

# La santé des abeilles

Apport de la recherche  
en évaluation  
des risques

9 décembre 2019

CONFERENCE INTERNATIONALE  
ANSES-EFSA

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# Surveillance data in EU and beyond: towards a global assessment of pesticide exposure and risk

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## 1. Refinement of pesticide risk assessment

## 2. Beyond the local surveys

### i. *An international approach*



### **RESCUE-B**

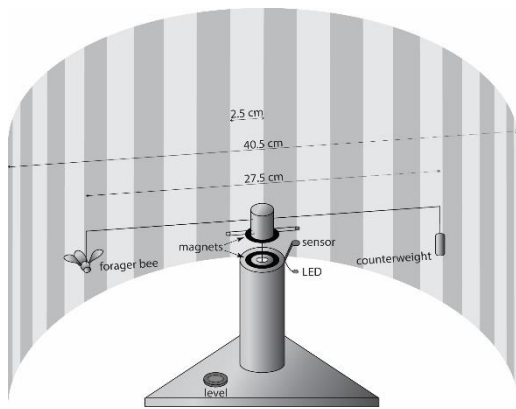
*Risk and Exposure Survey  
on Chemical Use in the  
Environment*



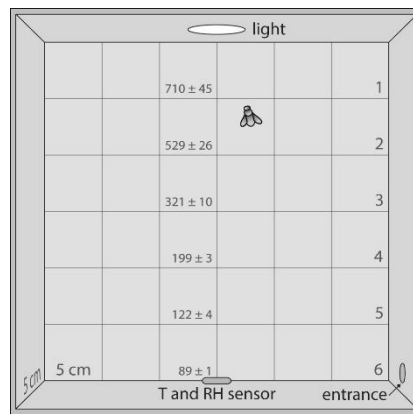


# Sublethal effects

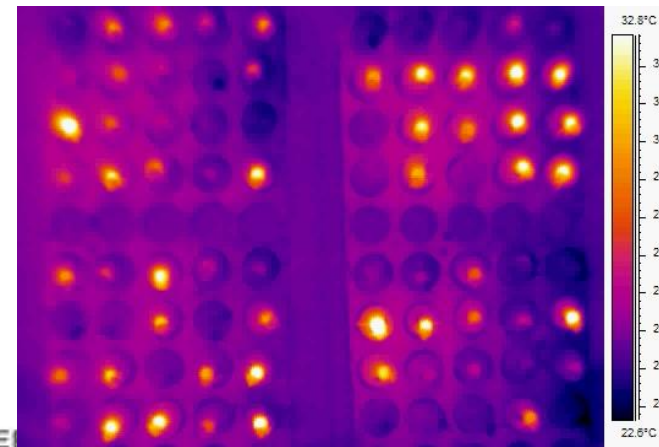
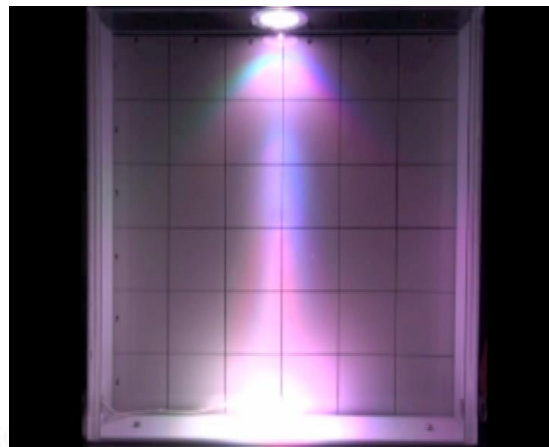
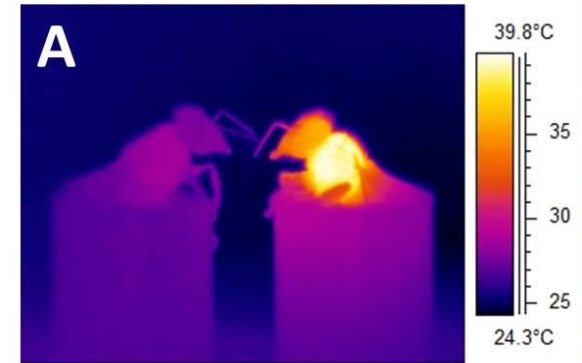
## Flight



