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RESEARCH ARTICLE

Morpho-physiological studies in *desi* cotton genotypes (*Gossypium arboreum* L.)

■ S. B. Borgaonkar, M. B. Patil, A. B. Jadhav and G. S. Pawar

SUMMARY

The present investigation entitled "Morpho-physiological analysis of *desi* cotton genotypes (*Gossypium arboreum* L.)" was carried out to evaluate promising cotton genotypes for morpho-physiological and yield contributing traits at Cotton Research Station, Mahboob baugh farm, VNMKV, Parbhani, during *Kharif* season-2022. The present experiment conducted on fifteen promising genotypes of cotton (*Gossypium arboreum* L.) including two checks. The genotypes tested were PA-904, PA-906, PA-907, PA-927, PA-929, PA-932, PA-936, PA-941, PA-942, PA-945, PA-947, PA-948, PA-950 along with two checks PA-742 (C) and NH-615 (C). The present experiment revealed that, PA-907 and PA-906 were observed as early flowering genotypes whereas, PA-942 was the late desi cotton genotype. PA-904 was highest among rest of the genotypes in term of height and at par with the both upland and lowland cotton checks. Genotype PA-950 produced highest dry matter as compare to desi cotton genotype check PA-402. PA-906 recorded highest ginning out turn than upland cotton check NH-615. Genotype PA-904 had highest leaf area, leaf area index, specific leaf weight, number of bolls and high seed cotton yield among desi cotton genotypes and appeared as a most promising genotype among rest of the *desi* genotypes studied for yield parameter.

Key Words : Ginning outturn, Staple length, Dry matter, Boll weight

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Cotton commonly known as 'king of fibre' is most important fibre as well as cash crop. It is important to India's economy in term of its contribution to commercial output, industrial activities, employment and foreign exchange profit. It is one of the most important and widely grown crops in the world, with various uses and economic significance. According to ministry of textiles, India ranks 2nd in the world with estimated production of 343.47 lakh bales (5.84 million metric tones) during cotton season 2022-23 *i.e.*, 23.83% of world cotton production of 1441 lakh bales *i.e.*, 24.51 million metric tones. Amongst all the crops cotton is the most important commercial crop of India, often referred as the 'White

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Gold'.It provides livelihoods for millions of farmers and supports various industries, including textile manufacturing *i.e.*, contribute upto 75 per cent of total raw material needs of textile industry. Apart from textiles, cottonseed oil is extracted from the seeds of the cotton plant and is used in cooking and various industrial applications. Cottonseed meal is used as animal feed. Additionally, the cotton plant produces linters (short fibres) used in the production of paper, cellulose-based products and medical supplies (Kulkarni *et al*., 2017). Morpho-physiological characters analysis play a crucial role in productivity of *desi* cotton (*Gossypium arboreum* L.). *Desi* cotton (*Gossypium arboreum* L.) is tolerant to pest and diseases like hoppers, thrips, white flies and cotton leaf curl virus disease (CLCuD). Because of the inherent ability to tolerate biotic and abiotic stress, cotton breeders like to use the diploid genetic resource for widening the genetic base of tetraploid cotton and identification of important genes/QTLs for introgression in the cotton improvement (Arpat *et al*., 2004). By analyzing morpho-physiological traits, plant breeders can identify desirable characteristics such as disease resistance, drought tolerance, early maturityand increased fibre yield. The information gained from morpho-physiological analyses can be used to develop effective breeding strategies including hybridization and selection to achieve specific goal in cotton improvement. Cotton breeders use morpho-physiological traits to select parent lines and develop new varieties with improved characteristics, such as yield, fibre quality and resistance to pests and diseases. These traits help in the identification of desirable genotypes (Paterson *et al*., 2012). Knowledge of morphological traits can help farmers to adopt suitable agronomic practices such as planting density, irrigation schedules and nutrient management to maximize cotton yield and quality. Analyzing morpho-physiological traits can identify specific traits associated with resistance to pests and diseases and thus, helping in the development of resistant varieties (Li *et al*., 2019).Morpho-physiological character analysis is vital for the advancement of *desi* crop. By understanding the inherent traits and physiological responses of the plants, researchers, plant breeders and farmers can work together to develop more resilient, productive and sustainable agricultural practices. The ultimate objective of any breeder is to increase the yield and is normally a complex trait governed by polygenes.

