

## Improving irrigation efficiency in a semi arid sub tropical environment a. cotton yields and water use efficiency

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There are increasing pressures to optimise crop production by sound irrigation management practices as well as to avoid waterlogging and salinity problems produced by excess irrigation(1).. Following early experiments with cotton at Emerald in Central Queensland (2) an irrigation management research programme was commenced. One objective is to assess different irrigation management strategies in terms of yield per unit of irrigation infiltration (I.W.U.E.).

### Methods

In the 82-83 and 83-84 seasons, the project was conducted on a cracking clay (Ug 5.12) with decomposing basalt at 80-85 cm. irrigation of each treatment was scheduled on potential crop water use estimated from a crop factor and Class A Pan evaporation model (2). The total amount of irrigation added to each treatment was calculated from measurements (using weirs and flumes) of water on and off plots 12 m x 200 m (furrow slope 1%). It was not possible to replicate irrigation treatments but 16 yield samples of 2 rows x 10 metres were taken from the 4 middle rows of each block.

### Results and Discussion

TABLE 1. Cotton yields and irrigation water use efficiency.

Irrigation Treatment	Deficit mm		No. Irrig.		Lint Yld <sub>1</sub> kg ha <sup>-1</sup>		I.W.U.E. <sub>1</sub> kg ha <sup>-1</sup> /mm	
	Phase B	Phase C			82/83	83/84	82/83	83/84
			82/83	83/84				
Very Frequent VF	45	45	11	7	1890	1880	3.5	5.5
Frequent F	75	75	7	5	2020	2050	4.2	5.9
Infrequent IF	120	120	-	2	-	2000	-	10.8
Very Infreq. VIF	150	150	3	2	1570	1970	4.6	7.9
Variable F-IF	75	120	-	3	-	2090	-	7.9
Sampling SE					155-277	172-270		
	Phase B = 1 Flower/m to 1 Flower/m + 28 days							
	Phase C = 1 Flower/m + 28 days to 5 open bolls/m							

Over 2 contrasting climatic seasons the F treatment produced the highest yields but the IF and VIF treatments had higher I.W.U.E. (Table 1).

There are reports that I.W.U.E. can be improved by varying the irrigation deficit with crop development (3). Four additional treatments were included in 83/84 to test this hypothesis. The most promising was the F-1• which with 3 irrigations had a much higher I.W.U.E. than the F treatment.

1. Smith, R.C.G., Meyer, W.S., Blackwell, J. and Mason, W.K. 1982. Proc. 2nd. Aust. Conf., Wagga Wagga, pp 126-141.

2. Keefer, G.O., Yule, D.F., Ladewig, J. 1982. Aust. Cotton Growers Research Conference Nov. 4-5, 1982, Goondiwindi.

3. Bordovsky, D.G., Jordan, W.R., Hiler, E.A., Howell, T.A. 1974 Agron. J. 66:88