



SEPTEMBER 2018



Organic Material

CO<sub>2</sub>

### Active/Labile Carbon

- + Recently deposited organic material
- + Rapid decomposition

### Slow Carbon

- + Intermediate age organic material
- + Slow decomposition

### Passive Carbon

- + Very stable organic material
- + Extremely slow decomposition

# LABILE CARBON

## KEY MESSAGES

- ✓ **Labile carbon is the carbon most readily available as a carbon and energy source to microorganisms**
- ✓ **Labile carbon is a useful indicator of soil biological activity**
- ✓ **The labile carbon field test is useful for comparing management practices that influence organic carbon.**

## WHAT IS LABILE CARBON?

Labile carbon is the carbon most readily available as a carbon and energy source to microorganisms. It turns over relatively rapidly with a residence time of 2-5 years (compared to, for instance, humus). While labile carbon may only make up small percentage of total soil carbon, changes in the amount of labile carbon in the soil can have a big impact on soil microbiology and therefore soil health and structure.

While changes in practice may not demonstrate changes in total soil carbon, they may increase labile carbon, making it a better indicator of improved soil quality. Labile carbon is often a good 'leading indicator' of soil responses.

Some carbon compounds in soil are able to react with permanganate. In the literature these compounds are referred to as "labile carbon", "active carbon", "reactive carbon" and "permanganate oxidisable carbon" or POx C.



Practices such as:

- cover crops,
- phase pastures,
- addition of organic material such as animal manure, green manure, composts, crop residues; and
- reduced tillage,

by increasing soil organic matter are highly likely to increase labile carbon as well.



On the left (purple), microbial activity is likely to be low (low labile carbon), while on the right, labile carbon (and microbial activity) is likely to be higher

## LABILE CARBON FIELD TEST

The field test method for measuring labile carbon is:

- In a suitably sized clear container put 1 teaspoon of soil and add 20 mL of potassium permanganate solution\* (or 2 teaspoons soil and 40 ml solution); shake or stir depending on preference
- Allow to sit for a few minutes, shake or stir again, and note colour change. If the mix turns brown, i.e. the purple colour of the mix disappears, the soil contains labile, active carbon; if it remains purple, it does not (see photo below) and the microbial activity is likely to be low. The deeper the remaining purple, the lower the active carbon level.

Laboratories will use a more accurate method and measurement, but this field test gives a good indication of labile carbon levels and with that, of microbial activity.

### \*Potassium permanganate solution

Potassium permanganate solution is made by dissolving 5 g Condy's Crystals (from the chemist) in 1 L rainwater, preferably in a dark glass bottle. Label as 'Poison' as the liquid looks like fruit juice!

## FOR MORE INFORMATION

<http://www.soilquality.org.au/factsheets/labile-carbon>

nrcs.usda.gov - '[Reactive Carbon](#)' factsheet (pdf download) under 'Chemical Properties'

FAO Soils Bulletin 80 '[The importance of soil organic matter](#)' by A. Bot and J. Benites