MATERIAL AND METHODS

The present investigation entitled "Morpho-physiological analysis of *desi* cotton genotypes (*Gossypium arboreum* L.)" was carried out at the experiment farm of Cotton Research Station, Mahboob baugh farm, VNMKV, Parbhani, during *Kharif* season-2022. The objectives of the research were : To evaluate promising cotton genotypes for morpho-physiological and yield contributing traits and, to study correlation for seed cotton yield with morpho-physiological traits. The present experiment conducted on fifteen promising genotypes of cotton (*Gossypium arboreum* L.) including two checks for morpho-physiological analysis during *Kharif* season -2022. The experiment was laid out in Randomized Block Design (RBD) with two replications. Genotypes tested were PA-904, PA-906, PA-907, PA-927, PA-929, PA-932, PA-936, PA-941, PA-942, PA-945, PA-947, PA-948, PA-950 along with two checks *viz.,* PA-742 (C) and NH-615 (C). Observations recorded were seed emergence percentage at 5th day after sowing, plant stand at 10th day after sowing, number of days require to 1st flower initiation, 50% flowering and first boll development. Plant height, leaf area, leaf area index, specific leaf weight, no. of monopodia and sympodia at harvesting, absolute growth rate, relative growth rate and net assimilation rate at various growth stages were recorded. The characters *viz.,* number of bolls per plant, boll weight, ginning outturn, seed index and seed cotton yield per plot was recorded as yield contributing traits.

Statistical analysis :

Fischer's method of analysis of variance was applied for the analysis of data and interpretation of the results as suggested by Panse and Sukhatme (1967). The level of significance used in 'F' and 't' tests was P = 0.05. Critical difference (CD) values were calculated at 5 per cent probability level, wherever 'F' test was significant.

RESULTS AND DISCUSSION

The analysis of variance for all the fifteen characters studied is presented in Table 1. The analysis of variance revealed that mean square due to genotypes washighly significant for all the 21 characters indicating the presence of sufficient amountof variability in the experimental materials used.

Table 1: Analysis of variance for various morphophysiological characters in *desi* cotton

Source of variation	Degrees of freedom	Seed emergence (%)	Plant stand (%)	Plant height (cm)	Leaf area (cm^2)	Leaf area index	Number of monopodia	Number of sympodia	Absolute growth rate (g/day)	Relative growth rate (g/g/day)	Net assimilation rate (g dm^{-2} day^{-1})	Specific leaf weight (mg/cm^2)	SPAD reading
Replication	1	13.25	11.69	9.41	75950.92	0.07	0.03	0.01	0.02	1.6-06	9.6 E-05	0.16	15.11
Treatment	14	28.54*	27.09*	174.54**	197723.33**	0.35**	0.38**	3.27**	0.09**	4.8-06**	9.2 E-05*	0.01**	13.09*
Error	14	10.79	9.80	23.97	38501.97	0.04	0.10	0.39	0.02	7.9-07	3.5 E-05	0.03	5.25

Table 1 : Contd……..

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Source of Variation	Degrees of freedom	Relative water content (%)	Specific leaf weight (mg/cm^2)	Relative water content (%)	Days to 1st flower initiation	Days to 50% flowering	Days to 1st boll development	Number of bolls per plant	10 Bolls weight (g)	Yield per plot (g)	GOT (%)	Seed index
Replication	1	1.39	0.16		22.53	0.30	17.63	0.07	5.63	770.13	0.36	0.62
Treatment	14	35.55*	0.01**		44.91**	49.26**	60.18**	13.13**	13.73**	38082.68**	9.50**	0.22**
Error	14	12.94	0.03		6.39	5.30	13.78	0.10	4.92	4751.28	3.83	0.09

Seed emergence (at 5 DAS) :

The data recorded for seed emergence is represented in Table 2. There were significant differences observed in seed emergence percentage (%) in different genotypes of *desi* cotton. At 5th day after sowing the genotypes PA-948, PA-950 and PA- 936 showed higher and equal percentage of seed emergence (96.15%) followed by PA-932 (95.19%), PA-402(c) (94.23%). Whereas, the genotype PA-941 showed lowest percent of seed emergence (82.69%) followed by PA-907(87.50%) and PA-927(88.46%).

