

# Ground Cover & Addressing Soil Compaction

## Fruit Growers Victoria Infosheet #8



A common soil constraint for plant growth in orchards is compaction. Here we explain what compaction is, what contributes to compaction on orchards and how it can be addressed using various methods.

### What is soil compaction?

A soil becomes compacted when the soil aggregates (soil particles) are forced close together, decreasing pore space. This can happen near surface or in subsoil. **Can be measured using a penetrometer.**

### What contributes to soil compaction?

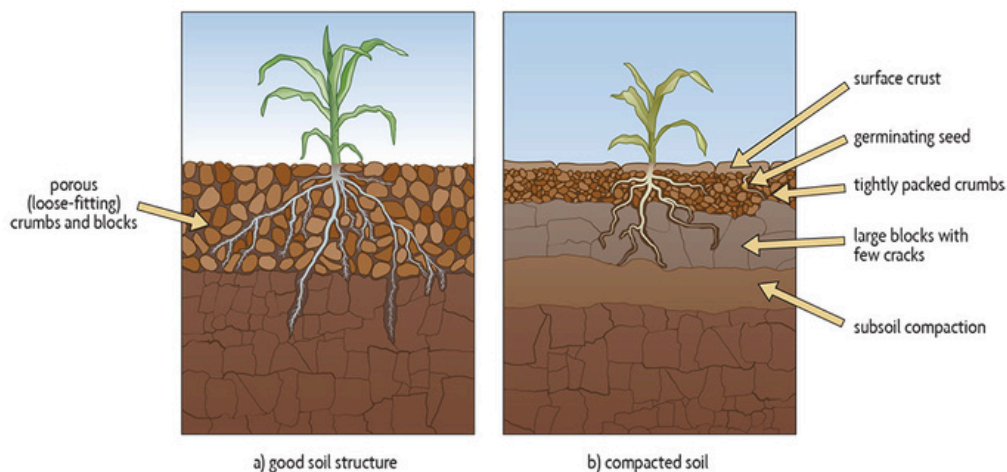
- Environmental factors can make a soil more prone (soil type)
- Orchard traffic - machinery on soil that is too wet
- Livestock (when soils are wet)
- Soil preparation (exposing subsoil)
- Species grown (shallow rooted)
- Weather events, rainfall
- Erosion
- Reduced organic matter



**Figure:** Clay subsoil with very shallow organic matter in upper horizon of soil profile, lack of roots. Compaction due to orchard traffic and historical mound preparation.

## Why address soil compaction?

- To improve water infiltration (high rainfall, reducing runoff)
- To improve root health and access to nutrients/water
- To improve ability to store moisture (drought resilience)



**Diagram:** a) Soil with good structure, b) compaction in soil with surface crust, subsoil compaction and tightly packed aggregates (Source: SARE 2021)

## Various methods listed below on addressing soil compaction:

Method	Benefit	Details
Ground/ Cover Crops	Live roots help biologically aerate, adds another physical buffer layer	<ul style="list-style-type: none"> <li>• Sowing inter-row crops in early autumn can allow the plants time to establish</li> <li>• Species with tubers or taproots (radish, turnip, etc)</li> <li>• Earthworms &amp; insects need large pores to move and access organic materials, bacteria and fungi need air exchange</li> <li>• Ground cover will protect surface crusting and damage from raindrops (Alternatively - residues on ground/mulch can help to ensure the surface is not exposed)</li> </ul>
Traffic (timing)	Avoiding creating tire ruts, improved machinery access	<ul style="list-style-type: none"> <li>• Scheduling field operations to allow soil to dry, or restrict to established wheel paths</li> <li>• When soil is friable the soil is not 'plastic' so can't be molded, instead it will crumble when tilled</li> <li>• Soil texture will determine how long it will take to dry</li> </ul>
Minimal Tillage	Break up surface crusting, clods - difficult for roots to penetrate	<ul style="list-style-type: none"> <li>• Controlled or Minimal tillage when the soil is dry may be useful if soils are compacted for initial sowing of crops</li> <li>• Consider if it is an option to cultivate shallow (5-10cm) to sow deep rooted crops which may help do some of the work</li> </ul>

### Further Information

- **AgVic** - [https://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/soilhealth\\_compaction](https://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/soilhealth_compaction)
- **Sustainable Agriculture Research and Education** - Ch 6. Soil Degradation: Erosion, Compaction, and Contamination 2021 - <https://www.sare.org/publications/building-soils-for-better-crops/soil-degradation/>
- **University of California**, Orchard Floor Management Practices to Reduce Erosion and Protect Water Quality Publication 8202 - <https://ucanr.edu/repository/fileaccess.cfm?article=54262&p=%20NOEUZX>