Robust Farming System Challenges for Cotton Production in the Ord River Irrigation Area of North Western Australia

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Introduction

Dry season cotton production in northern Australia faces considerable challenges if it is to emerge as a sustainable industry. Water for irrigation is abundant in the Ord River Irrigation Area (ORIA) and there are prospects of an increase in arable land with the future development of Ord Stage II. Yields from research trials have been encouraging and some of the early problems, such as shorter fibre length, have been overcome by growing adapted cultivars that produce longer fibres (ie Sicot 289I and Siokra V16I). Results from initial dry season trials have been reported previously (Strickland and Constable 1995; Yeates *et al* 1996; Yeates and Constable 1998; Strickland *et al* 1998) and management of issues such as irrigation scheduling, fertiliser requirements and the time of sowing are currently being addressed. However several areas remain that require further research.

Wet season cover crops

With the exception of sugar cane, agricultural crops in the ORIA are grown over the dry season (April - November). Beds are typically remade in late November and left clean fallowed over the wet season. Wet season storms can result in beds slumping and subsequent soil loss. Prolonged wet seasons can delay bed re-shaping and sowing. The use of wet season cover crops, as a way of holding bed shape and possibly drying down the soil profile, is being evaluated. Candidate crops include sorghum, pearl millet, Japanese millet, finger millet, lab lab, pigeon pea and soybean. The management of these crops is also under investigation such as sowing requirements.

One of the greatest issues is preventing excessive biomass buildup which would make sowing the following cotton crop difficult. The spraying out of these crops at various times throughout the wet season is being investigated and the levels of biomass at the end of the wet season recorded.

Virgin soil nutrition

Despite being a black soil, the Cununurra clay soils are inherently low in essential elements (Gunn, 1969). Levels of available phosphorous are typically less than 10kg/ha while there is virtually no nitrogen remaining in the soil after the wet season. Trace elements, such as zinc, are also known to be deficient. Some elements, such as phosphorous, are also known to be bound by these soils. The future development of the 42,500ha of land for Ord Stage II will rely initially on providing large amounts of nutrients to enable crops to be grown. As cotton is a candidate crop to be grown in Ord Stage II research is being conducted to examine the levels of nutrients required, in particular phosphorus and zinc. Follow up trials will be conducted over the trial areas in the following year to determine the residual levels of elements remaining in the soil.

Run off/Leaching

Heavy rains over the wt season can result in lateral and vertical movement of mobile nutrients out of the soil profile. It is hoped that the incorporation of cover crops which would seek out residual nutrients and keep them in the root zone for use by the following dry season crop. Soil analysis id being conducted on cores taken throughout the year to evaluate which nutrients are being leached from the profile and where they are located so losses can be minimised.

Possibilities for new transgenics

Currently, all dry season cotton production in the ORIA is based on the use of INGARD™. If a viable commercial industry is to develop it will be based on Bollgard II™, which should confer resistance to Heliothis longer into the growing season. The use of Roundup Ready™ may also have a place in cotton production in the ORIA. The current system involves waiting for fields to dry after the wet season, re-shape the

beds, incorporate pre-sowing herbicides such as Stomp™ and then sow the cotton in early to mid-April. The use of Roundup Ready™ cotton may allow growers to sow cotton straight after bed shaping is completed in mid to late-March and control weeds after emergence. There are yield advantages associated with sowing in late-March and problems associated with weathering of lint from early wet season storms could largely be avoided.

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