# Urban Agriculture:

## Bioavailability as a tool in urban agriculture?

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# I. Urban Agriculture: a wide range of activities

Communal gardens

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Allotments in or near cities

# I. Urban Agriculture: a wide range of activities

Agriculture near cities/highways/industry etc.

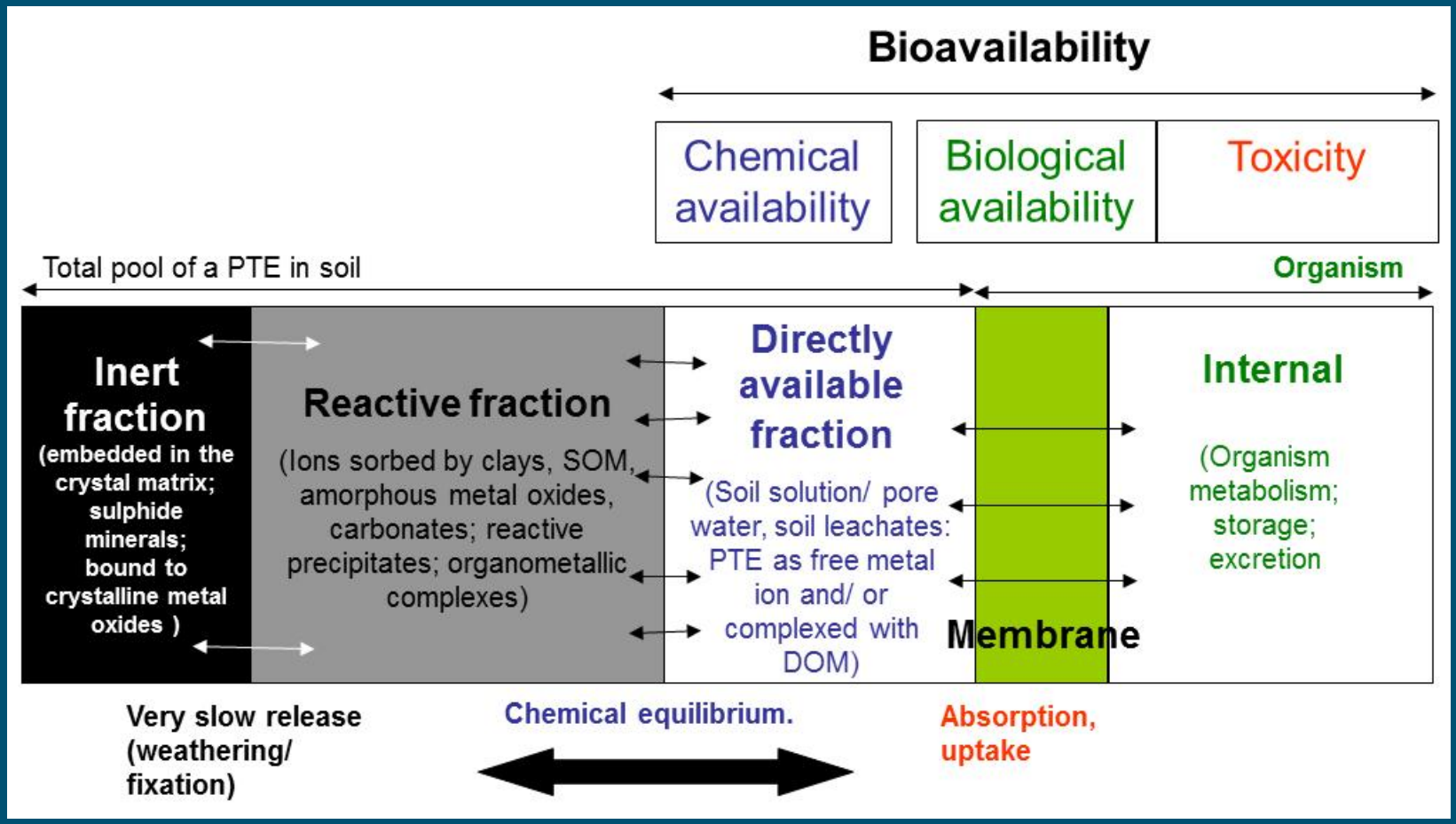
# II. Problem: impact of pollution on crop quality

- Communal gardens and Allotments: risk of elevated levels of lead: high exposure levels
  - Can people safely use allotments and gardens to grow vegetables and eat them?
- Regular Agriculture: crop quality insufficient for sale on market
  - Can the farmer sell the product and earn an income?

