

Sub-soil Manuring project

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BACKGROUND

The National Landcare Smart Farms small grants program is sponsoring a trial in which SCF is exploring the use of organic material amendments to ameliorate the poorly structured sub-soils of the sandy duplex soils typical to the APZ. Sub-soil manuring has been successfully implemented on dense, dispersive and sometimes sodic clay sub-soils in the eastern states, where the organically rich amendment is placed deep within the soil profile and alters and improves the soil structure by increasing soil porosity and water holding capacity.

The trial established by SCF utilised a locally manufactured organic manure product known as a bio-sludge (Abbott's soil conditioner). The trial utilised this product along with farm sourced clay to create two soil amelioration treatments.

The target zone for subsoil manuring is 30 to 40cm below the soil surface, where the dense clay subsoils have very low hydraulic conductivity and are restrictive to root growth. The manure is either placed into this target zone, via a specialised machine, or surface applied and worked into the critical zone. Within the SCF trial the manure was surface applied at 20t/ha and worked into the profile soil via a deep ripper. The soil conditioner was applied with and without clay, to assess if there would be any increased benefit from adding clay to the manure, or alternatively how the manure would compare to claying alone as a soil amendment (Figure 1). The trial site was set up as a farm scale trial and was seeded with wheat this year and Barley in 2021.

RESULTS

After the manure treatments were applied the site suffered prolonged periods of water logging which significantly delayed time of sowing, caused season-long trafficability problems and ultimately decreased yields. As a result, there was no yield difference observed between the treatment plots. However, given sub-soil manuring is a long-term treatment, there is a potential that the improvements from the soil amendment will influence

crop yield this season and in seasons to come by improving sub-soil structure, resulting in improved soil water holding capacity and nutrient availability. Based on previous studies, 20t/ha of manure, when placed into the critical zone, can cause the dense sub-soil to form smaller aggregates through increased microbial activity. This can result in significantly increased yields and typically continues to provide these benefits over a minimum of five years.

It should be noted that in the first year of the SCF trial, the claying only treatments failed to result in any increased yields when compared to the untreated control (UTC). As it is well established that claying often has a positive impact on yield, it highlights the impact the severe waterlogging in 2021 had on the trial as a whole. Interestingly results from a research trial conducted in Peshurst in Victoria found that in 2010 yields were increased by 27% compared to the untreated control, in a year where water was not a limiting factor, as the manuring treatment provided relief from potential waterlogging. This was not observed in the Green Range trial and could be a result of the paddock already being at field capacity when the amendment was applied or that waterlogging in 2021 was particularly severe.

Readers might be familiar with the use of manures which are surface applied as a fertiliser product, which have proven successful in increasing crop yields, when used in tandem with, or as an alternative to, inorganic fertiliser products. However, this is not specifically the aim of sub-soil manuring, which is designed to improve sub-soil structure and improve crop growth over the long term, and as a result does not need to be applied year on year. Interestingly, the plots which had the manure soil amendment, had more available ammonia N in the top 30cm of the soil profile at the start of the 2022 season. This will act as a readily available source of N for the coming season. The increase in available ammonia N measured is likely a result of the break down of the organic manure product over the 2021/2 fallow period and highlights the potential dual benefits of sub-soil

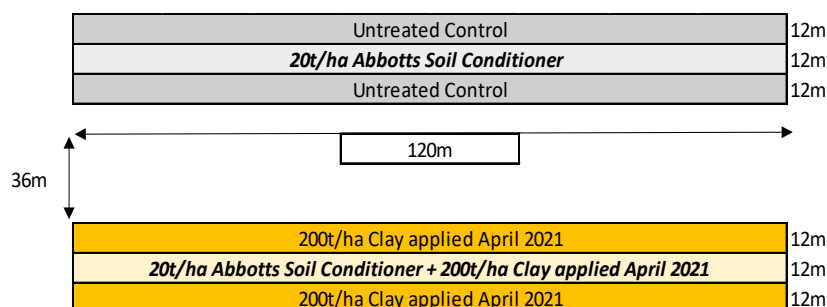


Figure 1: Trial design for the SCF sub soil manuring project.