Plant stand (at 10 DAS) :

There were significant differences observed in plant stand (%) in different genotypes of *desi* cotton. At 10th day after sowing,the genotype PA-936 recorded higher percentage of plant stand (92.31%) followed by PA-932 (91.30%), PA-402(c) (90.38%). Whereas, PA-941 recorded lowest per cent of plant stand (79.81%) followed by PA-907(80.77%) and PA-927(84.46%).

Plant height :

Observed values were significantly different among all the cotton genotypes in term of height at various growth stages. The genotype PA-904 recorded highest mean plant height (140cm) followed by PA-950 (135.10cm). In *desi* cotton genotypes, PA-948 recorded the lowest height compare to other genotypes (119.50cm). Plant height increased very slowly till 30 days after sowing, increased significantly between 30-90 days and increased gradually thereafter. Similar results were obtained by Damahe *et al*. (2018).The differences among genotypes for plant height might have been due to the difference in genetic makeup of genotypes considered in the experiment. These results are also in confirmation with the result of Nikhil *et al*. (2018) who reported that plant height is affected due to genetic makeup of genotypes.

Leaf area :

The genotype PA-941 recorded highest leaf area (3600.09 cm^2) followed by PA-950 (3269.57cm^2), PA-904 (3166.22cm^2) and PA-947 (3117.14cm^2). The lowest leaf area recorded by *desi* cotton genotype PA-948 (2377.19cm^2) followed by PA-927 (2524.22cm^2) and PA-907(2654.25cm^2).The genotype PA-941(3600.09cm^2) recorded significantly higher leaf area as compare to check NH-615 (3248.34cm^2).The lowest leaf area recorded in *desi* cotton genotype PA-948 (2367.07cm^2) followed by PA-927 (2413.86cm^2) and PA-907 (2611.51 cm^2). Leaf area increased between 30-90 days after sowing as number of leaves increased with the height of the plant. Similar results were reported by Singh *et al*. (2020).

