

Julius Kühn-Institut
100 Jahre

1898 * 2008 * 2018

1 2 0 J a h r e

Forschung für Kulturpflanzen von morgen

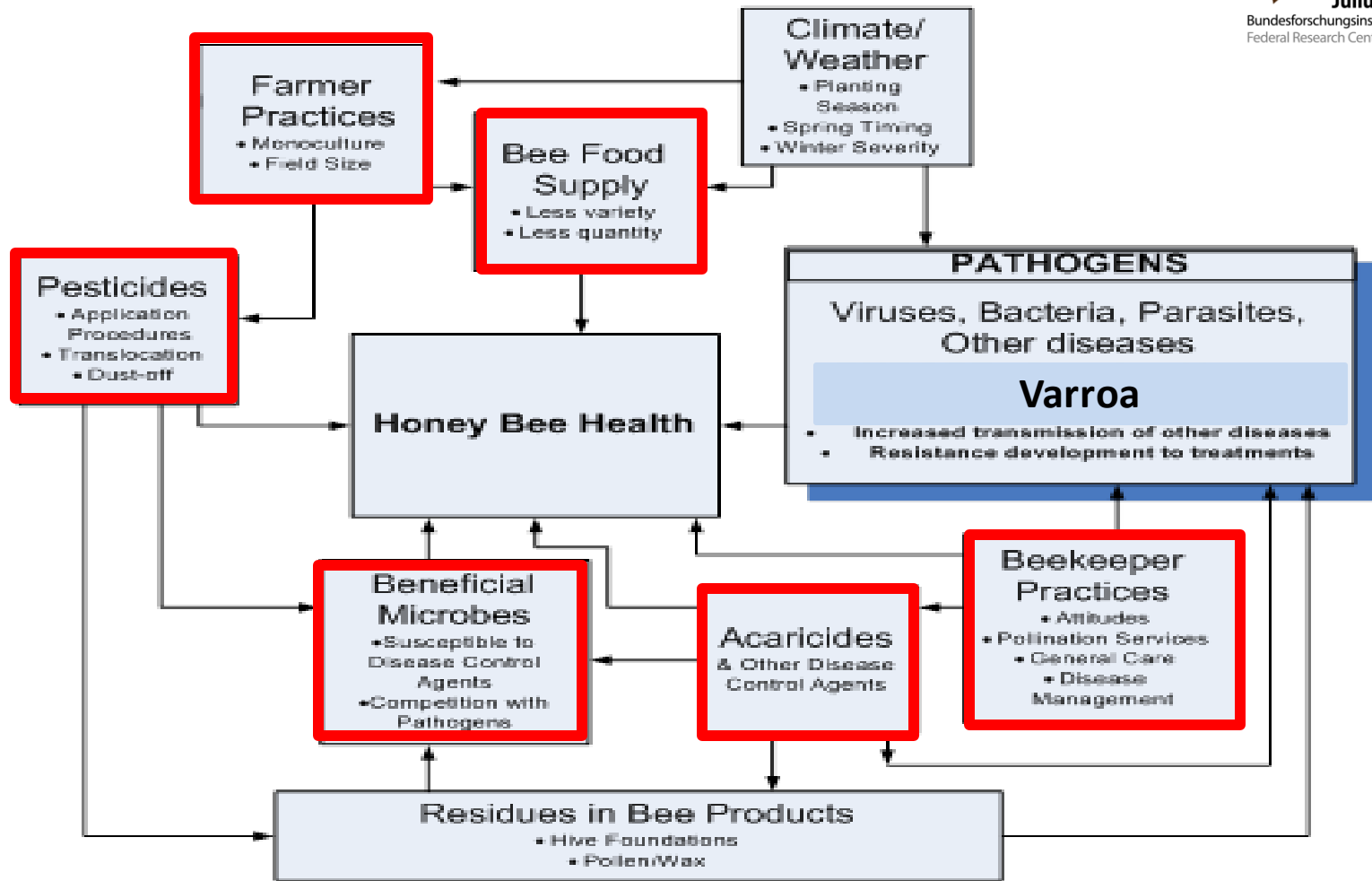


Julius Kühn-Institut
Bundesforschungsinstitut für Kulturpflanzen
Federal Research Centre for Cultivated Plants

