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for the Safety of the Food Chain

Exposure assessment of the Belgian population to pesticide residues - 2005

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Structure of the presentation

- Introduction

- Data bases - structure & harmonization

- Exposure assessment - deterministic & probabilistic

- Conclusions & Perspective

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Introduction

Monitoring programme:

– Authorization, registration?

– Exceeding of the MRL ?

– detection frequency

GAP, controlled field experiments

Toxicological data, insights

Public health safety?

*Exposure < toxicological endpoints (*ADI, ARfD)

Introduction

Exposure = consumption x residue level

➡ National Food Consumption Survey 2004 (IPH)

- commodity / person / day
- 6015 interviews, > 15 y, whole year

➡ Pesticide monitoring programme 2005 (FASFC)

- residue / commodity
- Analytical method (LOR)
- 1496 samples, 200 pesticides ≈ 134 940 residue/matrix

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Data bases

Reporting ↔ Data bases ↔ Exposure assessment

- **Selection:**
  - 25 residues more frequently found (> 2% of detected samples)
  - ≠ residues in 1 sample: "authorized combinations (Fytoweb, June 2005)

- **Harmonization of databases (compatibility?):**

Pesticide residue data

  - food items & residue codes (language, plural, groups, …)
  - addition of 'non-detects'
  - filtering of contra-analysis

Food consumption data

  - grouping of commodities
  - level of detail?

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Data bases

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Exposure assessment

I. Deterministic approach

II. Probabilistic approach

Exposure assessment

I. Deterministic approach

➡ 'point estimate' approach

$$\frac{\text{average concentration } \alpha \times \text{consumption (average, P97.5, …)}}{\text{Body weight}}$$

⬇

> Total intake of residue α
>
> $= \Sigma$ intakes for commodities considered
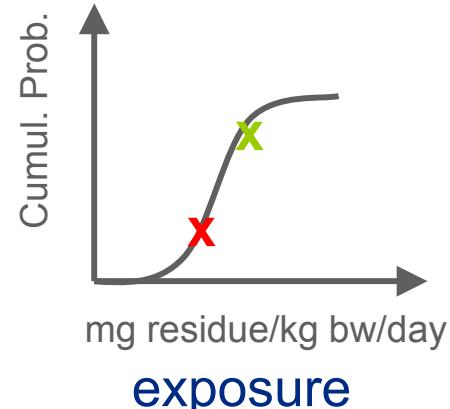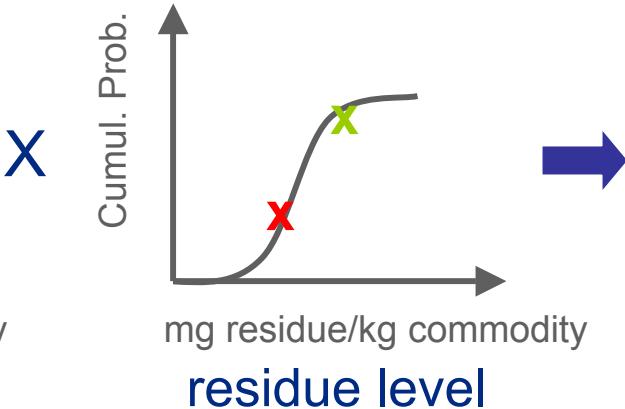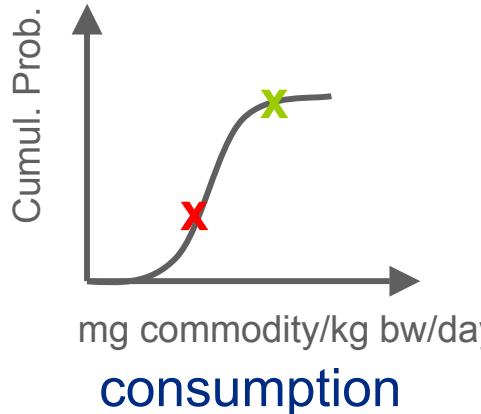
- Less need for extensive database
- Relatively easy to carry out
- Exposure = single estimate
- Output is easy to understand and interpret