## Walk and climb



## Body temperature



Tosi et al., *Sci Rep*, 2017a

Tosi et al., *Sci Rep*, 2017b

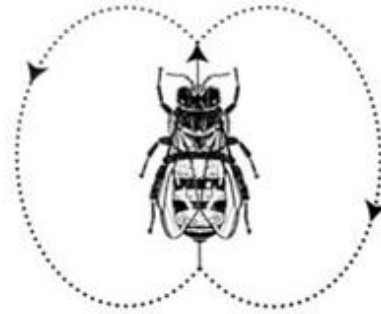
Tosi et al., *J Insect Physiol*, 2016

# Sublethal effects

[...]



# Sublethal effects



- **Subtle**
  - ✓ Alter of bee health without killing bees directly
- Occur at **lower doses**, as compared to *lethal* effects

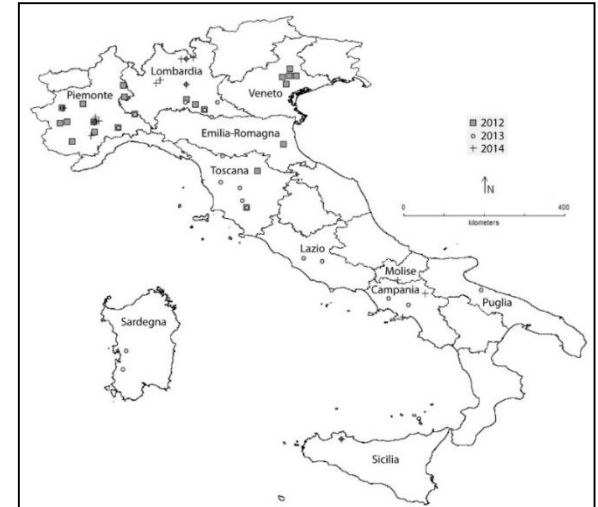


# Widespread pesticide exposure

## A 3-year survey



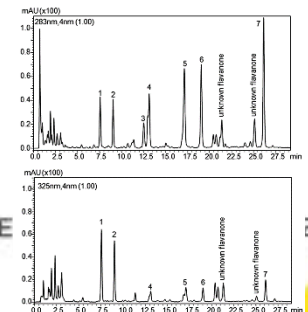
Tosi et al., *Sci Total Environ*, 2018



Pollen collection



Pesticide analysis



EFSA  
European Food Safety Authority

CONFERENCE INTERNATIONALE ANSE

ppt by Simone Tosi

2019

Convegno, Evaluar, proferir



