J. Cotton Res. Dev. **33** (2) 251-255 (July, 2019) **ISSN No. 0972-8619**

Response of pre seasonal *Bt* cotton under different dates of sowing and irrigation methods

A. S. JADHAV* AND D. P. WASKAR

Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani-431 402

****E-mail : asjadhav31@rediffmail.com***

ABSTRACT : A field experiment was carried out during 2015-2016 to 2017-2018 at Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani to study the effect of date of sowing and irrigation methods on pre seasonal *Bt* cotton. The experiment was conducted in split plot design with two irrigation methods *i.e.* I_1- drip irrigation and I_2- flood irrigation in main plots while four sowing dates *i.e.* D_1- 20May,D_2- 30May,D_3- 10June and D_4-20 June in subplots withfour replications. The pooled data analysis indicated that seed cotton yield (2310kg/ha), gross returns (Rs. 117460/ha) net returns (Rs. 69369/ha) and B:C ratio (2.4) was significantly highest with flood irrigation method as compared to drip irrigation. *Bt.*cotton sown on 20th may and 30th may recorded significantly highest seed cotton yield as compared to other sowing dates. Pre seasonal *Bt* cotton sowing at 30 May was found beneficial.

Key words : *Bt* cotton, irrigation, seed cotton yield, sowing dates

Cotton (*Gossypium hirsutum* L.) is one of the major commercial crops called as 'White Gold'. It plays an important role in textile industries and is a mean of livelihood for millions of farmers and those concerned with its trade, processing, manufacturing and other allied industries. In India area under cotton is 115.53 lakh ha with production of 348.90 lakh bales and 552 kg lint /ha productivity (Anonymous, 2013). In India, about 65% cotton is cultivated under rainfed condition and irrigated cotton is only 35 per cent. Only 3 per cent area under cotton is under irrigationin Maharashtra with good productivity (Bharambe,2010). Timely sown crop experiences optimum conditions like optimum solar radiation to produce more biomass (Arshad *et al.,* 2017).With the availability of water for irrigation from canal or wells *Bt* cotton is grown aspre-seasonal in the month of May. The seasonal cotton is sown in the month of June with receiving sufficient rains from south west monsoon.

Pre seasonal sowing can utilize the benefit of healthy atmosphere as compare to late sown seasonal crop. Irrigation method affects the growth and yield of *Bt* cotton under changing environment with various sowing dates. Therefore present investigation was undertaken to see the yield performance of pre seasonal *Bt* cotton.

MATERIALS AND METHODS

The field experiment on *Bt* cotton during 2015-2016 to 2017-2018 was conducted in split

plot design with four replicationsat Cotton Research Scheme, Parbhanion medium black soil with slightly alkaline in reaction (pH 8.1),low in nitrogen (212 kg/ha),medium in phosphorus (15.6 kg/ha) and high in potassium (578 kg/ha) content.Which falls within $19^0$16'N latitude and $76^0$47'longitude.The *Bt* cotton hybrid Ajeet 155 BGII was sown at 150 x 30cm spacing as per the sowing date treatment on D_1- 20 May, D_2-30 May,D_3-10 June and D_4-20 June.Irrigations were given as per treatments as I_1-Drip at 0.5 PE on alternate day and I_2-Flood at 0.8 IW/CPE. The recommended dose of FYM at 10 t/ha and 150:75:75 kg/haNPK was applied as 50 per cent N at sowing and 50 per cent N at 30 DAS. Whole dose of P and K was applied at the time of sowing. The price of seed cotton yield (kg/ha) and other inputs in market was considered for calculation of gross and net monetary returns and B: C ratio.

RESULTS AND DISCUSSION

Effect of sowing dates on seed cotton yield and economics: Pooled data regarding seed cotton yield revealed significant variations among sowing dates as well as irrigation methods(Table 1).*Bt* cotton sown on 20 May *i.e.*D_1 recorded significantly highest seed cotton yield (2460 kg/ha) as compare to all other sowing dates except it was on par with30 May *i.e.*D_2 sowing (2268 kg/ha).Kumar *et. al.* (2014) reported higher seed cotton yield in early sown crop.Whereas, Singh *et. al.*,(2011)who reported non-significant difference in seed cotton yield with delay in sowing from April 20 to May 10.Varinderjit Kaur *et al.* (2019) reported that for better seed cotton yield, second fortnight of April was most suitable sowing time as delayed sowing reduces yield by 7.5 per cent (May 10) and 29.1 per cent

