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Research Article

Genetic investigations in F_3 generations involving okra cotton leaf genotypes as parents

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Abstract
The experiment was conducted during winter 2021-22 to study the inheritance of okra leaf shape in F_3 populations of F2382/CO17 and PBH115/CO17 crosses where, F2382 and PBH 115 are okra leaf parents and CO17 had compact leaf type. A segregation ratio of 3:2:1 for okra, sub-okra and normal leaf types, respectively was observed in F2382/CO17 and PBH115/CO17. Besides, non-association of leaf type and leaf area was also deduced. This study was primarily taken to combine the okra leaf having reduced leaf area with compact plant type to develop an ideal plant type with compactness and okra leaf as the former trait makes the plant fit for mechanical harvest, while the later for pest resistance. Okra leaf type contributed for more yield than normal leaf owing to its short stature, zero monopodia, more sympodia per plant and relative compactness.

Keywords: cotton, F_3 population, okra leaf type, compact plant, variability.

INTRODUCTION

Cotton is one of the most important commercial crops in the World with a significant impact on foreign exchange and the industrial economy. Cotton fibre is consumed globally to the tune of 15 lakh bales. An estimate by COCPC 2021 indicated that cotton demand stands at the rate of 383 lakh bales of 170 kg each while total supply stands at the rate of 445.88 lakh bales of 170 kg resulting in a cozy balance of 62.88 lakh bales. In India, the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare indicated 362.18 lakh bales production of cotton from 120.69 lakh hectares area (2021-22 statistics). India remains the leading country in terms of area under cotton cultivation (38% of world cotton area) and raw cotton production in the world in the year 2021-22 (as estimated by ICAC) and the second largest in terms of raw cotton consumption, beginning and ending stock holding in the World. Though cotton is cultivated in a larger area in India, the productivity level of around 500 kg/ha is far beyond the yields realized in China (1844 kg/ha), Brazil (1772 kg/ha), Turkey (1735 kg/ha), Mexico (1592 kg/ha) during 2021-22.

India has the scope for creating genotypes that would fit well in various environments with significant yield comparing China which produces equivalent cotton from nearly one-fourth of the area of that India. Cotton belongs to Malvaceae family and the genus *Gossypium* has 51 recognized species of different genome compositions (seven tetraploids with 44 diploids). However, only four spinnable lint bearing species being cultivated are *G. hirsutum, G. barbadense, G.herbaceum* and *G.arboreum*. The *G. hirsutum* is noted for its production capability among the four cultivated species. Approximately 65% of India's cotton production comes from rainfed land and *G.hirsutum* accounts for more than 90 % of the Nation's output (cotcorp.org.2021). Thus, it necessitates the improvement of *hirsutum* cotton to suit varied agro climatic conditions and production systems. This would be possible by adopting an appropriate breeding programme to develop newer cross combinations. One of the ways of improving the productivity of cotton is to accommodate more number of plants in a unit area which could be achieved by cultivating compact cotton genotypes.

An ideal plant type would be the best one which fits well in High Density Planting System (HDPS) with the modest leaf area per plant. The okra leaf trait in cotton provides an open canopy characteristic to the crop facilitating more solar light interception. This has been employed by the breeders and physiologists in the studies to develop high yielding genotypes with efficient productivity. According to a study on okra leaf type, the leaf area is decreased by 35-40%. This reduction in leaf area results in early maturity &boll bursting (Preetha and Raveendran, 2007). Meredith Jr (1985) reported that okra leaf contributes to 3-18% more yield than normal leafy types. In areas where boll rot and pests are a major problem, okra leaf was observed to be higher in productivity and yield than normal and pesticide usage was also reduced to 41% in okra leaf types.

By combining okra leaf type in compact cultivars, it will be suitable for easy mechanization and harvest (Gunasekaran *et al.*, 2020). The compact genotypes are having short stature, earliness,matures in 125-135 days with compactness, short sympodia with synchronous boll maturity and zero monopodia resulting in higher productivity (Kumar *et al.*, 2020). In the present study, an investigation was made to understand the inheritance of okra leaf shape in the background of compactness by crossing two okra leaf genotypes individually with cotton variety CO17 which is suitable for high density planting system (HDPS). An investigation was made to disclose the association between the segregating leaf types and their specific area in F_3 generation and the inheritance of okra leaf type from F_2 to F_3. Besides, both F_3 populations were observed for their magnitude of variability and heritability for yield and morphological characters.