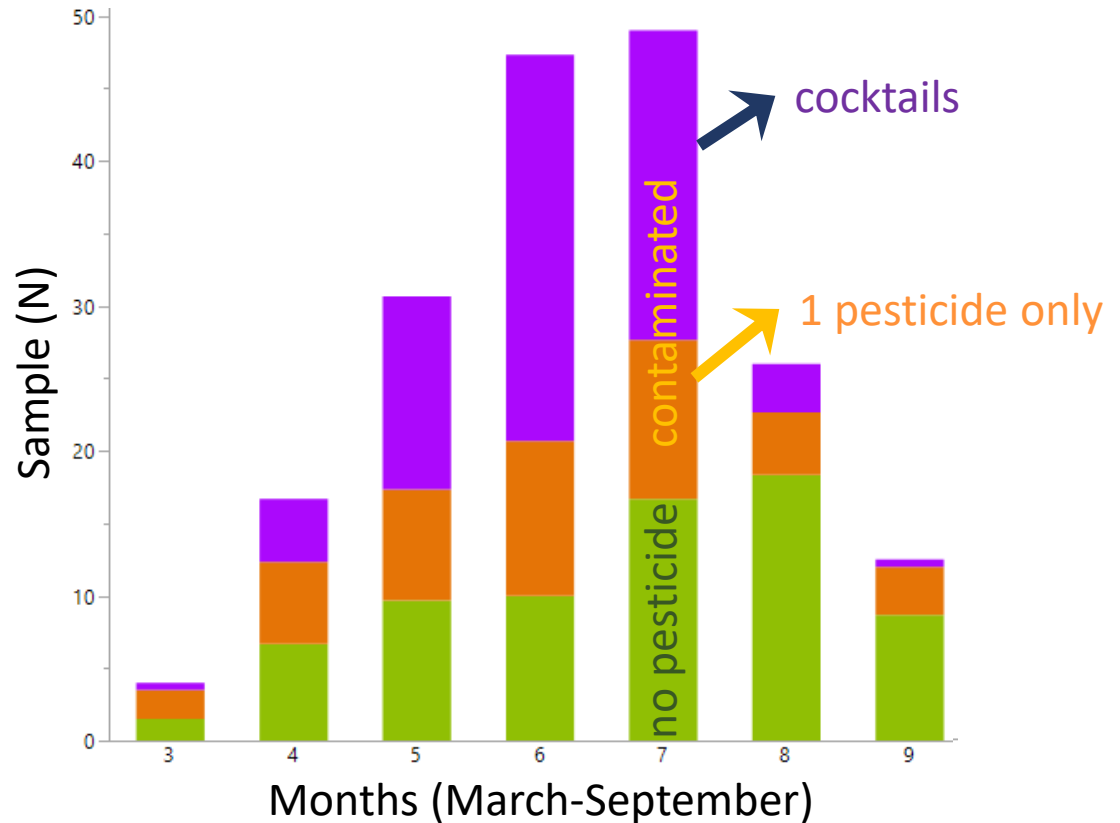


# Widespread pesticide exposure

## Mostly pesticide cocktails

- ✓ 62% positive samples
- ✓ Banned chemicals

- No pesticides
- 1 pesticide only
- Pesticide cocktails



Tosi et al., *Sci Total Environ*, 2018



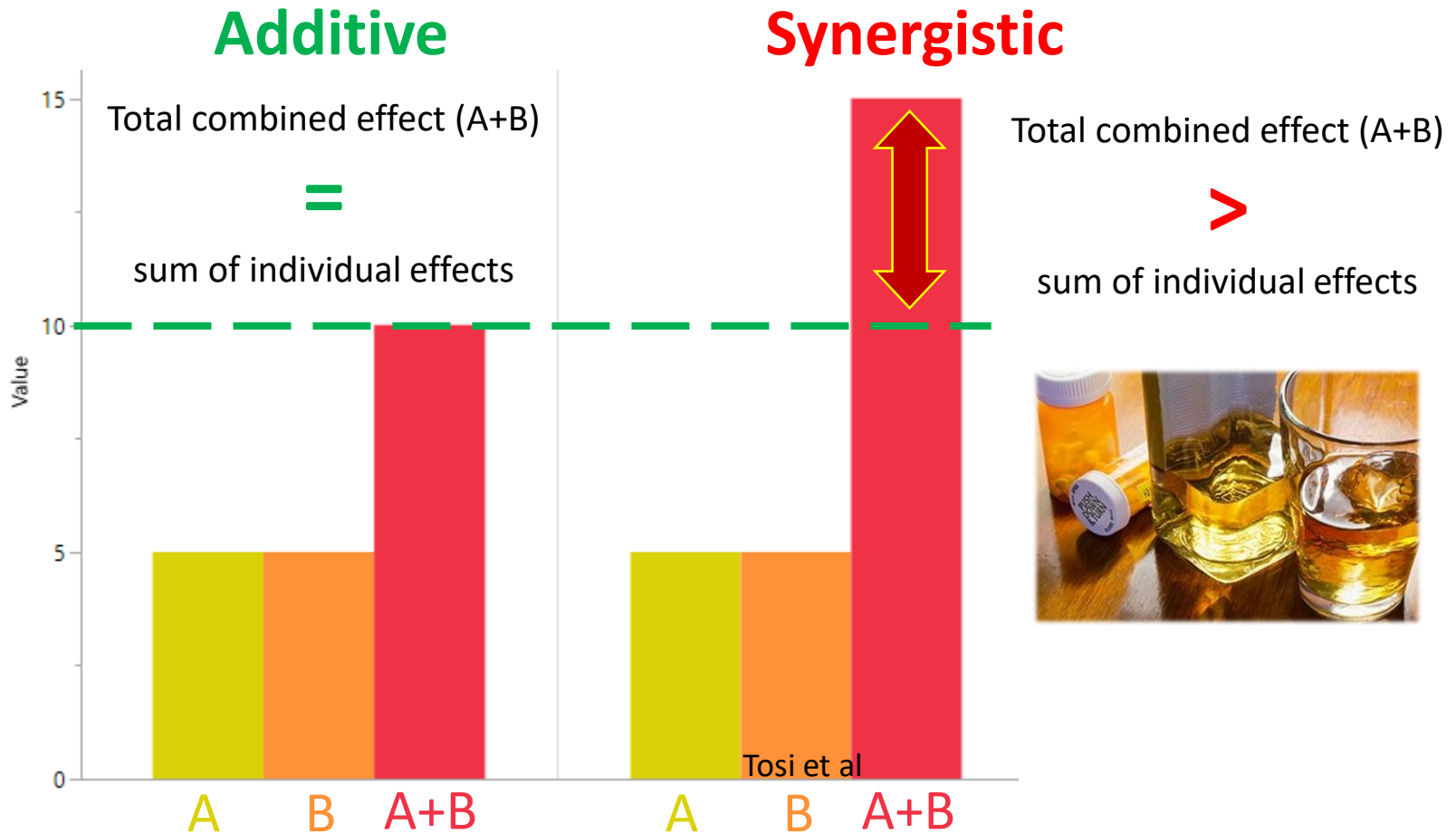
# Pesticide cocktails



[...]



# Pesticide cocktails



# Major gaps

**1. Monitoring studies and pesticide Risk Assessment are limited [...]**

**2. Monitoring studies are local and not harmonized**

- Chauzat 2009 (France), Seitz et al. 2015 (USA), Tosi et al 2018 (Italy), .....
- Mitchell et al. 2017 (*Science*)
  - Honey contamination *worldwide*, but *only neonicotinoids*