Table 1. Seed cotton yield (kg/ha) as influenced by different treatments

Treatments	Seed cotton yield (kg/ha)			
Irrigation method	2015-2016	2016-2017	2017-2018	**Pooled mean**
DRIP	2070	2210	2086	**2082**
FLOOD	2292	2501	2335	**2310**
SE +	48	46	47	**56**
CD (p=0.05)	141	135	139	**170**
Date of sowing				
D_1-20th May	2202	2615	2553	**2460**
D_2-30th May	2347	2307	2420	**2268**
D_3-10th Jun	2143	2280	2126	**2072**
D_4-20th Jun	1907	2119	1742	**1852**
SE +	68	65	67	**80**
CD (p=0.05)	199	192	196	**244**
INTERACTION				
Irrigation method x date of sowing				
SE +	96	92	94	**114**
CD (p=0.05)	N.S	N.S.	N.S.	**N.S.**
G.MEAN	**2150**	**2355**	**2210**	**2176**
CV%	9.0	7.8	8.5	**9.0**

Table 2. Water productivity (kg/mm) as influenced by different treatments

Treatments Irrigation method	Water productivity (kg/mm)
Drip	2070
Flood	2292
Date of Sowing	
D_1-20th May	2202
D_2-30th May	2347
D_3-10th Jun	2143
D_4-20th Jun	1907
G.MEAN	**2150**

(May 30) in south western Punjab.Gross monetary returns and net monetary returns influenced significantly due to date of sowing. *Bt* cotton sown on 20 May *i.e.*D_1 recorded significantly highest GMR and NMR as compare to all other sowing dates except it was *on par* with30 May *i.e.*D_2 on pooled mean basis.

Effect of irrigation methods on seed cotton yield and economics: Seed cotton yield is influenced significantly due to irrigation methods. Flood irrigation method recorded significantly highest seed cotton yield (2310 kg/ ha) as compare to drip irrigation method (2082 kg /ha) during the year in pooled mean. Data on gross monetary returns and net monetary returnsand B:C ratio as influenced by various treatments (Table 3) shows that flood irrigation method recorded significantly highest gross monetary returns and net monetary returnsas compare to drip irrigation method. Flood irrigation method recorded higher B:C ratio as compare to drip irrigation method in mean.

Irrigation water requirement (mm) of *Bt* Cotton: Water requirement was influenced due to date of sowing and irrigation methods. Total water requirement of pre seasonal *Bt* cotton was higher in early sowing dates in both the irrigation methods, whereas, it was higher (643 mm) with flood irrigation as compared to drip irrigation (406mm).On an average the water saving in drip irrigation method was 36.3 per cent as compared to flood irrigation method (Table 4).

In pre-seasonal *Bt* cotton due to very high temperature (more than 42^0C) there is a problem of partial wilting of seedlings in drip irrigation but in flood irrigation as water quantity applied was more and temperature in micro climate around cotton plants was less, helps to grow seedlings in a better way. This early better growth of seedling helps to stand cotton plants in better way. For seasonal planted cotton crop (after onset of monsoon) drip irrigation performs better than flood irrigation.

Water productivity (kg/mm)of *Bt* Cotton : Water productivity was calculated by a formula water productivity is equal to *Bt*. cotton yield divided by irrigation water applied plus rainfall received. Highest water productivity was recorded in drip irrigation, whereas highest water productivity was observed in *Bt*. Cotton sown on 10th June as compared to all other sowing dates (Table 2).

CONCLUSION

Present study clearlyindicates that seed cotton yield, gross monetary returns and net monetary returnswas significantly highest with flood irrigation method as compared to drip irrigation.*Bt* cotton sown on 20 May *i.e.* D_1recorded significantly highest seed cotton

Table 3. Gross monetary returns and net monetary returnsand B: C ratio as influenced by different treatments

Treatment	GMR(Rs/ha)				NMR (Rs/ha)				B : C			
Irrigation Method	2015-2016	2016-2017	2017-2018	**Mean**	2015-2016	2016-2017	2017-2018	**Mean**	2015-2016	2016-2017	2017-2018	**Mean**
DRIP	91086	120280	104270	**105630**	44194	72606	62426	**59742**	1.9	2.5	2.4	**2.3**
FLOOD	98084	137570	116710	**117460**	50098	85410	72599	**69369**	2.0	2.6	2.6	**2.4**
SE +	2105	3594	2362	**2310**	2005	2261	2362	**2592**	—	—	—	**—**
CD (p0=0.05)	6182	10556	6935	**6997**	NS	6640	6936	**7849**	—	—	—	**—**
Date of Sowing												
D_1-20 th May	96899	146850	127650	**124630**	48499	97510	83241	**76417**	2.0	2.5	2.8	**2.4**
D_2-30 th May	103250	126880	120970	**117030**	54521	73161	77266	**68316**	2.1	2.3	2.7	**2.4**
D_3-10 th Jun	94298	125380	106280	**108650**	47392	72681	63965	**61346**	2.0	2.3	2.5	**2.3**
D_4-20 th Jun	83897	116580	87075	**95851**	38172	72681	45579	**52144**	1.8	2.6	2.0	**2.1**
SE +	2977	5083	3334	**3267**	2977	3198	3339	**3665**	—	—	—	**—**
CD (p0=0.05)	8744	14929	9808	**9894**	8744	9391	9808	**11100**	—	—	—	**—**
INTERACTION												
Irrigation method X Date of sowing												
SE +	4210	7189	4723	**4620**	4210	4522	4722	**5183**	—	—	—	—
CD (p0=0.05)	N.S	N.S	N.S	**N.S**	N.S	N.S	N.S	**N.S**	—	—	—	—
G.MEAN	**94585**	**128920**	**110490**	**111540**	**47146**	**79008**	**67513**	**64556**	—	—	—	—
CV (%)	10.1	11.1	8.5	**7.1**	17.8	11.4	13.9	**13.9**	—	—	—	—

Table 4. Irrigation water requirement (mm) of *Bt* Cotton as influenced by different treatments

Sowing Date gMean of threeyears	Drip Irrigation				Flood Irrigation				Water saving in Drip (%)
	Irri.s given as on alternate day	Water applied (mm)	Water saving due to rainfall (mm)	Total water requirement (mm)	No. of Irrigations	Water Applied (mm)	ER mm	Total Water Requirement (mm)	
D_1-20th May	65	404	60	464	12.6	488	251	740	36.6
D_2-30th May	64	354	64	417	11.3	366	303	669	36.5
D_3-10th June	64	322	57	379	9.3	258	326	585	35.5
D_4-20th June	63	318	48	366	9.6	292	287	580	36.9
Mean	**64**	**350**	**57**	**406**	**10.7**	**351**	**291**	**643**	**36.3**

yield, gross monetary returns and net monetary returnsas compared to other sowing dates except it was on par with sowing on 30 May *i.e.* D_2 . Pre seasonal *Bt* cotton crop be sown on 30 May under drip whereas for early sowings than this flood irrigation method be followed.

REFERENCES

Anonymous,2013. Area, production and productivity of *Bt* cotton in India.http:// www.cotcorp.gov.in

Arshad, M.N., Ahmad, A., Wajid S.A., Jehanzab, M., Cheema, M. and Schwartz, M.W. 2017. Adapting DSSAT Model for Simulation of Cotton Yield for Nitrogen Levels and Planting Dates. *Agron. J.***109 :**2639-48

Bharambe, P. R. 2010. Integrated inputs management for enhancing productivity and quality of *Bt* cotton. "Proceedings of National Symposium on *Bt* cotton: *"Opportunities and Prospects*", 17-19 November 2009, Central Institute for Cotton Research, Nagpur. Pp. 22-34.

Kumar, R., Bhattoo, M.S., Punia S.S., Bhusal, N. and Yadav, S. 2014. Performance of different *Bt.* cotton (*Gossypium hirsutum L.)*hybrids under various dates of sowing.*J.Cotton Res. Dev.***28:** 263- 64.

Singh, K., Singh, H., Gumber, R. K. and Rathore, P. 2011. Performance of cotton genotypes under different planting dates in south western Punjab. *J.Cotton Res. Dev.***25:** 210-13.

Varinderjit Kaur, Sudhir Kumar Mishra, Kulvirsingh, K.K. Gill and R.K. Pal 2019. Performance of *Bt.* and non *Bt.* cotton cultivars under different sowing environment of south western Punjab.*J.Cotton Res. Dev.* **33 :** 93-98.

Received for publication : February 13, 2019
Accepted for publication : April 7, 2019