Vårmøte for Agder vitenskapsakademi 27. April 2023
Bærekraftsmål 2 Utrydde sult. Kristiansand

Global pollinator stewardship essential for zero hunger

Prof. Dr. Jeroen P. van der Sluijs

UNIVERSITAS BERGENSIS
Senter for vitenskapsteori

This Is What Your Grocery Store Looks Like Without Bees

https://www.huffpost.com/entry/store-without-bees_n_5500380

Mongabay Series: Environment And Health

Decline in pollinators linked to half a million premature human deaths every year, shows study

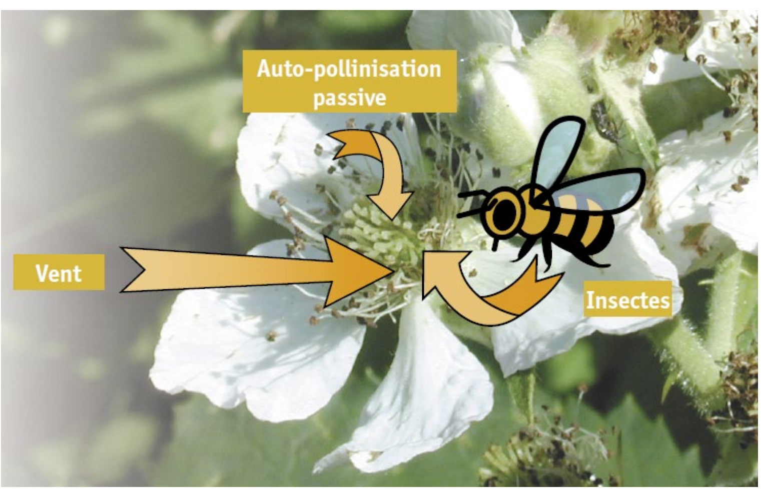
by Jeremy Hance on 4 April 2023

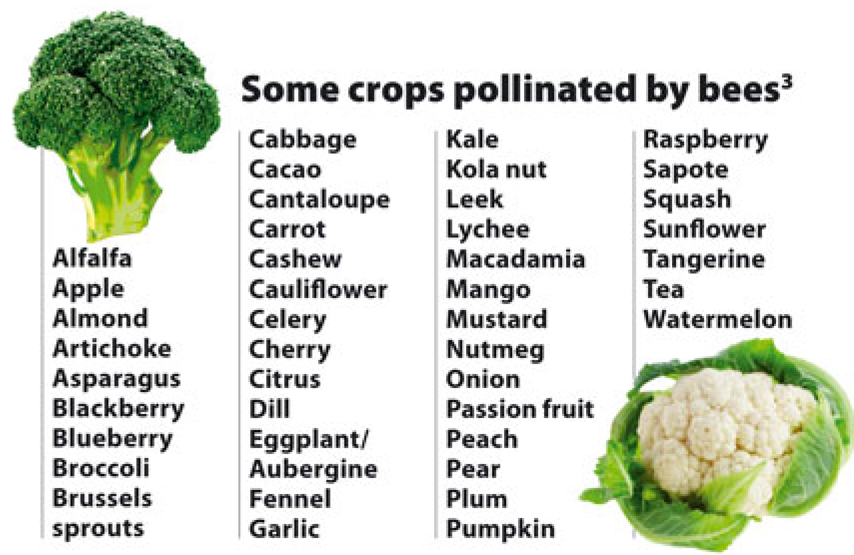
- Globally, the study calculated that 3%–5% of fruit, vegetable, and nut production is currently lost due to inadequate pollination
- Half a million people die prematurely every year due to global insect pollinator decline that has impacted the **availability and price of healthy foods** such as nuts, legumes, fruits and vegetables.
- Middle-income countries, including India, Russia and China are among the hardest hit.

Source: Mongabay Study in EPH: https://doi.org/10.1289/EHP10947

The importance of pollinators

- 90 major crops (35% world food production volume) depend on pollinators
- Key nutrients: 90-100% from pollinator mediated crops (vit C, antioxidants, lycopene, β-tocopherol, vit A and folic acid)
- Estimated global values of pollination (2020) range widely from US$ 195 billion to US$ 657 billion annually
- 94% of all flowering plants on Earth depends on insect pollinators for reproduction and evolution





World wide: 25000 bee species; EU: 1965 In NL about 350 bee species, 181 of them are on the Red List / at risk of extinction

EEA Report | No 1/2013

2013

Late lessons from early warnings: science, precaution, innovation

ISSN 1725-9177

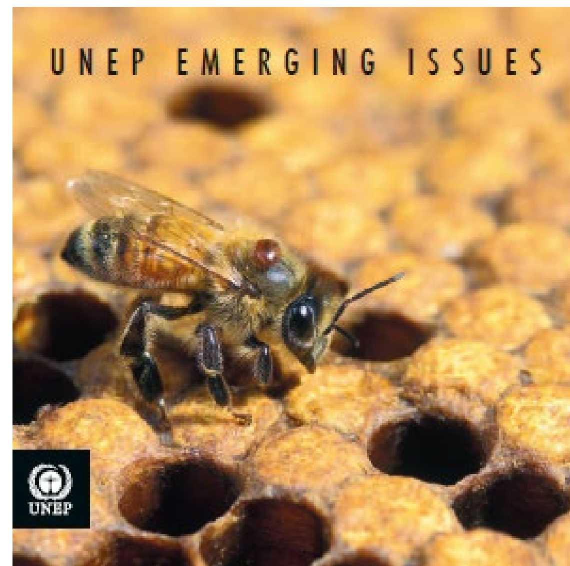
Parallel Declines in Pollinators and Insect-Pollinated Plants in Britain and the Netherlands

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. Kunin[1]

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.

UNEP EMERGING ISSUES



GLOBAL HONEY BEE COLONY DISORDERS AND OTHER THREATS TO INSECT POLLINATORS

2011

PNAS

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[b]

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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

New pollinator emerging in China

PLOS | ONE

RESEARCH ARTICLE

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

Caspar A. Hallmann[1]*, Martin Sorg[2], Eelke Jongejans[1], Henk Siepel[1], Nick Hofland[1], Heinz Schwan[2], Werner Stenmans[2], Andreas Müller[2], Hubert Sumser[2], Thomas Hörren[2], Dave Goulson[3], Hans de Kroon[1]

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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http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0185809&type=printable

Insects Opinion

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.”