Table 2 : Mean data on morphophysiological traits in desi cotton genotypes

Genotypes	Seed Emergence (%)	Plant stand (%)	Plant height (cm)	Leaf area (cm^2)	Leaf area index	Number of monopodia	Number of sympodia	Absolute growth rate (g/day)	Relative growth rate (g/g/day)	Net assimilation rate (g dm^{-2} day^{-1})	Specific leaf weight (mg/cm^2)	SPAD reading	Relative water content (%)
PA-904	92.31	87.50	140.00	2949.69	2.91	1.70	13.90	2.95	0.017	0.062	12.97	48.72	78.20
PA-906	89.42	85.58	129.80	3016.21	2.98	2.40	12.10	2.84	0.017	0.057	11.51	42.94	77.63
PA-907	87.50	80.77	120.60	2654.95	2.62	2.60	12.80	2.77	0.019	0.065	11.78	46.12	76.88
PA-927	88.46	84.62	130.00	2524.22	2.49	2.90	10.30	2.77	0.016	0.067	11.42	47.49	71.23
PA-929	93.27	89.42	127.20	2673.99	2.64	2.50	13.80	2.45	0.018	0.057	11.82	44.12	64.65
PA-932	95.19	91.35	123.90	2931.17	2.89	2.70	11.30	2.58	0.019	0.054	11.20	44.03	72.68
PA-936	96.15	92.31	128.80	3090.25	3.05	2.40	13.00	2.46	0.017	0.049	11.64	47.70	76.35
PA-941	82.69	79.81	135.10	3600.09	3.56	2.10	12.40	2.85	0.017	0.048	12.62	50.85	69.80
PA-942	91.35	90.38	130.00	2934.59	2.90	2.10	12.60	2.62	0.019	0.054	11.29	44.23	79.60
PA-945	93.27	89.42	121.70	3024.25	2.99	2.30	10.40	2.19	0.017	0.044	10.70	43.14	67.05
PA-947	93.27	87.50	124.40	3117.14	3.08	1.90	11.10	2.67	0.017	0.052	11.35	43.70	70.33
PA-948	96.15	85.58	119.50	2377.19	2.35	1.30	9.80	2.53	0.019	0.065	10.04	46.23	73.00
PA-950	96.15	89.42	133.10	3269.57	3.23	2.10	13.20	2.78	0.015	0.051	11.62	48.04	71.58
Checks													
NH-615(c)	93.42	89.47	91.60	3248.34	1.80	1.70	12.90	2.89	0.015	0.053	11.17	42.05	73.78
PA-402(c)	94.23	90.38	127.80	3166.22	3.13	2.60	12.60	2.83	0.017	0.055	11.17	47.72	71.50
GM	92.19	87.56	125.57	2971.86	2.84	2.22	12.15	2.68	0.017	0.055	11.49	45.81	72.95
S.E.	2.32	2.21	3.41	138.75	0.14	0.22	0.44	0.10	0.001	0.004	0.44	1.62	2.54
C.D. at 5 %	7.05	6.71	10.34	420.89	0.42	0.68	1.34	0.31	0.002	0.013	1.34	4.92	7.72
C.V. %	3.56	3.57	3.84	6.60	6.83	14.18	5.15	5.39	6.360	10.70	5.44	5.00	4.93

Table 2: Contd .....

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Genotypes	Specific leaf weight (mg/cm^2)	SPAD reading	Relative water content (%)	1st flower initiation	50% flowering	1st boll development	Number of bolls per plant	10 Bolls weight(g)	Yield per plot(g)	GOT (%)	Seed index
PA-904	12.97	48.72	78.20	65.50	78.00	93.00	4.10	20.50	620.50	34.62	5.50
PA-906	11.51	42.94	77.63	64.00	70.50	85.50	4.60	18.50	583.00	41.74	4.92
PA-907	11.78	46.12	76.88	61.00	71.50	86.50	4.20	19.50	495.00	36.07	5.29
PA-927	11.42	47.49	71.23	65.00	74.50	94.50	4.70	22.50	495.00	36.74	5.68
PA-929	11.82	44.12	64.65	70.00	78.50	93.50	5.00	18.50	536.50	38.26	4.66
PA-932	11.20	44.03	72.68	64.00	73.00	88.00	5.40	19.00	543.00	35.65	4.87
PA-936	11.64	47.70	76.35	65.50	74.00	89.00	4.40	18.50	397.50	38.64	5.35
PA-941	12.62	50.85	69.80	65.50	76.50	91.50	5.80	17.50	595.00	39.55	4.83
PA-942	11.29	44.23	79.60	73.00	82.00	97.00	6.10	19.50	435.00	36.86	5.37
PA-945	10.70	43.14	67.05	68.50	78.50	93.50	6.00	19.50	403.00	34.64	5.58
PA-947	11.35	43.70	70.33	66.50	74.00	89.00	5.90	21.00	451.00	36.73	4.92
PA-948	10.04	46.23	73.00	70.50	78.50	93.50	6.10	16.50	241.00	35.22	5.37
PA-950	11.62	48.04	71.58	68.00	80.00	95.00	6.10	21.00	491.00	36.72	5.13
Checks											
NH-615(c)	11.17	42.05	73.78	52.50	61.50	74.50	14.80	28.00	873.50	41.19	5.81
PA-402(c)	11.17	47.72	71.50	67.50	76.50	91.50	5.90	23.00	552.00	37.38	5.28
GM	11.49	45.81	72.95	65.80	75.17	90.37	5.94	20.20	514.13	37.33	5.24
S.E.	0.44	1.62	2.54	1.79	1.63	2.62	0.23	1.73	48.74	1.38	0.20
C.D. at 5 %	1.34	4.92	7.72	5.42	4.94	7.96	0.69	5.25	147.85	4.20	0.61
C.V. %	5.44	5.00	4.93	3.84	3.06	4.11	5.39	12.11	13.41	5.24	5.47