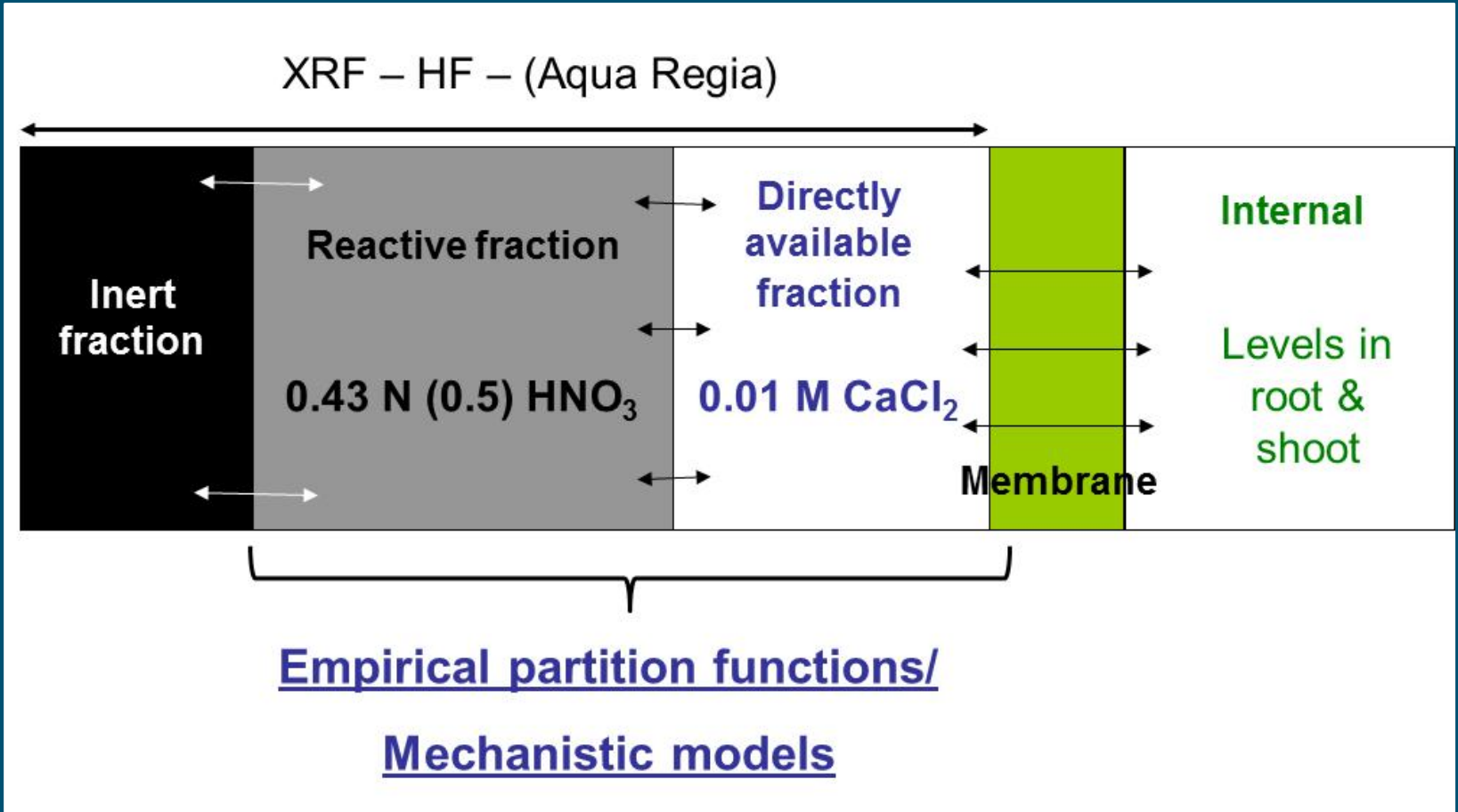
# II. Problem: impact of pollution on crop quality

- Why is this such an issue???
  - Strict soil quality guidelines (standards) due to conservative model approaches (e.g. in case of lead: 140 mg $kg^{-1}$)
  - Limited link between levels in soil and uptake by crops
  - Current soil standards do not consider availability of contaminants in soil!