Key role for insects in all categories of ecosystem services

- **Provisioning**
  - Nutrition (food for animals and humans: About 1,500 edible insect species are consumed by 3,000 ethnic groups in 113 countries), materials (silk, wax, lac, pigments), medicine
- **Regulation and maintenance**
  - **Pollination**, seed dispersal, **food web support**, **pest control**, **soil formation**, **decomposition**, **nutrient cycling**
- **Cultural**
  - Esthetic, poetry, scientific, educational, inspirational (for many domains, technology, robotics, democracy, art, etc)

Available online at www.sciencedirect.com

ScienceDirect

ELSEVIER

Current Opinion in Environmental Sustainability

Insect decline, an emerging global environmental risk

This Commentary follows up on the previously published article (https://doi.org/10.1016/j.cosust.2013.05.007) which appeared in COSUST Volume 5, Issues 3-4, September 2013, Pages 293-305

Jeroen P van der Sluijs[1,2,3]

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The Earth's entomofauna seems in an ongoing state of collapse. Insect decline could pose a global risk to key insect-mediated ecosystem functions and services such as soil and freshwater functions (nutrient cycling, soil formation, decomposition, and water purification), biological pest control, pollination services and food web support that all are critical to ecosystem functioning, human health and human survival. At present the attention for insect decline is low in all domains, ranging from scientific research to policy-making to nature conservation. Scientists made urgent calls to prioritise insect conservation. An international treaty for global pollinator stewardship and pollinator ecosystem restoration is urgently needed to counteract the current crisis. A review of insect pollinator conservation policies found that despite scientific calls and public outcry to develop polices that addresses declines, governments have not delivered such legislation, nor have they met basic monitoring needs recommended by experts.

Over the past decades, evidence has mounted that the Earth's entomofauna is in an ongoing state of collapse. Globally, insects make up three quarters of animal and plant species [1]. But these little things that run the world [2] seem to have been widely overlooked in science, nature conservation and environmental policy-making and law-making. Insect abundance in protected nature areas in Germany have fallen by 75% over the last 27 years [3]. Strong declines were also found in Netherlands [4]. Guardian columnist George Monbiot [5] coined the term 'insectageddon' to warn that the impacts of global insect collapse are more catastrophic than climate breakdown. Although this term has been criticised as being overly alarmist and unsubstantiated by data [6], entomologists warn that insects are indeed disappearing before we even have data [7]. Of the approximately 5.5 million insect species, about 90% has not even been named, nor have their roles in ecosystems been mapped. No global scientific monitoring of insect abundance in the past and present exists and there are no plans for systematic global monitoring in the near future.

Insects decline is a major concern for human health because essential micronutrients in our diet come from insect-pollinator mediated crops [8,9•] and because phytopharmaceuticals and nutritional supplements depend on pollinators [9•]. A modelling analysis found that complete removal of pollinators could increase global deaths yearly from non-communicable and malnutrition-related diseases by about 1.4 million (1.38–1.48) and disability-adjusted life-years (DALYs) by about 27 million (25.8–29.1), an increase of 2.7% for deaths and 1.1% for DALYs [10].

https://doi.org/10.1016/j.cosust.2020.08.012

Available online at www.sciencedirect.com

ScienceDirect

ELSEVIER

Current Opinion in Insect Science

Pollinator conservation requires a stronger and broader application of the precautionary principle☆

Laura Drivdal[1] and Jeroen P van der Sluijs[1,2]

The accumulating scientific evidence on global insect and pollinator decline is fuelling calls for pollinator conservation policies. A broad range of regulating and incentivising policies is undoubtedly needed to address the diverse threats to pollinator abundance and diversity, but implementing policies and regulations is beset by socio-political challenges. Lessons could be learned from the past and current applications of concepts central to biodiversity conservation. Given the uncertainties and data gaps, the concept of the Precautionary Principle (PP) is particularly important. The PP means that when it is scientifically plausible that human activities may lead to morally unacceptable harm, actions shall be taken to avoid or diminish that harm: uncertainty should not be an excuse to delay action. This paper reviews the role of the PP in pollinator conservation. The current research front is fragmented: the PP is briefly mentioned as relevant in literature on biodiversity conservation because of the scientific uncertainties regarding insect decline and their diverse drivers. A separate strand of literature contains studies on specific cases where the PP has played a role in the regulation of specific threats to pollinators: systemic insecticides and global trade in bees. Although limited to two significant threats to pollinator abundance and diversity, these studies provide important lessons on the challenges of implementing precautionary pollinator conservation policies and underline socio-political aspects of the 'human-dimensions' of pollinator conservation. Specifically, they highlight that ambiguity is a greater challenge than scientific uncertainty, which may be heightened when policies are intended to regulate specific economic sectors. We suggest that more attention should be paid to the discrepancy between the PP as formally included in policies or regulations and its inadequate implementation (too little too late) in a context of scientific uncertainty and societal conflict.

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Current Opinion in Insect Science 2021, **46**:95–105

This review comes from a themed issue on **Pollinator decline: human and policy dimensions**

Edited by **Jeroen P van der Sluijs**, **Stéphane Foucart** and **Jérôme Casas**

For a complete overview see the Issue and the Editorial

Available online 28th April 2021

https://doi.org/10.1016/j.cois.2021.04.005

Introduction

Pollinator decline, and more broadly global insect decline, is increasingly recognised as an emerging global environmental risk urgently requiring an internationally coordinated and integrated policy response [1•,2–5]. Major data gaps prevail, limiting our knowledge on the global status of insects. The best studied declining entomofauna of concern are the insect pollinators, of which the best studied are bees. A recent study indicates that worldwide, between 2006 and 2015, 25% fewer species of wild bees were seen than was the case before 1990 [6•]. The European Red List for bees shows that the populations of 46% of Europe's bumblebees (the best studied subgroup) are declining [7]. Despite the calls from scientists and the public to develop international and national policies to address pollinator declines, governments have not delivered on legislation [2]. Pollinator decline constitutes a typical post-normal science [8] problem: being essential for global food security and ecosystem resilience [1•,2] the stakes for pollinator conservation are high, while facts are uncertain and contested, values are disputed and decisions are urgently needed. In such situations, science advisers and policymakers typically struggle to make sense of science under conditions of uncertainty and complexity [9••], which can lead to *paralysis by analysis*: continuous calls for better knowledge and prevailing hesitancy to act despite ever-stronger warning signals. The literature presents a wide range of drivers and causes

https://doi.org/10.1016/j.cois.2021.04.005

Governing under extreme unknowns

- “Insects are disappearing and we don’t even have data”
- Globally, insects make up three quarters of animal and plant species
- There are approximately 5.5 million insect species
- Nearly 89 percent of these species has not even been named
- No global scientific monitoring of insect abundance in the past, present and near future
- Strong anecdotal evidence of dramatic declines of flying insects (windscreen phenomenon)
- Causes are poorly known, manifold, and(/or?!) highly contested