MATERIALS AND METHODS

Field experiment was carried out using two F_3 populations at the Department of Cotton, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore during the winter 2021-22. Two okra leaf type parents *viz.,* F2382 and PBH 115 were separately crossed with CO 17 which is a recently released compact variety having normal leaf type and the parents were individually raised for observations as well (**Table 1**).

Both the populations as well as their parents were individually planted at 90 cm x 30cm spacing (40 plants/ parent). Recommended package of practices and plant protection measures were carried out accordingly. All the individual plants from both the populations of F_3 were observed for segregation of leaf types. Specific Leaf Area (SLA) was observed for all the individual leaf (fifth leaf from the top) in both the populations using Leaf area meter. Observations for various morphological and yield related traits were observed in the selected 136 and 98 single plants having okra and sub-okra leaf type with compactness in both the populations, respectively. The traits observed include plant height (cm), the number of monopodia per plant, the number of sympodia per plant, internodal length (cm), the number of bolls per plant, boll weight (g), seed index, lint index, ginning out turn (%), single plant yield (g), upper half mean length (mm), uniformity ratio (%), fibre bundle strength (g/tex), elongation percentage and fibre fineness (µg/inch). Pearson's chi-square test was used to determine the goodness of fit for the segregation of leaf types for both the populations. The mean, variance, standard deviation and standard error for various morphological and yield related traits of F_3 populations were derived using the standard statistical formulae. Broad sense heritability for morphological and yield related traits were calculated (El-Hashash, 2017). Heritability was derived as per Rafiq *et al.* (2010). Genetic advance and genetic advance as percent of mean were also worked (Kumar *et al.,* (2019).

RESULTS AND DISCUSSION

Normal, sub-okra/sea-island, okra and super-okra are the four major leaf shape found in tetraploid cotton which are allelomorphic at L-D_1. This allelic genetic locus has broadened the leaf development research (Andres *et al.*, 2017). From sub-okra to okra, the okra allelic series contributes for increasing the lobed leaf morphologies with mature super okra's proximal lobes reduced to a single linear blade.

McLendon (1912) discovered that sub-okra leaf followed simple mendelian inheritance. In comparison to normal leaf type, the okra leaf shape trait confers a considerable reduction in the incidence of boll rot across various locations. A considerable increase in yield, earliness, lint per cent and micronaire was associated with reduction in leaf lamina as well as increase in fruiting rate. On the other hand, okra leaf shape had no effect on boll weight and fibre attributes but it reduced the fibre elongation and total leaf area and confers resistance to pests (Kumar *et al.*, 2020). The pattern of segregation of leaf types in both the crosses of F_3 population was observed as 3:2:1 for okra leaf, sub-okra and normal leaf (**Table 2 and Plate 1**).

Table 1. Parents and F_3 populations

Parents	F_3 Population
F2382 (Okra leaf type)	F2382 / CO17 (756 individual plants)
PBH115 (Okra leaf type)	PBH115 / CO17 (510 individual plants)
CO 17 (Compact variety with normal leaf type)	

