

# To Investigate the Effect on Yield Response of Cotton (*Gossypium hirsutum* L.) to Different Sowing Dates: A Case Study of District Vehari, Punjab, Pakistan

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## ABSTRACT

Cotton occupies large area for cultivation in Pakistan and major part of Pakistan's economy depends upon the import export of raw cotton as well as cotton by products and goods. This study was conducted to determine the effects of different sowing dates on seed cotton yield in cotton during 2016-17 at Cotton Research Station, Vehari, Pakistan. Plant biomass was affected significantly by different sowing dates, however late sowing was not significant. Overall the seed cotton yield of VH-369 was greater (10190 kg ha<sup>-1</sup>) in the plots sown on 1st March as compared to lowest seed cotton yield of VH-Gulzar (344kg ha<sup>-1</sup>) recorded in the plots sown on 1<sup>st</sup> June. Hence for getting the maximum seed cotton yield, the crop should be sown on 1st March to 16<sup>th</sup> March with plant spacing of 20 cm under the agro-climatic conditions of Vehari, Pakistan. This sowing period is critical to insect pest attack (especially pink boll worm) for some previous years to avoid from the saviour loss recommended sowing date is 1<sup>st</sup> April to 16 April.

**Keywords :** *Gossypium hirsutum*, Genotypes, Sowing Date, RCBD, Seed Cotton Yield.

## 1 INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is a natural important fibre crop of Pakistan that gives direct benefit to farmer and involves increasing annual revenue of Pakistan's economy? As a raw material Cotton is very important for textile products, coffee filters, fish nets and archival paper while cotton seed used to get oil and animal feed. Pakistan is predominantly including in highly cotton cultivated countries of the world. Cotton is a back bone of Pakistan economy. Although Pakistan has been able to achieve success in cotton production however still there is a huge gape to achieve potential yield of cotton (Akhtar et al. 2002). In Pakistan total cultivation area of cotton is 2,699 thousand hectares and production is 11,935 thousand bales but yield is 752 kgs/hec for 2017-18. There is an 8.4, 118, and 3.0 % increase in area, production and yield of cotton respectively in Pakistan from last year (2016-17). Pakistan shows 4th rank after china, India and USA in production and 3rd rank in consumption of cotton (Economic survey. 2017-18). Pakistan is the 3rd largest yarn producer with 9 percent, 2nd largest yarn exporter with 26 percent, and 3rd largest cloth producer with 7 percent and 3rd largest cloth exporter with 14 percent of world cotton production (International Cotton Advisory Committee, 2005). Keeping in view all the above mentioned statistical facts and figures one can understand that cotton is a back bone of Pakistan economy.

As like other factors the climatic conditions are very important because cotton seed requires warm soil conditions. That's why is recommended that, planting should be done as soon as possible when soil temperature is warm enough to develop healthy seedlings (Ali et al. 2009). There is a huge loss in cotton yield is due to many biotic and abiotic stresses like, weed infestation to crop, insect pest attack, water shortage (Drought), excess of salts. Cotton yield is also affected by some managerial

miscues i.e. , conventional sowing methods, poor soil management practices, pre-mature flower and boll shedding, too early or too late sowing and use of low yielding unapproved varieties. From all the above mentioned prospects, proper sowing time could be the main player of game in potentiating the yield of cotton (Arshad et al. 2007). Cultivation of cotton crop is a full season process by maintaining a complex balance between all vegetative and reproductive phases. The optimum duration is necessary for all reproductive and vegetative phases for better mobilization and utilization of photosynthesis to develop flowers and bolls to give higher yield results. Delayed sowing produced low threshold yield and reduce the quality of cotton. It has been observed that early and late sowing affects the yield and quality. It is reported that from April 15 to May 15 sowing of cotton give significantly higher plant height, sympodial branches, boll number, boll weight and seed cotton yield as compared to late sowing (Ali et al. 2010). Plant height and some fibre quality traits like fibre strength, fineness, staple length, uniformity, harvest index and GOT % was affected significantly by different sowing times. It is reported that to get maximum seed cotton yield with best fibre quality, the crop should be sown on 25th April (Awan et al. 2011). It is reported that sowing date from 1st may to 15 May give significant cotton seed yield that is determined through conducting experiment with three cotton varieties (Sadori, Chandi-95 and Malmal) under sowing dates i.e. April 15th, May 1st, May 15th and June 1st (Deho et al. 2012). Three commercial varieties Sadori, Chandi-95 and Malmal used to study the effect of sowing date and it was concluded that 1st May sown crop gives highest seed cotton yield and many other related traits as well (Deho et al. 2014). Another study has been conducted by using three cotton cultivars, i.e. Star-2, NIAB-78 and Sindh-1, with three sowing times (

TABLE 2.2: ANOVA FOR RCBD UNDER TWO FACTOR FACTORIAL

SOV	DF	Ss	MS	F CAL	F TAB
TREATMENT	35	104065958.1	2973313.09	0.115	1.59
BLOCK/R	2	1812929025	906464512	35.173	3.13
V	3	1552505.852	517501.951	0.020	2.74
S.D	8	76604899.09	9575612.39	0.371	2.07
V*S.D	24	25908553.13	1079523.05	0.041	1.66
ERROR	70	1803983137	25771187.7		
TOTAL	107	113011845.4	1056185.47		

20th April, 10th May and 30th May) and concluded that, Sindh-1 gives highest cotton seed yield with sowing date of 20th April (Shoab et al. 2015). Although lot of studies have been done in elaborating the best sowing time with best yielding variety in Pakistan. However this study was conducted with 4 cotton varieties under 9 sowing dates to evaluate high yielding variety under best sowing time specifically in Vehari region. Therefore it could be one of the most fascinating topic of research in the areas which are affected by climate change.