The assessment report on
POLLINATORS, POLLINATION AND FOOD PRODUCTION

SUMMARY FOR POLICYMAKERS

ipbes

2016

2019

*"**Global trends in insect populations are not known but rapid declines have been well documented in some places.**"*

*"… **The proportion of insect species threatened with extinction is a key uncertainty**, but available evidence supports a **tentative estimate of 10 per cent** (established but incomplete)"*

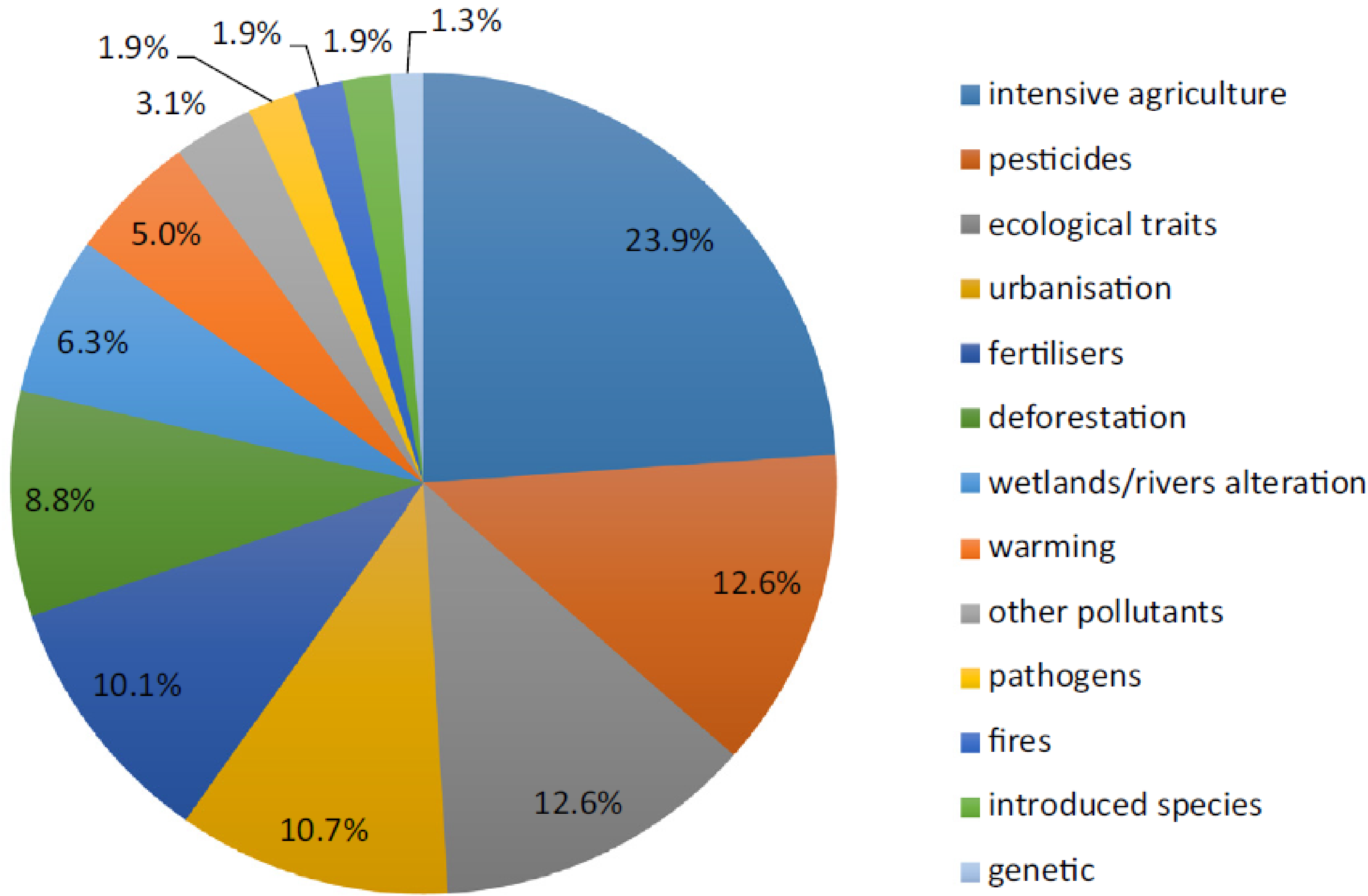
*"… of an estimated 8 million animal and plant species (**75% of which are insects**), around **1 million are threatened with extinction** (established but incomplete)*

"Local declines of insect populations such as wild bees and butterflies have often been reported, and insect abundance has declined very rapidly in some places even without large-scale land-use change, but the global extent of such declines is not known (established but incomplete)"