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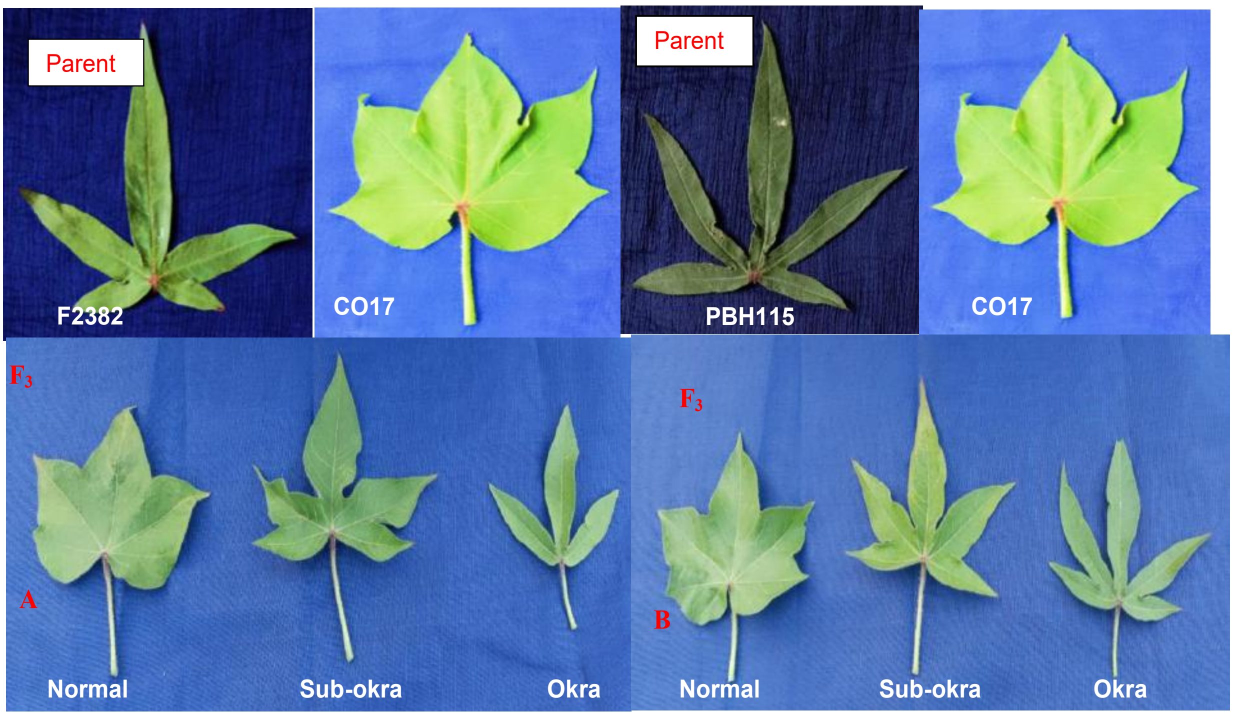
Table 2. Segregation of leaf types (Normal, Sub-okra, Okra) in F_3 populations

Leaf shape	Observed	Expected	Chi-square
F2382 / CO17			
Normal	122	126	0.12
Sub-okra	255	252	0.57
Okra	379	379	0.02
	756		0.71
PBH115 / CO17			
Normal	81	85	0.188
Subokra	179	170	0.47
Okra	250	255	0.09
	510		0.748

Chisquare critical = 5.99 (0.05,2df)



A) F2382/CO 17 B) PBH115/CO 17

Plate 1. Parents and Segregation of leaf types in F_3

The presence of okra leaf plants increased from F_2 to F_3 which was 1:2:1 for normal, sub-okra, okra leaf types in $F_2$and 3:2:1 for okra, sub-okra and normal leaf type in F_3(Krishna *et al.*, 2021). The segregation and inheritance pattern of okra leaf type also increased in both the crosses of F_3 populations. The discovery of the LATE MERISTEM IDENTITY1 (GhLMI 1-D_1b) which codes for the HD-Zip transcription factor plays a crucial determinant role in deciding leaf shape variation in cotton at the L-D_1 (Andres *et al.*, 2017). As the gene sequence for okra leaf type is known, this trait can be incorporated into compact cotton genotypes. This can be accomplished by phenotype based backcross or genetic transformation.

Besides, the leaf area was estimated using the destructive method by using leaf area meter by detaching the leaf from the plant and measuring it for all the individuals of F_3 populations (SLA in sq.cm). The overall mean specific leaf area (38.56 cm^2) of F2382 / CO 17 is lower than the overall mean of PBH115 / CO 17 (41.482 cm^2) implying the intensity of occurrence of okra leaved plants in the first cross. It was also observed by Krishna *et al.* (2021) in F_2 populations of the same crosses that the overall mean of SLA of F2383 / CO 17 cross (27.0562 cm^2) was lower than that of PBH115 / CO17 (38.128 cm^2). This indicates that though there is a progressive increase in SLA over the generations in both the populations, recovery of okra type had been consistently higher in the cross F2383/CO 17. Another interesting observation is that though SLA of both crosses differed significantly, there was no significant difference observed in the mean value of leaf groups of normal, okra, sub-okra from both the crosses indicating non-association of leaf type and leaf area (**Table 3**).

