

## Subsoiling useful tool for remedying compaction

Compaction is generally always the result of mismanagement. The effects on production and the bottom line can be long lasting. Subsoiling is one method used to remedy subsoil compaction problems. Before you subsoil it is important to know whether it will do the trick for your situation.

Soil compaction is deterioration of the soil structure. It can result from (a) surface layer damage due to wheel slip, stock pugging and excessive cultivations; and (b) deeper soil compaction due to weight of vehicles, trucks, tractors. The depth of the compaction will dictate the most appropriate method for remediation.

Where compaction occurs, irrespective of whether it is at the surface or deeper in the profile, it will restrict water movement and prevent drainage. Surface ponding may be evident along with increased surface runoff. Reduced aeration will limit the availability of oxygen to plant roots. When water logging occurs in winter the soil will remain wet and cold for extended periods and plant growth is retarded causing reduced yields. In summer, compaction in the soil profile will hinder root penetration down to the moist subsoil and effectively stop capillary rise of water up through the soil profile. Drought conditions will result.

Digging a hole prior to getting the tractor out, is the only way to determine what is going on in the soil. On a site typical of the area concerned, dig down to 0.5 m and look for the smeared surfaces. Look for a surface crust and for pans around the base of the cultivated layers. In winter, soil above a pan is likely to be wetter than below, and in summer the opposite can be observed.

Roots should evenly reduce with depth rather than suddenly decrease. This often indicates a compacted layer. Soil texture, colour, aggregates and density need examination and the drainage characteristics of the subsoil or artificial drainage must be considered. Subsoiling is of little benefit if there is nowhere for the water to go.

Cultivation and aeration operations, result in the aeration of the soil to a depth of around 150-200 mm whereas subsoiling shatters deeper subsoil layers to depths of 200-350 mm thus encouraging deeper root growth. If your compaction zone is occurring below 200 mm, cultivation will not sort it out.

Timing relative to subsequent operations also needs consideration. Traditionally subsoiling has been done prior to ploughing, but subsequent cultivation partly negates the effects.

The type of subsoiling tines will influence the outcome. There are basically three types of subsoiling tines – the straight leg and various angles there of; the straight leg with a wing type foot; and the slanted leg (paraplow type). A winged type subsoiler requires 20-30% extra pull compared with a conventional (straight leg) type, but the subsoil disturbance it creates is two or three times greater. Oscillating subsoilers can reduce draft requirements. Straight leg type tines tend to cause failure along a few well defined planes due to compressive loading and therefore give better results in drier soils. Winged and paraplow type implements fail the soil in tension along natural cleavage lines as it flows over the tines, minimizing resistance and allowing soil fissuring to be achieved over the widest possible range of moisture conditions.

The moisture conditions at the time of subsoiling greatly affect its effectiveness. It should be carried out when the soil is moderately dry if maximum lifting and shattering is to be obtained. If the soil is too wet when subsoiled you are likely to compact the soil further. Wilting of pastures when subsoiled during mid-summer may occur due to root pruning and/or soil moisture loss. The best way to determine whether the soil is too wet or too dry is to undertake a trial run and then dig a trench across the work to inspect the soil

profile and find where loosening has occurred. The trench will also tell you whether your rows are close enough with more regular shattering.

Subsoiling is an effective way to improve soil structure by the establishment of deep cracks, fissures and crease porosity for better water percolation, soil aeration and root growth, provided that it is undertaken at the right moisture levels and backed up with good management. Soil when loosened tends to act like a sponge and will have reduced soil strength and load bearing capacity than if left in the undisturbed state if natural or artificial drainage is not present.