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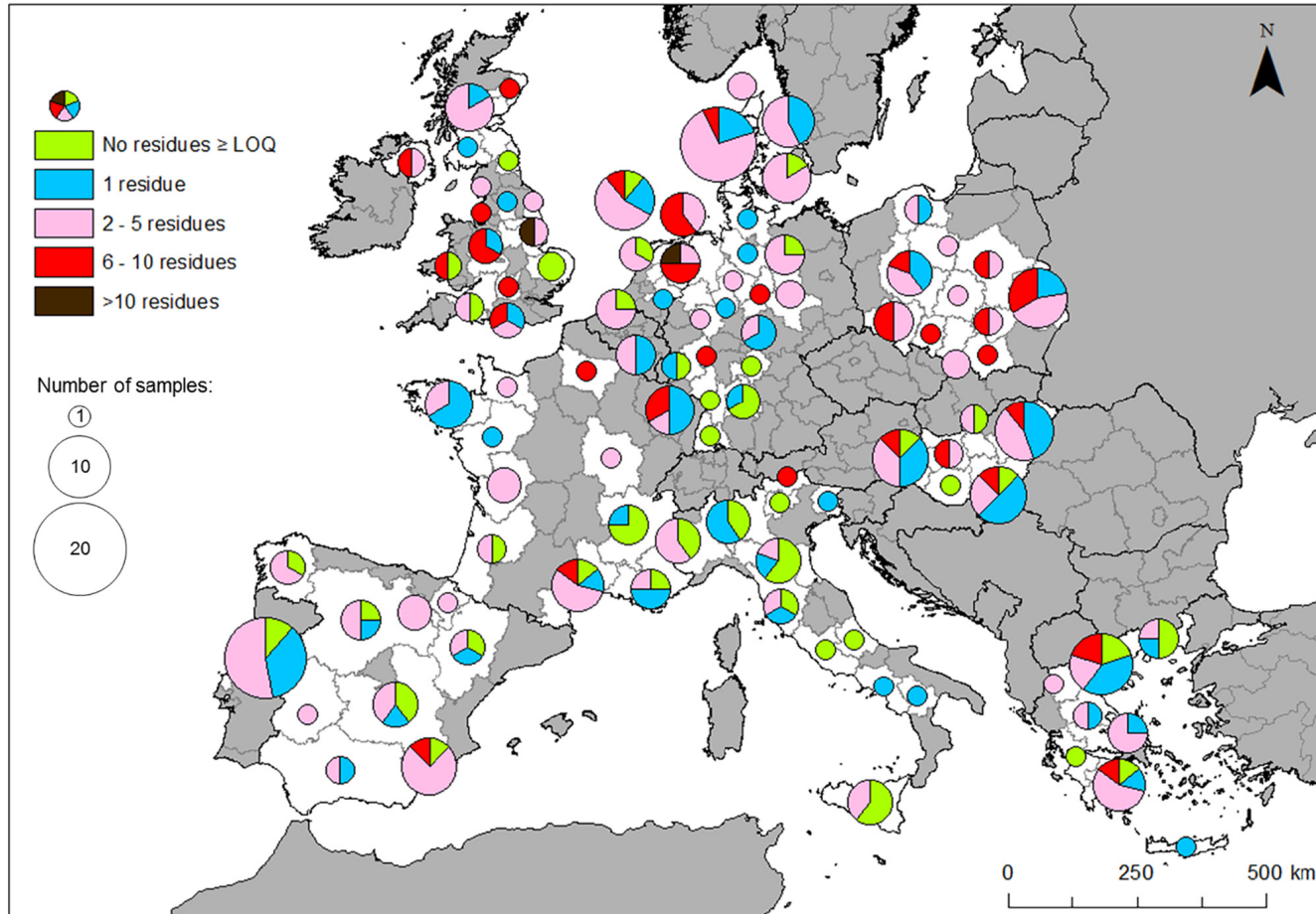
European
Commission

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13-14 April 2021
**EIP-AGRI Seminar 'Healthy soils for Europe:
sustainable management through knowledge and practice'**

Focus Group on soil contamination - Framework



In a study about pesticide residues in European agricultural soils:

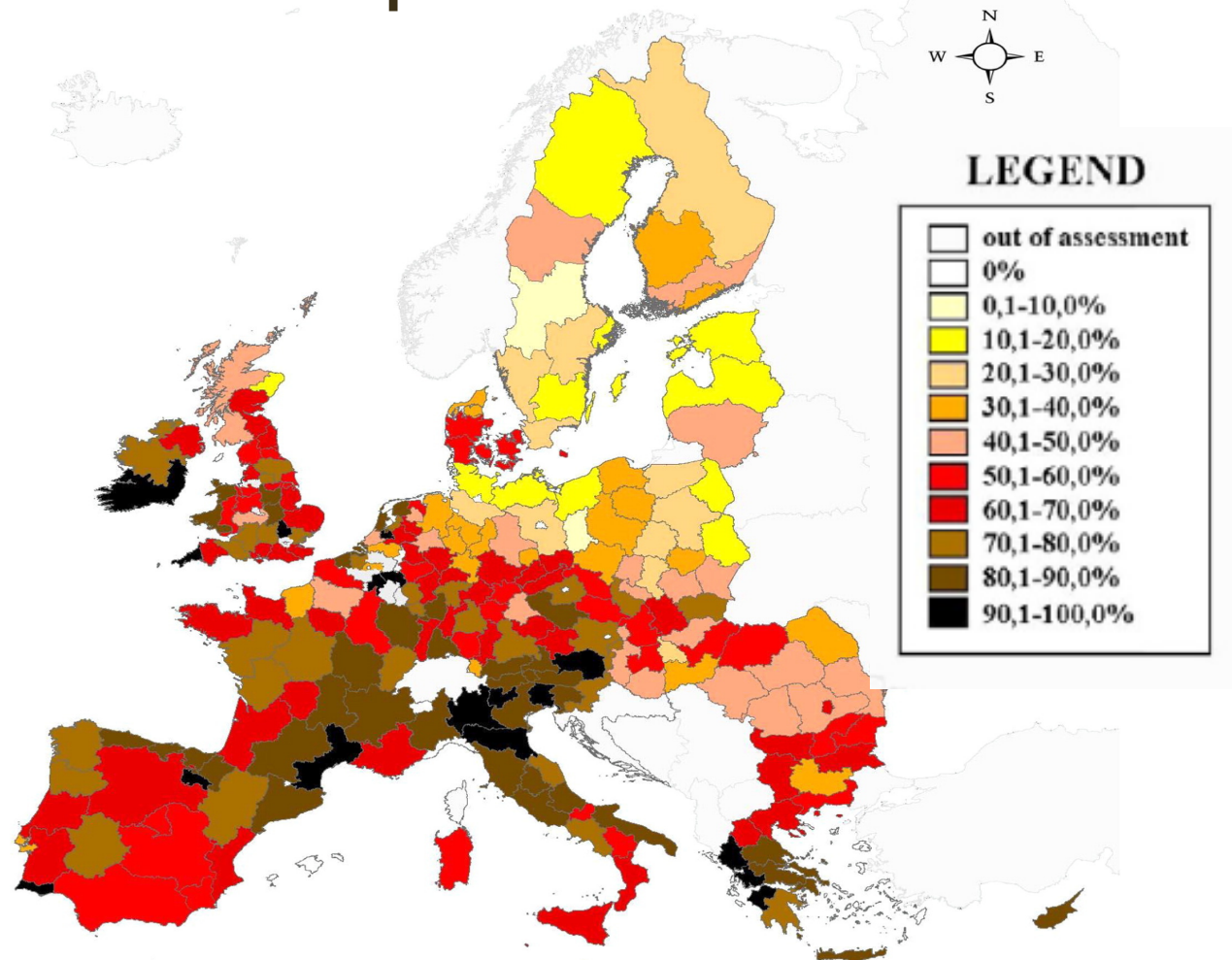
- 83% of the soils contained one or more residues,
- 58% of the soils contained mixtures of residues

(Silva et al., 2018).

Figure 1. Number of pesticide residues in EU agricultural topsoils (0–15/20 cm) at the NUTS 2 level.

Source: Silva, V., et al. 2019. Pesticide residues in European agricultural soils – A hidden reality unfolded. *Science of The Total Environment* 653, 1532–1545. <https://doi.org/10.1016/j.scitotenv.2018.10.441>

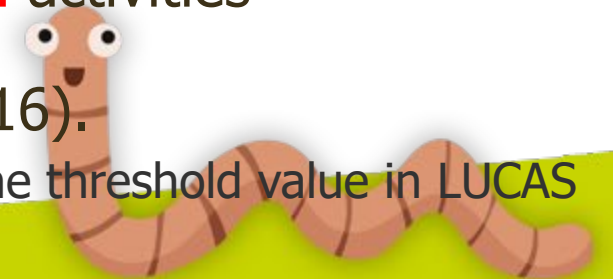
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- For **metals and metalloids**, there is a high percentage of samples with concentrations above the threshold value in LUCAS samples from agricultural land.
- Altogether, over **137,000 km² (6.24% of all agricultural soils in Europe) need remediation** activities

(Toth et al., 2016).

Figure 2. Percentage of samples with metals and metalloids concentrations above the threshold value in LUCAS samples from agricultural land (Toth et al., 2016).



Focus Group on soil contamination

Main question:

"How to prevent agricultural soil contamination and how to address the problem of contaminated soils?"



Focus Group on soil contamination

The FG was composed of **16 experts from 12 EU countries** with different professional backgrounds.

The members actively participated in two meetings in Bari, Italy (11-12 June 2019) and Santarém, Portugal (19-20 November 2019). <https://ec.europa.eu/eip/agriculture/en/focus-groups/protecting-agricultural-soils-contamination>

Methods & Activities: Questionnaires, Group discussions, visits to farmers, meetings with Operational Groups related to soil's health.



