, vit A og folsyre)
- 94% av alle blomstrende planter avhenger av 25 000 biearter for reproduksjon og evolusjon



Alfalfa
Apple
Almond
Artichoke
Asparagus
Blackberry
Blueberry
Broccoli
Brussels sprouts

Some crops pollinated by bees³

Cabbage
Cacao
Cantaloupe
Carrot
Cashew
Cauliflower
Celery
Cherry
Citrus
Dill
Eggplant/
Aubergine
Fennel
Garlic

Kale
Kola nut
Leek
Lychee
Macadamia
Mango
Mustard
Nutmeg
Onion
Passion fruit
Peach
Pear
Plum
Pumpkin

Raspberry
Sapote
Squash
Sunflower
Tangerine
Tea
Watermelon



Verden: 25000 biearter; EU 1965 I NL rundt 350 biearter, 181 av dem v rødlistet / utrydningstruet t



2013

Late lessen uit vroege waarschuwingen: wetenschap, voorzorg, innovatie

H.16 Zaadbehandeling met systemische insecticiden en honingbijen

ISSN 1725-9177



European Environment Agency 

Parallel Declines in Pollinators and Insect-Pollinated Plants in Britain and the Netherlands

2006

J. C. Biesmeijer,^{1*} S. P. M. Roberts,² M. Reemer,³ R. Ohlemüller,⁴ M. Edwards,⁵ T. Peeters,^{3,6} A. P. Schaffers,⁷ S. G. Potts,² R. Kleukers,³ C. D. Thomas,⁴ J. Settele,⁸ W. E. Kunin¹

Despite widespread concern about declines in pollination services, little is known about the patterns of change in most pollinator assemblages. By studying bee and hoverfly assemblages in Britain and the Netherlands, we found evidence of declines (pre- versus post-1980) in local bee diversity in both countries; however, divergent trends were observed in hoverflies. Depending on the assemblage and location, pollinator declines were most frequent in habitat and flower specialists, in univoltine species, and/or in nonmigrants. In conjunction with this evidence, outcrossing plant species that are reliant on the declining pollinators have themselves declined relative to other plant species. Taken together, these findings strongly suggest a causal connection between local extinctions of functionally linked plant and pollinator species.

Patterns of widespread decline in North American bumble bees

Sydney A. Cameron^{a,1}, Jeffrey D. Lozier^a, James P. Strange^b, Jonathan B. Koch^{b,c}, Nils Cordes^{a,2}, Leellen F. Solter^d, and Terry L. Griswold^a

^aDepartment of Entomology and Institute for Genomic Biology, University of Illinois, Urbana, IL 61801; ^bUnited States Department of Agriculture-Agricultural Research Service Pollinating Insects Research Unit, Utah State University, Logan, UT 84322; ^cDepartment of Biology, Utah State University, Logan, UT 84321; and ^dIllinois Natural History Survey, Institute of Natural Resource Sustainability, University of Illinois, Champaign, IL 61820

Edited* by Gene E. Robinson, University of Illinois, Urbana, IL, and approved November 24, 2010 (received for review October 3, 2010)

Bumble bees (*Bombus*) are vitally important pollinators of wild study in the United States identified lower genetic diversity and

2011

intensive nationwide surveys of >16,000 specimens. We show that the relative abundances of four species have declined by up to 96% and that their surveyed geographic ranges have contracted by 23–87%, some within the last 20 y. We also show that declining populations have significantly higher infection levels of the microsporidian pathogen *Nosema bombi* and lower genetic diversity compared



GLOBAL HONEY BEE COLONY DISORDERS AND OTHER THREATS TO INSECT POLLINATORS

2011

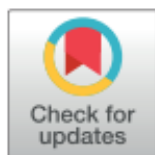
RESEARCH ARTICLE

More than 75 percent decline over 27 years in total flying insect biomass in protected areas

Caspar A. Hallmann^{1*}, Martin Sorg², Eelke Jongejans¹, Henk Siepel¹, Nick Hofland¹, Heinz Schwan², Werner Stenmans², Andreas Müller², Hubert Sumser², Thomas Hörrén², Dave Goulson³, Hans de Kroon¹

1 Radboud University, Institute for Water and Wetland Research, Animal Ecology and Physiology & Experimental Plant Ecology, PO Box 9100, 6500 GL Nijmegen, The Netherlands, **2** Entomological Society Krefeld e.V., Entomological Collections Krefeld, Marktstrasse 159, 47798 Krefeld, Germany, **3** University of Sussex, School of Life Sciences, Falmer, Brighton BN1 9QG, United Kingdom

* c.hallmann@science.ru.nl



Abstract

Global declines in insects have sparked wide interest among scientists, politicians, and the general public. Loss of insect diversity and abundance is expected to provoke cascading effects on food webs and to jeopardize ecosystem services. Our understanding of the extent and underlying causes of this decline is based on the abundance of single species or taxonomic groups only, rather than changes in insect biomass which is more relevant for ecological functioning. Here, we used a standardized protocol to measure total insect biomass using Malaise traps, deployed over 27 years in 63 nature protection areas in Germany (96 unique location-year combinations) to infer on the status and trend of local entomofauna. Our analysis estimates a seasonal decline of 76%, and mid-summer decline of 82% in flying insect biomass over the 27 years of study. We show that this decline is apparent regardless of habitat type, while changes in weather, land use, and habitat characteristics cannot explain this overall decline. This yet unrecognized loss of insect biomass must be taken into account in evaluating declines in abundance of species depending on insects as a food source, and ecosystem functioning in the European landscape.

OPEN ACCESS

Citation: Hallmann CA, Sorg M, Jongejans E, Siepel H, Hofland N, Schwan H, et al. (2017) More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *PLoS ONE* 12 (10): e0185809. <https://doi.org/10.1371/journal.pone.0185809>

Editor: Eric Gordon Lamb, University of Saskatchewan, CANADA

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Insectageddon: farming is more catastrophic than climate breakdown

