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Summary

Subsoil compaction affects all aspects of soil quality, and contrary to topsoil compaction it is persistent. Natural alleviation processes such as wetting/drying, freezing/thawing and biological activity including root growth decrease rapidly with depth. In compacted soil, these alleviation processes are moreover diminished because root growth and biological activity are reduced and soil water contents remain higher in compacted than in well-structured soil. Wheel loads are still increasing and, in consequence, the extent and severity of subsoil compaction. Sustainable soil management requires the uncompromising criterion that no subsoil compaction can be accepted. Consequently, only field traffic with wheel loads lower than the carrying capacity of the subsoil is allowed. This implies that subsoil stress caused by wheel load should not exceed the strength of the subsoil. Therefore, this chapter emphasises the importance of soil strength and the calculation of soil stresses in the subsoil. One of the main constraints in using the carrying capacity concept proves to be the lack of data on soil strength. Existing recommended limits for wheel loads and inflation pressures are not adequate and can result in over or underestimating of allowable wheel loads and subsequent uneconomical solutions or subsoil compaction. Adequate drainage of soils is a prerequisite for reduced subsoil compaction. Mouldboard ploughing with all tractor wheels on the non-ploughed 'land' and umbilical systems for applying manure slurry are realistic options to reduce compaction. Controlled traffic systems that limit the wheeled area may be implemented by the use of wide span vehicles and by steering tractors along traffic lanes. Although we support such provisions, our chapter will advocate and focus primarily on adjusting wheel loads to the carrying capacity of the subsoils.