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Scheduling Irrigation for Bidi Tobacco Var. GT 5

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ABSTRACT

An experiment was conducted to schedule irrigation for bidi tobacco Var. GT 5 at Bidi Tobacco Research Station, Anand from 1986-87 to 1988-89 based on IW/CPE ratios. The results revealed that to accru maximum monetary returns under middle Gujarat soil conditions, bidi tobacco Var. GT 5 should be irrigated at 0.5 IW/CPE ratio, which requires 4 to 5 irrigations with a depth of 5 cm each at an interval of 15-20 days after cessation of monsoon.

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INTRODUCTION

Among various types of tobacco grown in Gujarat,bidi tobacco accounts for about 85% of the total tobacco area of the state. The newly released bidi tobacco variety GT 5 has high yield potential by 27 per cent over Anand 119. With the introduction of high yielding varieties and owing to inadequate rainfall before planting and at the time of planting and ill distribution of rains during growth period, it is necessary to irrigate the crop in most of the years. A substantial improvement in water use efficiency is possible by timing the irrigation based on open pan evaporation (Ravindranath and Subrahmanyam, 1978 and Ramchandran *et al.*, 1984). Gopalachari and Gopinath (1965) also reported progressive increase in yield of FCV tobacco with irrigation. Khot (1974) reported 55 per cent increase in yield of bidi tobacco when crop was irrigated once in 15 days. Hence, present study was undertaken to workout optimum and economic level of irrigation for bidi tobacco variety GT 5 under middle Gujarat condition.

MATERIALS AND METHODS

The experiment was conducted at the Bidi Tobacco Research Station, Gujarat Agricultural University, Anand Campus, Anand during 1986-87 to 1988-89 in a randomised block design with four replications. The treatments comprised seven levels of irrigation viz., no irrigation (I_0), irrigation upto crop establishment (I_1), irrigation at 0.3 IW/CPE ratio (I_2), irrigation at 0.4 IW/CPE ratio (I_3), irrigation at 0.5 IW/CPE ratio (I_4), irrigation at 0.6 IW/CPE ratio (I_5) and irrigation at 0.7 IW/CPE ratio (I_6). The gross and net plot sizes were 5.4 m x 8.4 m and 1.8 m x 6.0 m, respectively. The crop was transplanted at 90 cm x 60 cm spacing in the second fortnight of August. The irrigation treatments were imposed from 15th September.

TABLE 1

Response of GT 5 to levels of irrigation.

Treatment		Cured leaf yield (kg/ha)				Economics on the basis of pooled data (Rs./ha)			
		1986-87	1987-88	1988-89	Pooled	Gross realization	Treatment cost	Net realization	C.B.R.
No irrigation	(I_0)	1128 (-)	1328 (-)	1820 (-)	1426 (-)	10053	6131	3922	1 : 0.63
Irri. upto esta.	(I_1)	2361 (1)	1172 (1)	1976 (-)	1836 (1)	12944	6345	6599	1 : 1.04
Irri. at 0.3 IW/CPE ratio	(I_2)	3150 (3)	1719 (3)	1962 (2)	2277 (3)	16053	6666	9387	1 : 1.41
" 0.4 "	(I_3)	3513 (4)	2014 (4)	2407 (3)	2645 (4)	18647	6773	11844	1 : 1.75
" 0.5 "	(I_4)	3533 (5)	2208 (5)	2468 (4)	2736 (5)	19289	6856	12433	1 : 1.81
" 0.6 "	(I_5)	3709 (6)	2089 (6)	2477 (4)	2758 (5)	19444	6963	12481	1 : 1.79
" 0.7 "	(I_6)	3727 (6)	1970 (7)	2254 (5)	2650 (6)	18682	7058	11624	1 : 1.65
S. Em.		178	219	117	95				
C. D. 0.05		536	651	348	283				
C. V. %		11.8	24.6	10.7	14.1				

Figures in parenthese indicate number of irrigations.

The depth of irrigation water was 5 cm for each treatment. Observations of open pan evaporimeter were recorded daily and cumulated and irrigations were given as per the treatment. The chemical analysis for nitrogen (A.O.A.C., 1970) nicotine, reducing sugars (Harvey *et al.*, 1969) and chloride (Murthy *et al.*, 1962) was carried out by adopting standard methods.

