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Comparison of efficiency of in situ amendment of soil and alimentary supplementation with activated carbons to limit CLD transfer to piglets

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INTRODUCTION

Chlordecone (CLD) is a chlorinated ketone pesticide formerly used in Martinique and Guadeloupe (French West Indies). Large quantities of this pesticide were spread and **superficial layers of large areas of agricultural soils appear to be highly contaminated (>1 mg of CLD /Kg of DM) [1]**. Due to its high bioavailability in such matrix, and its high lipophilicity, animal food products could be contaminated. In this French West Indies context, an efficient **strategy aiming at limiting the CLD-transfer to food products is needed**. In that purpose, the use of carbonaceous microporous media to sequester contaminants into a non-bioavailable shape could be a promising strategy.

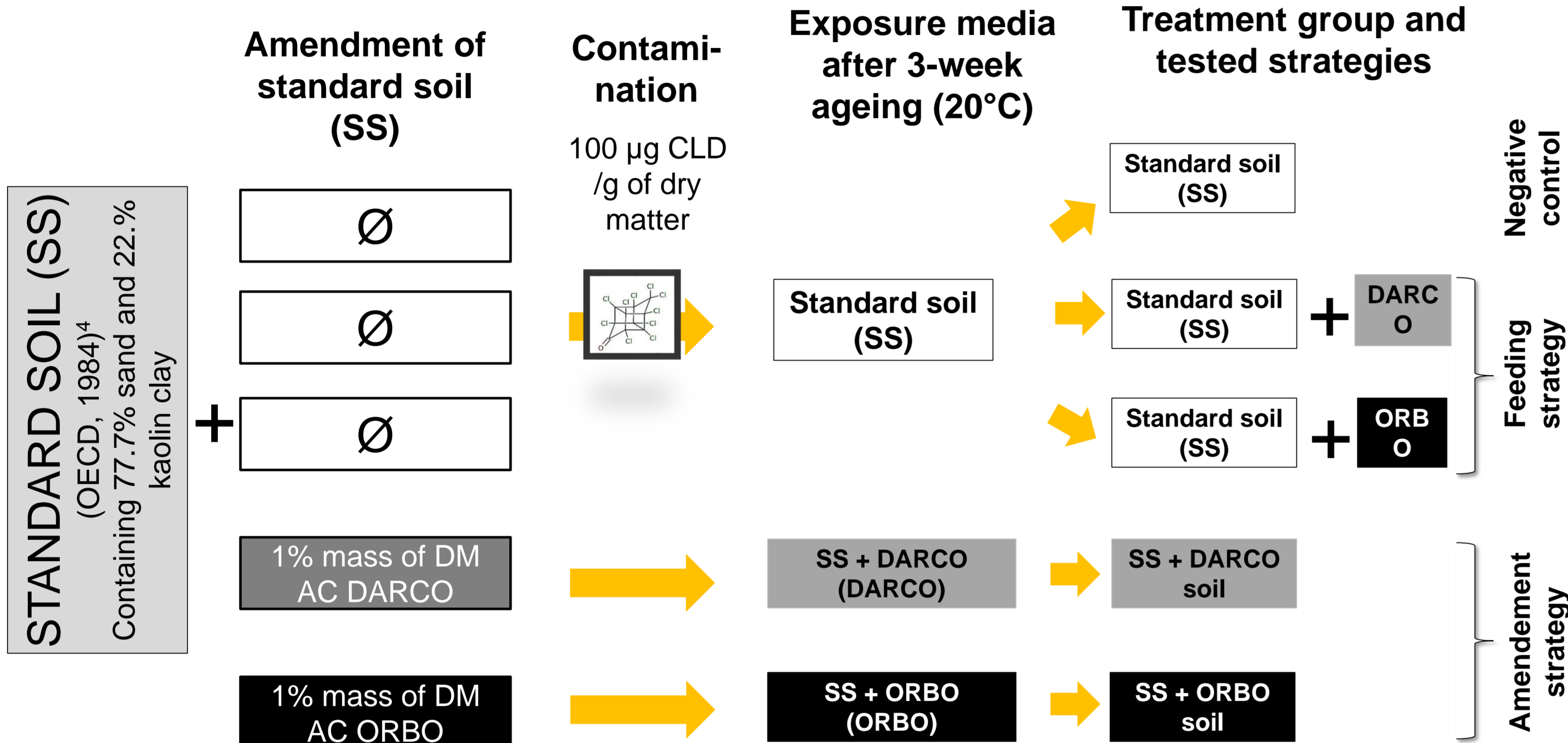
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OBJECTIVES

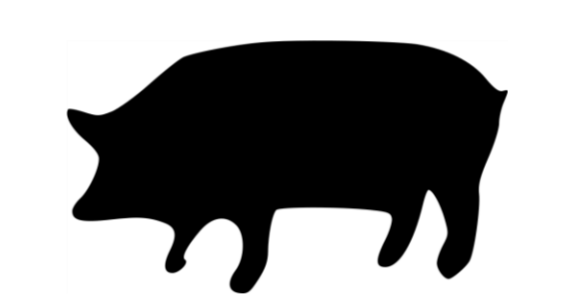
This study aims at assessing the retention of CLD during digestive processes of piglets using **two different strategies of sequestration by AC**: either by **amendment of contaminated soils, or via feed**.

MATERIALS AND METHODS

I – Preparation and contamination of artificial soils



II – *In vivo* assay



27-day old
Ingestion through a
dough ball
n= 4 per treatment

10 µg CLD /Kg of
Body weight

Sampling tissues
known as bioaccumulative ones

III – Analysis

Analysis of biological samples

Extraction
Analysis of CLD by LC-MS/MS.
Detection by mass spectrometry
using a triple quadrupole.