Though there had been a reduction in the leaf area which could be witnessed as one progress from normal to okra leaf type through sub okra, the reduction in leaf area in general is more prominent in F2382 X CO 17 than the other. Non clear association of leaf area with leaf type requires thorough investigation. High heritability coupled with high genetic advance indicates that heritability is due to additive gene action and selection is most effective in the population. In this study, both the F_3 populations F2382 / CO 17 (136 single plants) and PBH115 / CO 17 (98 single plants) were analyzed for 15 morphological and yield related traits and the details are given in **Table 4**. Plant height, the number of sympodia, the number of bolls, ginning out turn and lint index showed the high heritability in both crosses of F_3 population. Boll weight showed moderate heritability and the number of monopodia showed less heritability. Both the crosses showed varied heritability for fibre quality parameters (**Table 5**). This result is in accordance with that of Shruti *et al.* (2019). The relationship between the traits in both the F_3 populations was estimated using correlation coefficients.

In the F_3 populations of F2382 / CO 17, out of the fifteen characters studied, the number of sympodia (0.29), the number of bolls (0.17), boll weight (0.18), lint index (0.22) and ginning out turn (0.21) revealed a positive and significant correlation with single plant yield at 5% and 1% level of significance. Similarly, fibre bundle strength (-0.18) portrayed a significant and negative correlation with single plant yield. The number of monopodia had a positive and significant correlation with plant height (0.31). The number of sympodia revealed a positive and significant correlation with plant height (0.25). The number of bolls per plant showed a positive and significant association with the number of monopodia per plant (0.35). Boll weight showed a positive and significant association with the number of monopodia (0.47) and the number of bolls (0.25). Ginning out turn revealed a negative and significant correlation with the number of bolls per plant (-0.017).Upper half mean length revealed a positive and significant correlation with the number of monopodia (0.41) and boll weight (0.39). Uniformity ratio depicted a positive and significant correlation with the number of monopodia (0.53), the number of bolls (0.43), boll weight (0.48) and upper half mean length (0.36). Lint index (-0.18) showed a negative and significant association with uniformity ratio. Fibre bundle strength showed a positive and significant association with the number of monopodia (0.39), boll weight (0.39), upper half mean length (0.83), and uniformity index (0.52). Fibre fineness showed a positive and significant correlation with the number of monopodia (0.54), the number of bolls (0.31), boll weight (0.55), upper half mean length (0.54), uniformity index (0.65), fibre bundle strength (0.55), elongation per cent (0.84). (**Table 6**).

In the F_3 populations of PBH 115 / CO17 cross, of the fifteen characters studied the number of monopodia (0.55), the number of sympodia (0.48), internodal length (0.39), the number of bolls (0.49), boll weight (0.80), lint index (0.35), ginning out turn (0.27), upper half mean length (0.26), uniformity ratio (0.67), fibre bundle strength (0.78), elongation per cent (0.66), fibre fineness(0.91) depicted a positive and significant correlation with the

Table 3. Association between leaf type and specific area in F_3 population

Groups	Count	Mean (cm^2)	Range	Variance
F2382 X CO17				
Normal	122	40.68	15.21-78.63	51.98
Sub-okra	255	39.98	14.21-61.20	49.32
Okra	379	35.87	11.32-48.36	33.67

F calculated:39.98, P-value: 0.001, F critical: 1.88 (0.05, 2df)

PBH115 X CO17

Groups	Count	Mean (cm^2)	Range	Variance
Normal	81	43.98	18.67-81.32	58.87
Sub-okra	179	39.67	17.98-75.65	54.67
Okra	250	36.67	11.23-49.27	45.98

F calculated:31.89, P-value: 0.001, F critical:1.891009 (0.05, 2df)

Table 4. A summary of the output related to morphological and yield related traits of F_3 populations

