

Taking a close look at Hillston soils

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Cotton growers and consultants at Hillston and Condobolin have been taking a closer look at their soil to help overcome some of the problems they face.

A SOILpak workshop was recently conducted at Hillston. Growers and consultants learnt how to improve their soil management for irrigated cotton production. The workshop was funded by the CRDC and was led by David McKenzie of Precision Land Management, Orange. The field sites were located at 'Yilgah' (Lachlan Farming Ltd).

The morning session provided background about the principles used in assessing cotton soils. The afternoon session was hands-on, jumping into the soil pits and learning how to check pH, texture, structure and soil moisture, with an emphasis on how to identify compaction and sodicity problems.

The soil types examined were a red cracking clay (red vertisol) and a grey cracking clay (grey vertisol). On the red soil, the high-yielding and low yielding ends of a field were assessed. On the grey soil the high-yielding and low yielding end were assessed and compared to a nearby unfarmed area.

CASE STUDIES

Red soil field

The low lint yield at the poor end of the red soil field was associated with dispersion that causes waterlogging — this was due to excess sodium on the clay surfaces. Gypsum needs to be applied. The soil was too alkaline for lime to be considered as an alternative source of calcium ions and electrolyte.



David McKenzie showing growers and consultants how to analyse cotton soil at the Hillston SOILpak workshop.

Both the poor soil and good soil had evidence of moderate compaction. A winter cereal planted on the shoulder of the beds was recommended to help dry the soil and create shrinkage cracks and traffic guidance options were discussed.

Grey soil field

The grey soil, on the other hand, had no major chemical or nutritional problems at the surface although the concentration of some nutrients was low in the subsoil. There was no evidence of surface slope problems, but subsoil compaction was a major issue, particularly at the poor site.

Several Hillston cotton farms have had a history of rice production. These areas have now been landformed and turned into cotton fields.

A former rice field with grey cracking clay was chosen in January 2002 for the SOILpak workshop, and soil samples were taken from the low-yielding and high-yielding ends of the field. At first it was thought this may be a poor choice of sites as the soil core results came back with soil chemical properties (to a depth of 80 cm) that were almost identical.

But when pits were dug for the SOILpak workshop in June, it became clear that the areas with poor cotton growth had a severe subsoil compaction problem, caused apparently by rice farming about five years previously.

Solution

Growers and consultants at the SOILpak workshop recommended that a crop such as safflower be grown to thoroughly dry the soil profile, followed immediately by a one-off non-inversion deep ripping operation to a depth of 50 cm. The cation exchange capacity data indicated that the soil had moderate shrink-swell potential (CEC=32 meq/100g throughout the root zone), but numerous drying and wetting cycles would be required to loosen a subsoil with such severe compaction.

So it was decided that mechanical loosening was needed to accelerate the repair process. The next step would be to re-establish permanent wheel tracks using a

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Eastern end of the grey clay field with a cotton crop severely stunted by compaction.



Good (western) end of the grey clay field in late February 2002.

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guidance system such as 'Beeline'.

This pit examination in the field provided very clear evidence of the importance of looking beneath the crop to investigate decline problems.

What did we learn?

- Soil compaction is an old, and often overlooked issue that still is very important. With limited water this season, choose fields that are least compacted.
- Dispersion, sodicity, and the need for

gypsum application were key issues at the 'poor red soil' site.

- The value of assessing soil nutrients in both the topsoil and subsoil.
- Examination of unfarmed soil shows that the development of land for irrigated cotton production does not automatically lead to irreversible soil degradation — some soil properties may even be improved.
- Deep drainage below cotton fields is an important issue that can be evaluated and managed using salt balance data.

- On the red soil, an EM survey almost certainly would have defined the boundaries of the saline-sodic area, although the EM data would have to be collected when the soil is uniformly moist across the field.
- On grey clay soil there is no obvious remote sensing technique that would be able to map the extent of the compaction problem across the field and on other parts of the farm — direct measurement via pits appeared to be the only option.

For more information on the SOILpak system contact David Larsen on 02 67991534. 