ASSESSMENT OF TOXICITY OF HEAVY METAL CONTAMINATED SOILS FOR COLLEMBOLA IN THE FIELD AND LABORATORY

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Outline

- Current approach to soil ecological risk assessment of polluted soil
- Methodology
- Example study from a Chinese paddy field
  - Field observations
  - Lab observations
- Conclusions

A fundamental conception of the soil ecosystem applied in applied ecotoxicology

Two sides of the coin

- Soil biodiversity
- Soil ecological functioning

- Spatio-temporal system model

Translation of ecological concepts into ecological risk assessment practice

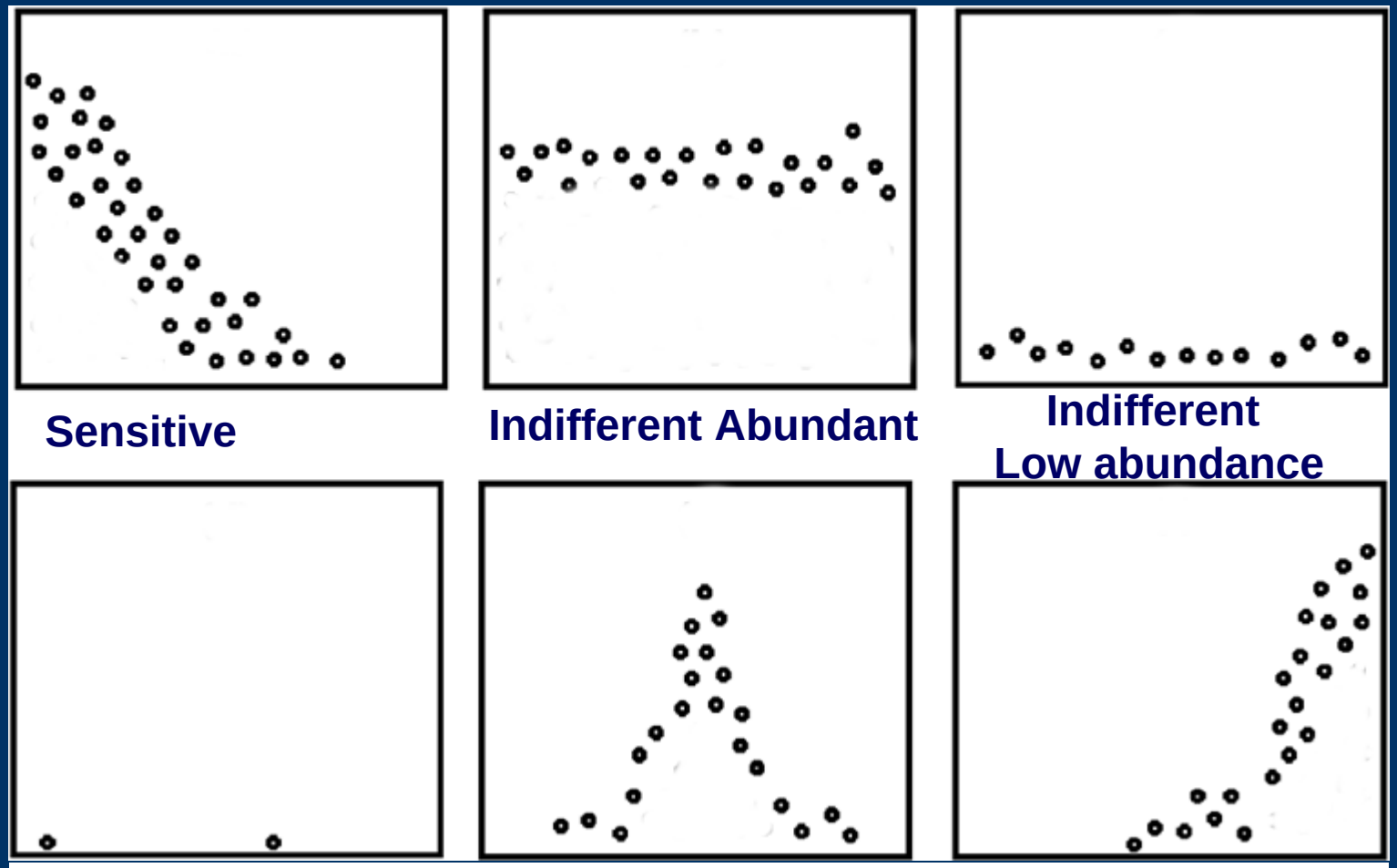
OECD soil standards

- OECD 208 Plant growth test
- OECD 207 Earthworm acute test – obsolete
- OECD 220 Enchytraeid reproduction
- OECD 222 Earthworm reproduction
- OECD draft Collembolan reproduction
- OECD draft Predatory mite reproduction
- OECD guidance Organic matter decomposition
- etc.