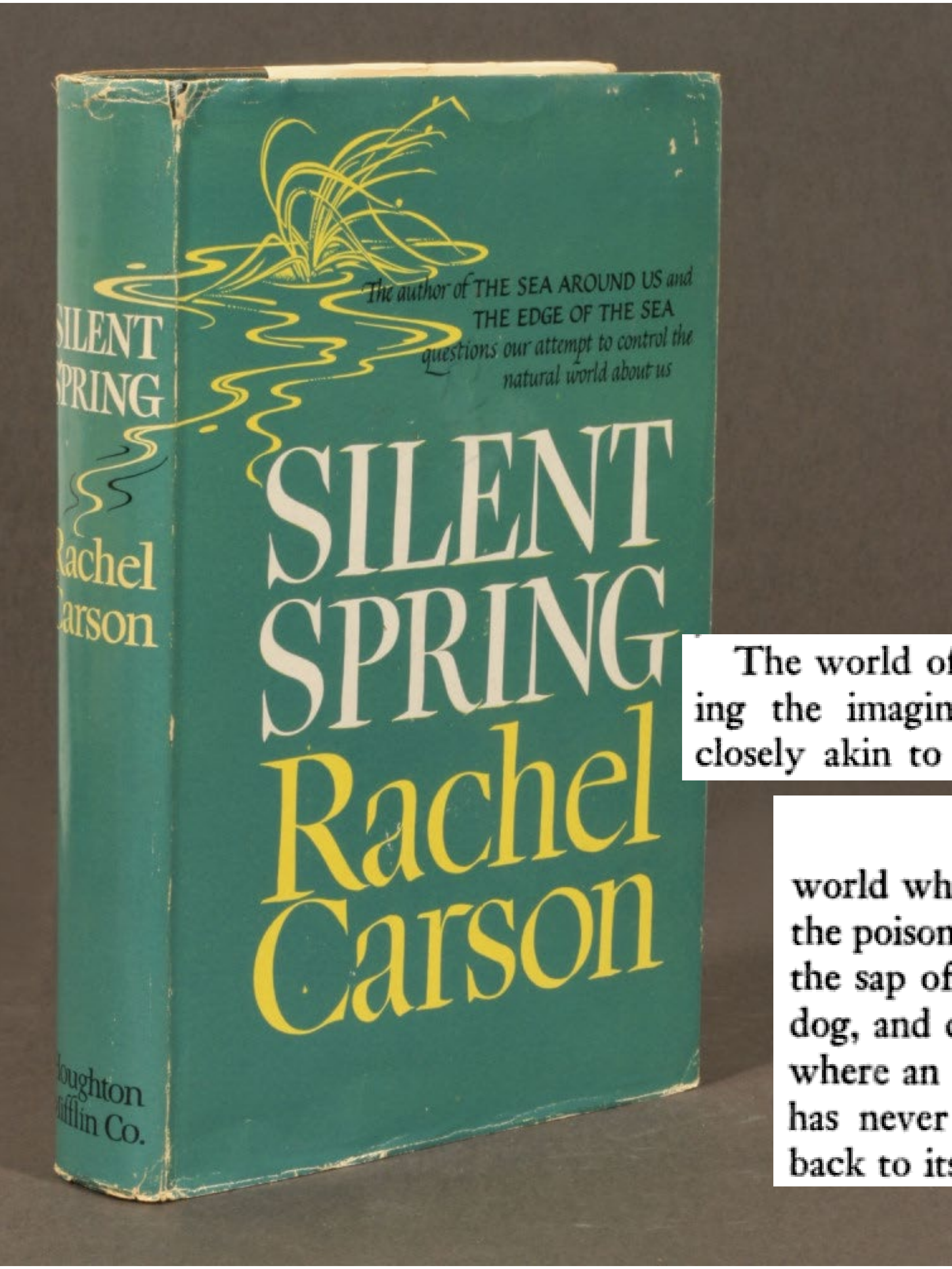
Pollinator decline: interaction of mutually reinforcing causes

PPPP

- **P**ollen
- **P**athogens
- **P**esticides
- **P**laces (for nesting)



<u>Scientific dissent</u> on what drives insect declines (% of publications [*n*=73] mentioning cause *x* as the main driver of insect decline)
DOI: 10.1016/j.biocon.2019.01.020



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

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.

2017

NEONICOTINOIDS

A worldwide survey of neonicotinoids in honey

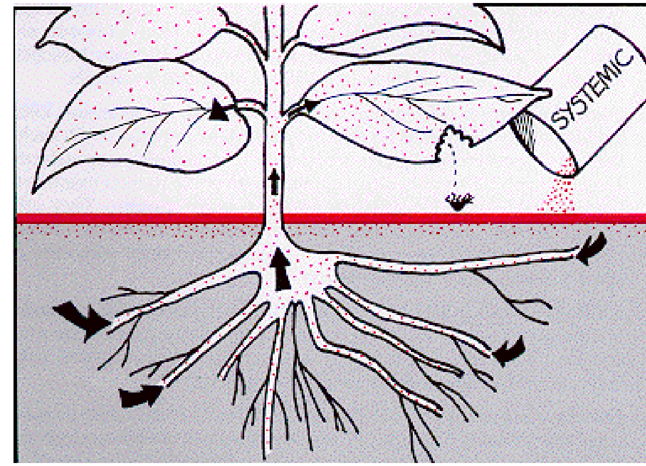
E. A. D. Mitchell,[1,2]* B. Mulhauser,[2] M. Mulot,[1]† A. Mutabazi,[3]‡ G. Glauser,[3] A. Aebi[1,4]

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 ± standard error for positive samples: 1.8 ± 0.56 nanograms per gram).

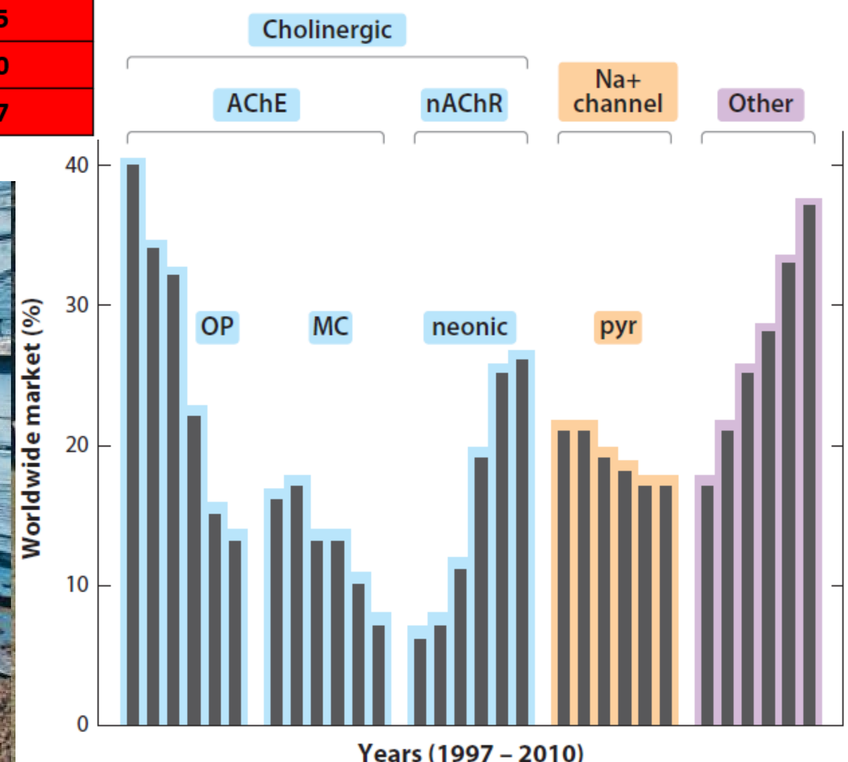
https://science.sciencemag.org/content/358/6359/109/tab-pdf

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	Mesurol	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	Gaucho	Insecticide	3.7	7297