George Monbiot

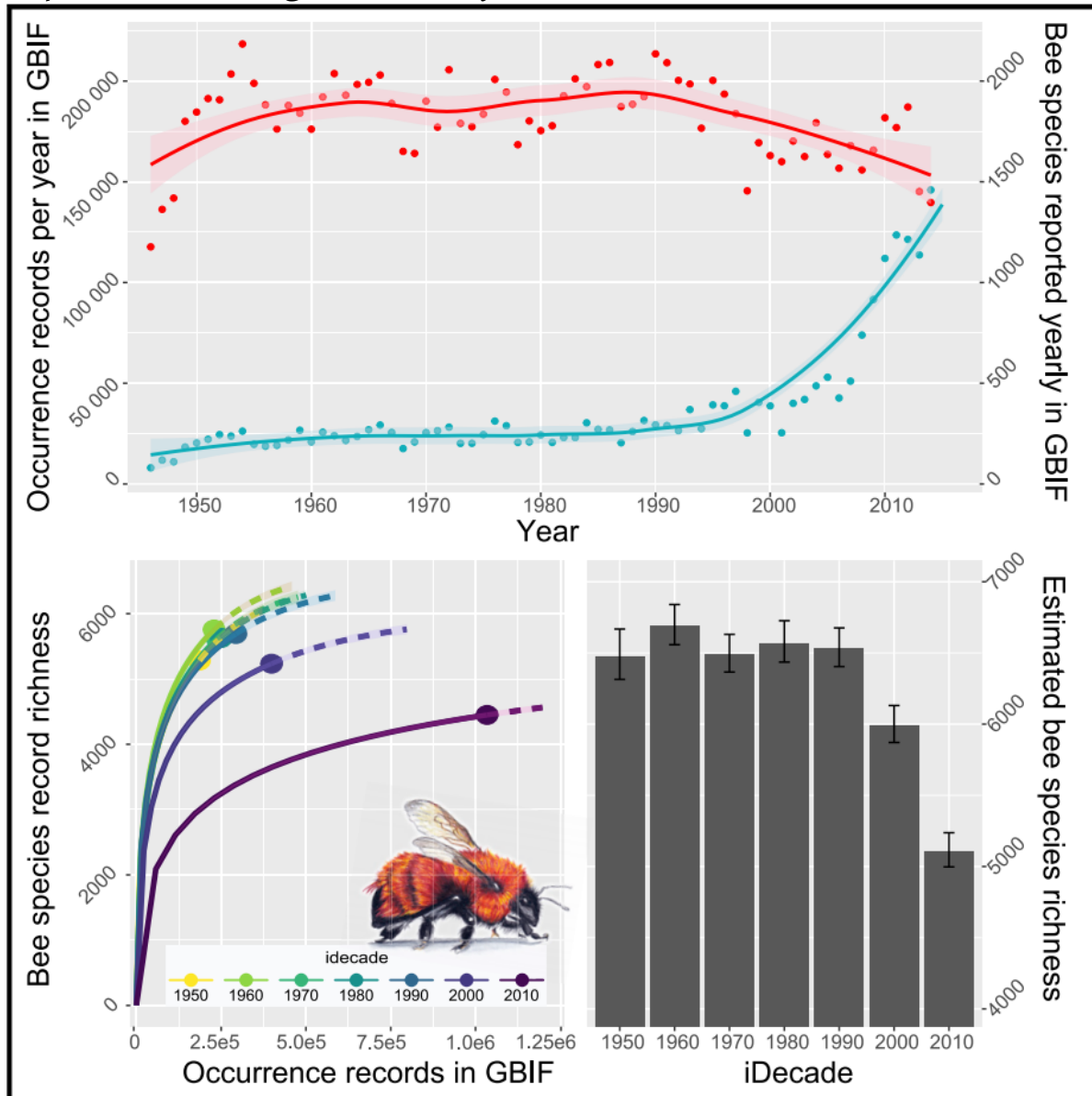


The shocking collapse of insect populations hints at a global ecological meltdown

“The impact on wildlife of changes in farming practice (and the expansion of the farmed area) is so rapid and severe that it is hard to get your head round the scale of what is happening. A study published this week in the journal Plos One reveals that flying insects surveyed on nature reserves in Germany have declined by 76% in 27 years. The most likely cause of this Insectageddon is that the land surrounding those reserves has become hostile to them: the volume of pesticides and the destruction of habitat have turned farmland into a wildlife desert.”

Number of worldwide recorded bee species is sharply decreasing

Despite increasing number of observations in Global Biodiversity Information Facility,



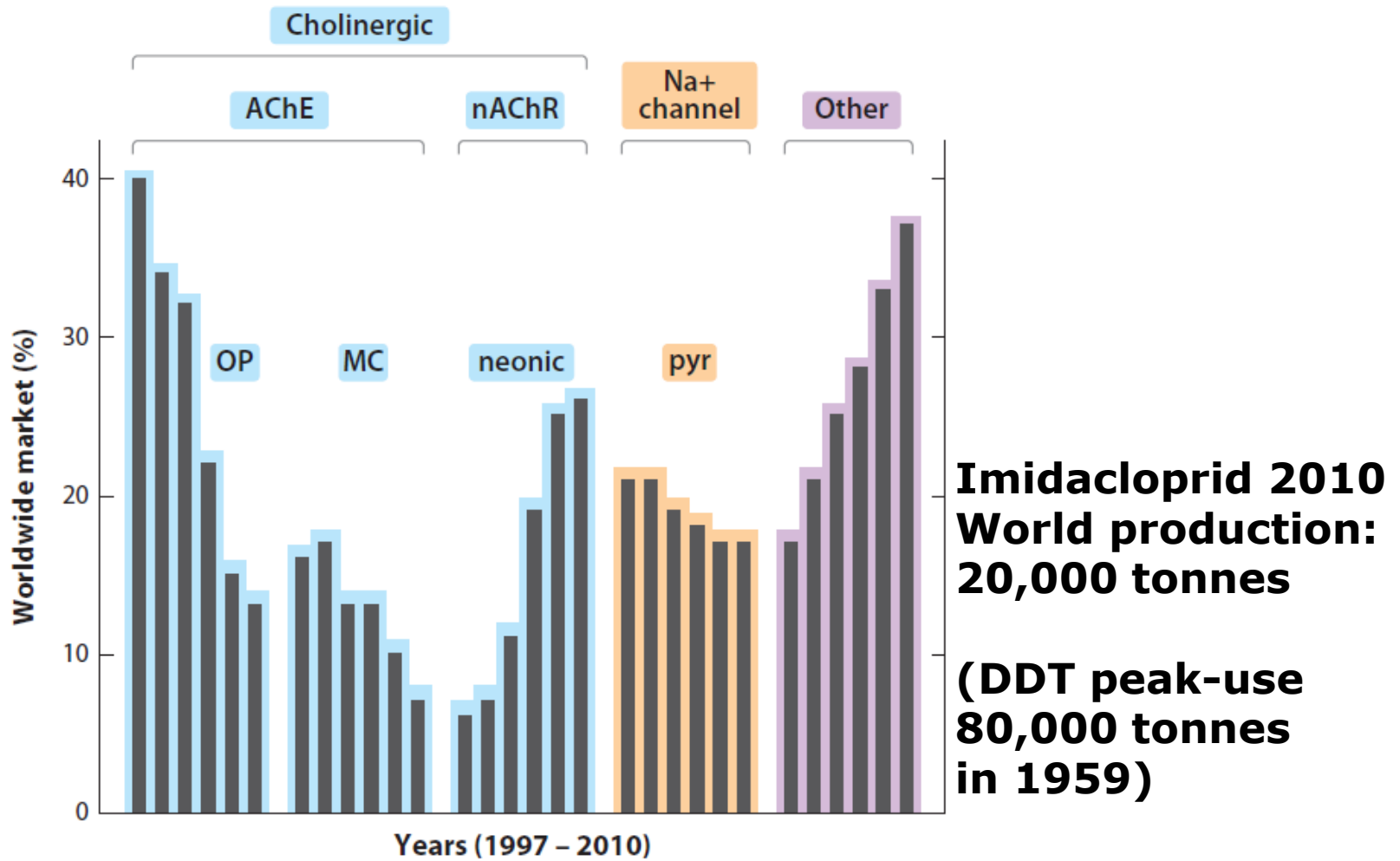
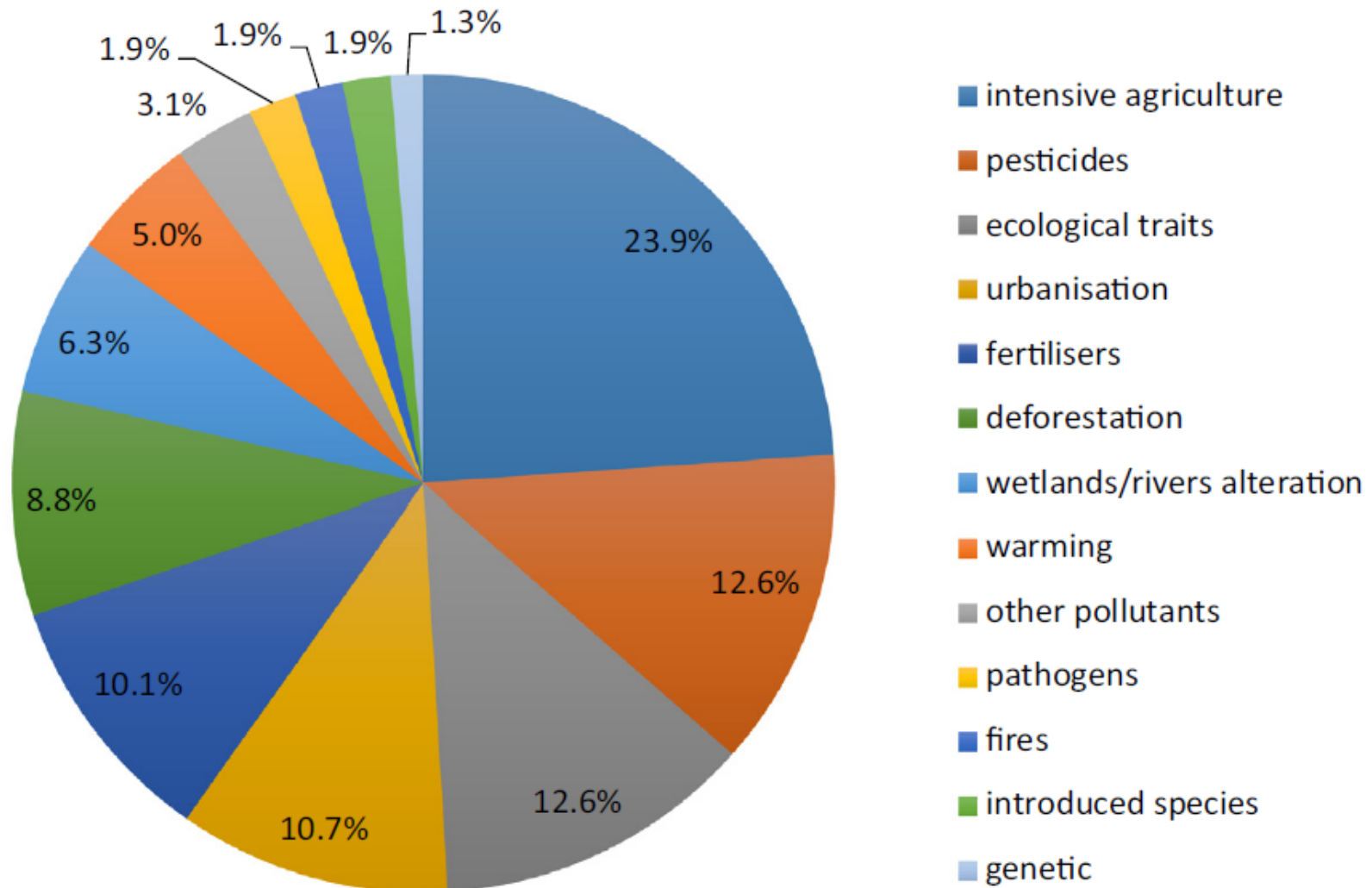