Leaf area index :

Observed values were found significantly different among all the cotton genotypes. The genotype PA-941 recorded highest leaf area index (3.56) followed by PA-950 (3.23), PA-904 (3.13), and PA-936 (3.05). The lowest leaf area was recorded in *desi* cotton genotype PA-948 (2.35) followed by PA-927 (2.49) and PA-907 (2.62). The genotype PA-941 (3.56) and PA-950 (3.23) recorded significantly higher leaf area index as compare to check PA-402 (3.13). Singh *et al*. (2020) found similar result and stated that LAI reached its peak value at 120 days after sowing. The Leaf area index was found slightly decreasing after 120 days of sowing. The obtained result confirms the finding of Thakur (2020), who reported that partitioning of more photosynthates towards sink might have reduced production of new leaves and consequently leaf area and LAI and each increase in the nutrient level resulted in significant increase in LAI over its preceding lower level of nutrients.

Number of sympodia :

The genotype PA-904 had the highest number of sympodia per plant (13.90) followed by PA-929 (13.80), PA-950 (13.20) and PA-936 (13). While, the lowest number of sympodia per plant recorded in the genotype PA-948 (9.80) followed by PA-927 (10.30), PA-945 (10.40) and PA-947 (11.10). The overall mean for number of sympodia per plant was 12.15. The genotype PA-904(13.90) recorded highest number of sympodia compare to check NH-615(12.90).It was also observed that genotype having more number of sympodia, produces more number of seed cotton yield. Hence, positive and significant correlation was observed between number of sympodia and seed cotton yield. This result was in correspondence with the respect of Satish *et al*. (2020), Nikhil *et al*. (2018) and Subalakshmi *et al*. (2023).

Absolute growth rate :

The average absolute growth rate was 1.12g/day between 30-60 days after sowing, 2.68g/day between 60-90 days after sowing and further decreased to 0.93g/day between 90-120day after sowing. The genotype NH-615 recorded significantly higher absolute growth rate (1.24g/day). Among *desi* cotton genotypes, PA-904(1.11g/day) recorded the highest absolute growth rate followed by PA-906(1.10g/day) and PA-941(1.10g/day). The lowest absolute growth rate was recorded by genotype PA-945(2.19g/day) followed by PA-929(0.67g/day) and PA-932(0.68g/day). Absolute growth rate increased significantly and reduced drastically thereafter. The increase in AGR was due to more availability of nutrients which in turn increased the plant height, number of leaves and leaf areawhich ultimately enhanced production of photosynthates and their subsequent accumulation in plant (Ghule *et al*., 2013).

Relative growth rate :

The genotype PA-907 and PA-948 (0.0191g/g//day) recorded the highest relative growth rate followed by PA-932(0.0188g/g/day) and PA-942(0.086g/g/day). The lowest relative growth rate was recorded in genotype PA-950 (0.0152g/g/day) followed by PA-945(0.0165g/g/day). It was observed that relative growth rate (RGR) increased slowly in the beginning, increased significantly and reduced thereafter. Result obtained by Ghule*et al.,* (2013) and Hussain *et al*. (2018) were found similar with the result obtained in the present investigation.

Net assimilation rate :

The genotype PA-927(0.067g/dm^2/day) recorded the highest net assimilation rate followed by PA-907 and PA-948(0.065g/dm^2/day). The lowest net assimilation rate was recorded in genotype PA-945(0.044g/dm^2/day) followed by PA-941(0.048g/dm^2/day) and PA-950(0.051g/dm^2/day). It was observed that net assimilation rate (NAR) was highest in the beginning and reduced consistently. Result obtained by Hussain *et al*. (2018) were parallel with the same *i.e*. Net assimilation rate (NAR) followed an increasing trend in the primary stages of cotton growth and then reduced subsequently.

