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Assessment of the impact of organic mater in NDL-PCBs sequestration in industrially contaminated soils

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INTRODUCTION

Little reliable information on transfer of PCBs to humans *via* involuntary soil ingestion is available although young children (1-30 months) with their hand-to-mouth activity may be exposed to contaminated soils. The relative bioavailability (RBA) approach appears to be an **adequate method** to compare the **bioavailability of organic pollutants from different soils** (USEPA 2006).

Because of coats induced by such methods, we've tried to compare *in vivo* results to a new *in vitro* physiologically based methodology. This study presents preliminary *in vivo* results and the *in vitro* methodology which is employed in our laboratory.

The current study addresses both the impact of soil organic matter (OM) on bioavailability of sequestered ND-L-PCBs and an emerging *in vitro* method to assess it.

MATERIAL & METHODS



Site name and location	Contamination historic
Korsec (Basse-Ham, 57 970)	Buried industrial waste from a former mechanical workshop. Dielectrical fluid leak from transformer.
Réverdy (Cognière, 70 230)	Dielectrical fluid leak from transformer. Former agri-food facility.
Lyon	NC
Saint-Cyprien (Loire, 42 160)	Historical dielectrical fluid leak from transformer followed by a recent fire of pallets
Ploufragan (Côtes-d'Armor)	Heavy oil processing facility

8 different soil-samples :

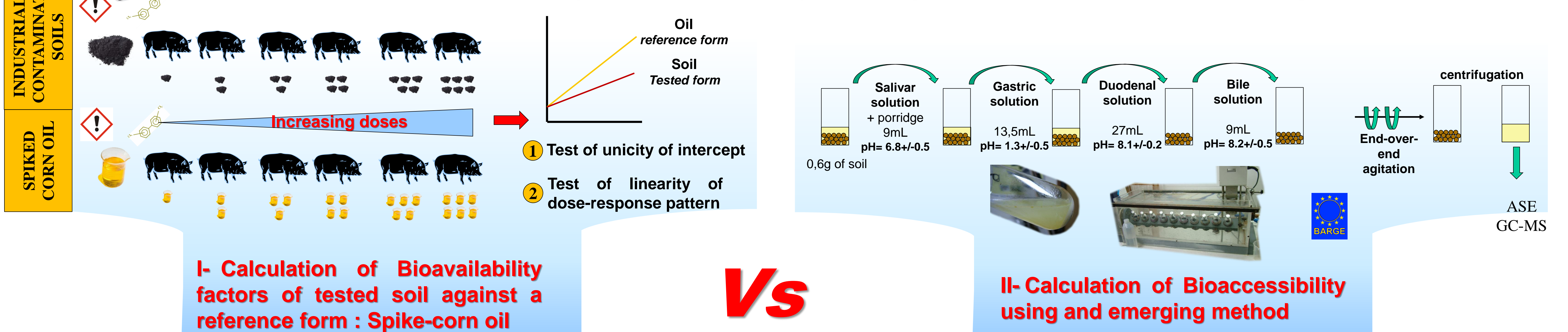
- freeze-dried.
- sieved to 500µm
- homogenised using karter

Determination of ND-L-PCBs concentrations in soil using Accelerated Solvent Extraction (ASE) and GC-MS

Determination :