Limitations and opportunities of field and laboratory approaches

	Lab	Field
Reference soil	Available	Possibly available
Species tested	Few	Many
Different species responses	Similar	Dissimilar
Pollutant complexicity	Single chemical	Mixtures
Exposure	Overestimated	True
Species interactions Predation - competition	Neglected	Included
Long term exposure	Ignored	Included
Climatic conditions	Optimal	Variable level of stress
Food availability	Plenty	Variable
Avoidance due to heterogeneity of exposure	Impossible	Possible
Dependent on season and climate	No	Yes
Taxonomic expertise	Not needed	Needed
Costs	Expensive!	More expensive!

Real field population responses to increasing pollutant concentrations

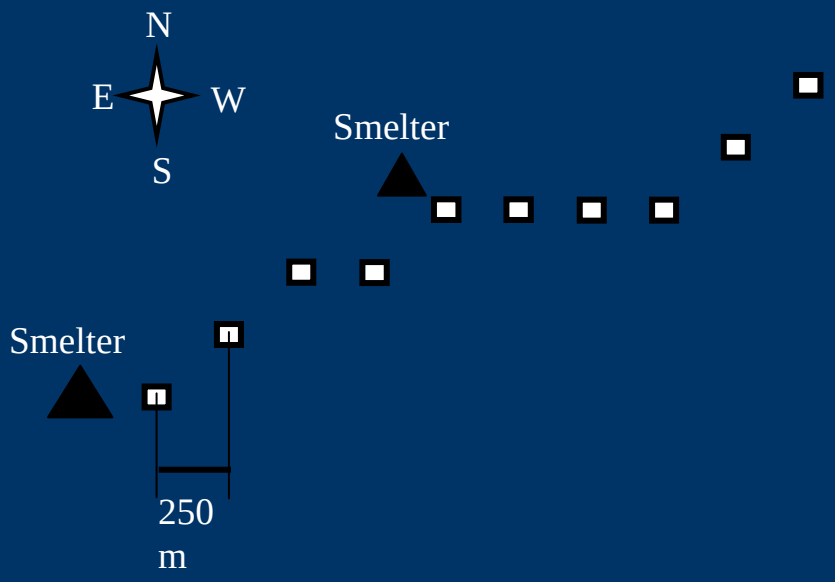


Leung *et al.* EST 2005

SOILREM Nanjing 2008


2 km

Sampling point positioning