Exposure assessment

II. Probabilistic approach

➡ Monte Carlo

consumption X residue level ➡ exposure

- All available data and knowledge are used
- Exposure = distribution
- probabilities
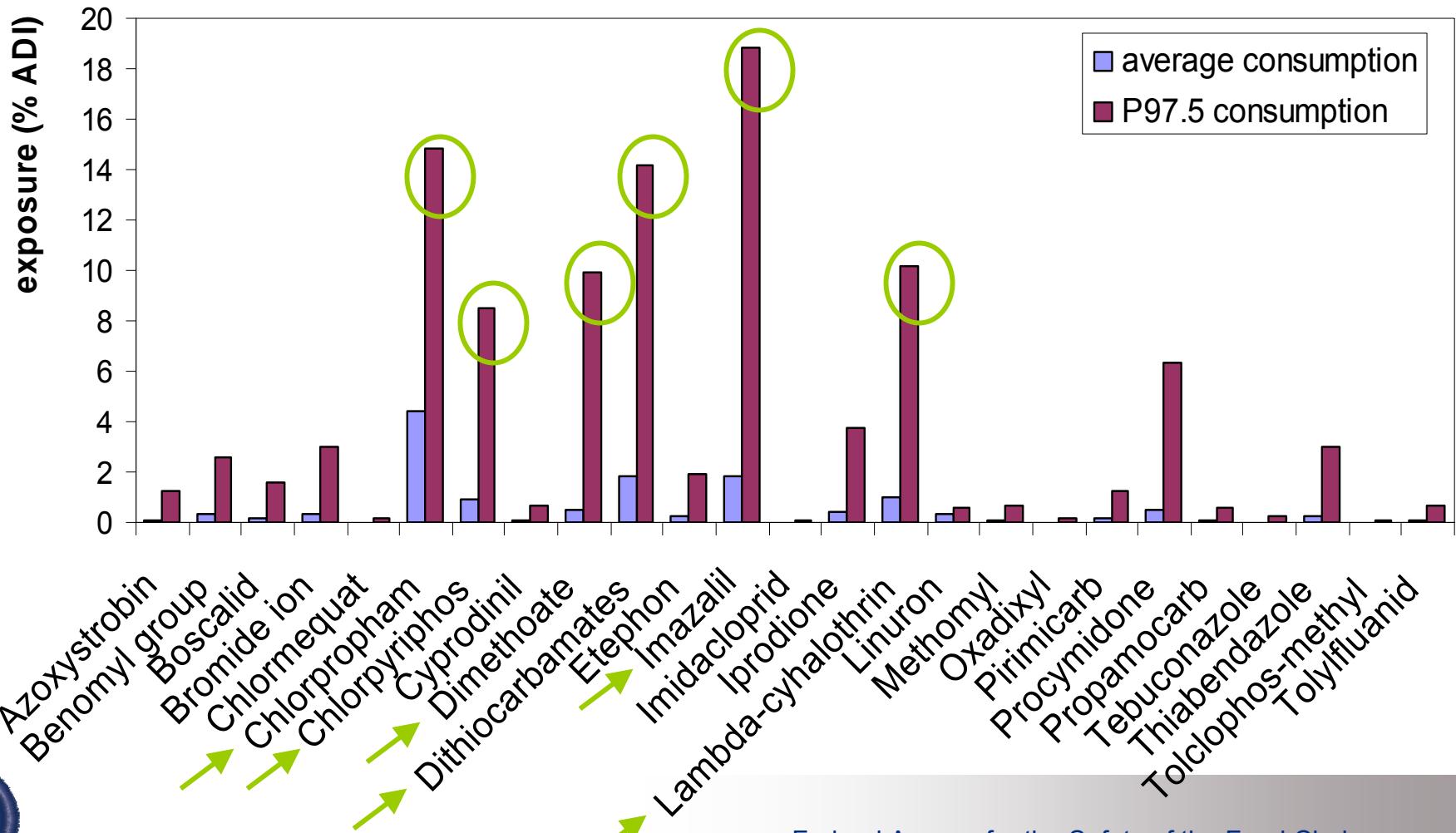
Exposure assessment

- **residues < LOR ('non-detects'):**
  - lower bound: 0
  - middle bound : LOR/2
  - upper bound: LOR (worst case scenario)