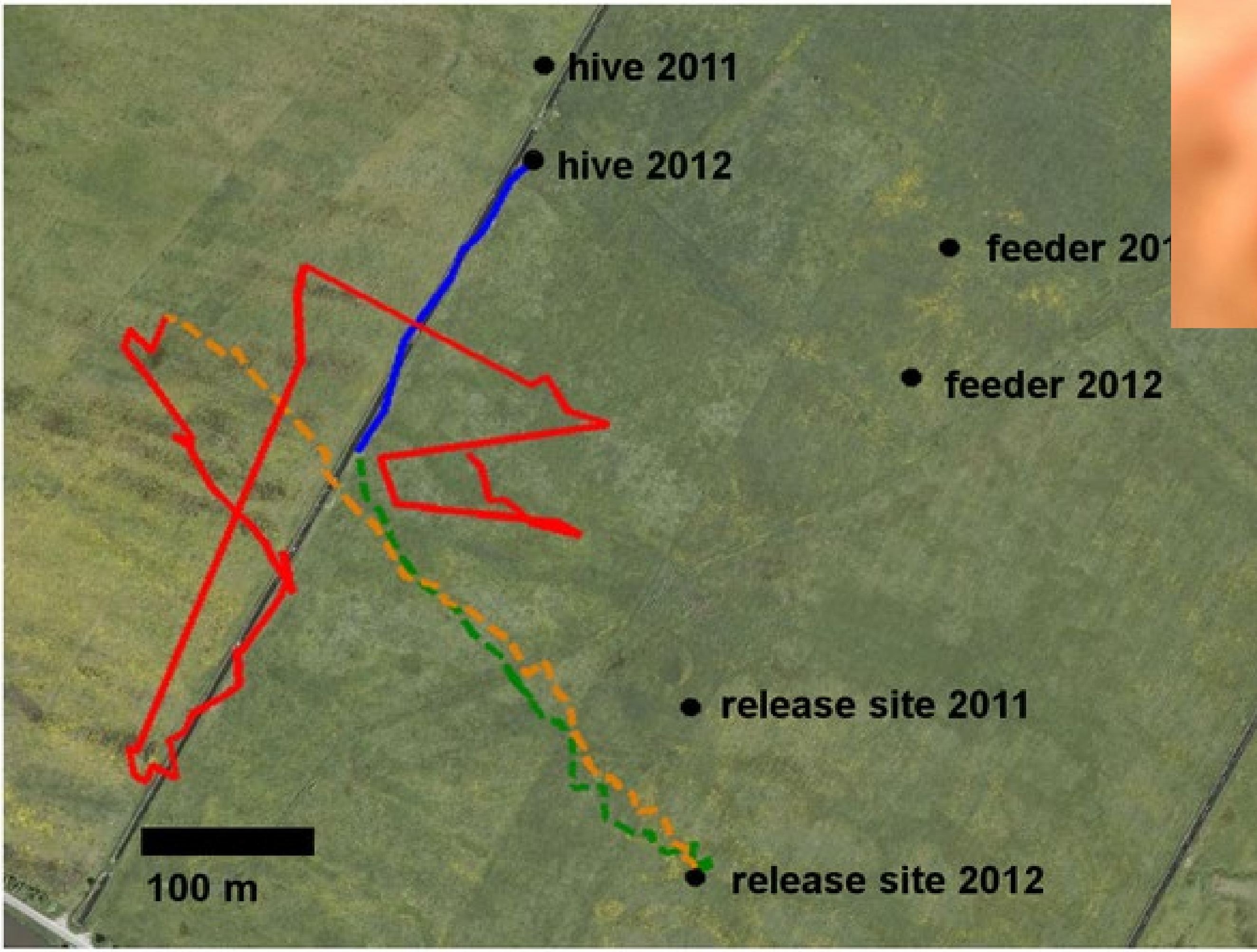


Systemic = plant takes up the insecticide into its sap-stream, becomes toxic from the inside



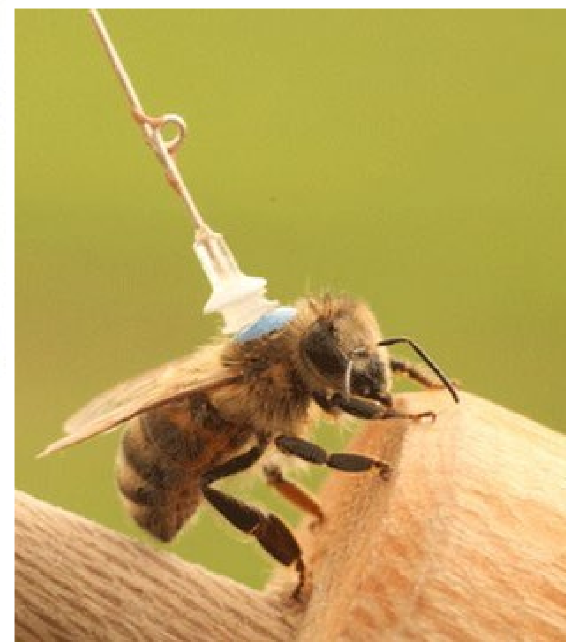
Source: Casida and Durkin, 2013 doi: 10.1146/annurev-ento-120811-153645

Radar-tracking experiment Randolf 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