Threats to Pollinators - and strategies to protect Bees: Plant Protection - side effects, risk assessment/management in Germany

Jens Pistorius, Ina Wirtz, Gabriela Bischoff, Kerstin Geißler, David Thorbahn, Nadine Kunz, Anke Dietzsch, Malte Frommberger, Christiane Klein, Renate Scheb-Wetzel, Hartmut Nowak, Kerstin Paulutt, Sabine Kaiser, Alexander Kuhle, Anke Ehlers, Magda Podjaski, Jakob Eckert, Tobias Jütte, André Krahnert, Janika Libowski, Benjamin Grasz, Jana Slave, Kim Müller-Herring, Jana Deierling, Charlotte Steinigeweg, Freddy Mühlberger...

Multiple threats to bee health



Interrelationship of bee health Stressors Adapted from Le Conte *et al.*, 2010

Bees gone. Shelf empty.



Fotos:
Utopia.de



Pollination ensures quality and quantity



Your produce choices
without bees

(Whole Foods
Market 2014,
Folien: Goss

www.julius-kuenn.de

Pollination ensures quality and quantity



Your produce choices
with bees

Pollination of crops and wild plants

Here: Orchid (*Orchis maculata*, *O. latifolia*, ...)



Foto: Rüdi Ritter

> 560 bee species in Germany





Photo: Jürgen Gräfe/fotocommunity.de



Photos: Roland Günther



Julius Kühn Institute

The Julius Kühn Institute (JKI) is the Federal Research Centre for Cultivated Plants in Germany and an autonomous superior federal authority in the portfolio of the Federal Ministry of Food and Agriculture

JKI`s Major Fields of Competence



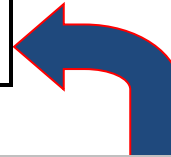
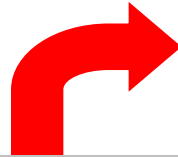
- **Plant Genetics**
- **Plant Cultivation Systems**
- **Plant Nutrition and Soil Science**
- **Plant Pests**
- **Plant Protection and Plant Health**
- **Bee Protection**

Core tasks



**Risk Management
authority →**

(registration)



Risk Assessment governing authorities: JKI, UBA, BfR



Commercially used
pollinators (Honeybees,
Bumblebees, Solitary Bees)



Risk for Health



Wild living Bees

JKI- Federal research center for cultivated plants

Institute for Bee Protection

- I. Risk assessment of plant protection products/bees
- II. Examination center for bee poisoning incidents
- III. Research on risks of pesticides to bees



Toxicity of active substances & Plant Protection Products

Untoxic a.s. (almost all fungicides/herbicides)

- e.g. Boscalid, Terbutylazin, Metalaxyl-M, EBI-fungicides

Low to moderately toxic a.s (some insecticides)

- Neonicotinoids (Thiacloprid, Acetamiprid), tau-Fluvalinat

toxic a.s. (most insecticides)

- Pyrethroids, Neonicotinoids, Organophosphates, Carbamates, (e.g. Imidacloprid, Thiamethoxam, Chlorpyrifos, Dimethoate,...)

Synergist and toxic a.s

- PBO (Piperonylbutoxide: synergist with insecticides!)

Mixtures:

- Certain combinations with synergisms possible, e.g. Pyrethroids & EBI-fungicides;

Toxicity, Hazard, Risk?