## 2 MATERIAL & METHODS

The field experiments were carried out at the experimental field of Cotton Research Station of Agriculture, Vehari, Punjab, Pakistan during season 2016-17. The experimental site was situated in arid subtropical climate in Punjab province of Pakistan. The mean monthly temperature ranges from a minimum of 16 (0C) in March to a maximum of 44 (0C) in July. During crop growth duration average minimum temperature 15.2 0C and maximum temperature 41 0C was remained in month of March to July. The soil of experimental site was semi loam in texture. Four commercial varieties viz VH-Gulzar, VH-369, VH-189 and VH-383 were evaluated for their yield under nine sowing dates (1st March , 16th March, 1st April 16th April ,1st May, 16th May, 1st June, 16th June , 1st July). Cotton sowing was done on ridges. First mould board plough was used followed by planking and levelling to prepare land for proper distribution of seed, irrigation and fertilizer at recommended rate. The experiment was laid out in randomized complete block design (RCBD) having three replication with plot size of 30X10 ft. Seeds were properly soaked before sowing for proper germination.

TABLE 2.1 THE DATA WAS RECORDED AND ANALYSED FOR LSD AT 0.05% AFTER ANOVA. FACTORS WERE VARIETIES, SOWING DATES AND THEIR INTERACTION.

VARIETIES	S.D 1	S.D 2	S.D 3	S.D 4	S.D 5
VH-GULZAR	6889	6190	4593	4162	3337
VH-369	10190	7982	6530	5310	3875
VH-189	7358	7301	6494	4485	4413
VH-383	8359	7570	7032	4755	4162
VARIETIES	S.D 6	S.D 7	S.D 8	S.D 9	MEAN
VH-GULZAR	1614	345	567	591	3143.1
VH-369	1436	470	743	627	4129.2
VH-189	1292	864	538	505	3694.4
VH-383	1070	824	503	396	3852.3

## 3-STATISTICAL ANALYSIS

The data was recorded and analysed for LSD at 0.05% after ANOVA. Factors were varieties, sowing dates and their interaction.

## 4-RESULTS AND DISSUCION

It was recorded that VH-369 gives highest yield among four varities in sowing date March 1<sup>st</sup> , VH-369 gives highest yield among four varities in sowing date March 16<sup>th</sup> ,VH-383 gives highest yield among four varities in sowing date April 1<sup>st</sup> , VH-369 gives highest yield among four varities in sowing date April 16<sup>th</sup> , that VH-189 gives highest yield among four varities in sowing date May 1<sup>st</sup> , that VH-Gulzar gives highest yield among four varities in sowing date May 16<sup>th</sup> , that VH-189 gives highest yield among four varities in sowing date June 1<sup>st</sup> , that VH-369 gives highest yield among four varities in sowing date June 16<sup>th</sup> , that VH-369 gives highest yield among four varities in sowing date July 1<sup>st</sup> . Overall VH-369 was recorded for good cotton

seed yield among four cultivars VH-Gulzar, VH-189, VH-383 and VH-369. It is concluded that, the crop should be sown on 1st March to 16th March with plant spacing of 20 cm under the agro-climatic conditions of Vehari, Pakistan. This sowing period is critical to insect pest attack (especially pink boll worm) for some previous years to avoid from the saviour loss recommended sowing date is 1st April to 16 April.

*Temperature plays important role in crop production and development .It effects crop production phase from the time of sowing to harvest. Both low and high temperature cause drastic effects in crop biomass and crop yield. To describe best temperature and sowing time for cotton varities for optimum yield an experiment placed at field in Cotton research station of Vehari.*

*It was recorded that VH-369 gives highest yield among four varities in sowing date March 1st, VH-369 gives highest yield among four varities in sowing date March 16th, VH-383 gives highest yield among four varities in sowing date April 1st, VH-369 gives highest yield among four varities in sowing date April 16th, that VH-189 gives highest yield among four varities in sowing date May 1st , that VH-Gulzar gives highest yield among four varities in sowing date May 16th , that VH-189 gives highest yield among four varities in sowing date June 1st , that VH-369 gives highest yield among four varities in sowing date June 16th , that VH-369 gives highest yield among four varities in sowing date July 1st . Overall VH-369 was recorded for good cotton seed yield among four cultivars VH-Gulzar, VH-189, VH-383 and VH-369. It is concluded that ,the crop should be sown on 1st March to 16th March with plant spacing of 20 cm under the agro-climatic conditions of Vehari, Pakistan. This sowing period is critical to insect pest attack (especially pink boll worm) for some previous years to avoid from the saviour loss recommended sowing date is 1st April to 16 April.*

## 5-SUGGESTION & RECOMMENDATIONS

*From the above experiment it is suggested that optimum sowing date tp get heighest yield is 1<sup>st</sup> March to 16<sup>th</sup> March. Therefore awareness must be given to farmer community to adopt this sowing time to get maximum yield.*

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