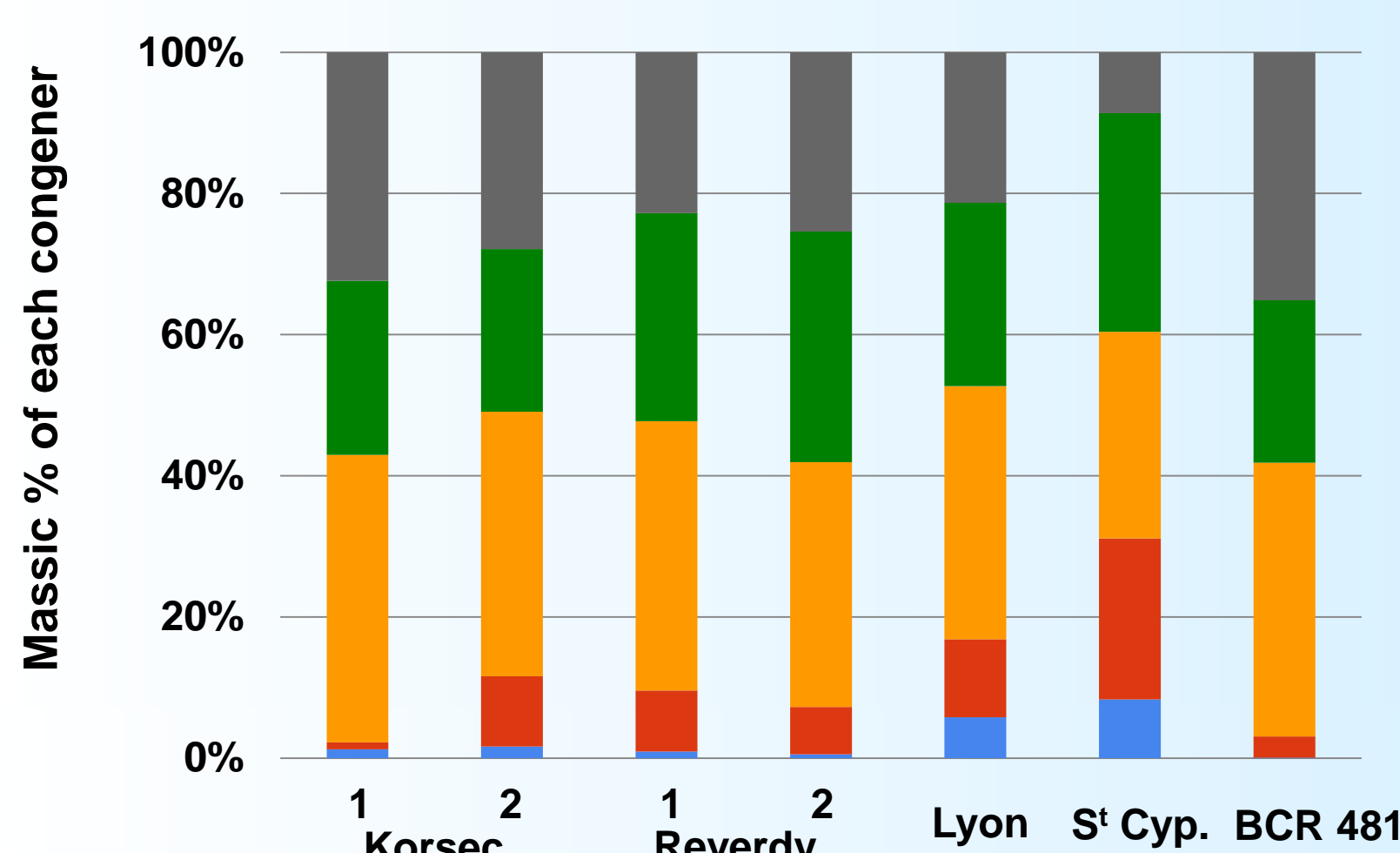
- C_{org} content
- Black Carbon (BC) content

5 different sites were sampled – 8 soils took part of experiments 1 of them was an analytical standard.