Principles of Risk assessment & Risk management

Tier I (screening level):
toxicity assessment exposure estimates: intended to be “reasonably”, “relatively”, “highly” conservative



risk cannot be excluded: Semi-field – or field studies

Tier II/Tier III: refining risks, testing more realistic scenarios with bee colonies- but: need to deal with uncertainties

Toxicity assessment: laboratory



Dose? Crop? Timing? Use conditions- calculation **Trigger Values**



Risk management:

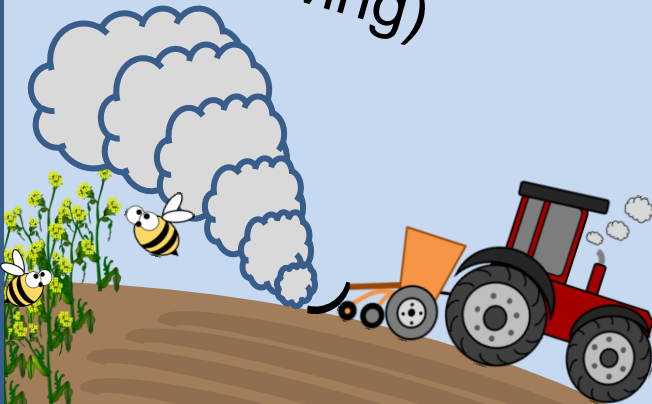
Classification & Labelling

B1, B2, (Hazardous for Bees), B3 or B4 (not hazardous)

Relevance of different routes of exposure & magnitude of effects

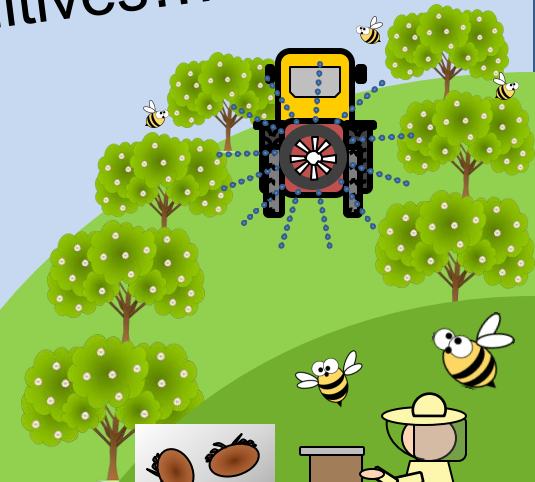
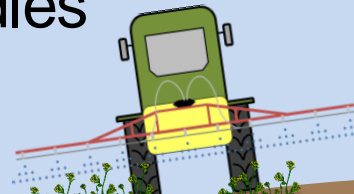


Spray drift
dust drift
(during sowing)