Figure 4

Source: Casida and Durkin, 2013 doi: 10.1146/annurev-ento-120811-153645

Changes in use of insecticide classes between 1997 and 2010 showing decreases for organophosphates (OPs), methylcarbamates (MCs), and pyrethroids (pyr) and increases for neonicotinoids (neonic) and other compounds. Abbreviations: AChE, acetylcholinesterase; nAChR, nicotinic acetylcholine receptor. Data shown for the years 1997, 2000, 2002, 2005, 2008, and 2010 from T.C. Sparks (personal communication) are similar to those from his coauthored paper (95).

Scientific uncertainty on what drives insect declines



% of publications [$n=73$] mentioning cause x as the main driver

<https://doi.org/10.1016/j.biocon.2019.01.020>

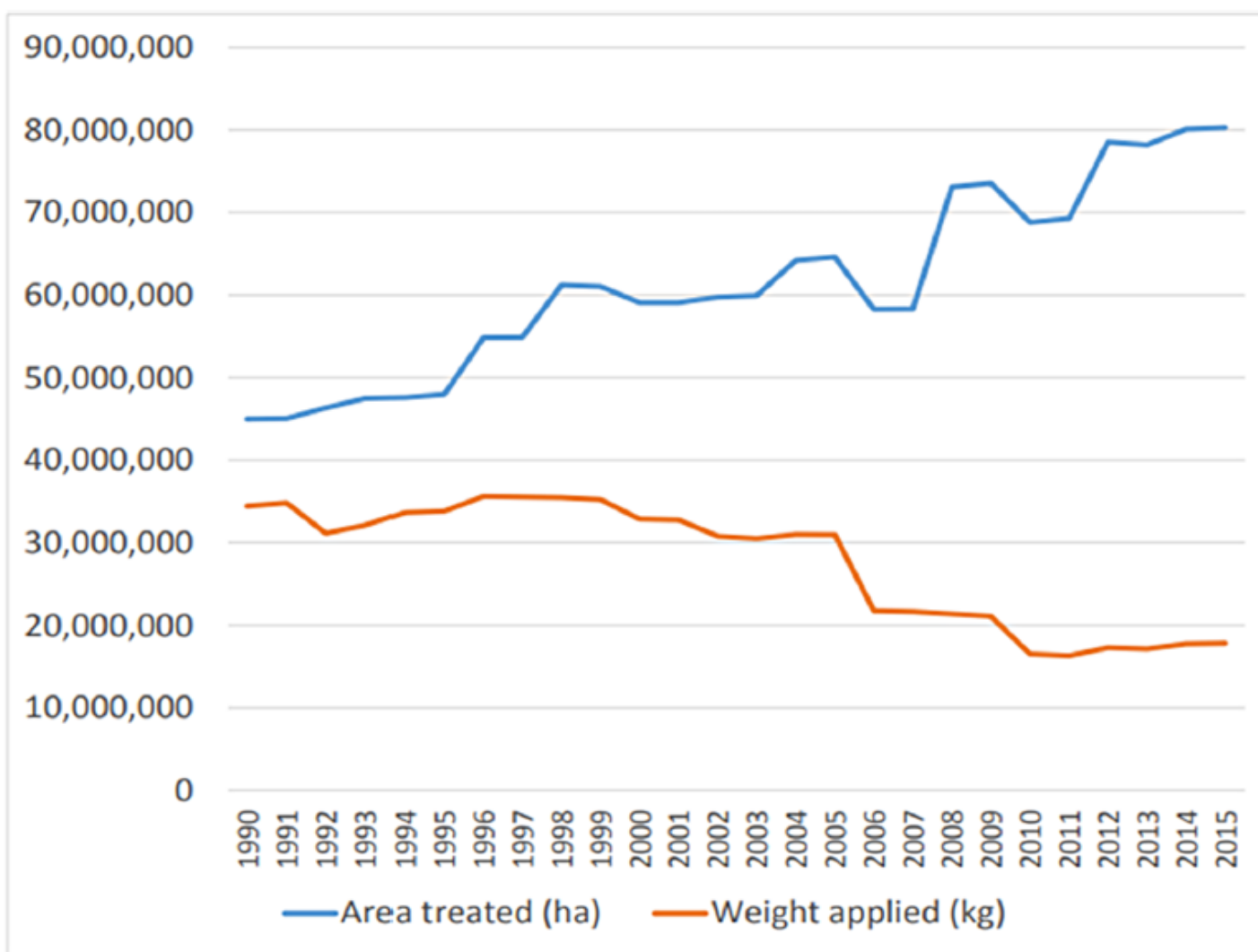
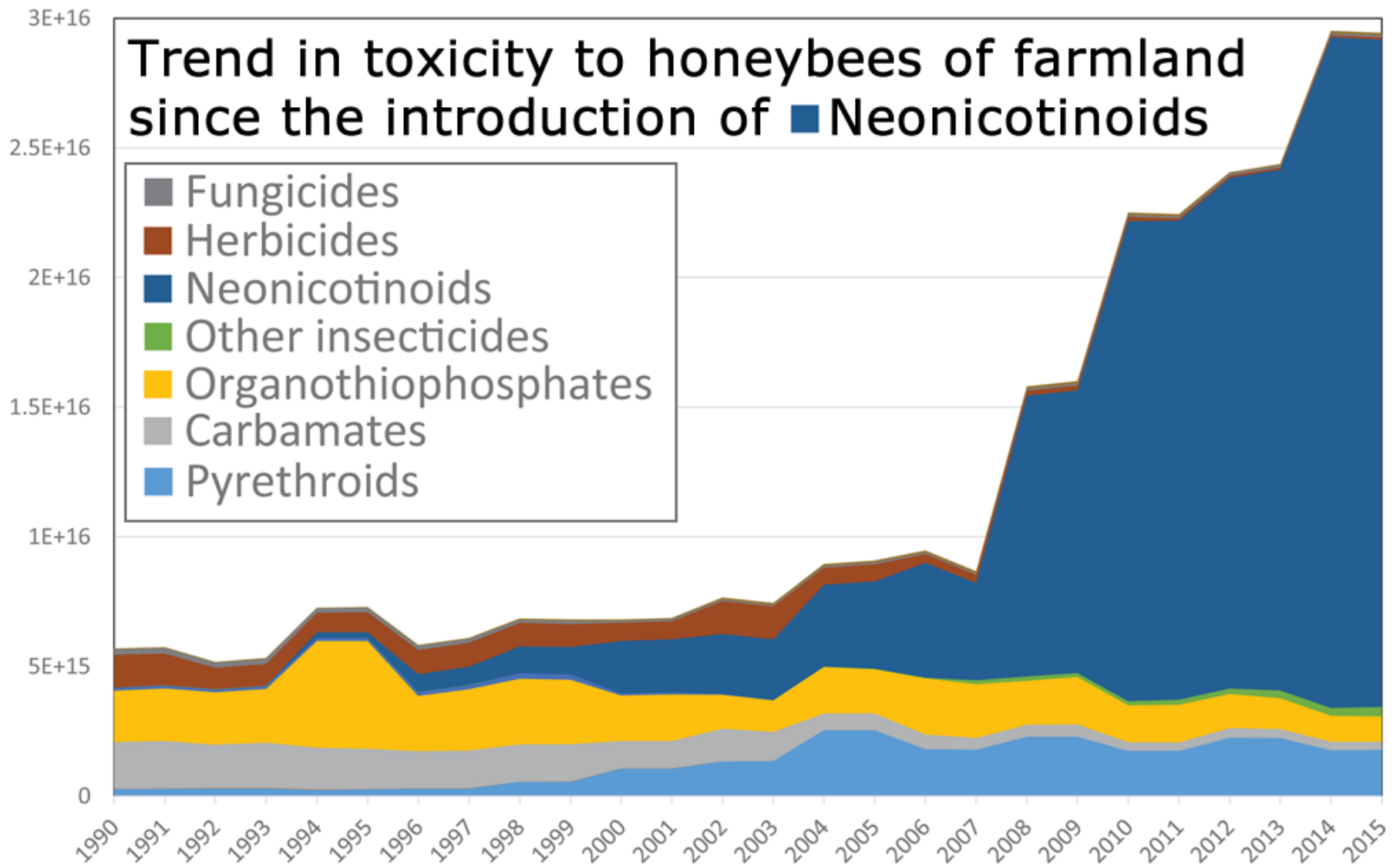


