Improving Soil Structure

Dennis Hobbs, Warracknabeal, Vic

HISTORY - CONVENTIONAL FARMING

- Poor infiltration of water
    - leading to high evaporation loses in summer rain events
    - water logging in root zone when not over wet
    - not using water efficiently
- Hard pan problems which led to deep ripping
- History of good gypsum applications but calcium still low and magnesium high which leads to poor soil structure
- Soil is very fine like with very little air in the profile, it looks like the working of the soil has caused compaction problems while breaking down any sort of structure
- Have been applying small rate applications of lime and gypsum on high PH soil i.e. 300 kg / ha (after 5 years have noticed an increase in calcium and a drop in sodium and magnesium)

PRESENT – CONTROLLED TRAFFIC FARMING

- Poor soil structure (hard pan) led to controlled traffic
- Have been controlled traffic farming for one season and already found improved soil conditions
- Can now push probe through hard pan after harvest when dry (have not been able to do that before)
- CTF has helped sowing between stubble rows by moving tynes around
- Noticed compaction from wheels on the bar at sowing time
- Applying trace element applications (copper zinc and iron and manganese)
- A change to narrow points and press wheels has helped with emergence

FUTURE

- Moving to 3 point linkage bar (may look at parallelogram arrangement)
- Yield Mapping leading to variable rate fertilizer applications
- Nutrient applications by foliar feeding
- GPS which will open up a huge range of options
    - Drilling - in crop fertilizer applications
    - Shielded spraying on wide row crops ie chick peas
    - Accurate sowing between stubble row

I have found that in wet years (eighties} the high magnesium red clay type soil was very hard to put a tractor and bar on, the wheels would sink leaving tracks. Although in the dryer years this type of soil has out performed the black flats.

It does not matter where I dig a hole there is a poorly structured soil with a hard pan as I have mentioned, the soil is too fine. I would like to see a more bread crumb looking type of structure with more air in the profile that does not run together every time it rains.

My soil has very low carbon levels which have not increased over a number of years with the move to stubble retention. So I am hoping that the idea of leaving the old root systems untouched for the next cropping cycle will leave a food source for the fungi and bacteria and help with the decaying of the old root systems leaving channels for water infiltration.

During the summer of 2004/2005 I did not have any wind erosion due to leaving the stubble standing, which dropped the wind speed greatly near the ground surface. I would like to think that I retained more water in what summer rain we did receive with the stubble acting as mulch.

Where my soil has a Calcium Magnesium ratio of around 5.5 - 6 to 1 the crops seem to do better and I have noticed I need less extra nitrogen while producing high protein wheat but on the high magnesium soils I have to apply more nitrogen with protein down in the 7 and 8 range.

At this stage I am very pleased with how quickly the soil has responded to controlling the traffic on my paddocks and to see the calcium increase, magnesium and sodium drop due, I think, to light rates of gypsum and lime. This is very rewarding and I look forward to more improvements in the not too distant future.