PLOS | ONE

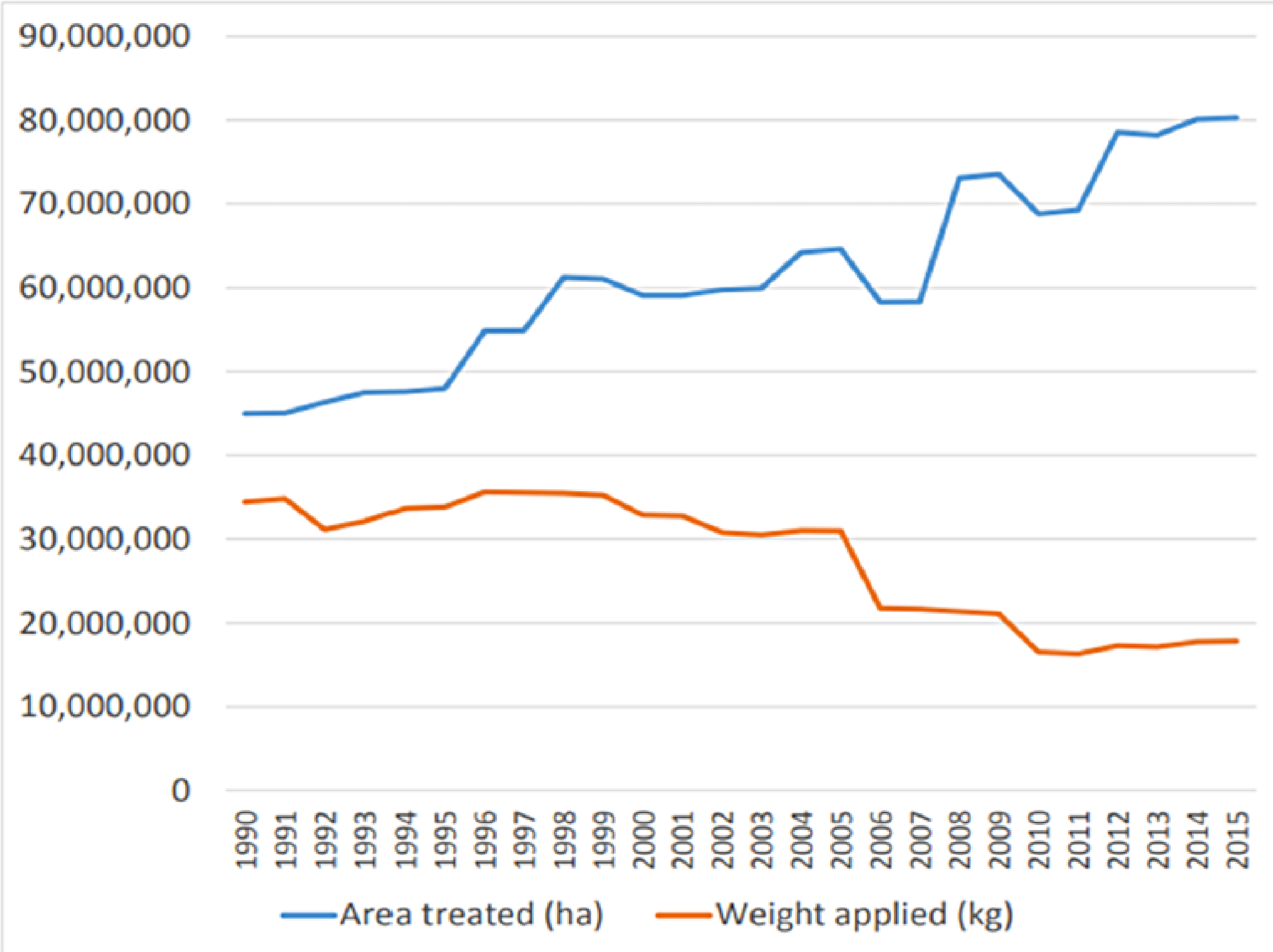
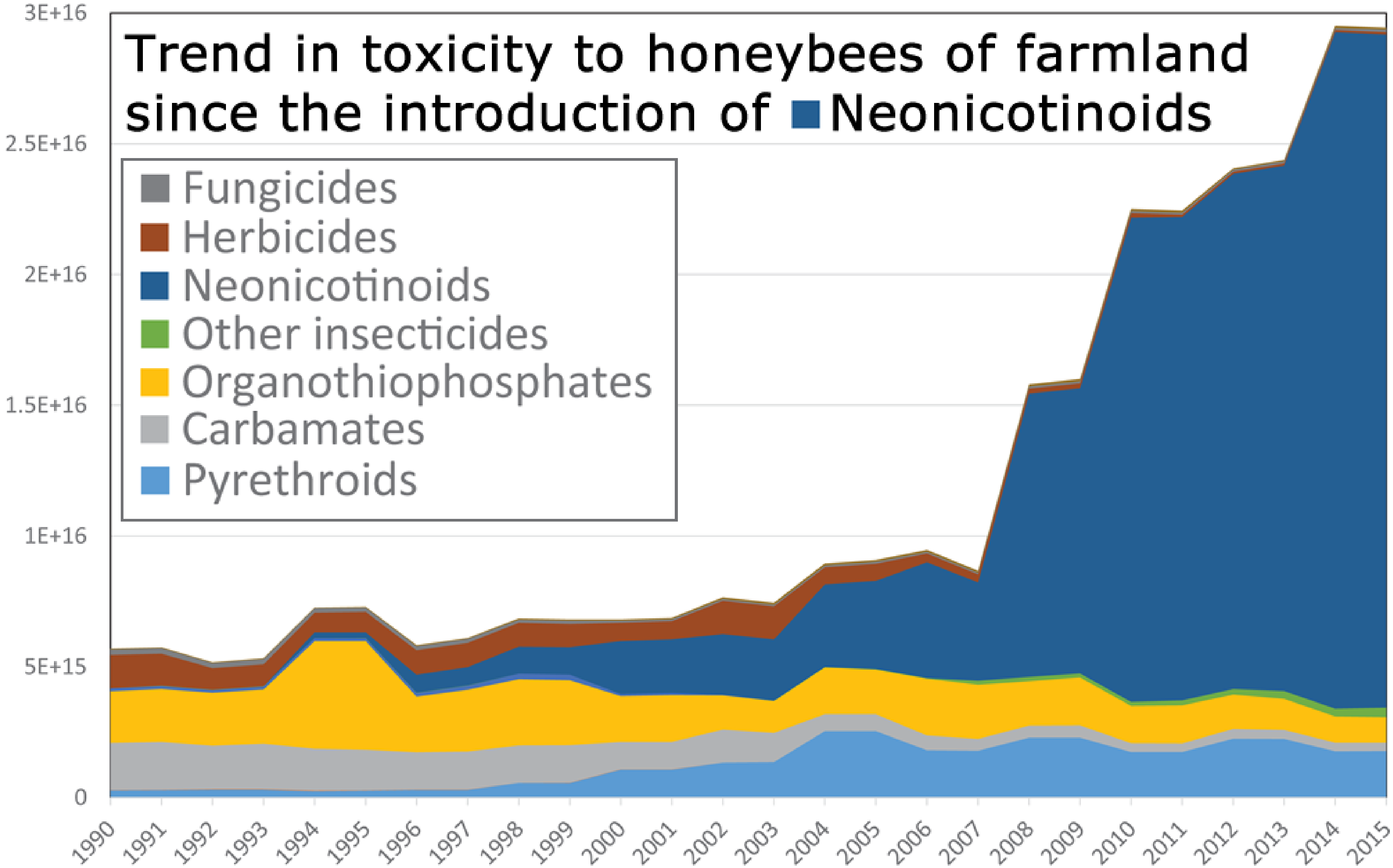


