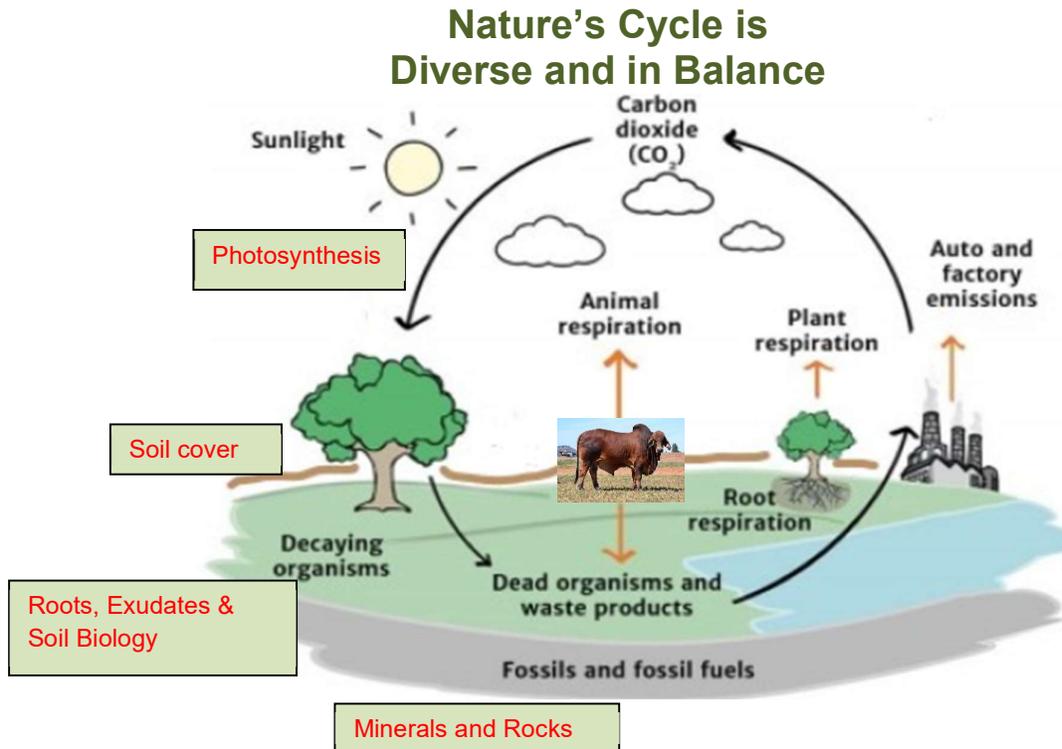


Overview.

This Factsheet is one in a planned series about increasing soil carbon following nature's cycle. The focus of the series will be on the green boxes below. This one is about soil-biology and placing the **DIY Soil Biology Booster** in the wider context of building all-important soil carbon. It highlights the critical role of fungi in this process. Fungi are Nature's main mechanism to form long-term carbon in the soil. The DIY Soil Biology Booster fits into "Roots, Exudates & Soil Biology" box in the drawing below.



In Nature's Cycle countless life forms depend on each other, are in balance and recycle through interwoven processes. Modern farming and grazing practices have broken vital chains of these processes. As a result, carbon has largely decreased or disappeared from many soils. The devastating effects of that on farming and grazing are well-known. Carbon is one of the four core building blocks of all life forms. No carbon means no life.

Regenerative Agriculture is a movement to restore carbon to the soil by bringing life back into it. Many versions use compost and compost tea in some form. Much compost is made as 'hot' compost using temperatures above 65° Celsius to prevent spreading weeds and diseases. It also kills fungi and fungal spores. In addition, most compost teas are made and brewed elsewhere, can take a up to 12 months and often use biology from elsewhere.

Fungal-based cold compost

Dr. David Johnson's Research on Fungal-Dominated Compost and Carbon Sequestration developed the use of cold compost favouring fungi. This has shown 20-50 times the currently observed increase in soil carbon in 40 no-till soils tested.ⁱⁱ "A great result indeed. However, compost from the 'Johnson Su Bioreactor' is not commercially available and requires 12 months to produce. We looked for, developed and are testing a faster method.

The DIY Soil-Biology Booster

Its characteristics are:

- It takes only four to six days from start to application: two to three days for the starter to develop and one to three days to brew.

- It uses local biology from chemical-free on-farm areas and nearby remnant vegetation.
- This provides many and diverse local fungal species (see photo 1) and does not carry the risk of introducing unknown new species.
- Fungal counts can be confirmed by microscope.
- It is very low cost \$5 – 10 /ha; no need to apply for subsidies etc.
- Yield gains have been substantial within one crop cycle in soybeans and avocados.
- The field experiments have shown changes in soil structure in under 100 days.
- Fungi spread fast into adjacent areas, which has been clearly visually in row crops.
- Under bio-friendly farm practices, the plants keep feeding the soil-biology which then provides on-going and increasing benefits.

It has been tested on soybeans and avocados, with results that indicate that it can be very profitable from the start. It is being tested in macadamias and pasture (See case studies.ⁱⁱⁱ)

Factsheet **DIY Soil-Biology Booster** provides detailed instructions about growing the starter and the brewing on the property.



Photo 1 - High density fungi



Photo 2 - Application by injection

Application

The brew is best applied within four hours after brewing is stopped. Application needs to ensure the brew is not exposed to direct sunlight as this will kill the biology. It can be by:

- Direct injection with a low-pressure pump into the soil behind a coulter opening a narrow furrow about 10 cm deep (Photo 2) - suitable for larger areas.
- Through sprinklers and overhead irrigation in the late afternoon.
- Gravity-fed from a tank distributed directly onto the surface followed watering or rain.
- Watering-can followed by watering it in - suitable for home gardens.

Lasting and increasing results

Under a microscope dark stains can be seen on sand particles indicating the presence of humic compounds. These compounds are at the core of building soil carbon. Under regenerative farm management the increase in soil-bioactivities will continue, and with it the building up of soil carbon. Regenerative management includes practices such as:

- retaining stubble,
- avoiding ploughing - this breaks up the hyphens of the fungi and ultimately kills them,
- avoiding chemicals that kill biology,
- avoiding overgrazing, see *Factsheet Carbon from air to soil.*ⁱⁱⁱ
- avoiding the use of superphosphate – this supplants fungi as providers of P and so blocks them from exchanging P for root exudates, leading to their starvation. Most farmed soils are high in locked-up P, which fungi can and do make available to crops.

For further information and advice contact Trevor - 0417 196 315.

ⁱ Trevor Galletly, QDA, B AgSC - 40 years in biological farming Peter van Beek, Dip Agr, B Ec, M Ag studies

ⁱⁱ <https://www.csuchico.edu/regenerativeagriculture/bioreactor/david-johnson.shtml>

ⁱⁱⁱ <https://www.gladstoneconservationcouncil.com.au/gcc-campaigns/regenerative-agriculture/>