

# Partial extractions on soil samples

## Principle

A reagent (carefully selected) is applied *in vitro*, according to a specific protocol, to a soil sample taken from the ploughed surface horizon. This reagent is designed to extract only certain chemical forms that are of interest to us (e.g. exchangeable forms, those bound to organic matter (OM), bound to carbonates, iron oxides, etc.).

There are two categories of reagents: i) neutral salts in solution ( $\text{CaCl}_2$  ;  $\text{NaNO}_3$  ;  $\text{NH}_4\text{NO}_3$  ); ii) reagents containing complexing/chelating agents such as ethylenediaminetetraacetic acid (EDTA) or diethylenetriamine pentaacetic acid (DTPA).

## What is the point of this?

- To determine the quantity of easily "assimilable" elements (e.g. phosphorus) = these must be absorbed by the roots to contribute to biomass production. This is the objective of soil analyses for farmers: to optimise the fertilisation of a plot of land.
- To determine the quantities of "bioavailable" or "phytodisponible" forms of trace elements and undesirable heavy metals. The aim is to assess the dangers of transfer to our food chain, or the risks of deficiencies or toxicity.

## Conceptual difficulties

How can absorption be simulated, through an instantaneous *in vitro* chemical reaction, by reacting a chemical reagent on a sieved and dried soil sample, i.e. a biochemical reaction that occurs at the interface between the soil solution and the roots of a population of plants (cultivated or otherwise) over a period of several months (crop development)?

In addition, the following are neglected: i) absorption in other deeper horizons; ii) redistribution from the roots to other organs; iii) antagonisms and synergies between elements acting at the cellular level (e.g. Cd vs Zn).

As a result, there are many methods in the literature whose protocols (and therefore results) are not identical. None is universally valid: for all soils, all elements, all plants... These extractions, although often referred to as "selective", are in fact not sufficiently selective.

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