

Original Research Article

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Effect of Date of Sowing and Varieties on Yield of *Kharif* Bt-cotton in Middle Gujarat Agro-Climatic Region

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ABSTRACT

Keywords

Bt-cotton, Sowing dates, Variety, growth, Yield attributes etc

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A field experiment was conducted at B. A. College of Agriculture, A.A.U., Anand to analyze the yield attributes of Bt- cotton. The experiment was carried out in a split plot design with three dates of sowing and two Bt-cotton cultivars. The results of field experiment revealed that the difference in cotton seed yield and biomass as well as plant height and no. of bolls/plant were found significant due to date of sowing. Yield and yield attributes character were found o decrease with delay sowing. There was no difference found in yield and yield attributes characters due to varieties.

Introduction

Cotton is an important fibre yielding crop of global importance, which is grown in tropical and subtropical regions of more than 80 countries world over. India is the only country, where all four cultivated species of cotton are grown on commercial scale and has one of the largest growing area of cotton in the world. India remains the leading country in terms of area under cotton cultivation and raw cotton production in the world. As per CAB estimate, cotton production in India during 2017-18 is expected to produce 377 lakh bales of 170 kg from 122 lakh hectares

with a productivity of 524 kg lint/ha. During the current year 2017-18, Gujarat, Maharashtra and Telangana were the major cotton growing states covering around 71% (86.4 lakh hectare) in area under cotton cultivation and 65% (246 lakh bales) of cotton production in India (Anon, 2018). n. The cotton production in Gujarat increased from 95 to 104 lakh bales compared to last year but reduction in cotton production estimated in Maharashtra and Madhya Pradesh to the tune of 3.95% and 2.44%, respectively (Anon, 2018). India maintaining the position of leading cotton producer in the world, China and United States has increased cotton

production around 23% as compared to last year. It was just 5.56% increase in cotton production this year, though larger area brought under cotton cultivation in India. It is also estimated that the area under cotton increased from 292.23 to 333.85 lakh hectare this year at an increase of 14.24%. In India, the area under cotton increased from 105 to 123 lakh hectares with an increase of 17% this year, also significant increase in area under cotton in China, the United States to the tune of 20% from last year (Anon, 2018). Cotton seed cake, after extraction of oil is good organic manure and contains about 6% nitrogen, 3% phosphorus and 2% potash. Cotton seed, cotton linters and pulp obtained during oil extraction and cotton meal are good concentrated feed for cattles. Out of about 50 species of cotton plants in the world, only four have been domestically cultivated for cotton fibres. *Gossypium hirsutum* and *Gossypium barbadense* are the most commonly cultivated species of cotton in the world. *Gossypium hirsutum* variety is the most important agricultural cotton, accounting for more than 90% of world fibre production (Anon, 2013).

Cotton is cultivated in India from sub-Himalayan region of Punjab in the north to Kerala in south and from dry regions of Kutch to high rainfall areas of Manipur in east. Cultivation of hybrids, Bt cotton varieties, latest production technology and plant protection technologies, adoption of scientific and agronomic practices by farmers, increase in area under irrigation, Government policies on R&D and price support, are all responsible for the present drastic changes of Indian cotton scenario to its present position. The technology was found to be very favorable for farmers all over the world and has been responsible for tremendous reduction in the overall use of insecticides against cotton bollworms. Insect resistance, however, can reduce the effectiveness of *Bt* crops and is

therefore a major concern for the long-term sustainability of *Bt* crops.

Materials and Methods

A study was conducted during the *kharif* season 2012 at the Agronomy farm of B. A. College of Agriculture, India situated at 22° 35' N latitude and 72° 55' E longitude and at an altitude of 45.1 m above mean sea level. Experiment carried out in a split plot design with two Bt-cotton cultivars viz. Vikram-5 (V₁) and RCH-2 (V₂) as a main plot treatment and three dates of sowing 25th May (D₁), 10th June (D₂) and 25th June (D₃) as sub-plot treatment with four replications. Three dates of sowing provided three different environments in terms of thermal and moisture regimes. The location of the field experiment at the research farm falls under middle Gujarat Agro-climatic Zone-III of the Gujarat State and is 90 km away from the Arabian Sea. Its climate has been classified as semi-arid tropical. The average annual rainfall of study area is 839.6 mm and is received through Southwest monsoon wind currents during the 3rd week of June and withdraws by the 2nd week of September. The weather remains dry from October to May. Summer is hot and sometimes mercury crosses 45.0°C in the month of May, while winter is cool and dry and temperature drops up to 5.0°C during January. The soil of the experimental site is representative of the soils of the region and is popularly known as “Goradu” soil. This soil is of alluvial origin and classified as “Loamy sand” and belongs to Entisols. The experimental field had a good drainage as well as fair moisture retentive capacity.