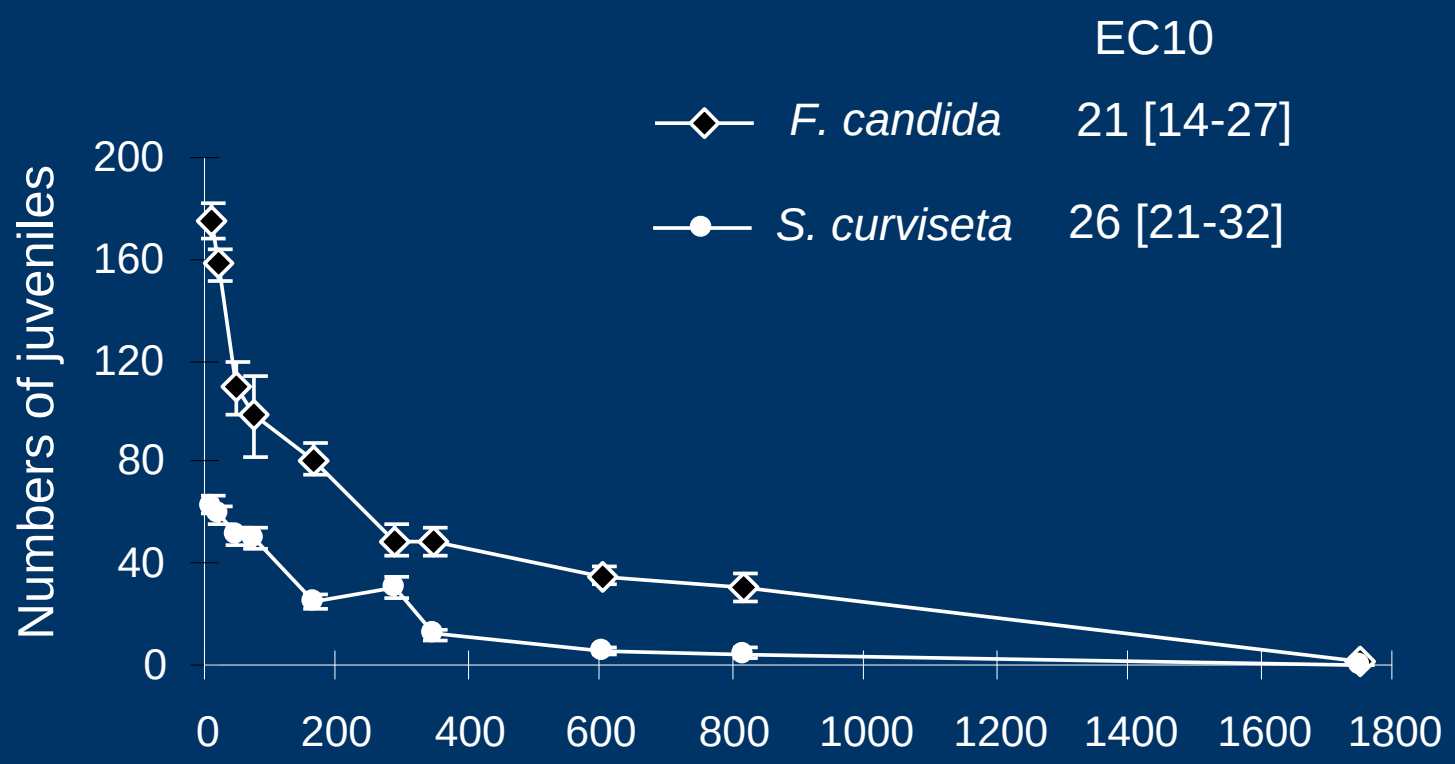


Two lab species

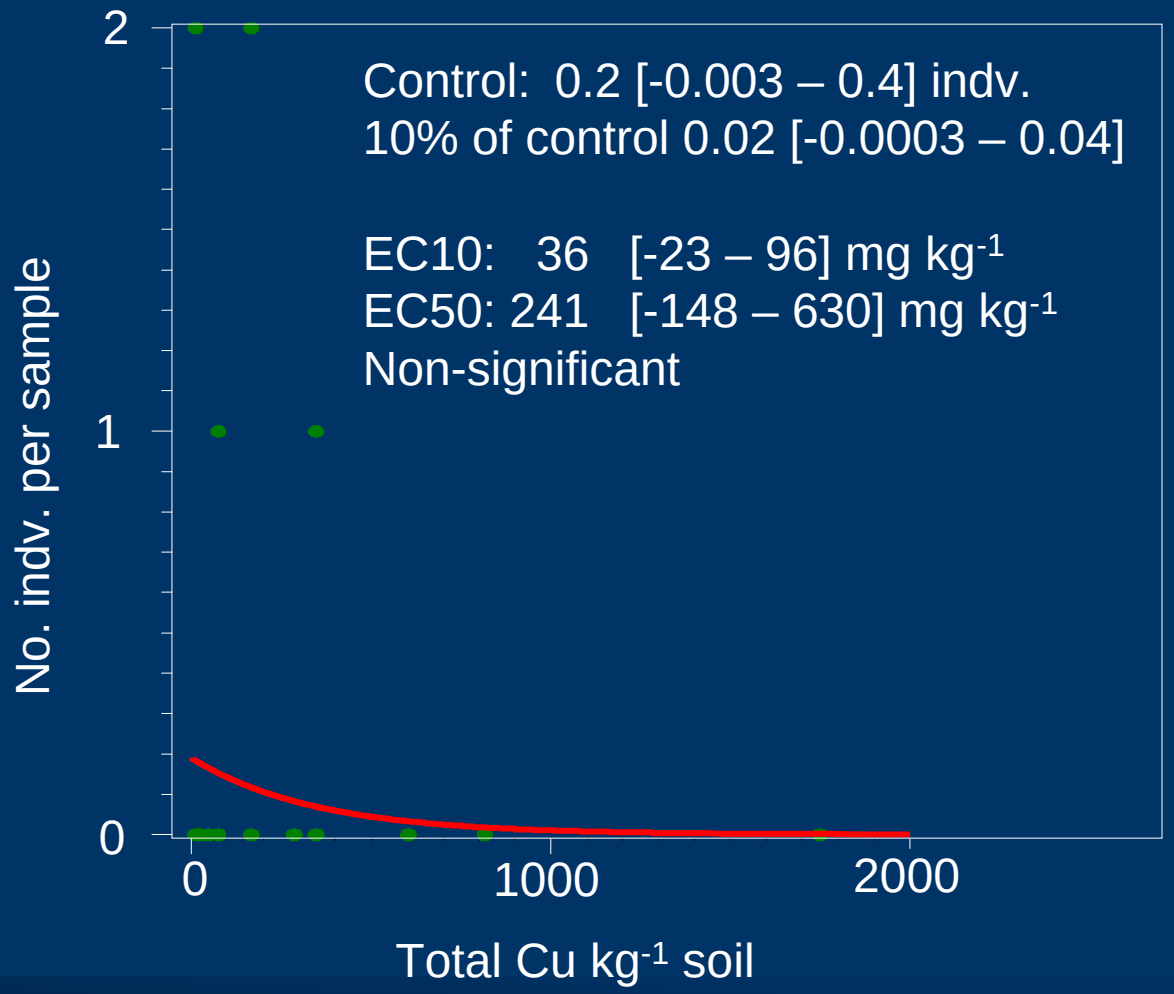
Sinella curviseta

Folsomia candida

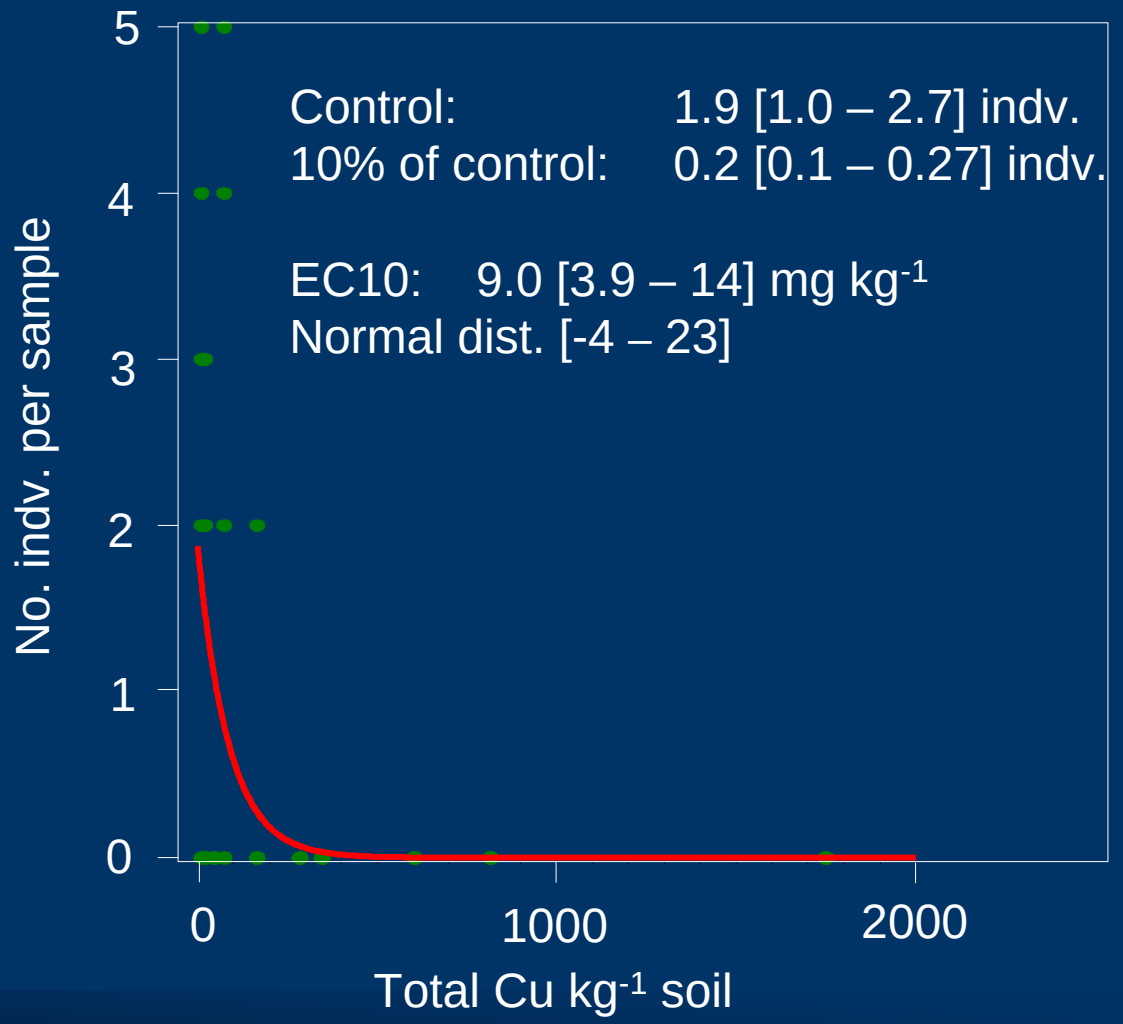
Lab reproduction in field soil



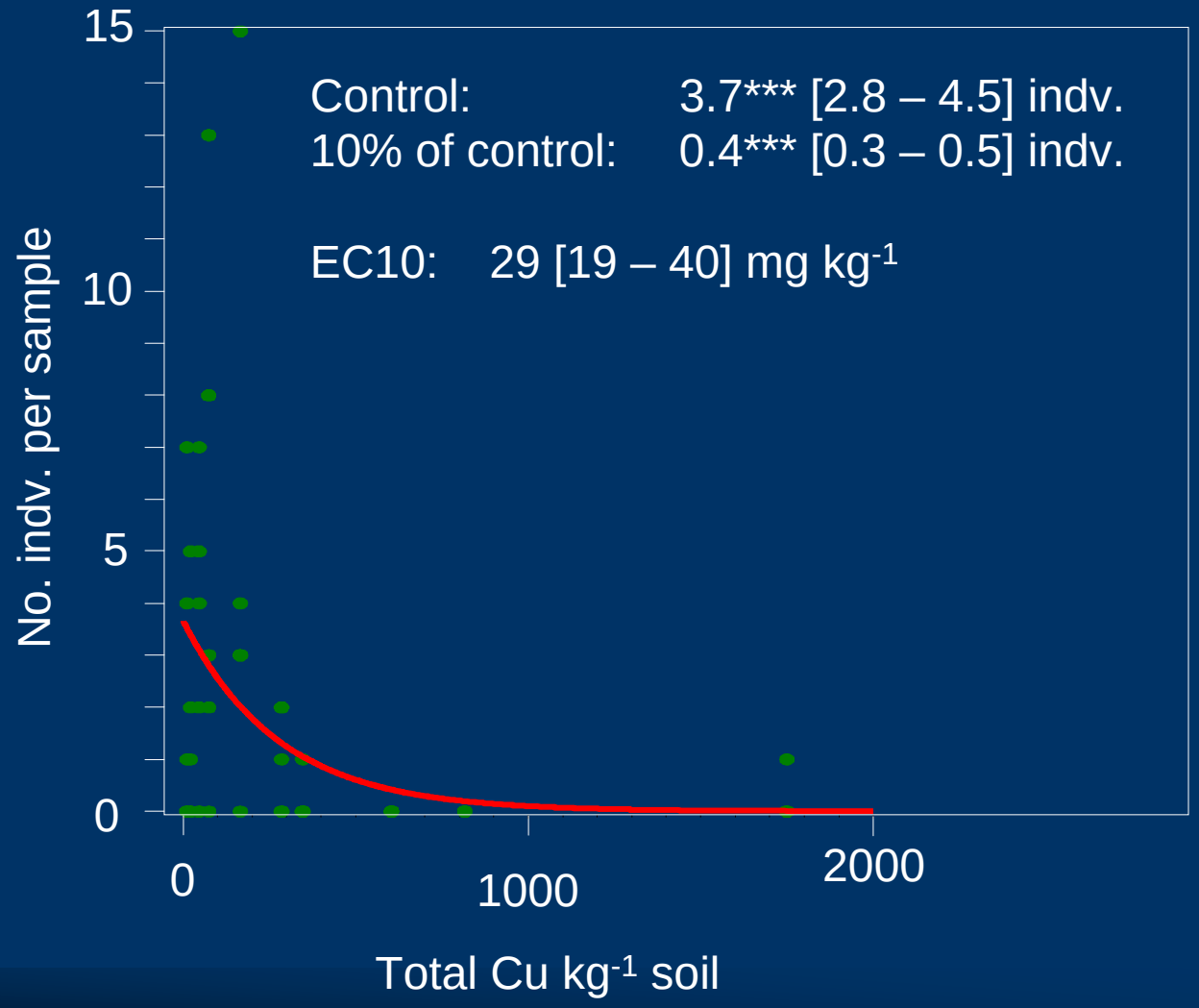
S. curviseta
field population response to copper



F. candida
field population response to copper



Folsomia quadrioculata
field population response to copper



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Conclusions

- Epigeic species are less exposed to soil pollutants than euedaphic species
- Effects on species with low abundance can hardly be detected
- Heterogeneous variance should be taken into account in regression
- The background Cu level seem to create a population effect

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