Timing of the last irrigation in Cotton

Irrigation Strategy 1990/91

(see Figure 1)

- 1st irrigation 2/11/90 - much earlier than usual and at a small deficit. The top 20 - 30 cm of the profile had very poor structure due to wet seasons and difficult conditions for seedbed preparation, and combined with hot weather caused young seedlings to suffer moisture stress and so irrigation was started earlier than normal.

- 2nd irrigation 17 mm deficit

- 3rd irrigation 24 mm deficit

- 4th irrigation 57 mm deficit. This was used as the refill point for remainder of the season.

- at the 6th and subsequent irrigation surface sealing caused some infiltration problems and the profile could not be wet back up to original full point (Figure 2). Effectively the amount of water available after irrigation fell from 57 mm to about 40 to 50 mm. At water use rates up to 8.5 mm the irrigation cycle got as short as 6 days during January and February.

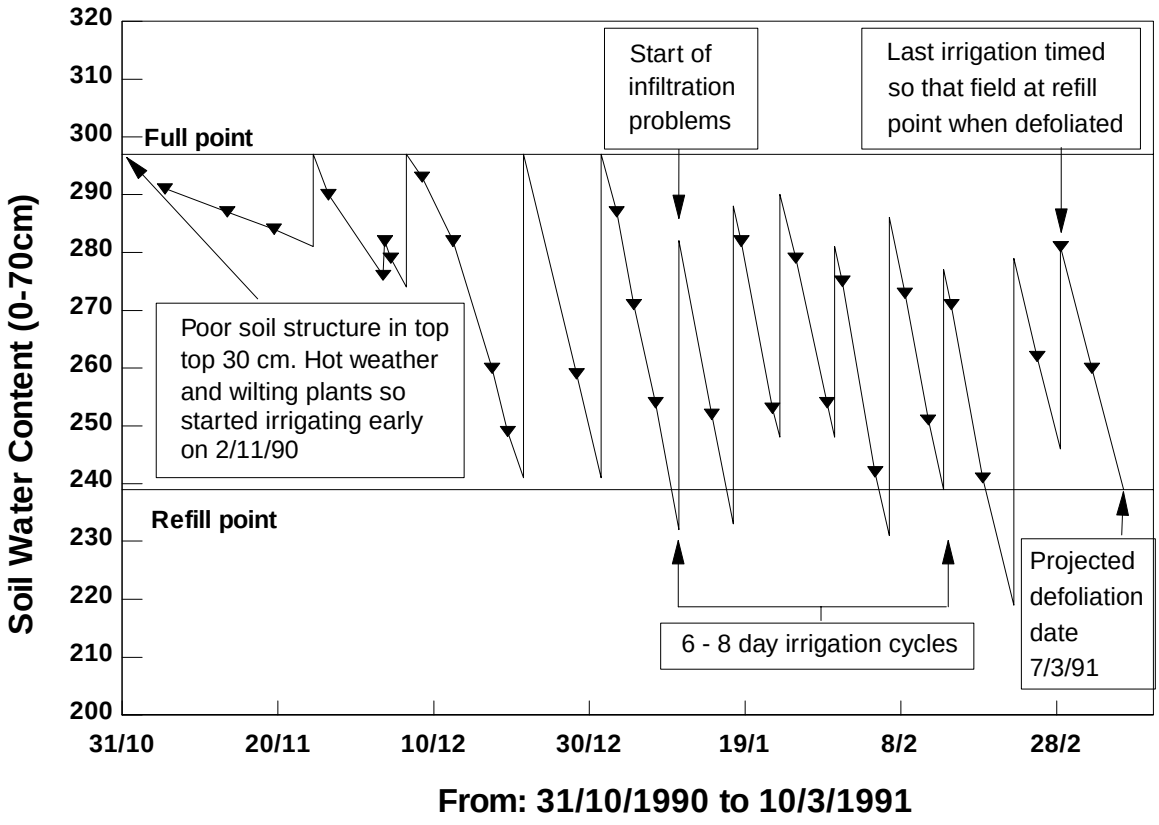

Figure 1. Buttabone Field 1 1990/91 season.

