## Heavy machinery: The cancer of soil health?

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In an effort to increase the field efficiency of machines carrying out various agricultural tasks, the trend has been for larger, more powerful, and subsequently much heavier equipment. This work uses as a case study the rapid uptake of the John Deere 7760 cotton picker from inception in 2008 to 80% adoption in 2013 and the capacity to pick ≈150% of the Australian crop; the fastest uptake of agricultural harvesting technology ever. Weighing in at 32 Mg empty, with dynamic increase in loading as cotton modules are formed, there are some obvious concerns with regard to soil compaction and flow on effects. With wheel loads between 400 and 600 kPa, this machine is equivalent to civil construction equipment used in foundation preparation, yet there is propensity from industry to state it has no effect on soil compaction. Being a latent effect, heavy machinery soil compaction might just be the cancer of agriculture and soil health.

This work examines the impact of heavy machinery on soil compaction, natural and biological repair of Vertisol soils under the machines, numerous management methodologies, as well as a side-by-side comparison of soil resource and economics for a controlled traffic versus uncontrolled traffic farming system. Decision frameworks and full-system farming tensions are discussed, alongside the requirement for regulated best management practice; a concept that has been raised with much lighter machinery.