Soil compaction resulting from tyres and a rubber track for single axle loads in the range of 10-12 tonnes

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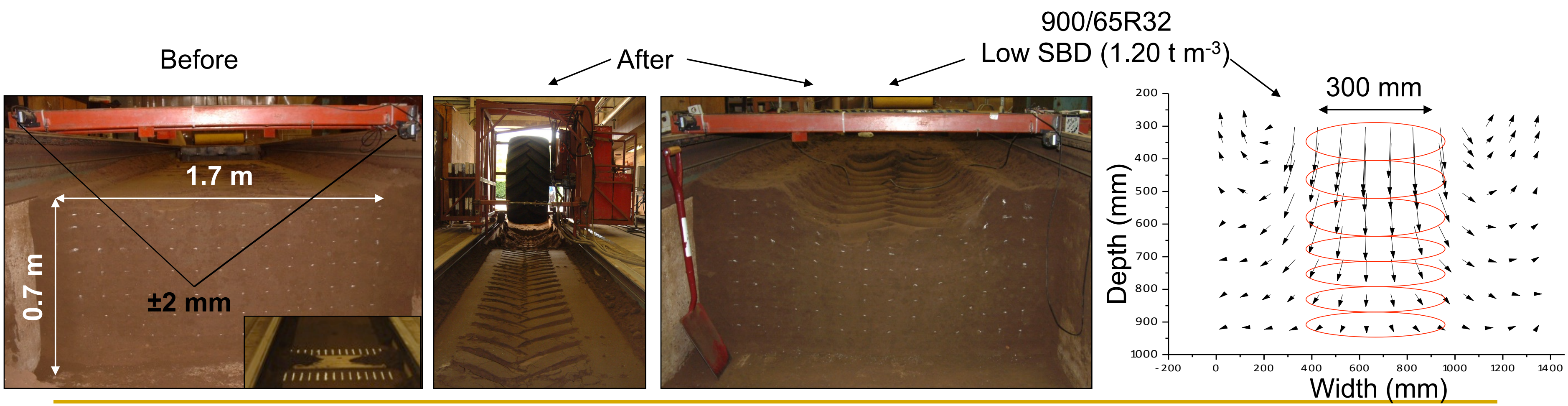
Objectives

- To determine the **changes in soil bulk density** (SBD) from **soil deformation data** to provide a valuable indicator for tyre selection, and
- To determine the **potential benefits of a rubber track** system to mitigate soil damage caused by machinery traffic.

Methodology

- The studies were conducted in a soil bin facility using a **sandy loam soil**, with **3** different **soil bulk densities** (low, medium and high), **3 tyres** (680/85R32; 800/65R32; 900/65R32 – **axle load: 10 t**), and a **rubber track** (Terra-Track® 635 mm – **axle load: 12 t**).



[After: Ansorge & Godwin, 2007, 2008; Antille et al. (submitted)]

Figure 1: Vector diagram of soil displacement *vs.* depth following the passage of the 900 mm tyre.

Key results

- Vertical displacement *vs*. depth (Figure 2): **near-constant slope**; therefore, **a uniform change in soil density**.
- **Soil compaction is influenced by axle load and distribution of that load over the contact area.**
- Benefits of rubber track over tyres (medium soil): **reduction in rut depth and soil displacement (*c*.40%); therefore, a lower increase in SBD (13% *vs*. 18%).**

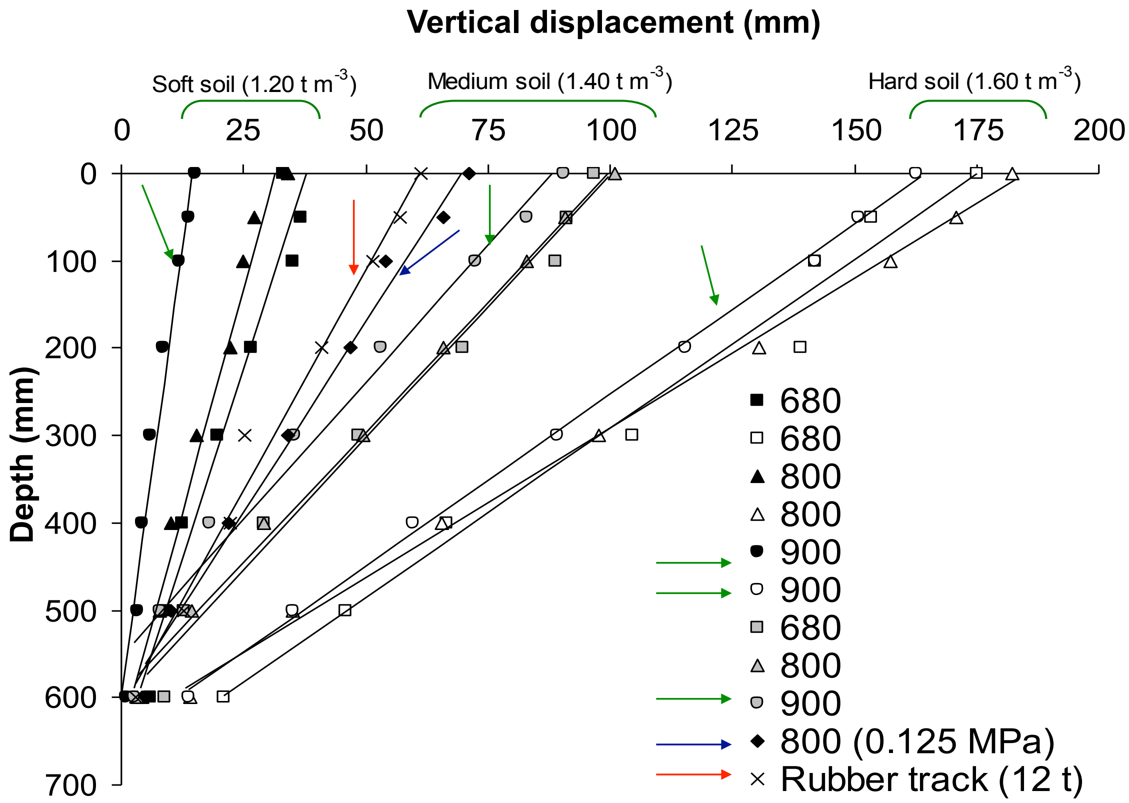


Figure 2: Mean vertical displacement vs. depth for the range of tyre/track configurations and soil conditions used in the soil bin studies.

- The **900 mm section tyre** produced **lesser soil displacement** and **the lowest increase in SBD** (P<0.05) across all soil conditions (14.2%) compared with the 680 mm (15.8%) and the 800 mm (17%) section tyres respectively.

[After: Ansorge & Godwin, 2007, 2008; Antille et al. (submitted)]