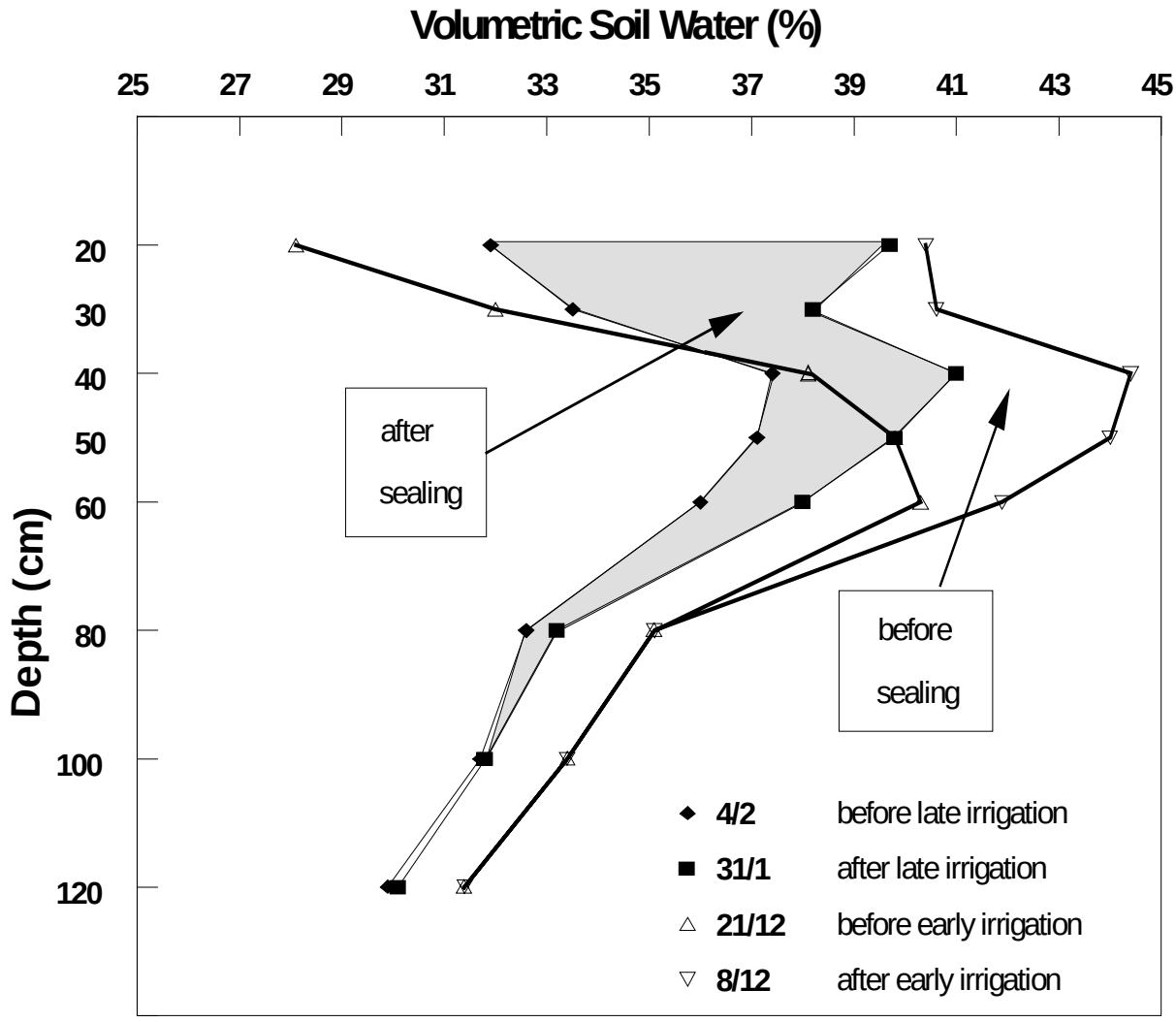

Figure 2. Soil moisture profiles before and after sealing.

Timing of last irrigation.

The field showed right throughout the season that falling below the refill point would rapidly lead to stressed plants. When the crop was below refill point for example 6/2 or 24/2 the plants wilted. The root had not developed throughout the season to overcome compaction or sodic subsoil effects. Therefore to get as much yield out of the field as possible and to ensure plants were not stressed at defoliation the plan was to have the field at refill the day of defoliation. This meant that it was important to identify the last effective flower (LEF) and try to determine the date at which it would be mature enough to defoliate. The LEF was determined as being on 4/2/91. Then it had to be decided how many days it would take for the LEF to mature. Greg Constable indicated that 550 growing day degrees (GDD) was a reasonable average number of heat units required to take a flower to maturity. Data from last year (see table 1) also supports this value. Based on long term average weather data the calendar days required to get 550 GDDs for Trangie and Narrabri are set out in Table 2. Since there is no long term weather data for Buttabone it is assumed to be the average of Trangie and Narrabri.

The LEF at 4/2/91 gave a predicted defoliation date of 22/3/91. However a combination of hot weather and tight soils appeared to cause the last 2-3 bolls to stop growing. This brought the LEF back to 30/1/91 and given average weather a date of defoliation of 12/3/91. From 30/1/91 to 28/2/91 the weather was hot and there were 450 GDDs which is approximately 50 above average This meant that last bolls would be mature by 7/3/91 and field observations confirmed this date. Therefore last irrigation was applied on 28/2/91 and with a crop water use of 6 mm/day the crop should have used the 42 mm of available water and been at refill on 7/3/91 the planned defoliation date.

Table 1. Growing day degrees from last effective flower to first defoliation on Buttabone in 1990.

Field	LEF date	GDD to first defoliation	Calendar days LEF to defoliation
7	14/2/90	536	41
8	19/2/90	500	39
10	12/2/90	400	30
11	14/2/90	550	42
12	14/2/90	524	40
13	15/2/90	512	39
21	15/2/90	558	43
23	15/2/90	536	41
2A	19/2/90	550	44
2B	14/2/90	614	49
1C	14/2/90	614	49
Average		536	42

Table 2. Calendar day to get 550 growing day degrees at Trangie and Narrabri.

LEF Date	Days using Trangie weather	Days using Narrabri weather	Average
21/1/91	44	40	42
28/1/91	46	41	44
4/2/91	49	43	46
11/2/91	53	46	50
20/2/91	62	51	56

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