

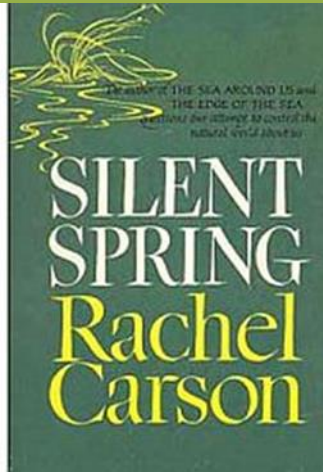


Pesticide toxicity & regulatory needs

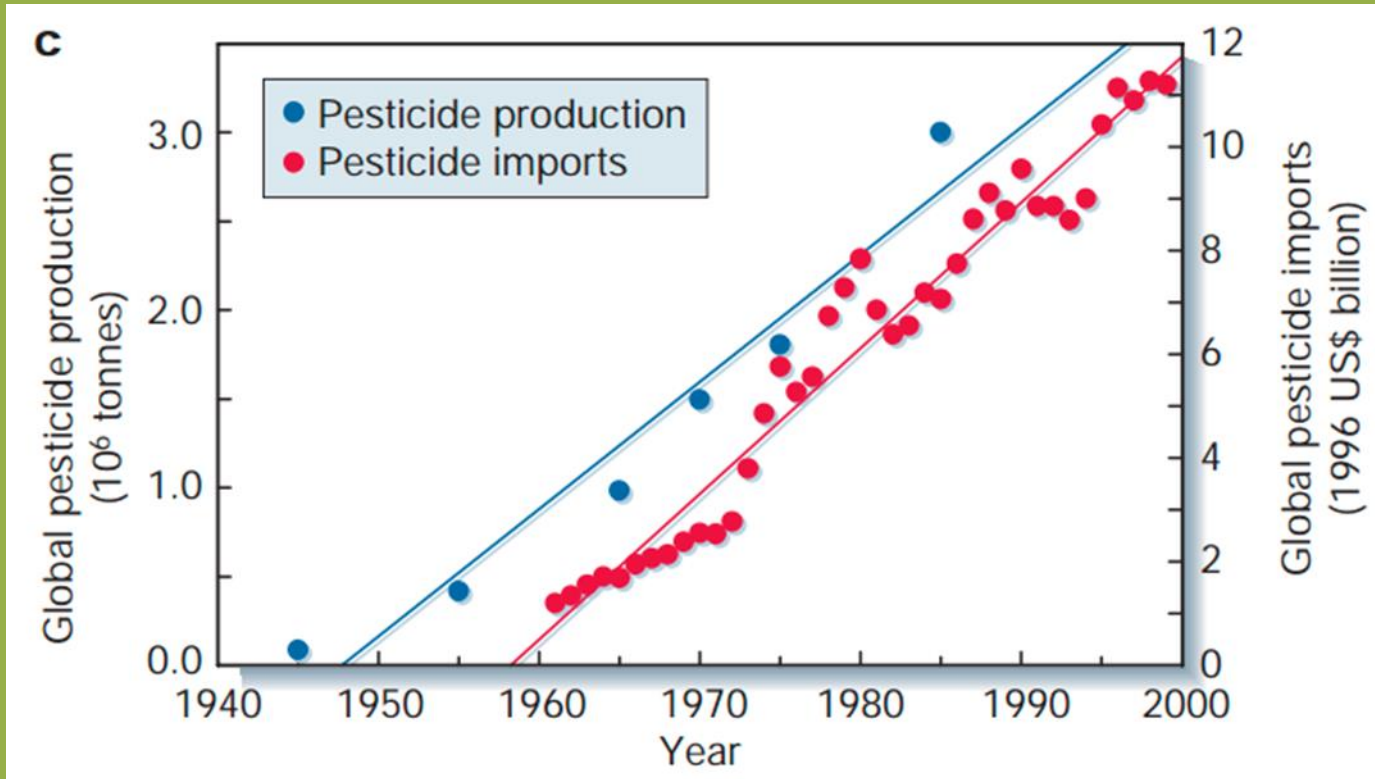
Angeliki Lyssimachou, PhD
Environmental Toxicologist and Science Policy Officer
NO PESTICIDES ON MY PLATE CONFERENCE
KADIR HAS UNIVERSITY CIBALI CAMPUS, İSTANBUL
23 NOVEMBER 2019



Synthetic pesticides – a new era (1940s)



