

Subsoil manuring poorly structured clays in the high rainfall zone of South Western Australia

Recently SCF was successful in receiving a National Landcare project to look at placing high rates of organic material into poorly structured clay subsoils to increase yields.

Background

The high levels of microbes, carbon, nitrogen and other nutrients in the organic manure physically interact with the clay to permanently change it from a dense and sometimes sodic soil into a fertile, highly porous structure. This provides a subsoil that is high in nutrients and which also holds highly accessible water for later in the growing season to finish off plants during grain fill. It also allows better drainage of water from the top root zone giving the entire soil depth a better water 'bucket' and reducing the intermittent waterlogging that often affect our paddocks.

We are currently only achieving on average about 50-60% of our potential yield, subsoil manuring could increase our yields and significantly close the yield gap towards our potential. There has been a large amount of research over the past 10 years on this process in the eastern states with the average yield increase over all trials found to be 62% per annum with the same benefits extending at least seven years. This benefit is most likely a permanent fixed benefit. There are the additional nutritional benefits for the first three years which is then continued by the permanent change in soil structure at depth.

However, the benefits that are likely to be achieved always come at a price. Subsoil manuring can cost over \$1000 per hectare to implement, varying significantly depending on the ameliorant used and the distance to the source. These costs are most commonly paid off in the first two years with the continuing future benefits providing a return to the farmer. For example, a wheat paddock that usually yields around 4 t/ha could improve to 6.5 t/ha, at a price of \$300/t this would equate to \$750/ha in improved income. It will also reduce the variability seen in our seasons, in a wet year it should reduce intermittent waterlogging and in dry years will provide subsoil moisture to finish crops. Other than the initial financial risk in investment the addition of sub soil manure can increase production, profitability and sustainability.

The project

SCF will implement at least one demonstration site for subsoil manuring using a compost by-product created from wastewater

treatment by Abbotts Liquid Salvage. The compost is completely unregulated for everything other than vegetable root crops, so no restrictions apply for our broadacre agriculture. The deep placement of compost will be compared to an untreated control, placement on the surface, deep ripping only, deep placement of gypsum and deep placement of a nutrient matched fertiliser. Soil moisture probes will monitor the use of plant available water at depth across the treatments along and grain yields will be monitored over two years.



Figure 1 <https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2015/02/subsoil-manuring>



Figure 2 http://www.ausvegvic.com.au/wp-content/uploads/2018/05/Sub-Soil_manuring_Fact_Sheet_v4_20180115.pdf