

Soil and irrigation: soil management

Soil compaction

Compaction is caused through the use of heavy infield machines which are necessary for harvesting and crop management activities.

The use of a controlled traffic farming system - where the wheel spacing of infield machinery and the row spacing is matched - reduces the area of the field which is compacted from 66 per cent to 33 per cent (Images 1 and 2).



Image 1: Compaction is limited to the interspace when the row width and machinery wheel spacings match.



Image 2: Compaction caused by using a 1.8m wide harvester on a 1.5m row spacing.

Compaction of the soil can have a number of adverse effects:

- Restriction of rain or irrigation water entering and moving through the soil. This can result in a limited amount of water being stored by the soil. As the water is not moving into and through the soil, waterlogging, erosion and runoff can also occur.
- Restricted root growth, making it harder for the plants to access water and nutrients.
- Increased costs of production (fuel, labour, fertiliser, irrigation) or reduced yields.
- Reduced plant available water as soil pores are reduced in size by compaction (Image 3).



Image 3: Compaction leads to poor soil structure.

Tillage

Tillage operations should aim to relieve compaction while maintaining soil structure and organic matter levels. To achieve this:

- Tillage operations should only be conducted when soil moisture is suitable.
- In-crop tillage operations should aim to preserve organic matter on the soil surface to assist in water infiltration.
- Tillage operations conducted to break-up soil crusts should be viewed as a short term solution. An overall improvement in soil health and water infiltration is the long term aim.

Poorly managed or timed tillage can have a number of consequences.

- Frequent and aggressive cultivation will reduce soil organic matter.
- Aggressive tillage will damage soil structure by breaking up soil peds (small aggregated pieces of soil). This leads to a soil with fine texture which is prone to surface sealing and crusting.
- Frequent tillage can cause plough pans at depth limiting water movement through the soil.
- Tillage operations carried out on wet soil can lead to compaction and surface smearing, reducing water infiltration.