# RESCUE-B

## Goals



❖ Improve our understanding of pesticide risk

- Refine the assessment of risk
- *International perspective*

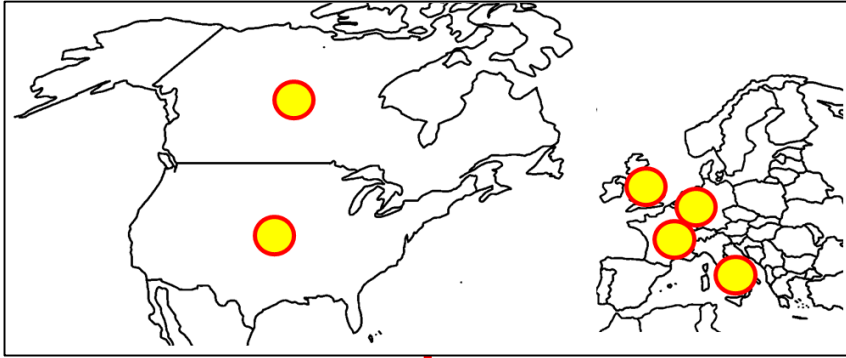


# RESCUE-B

*International assessment of real world risk*



# RESCUE-B





# USA data

- **8 years** of apiary level samplings
- **42 US states** and territories
- **>5000** inspections

[...]

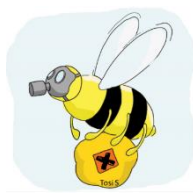


# USA data

**High contamination**  
**✓ 100% contaminated**

[...]





# USA data

## Measuring risk – the *standard* way

### Risk caused by lethal effects

- ✓ “Are the bees going to die?”  
(assuming no interaction between pesticides)

[...]





# USA data

## Measuring risk – a *refined* assessment

[...]