Traits	Cross	Mean	Variance	SD	Standard Error	Minimum	Maximum
Plant height (cm)	Cross 1	83.77	329.03	18.13	1.60	49.50	135.90
	Cross 2	84.45	379.09	19.47	2.11	35.10	131.60
Number of monopodia/plant	Cross 1	2.21	1.95	1.39	0.12	0.00	7.00
	Cross 2	1.89	1.54	1.24	0.13	0.00	4.00
Number of sympodia/plant	Cross 1	7.46	54.39	7.37	0.65	2.00	18.00
	Cross 2	5.89	4.38	2.09	0.22	2.00	13.00
Internodal length (cm)	Cross 1	5.28	6.86	2.61	0.23	2.06	25.86
	Cross 2	4.80	3.82	1.95	0.21	2.23	18.53
Number of bolls/plant	Cross 1	5.43	4.01	2.03	0.17	1.00	10.00
	Cross 2	5.45	3.98	1.99	0.21	2.00	12.00
Boll weight (g)	Cross 1	3.18	0.82	0.90	0.08	1.66	5.33
	Cross 2	3.17	0.48	0.69	0.07	1.66	5.33
Single plant yield(g)	Cross 1	17.73	99.44	11.02	0.97	2.00	72.00
	Cross 2	20.07	98.40	11.24	1.21	5.00	63.00
Seed index	Cross 1	10.18	97.20	9.85	0.87	2.87	48.46
	Cross 2	8.39	6.48	2.54	0.27	1.70	15.54
Lint index	Cross 1	33.44	75.95	31.24	2.76	6.05	28.76
	Cross 2	31.35	73.39	8.56	0.92	17.32	48.02
Ginning out turn (%)	Cross 1	36.75	96.05	32.03	2.83	11.54	30.50
	Cross 2	34.07	76.14	8.72	0.94	19.58	49.50
Upper half mean length (mm)	Cross 1	24.01	2.54	1.594	0.22	20.60	28.80
	Cross 2	23.67	2.95	1.72	0.36	17.40	27.10
Uniformity (%)	Cross 1	47.23	0.702	0.83	0.13	45.10	50.00
	Cross 2	47.22	0.79	0.89	0.17	44.20	49.50
Fibre bundle strength (g/tex)	Cross 1	23.31	4.20	2.05	0.28	18.80	29.10
	Cross 2	22.38	2.88	1.69	0.32	18.80	25.20
Elongation ratio (%)	Cross 1	5.38	0.23	0.48	0.06	3.51	6.20
	Cross 2	5.57	0.08	0.29	0.05	4.90	6.70
Fibre fineness (µg/inch)	Cross 1	5.20	0.34	0.56	0.07	3.51	6.58
	Cross 2	4.83	0.64	0.80	0.15	3.15	5.97

Cross 1: F2382/CO17; Cross 2: PBH115/CO17

single plant yield. The number of monopodia showed a positive and significant correlation with plant height (0.23). The number of sympodia showed a positive and significant correlation with the number of monopodia (0.60). Internodal length revealed a positive and significant association with the number of monopodia (0.49) and the number of sympodia (0.37). The number of bolls revealed a positive and significant association with the number of monopodia (0.51), the number of sympodia (0.82) and internodal length (0.30). Boll weight depicted a positive and significant association the number of monopodia (0.71), the number of sympodia (0.50), internodal length (0.46) and the number of bolls (0.47). Lint index depicted a positive and significant association the number of monopodia (0.41), the number of sympodia (0.22), the number of bolls (0.29), boll weight (0.41). Uniformity ratio depicted positive and significant association the number of monopodia (0.51), the number of sympodia (0.55), internodal length (0.34), the number of bolls (0.44), boll weight (0.63) and lint index (0.26).