Specific leaf weight :

The genotype PA-904 recorded highest mean specific leaf weight (12.97mg/cm^2) followed by PA-929 (11.82mg/cm^2) and PA-907(11.78mg/cm^2). The lowest mean specific leaf weight was recorded in *desi* cotton genotype PA-948(10.04mg/cm^2) followed by PA-945 (10.70mg/cm^2). The results are in agreement with the reports of Thakur (2020). Plant with higher SLW hadmore photosynthetic capability for dry matter production was observed by Kerby *et al*. (1980).

SPAD chlorophyll meter reading (SCMR) values :

The genotype PA-941 recorded highest mean SCMR value (50.85) followed by PA-904 (48.72), PA-904 (48.72) and PA-950 (47.72). The check variety NH-615 recorded the lowest SCMR value (42.05). The lowest

mean SCMR value recorded in *desi* cotton genotype PA-906(42.94) followed by PA-945 (43.14) and PA-947(43.70).There was direct relationship between SPAD readings and chlorophyll content per leaf area as reported by Xiong *et al*.(2015). It was observed that SCMR values were increased at the initial stage of the growth and slightly decreased thereafter.

Relative water content :

Highest relative water content was observed in genotype PA-942 (79.60%) followed by PA-904 (78.20%) and PA-904 (77.63%). The lowest relative water content was observed in genotype PA-929 (64.65%) followed by PA-945 (67.05%). The overall mean relative water content was 72.95%.The result found was in accordance with the report of Vanderbilt *et al*. (2017).

Days required for first flower initiation :

The range for first flower initiation varied from 52-53 to 73 days. It was observed that genotype NH-615(c) recorded lowest number of days required for first flower initiation (52-53 Days) followed by PA-907 (61 Days) and PA-932 (64 Days). The genotypes that recorded highest number of days for first flower initiation were PA-942 (73 days) followed by PA-948 (70-71 days) and PA-929 (70 days). Earliest first flower initiation was observed in genotype PA-907 (61th Day) as compared to check PA-402 (67-68 days). It has negative but significant correlation with seed cotton yield. Similar findings were reported by Saeed *et al*. (2008) and Sanwar *et al.* (2021). It is evident from the above data that more the days taken to flowering, reduction in overall yield and yield contributing character observed.

Day require for the 50% flowering :

It was observed that number of days required for the 50% flowering were lowest in the genotype NH-615 (61-62 days). Among *desi* cotton genotypes, PA-906 recorded lowest number days required for the 50% flowering (70-71 days) followed by PA-907(71-72 days) and PA-932(73 days) as compared to check PA-402 (77-78 Days). Genotype PA-950 recorded highest number of days required for the 50% flowering among *desi* cotton genotypes followed by PA-929 (78-79 day) and PA-904 (78 days).

Day require for the 1st boll development :

It was recorded that number of days required for the 1st boll development were lowest in the check variety NH-615 (74-75 days). In *desi* cotton genotypes, PA-906 recorded lowest number days required for the 1st boll development (85-86 days) followed byPA-907(86-87 days) and PA-932(88 days) *i.e.*, they took less days as compared to check PA-402(91-92Days). Genotype PA-942 (97) recorded highest number of days required for the 1st boll development among *desi* cotton genotypes followed by PA-950 (95 day) and PA-927 (94-95 days). Phenological characters were found negatively but significantly affecting the seed cotton yield in the given cotton genotypes. The obtained results are in accordance with the results of Saeed *et al*. (2008) and Sanwar *et al.* (2021).