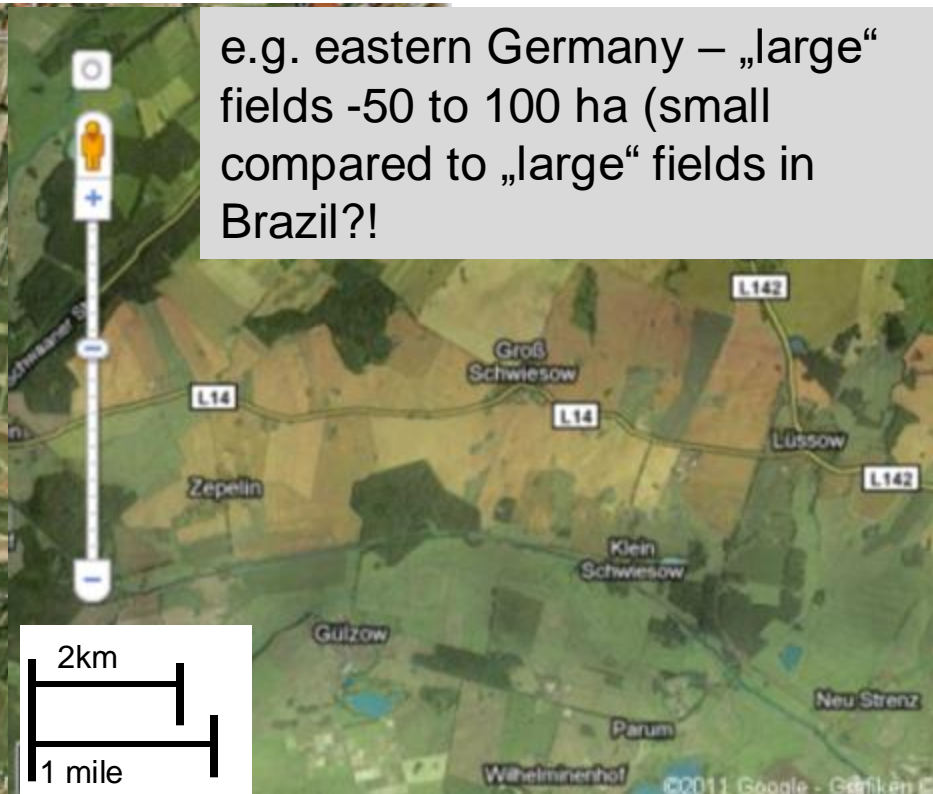
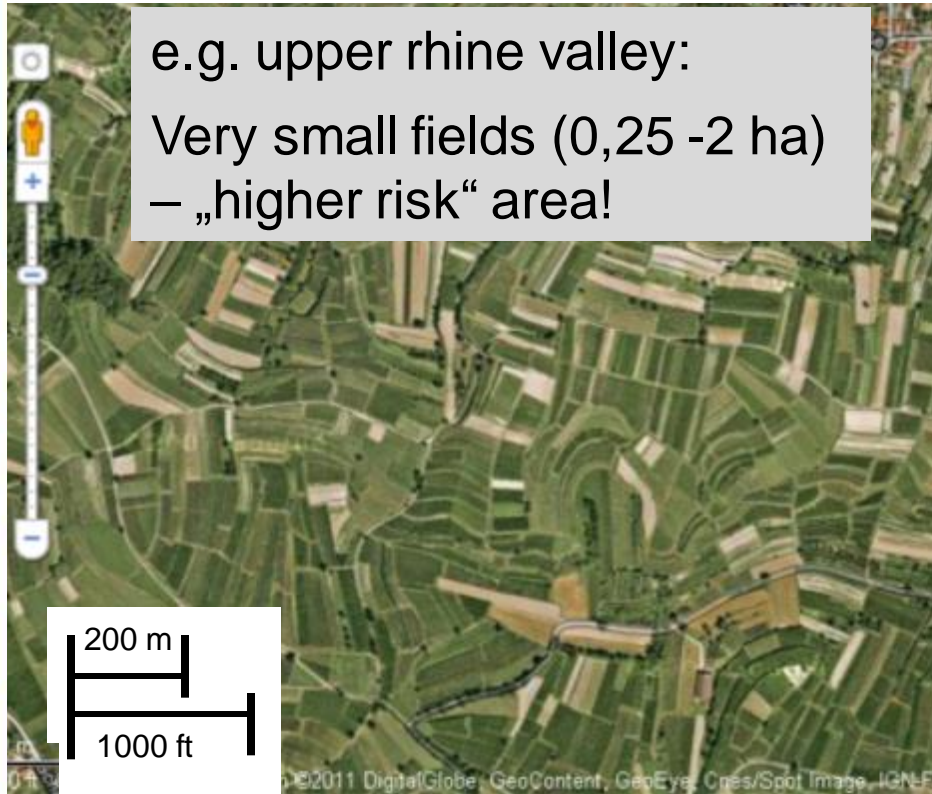


Systemic residues, tank mixtures,
Nectar & Pollen,
Guttation,
water puddles

Spray applications:
Overspray, bees,
flowers, honeydew,
additives....



Risk varies in landscapes



Source: google maps

Risk assessment and Risk management- Need to be closely linked...

Mitigation measures / Labelling PSM according to German Bee Protection Ordinance – Testing of the highest application rate-

B1 – Hazardous for Bees. No application on flowering crops or if crop is attractive to bees (e.g. Honeydew), no application 60m surrounding apiary

B2 – Hazardous for Bees. Application only after daily bee flight up to 11 p.m.

B3 – No relevant exposure of bees if used according to label instructions (e.g. seed treatments, in-house treatments)

B4 – Not hazardous for bees

Application allowed also on flowering crops and during bee flight up to the highest registered (and tested) application rate

+ additional measures/restrictions may apply in some cases, e.g. limitations of BBCH-Stages for some B1- Products!