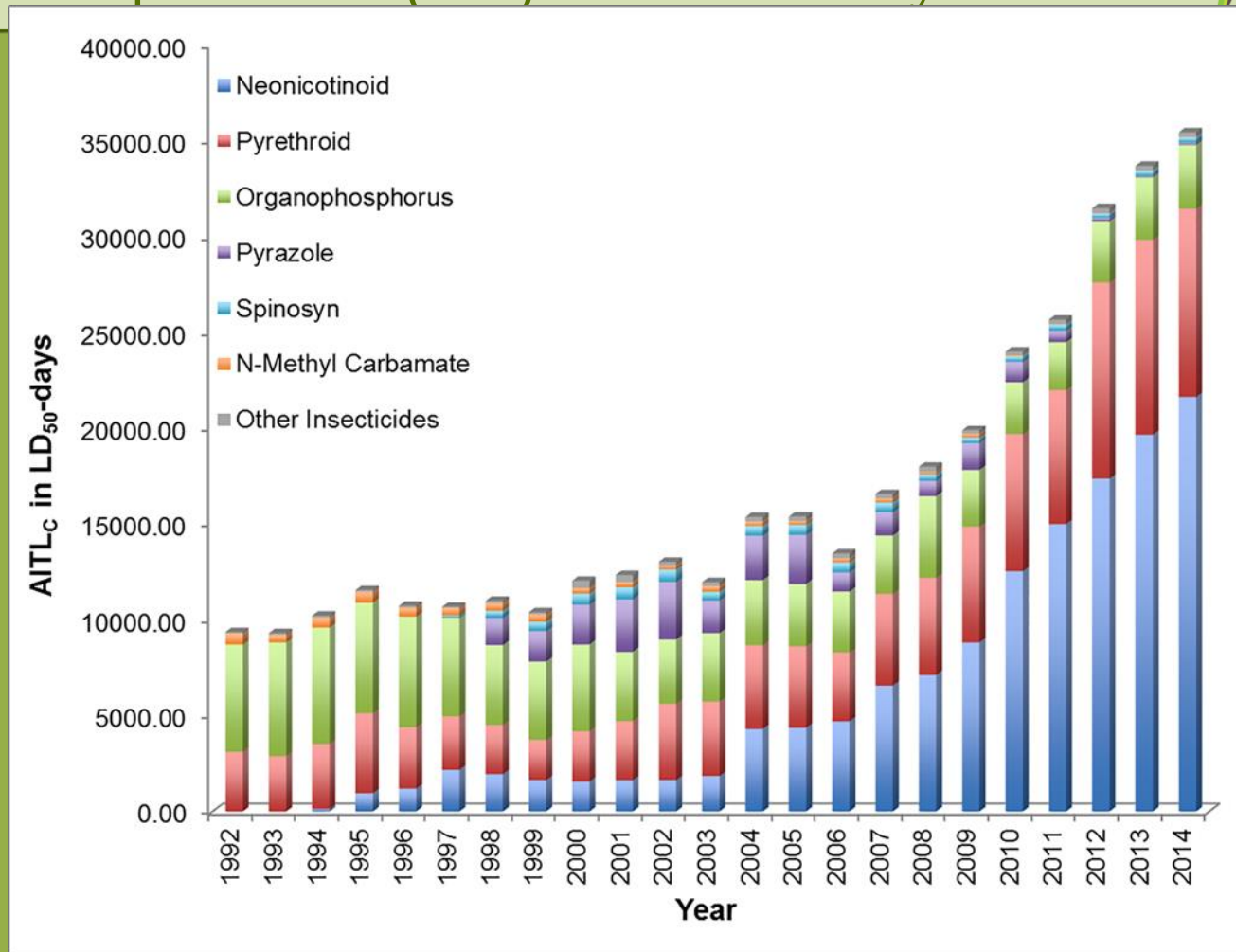
Synthetic pesticides- global production (1940-1995)



Tillman et al. (2002).



Synthetic pesticides (use) – acute toxicity



Tillman et al. (2002).



P



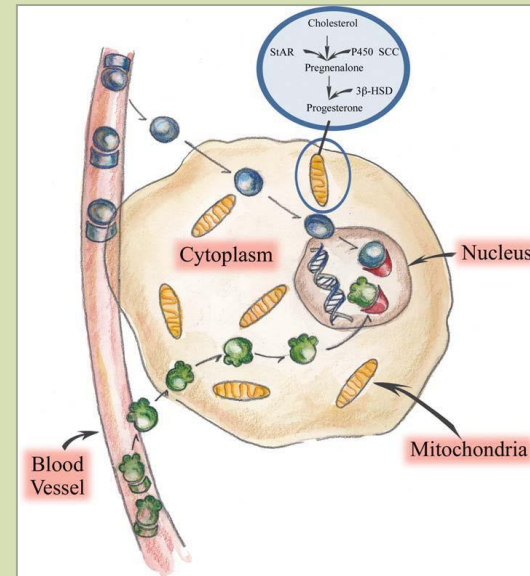


Pesticide toxicity

Designed to be toxic to living organisms

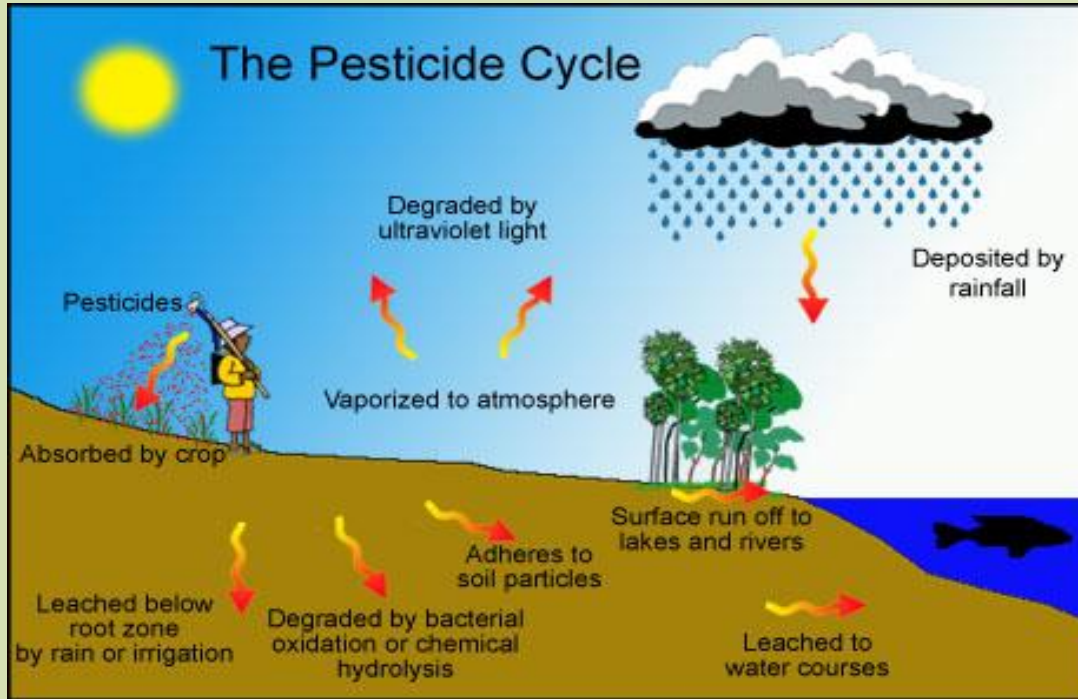
- Cellular sites in target species similar to humans and other animals