Figure 1 **Area of crop treated (blue line, hectares) and mass of pesticide applied (red line, kilograms) from 1990 to 2015.** The total area of crop remained approximately constant at 4.6 million hectares. In 1990 each hectare of cropped land on average received a total of 7.5 kg of pesticide active 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



<u>Prophylactic pesticides</u>: # of honeybee lethal doses (LD_{50}) in pesticides applied to UK farmland 1990-2015 DOI: 10.7717/peerj.5255/fig-2

Worldwide integrated assessment on systemic pesticides

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

2014: Eight scientific papers (154 pages)

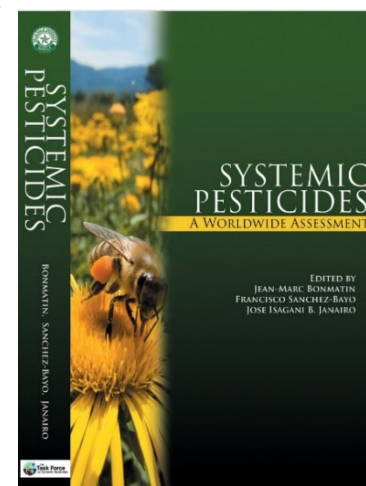
- **Five years study**
- **First meta-analysis on neonicotinoids and fipronil**
- **29 scientific authors (no conflict of interest)**
- **Comprehensive analysis (1121 publications & data from companies)**
- **Published in *Environmental Science and Pollution Research*, 2015**

DOI: 10.1007/s11356-014-3220-1
DOI: 10.1007/s11356-014-3180-5
DOI: 10.1007/s11356-014-3332-7
DOI: 10.1007/s11356-014-3628-7
DOI: 10.1007/s11356-014-3470-y
DOI: 10.1007/s11356-014-3277-x
DOI: 10.1007/s11356-014-3471-x
DOI: 10.1007/s11356-014-3229-5

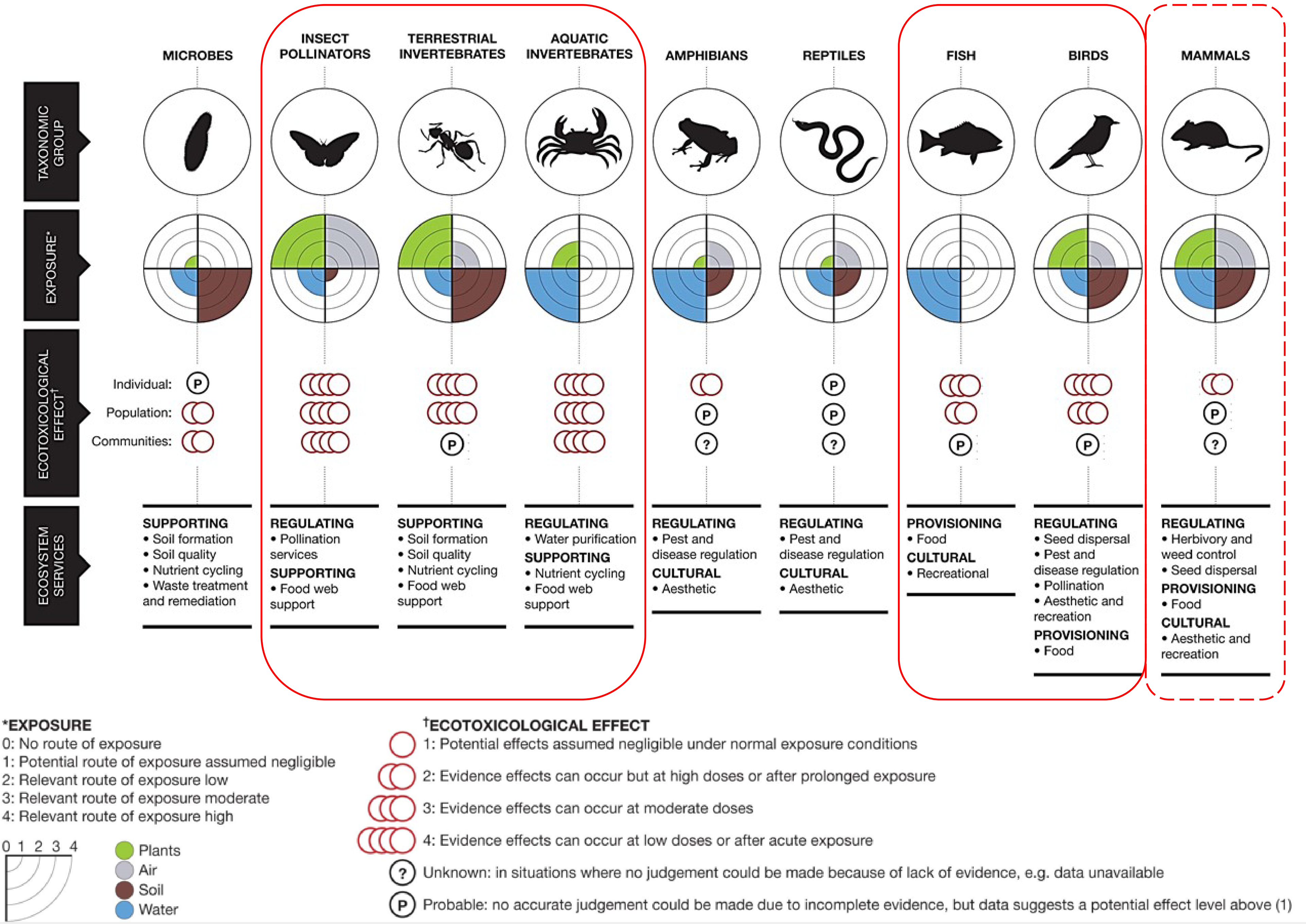
http://www.tfsp.info/assets/WIA_2015.pdf

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
  - **Impacts & Ecosystems** DOI: 10.1007/s11356-017-0341-3
  - **Resistances & Alternatives** DOI: 10.1007/s11356-017-1052-5



Slide by: Dr. JM Bonmatin (CNRS) France



Pisa et al. 2017 https://link.springer.com/article/10.1007/s11356-017-0341-3

Food ethics (2016) 1:75–91
DOI 10.1007/s41055-016-0003-z

DISCUSSION PAPER

Pollinators and Global Food Security: the Need for Holistic Global Stewardship

Jeroen P. van der Sluijs[1,2,3] **• Nora S. Vaage**[1,4]

