Multikraft® PROBIOTICS AUSTRALIA
'It pays to be sustainable'

AG PLUS CONSULTANCY

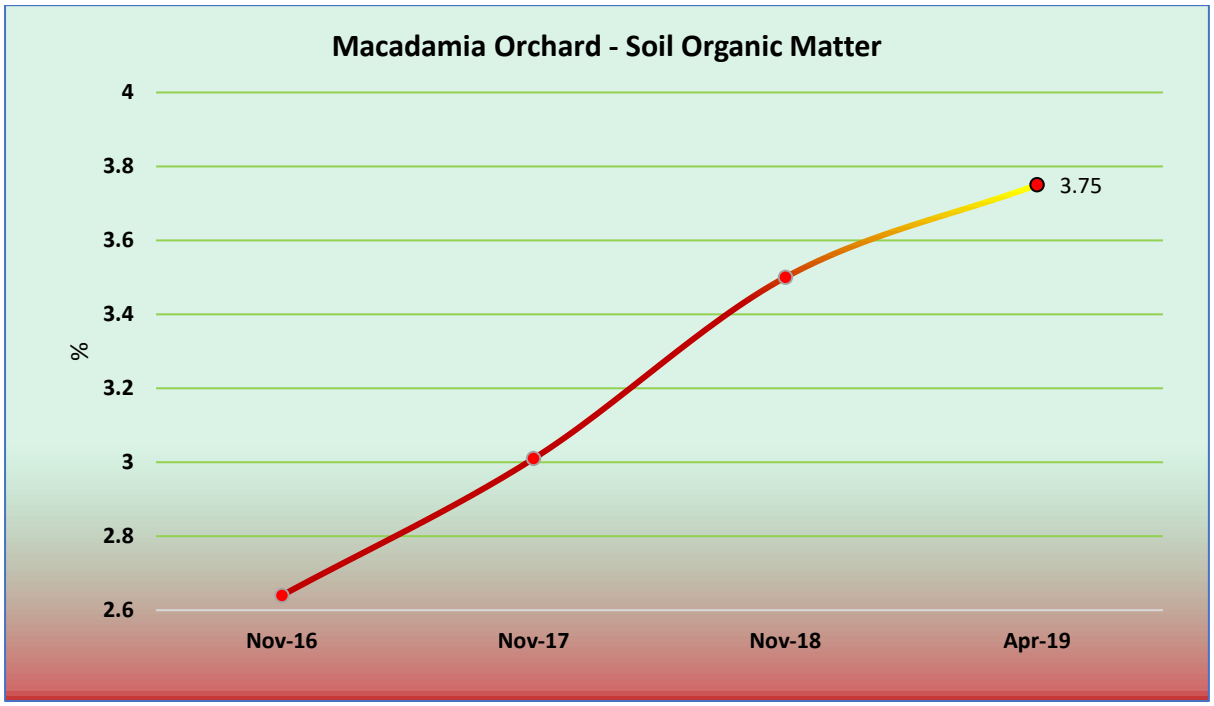
Report BACE20/2/Bar *March 2020*

Increasing long term soil productivity in a changing climate

Background: A program of fermented compost and Microlife (see appendix) was applied to macadamia trees over a four year period and the effect on the 'soil health' assessed each year.

There are many different ways of measuring improvements in soil health and potential productivity but two key indicators are soil organic matter (SOM) and Cation Exchange Capacity (CEC).

Results:

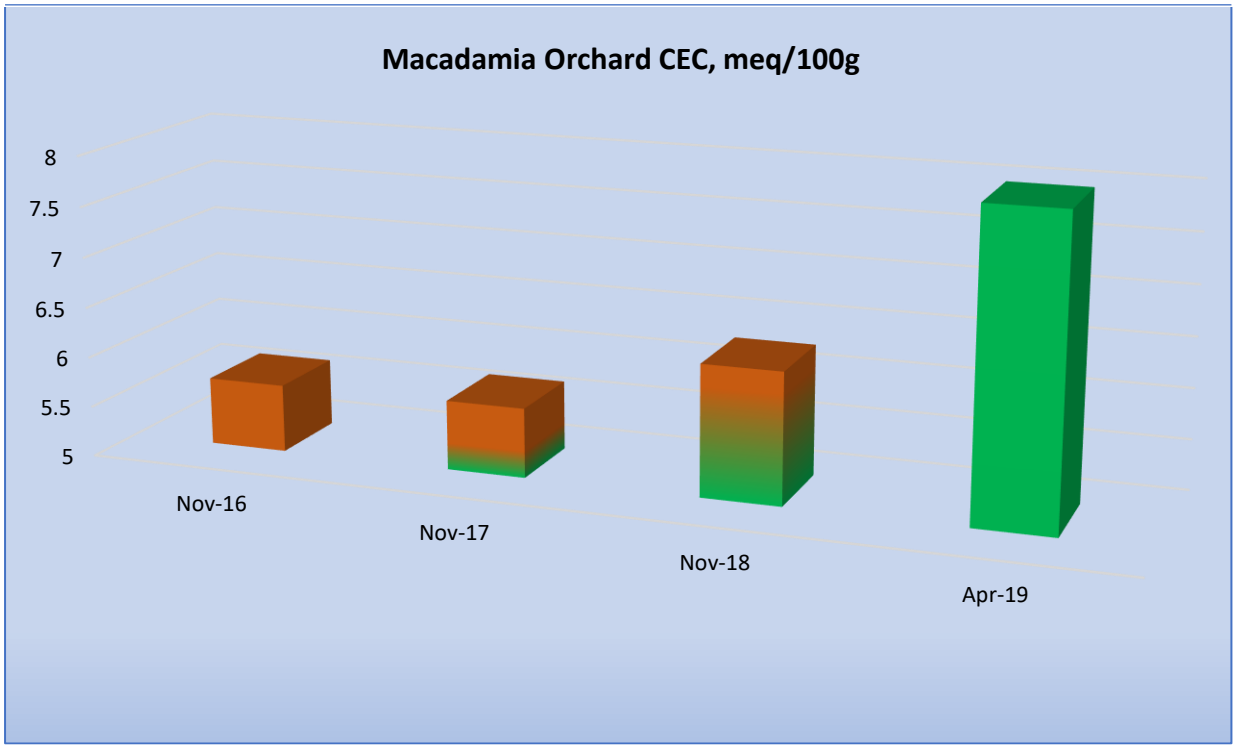


The benefits of increased soil organic matter are numerous and have been repeatedly demonstrated in many different crops and soil types.

- The activity and diversity of the soil microbiome increases as a direct response to each percentage rise in SOM.
- Within the microbiome, some bacteria produce sticky polysaccharides and some fungi produce glomalin, both substances act to micro-aggregate soil particles and the soil can self-structure. This is particularly important where tillage is not possible, such as in orchards.
- Principally, the surface structure becomes more stable and less prone to crusting and erosion. Water infiltration increases and runoff decreases as soil structure improves.
- Soil organic matter can hold ten to many hundred times more water and nutrients than the same amount of soil minerals.
- Nitrogen: Some studies have shown that a soil with 3% SOM can contain up to 1300 kg/ha of total nitrogen. Each percent increase in SOM could add 400kg/ha of nitrogen.

Most of this nitrogen is unavailable until it is mineralized by soil microbes. This is one of the important reasons for improving microbial activity in the soil. SOM mineralization rates range from 1% to 3% per year, depending on soil temperatures, soil moisture levels, soil pH, and tillage systems. The whole process acts as a controlled release of nitrogen availability for the plant.

- Phosphorous: The ratio of available nitrogen to available phosphorus in SOM is 10:1.



Cation Exchange Capacity (CEC) is a measure of how much of a soil can hold of certain, positively charged minerals such as calcium, magnesium and potassium, until the plant needs them; a nutrient retention capacity.

Calcium is crucial for holding together the cell walls of plants. When calcium is deficient, new tissue such as root tips, young leaves, and shoot tips often exhibit distorted growth. Calcium is also important in activating certain enzymes signalling for coordinating various cellular activities.

Magnesium is the central atom in the chlorophyll molecule and therefore vital for the process of photosynthesis. It also aids in the activation of many plant enzymes needed for growth and contributes to protein synthesis.

Potassium is used for maintaining the turgor pressure of the plant cells, thereby preventing wilting. It is also key to the proper functioning of the stomata.

Useful ref sites:

https://www.agric.wa.gov.au/measuring-and-assessing-soils/soil-organic-matter-influence-nutrient-availability

http://www.soilquality.org.au/

Appendix:

Application program

2016 - Fermented compost was applied at a rate of 10 cubic metres/ha (=25kg/tree), plus 25L/ha of Microlife as a soil drench after the compost was applied (1 application)
2017 - Fermented compost was applied at a rate of 10 cubic metres/ha (=25kg/tree); then a total of 2 x Microlife applications @ 25L/ha (i.e. July & August)
2018 - Fermented compost was applied at a rate of 10 cubic metres/ha (=25kg/tree); then a total of 4 x Microlife applications @ 25L/ha (i.e. July, Aug, Sept, Oct)
2019 - Fermented compost was applied at a rate of 10 cubic metres/ha (=25kg/tree); then a total of 5 x Microlife applications @ 25L/ha (i.e. July, Aug, Sept, Oct, Nov). In 2019 only; Plus 5L/ha of Soil NRG with the Microlife applications.
July to November is the approximate application period.

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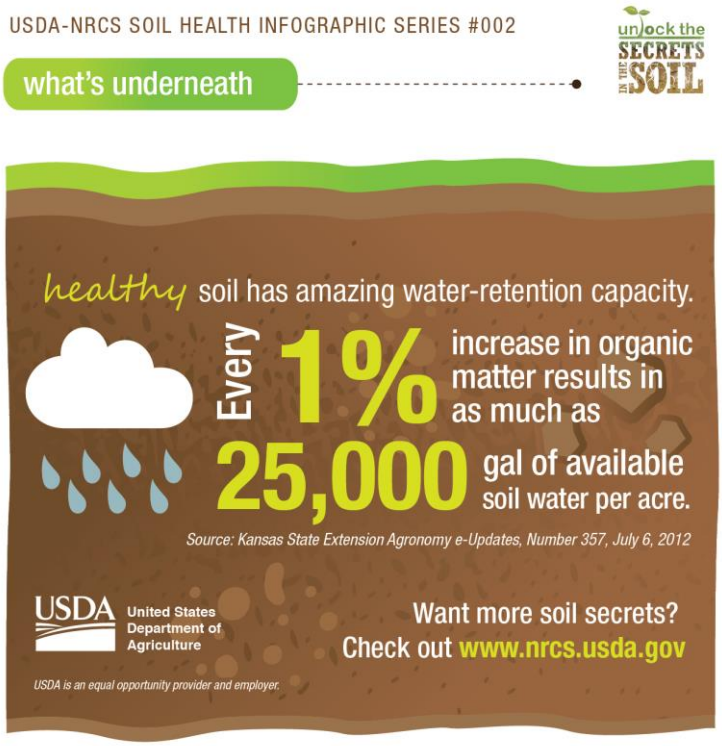

94,635 litres / acre
Or 233,749 litres / ha