

Project: DAN 76C Rotopak – developing rotations to overcome soil degradation for irrigated cotton systems.

SUMMARY REPORT

Insect pests, disease, weeds, declining soil structure and fertility are some of the problems the Australian cotton industry faces. Growing other crops in rotation with cotton appears to offer the best prospect for long term viability of the cotton industry. Much of the Australian cotton crop is produced under irrigation in the Macquarie, Namoi and Gwydir valleys of NSW, so a survey was conducted in those valleys, to find out how widely rotation crops are used and which rotation crops growers favour.

In addition to the survey, soil samples were taken from paddocks which had grown cotton continuously for several years, and paddocks which had grown a rotation crop the previous season. The soil samples were subjected to a wide range of physical and chemical tests to see what differences could be measured.

A major objective of this project was to co-ordinate, and ensure proper planning of, future rotation research in the cotton industry. To help achieve this, a review meeting was held at Narrabri, which involved all key workers in cotton soils and rotation research, plus representatives of the cotton industry.

The cotton survey had a good response with over half the growers in NSW contacted. The extent to which individual growers used rotations varied widely, but on average, cotton fields grew a rotation crop one year in 4, with the use of rotations likely to increase in future. Wheat was the crop most frequently grown in rotation with cotton, but there was widespread interest in the use of legumes. Many farmers were developing rotation cropping systems, but they had a lot of questions which only research could answer eg. which crop is best for soil structure, how much nitrogen do different legumes provide, do rotations crops differ in their effect on weeds, disease, insects, VAM etc, and does management of the rotation crop affect subsequent cotton crops.

The comparison of continuous cotton fields and those growing rotation crops found that the differences are small and difficult to measure. Field measurements of soil structure (shear strength and Soilpak score) could not detect any differences. The only tests to show up differences were dispersion index, plastic limit, % of coarse particulate organic matter and soil respiration rate.

Looking at the history of the sites revealed that management of stubble from the previous crop is important. Soil structure was better at sites which retained the stubble compared to sites where the stubble was burnt. This is important given the widespread use of raking and burning for back to back cotton.

Although cropping history had little effect on the soil properties measured, there were many significant differences between the soils of the Macquarie and Namoi valleys. This means that great care should be taken when extrapolating results from one valley to another.

The research co-ordination meeting at Narrabri has resulted in close liaison between NSW Agriculture, CSIRO, University of Sydney, Qld Department of Primary Industries, University of New England and Brisbane University. Several follow up meetings have been held, one result of which is that the NSW Agriculture rotation experiment and the Co-operative Research Centre for sustainable cotton production are using a common site in the Macquarie valley.