Results and Discussion

Plant height

Data regarding plant height of Bt-cotton recorded at harvest as influenced by variety

and dates of sowing are presented in Table 1. The higher plant height cultivar RCH-2 recorded (101 cm/plant) than that of Vikram-5 (99 cm/plant) at harvest time. As obtained in periodical observations, the plant height observed where the lowest plant height at

harvest time was also similar. Cotton sown on May 25th (D₁) produce maximum height 106 cm followed by D₂ (101 cm) and D₃ (91 cm). The results were in accordance to Awan *et al.*, (2011) for Bt-cotton yield.

Table.1 Plant height (cm) influenced by different date of sowing and variety

Treatments	Plant height (cm)			
	D ₁	D ₂	D ₃	Mean
V ₁ (Vikram-5)	103	99	93	99
V ₂ (RCH-2)	110	103	89	101
Mean	106	101	91	

Table.2 Number of bolls/plant influenced by different date of sowing and variety

Treatment	No. of bolls/plant			
	D ₁	D ₂	D ₃	Mean
V ₁	33	27	26	29
V ₂	39	31	29	33
Mean	36	29	28	

Table.3 Seed cotton yield and Biomass yield influenced by different date of sowing and Variety

Treatments	Seed cotton yield (kg/ ha)	Biomass yield (kg /ha)
Mean for variety		
V ₁	4321	8063
V ₂	4537	8460
S.Em. ±	130.5	386.6
CD at 5 %	NS	NS
CV%	10.2	16.2
Mean for date of sowing		
D ₁	5396	12997
D ₂	4682	8123
D ₃	3209	3666
S.Em. ±	150.4	415.8
CD at 5 %	463.5	1281.5
V x D	212.7	588.1
CV%	9.6	14.2

No. of bolls/plant

Data regarding no. of bolls/plant of Bt-cotton recorded at harvest as influenced by variety and dates of sowing are presented in Table 2.

The higher no. of bolls/plant was observed in cultivar RCH-2 (33 bolls/plant) followed by Vikram-5 (29 bolls/plant) the time at harvest. The early sown Bt-cotton D₁ recorded highest (36 bolls/plant) bolls/plant followed by D₂ (29 bolls/plant) dates and D₃ (28 bolls/plant). The results were in accordance to Arshad *et al.*, (2011) for Bt-cotton yield.

Seed cotton and dry biomass yield (kg/ha)

Effect of varieties

It may be seen from the Table 3, that the differences in seed cotton yield of Bt-cotton due to varieties were non-significant. Higher seed cotton yield (4536 kg/ha) was obtained with variety V₂ as compared with variety V₁ (4312.2 kg/ha).

The biomass yield of cotton was also found non-significant, however, higher biomass yield was recorded in V₂ cultivar (8460 kg/ha) as compared to V₁ cultivar (8063 kg/ha). The results were in accordance to Awan *et al.*, (2011) for Bt-cotton yield.

Effect of date of sowing

The seed cotton and biomass yields of Bt-cotton as influenced by different sowing dates are presented in Table 3. Significantly highest seed cotton yield (5396 kg/ha) was obtained in early sown cotton (25th May D₁) as compared to crop sown on 10th June (D₂) and 25th June (D₃).

With delay in sowing the seed cotton yield reduced by 15% and 68 % in D₂ and D₃

respectively over D₁ sown crop. The highest biomass yield (12996.79 kg/ha) was recorded with the crop sown on 25th May (D₁), whereas later sown crop gave significantly lower yield (8123 kg/ha) 10th June (D₂) and (3666 kg/ha) on 25th June (D₃).

It might be due to early maturity achieved in third date of sowing. This is in agreement with the comparatively small accumulation of heat units in third date of sowing (2936 OC days). The results were in accordance to Arshad *et al.*, (2007) for Bt-cotton yield.

Interaction effect of V x D

The interaction effect among the different varieties and date of sowing showed significantly variation in all the parameters presented in Table 3.

In general, looking to all the yield attributing characters interaction effect inferences, it was concluded that cultivar Vikram-5 was found most suitable cultivar for sowing at early sowing for optimum seed cotton and biomass yield.

In conclusion the results of present experiment show that the total crop duration varied with the dates of sowing. The crop life period was found to be shortened with delay in sowing, more pronounced being in cv. Vikram-5. The total yield and yield attributes of cotton as influenced by different treatments showed that the first date of sowing (D₁- 25th May) had produced significantly higher seed cotton yield as well as yield attributes than other dates mentioned.

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