# III. Availability: from theoretical framework



# III. Availability: to practical approach



# IV. Application in urban settings: Policy development

From Field data  To model development  To soil standards

**Pb (L. perenne)**

Esposende: Agricultural fields –

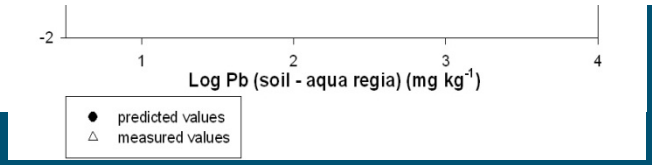
Estarreja: Agricultural fields surrc industrial area – 39 sites

Lousal, Caveira, Aljustrel (Iberia sulphides, pyrites, Cu extractior fields surrounding three mining 27+15+25 sites

| | Limit soil concentrations (total*) (mg $kg^{-1}$ d.w.) | | | | | |
|---|---|---|---|---|---|---|
| | Cd | | | Pb | | |
| | pH=4; Org C=3% | pH=5; Org C=3% | pH=6; Org C=3% | $Al_{ox}$=50 mmol $kg^{-1}$ | $Al_{ox}$=100 mmol $kg^{-1}$ | $Al_{ox}$=150 mmol $kg^{-1}$ |
| Green fodder production (*Lolium perenne*) | 2.1 | 3.1 | 4.8 | 411 | 618 | 789 |
| | Limit soil concentrations (available **) (mg $kg^{-1}$ d.w.) | | | | | |
| | Cd | | | Pb | | |
| Green fodder production (*Lolium perenne*) | 0.3 | | | 71 | | |

* soil total concentrations = *aqua regia* extraction

** soil available concentrations = 0.01 M $CaCl_2$ extraction



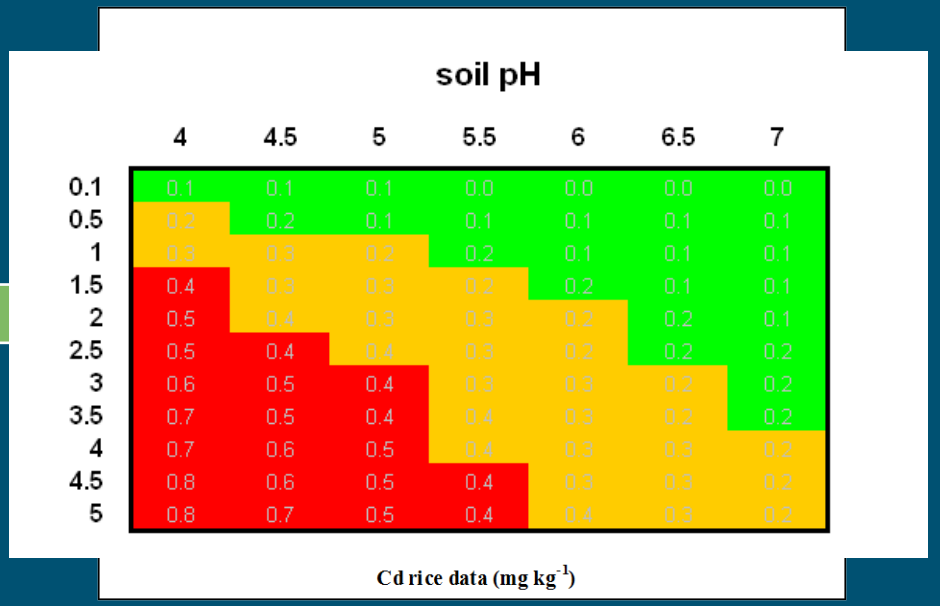
# IV. Application in urban settings:

# Paddy Fields

Cadmium uptake by rice depends on:

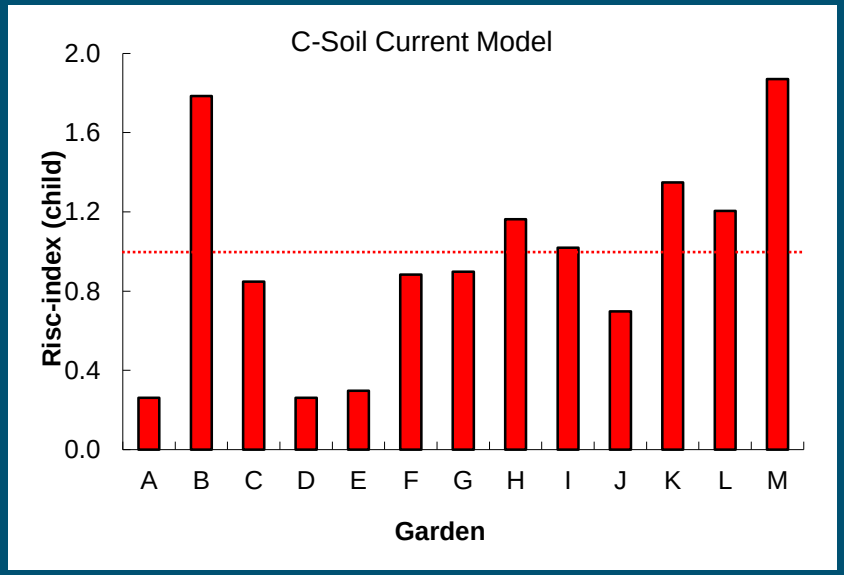
- pH
- CEC
- Weather
- Cultivar
- Redox potential

From 'Look-up' Table to Model Development



# IV. Application in urban settings: Allotments

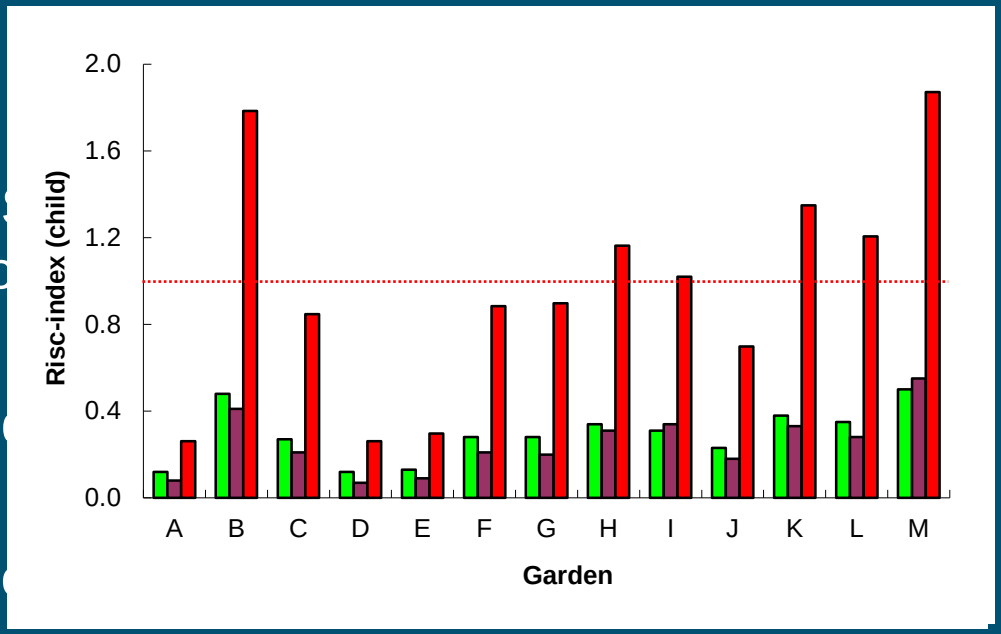
- Specific issue for lead: linear BCF leads to high (predicted!) uptake by vegetables
- This results in numerous cases of presumed risk of unacceptable exposure:
- But is that realistic?



# IV. Application in urban settings: Allotments

Actions:

- Improve C-S non-linear behaviour o
- Using field
- Test on ind



# Conclusions

- Concept of (bio)availability works in many cases
- Improved risk assessment tools
- Application on local, regional, national scale
- Field testing essential
- Still (long) way to go for generic application
- Bút: promising approach in view of harmonization (not numbers but concepts!)

# Thank you

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