

CRC1C Executive Summary

Part 3 - Final Report Format

A plain English summary:

The N nutrition of cotton crops was investigated with respect to the effectiveness with which rotation crops improve the supply of N to cotton and reduce the amount of N fertilizer required. The CRC farming systems experiments were examined to demonstrate these principles by monitoring the N status of each system. This has helped to identify the more N efficient cropping systems and allow for more effective N nutrition of cotton.

Summer and winter growing rotation crops (including grain, green-manure and forage legumes) were compared in field experiments at ACRI and the benefit of these legume systems and savings in N fertilizer for cotton was assessed. Both back-to-back and rotational cotton systems were investigated. The biofumigatory effect of Brassica species will also be determined through lint yield and VAM assessment. The value of other rotation crops was evaluated in terms of improved N nutrition, soil structure, weed and insect management, VAM and cotton pathogen survival.

Improvements to soil and crop nitrate tests for predicting N fertilizer requirement and crop N status will enhance grower confidence and adoption of this technology by allowing on-farm determination of soil nitrate levels. These results will be incorporated into the Nutripak /Nutrilogic program.

Background to the project

Legume crops vary enormously in their capacity to supply N to cotton crops. Our measurements indicate that up to 350 kg N/ha can be fixed by faba bean crops grown after cotton, although some of this N (~100 kg N/ha) is removed in seed. This input of organic N replaces much of the fertilizer N required for the next cotton crop which is conducive to an improved sustainability of the cotton industry.

The objectives and the extent to which these have been achieved

- We have assessed a large range of commercial legume crops throughout the cotton-growing areas for N fixation and their input of N into the soil.
- Cropping system experiments are continuing in Field 6 at ACRI to compare summer and winter growing legume and other rotation crops, including forage legumes, double legume cropping in systems where cotton is sown back-to-back or with rotation crops and fallows. The benefits of these crops on the following cotton crop are assessed by its response to N fertilizer.
- N status in the three CRC farming systems experiments has been monitored regularly.
- Investigation into on-farm testing methods for improved assessment of plant N status is continuing and is showing positive results.
- Collaborators have monitored disease and insect incidence, and compared soil structural characteristics in these experiments.
- Considerable effort was put into the development of the NutriLOGIC program. The writing of NUTRIpak is now requiring intensive work by researchers in the nutrition field.
- We have assessed a large range of commercial legume crops throughout the cotton-growing areas for N fixation and their input of N into the soil.

The methodology and a justification for the methodology used

Field experiments were conducted to ascertain N fixation in legume rotation crops and determine the response to applied N fertilizer in the following cotton crops. The cotton phase was sown to Ingard and non-Ingard cotton to indicate the effect of N nutrition on Ingard efficacy. Laboratory experiments indicated that simplified soil nitrate tests (using Merck test strips) were not accurate and this research was not continued. Leaf nitrogen testing with the hand-held SPAD meter has shown much more potential and requires further development before this technology is released to the industry. NutriLOGIC development is continuing with upgraded calibrations forthcoming from this research. NUTRIpak has been written and requires some editing before publication in late 2000.