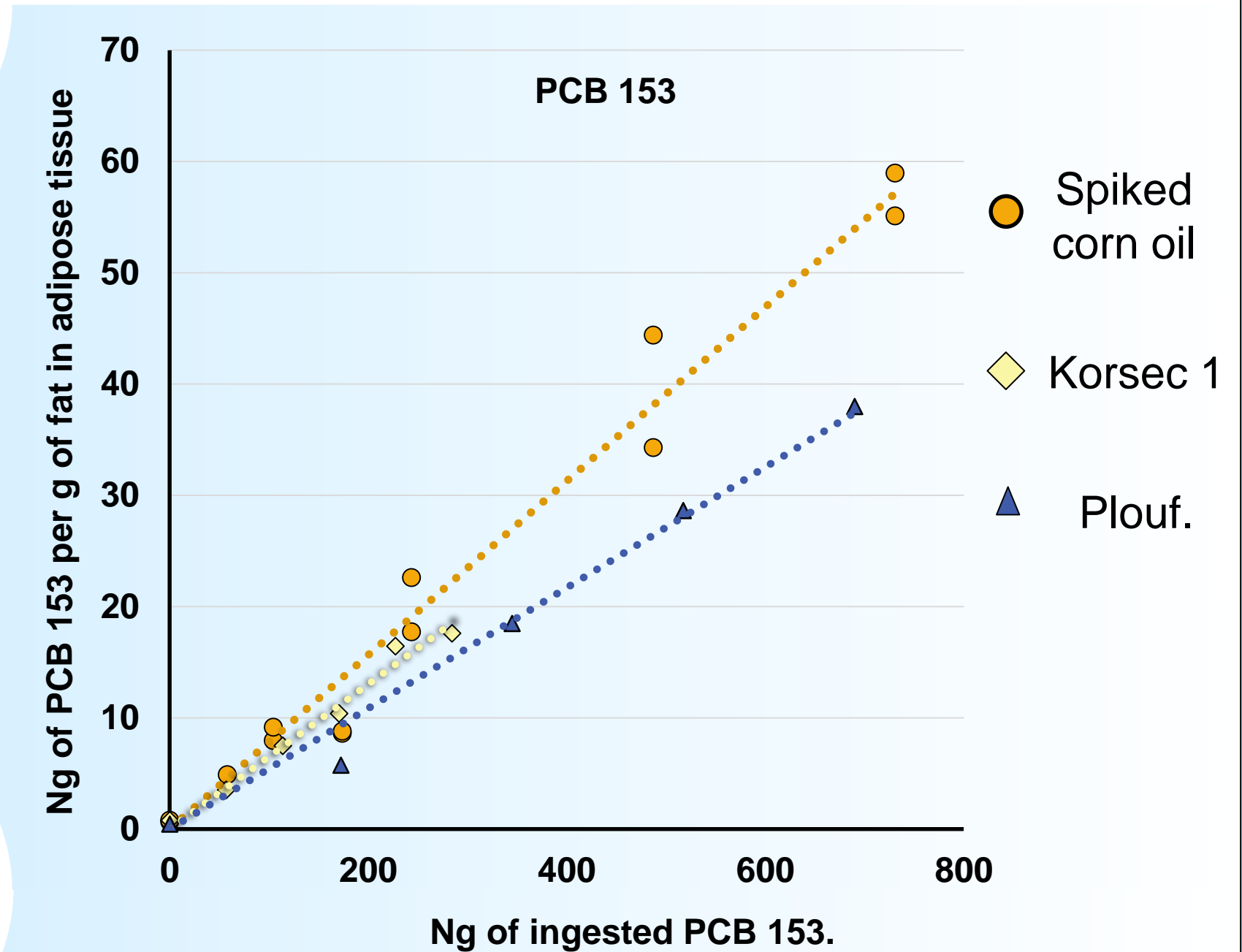
RESULTS AND DISCUSSION

Characterization of soil samples



Contamination profile appears to be similar between soil samples despite their different location