Relative bioavailability calculation

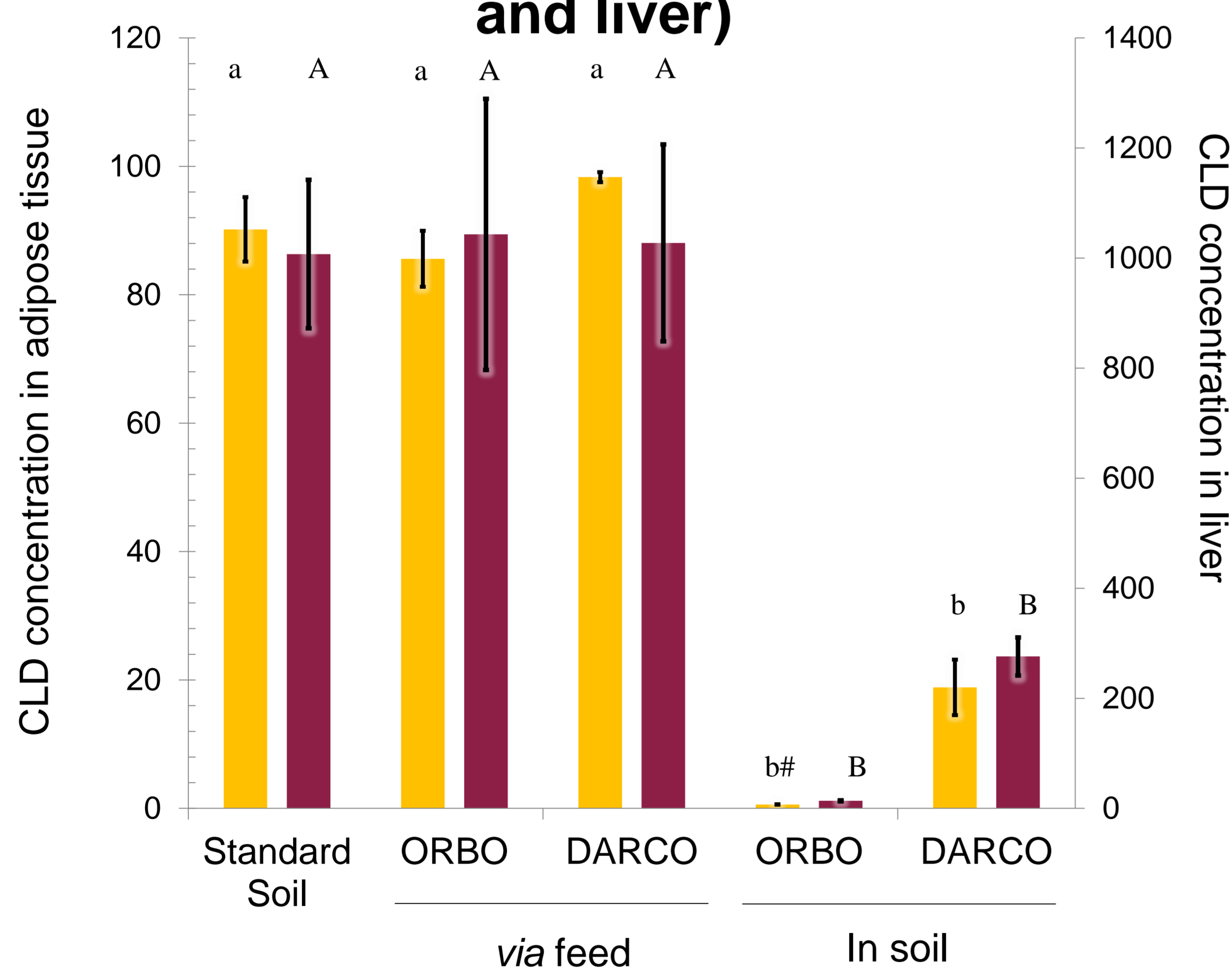
Determination of the retention offers by AC
against standard (reference)

$$RBA_{CLD} (\%) = \frac{[CLD]_{AC}}{[CLD]_{SS}}$$

RBA_{CLD} : relative bioavailability of CLD in tested soil amended with AC
[CLD]_{AC} and [CLD]_{SS} are respectively concentrations of CLD found in the same target tissue after ingestion of one AC soil or SS

RESULTS

Concentrations of CLD (ng of CLD per g of DM) in biological matrices (adipose tissue and liver)



Values correspond to the mean ± SD. Mean values with different superscript letters (a, b or A, B) were statistically different (P<0.05). Treatment effect was significant (p<0.0001) and RMSE =9.52 (adipose tissue) 150 (liver). (n=4). # : below LOQ.

Relative bioavailability factors of CLD in biological matrices

Treatment	Adipose Tissue	Liver
ORBO <i>via</i> feed	100%#	100%#
DARCO <i>via</i> feed	100%#	100%#
ORBO in soil	0.7% ^a [NA]	1.4% ^a [1.0-1.8%]
DARCO in soil	21% [14-28%]	27% ^a [15-40%]

Relative bioavailability is expressed in %. Values into brackets indicates 95% confidence interval. #: not statistically different from standard soil group. NA: 95% confidence interval was not calculated as values were below LOQ

CONCLUSIONS

This study leads to conclude that

- (i) AC introduced in CLD contaminated soils should strongly reduces CLD bioavailability
- (ii) whereas sequestration of CLD during digestive processes through an aliment supplemented by AC is not efficient.

These differences could be explained by the needed contact time between CLD and AC to trap efficiently CLD (ageing effect). It is probably the time needed to reach the deepest part of AC micropores.