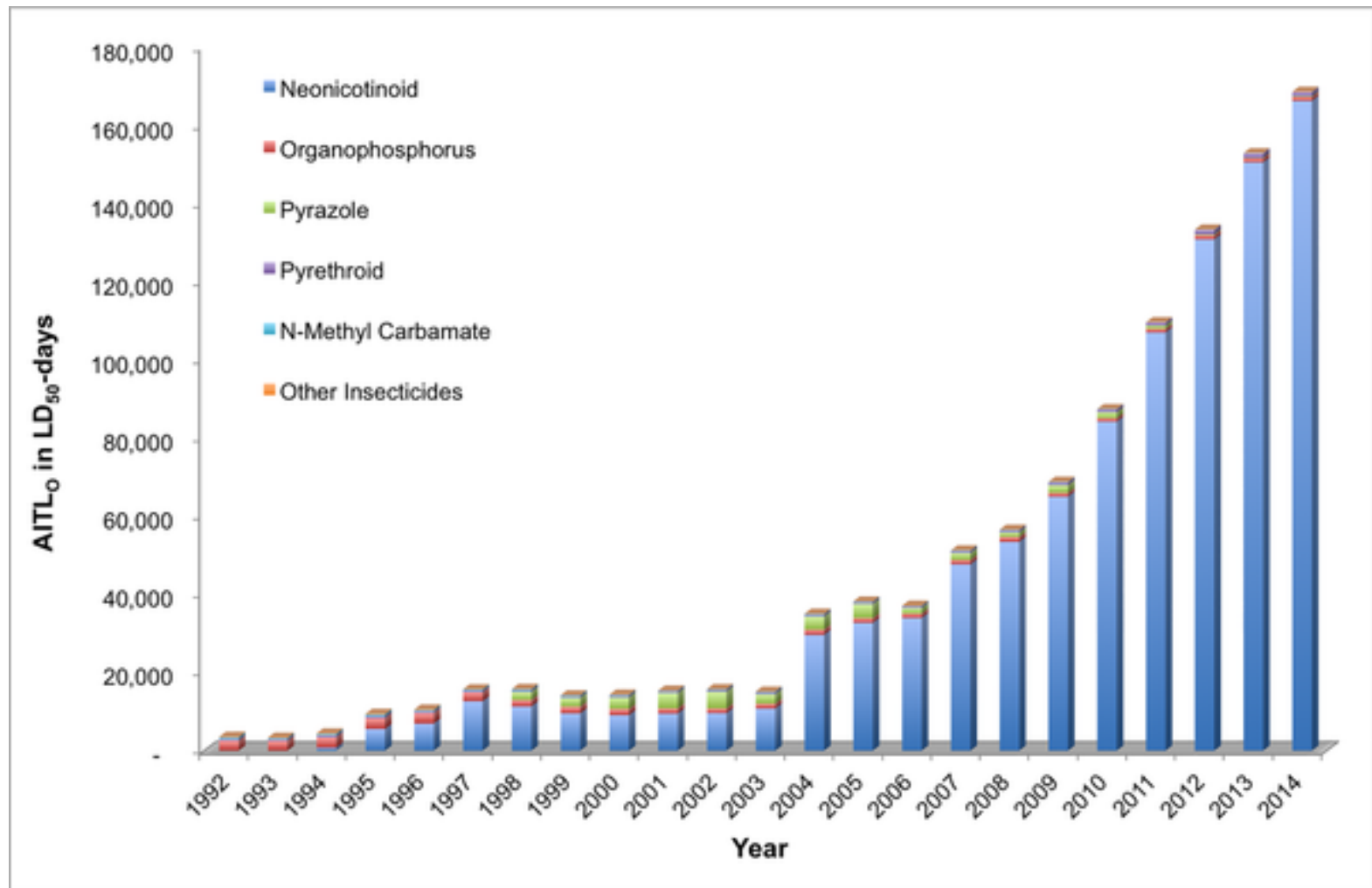
Figure 1 Area of crop treated (blue line, hectares) and mass of pesticide applied (red line, kilograms) from 1990 to 2015. The total area of crop remained approximately constant at 4.6 million hectares. In 1990 each hectare of croppped land on average received a total of 7.5 kg of pesticide active ingredient delivered in 9.8 applications. By 2015 each hectare of land received 3.9 kg of pesticide in 17.4 applications.