Several pesticides disrupt the function of the hormone system



✚ Low solubility → Contamination of ecosystems

Pesticides – no borders

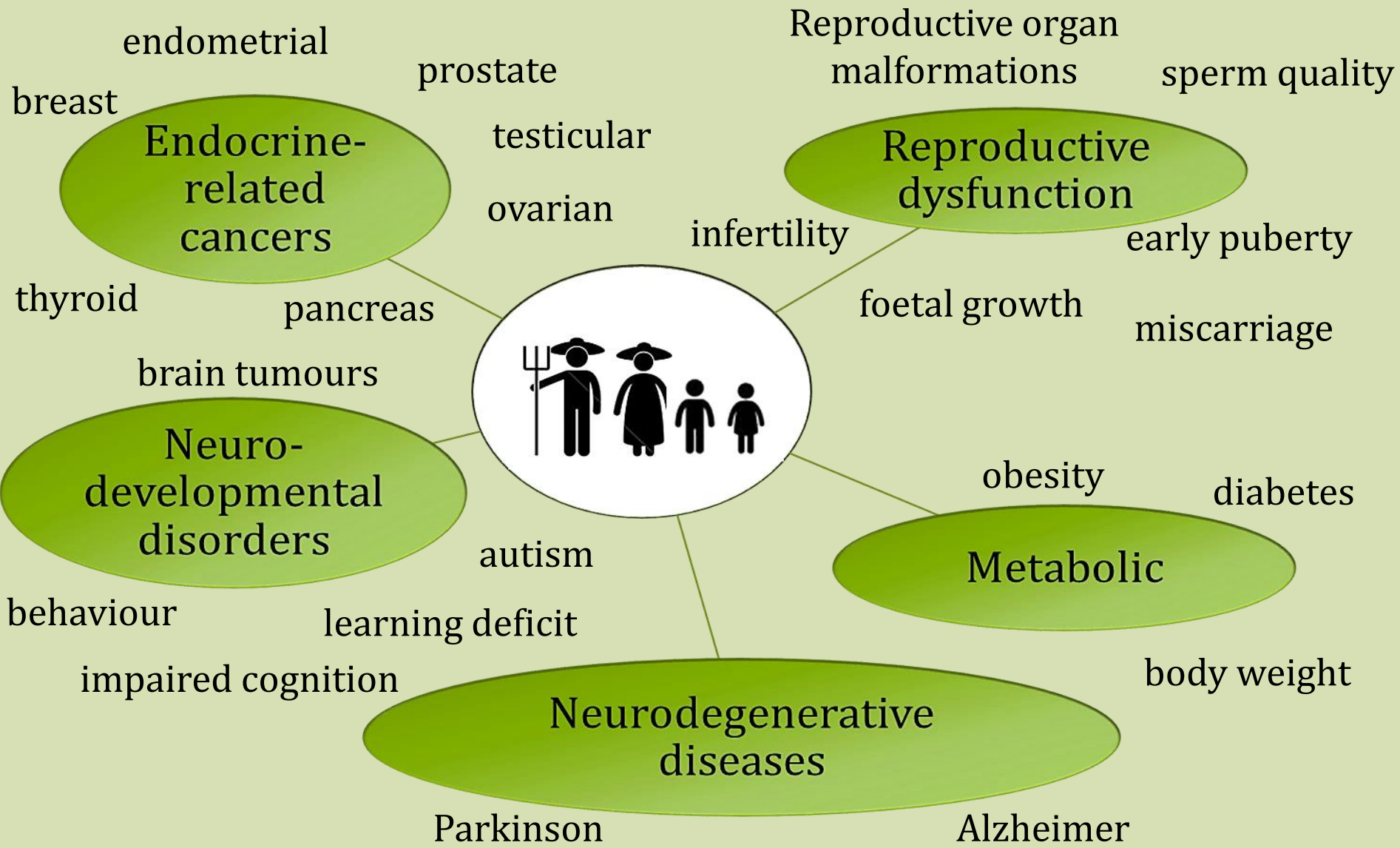


Detected in: living organisms, soil & sediments, water systems, human tissues and blood- including of newborns.