Development of novel methodologies

# USA data

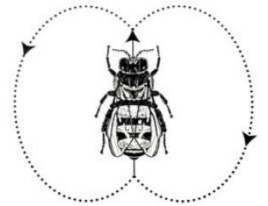
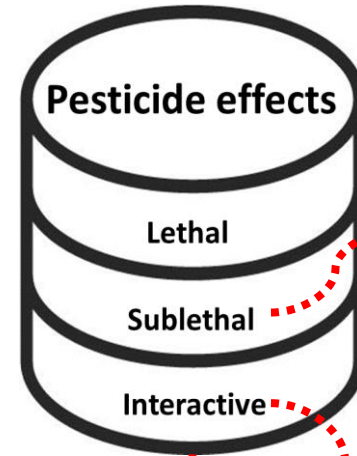
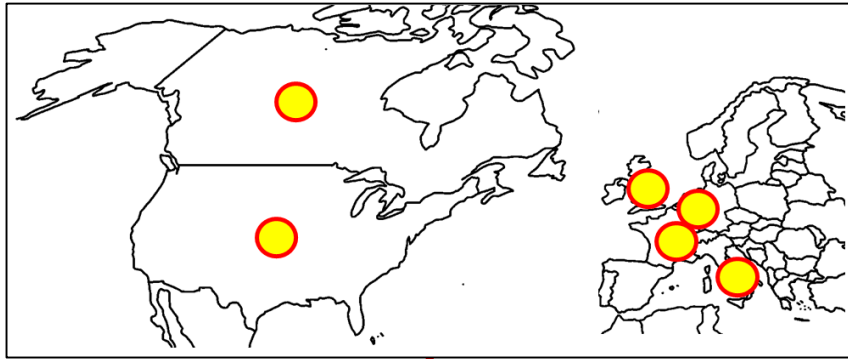
- ✓ Lack of data
- ✓ Not studied in RA

[...]

# A complex network

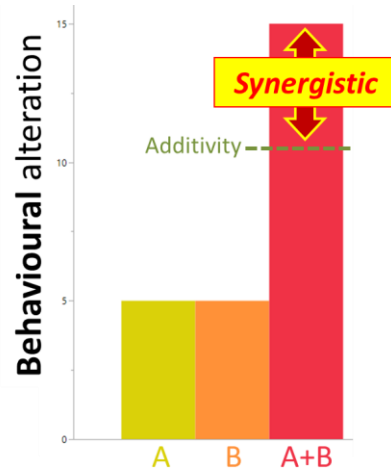
[...]

# RESCUE-B



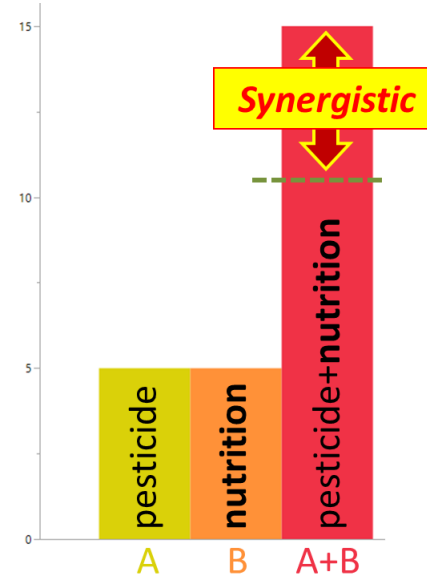
# Future challenges...

**Sublethal synergy**



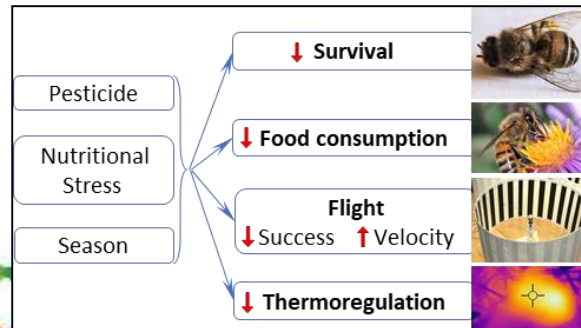
Tosi and Nieh, 2019

**Synergy  
pesticide & nutritional stress**



Tosi et al., 2017

**Combined sublethal  
effects of  
pesticide & nutrition & ...**



Tong, Nieh, Tosi, 2019



# Thank you!



ANSES

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