

# Picker traffic & soil conditions



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Soil compaction is a well known risk with most cotton soils and can have significant consequences for productivity. The cotton industry is well aware of compaction risk and operations/rotations to manage ongoing problems. Cotton picking has changed dramatically with the rapid adoption of round bale pickers. The substantial increase in weight raises the question “what is the implication for compaction”?

## What we did

We measured the strength of soils before and after they were driven over by empty or fully loaded pickers at a series of sites during the 2010-2011 cotton harvest (Table 1). Soil strength was measured with a constant insertion rate recording penetrometer across eight or twelve rows depending on whether a four or six row picker was being assessed (Photo 1).

Table 1: Details of sites, soil type and equipment measured

SITE	SOIL	EQUIPMENT	WEIGHT (T)		SOIL WATER (%)	
			• Empty	• Full	• Field	• Plastic limit
Namoi	Cracking clay	Round bale + trailer	38	47	24	22
Hillston	Red brown clay	Round bale	32	34	19	17
Boggabilla	Cracking clay	Basket	16	18	22	19

## What we found

At all sites we found that soil strength profiles changed after traffic compared with before traffic (Figure 1):

- Greater change occurred under the fully laden picker compared with the empty picker
- At all sites the soil was close to or wetter than the plastic limit Table 1: this is the point at which soil is susceptible to compaction
- Soil strength >2000kPa, which may limit root growth, occurred closer to the soil surface after picker traffic compared with before traffic (Figure 2)

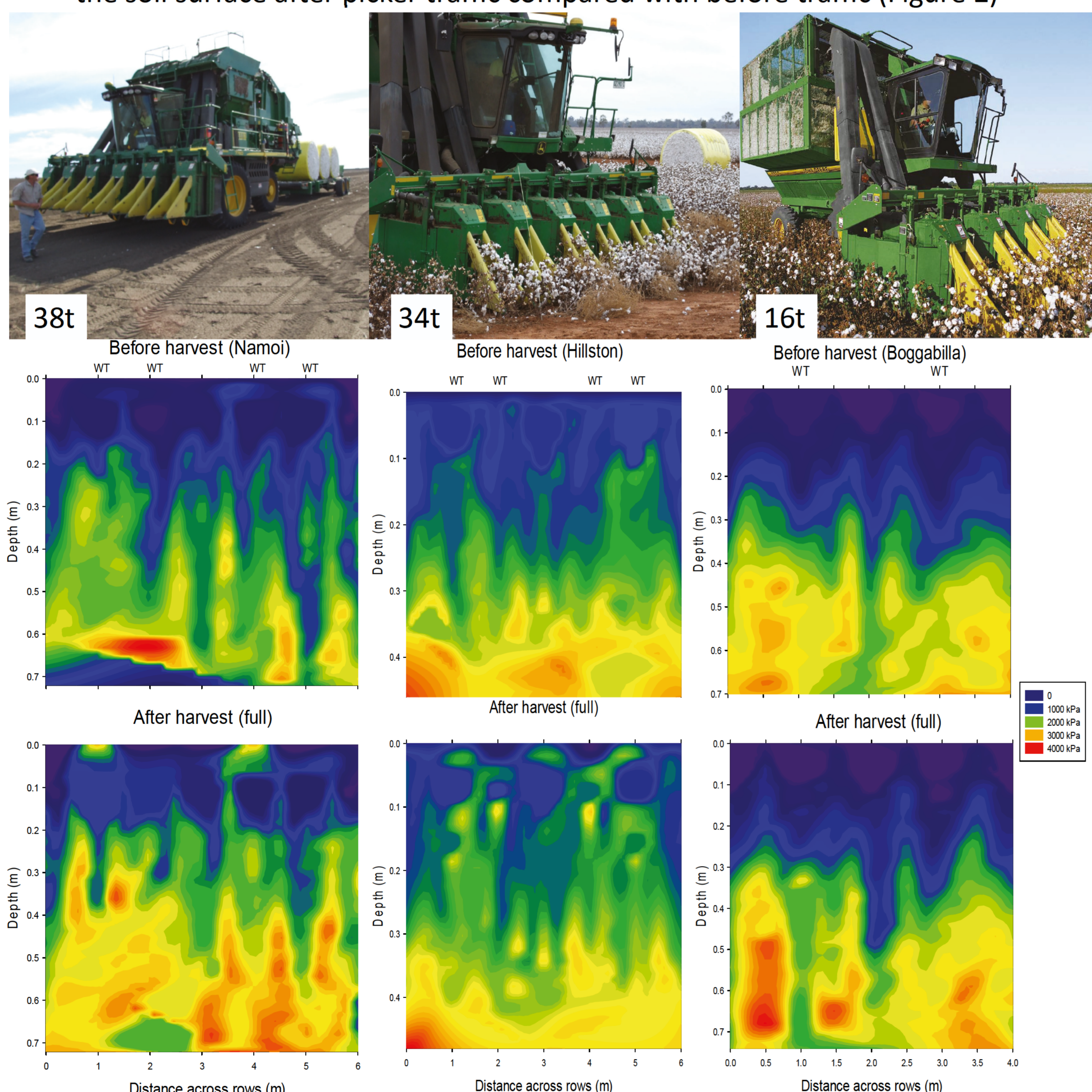


Figure 1: Soil strength contours before & after picking in the Namoi, at Hillston & Boggabilla with round bale & basket pickers. Purple/Blue OK for root growth, roots restricted at Blue/Green interface, roots stop growing Yellow/Orange.