Risk management

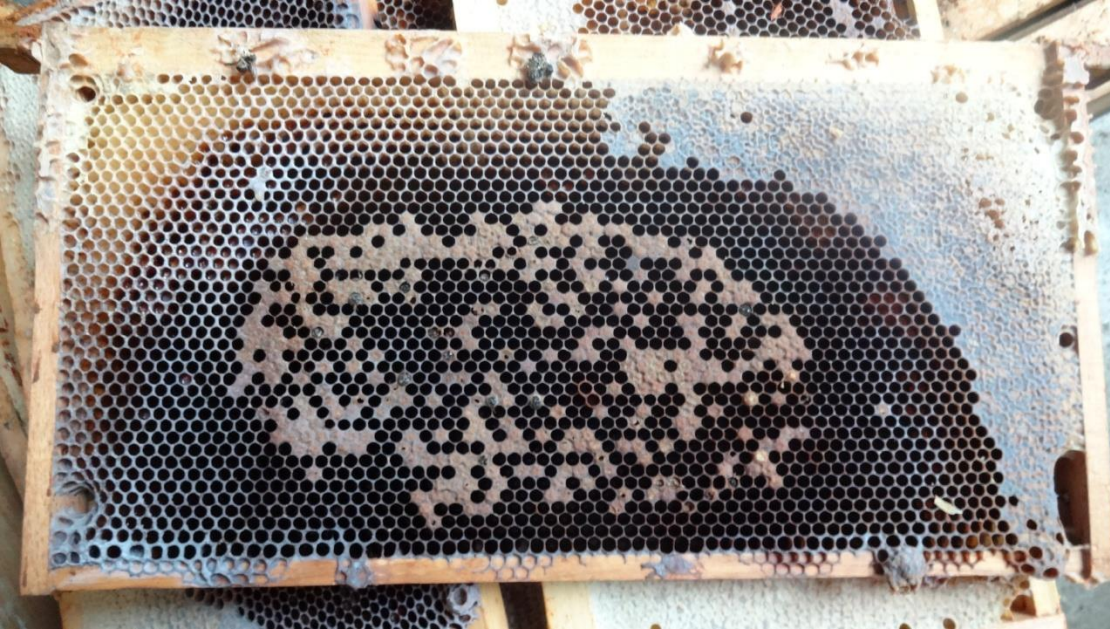
- **Federal:** Registration/approval of PPP and application techniques
- **State level:** 17 states in Germany
 - State Plant Protection advisory services
 - Enforcement of PPP application



Pesticides in organic farming

- Also in organic farming sometimes pesticides are needed
- These substances are not necessarily „better“: Spinosad, Pyrethrine – also toxic for bees
- These substances lead to similar residues in bee products as conventional substances
- But- use of pesticides is principally avoided if possible and other means of pest reduction are preferred
- Microbials - may also result in some risks, but a lot less knowledge on side effects available
- Also farming practices may harm bees- both in organic and conventional farming