RESULTS AND DISCUSSION

Results of the individual years showed significant differences for cured leaf yield and all the yield attributes except growth score due to irrigation levels. There was significant improvement in yield as the levels of irrigation increased from I_0 upto I_3 (0.4 IW/CPE ratio) treatment during 1987-88 and 1988-89. In all the years irrigating the crop at 0.4, 0.5 and 0.6 IW/CPE ratios being at par gave significantly higher yield over no irrigation, irrigation upto establishment and 0.3 IW/CPE ratio. In 1986-87 treatment I_2, I_3 and I_4 being at par gave significantly higher yield over I_0 and I_1. The cured leaf yield of treatment I_5 (0.6 IW/CPE ratio) was significantly superior to I_0, I_1 and I_2 in 1986-87 and 1988-89. These variations were due to ill distribution of rainfall. The years 1986-87 and 1987-88 were severe drought and drought, respectively, while 1988-89 was a normal year wherein sufficient rainfall was received (Table 4).

Pooled results also showed significant differences for yield and its attributes except

TABLE 2

Effect of irrigation levels on yield attributes of GT 5.

Treatment	*Growth score (0-10)*	*Plant height (cm)*	*Leaf length (cm)*	*Leaf width (cm)*	*Spangle score (0-5)*
No irrigation	(I_0) 3.8	55.4	36.8	17.2	1.2
Irri. upto Esta.	(I_1) 5.4	60.8	36.9	17.8	1.7
Irri. at 0.3 IW/CPE ratio	(I_2) 5.3	61.7	43.5	19.7	2.2
Irri at 0.4 IW/CPE ratio	(I_3) 5.8	65.2	47.1	22.4	2.5
Irri. at 0.5 IW/CPE ratio	(I_4) 5.7	66.5	46.2	21.9	2.6
Irri. at 0.6 IW/CPE ratio	(I_5) 6.1	62.8	47.1	23.1	2.7
Irri. at 0.7 IW/CPE ratio	(I_6) 6.2	67.5	48.9	22.5	2.6
S. Em.	0.63	1.89	2.07	0.95	0.19
C. D. 0.05	NS	5.33	6.39	2.93	0.60
C. V.%	9.4	10.2	9.6	11.0	12.3

TABLE 3
Chemical constituents as influenced by irrigation levels.

Treatment		Per cent oven dry basis			
		Nitrogen	Nicotine	Reducing sugar	Chloride
No Irrigation	(I_0)	3.11	6.73	3.66	1.49
Irrigation upto Esta.	(I_1)	3.14	7.30	3.35	1.65
Irrigation at 0.3 IW/CPE ratio	(I_2)	3.27	7.76	3.33	2.04
Irrigation at 0.4 IW/CPE ratio	(I_3)	3.00	7.82	3.55	2.04
Irrigation at 0.5 IW/CPE ratio	(I_4)	3.13	7.62	3.42	2.14
Irrigation at 0.6 IW/CPE ratio	(I_5)	3.08	8.11	3.49	2.21
Irrigation at 0.7 IW/CPE ratio	(I_6)	3.08	8.07	3.51	2.46
S. Em.		0.08	0.24	0.22	0.19
C. D. 0.05		NS	0.75	NS	0.59
C. V.%		8.5	6.0	9-7	11.8

TABLE 4
Rainfall pattern during crop period.

Month	1986-87		1987-88		1989-89	
	RF	RD	RF	RD	RF	RD
June	123.8	6	130.0	1	26.0	3
July	87.5	7	76.2	4	638.7	24
August	72.1	8	199.0	9	210.7	12
September	—	—	—	—	178.9	8
October	4.8	1	4.5	1	—	—
November	—	—	1.8	1	—	—
December	—	—	8.6	1	—	—
January	—	—	—	—	4.0	1
February	—	—	—	—	—	—
March	—	—	—	—	—	—
Total	288.2	22	420.1	17	1058.3	48

RF = Rainfall in mm; RD = Rainy days

growth score. Treatments I_3, I_4, I_5 and I_6 were at par but were significantly superior to I_0, I_1 and I_2 in respect of yield, height, leaf length, leaf width and spangle score. At these levels it required 4 to 6 irrigations each of 5 cm depth.

Pooled results of chemical constituents showed significant differences for nicotine and chloride content due to irrigation levels. The treatment I_1 was at par with I_2 but contained significantly lower nicotine than rest of the treatments and I_1 gave significantly lower chloride content than the rest, barring I_2 I_3 and I_4.

From economic points of view it could be concluded that GT 5 tobacco should be irrigated at 0.5 IW/CPE ratio which requires 4 to 5 irrigations each 5 cm depth. These findings were in confirmity with those of Ramachandram *et al.* (1984) and Razak and Ibrahim (1990) for Virginian tobacco and Khot *et al.* (1989) for bidi tobacco Sinha *et al.* (1982) also reported beneficial effect of irrigation in hookah tobacco.

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