Number of bolls per plant :

The mean value for the number of bolls per plant per plant ranged from 4.10 to 14.80. The check variety NH-615 found to have highest number of bolls per plant (14.80). The genotype PA-948 and PA- 950 had highest number of bolls per plant (6.10) followed by PA-945 (6.00), PA-947(5.90) and PA-936 (5.80). While, the lowest number of bolls per plant observed by the genotype PA-904 (4.10) followed by PA-907 (4.20), PA-941 (4.40) and PA-906 (4.60).The overall mean for number of sympodia per plant was 5.24. The present investigation reveals that genotypes having a greater number of bolls per plant contributed positively towards the seed cotton yield. This suggested need for selection for high seed cotton yield per plant based on bolls per plant would be beneficial. This result is in accordance with the report of Shazia *et al*. (2010) who stated that there had been positive and highly significant association between bolls per plant and seed cotton yield per plant.

Boll weight :

The mean value for the number of bolls per plant per plant ranged from 17.50 to 28 (g). The check variety NH-615 had the highest 10-boll weight (28g). The genotypes PA-402 had the highest 10-boll weight (23.00g) followed by PA-927 (22.5g), PA-947 and PA-950 (21.00g) in *desi* cotton genotypes. While, the lowest 10-boll weight was observed by the genotype PA-948 (16.50g) followed by PA-936 (17.50g) and PA-906, PA-929, PA-941 (18.50g). The overall mean of 10 boll weight was 20.20g. Boll weight displayed a highly significant and positive correlation with seed cotton yield per plant. This displayed close association of the two characters and this meaningful association can be exploited in

selection programme leading towards the improvement of cotton genotypes (Shazia *et al*., 2010).

Seed cotton yield per plot :

There were significant differences observed in the recorded values for the seed cotton yield per plot among cotton genotypes. The mean value for seed cotton yield per plot ranged from 241 to 873 (g). The check variety NH-615 had recorded highest seed cotton yield per plot (873.5g). The genotypes PA-904 recorded highest seed cotton yield per plot (620.5g) followed by PA-936 (g), PA-906 (583g) and PA-402 (552g) in *desi* cotton genotypes. While, the lowest seed cotton yield per plot was observed by the genotype PA-948 (241g) followed by PA-941 (397.5g) and PA-945 (403g).The overall mean of seed cotton yield per plot was 514.13g. These results are in accordance with those of Premalatha *et al*. (2020), who reported that seed cotton yield traits in cotton vary depending on the genotypic structure of cultivar and environmental conditions.

Ginning out turn (GOT) :

The mean value for ginning out turn ranged from 34.62 to 41.74 (in percentage). GenotypePA-906 recorded the highest ginning out turn (41.74%) followed by PA-941 (39.55%), PA-936 (38.64%) and PA-929 (38.26%) by *desi* cotton genotypes. While, the lowest ginning out turn was observed by genotype PA-904 (34.62%) followed by PA-945 (34.64%) and PA-948 (35.22%). The overall mean of ginning out turn (GOT) was 37.33%. Highest ginning out turn (GOT)% was found in genotype PA-906(41.74%) as compared to check NH-615(41.19%).

Seed index :

The mean value for seed index ranged from 4.66 to 5.81. The genotype NH-615 recorded the highest seed index (5.81). The genotypes PA-927 had recorded highest seed index (5.68) followed by PA-945 (5.58) and PA-904 (5.50) in *desi* cotton genotypes. While, the lowest seed index was observed in the genotype PA-929 (4.66) followed by PA-941(4.83) and PA-932 (4.87). The overall mean of seed index was 5.34.Seed index was found highest in genotype PA-927(5.68) compare to *desi* highest check PA-402(5.28).Values range obtained in ginning out turn (34.62% to 41.74%) and seed index (4.66 to 5.81) were in accordance with the values obtained by Ramesh *et al*. (2015) and Punitha *et al*. (2013).

Conclusion :

PA-907 and PA-906 were the early flowering genotypes. The genotype PA-904 was tallest among rest of the genotypes in term of height and at par with the both upland and lowland cotton checks. Genotype PA-950 produced highest dry matter as compare to check PA-402. The genotype PA-906 exhibited highest ginning out turn than check NH-615. Genotype PA-904 had recoded highest leaf area, leaf area index, specific leaf weight, number of bolls and high seed cotton yield among rest of the cotton genotypes. The genotype PA-904 (620.5g) recorded highest seed cotton yield hence appeared as a most superior and promising.

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