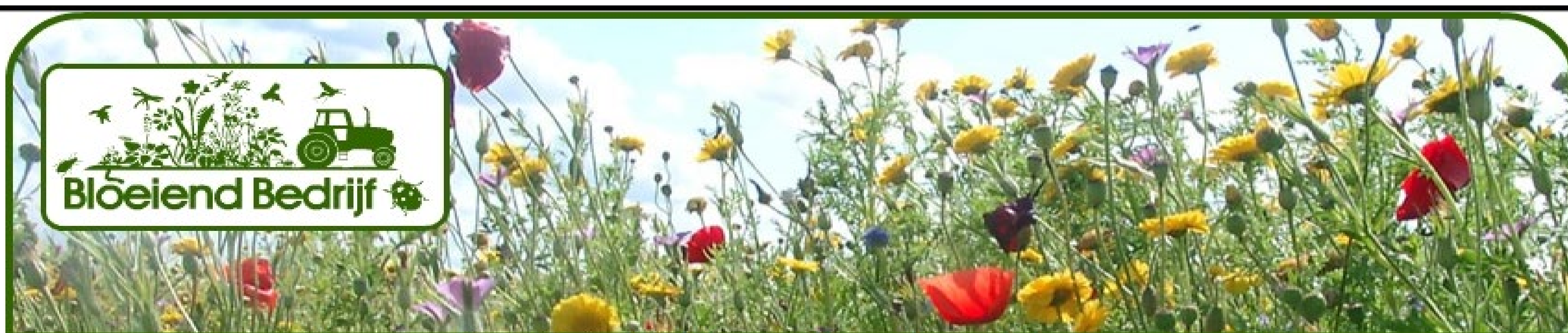
Abstract Over the past decades, both wild and domesticated insect pollinators are in dramatic decline, which puts at stake the existence of species, ecosystem resilience and global food security. Globally, 87 of major food crops depend on animal pollination. Together these account for 35 % of the world food production volume. Pollinator mediated crops are indispensable for essential micronutrients in the human diet. Many ornamental plants as well as crops for fibre, fodder, biofuels, timber and phytopharmaceuticals also depend on insect pollinators. This article aims to map the current situation of pollinators worldwide, with a focus on the critical role of pollinators in the human food chain and ecosystem sustainability, their intrinsic and extrinsic value, as well as the causes of their declines and the interventions needed to conserve them, in order to develop an argument for the importance of conserving and restoring pollinator populations and diversity. The present pollinator crisis threatens global and local food security, can worsen the problems of hidden hunger, erodes ecosystem resilience, and can destabilise ecosystems that form our life support system. An integrated approach that simultaneously addresses the key drivers is needed. This includes creation and restoration of floral and nesting resources, a global phase out of prophylactic use of neonicotinoids and fipronil, improvement of test protocols in authorisation of agrochemicals, and restoration and maintenance of independence in regulatory science. The authors argue that an international treaty for global pollinator stewardship and pollinator ecosystem restoration should be initiated in order to systemically counteract the current crisis.

Pollinator Stewardship, an International Challenge for Science and Policy

- At present the attention for insect decline is low in all domains, ranging from scientific research to policy-making to nature conservation.
- Global risk requires globally coordinated approach: international treaty on pollinator stewardship
- End pollinator habitat destruction
- global phase out of the prophylactic use of ecotoxic agrochemicals such as neonicotinoids and fipronil
- Improve pesticide regulation and transition to agroecology

Response options

- Reintroduction and conservation of micro-habitats for pollinators.
- Counteract nitrogen accumulation in soils of nature areas increases floral biodiversity.
- Ecosystem restoration
- Promotion and further development of pollinator friendly agricultural practices and landscape management
  - hedgerows and field margins rich in native wild flowers and micro habitats suitable for nesting, flowering trees in meadows



What can citizens do?

- Don’t use pesticides in your garden, only use organic ornamental plants, seeds, flower bulbs. Native plants are better for pollinators than exotic ones.
- Ask the garden centers to sell more organically grown garden plants and phase out pesticides and non-organic plants.
- Replace lawns and tiled areas by native flower mixes for pollinators
- Place nesting boxes / insect hotels for wild bees and bumble bees in your gardens
- Ask the municipality for bee friendly management of urban green areas (choice of plants as well as mowing and pruning practices) and road margins,
- Promote creation of flowering green roofs and vertical gardens in the urban environment (also helps for climate change adaptation)
- Connect green areas to create pollinator highways in cities
- Urban beekeeping and urban farming can further contribute to the creation of both floral resources and nesting resources for wild bees



RESEARCH

14 LIV UNDER VANN ?

SPECIES INTERACTIONS

Pollinators of the sea: A discovery of animal-mediated fertilization in seaweed

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The long-held belief that animal-mediated pollination is absent in the sea has recently been contradicted in seagrasses, motivating investigations of other marine phyla. This is particularly relevant in red algae, in which female gametes are not liberated and male gametes are not flagellated. Using experiments with the isopod *Idotea balthica* and the red alga *Gracilaria gracilis*, we demonstrate that biotic interactions dramatically increase the fertilization success of the alga through animal transport of spermatia on their body. This discovery suggests that animal-mediated fertilization could have evolved independently in terrestrial and marine environments and raises the possibility of its emergence in the sea before plants moved ashore.

Lavautet al. (2022). Science 377, 528–530
https://doi.org/10.1126/science.abo6661

Further reading

Pollinators and Global Food Security: the Need for Holistic Global Stewardship
https://doi.org/10.1007/s41055-016-0003-z

Insect decline, an emerging global environmental risk
https://doi.org/10.1016/j.cosust.2020.08.012

Pollinator conservation requires a stronger and broader application of the precautionary principle
https://doi.org/10.1016/j.cois.2021.04.005

Halting the pollinator crisis requires entomologists to step up and assume their societal responsibilities
http://endsdhi.com/wp-content/uploads/2021/10/edito-COIS.pdf

EU Ban on Neonics: Too Little, Too Late
https://www.greeneuropeanjournal.eu/eu-ban-on-neonics-too-little-too-late/

Heller føre var enn etter snar – bruk ikkje gift mot løvetann!
Kronikk i Stavanger Aftenblad – 12 April 2023
https://www.aftenbladet.no/meninger/debatt/i/kEeX8X/heller-foere-var-enn-etter-snar-bruk-ikkje-gift-mot-loevetann