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Abstract

Project Title:	Soil Fabric: Use as a Field Indicator of Instability and Clay and Solute Movement
Project No.:	SCU1C
Principal Researcher:	Dr Leigh Sullivan Senior Lecturer in Soil Science Resource Science and Management Southern Cross University P.O. Box 157, Lismore, NSW, 2480.
Telephoue: Fax: email:	(066) 203742 (066) 212669 lsulliva@scu.edu.au

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The objectives of this study were to: 1) determine the role of soil instability and clay translocation in the formation of shiny-faced soil aggregates, 2) determine the roles of clay translocation and vehicular compaction in the formation of subsoil densification in cracking clays used for cotton production, and 3) examine the effect of aggregate surface fabric on the movement of water and solutes in these soils. The results of this study have extended the results of previous research on cracking clays to show that the past practices used in long-term irrigated cotton growing have resulted in substantial deep subsoil densification down to depths of 200 cm, and that such deep subsoil densification is likely to be widespread in these soils. This project has also identified that the cause of the deep subsoil densification in irrigated cracking clay soils used for cotton production is vehicular compaction (as a result of heavy axle loads) rather than clay translocation as has been previously suspected. The results indicate that the present trends and recommendations towards the use of lower axle loads and permanent hed systems in cotton production in Australia are very appropriate for these soils. The scanning electron microscopy study on the fabric of these soils has provided an understanding of the fundamental nature of this soil characteristic and provided a more rational basis for the measurement and subsequent interpretation of this soil characteristic. For example, the results of this project indicate that that dull ped fahrics cannot be taken to infer that structural instability in the form of clay mobilisation and translocation has not taken place in these soils. The fabric studies clearly show that there are clay coatings on the structural surfaces within these soils: the solute movement work indicates that at moisture contents below that where the large pore space is coated by conductive films of water, the presence of such clay coatings leads to preferential flow.