Fibre bundle strength showed a positive and significant correlation with the number of monopodia (0.67), the number of sympodia (0.50), internodal length (0.36), the number of bolls (0.44), boll weight (0.82), lint index (0.41) and uniformity ratio (0.58). Elongation per cent showed a positive and significant correlation with the number of monopodia (0.52), the number of sympodia (0.52), internodal length (0.31), the number of bolls (0.44), boll weight (0.60), lint index (0.34), uniformity ratio (0.87)

Table 5. Variability parameters of morphological & yield related traits in F_3 populations

Traits	Cross	σ^2 F_3	σ^2F2382	σ^2 Co17	PCV%	GCV%	EVC%	h^2bs (%)	GA	GAM (%)
Plant height	Cross 1	329.03	25.32	195.35	21.65	18.01	12.02	69.18	25.73	30.71
	Cross 2	379.09	13.45	195.35	23.05	19.68	12.01	72.85	29.08	34.43
Number of monopodia/plant	Cross 1	1.95	0.52	2.49	62.97	35.97	51.68	32.63	0.93	42.11
	Cross 2	1.55	0.73	2.49	65.69	26.03	60.31	15.71	0.40	21.15
Number of sympodia/plant	Cross 1	6.39	5.67	12.06	59.75	45.89	38.6	84.72	12.81	51.50
	Cross 2	4.38	3.34	12.06	35.51	28.02	45.24	62.27	2.67	45.34
Internodal length	Cross 1	6.86	0.23	0.49	49.52	48.33	10.79	95.25	5.11	96.70
	Cross 2	3.82	0.16	0.49	40.68	38.91	11.88	91.47	3.67	76.28
Number of bolls/plant	Cross 1	4.01	4.98	15.33	36.88	43.52	57.05	97.66	5.72	105.20
	Cross 2	3.99	2.89	15.33	36.59	39.28	53.68	98.76	4.72	86.46
Boll weight	Cross 1	0.83	0.05	0.29	28.5	25.55	12.61	80.40	1.5	46.97
	Cross 2	0.48	0.03	0.29	21.88	17.57	13.04	64.46	0.92	28.91
Single plant yield	Cross 1	121.44	0.87	107.83	62.14	46.22	41.53	55.32	12.5	70.47
	Cross 2	126.40	0.65	107.83	56.02	42.26	36.77	56.91	13.12	65.36
Seed index	Cross 1	2.20	0.67	5.09	56.78	38.44	16.05	97.25	19.66	52.94
	Cross 2	3.48	0.87	5.09	30.34	23.27	19.47	58.82	3.07	36.59
Lint index	Cross 1	0.95	0.54	46.86	45.40	32.25	14.63	97.55	62.47	86.70
	Cross 2	0.40	0.43	46.86	27.33	22.47	15.55	67.62	11.88	37.88
Ginning out turn	Cross 1	5.06	0.98	48.77	47.15	41.09	13.57	97.58	64.07	54.33
	Cross 2	8.14	0.95	48.77	25.61	21.02	14.63	67.35	12.05	35.36
Upper half mean length	Cross 1	2.54	0.68	0.17	32.53	21.89	14.63	73.13	13.08	38.30
	Cross 2	2.95	0.43	0.17	35.36	25.87	23.87	85.26	20.64	38.39
Uniformity	Cross 1	0.70	0.84	0.98	12.19	19.65	21.98	52.02	18.63	46.78
	Cross 2	0.79	0.81	0.98	12.97	23.91	19.76	46.88	9.37	78.60
Fibre bundle strength	Cross 1	4.20	0.57	0.74	42.45	36.74	45.09	86.24	18.30	19.80
	Cross 2	2.88	0.52	0.74	35.91	19.07	36.87	81.88	21.38	38.75
Elongation ratio	Cross 1	0.23	0.05	0.05	20.94	28.43	12.54	98.30	22.80	91.72
	Cross 2	0.08	0.04	0.06	12.63	45.87	18.56	95.50	12.34	26.87
Fibre fineness	Cross 1	0.31	0.25	0.30	24.54	39.87	29.03	60.06	19.38	43.87
	Cross 2	0.64	0.32	0.30	36.41	21.98	23.32	58.98	10.42	33.98

Cross 1: F2382/CO17; Cross 2: PBH115/CO17

and fibre bundle strength (0.64). Fibre fineness showed a positive and significant correlation with the number of monopodia (0.63), the number of sympodia (0.51), internodal length (0.46), the number of bolls (0.46), boll weight (0.86), lint index (0.39), uniformity ratio (0.73), fibre bundle strength (0.85) and elongation per cent (0.71) (**Table 7**).