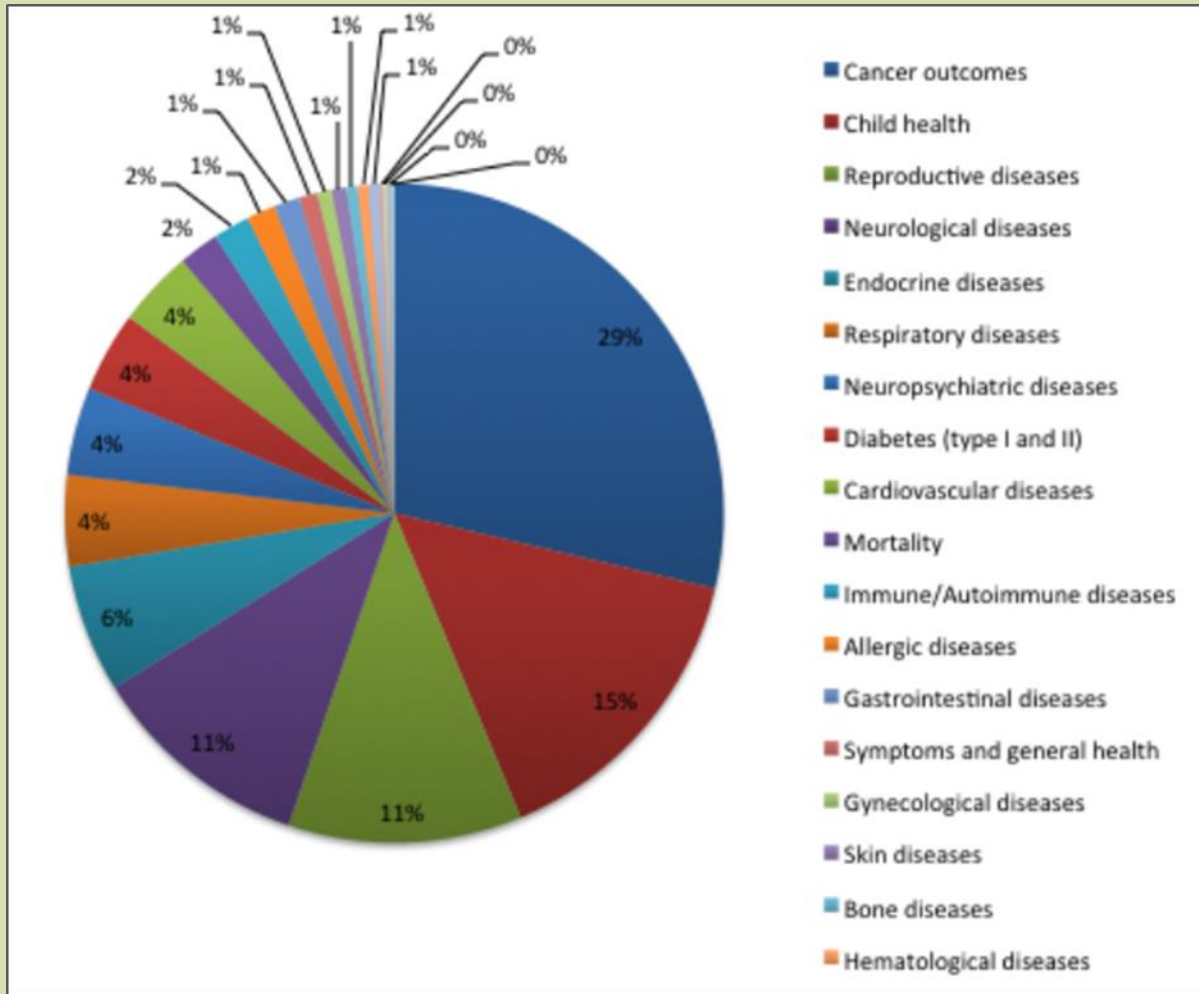




Endocrine-related diseases in humans



Pesticides – human diseases



Scientific literature
Meta-analysis 2006-
2012:

- 602 publications
- 23 major diseases
- Workers, women, children

Ntzani 2013, EFSA Scientific Report: Literature review on epidemiological studies linking exposure to pesticides and health effects

ED-pesticides and wildlife



DDT;
alligators &
birds



Atrazine; fish,
amphibian &
reptile
feminization

*History of
endocrine disruption
due to pesticides*

Dieldrin,
chlordane;
Hermaphrodite
polarbears



TBT;
imposex in
snails



Agricultural
areas:
amphibian
intersex



European Legislation – plant protection products

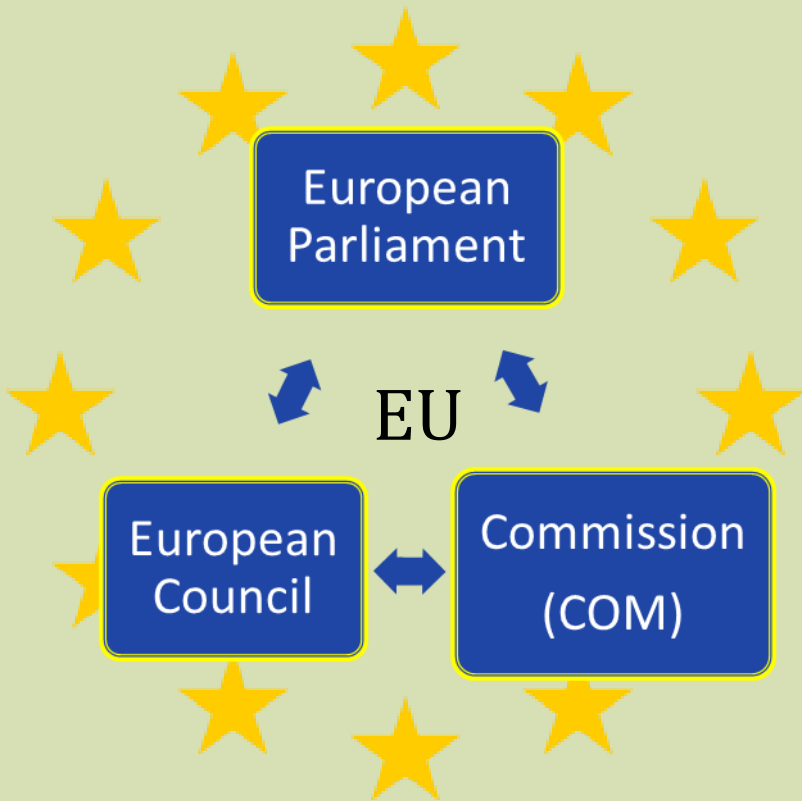


- Directive 79/117/EEC 1978 prohibiting placing PPPs on the market - *Only highly toxic substances (DDT, mercury)*
- Directive 91/414/EEC 1991 concerning the placing of PPPs on the market
 - A bigger set of data requirements
 - No serious adverse effects on the environment
- **Regulation (EC) 1107/2009**
- Maximum Residue Limits Regulation (**food** and animal feed)
- Sustainable use of Pesticides Directive
- **Water** Framework directive
 - all European surface water to reach good ecological status in 2015
(*not reached*)
- **Drinking water and groundwater** Directives

Legal requirements - pesticides



Plant Protection Product Reg. 1107/2009:



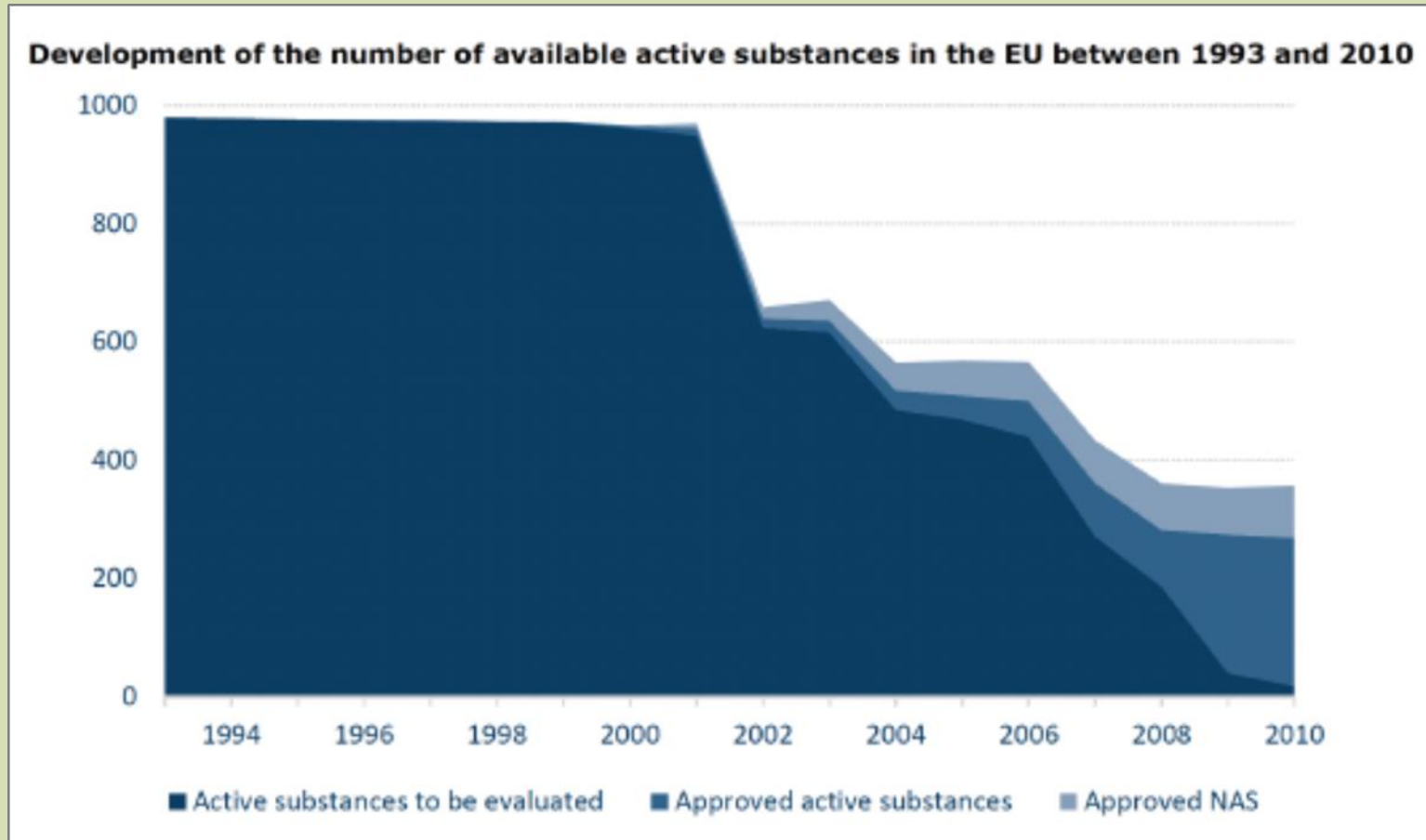
- High level of protection for ALL
 - Humans, animals, environment & ecosystems
- Protect the vulnerable
 - Pregnant women, children, babies
- Consider active substances, products and food residues
- Consider mixture effects (cocktails)
- Apply the precautionary principle

