

## **Varietal Response to Irrigation and Nitrogen**

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### **Introduction**

An experiment was conducted at Narrabri Agricultural Research Station during the 1991-92 season to investigate the response of a range of currently available cotton varieties to irrigation and nitrogen treatments. This experiment, along with the date of planting experiments described by Tony Wells elsewhere in the conference proceedings, forms part of a long-term program to study the agronomic requirements of new cotton varieties. These experiments also provide data for development of crop simulation models including the Hydrologic program.

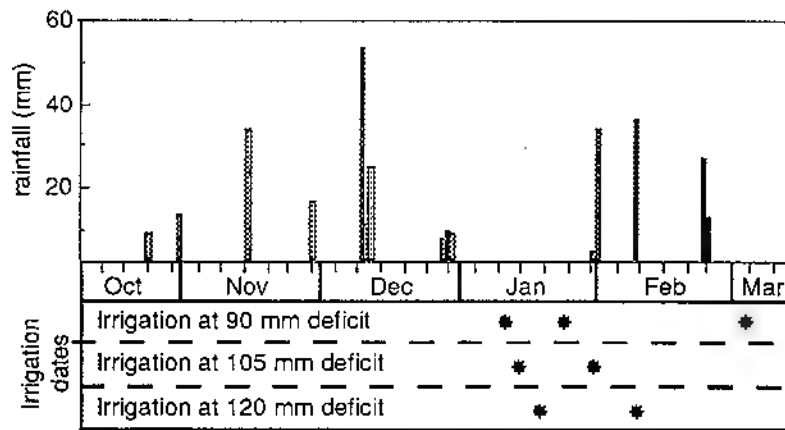
This paper describes the yield and fibre quality results from the experiment and discusses the implications for irrigation and fertiliser management of different varieties. Some recommendations also apply to dry land cotton production.

### **Description of Experiment**

The following varieties were used:

- CS 7S
- Siokra S324
- Deltapine 90
- Siokra 1-4
- CS 50
- Sicala V1
- 83203-183
- Siokra L23

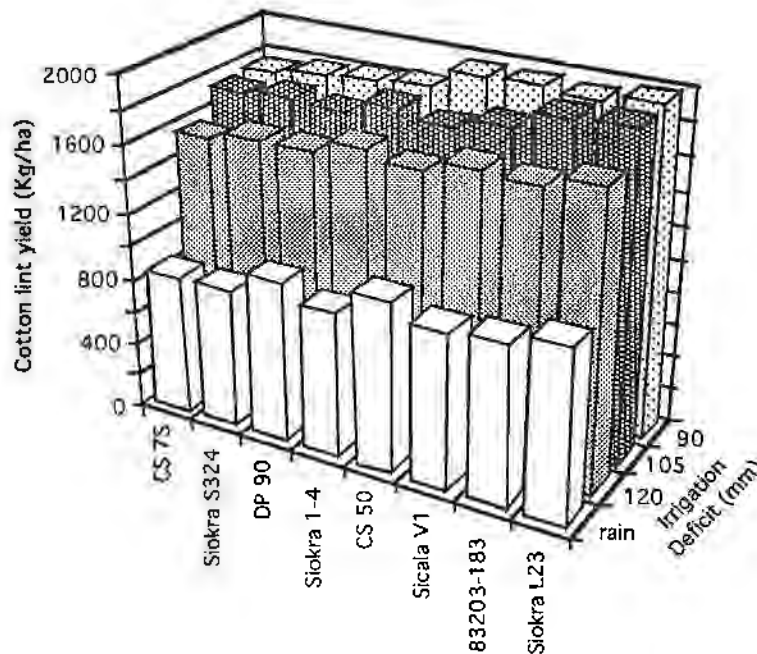
All varieties are currently, or are soon likely to be, commercially available. Siokra L23 is a potential replacement for Siokra L22 and 83203-183 is a potential replacement for CS 189. Irrigation treatments of 90, 105 and 120 mm deficit and no irrigation were used; irrigation dates, as shown in Figure 1, were determined using the Hydrologic program. Nitrogen rates of 150, 75 and 0 Kg/ha were applied. The area was pre-irrigated on 1 October 1991 and planted on 10 October using a cone seeder. The previous crop was grain sorghum; pest and weed control were standard; and the soil was a grey cracking clay.