In the present study, plants with ideal genotype having okra leaf with compactness and ideal fibre quality parameters, resistant to pest and amenable for mechanization were identified. A comparison of identified plants in both the crosses along with normal type is provided (**Plate 2**). The findings of the current study on the inheritance of okra leaf revealed that the inheritance is controlled by a single gene and segregation towards okra leaf type increased in F_3 compared F_2 generation. Taking into consideration the reduction of leaf area, it is important to have a better understanding of okra leaf shape in order to associate it with needed quantitative traits. The association between seed colour and size was discovered (McClean *et al.*, 2018). In similar manner, association between okra leaf type with morphological and yield related traits can be investigated for breeding compact genotypes with okra leaf trait.

Table 6. Phenotypic correlation among yield and other quantitative traits in F_3 progenies of F2382/CO17

	PH	NM	NS	IL	NB	BW	SI	LI	GOT	UHML	UI	ST	EL	MIC	SPY
PH	1.00														
NM	0.55**	1.00													
NS	0.25**	0.15	1.00												
IL	0.06	0.13	0.03	1.00											
NB	0.00	0.35**	0.03	0.13	1.00										
BW	0.04	0.47**	0.04	0.12	0.25	1.00									
SI	-0.14	-0.03	0.01	-0.02	0.13	0.10	1.00								
LI	0.04	-0.08	0.06	0.06	-0.08	0.05	-0.27	1.00							
GOT	0.02	-0.09	0.06	0.06	-0.17**	0.05	-0.15	0.99	1.00						
UHML	-0.05	0.41**	0.15	0.07	0.08	0.39**	0.11	-0.12	-0.12	1.00					
UI	-0.03	0.53**	0.02	0.13	0.43**	0.48	0.01	-0.18	-0.16	0.36**	1.00				
ST	-0.08	0.39**	0.08	0.06	0.14	0.39**	0.04	-0.12	-0.13	0.83**	0.52**	1.00			
EL	-0.01	0.61**	0.07	0.17	0.34**	0.66**	0.03	-0.02	-0.03	0.65**	0.71**	0.66**	1.00		
MIC	-0.02	0.54**	0.09	0.09	0.31**	0.55**	-0.04	-0.04	-0.06	0.54**	0.65**	0.55**	0.84**	1.00	
SPY	0.15	0.03	0.29**	0.17	0.17*	0.18*	0.01	0.22*	0.21*	-0.10	-0.05	-0.18	-0.09	-0.08	1.00

*Significant at 5% (p = 0.05) ** Significant at 1% (p = 0.01)

PH- Plant height ; NM- Number of monopodia/plant; NS- Number of sympodia/plant; IL- Internodal length ; NOB- Number of bolls/ plant; BW- Boll weight ; SI- Seed index; LI- Lint index; GOT- Ginning out turn ; UHML- Upper half mean length ; UI- Uniformity ratio ; ST- Fibre bundle strength ; EL- Elongation percentage; MIC- Fibre fineness ; SPY-Single plant yield.