Mutagens, Carcinogens, Toxic to Reproduction, Endocrine Disruptors, PBTs



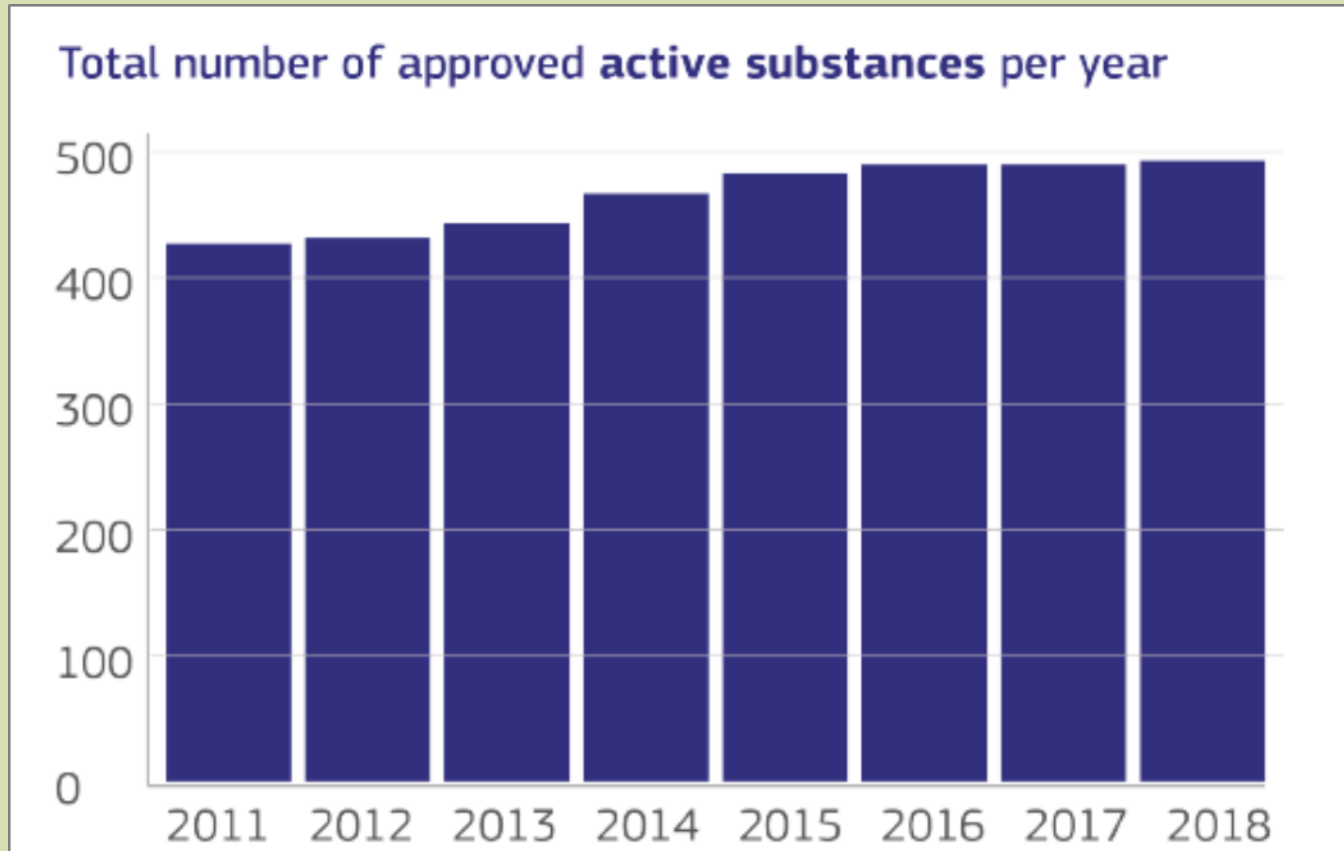
Hazards

Availability of active substances



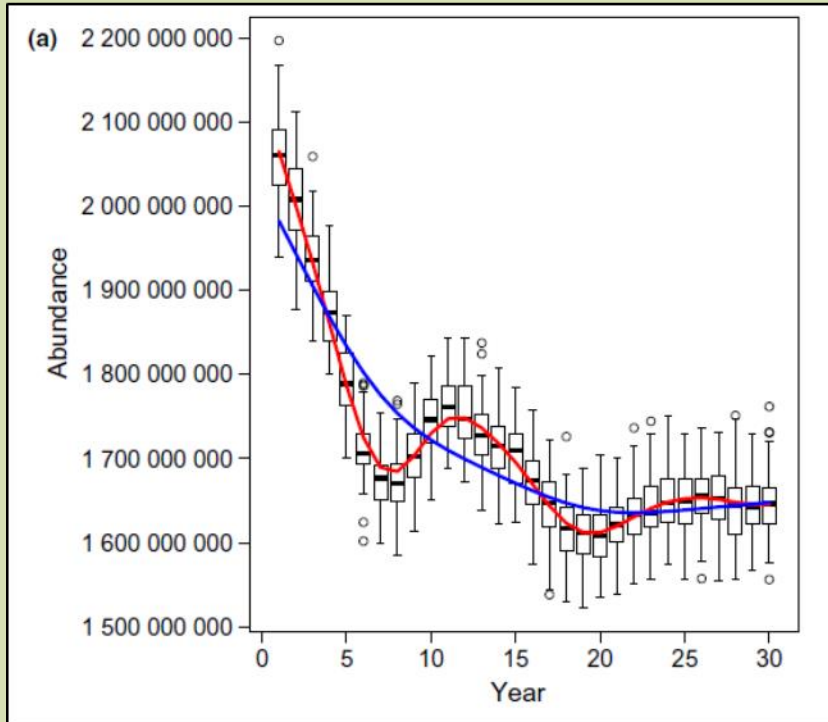
European Commission, DG Sante, 2019

Availability of active substances



DG Sante, 2019

Pesticide impact – environment and ecosystems



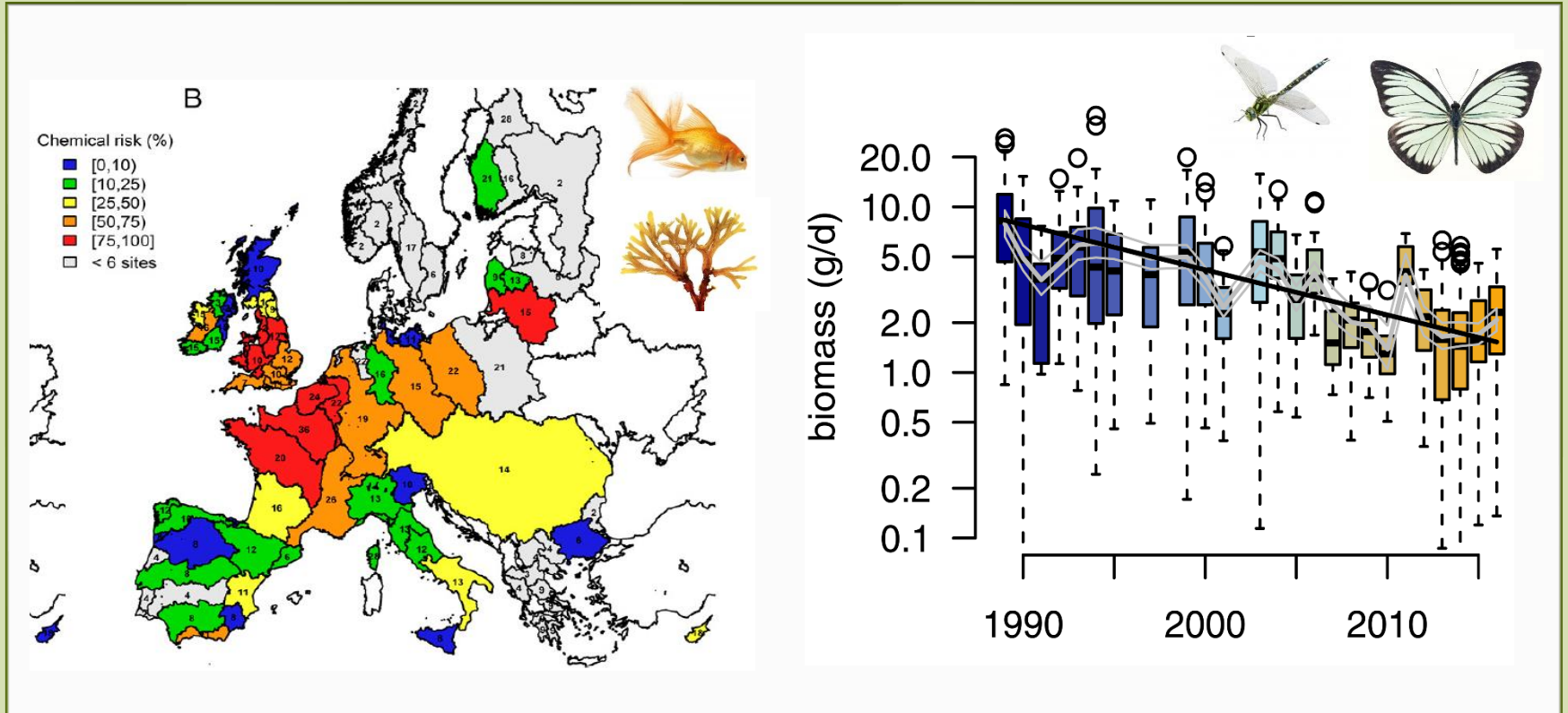
EU (1980-2009):

loss of 421 million birds

France (agricultural zones):

33% population decline in 17 years

Pesticide impact – environment and ecosystems



EU aquatic ecosystems:
Risk 42% sites
Malaj et al. (2014)

Forests (Germany):
76% insect biomass
Hallmann et al. (2017)

Who is informing the farmers and policy-makers?