Photo 1: Cone penetrometer

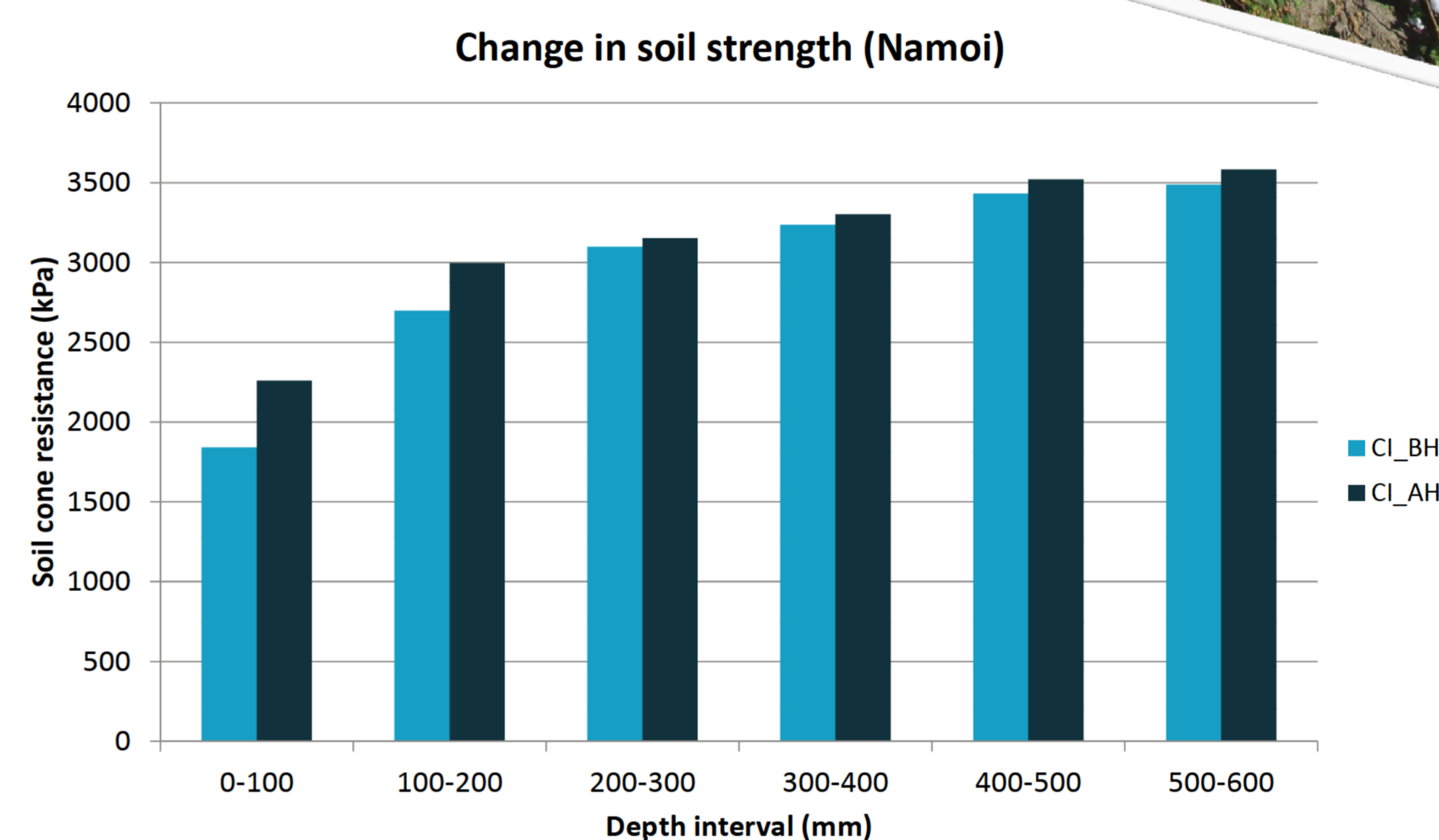


Figure 2: An example of change in profile soil strength of the Namoi cracking clay with depth after traffic of the round bale picker + trailer

## What does it mean?

- Increased soil strength at depth is a concern if it persists after irrigation
- Deeper compaction may restrict root growth to shallow soil depths which may result in reduced access to water, nutrients and require more frequent irrigation
- Mismatch of picker dual wheels (0.75 m) and crop row (1.0 m) spacing results in compaction under crop row (Photo 2)



Photo 2: Furrow before and after picker traffic; note proximity of tyre to crop row after traffic

## Conclusion

- Heavier pickers on soil close to or past plastic limit increases the risk of subsoil compaction
- Growers need to be aware of potential changes to soils both in the short and long term

### FOR FURTHER INFORMATION

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