Spading – Improving Non Wetting Soils

By Quenten Knight – Precision Agronomics Australia

Many growers around the state and indeed Australia are focusing their attention on the new mechanical process of spading to help improve water repellent soils by incorporating clay.

Spading machines have only recently been introduced to the Australian market from Europe where they are used extensively for deep tillage and incorporating large amounts of crop residues into the most biologically active top 30-45cm of top soil. Spader machines essentially achieve this by attaching spade arms **(Photo 1)** to a rotating central shaft that gently rotate through the soil, thoroughly mixing the soil profile to the working depth, which in Australia has generally been to 30cm at a ground speed of around 9Km/hr.

A Case Study

A forty hectare paddock to the East of Esperance was first surveyed using EM38 to determine the depth to clay (**Figure 1) .** Once the depth to clay was determined by strategic soil coring, the areas where clay was within 0.5mt from the surface were delved to bring clay to the surface (**Photo 2).** Whilst the remaining areas where clay was deeper than 0.5mt were clay spread from a nearby clay pit using a carry grader. Immediately after the clay delving and spreading was complete a 3.5mt Imants spader machine **(Photo 3)** proceeded to spade the clay throughout the soil profile to the spaders working depth of 30cm **(Photo 4).** For this case study soil cores were taken at exactly the same sites before and after the clay delving/spreading and spading operations. A whole range of chemical and physical soil characteristics were measured at three depth increments 0-10cm, 10-30cm and 30-60cm. In **(Figure 2 and Figure 3)** you can clearly see the effects of clay incorporation using the spader, where site A is clay delved and spaded and Site B is clay spread and spaded. The end result for both these sites is that the spader has created a very uniform soil type that consists of approximately 5% clay, 90% sand and 5% silt throughout the top 30cm. This soil now wets up quickly and uniformly after rain and is no longer compacted, when assessing using a soil penetrometer the pressure does not exceed 300 psi to a depth of 0.5mt. One downside to spading is that it leaves the soil in a fragile state for potential wind erosion, in this example the paddock was immediately sown to grain sorghum after spading **(Photo 5)** for soil cover, remarkably the grain sorghum averaged over 5 ton/ha thanks to a very wet Summer.

Summary

The depth of clay incorporation using a spader is a clear advantage over traditional methods of clay incorporation using offset discs and smudge bars which at best were only incorporating clay to 10-15cm. Other opportunities for incorporating lime into the subsoil as well breaking up compacted layers are obvious advantages to be derived from spading.

.**Photo 1:** Internal workings of the Spader.

Photo 2: Delved clay to be incorporated by the Spader.

Photo 3: Spader incorporating clay..

Figure 1: EM38 map depicting depth to clay.

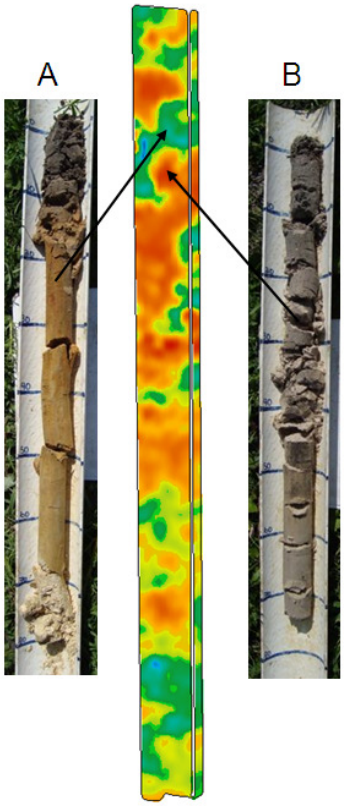

Figure 2: Change in Clay %

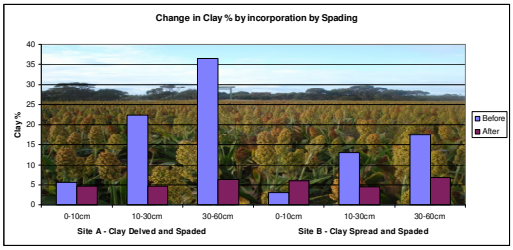

Figure 3: Change in Sand %.

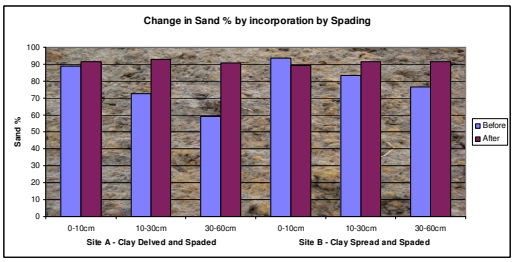

Photo 4: Clay incorporated to 30cm by Spader.

Photo 5: Grain Sorghum sown after spading with excellent root growth into incorporated clay.