„ I have an incident“ – what is the



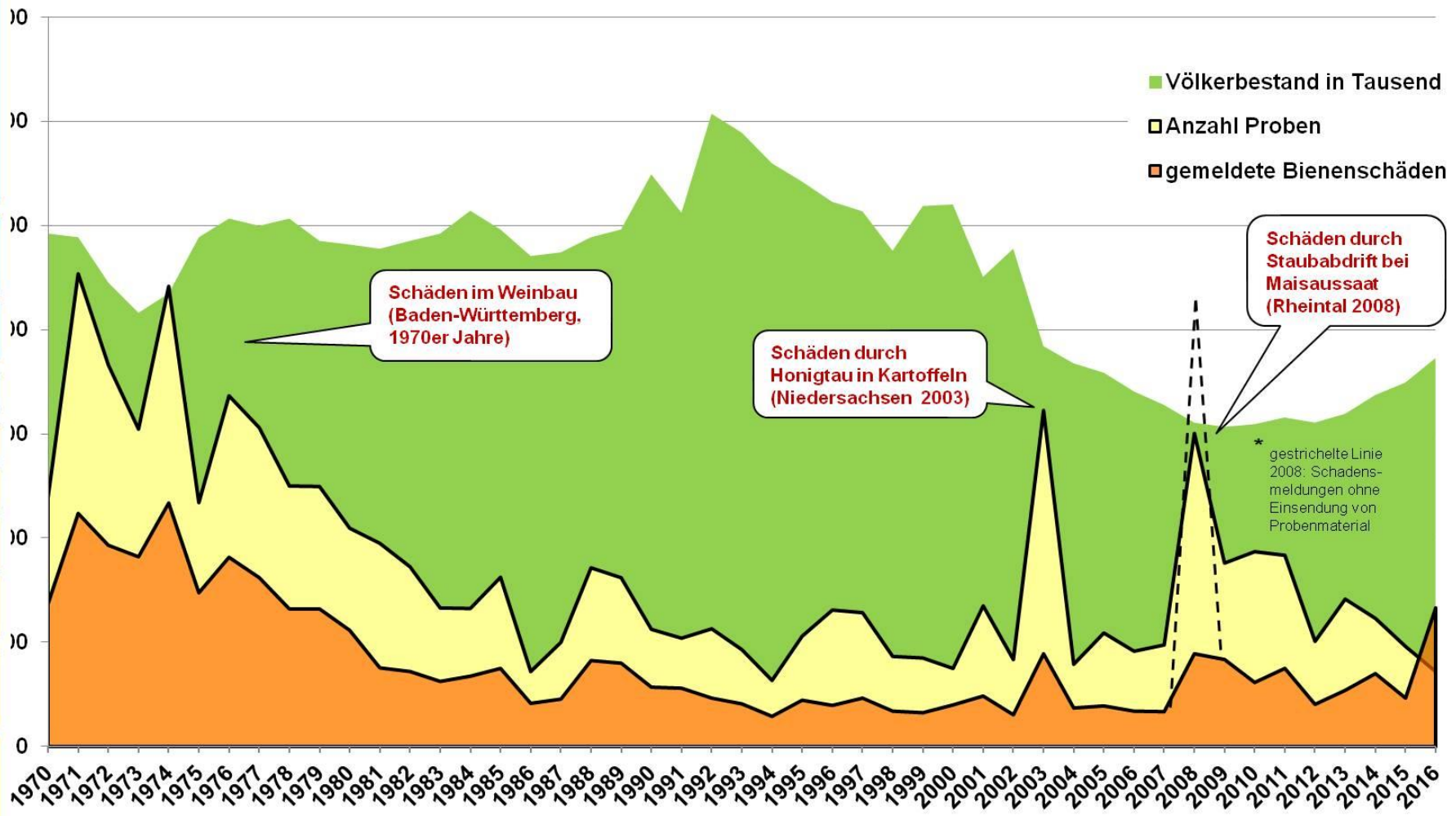
Examination of bee incidents

biological and chemical analyses

→ poisoning or other causes e.g. diseases?



Incidents reported with suspected poisoning



Example- Investigation of incidents

Year	2013	2014	2015	2016
Number of reported incidents	108	140	93	144
Not investigated (unsuitable Samples)	25	29	21	27
Insecticides only in Biocides (Fraud, delib. Poisoning)	9	6	8	9
→ 1) Insecticides in hazardous products (B1, B2), Seed treatments (B3) or hazardous mixtures	24	33	12	19
→ 2) Beetoxic Insecticides in non- hazardous products (B4)	3	5	3	2
→ 3) Beetoxic insecticides with unclear origin (PPP or Biocides)	6	8	8	8
→ 1 + 2 + 3 = PSM causal/ involved	33	46	23	29
% PSM causal/ involved of reported incidents	31 %	32 %	25 %	20 %



But...

- Very small and local poisoning incidents may not be detected- incident investigation is no precise measure
- Honey bee incidents- do not give us clear information about the magnitude of effects
- „social“ aspect- not all incidents will be reported due to neighbourhood relations etc.