- **zero-consumption days incl.:**

  'average' diet for long-term exposure assessment

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Exposure assessment

I. Deterministic approach: screening
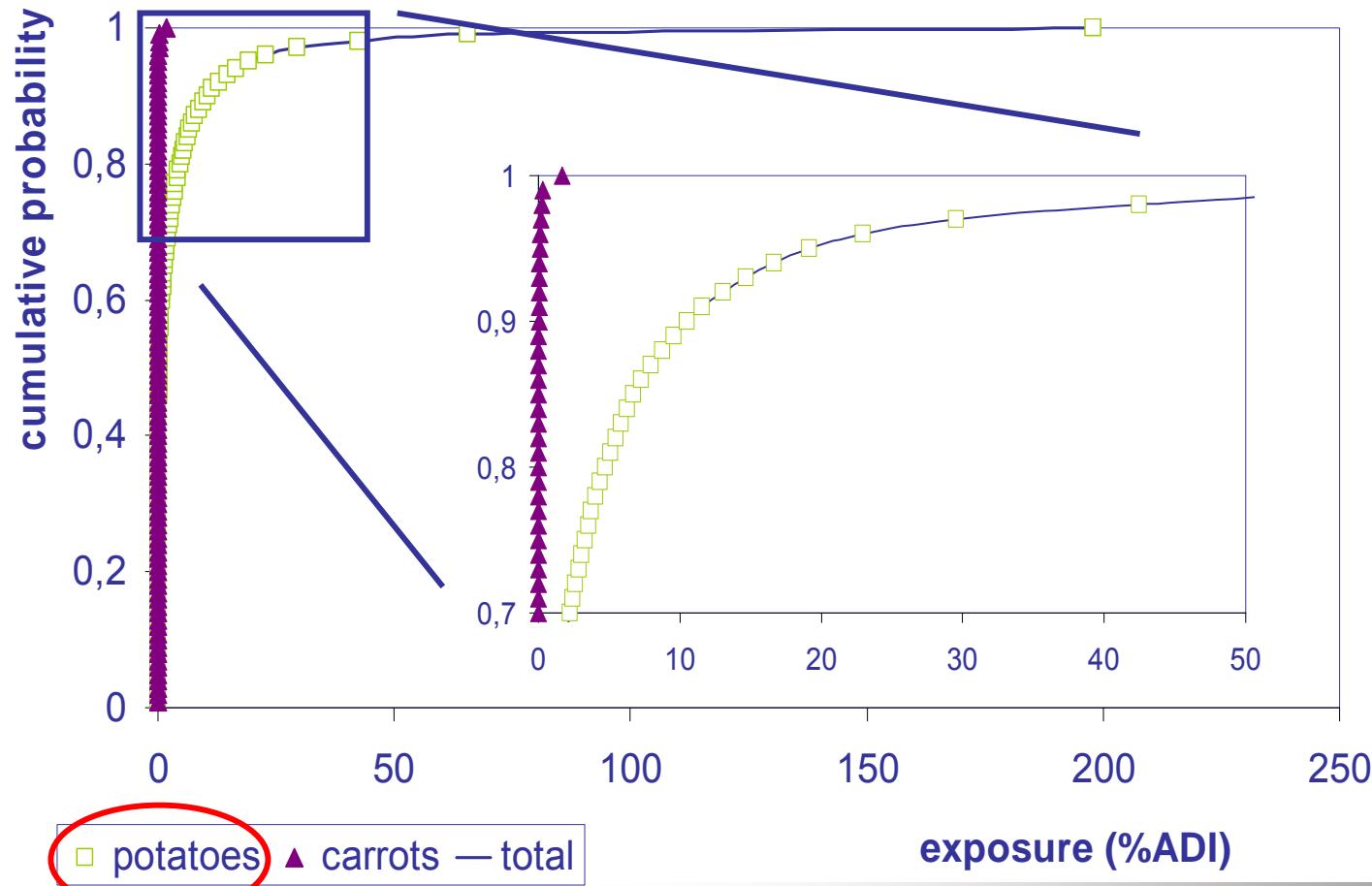
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Exposure assessment

I. Probabilistic approach

Detection frequency (%)	Average			P97.5			P99.9		
	0	LOR/2	LOR	0	LOR/2	LOR	0	LOR/2	LOR
Chlorpropham 41.3 (104)	4.26	4.26	4.49	34.65	34.40	36.20	119.61	133.41	153.35
Imazalil 26 (323)	1.65	2.14	2.58	15.99	16.82	17.36	54.19	52.35	59.55
Dimethoate 9.6 (197)	0.25	0.44	0.63	0.00	1.63	3.25	55.92	56.61	63.70
Dithiocarbamates 16.4 (861)	0.26	1.83	3.41	2.22	5.27	9.55	11.66	11.74	18.68
Chlorpyrifos 5.3 (509)	0.05	0.79	1.51	0.68	3.24	5.96	3.62	6.54	10.62
Lambda-cyhalothrin 1.9 (855)	0.01	1.04	2.05	0.00	4.45	8.87	1.63	8.93	17.04