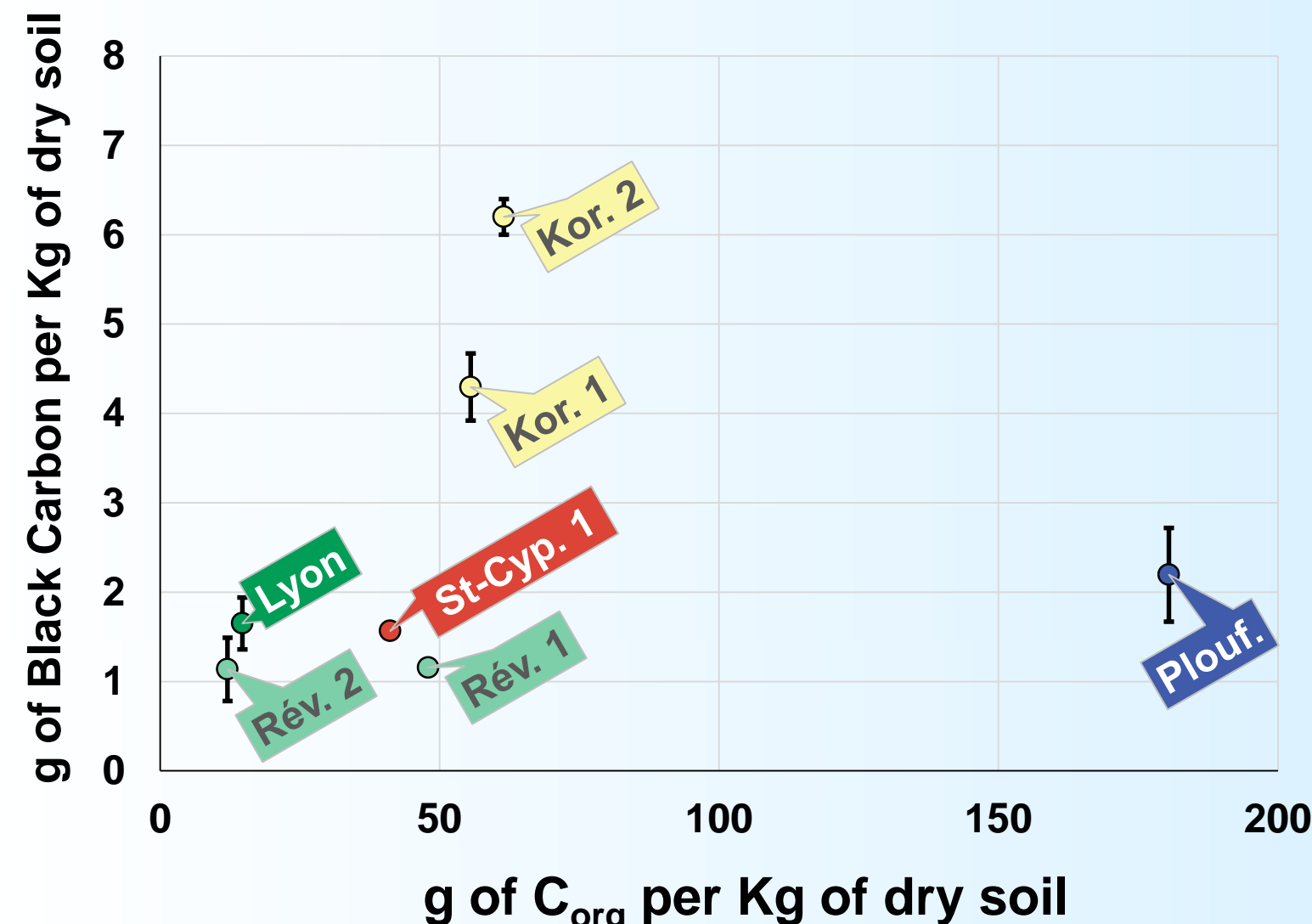
Dose-response relationships were significantly linear. Intercept was non significant.



Whereas soil samples exhibit different qualities and quantities of organic matter, reduction of bioavailability, if any, is weak

Soil samples exhibit different qualities and quantities of organic matter.

Dose-response relationship was significantly linear. Intercept was non significant.



	Slope	Significance vs Corn oil	Relative Bioavailability Factor +/- 2xSE
Corn Oil	0,057	-	100% +/- 14%
Kors. 1	0,032	<0,001	57% +/- 18%
Kors.2	0,057	NS	100% +/- 25%
Rev. 1	0,053	NS	93% +/- 22%
Rev. 2	0,057	NS	100% +/- 16%
Lyon	0,058	NS	103% +/- 19%
St Cyp	0,043	0,0052	75% +/- 17%
Plouf.	0,036	<0,001	64% +/- 14%
BCR481	0,065	0,0798	114% +/- 15%

Calculation of Relative Bioavailability factors. Slope are expressed as the figure above. Relative bioavailability factors were calculated as ratio of the tested soil slope and the spiked corn oil one.

CONCLUSION

- Only three soils exhibited a weaker bioavailability of sequestered ND-L-PCB.
- Implication in risk assessment to contaminated field-management needs to be further investigated.
- However some samples exhibited significant reduction in bioavailability compared to the oil group.
- Quality of organic matter of these soils has to be further investigated