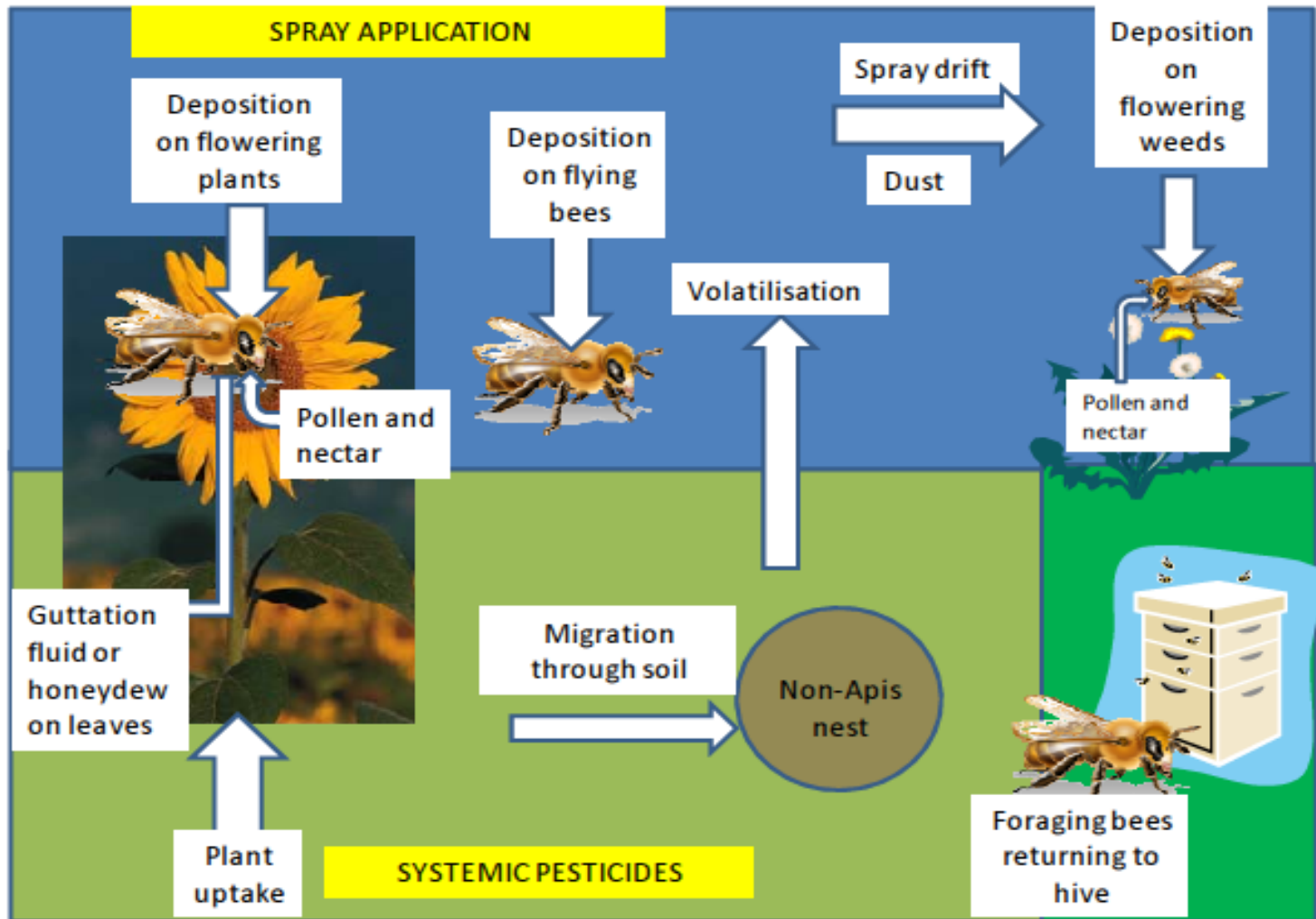
Concluding remarks

- Protection of bees is essential for thriving bioeconomy!
- use Plant Protection Products only when needed
- Reduce the use of Insecticides
- **Obey risk mitigation measures and labelling** of pesticides: important for farmers to keep pollinators' free service to mankind: ensuring farmers yield, product quality and quantity

**Protect your most important helpers-
Such as the bees!
Obrigado!
Danke!**



Exposure of bees



EFSA Journal 2012; 10(5):2668 Scientific Opinion on the science behind the development of a risk assessment of Plant Protection Products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees)