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Impact of Various Sowing Dates on Growth and Yield Parameters of Different Cotton Varieties

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ABSTRACT

It is essential to provide the experimental evidence and reliable predictions to investigate the effects of sowing dates (1st, 10th, 20th and 30th May) on the enlargement and yield of selected cotton varieties (Haridost, Koonj and Sindh-1) at Sindh Agriculture University Tandojam during the session 2013. It was noted that 1st May was most promising sowing date 34.97 percent ginning out-turn (G.O.T), and 2153.33 kg seed cotton yield ha^{-1} as compared to remaining sowing dates. In case of varieties lowest plant height (126.33) was noted in Haridost with production 2089.75 seed cotton yield ha^{-1}. Similarly, variety Koonj height was (131.25cm) with production 1945.91 kg ha^{-1}, While highest plant height was observed 137.25cm in cultivar Sind-1 with minimum yield production 2035.25 kg ha^{-1}. It was concluded that cotton sowing should not be delayed beyond 10th May, and among varieties Haridost and Sindh-1 may be preferred for achieving higher seed cotton yields.
KEYWORDS: Cotton Varieties, Sowing Dates, Growth and Yield.

INTRODUCTION

Cotton, *Gossypiumhirsutum* L., belongs to the *Malvaceae* family and reportedly Pakistan is ancient homeland of indigenous cultivated cotton, *Gossypiumarboreum* L. [1]. The old world cottons are diploid species and belong to *Gossypiumarboreum* and *G. herbaceum* while the new hybrids cultivars belong to tetraploids spp are *G. hirsutum*L. and *G. barbadense* L. [2] and cotton play essential role in high fiber quality contribution in whole world socio-economic setup [3]. China, India, USA, Pakistan, Brazil, and Turkey are the leading cotton producers.
Cotton is consider as non-food crop and also good source for foreign exchange to earn more money, according to GDP 1.6% of total but this crop share was 7.3% of the value supplementary in agriculture. The industry contributes around 46% to the total output produced in the country. The involvement of textile industry to the total GDP is 8.5%. It provides big chance of employment to 38% due to unskilled labor. Round figure was about 15 million. The world demand due to textiles is increasing day by day around 2.5%, is provide greater opportunity for rise in exports from Pakistan [4].
The growth, yield and components of cotton crop are affected by sowing times. The development and seed cotton yield contributing traits were markedly affected by sowing dates [5]. The yield of cotton is mostly associated with sowing dates as boll weight and formation of bolls per plant are co related with the yield [6].
The planting of cotton should be done in May 1st to June 1st. cotton variety CIM-497 showed more susceptibility to viral diseases when sown on June 15th, whereas CIM-506 showed more tolerance to viral attack than other varieties [7]. [8] Stated that ginning production was various varieties affected by different sowing dates; while [9] described that delayed cotton sowing and simultaneously delayed picking; and found that ginning outturn was low in late sown crop and early pickings. Among the cultivars, Karishma recorded the highest average ginning outturn.
Keeping in view the significance of sowing time, the recently study was conducted to check the effects of various sowing dates on the growth and seed cotton production of different cotton cultivar.

MATERIALS AND METHODS

Field trail was conducted in year 2013 during the spring season at the Research area of Sindh Agriculture University Tandojam to compare and evaluate the result of sowing dates on the crop vegetative growth, seed cotton yield and its quality characteristics of three cotton varieties under the design Randomized Complete Block

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Design (RCBD) factorial arrangement with three replication, the size of plotswere3.50m x 5.0m (17.50m^2). The experiment comprised the following treatments:

Factor-A (Sowing Dates) 4

S_1 1st May
S_2 10th May
S_3 20th May
S_4 30th May

Factor-B (Varieties)

V_1 Haridost
V_2 Koonj
V_3 Sindh-1

Treatment combinations 12

$T_1=S_1V_1$	$T_2=S_1V_2$	$T_3= S_1V_3$	$T_4=S_2V_1$
$T_5=S_2V_2$	$T_6=S_2V_3$	$T_7=S_3V_1$	$T_8=S_3V_2$
$T_9= S_3V_3$	$T_{10}=S_4V_1$	$T_{11}=S_4V_2$	$T_{12}=S_4V_3$

The soil was fully pulverized before sowing the crop with accurate soil leveling and depth was done according to crop for better root penetration and utilized more nutrients with equal water and fertilizer distribution. After the first irrigation, when land come to watter conditions, then again cultivated the soil to make pulverized seed bed for better germination and good penetration of root makes plants health. During the send preparation of soil bed using cultivator (cross-wise) followed by motivator. The clods were crushed by means of clod crusher followed by planking. The sowing was done with the help of single coulter hand drill in lines on different dates continued for almost one month period. The experimental treatments were managed according to plan.

The essential macro nutrients such are N P fertilizers are provided as recommended rate, inorganic Nitrogenous fertilizer was applied in the form of Urea (46%) in three different splits. The first dose of nitrogen ($^1/_3$ N) was applied at the time of sowing, and remaining two, the second ($^1/_3$ N) at the first irrigation and the final ($^1/_3$ N) at the time of third irrigation. All Phosphorus was applied in the form of SSP (18 %P_2O_5) at the time of sowing. Reaming agronomic practices such as Irrigations were applied as per the schedule and distance was maintain by row to row spacing of 75 cm and plant to plant spacing of 30 cm was managed uniform number of plants were kept normal in every plots.

The field observations on the selected plants were recorded by means of common counting and measuring methods, while for quality traits, the samples were prepared and brought to the laboratory at Cotton Agriculture Research center Tandojam. Finally, all the collected data were used to statistical analysis using Analysis of variance technique. The LSD (Least Significant Differences) test was applied to compare the individual treatment means as per the statistical methods developed by Gomez and Gomez (1984). The above statistical analyses were performed by using Mstat-C Computer Software.

RESULTS

From the field experiments results are observed to check the various effect of sowing dates on the growth and yield of selected cotton varieties, the study was carried out during the spring season of year 2013 at the Experimental Fields of sindh Agriculture university Tandojam. The experimental cotton was sown on different dates i.e. 1st, 10th,20th and 30th May, 2012 to examine the performance of three newly evolved cotton varieties i.e. Haridost, Koonj and Sindh-1. The evaluating the performance of cotton varieties are recorded under different sowing dates, the observations on plant height, number of monopodial branches plant^{-1}, number of sympodial branches plant^{-1}, number of bolls plant^{-1}, ginning outturn (G.O.T %), staple length seed cotton yield plant^{-1} and yield ha^{-1} were recorded. The data on various growth, seed cotton yield and cotton quality characteristics are presented in Tables 1 to 8.

Plant height (cm)

Plant height is also consider an important factor to contribute the yield of cotton are affected by application of different inputs and sowing dates. The plant height of cotton varieties as influenced by various sowing dates results are provided in Table-1 and its analysis of variance as Appendix-I. The analysis of variance showed that the plant height was statistically significant by sowing dates and varieties ($P<0.01$) and no interaction was observed ($P>0.50$).

Sowing of cotton on 10th May resulted in significantly maximum plant height of 138.66 cm, closely followed by the crop sown on 1st May with average plant height of 137.89 cm. The plant height reduced considerably to 129.22

cm when sowing was delayed up to 20th May and lower plant height of 120.66 cm was noted under 30th May sowing. This showed that delayed sowing of cotton beyond 10th May affected the plant height adversely and the differences in plant height were marginal when the crop was sown either on 1st May or 10th May. In case of varieties, the plants of cotton variety Sindh-1 grew taller (137.25 cm) than variety Koonj (131.25 cm) and Haridost (126.33 cm). This indicates that genetically, cotton variety Sindh-1 grows taller than rest of the varieties evaluated; while Haridost is characteristically lower in height than Sindh-1 and Koonj. The studies further suggested that interaction of 10th May sowing X variety Sindh-1 caused maximum plant height of 147.33 cm, while the interaction of 30th May sowing X variety Haridost resulted lowest plant height of 120.66 cm.

Table-1 Plant height (cm) of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	*V3=Sindh-1*	
S1 = 1st May	132.33	142.00	139.33	137.89 a
S2 = 10th May	130.33	138.33	147.33	138.66 a
S3 = 20th May	122.00	131.00	134.66	129.22 bc
S4 = 30th May	120.66	113.66	127.66	120.66 c
Mean	126.33 b	131.25 a	137.25 a	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	1.6586	1.9152	1.6586
LSD at 0.05	8.22	9.626	9.514
LSD at 0.01	11.33	12.00	12.76
CV%	4.37		

Values followed by same letters are not significantly different at 5% level.

Monopodial branches plant^{-1}

The number of monopodial branches plant^{-1} is essential plant parameter to contribute the yield of cotton crop are affected by genetic factors, nutrients and agronomic practices. From Table-2 results are stated that the monopodial branches plant^{-1} of cotton varieties as influenced by changing the sowing dates and its analysis of variance as Appendix-II. The results of analysis of variance illustrated that the effect of sowing dates, varieties as well as for their interaction was non-significant ($P>0.05$) on the number of monopodial branches plant^{-1}.

The more number of monopodial branches plant^{-1} (1.20) were counted in those treated plots where sowing was done on 20th May, followed by the crop sown on 10th and 1st May with 1.17 and 1.09 respectively. However, the minimum number of monopodial branches of 1.07plant^{-1} was recorded in plots where the sowing was delayed i.e. on 30th May. The results suggested that there was no linear influence of sowing date on the number of monopodial branches plant^{-1} of cotton. In case of varieties relatively was higher i.e. 1.15 plant^{-1} in variety Haridost as compared to varieties Koonj and Sindh-1 having averagely 1.13 and 1.12 monopodial branches plant^{-1}, respectively. This indicates that all the varieties evaluated had similarity in relation to monopodial branches and hence, no significant differences were found. Results further indicated that interaction of 10th May sowing X variety Koonj or 20th May sowing X variety Haridost resulted relatively higher monopodial branches of 1.27 and 1.27 pant^{-1}, respectively; while the interaction of 1st May sowing X variety Koonj resulted lowest monopodial branches of 1.00 plant^{-1}.

Table-2 Monopodial branches plant^{-1} of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	1.07	1.00	1.20	1.09
S2 = 10th May	1.13	1.26	1.13	1.18
S3 = 20th May	1.26	1.20	1.13	1.20
S4 = 30th May	1.13	1.07	1.00	1.07
Mean	1.15	1.13	1.12	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	0.0441	0.0509	0.0441
LSD at 0.05	-	-	-
LSD at 0.01	-	-	-
CV%	13.48		

Values followed by same letters are not significantly different at 0.05% level.

Sympodial branches plant^{-1}

It is essential factor to increase the growth and yield of cotton are influenced by different sowing dates. The statistical results are presented in Table-3 and its analysis of variance as Appendix-III. The analysis of variance described that the sowing dates and as well as varieties showed equally statistically significant (P<0.01) impact on sympodial branches plant^{-1}, while non-significant (P>0.05) effect was observed in case of their interaction.

The no of sympodial branches was maximum (20.58 and 20.47 plant^{-1}) in cotton crop sown on 10th May and 1st May, respectively; while delayed sowing on 20th May reduced the number of sympodial branches to 18.98 plant^{-1}. However, the less number of sympodial branches (18.24) plant^{-1} was obtained when sowing was further delayed to 30th May. It was observed that sympodial branches adversely affected with delaying sowing beyond 10th May. In varieties, Koonj produced significantly higher number of sympodial branches (1.15) plant^{-1} as compared to varieties Haridost and Sindh-1 producing 18.98 and 18.47 average number of sympodial branches plant^{-1}, respectively. It was noted that variety Koonj was relatively superior in sympodial branches as compared to rest of the varieties examined. The results further indicated that interaction of 1st May sowing X variety Koonj resulted significantly more sympodial branches of 22.94 pant^{-1}, while the interaction of 30th May sowing X variety Sindh-1 resulted lowest number of sympodial branches (17.32 plant^{-1}).

Table-3 Sympodial branches plant^{-1} of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	19.73	22.94	18.75	20.47 a
S2 = 10th May	19.31	22.02	20.41	20.58 a
S3 = 20th May	18.76	20.77	17.40	18.98 ab
S4 = 30th May	18.11	19.30	17.32	18.24 b
Mean	18.98 b	21.25 a	18.47 b	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	0.3448	0.3981	0.3448
LSD at 0.05	1.124	1.001	-
LSD at 0.01	1.728	1.601	-
CV%	6.10		

Values followed by same letters are not significantly different at 0.05% level.

Number of bolls plant^{-1}

This agronomic parameter is highly co relative with yield of cotton crop are highly affected by changing sowing dates. The statistical significant results are in Table-4 and its analysis of variance as Appendix-IV. The No. of bolls plant^{-1} were significantly (P<0.01) affected by various sowing dates and cultivars and interaction between was non-significant (P>0.05).

It is evident from the results that the number of bolls was highest i.e. 47.28 plant^{-1} when cotton was sown 1st May, closely followed by 45.99 bolls plant^{-1} recorded in the crop sown on 10th May. However, delayed sowing on 20th May reduced number of bolls to 43.80 plant^{-1} and number of bolls reached lowest level of 40.96 plant^{-1} when cotton sowing was delayed up to 30th May. It was observed that number of bolls plant^{-1} negatively influenced with delaying sowing beyond 10th May. In case of varieties, Koonj produced significantly higher number of bolls (47.16) plant^{-1} as compared to varieties Haridost and Sindh-1 producing 43.27 and 43.09 average number of bolls plant^{-1}, respectively. This showed that variety Koonj was relatively better in bearing number of bolls than rest of the varieties evaluated. The treatment interaction of 1st May sowing X variety

Koonj resulted significantly more bolls of 51.27 pant^{-1}, while the interaction of 30th May sowing X variety Haridost produced lowest number of bolls (38.21 plant ^{1}).

Table-4 Number of bolls plant^{-1} of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	45.14	51.27	45.44	47.28 a
S2 = 10th May	48.10	46.55	43.32	45.99 a
S3 = 20th May	41.65	46.38	43.35	43.80 ab
S4 = 30th May	38.21	44.44	40.24	40.96 b
Mean	43.27 ab	47.16 a	43.09 ab	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	1.0794	1.2464	1.0794
LSD at 0.05	3.652	3.264	-
LSD at 0.01	5.326	5.459	-
CV%	8.40		

Values followed by same letters are not significantly different at0.0 5% level.

G.O.T. (Ginning out-turn)

This agronomic parameter Ginning out-turn is an important quality parameter in cotton crop and it is the percentage of lint from the total seed cotton yield. The data regarding of this parameter of cotton varieties as affected by various sowing dates, the statistical results are provided in Table-5, while the analysis of variance is given as Appendix-V. The results of the analysis of variance illustrated that the differences in ginning out-turn were statistically significant under the effect of varieties ($P<0.01$), while sowing dates and interaction between varieties and sowing dates have non-significant effect ($P>0.05$) on this character.

It is evident from the results that ginning out-turn was relatively higher (34.97%) in cotton crop sown on 1st May, followed by average ginning out-turn of 34.87 percent, recorded from the crop sown on 30th May. However, the ginning out-turn was 34.82 and 34.81 percent when the crop was sown on 10th May and 20th May, respectively. It was noted that there was no marked difference in ginning out-turn under various sowing dates. In case of varieties, the ginning out-turn was remarkably higher i.e. 35.04 and 35.03 percent for varieties Haridost and Koonj, while Sindh-1 had the lowest ginning out-turn of 34.53 percent. This indicates that ginning out-turn is closely associated with the crop genetic diversity and seldom associated with management practices or inputs quantities. The interaction results showed that ginning out-turn was higher (35.26%) in variety Haridost X 1st May sowing interaction, while minimum (34.48%) under interaction of variety Sindh-1 X 1st May sowing.

Table-5 Ginning out-turn (GOT %) of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	35.26	35.16	34.48	34.97
S2 = 10th May	35.10	34.86	34.49	34.82
S3 = 20th May	34.76	35.13	34.59	34.81
S4 = 30th May	35.30	34.96	34.63	34.87
Mean	35.04 a	35.03 a	34.53 b	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	0.0455	0.0525	0.0455
LSD at 0.05	-	0.2649	-
LSD at 0.01	-	0.3597	-
CV%	8.40		

Values followed by same letters are not significantly different at0.0 5% level.

Staple length (mm)

Staple length measurement is also denoted as Upper Half Mean Length/UHML and this character has key position while quality of cotton is meant. The data regarding staple length of cotton cultivar as effected by different sowing dates are demonstrated in Table-6, and its analysis of variance is given as Appendix-VI. The analysis of variance illustrated that the differences in staple length were statistically significant (P<0.01) under the effect of sowing dates, varieties as well as their interaction.

The results showed that the staple length was comparatively greater i.e. 26.31 mm in cotton sown on 1stMay, followed by average length of 26.1 and 26.12 mm, recorded from the cotton sown on 20th May and 30th May, respectively. However, the staple length was lowest (26.02 mm) when the crop was sown on 10th May. This indicates that there was considerable difference in staple length under various sowing dates. In case of varieties, the staple length was higher i.e. 26.93 mm in variety Haridost, followed by variety Sindh-1 with average staple length of 26.30 mm, and the lowest value of staple length is 25.22 mm was noted in case of variety Koonj. This suggested that staple length is mostly considered as the good genetic characteristic of a variety rather to associate with the crop management. The interaction studies suggested that staple length was highest (27.32 mm) in variety Haridost X 1st May sowing interaction, while minimum (25.01 mm) under interaction of variety Koonj X 10th May sowing.

Table-6 Staple length (mm) of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	27.32	25.32	26.28	26.31 a
S2 = 10th May	26.85	25.01	26.20	26.02 ab
S3 = 20th May	26.81	25.21	26.42	26.15 a
S4 = 30th May	26.74	25.33	26.28	26.12 a
Mean	26.93 a	25.22 c	26.30 b	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	0.0378	0.0436	0.0378
LSD at 0.05	0.2320	0.2184	0.2159
LSD at 0.01	0.3250	0.2950	0.2895
CV%	0.50		

Values followed by same letters are not significantly different at0.0 5% level.

Seed cotton weight plant^{-1}

The data pertaining to seed cotton weight plant^{-1} of cotton varieties as effected by changing a sowing dates, the statistical results are provided in Table-7, and the analysis of variance as Appendix-VII. The results of statistical analysis revealed that the seed cotton weight was significantly affected by sowing dates (P<0.01), varieties (P<0.05), while their interaction was significant (P>0.05).

The cotton sown on 1st May produced significantly maximum seed cotton weight of 114.11 g plant^{-1}, closely followed by 10th May sowing with 111.66 g average seed cotton weight plant^{-1}. Seed cotton yield plant^{-1} considerable reduced to 100.44 g, under delayed sowing on 20th May, while the minimum seed cotton weight of 96.66 g plant^{-1} was recorded under 30th May sowing. This showed that each delay in sowing of cotton over 1stMay showed adverse impacts on seed cotton weight plant^{-1}. However, the differences in seed cotton weight plant^{-1} were negligible when crop was sown either on 1st May or on 10th May. In case of varieties, Haridost and

Sindhi-1 produced comparatively higher seed cotton weight of 107.91 g and 106.08 g, respectively than variety Koonj (103.16 g). This indicates that Haridost and Sindh-1 are relatively better varieties in seed cotton weight plant^{-1} over variety Koonj. The interaction results indicated that treatment interaction of variety Haridost X 1st May sowing resulted highest seed cotton weight of 117.66 g plant^{-1} and the lowest seed cotton weight of 95.33 g was noted in the interaction of cotton variety Koonj X 30th May sowing.

Table-7 Seed cotton weight (g plant^{-1}) of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	117.66	108.00	116.66	114.11 a
S2 = 10th May	112.00	109.00	114.00	111.66 a
S3 = 20th May	102.66	100.33	98.33	100.44 b
S4 = 30th May	99.33	95.33	95.33	96.66 c
Mean	107.91 a	103.16 ab	106.08 a	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	1.1899	1.3740	1.1899
LSD at 0.05	3.513	3.308	-
LSD at 0.01	4.925	-	-
CV%	3.90		

Values followed by same letters are not significantly different at 0.05% level.

Seed cotton yield (kg ha^{-1})

The results are presented in Table-8 evaluated seed cotton yield ha^{-1} of cotton cultivars as affected by different sowing dates, while the analysis of variance is given as Appendix-VIII. The analysis of variance shows that the seed cotton yield was significantly ($P<0.01$) affected by sowing dates and varieties, while there interaction ($P>0.05$) was non-significant

Sowing was done on 1st May gave significantly higher seed cotton yield of 2153.33 kg ha^{-1}, closely followed by seed cotton yield of 2108.00 kg ha^{-1} recorded under 10th May sowing. There was a considerable reduction in seed cotton yield (1964.89 kg ha^{-1}) when the sowing of cotton delayed up to 20th May; and similarly the seed cotton yield further decreased to lowest (1861.66 kg ha^{-1}) when cotton was sown on 30th May. This indicated that each delay in sowing of cotton over 1st May resulted considerable decrease in the seed cotton yield ha^{-1}. However, the decrease in seed cotton yield ha^{-1} was non-significant when 1st May and 10th and 10th May sowings are compared. In case of varieties, Haridost and Sindhi-1 produced comparatively higher seed cotton yield of 2089.75 kg and 2030.25 kg ha^{-1}, respectively than variety Koonj (1945.91 kg ha^{-1}). It was noted that Haridost and Sindh-1 were comparatively superior varieties in seed cotton yield ha^{-1} than variety Koonj. The interaction studies showed that treatment interaction of variety Haridost X 1st May sowing resulted in highest seed cotton yield of 2230.00 kg ha^{-1} and the lowest seed cotton yield of 95.33 g was recorded in the interaction of variety Koonj X 30th May sowing.

Table-8 Seed cotton yield (kg ha^{-1}) of cotton as influenced by sowing dates, varieties and their interaction

Sowing Dates	Varieties			Mean
	V1=Haridost	V2=Koonj	V3=Sindh-1	
S1 = 1st May	2230.00	2065.33	2164.66	2153.33 a
S2 = 10th May	2173.66	2030.66	2119.66	2108.00 a
S3 = 20th May	2040.33	1876.33	1978.00	1964.89 b
S4 = 30th May	1915.00	1811.33	1858.66	1861.66 bc
Mean	2089.75 a	1945.91 b	2030.25 a	-

Analysis of Variance (ANOVA)

	Sowing Dates (SD)	Varieties (V)	SD X V
S.E±	20.5096	15.2294	20.5096
LSD at 0.05	88.00	77.10	-
LSD at 0.01	123.60	119.10	-
CV%	5.23		

Values followed by same letters are not significantly different at 0.05% level.