Key outcomes of the discussions

Several **contamination sources**, old and emerging ones, with **organic contaminants and inorganic contaminants, external or internal** to the agricultural activity



Key outcomes of the discussions

It is important that farmers try to achieve good yields and profitability through **good farming practices that enhance soil quality and avoid its contamination.**

Which good farming practices? Crop rotations, cover crops, integrated soil fertility management, precision agriculture, etc. that can ultimately **reduce the use of chemical fertilizers and pesticides**, which cause contamination of soil and water when applied in excess.

When needed, **contaminated soils should be remediated** – “gentle” remediation options:

- **Organic amendments** (i.e., compost, biochar), help to immobilize contaminants and enhance microbial activity to break down certain soil organic pollutants –
Biorremediation
- **Plants**, that help to immobilize trace elements (phytostabilization), to extract them from soil (phytoextraction), or to degrade organics (phytodegradation) –
Phytoremediation



Some examples:

Energy crops grown in arable soils contaminated with heavy metals or in marginal soils

Miscanthus x giganteus, *Sida hermaphrodita*, *Spartina pectinata* and *Panicum virgatum*

Local: Upper Silesian Metropolitan Association (Poland) and in Germany, in the vicinity of Leipzig

Results: remediation of soils contaminated with Pb, Cd and Zn.

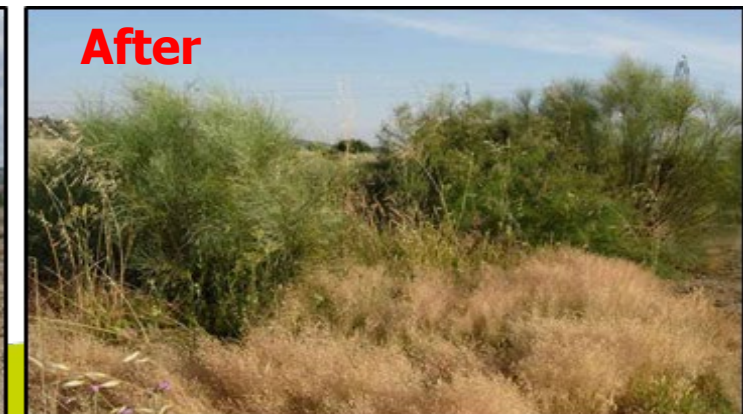
Miscanthus was confirmed as a safe and profitable non-food crop (biomass is used for energy) for marginal and contaminated soils.



Miscanthus in a heavy metal contaminated soil

Restoration program of an agricultural soil polluted by a mining spill

Active phytoremediation with two successive crops of *Brassica juncea*, the addition of organic amendments (compost and cow manure) and lime (in the acid patches), as well as other native shrubs.



Knowledge gaps do address the main question

- **Links between soil laboratory data and their applicability at the farm level**
- **Uptake of contaminants by crops and their entrance into the human food chain**, and the consequences for human health
- **Identify alternative crops to be cultivated in contaminated soils** (e.g., energy crops, fiber, biomass, etc.)
- **Establish long term experimental sites** to deliver scientific criteria for soil remediation
- **Fate of emerging contaminants** such as pharmaceuticals, veterinary and personal care products (PCPs) and definition of threshold values
- **Plastics in agricultural soils**: potential sources, transport, content and behavior in soil
- **Standardization and validation of precision agriculture methods**

Innovative ideas to address the knowledge gaps

- **Establish common soil sampling procedures** to evaluate and monitor soil quality based on farmer's needs
- **Evaluate the bioavailable and soluble fraction of the contaminants** in agricultural soils to protect crops and water
- **Define alternative plant crops for low quality agricultural or marginal land**
- **Select non-food crops for soil remediation** adapted to different European climate regions
- **Implement sustainable farming systems** to apply the right amounts of fertilizers based on plant eco-physiological needs
- **Adopt natural "buffer strips" near surface waters**, as biodiversity areas and contaminants sinks
- **Increase the use of precision agriculture technologies and adapt technologies** for small scale farmers

Conclusions

- **Healthy soils are paramount to the future of the agriculture** to maintain ecosystem functions and services and to sustain plant communities.
- **Prevention** should lead farmers to protect their soils from contamination (**it is preferable to remediation**).
- This could be done through the implementation of **sustainable farm management practices** and the **application of soil-friendly technologies**.

Five *Minipapers* (MP) and a *FINAL REPORT* were prepared:

MP1 Agricultural sources of contamination,

MP2 Developing a soil quality toolbox for agricultural soil monitoring and assessment,

MP3 Biological remediation of contaminated agricultural soils,

MP4 Precision Agriculture as a tool to reduce and prevent soil contamination, and

MP5 Sustainable farm management for the preservation of soil quality.

<https://ec.europa.eu/eip/agriculture/en/focus-groups/protecting-agricultural-soils-contamination>



Thank you for your attention!

More information available at:

Focus Group on soil contamination

<https://ec.europa.eu/eip/agriculture/en/focus-groups/protecting-agricultural-soils-contamination>

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EIP-AGRI seminar

Healthy soils for Europe: sustainable management through knowledge and practice

Online – 13-14 April 2021

All information of the seminar is available on
www.eip-agri.eu

On the event webpage
<https://ec.europa.eu/eip/agriculture/en/event/eip-agri-seminar-healthy-soils-europe-sustainable>