Exposure assessment

Chlorpropham

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Exposure assessment

I. Probabilistic approach

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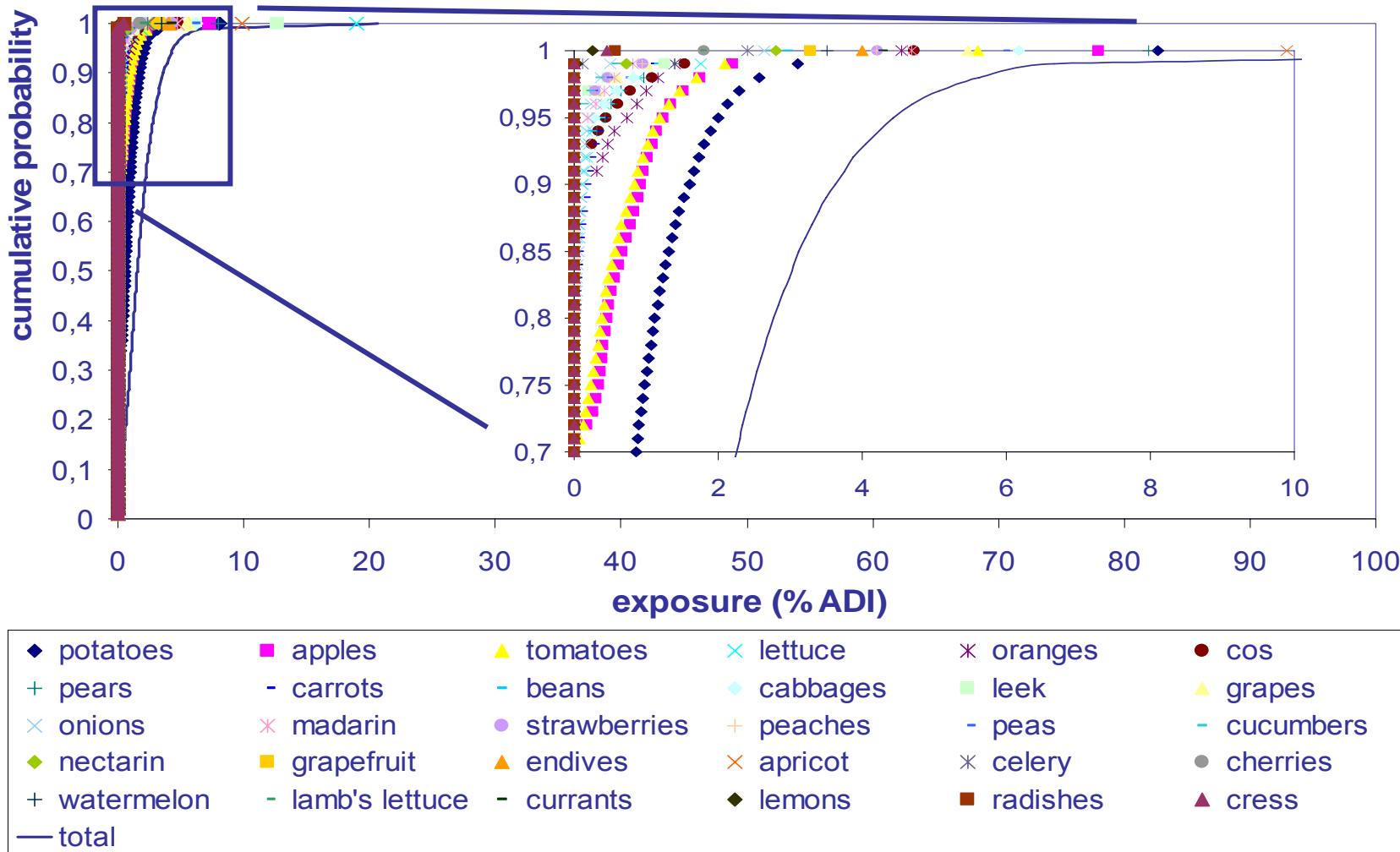
Exposure assessment

Imazalil

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Exposure assessment

Dithiocarbamates

◆ potatoes	■ apples	▲ tomatoes	✕ lettuce	✳ oranges	● cos
+ pears	− carrots	− beans	◆ cabbages	■ leek	▲ grapes
✕ onions	✳ madarin	● strawberries	+ peaches	− peas	− cucumbers
◆ nectarin	■ grapefruit	▲ endives	✕ apricot	✳ celery	● cherries
+ watermelon	− lamb's lettuce	− currants	◆ lemons	■ radishes	▲ cress
— total					

Conclusions & Perspectives

- **Pesticide monitoring program FASFC 2005**

    Detection frequency = 56%

    exceeding % of the MRL = 7.9%

    ↕

Chronic exposure seems generally under control

- **Possible lacunes/improvements:**

    • Only fruit and vegetables

    • Processing factors

    • Storage, transport, shelf life, lab-to-lab variation, analytical method, …

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Conclusions & Perspectives

- **Further research**
  - sensitive population (children, pregnant women, …)
  - cumulative exposure assessment
  - comparing (years, trends – evolution)

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Thank you for your attention

Claeys W., de Voghel S., Schmit J.-F., Vromman V. & Pussemier L.
Exposure assessment of the Belgian population through fruit and vegetable consumption.
Submitted for publication to *Food Additives & Contaminants*

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