Full-size  DOI: 10.7717/peerj.5255/fig-1



Prophylactic pesticides: # of honeybee lethal doses (LD₅₀) in pesticides applied to UK farmland 1990-2015 DOI: [10.7717/peerj.5255/fig-2](https://doi.org/10.7717/peerj.5255/fig-2)

Fig 5. Oral acute insecticide toxicity loading (AITLO) by chemical class, 1992–2014.

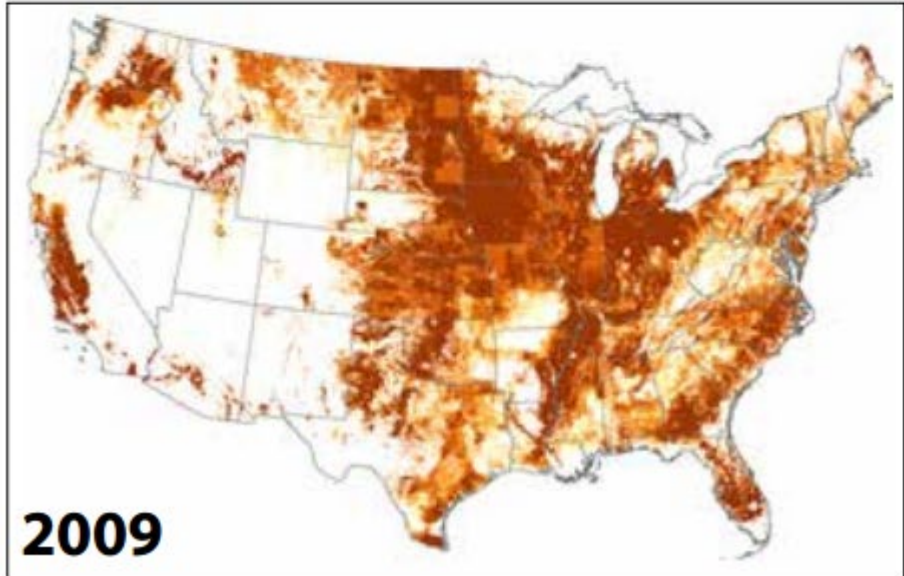
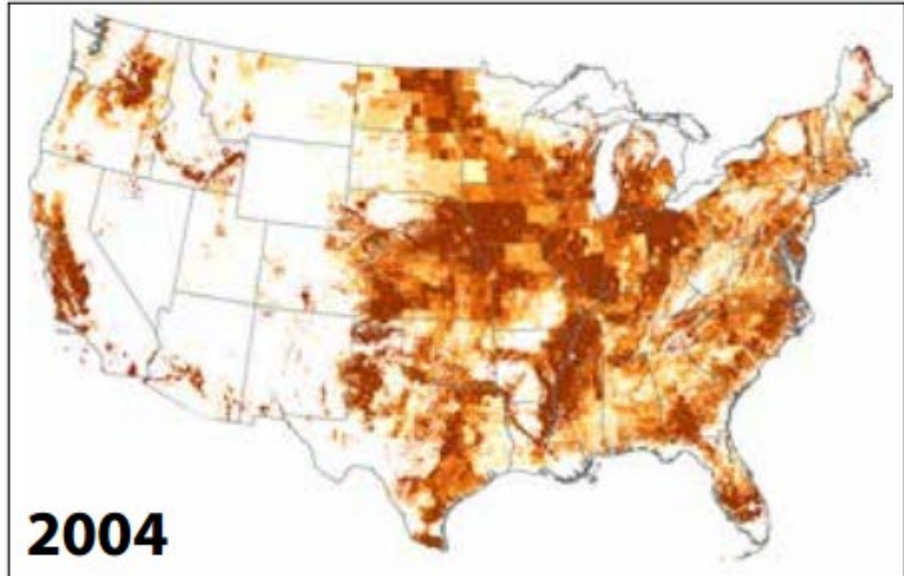
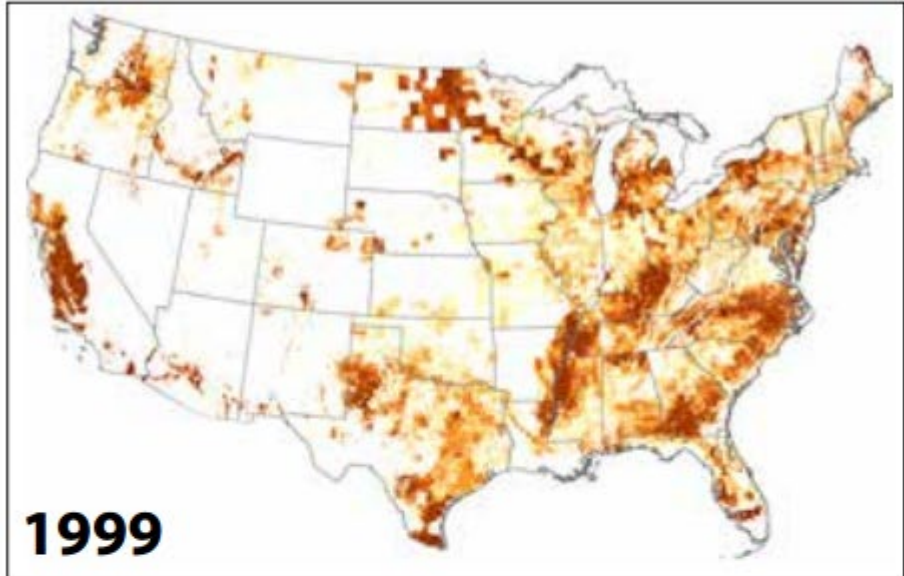


DiBartolomeis M, Kegley S, Mineau P, Radford R, Klein K (2019) An assessment of acute insecticide toxicity loading (AITL) of chemical pesticides used on agricultural land in the United States. PLOS ONE 14(8): e0220029.

<https://doi.org/10.1371/journal.pone.0220029>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0220029>

Imidacloprid use on farms. Darker color indicates greater quantity used per square mile.



Source: USGS National Water-Quality Assessment Program Pesticide National Synthesis Project, http://water.usgs.gov/nawqa/pnsp/usage/maps/compound_listing.php (accessed 9/16/13).