“We represent the crop protection industry in Europe. Our members develop innovative and science-based solutions that keep crops healthy and contribute to provide Europeans a safe, affordable, healthy, and sustainable food supply.”

Who is informing the farmers and policy-makers?



#WithOrWithout



If EU farmers no longer had access to certain pesticides, **tomato yields could decrease by 85%**

Consider the facts.
[ecpa.eu/with-or-without](http://www.ecpa.eu/with-or-without)

European Crop Protection

UNITED KINGDOM

Without pesticides, onion yields could be down as much as **50%** in the UK.

Consider the facts.
[ecpa.eu/with-or-without](http://www.ecpa.eu/with-or-without)
#WithOrWithout

European Crop Protection

If EU farmers are denied access to certain pesticides, **olive yields could decrease by 40%**

Consider the facts.
[ecpa.eu/with-or-without](http://www.ecpa.eu/with-or-without)

European Crop Protection

Up to **40%** of global crop yields are lost to pests and diseases every year. These losses could double without pesticides.

5€

5€



Example 1 - Glyphosate

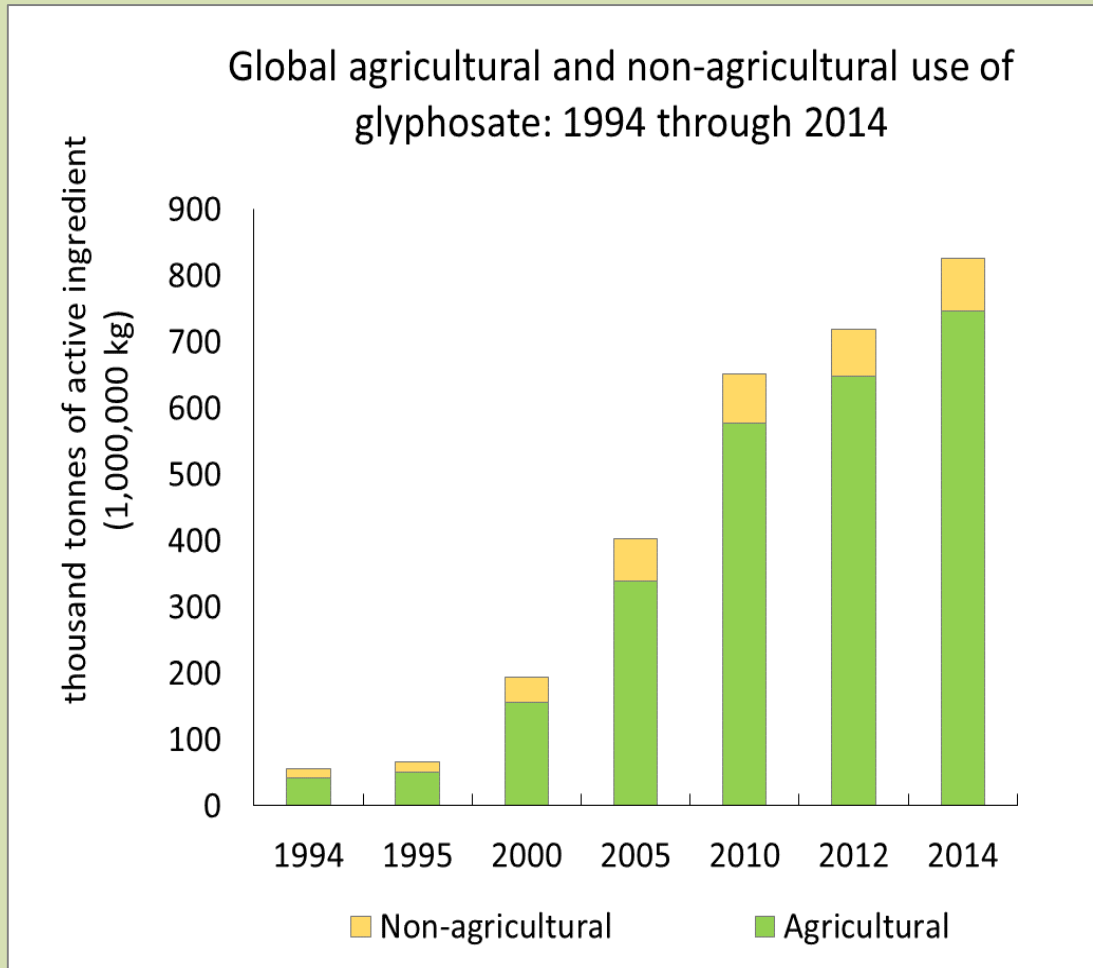
1974 – Registered as phytotoxicant (Monsanto)

- Blocks synthesis of plant nutrients – kills all plants
- Also toxic to certain microorganisms (bacteria, fungi)