DISCUSSION

Sowing time has great impact on cotton yield and quality. [9] found that cotton sown earlier or later than its optimum time showed adverse effects on seed cotton yield. Delay of a week in sowing may result in a marked decreased in yield [10;11] suggested early sowing of cotton (15th April to 15th May); while [9] advocated 15th May as the best cotton sowing time for its almost all the growth and yield components. [9] Suggested that varietal trials should be a regular feature of every research organization working on cotton allied aspects of these varieties should also be investigated. This research study was to conduct the experiment and observed the various effects that are influenced by sowing dates on the growth and seed cotton yield of some newly evolved cotton varieties.

Present research showed that 1st May was most promising sowing date with 137.89 cm plant height, 1.08 monopodial branches plant^{-1}, 20.47 sympodial branches plant^{-1}, 47.28 bolls plant^{-1}, 34.97 percent ginning out-turn (G.O.T), 26.31 mm staple length, 114.11 g seed cotton yield plant^{-1} and 2153.33 kg seed cotton yield ha^{-1}. The 10th May sowing resulted 138.66 cm plant height, 1.18 monopodial branches plant^{-1}, 20.58 sympodial branches plant^{-1}, 45.99 bolls plant^{-1}, 34.82 percent G.O.T, 26.02 mm staple length, 111.66 g seed cotton yield plant^{-1} and 2108.00 kg seed cotton yield ha^{-1}. The sowing when delayed up to 20th or 30th May, all the growth and seed cotton yield components were adversely affected. In case of cotton varieties, Haridost resulted 126.33 cm plant height, 1.15 monopodial branches plant^{-1}, 18.98 sympodial branches plant^{-1}, 43.27 bolls plant^{-1}, 35.04 percent G.O.T, 26.93 mm staple length, 107.91 g seed cotton yield plant^{-1} and 2089.75 kg seed cotton yield ha^{-1}. Similarly, variety Koonj produced 131.25 cm plant height, 1.13 monopodial branches plant^{-1}, 21.25 sympodial branches plant^{-1}, 47.16 bolls plant^{-1}, 35.03 percent G.O.T, 25.22 mm staple length, 103.16 g seed cotton yield plant^{-1} and 1945.91 kg seed cotton yield ha^{-1}. However, cotton variety Sindh-1 gave 137.25 cm plant height, 1.12 monopodial branches plant^{-1}, 18.47 sympodial branches plant^{-1}, 43.09 bolls plant^{-1}, 34.53 percent G.O.T, 26.30 mm staple length, 106.08 g seed cotton yield plant^{-1} and 2030.25 kg seed cotton yield ha^{-1}. These results are in concurrence with those of [5; 6] who all have reported that delayed sowing had adverse effects on the plant height, monopodial and sympodial branches, bolls and seed cotton yield.[6] and [12] have also supported the findings of present research with the conclusion that all the cultivars they tested were efficient in sprouting sympodial branches alongwith other yield components in case of early sown cotton. These results are also in line with [13], reported that negative effects are observed in delayed sowing on the growth and yield of different cotton varieties.

Cotton sowing should not be delayed beyond 10th May and among varieties Haridost and Sindh-1 may be preferred for achieving higher seed cotton yields. In a similar study, [5] concluded that cotton sown early on 25th April produced significantly higher seed cotton yield than late sowing cotton, while commercial cultivar NIAB-78 remained superior in case of seed cotton yield. Similar results have also been reported by [6] and [12] who found higher seed cotton yields under early sowing in April, while [14] concluded that all the varieties had their best performances under early sowing and with delayed sowing the quantitative and qualitative performance was deteriorated considerably. Similar results have also been described by [13] who was of the conclusion that all the growth and yield components of cotton were significantly affected by sowing date and varieties Koonj and Sindh being new entries performed well under Sindh soil and climatic conditions.

CONCLUSIONS

It was concluded from the findings of the present research that all the growth and yield components were promising when cotton sowing was completed up to 10th May, further delay in sowing resulted adverse effects on the crop production performance. Moreover, sowing of Haridost and Sindh-1 cotton varieties may be preferred for achieving higher seed cotton yields.

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