(society)
Practical problem

translate



interpret



Technical problem
(science)

Imidakloprid: kronisk giftighet for humler



Mikrokolonier matet med imidakloprid

- 200 ppm 100% dødelighet innen få timer
- 20 ppm 100% dødelighet innen 14 dager
- 2 ppm 100% dødelighet innen 28 dager
- 0.2 ppm 100% dødelighet innen 49 dager,
- 20 ppb 15% dødelighet (77 dager)
- 10 ppb 0% dødelighet (77 dager)

NOEC reproduction <2.5 ppb

<http://dx.doi.org/10.1007/s10646-009-0406-2> Mommaerts e.a. 2010

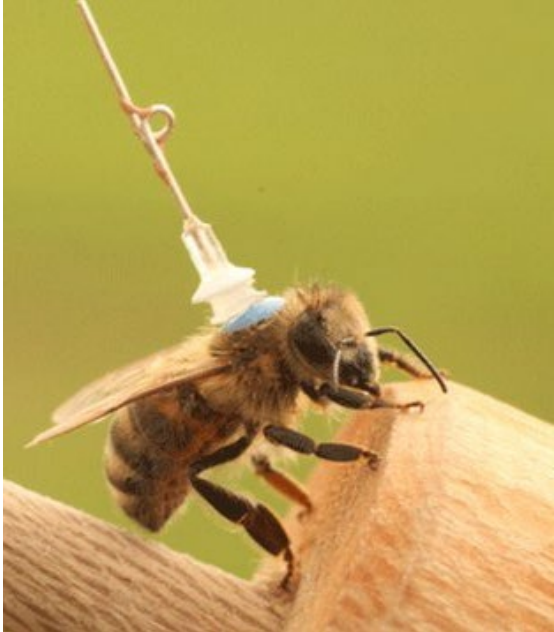
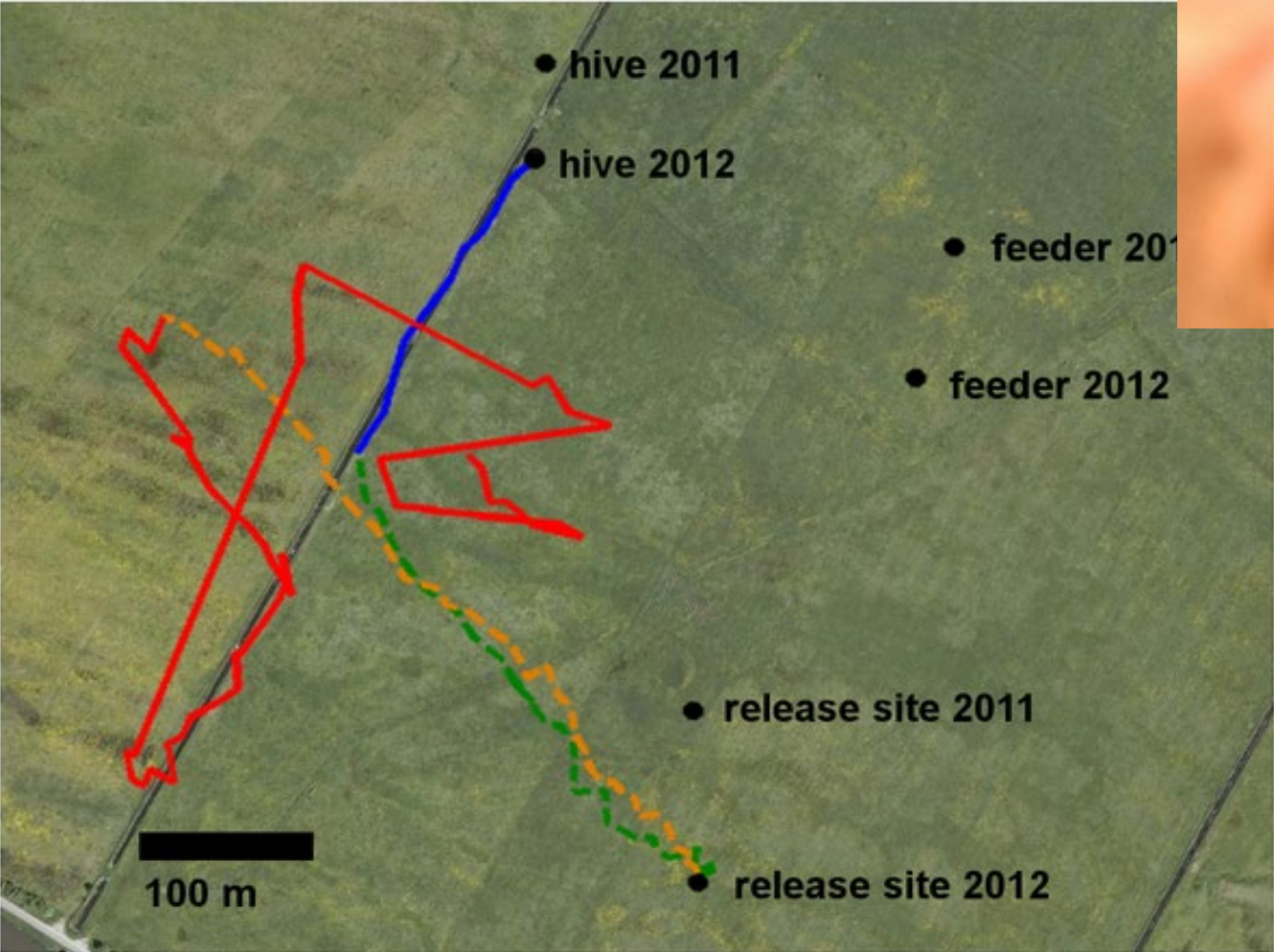
EU legger til grunn en ti-dagers test!!

Radar-tracking experiment Randolph Menzel: Bees exposed to neonicotinoids loose orientation



Yellow-Red
Thiacloprid-bees

Green-Blue
Control bees



Fischer J, Müller T, Spatz A-K, Greggers U, et al. (2014) Neonicotinoids Interfere with Specific Components of Navigation in Honeybees. PLoS ONE 9(3): e91364. doi:10.1371/journal.pone.0091364 <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0091364>

Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production



Penelope R. Whitehorn,¹ Stephanie O'Connor,¹ Felix L. Wackers,² Dave Goulson^{1*}

¹School Natural Sciences, University of Stirling, Stirling FK9 4LA, UK. ²Lancaster University, LEC, Lancaster LA1 4YQ, UK.

*To whom correspondence should be addressed. E-mail: dave.goulson@stir.ac.uk

Growing evidence for declines in bee populations has caused great concern due to the valuable ecosystem services they provide. Neonicotinoid insecticides have been implicated in these declines as they occur at trace levels in the nectar and pollen of crop plants. We exposed colonies of the bumble bee *Bombus terrestris* in the lab to **field-realistic levels** of the neonicotinoid **imidacloprid**, then allowed them to develop naturally under field conditions. Treated colonies had a significantly reduced growth rate and suffered an **85% reduction in production of new queens** compared to control colonies. Given the scale of use of neonicotinoids, we suggest that they may be having a considerable negative impact on wild bumble bee populations across the developed world.

Wild flowers translocate neonics



Table 6. Pesticide concentrations found in unplanted fields near apiary during planting period in 2011, all concentrations shown are expressed as **parts per billion**.¹

SAMPLE TYPE	Sample wt. (g)	THIAMETHOXAM LOD=1.0	CLOTHIANIDIN LOD=1.0	METOLACHLOR LOD=0.5	ATRAZINE LOD=0.2	AZOXYSTROBIN LOD=0.2	COUMAPHOS LOD=1.0
Soil, unplanted field 1, Soybeans 2010 (2 samples)	5.15, 5.01	ND	6.0±0.3	1014±14	771±170	0.2±0.1	ND
Soil, unplanted field 2, Soybeans 2010 (2 samples)	5.28, 5.43	ND	8.9±0.1	8.3±0.7	160±15	26±17	ND
Dandelions near maize field	2.96	ND	1.4	49	677	ND	ND
Dandelions near maize field	3.81	1.6	5.9	64	1133	ND	ND
Dandelions near maize field	4.51	1.3	3.1	28	522	ND	ND
Dandelions near maize field	4.05	2.9	1.1	60	269	ND	ND
Dandelions near maize field	3.10	1.1	1.6	5.7	125	ND	ND
Dandelions near maize field	3.44	ND	9.4	295	1004	ND	ND
Dandelion, CAES (non-agricultural area)	3.93	ND	ND	ND	0.3	ND	ND

When two aliquots of the same sample were analyzed the results are expressed as ± the standard deviation of the two analyses.

