Improving and quantifying soil quality in citrus productions systems on sands in the West Gingin/Moora area

WA Citrus delivered this project. This project was supported by the Northern Agricultural Catchments Council through funding from the Australian Government's National Landcare Program

Aim of the project

The project aimed to improve and quantify soil quality on the sands in the Gingin/Moora area.

There were three demonstration sites:

1. Compost trial
2. Use of cover crops to improve soil health
3. Use of gypsum and other calcium products to reduce albedo breakdown in citrus

The soil under citrus production in the West Gingin /Moora area is very sandy and poses a unique set of growing conditions. The nutrient and water holding ability of these soils is very low when compared to other citrus growing regions in Australia. The demonstrations were established to see if adding organic matter and calcium to the soil could improve soil health, yield and fruit quality.

Site 1 Compost trial

Two composted materials were applied as a mulch to a seven year old Clementine mandarin orchard in October 2014. The soil is a deep, grey sand.

Treatments

1. Compost
2. Organic soil conditioner (partially composted product)
3. Control

Rate

Both amendments were applied with a compost spreader to a 1 m wide band along the tree line at a rate of 100 litres per tree. This equates to at rate of 65 m3/ha.

Results

1. The trial showed that the application of compost and soil conditioner resulted in small and probably insignificant increases in soil qualities in the 10 months following application.
2. The higher yield in the compost treatment as compared to the control and soil conditioner treatments was most likely due to the extra nitrogen supplied by the compost and not improvements in soil qualities.
3. The cost of applying extra nitrogen as inorganic fertiliser is a much cheaper option than applying compost for its fertiliser value alone.
4. There are currently no easy and cheap methods with reliable standards for growers to use to assess whether their farming practices are improving the soil biology.
5. To demonstrate any benefits of compost application long term trials, possibly with ongoing applications, are probably required.
6. The high cost of composts limits use by the horticultural industry. Transport costs increase with distance from the supplier.

A full copy of the trial report can be found here.
Further trial measurements will be taken in 2016 and 2017

Site 2. Cover crop trial

The grower was interested in better understanding the benefits and disadvantages of using a love grass cover crop to build up soil organic matter and biological activity on a deep sand. The mid row pasture was slashed into the tree line.

Treatments

1. Love grass
2. Existing annual pasture species

Results
The love grass plots showed:

1. Small increases in soil organic carbon.
2. No real increase in cation exchange capacity.
3. No increase in soil microbiology.
4. Excellent weed control, less herbicide required.
5. More slashing required than conventional practice
6. No yield and quality measurements have been taken as yet.

Improvements in soil quality following additions of organic matter have been difficult to quantify. Many years of organic matter applications are often required and soil test standards linking soil biological properties with fruit yield and quality are not currently available. Never the less this work has demonstrated minor improvements in the soil characteristics. Individual growers will have to assess the cost of applying organic matter (as compost or via growing a cover crop) and determine whether they are benefits are worthwhile. Refer to PRNRM Sustainable Agriculture Fact Sheet Number 5

Site 3. Calcium trial

In 2015 there were high levels of albedo breakdown in navels on the property. The farmer set up trial to determine if soil applied calcium would reduce the level of the disorder. The NACC project assisted with taking soil measurements and laboratory analysis.

Treatments

1. No soil applied calcium (control)
2. Gypsum
3. Lime

Results
Calcium levels did increase in the soil. The calcium levels were lower in the drip wetted pattern than outside the wetted area. This was despite additional calcium being applied through water (as calcium nitrate and Calsap). It appears calcium is being leached due to the irrigation as with drip irrigation a very large amount of water is being applied to a small area of sand that has a low ability to hold onto cations.

In 2016 the level of albedo breakdown was reduced in the lime/gypsum/silica/humic acid treatment. Nutrition trials with perennial crops may take many years to show benefits. This trial will be monitored over the coming years by staff on the property.