**Figure 1:** Dates of irrigation for different irrigation treatments and rainfall during irrigation period.

**Variety responses to irrigation**

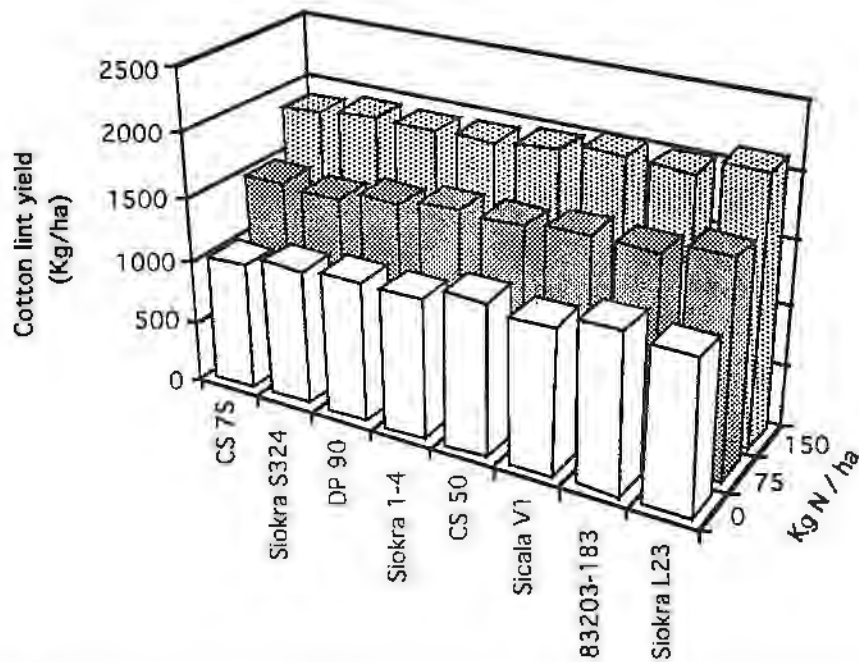
As Figure 2 shows all varieties responded in a similar way to water stress. That is, there was no interaction between variety and irrigation treatment; so the highest yielding variety (Siokra L23) for fully irrigated production was also the highest yielding for dry land conditions. This finding is in agreement with results from the breeders experiments. The effect of irrigation on yield over all varieties and nitrogen rates was highly significant between rain and 120 mm deficit and between 120 mm and 105 mm deficit but not between 105 mm and 90 mm deficit.



**Figure 2:** The yield response of eight cotton varieties to four irrigation treatments. The yields are averages of three nitrogen rates.

### Variety responses to nitrogen

It is clear from Figure 3 that yield was highly sensitive to nitrogen supply but the ordering of the varieties from highest to lowest yield does not change for different nitrogen rates.

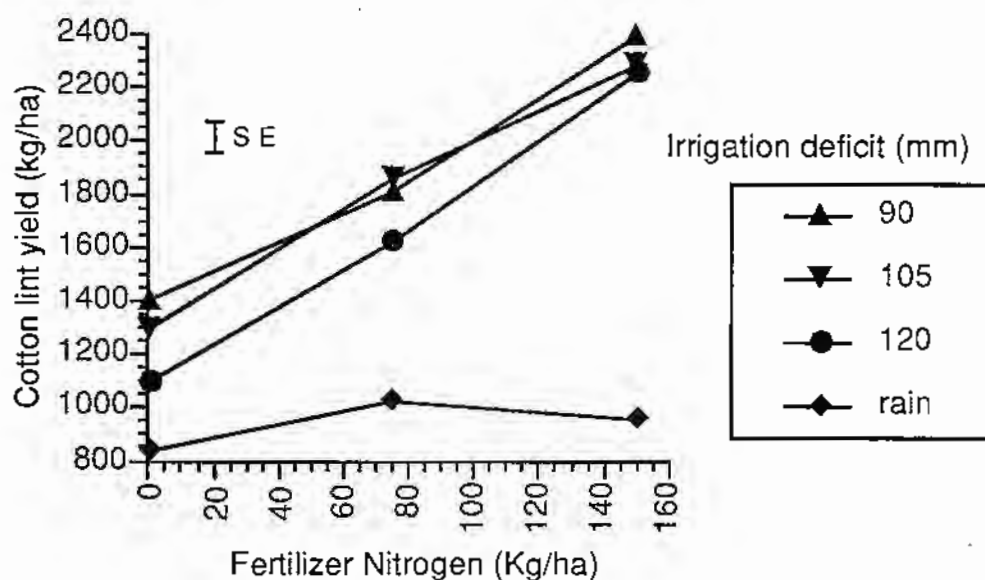


**Figure 3:** The yield response of eight cotton varieties to three nitrogen rates. The yields are averages of four irrigation treatments.

### Combined irrigation and nitrogen effects

Figure 4 shows that for the irrigated treatments higher yields would have been obtained with higher nitrogen applications in this instance following grain sorghum.

The most striking feature of Figure 4 is the lack of yield increase per nitrogen rate under rain grown conditions. The rain grown treatment did not utilise nitrogen above 75 kg/ha. nitrogen applied above this rate was wasted. This result confirms the results of work done on other varieties.



**Figure 4:** The average yield response for all varieties to four irrigation and three nitrogen treatments.

### Fibre quality

Fibre length was slightly reduced by shortage of nitrogen except with Sicala V1 which remained constant. Length was also reduced by water stress particularly in Siokra L23, DP90 and 83203-183. Less affected were varieties CS 7S and CS50. The experiment showed that strength was more influenced by nitrogen treatment than by irrigation. Sicala V1 showed no change in fibre strength under different nitrogen rates. Uniformity went down with nitrogen supply for DP90 and Siokra L23. All other varieties were less affected. Micronaire, in this experiment, showed a decrease with lower nitrogen and increase with less water.

### Conclusions

Although all varieties were influenced by either water or nitrogen stress or by both, there was no variety that was particularly better under stress conditions. The potential replacement for Siokra L22 (L23) confirmed its promise from other experiments by being the highest yielder.