¹ND= Not detected.

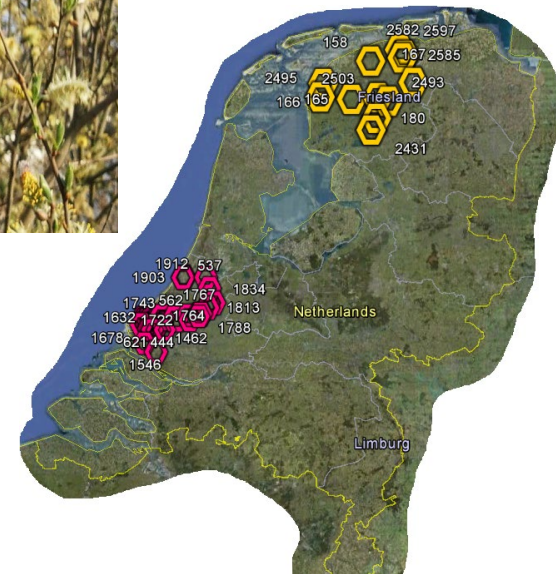
doi:10.1371/journal.pone.0029268.t006

Krupke e.a. 2012. Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields. <http://dx.doi.org/10.1371/journal.pone.0029268>



Trær forflytter neoniks fra overflatevann til pollen og nektar

I NL fant vi imidakloprid og tiakloprid i prøver fra piletrær (Salix) i forurensede områder



Worldwide integrated assessment on systemic pesticides

Global collapse of the entomofauna: exploring the role of systemic insecticides

2014: Eight scientific papers (154 pages)

- Five years study
- First meta-analysis on neonicotinoids and fipronil
- 29 scientific authors (no conflict of interest)
- Comprehensive analysis (1121 publications & data from companies)
- Published in *Environmental Science and Pollution Research*, 2015

DOI: 10.1007/s11356-014-3220-1

DOI: 10.1007/s11356-014-3470-y

DOI: 10.1007/s11356-014-3180-5

DOI: 10.1007/s11356-014-3277-x

DOI: 10.1007/s11356-014-3332-7

DOI: 10.1007/s11356-014-3471-x

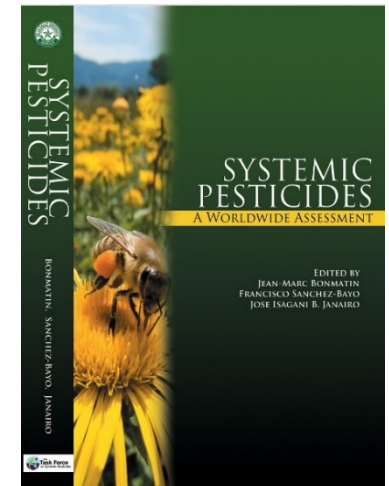
DOI: 10.1007/s11356-014-3628-7

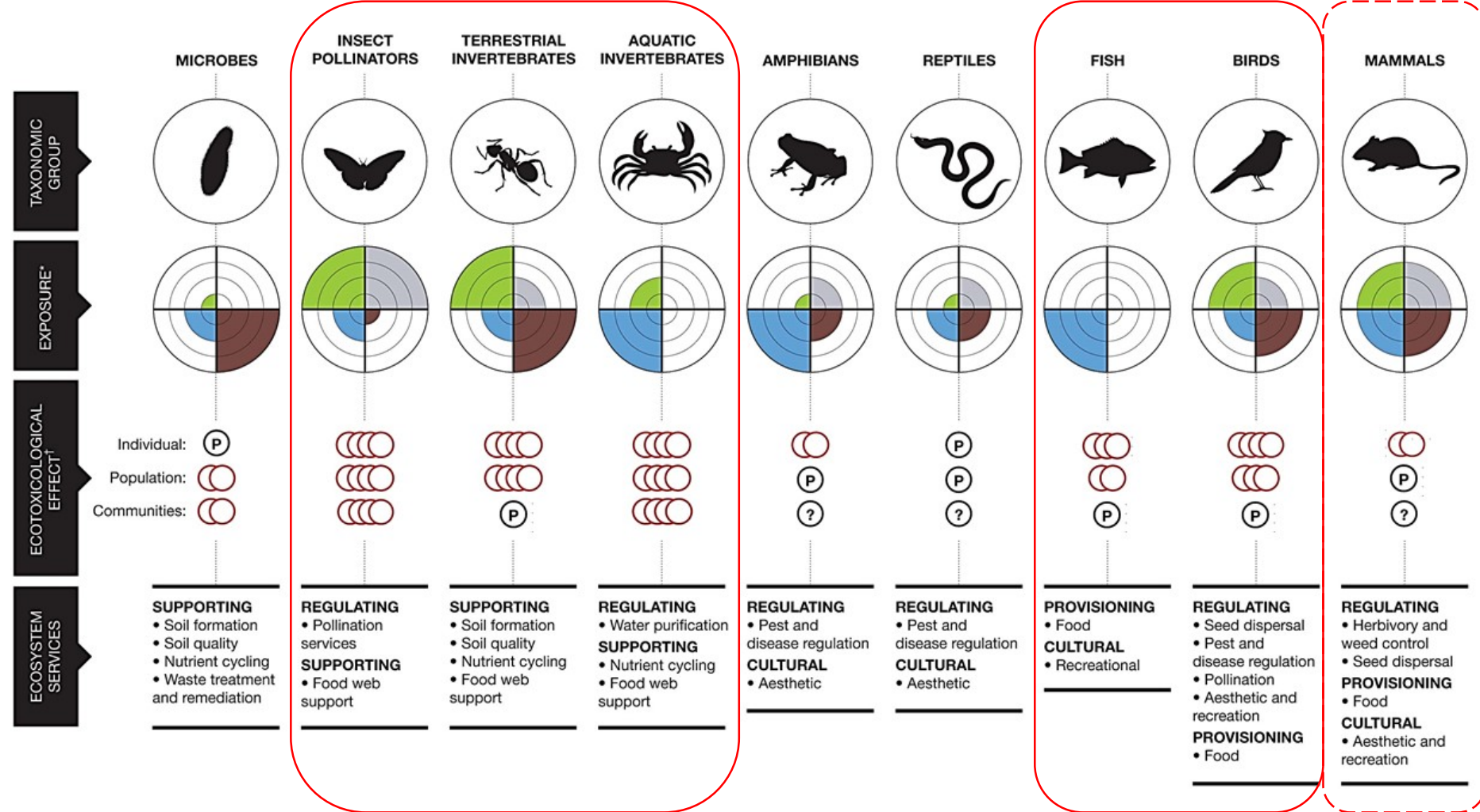
DOI: 10.1007/s11356-014-3229-5

http://www.tfsp.info/assets/WIA_2015.pdf

2017-2018: Three new scientific papers (107 pages)

- Updated meta-analysis on neonicotinoids and fipronil
- 24 scientific authors (no conflict of interest)
- Comprehensive analysis (700 additional publications)
- 3 main chapters:
 - Exposures & Metabolism [DOI:10.1007/s11356-017-0394-3](https://doi.org/10.1007/s11356-017-0394-3)
 - Impacts & Ecosystems [DOI: 10.1007/s11356-017-0341-3](https://doi.org/10.1007/s11356-017-0341-3)
 - Resistances & Alternatives [DOI: 10.1007/s11356-017-1052-5](https://doi.org/10.1007/s11356-017-1052-5)