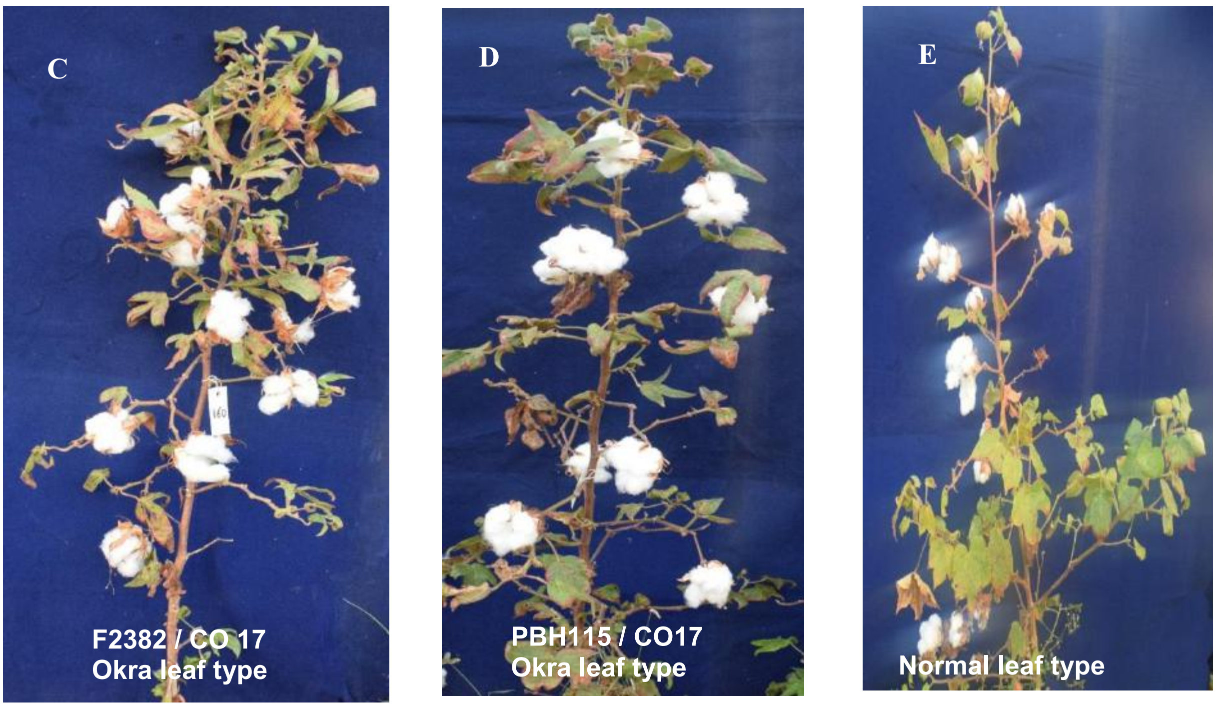


Plate 2. Comparsion of Normal leaf (E) with okra leaf type of F2382/CO17(C) and PBH115 /CO17 (D)

Table 7. Phenotypic correlation among yield and other quantitative traits in F_3 progenies of PBH115/CO17

	PH	NM	NS	IL	NB	BW	SI	LI	GOT	UHML	UI	ST	EL	MIC	SPY
PH	1.00														
NM	0.23*	1.00													
NS	0.16	0.60**	1.00												
IL	0.07	0.49**	0.37**	1.00											
NB	0.19	0.51**	0.82**	0.30**	1.00										
BW	0.08	0.71**	0.50**	0.46**	0.47**	1.00									
SI	-0.01	-0.01	0.15	-0.04	0.14	-0.06	1.00								
LI	-0.07	0.41**	0.22**	0.21	0.29**	0.41**	-0.12	1.00							
GOT	0.18	-0.02	0.15	0.09	0.17	0.08	0.20	-0.52	1.00						
UHML	0.19	-0.02	0.14	0.08	0.17	0.06	0.20	-0.48	1.00	1.00					
UI	0.08	0.51**	0.55**	0.34**	0.44**	0.63**	0.10	0.26**	0.19	0.18	1.00				
ST	0.01	0.67**	0.50**	0.36**	0.44**	0.82**	0.04	0.41**	0.09	0.08	0.58**	1.00			
EL	0.10	0.52**	0.52**	0.31**	0.44**	0.60**	0.08	0.34**	0.14	0.13	0.87**	0.64**	1.00		
MIC	-0.05	0.63**	0.51**	0.46**	0.46**	0.86**	0.01	0.39**	0.20	0.19	0.73**	0.85**	0.71**	1.00	
SPY	0.01	0.55**	0.48**	0.39**	0.49**	0.80**	-0.02	0.35**	0.27*	0.26*	0.67**	0.78**	0.66**	0.91**	1.00

*Significant at 5% (p = 0.05) ** Significant at 1% (p = 0.01)

PH- Plant height ; NM- Number of monopodia/plant; NS- Number of sympodia/plant; IL- Internodal length ; NOB- Number of bolls/ plant; BW- Boll weight ; SI- Seed index; LI- Lint index; GOT- Ginning out turn ; UHML- Upper half mean length ; UI- Uniformity ratio ; ST- Fibre bundle strength ; EL- Elongation percentage; MIC- Fibre fineness ; SPY-Single plant yield.

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