

## Comparison of trickle and inter-row surface flow irrigation of cotton II. Yield and water use

C.J. Birch and M.J. Bright

Queensland Agricultural College, Lawes, 4343

Trickle irrigation (TI) has been reported to increase (1, 2), decrease (3) or not to affect (4) cotton yield, and to increase (2, 3) or not affect (4) water use efficiency. These overseas reports cannot be applied directly to Australian conditions, because of soil, irrigation practice and climatic differences. The precise control of water application rates with TI can overcome some of the limitations, e.g. temporary waterlogging of interrow surface flow irrigation (SFI) and improve rainfall utilization. Because of recent promotion and farm evaluations (which also involve other changes to crop management) of TI, a trial to study the comparative effects of TI and SFI on crop yield and water use in a cracking clay soil was conducted.

### Materials and methods

Trial design and cultural practices have been described elsewhere in these proceedings (5). The cotton was picked three times from two fixed two metre quadrats in each datum row, and to gain some information on crop maturity, open and closed bolls were counted in two x two metre quadrats in each datum row 145 days after sowing.

Treatment	Yield of Seed Cotton (kg ha <sup>-1</sup> )			Total
	Pick 1 (137 days)	Pick 2 (172 days)	Pick 3 (185 days)	
T.I.	1180	1420	1560	4160
S.F.I.	990	1340	1410	3740
L.S.D. (P=0.05)	-	-	-	260

More bolls were open in the TI than SKI treatment 145 days from planting and the consistent, though non-significant trend to higher yield in each pick in the TI treatment suggests more rapid plant development, and thus advanced maturity. The apparent retention (5) and/or earlier opening of bolls would explain the increased total yield in the trickle treatment.

The increased yield was achieved with only 40% of the irrigation water used in the SKI treatment (234 mm). It is not possible from the data collected to calculate water use efficiency ratios, but it is clear that when irrigation is used to supplement rainfall, limited water supplies will be able to support an increased crop area due to more effective use of both rainfall and irrigation water. Also TI could be used to expand production onto areas unsuitable for SFI.

These data clearly indicate that further research is needed, and should be extended in studying the effects of use of TI as a means of applying other crop inputs, e.g. fertilizers.

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