***EXPOSURE**

0: No route of exposure
 1: Potential route of exposure assumed negligible
 2: Relevant route of exposure low
 3: Relevant route of exposure moderate
 4: Relevant route of exposure high

†ECOTOXICOLOGICAL EFFECT

○ 1: Potential effects assumed negligible under normal exposure conditions
 ○○ 2: Evidence effects can occur but at high doses or after prolonged exposure
 ○○○ 3: Evidence effects can occur at moderate doses
 ○○○○ 4: Evidence effects can occur at low doses or after acute exposure
 (?) Unknown: in situations where no judgement could be made because of lack of evidence, e.g. data unavailable
 (P) Probable: no accurate judgement could be made due to incomplete evidence, but data suggests a potential effect level above (1)



Smutthull

Neonikotinoider forurenses fortsatt miljøet:

- **Fortsatt i bruk som biocid**
 - Brukes (imidakloprid) to kill flies in cattle breeding (stables, trucks, etc.)
 - Wood conservation (thiacloprid)
- **Brukes fortsatt i dyremedisin**
 - I kjæledyr og storfe (lopper og fluer)
- **Brukes fortsatt i matproduksjon (for mennesker og dyr) utenfor EU**
 - Rester av neonikotinoider ender opp i urin og møkk, funnet i avløpsvann fra renseanlegg.
- **Uønsket substitusjon:**
 - Tiakloprid (erstattet de tre forbudte neonikotinoidene I 2013/2018)
 - Sulfoxaflor [2015] & Flupyradifurone [2015]: samme virkningsmekanisme, *tidlige advarsler før autorisasjon ble innvilget*
- **Nye markeder:**
 - Lakselusbehandling (imidakloprid)

Pet flea treatments poisoning rivers across England, scientists find

17 Nov 2020

Discovery is 'extremely concerning' for water insects, and fish and birds that depend on them



▲ Research found chemical fipronil in 99% samples from 20 rivers in England. Photograph: Danny Lawson/PA

Highly toxic insecticides used on cats and dogs to kill fleas are poisoning rivers across England, a study has revealed. The discovery is “extremely concerning” for water insects, and the fish and birds that depend on them, the scientists said, who expect significant environmental damage is being done.

The research found fipronil in 99% of samples from 20 rivers and the average level of one particularly toxic breakdown product of the pesticide was 38 times above the safety limit. Fipronil and another nerve agent called imidacloprid that was found in the rivers have been banned from use on farms for some years.

<https://www.theguardian.com/environment/2020/nov/17/pet-flea-treatments-poisoning-rivers-across-england-scientists-find>



One Seresto vet halsbånd contains 4.5 gram imidacloprid

Enough to give 1.2 milliard honeybees (ca. 30 000 hives) a deadly dose (LD50 honeybee = 3.7 ng)

Enough to pollute 640 million litre surface water up to the MTR-norm to protect aquatic insects (MTR = 7 ng/litre)

Sea lice medicine approval ratified in EU law

16-4-2021



Benchmark's CleanTreat water filtration system enables BMK08 to be used without harm to the environment. Photo: Benchmark.

“BMK08 contains the neonicotinoid imidacloprid and has proved to be highly effective in commercial trials in Norway. It is designed to be used with CleanTreat, Benchmark’s award-winning filtration system which removes both medicine residues and lice egg strings from wellboat treatment water before it is returned to the sea.”

<https://www.fishfarmingexpert.com/article/sea-lice-medicine-approval-ratified-in-eu-law/>

Dagens situasjon i Norge

- I senere år har kun imidakloprid og tiakloprid vært tillatt i Norge.

Imidakloprid:

- 2018 EU-forbud: utendørs bruk ikke lenger tillatt i Norge, kun tillatt i permanente drivhus (veksthus)
- November 2020: også forbudt i drivhus
“utfasingsperiode” kan selges til og med 1. juni 2021, og videre lagres og brukes til og med 1. juni 2022
- **Fortsatt brukt som biocid:** QUICK BAYT, Baythion D Mot Maur, Kvitt N Maurlokkeboks, Maxforce Quantum
- **Veterinærmedisin** (Seresto vet halsbånd 4.5 gram imidakloprid)
- Nytt bruksområde: **Lakselusbehandling** (BMK08 / Imidakloprid)

Tiakloprid:

- EU-forbud 2019. (*Utfasingsperiode: tillatt solgt i Norge til og med 3. november 2020, og tillatt brukt i Norge til og med 3. februar 2021.*)
- **Brukes fortsatt som biocid i trevarer :**
Jotun Industry Grunning, Jotun Industry Impregnering

Utfordringer

For lite

- Hvordan tetter vi smutthullene?

For sent

- Hvordan unngå forsinkelser mellom tidlige advarsler og handling?
- Hvordan forsterke den samfunnsmessige organiseringen av ekspertise for å legge til rette for tidriktig og adekvat handling?

Kapasitetsbygging

- Hvordan bygge et kunnskapsnettverk for å forsterke forståelsen av føre-var prinsippet i Norge?

SFF V proposal **AcKnowledges** Centre of Actionable Knowledges

Project summary:

Pressing complex issues such as pandemics, chemical risks, climate adaptation and biodiversity loss exemplify society's heavy reliance on institutionalised expertise to inform and justify action. But in deploying knowledge for action, a narrow selection of knowledge is privileged, while other knowledge is silenced. Faced with uncertainty, high stakes, disputed values and urgent decision-making, a plurality of knowledges must be considered when finding ways to properly scope the decision space.

Our CoE will explore and assess whether a turn to a more inclusive and socially robust knowledge base, attentive to epistemic pluralism, can expand the range of policy options, avoid addressing the wrong problems and reduce unforeseen impacts. Our transdisciplinary study of actionable knowledge will advance empirical, theoretical and normative insights into what makes knowledge actionable. Grounded in comparative analysis of salient cases, we uncover the processes systematically privileging or silencing certain knowledges and thought styles in informing action and draw lessons within and across cases.

To pioneer inclusive engagement spaces for co-creating actionable knowledge, we will apply novel notions of empowerment and experiment in institutional arenas ranging from regulatory science to courts. This marks a shift from studying the processes by which knowledge is heard in decision-making to studying processes through which knowledge is ignored. Based on a new practice of **knowledge curation**, our CoE will devise a groundbreaking Actionable Knowledge Framework that will allow science and society to include relevant knowledge from diverse sources more equitably.

Our strategic transdisciplinary assemblage of academic perspectives and long high-level involvement in science advice for policy will enable us to uncover and help reform the intertwined scientific, social, cultural, historical and political processes to better curate knowledge for action and accommodate diversity.

Primary and secondary objectives of the project:

Mission: To enable and catalyse a reform of the social organisation of expertise.

Primary objective: To devise and apply a transformative framework accommodating diversification of knowledge forms in the co-creation of the actionable knowledges that inform societal responses to pressing issues.

Secondary objectives:

- To uncover the processes that shape which knowledges are privileged and which are silenced, marginalised, or ignored in institutionalised expertise in complexly interlinked cases (pandemics, chemical risks, climate adaptation and biodiversity loss) according to: (a) the dominating thought styles and framings; (b) the underpinning historical and cultural/cognitive processes; (c) the role of context and power; (d) the role of ethics and value judgements.
- To experimentally devise and apply novel co-creation processes for curating actionable knowledges according to a logic of care and to devise methods to critically appraise knowledge quality for informing decisions.

Curation



/kʏə'reɪ.ʃən/ the action or process of scoping, carefully choosing, organising, presenting and taking care of information or objects for others to use or enjoy.

Akin to an arts curator in a museum, we understand curation as an active and interventionist practice of stewardship.

Twitter: @Jeroen_vdSluijs