safer than salt

Glyphosate Use

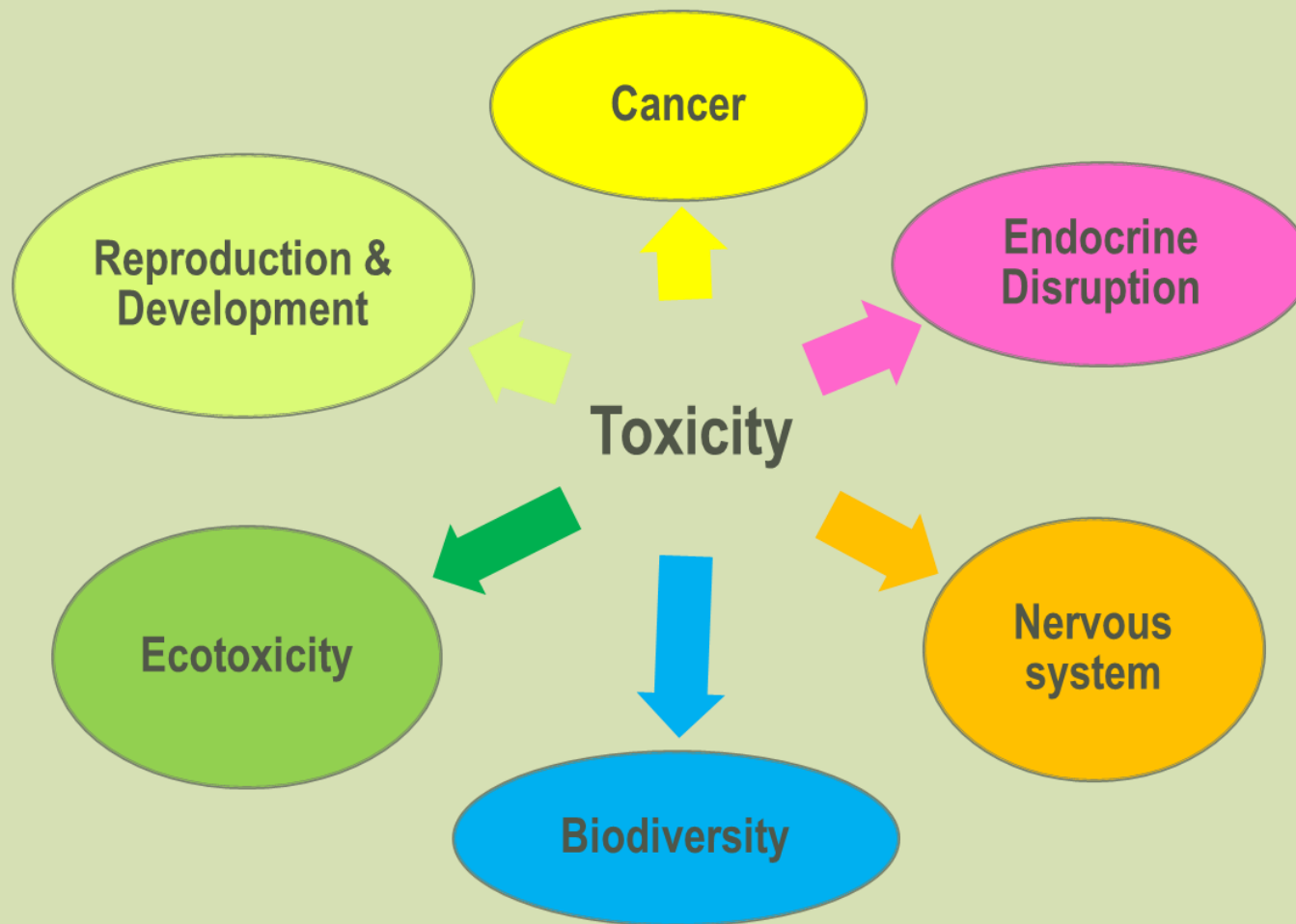


Source: Benbrook (2016) Environ Sci Eur **28**:3



Toxicity of glyphosate

> 700 (published) studies



Toxicity of glyphosate - agriculture

Not treated with
glyphosate



Treated with
glyphosate



Carcinogenicity



International Agency for Research on Cancer



■ Probable human carcinogen

- Limited evidence in humans
- Sufficient evidence in experimental animals
- Strong mechanistic evidence

- ✓ Only published studies
- ✓ Strict rules on conflict of interest

■ Not a human carcinogen:

- Evidence in humans not enough
- Tumours in experimental animals not significant
- Mechanistic data not relevant

- ✓ Weak arguments/data gaps
- ✓ No studies on products
- ✓ Undisclosed studies
- ✓ Ghost-written scientific papers

European Risk Assessment of glyphosate

2017: Commission proposed a 15 year authorization





Example 2 - neonicotinoids

1990s – (Sygenta) systemic insecticides, applied on seeds

- Used on bee attractive crops (e.g. maize, oilseed rape, sunflower)
- Toxic to honey-bees and other pollinators
- 2013- European moratorium on 3 neonics
- 2013-2016 over 62 “emergency authorisations” in EU
- 2018 – European ban (outdoor uses)
- Member States disagree on level of protection for bees for other pesticides

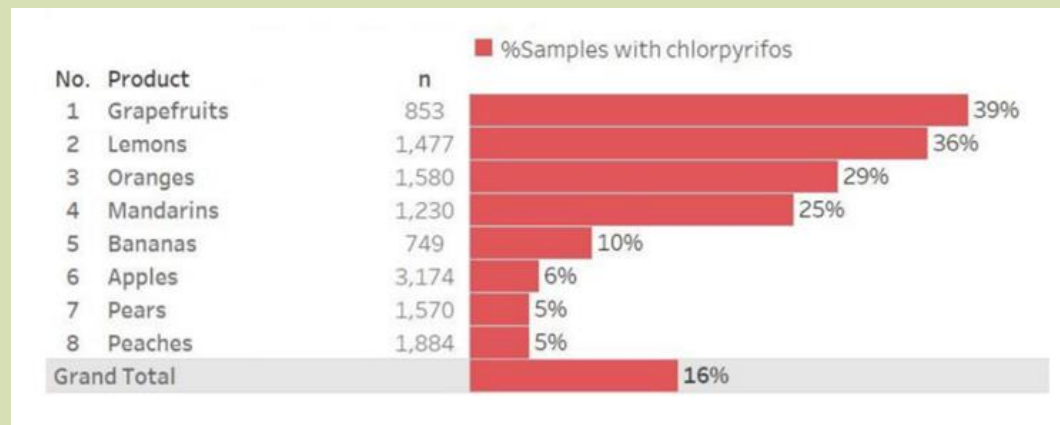




Example 3 - Chlorpyrifos

1966 – Organophosphate, patented by Dow Chemical Company

- Blocks neuron cell signaling at low doses
- Affects brain development in children: learning difficulties, memory loss and lower IQ
- August 2019: EU risk assessment identifies that Chlorpyrifos causes developmental neurotoxicity
- October 2019: EU proposes an immediate ban in Europe (voting in December)





Solutions – debunk the myths

1

We need intensive farming to feed the world

2

Large farms are more efficient

3

Pesticides are safe

- Family farms: 80% of world's food
- \uparrow pesticide \neq \downarrow hunger
- 25% global food waste
 - (40% in rich countries)
- small, diversified farms:
 - \downarrow pesticides, \uparrow (x2) food/acre
- Human health
- Biodiversity
- Human rights/right to food



Thank you!

Working together towards a healthier future

