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Short Communication

Introgressed lines as sources for fibre quality traits and resistance to biotic stresses for diversification of landraces in upland cotton (*Gossypium hirsutum* L.)

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Among the different pests bollworms and sucking pests account for 25-35% and 5-10% yield loss respectively. Application of insecticides for pest management produces pest resurgence and undesirable environmental impacts. An alternative strategy for managing these pests is use of genetically resistant varieties for reducing the use of pesticides. Of late quality of fibre assumed major importance in view of latest technological happenings in textile industry. The wild species of *Gossypium* form an important source of genes for improving the cultivated varieties through introgressive breeding with divergent species of *Gossypium* to improve the fibre qualities along with tolerance to biotic stresses. The present study was, therefore, planned to evaluate diverse introgressed lines so as to identify potential sources for productivity potential, fibre quality traits, resistance to CLCuV and tolerance to sucking pests with which diversify the genetic base of cultivars.

The material for the present study included 23 introgressed lines received from different cotton research centres of the country along with local check RS 2013 were sown at Central Institute for Cotton Research, Regional Station, Sirsa during 2003-04, 2004-05 and 2005-06. Each entry was grown in 3 row plots of 5.4 meter length in randomized block design with 3 replications. Data on seed cotton yield were recorded on plot basis and converted into kg/ha. After estimating the ginning outturn (%), the lint samples were subjected to fibre quality analysis and data on 2.5 % span length, uniformity ratio, micronaire value and bundle strength were recorded using High Volume Instrument (HVI) as per standard test methods [1]. Brief history of 23 introgressed lines utilized in the study is given in Table 1.

The data on introgressed lines developed through introgressive breeding along with one check (RS 2013) were subjected to statistical analysis. The results revealed that seed cotton yield obtained during three year was between 461.1 ka/ha to 1043.0 kg/ha. Mean seed cotton yield of-three year was 838.1 kg/ha reflecting the generally fayourable nature of the test environments, which allowed the expression of productivity potential of the introgressed lines. Thus this data should be useful for identifying those elite genotypes that are able to produce high seed cotton yield under prevailing conditions but the seed cotton yield of all the tested genotypes was significantly less than the check variety RS 2013 (Table 2).

Table 1. Brief breeding history of introgressed lines utilized for the study

S.No.	Introgressed lines	Source	Origin
1	AKH 8828	*G. harknessii*	PDKV, Akola
2	TCH 1648, TCH 1649, TCH 1652, TCH 1653, TCH 1691, TCH 1693, TCH 1695 and TCH 1696	*G. barbadense*	TNAU, Coimbatore
3	Rai 4A-2, Rai 7BSP12, Rai 7B-1, Rai 7B-2, Rai 9, Rai 11-3, MSH-SP-91 and MSH 345	*G. raimondii*	CICR, Nagpur
4	IGM-27, IGM-100, IGM-102, IGM105 and IGM 106	*G. australe*, *G. aridium*	RARS, Lam Farm, Guntur
5	IH-35	*G. harknessii*	JNKV, Khandawa

The range in seed cotton yield among lines was from 317 kg/ha (IGM 27) to 1303 kg/ha (IGM 106). The best populations for seed cotton yield were IGM 102, IGM 106 and TCH 1691 which had more than 1000 kg seed cotton yield among the tested lines. Out of these 23 lines, 9 lines were found resistant against cotton leaf curl virus (CLCuV). Whereas, out of these 3 high yielding lines the two *viz.*, IGM 102 and IGM 106 was also found tolerant to jassid (0.29 & 0.85 per leaf, respectively) and resistant to CLCV (0 %) (Table 2).

Table 2. Mean performance of introgressed lines of cotton (2003-2005) for seed cotton yield, quality and resistance characters

S.No.	Entries	Seed cotton yield (kg/ha)	Ginning outturn (%)	2.5% Span length (mm)	Uniformity ratio (%)	Micronaire value	Tenacity (g/tex)	Jassid population (per leaf)	CLCuV (%)	Bollworm damage (%)
1	AKH-8828	593	35.9*	25.7	48.0	4.6	19.3	0.56	12.79	28.0
2	IH-35	990	32.8	26.5*	47.0	4.4*	21.6*	0.52	0.00	19.4
3	IGM-102	1066	33.5	25.5	49.0	4.3*	19.5*	0.37	0.00	14.1
4	IGM-27	317	33.7	25.8	48.0	4.5*	20.5	0.63	4.17	12.0
5	IGM-106	1303	31.1	25.0	48.0	4.6	21.7*	0.29	0.00	17.3
6	IGM-105	861	33.8	25.5	48.0	4.9	19.7	0.33	3.23	12.3
7	IGM-100	477	34.6*	24.2	46.0	5.0	18.8	0.85	0.00	22.5
8	MSH-SP-91	802	32.1	25.8	47.0	4.2*	21.6*	0.89	0.00	11.8
9	MSH-345	670	32.7	25.7	47.0	4.5*	19.6	0.81	0.00	15.9
10	Rail 1-3	820	35.0*	24.1	48.0	4.5*	20.8	1.11	0.00	11.1
11	Rai 4A-2	900	34.9*	25.7	48.0	4.6	18.9	0.70	0.78	10.7
12	Rai 7B SP12	600	34.0	23.1	49.0	4.6	20.3	0.81	4.12	15.4
13	Rai 7B-1	698	36.1*	24.0	48.0	4.7	18.9	1.00	4.35	4.9
14	Rai 7B-2	827	35.3	24.6	49.0	4.7	20.4	0.67	1.11	18.8
15	Rai 9	897	34.4	24.3	49.0	4.5*	19.0	0.41	0.00	16.5
16	TCH-1653	658	33.1	25.8	46.0	4.2*	23.3*	1.33	3.39	4.9
17	TCH-1649	865	31.6	28.4*	43.0	3.6*	23.3*	0.89	3.03	21.8
18	TCH-1652	932	32.1	27.8*	48.0	4.1*	21.7*	0.89	0.00	22.5
19	TCH-1691	1082	34.8*	25.7	49.0	4.3*	22.1*	0.81	0.73	18.5
20	TCH-1693	453	35.9*	23.8	48.0	4.4*	21.1	0.66	6.06	9.8
21	TCH-1695	692	33.7	26.8*	48.0	4.5*	18.3	0.74	3.55	16.7
22	TCH-1696	936	34.7*	24.0	44.0	4.1*	20.3	0.85	2.44	7.5
23	TCH-1648	714	32.0	29.6*	47.0	4.5	20.3	1.52	2.04	9.5
24	RS-2013 (LC)	1962	33.9	25.2	49.0	4.2*	20.0	0.19	0.00	13.4
Mean		838.1	33.8	25.2	46.8	4.4	20.2	0.74	2.16	14.80
C.D. at 5%		137.14	0.60	0.94	1.45	0.18	0.89	0.13	1.24	2.44

The range of ginning out turn percentage was also very wide (5.5%). The differences among introgressed lines for 2.5% span length varied from 7B SP12 (23.1mm) smallest and TCH 1648 (29.6 mm) the highest. Three lines *viz.*, TCH 1648, TCH 1649 and TCH 1652 had 2.5% span length more than 27.8 mm coupling with highest tenacity (g/tex). Similarly, uniformity ratio and micronaire value ranged between 44 to 49 and 4.1 to 5.0 respectively. The choice of elite population for improving fibre quality was greater than seed cotton yield. As many as five lines had significantly higher 2.5 % span length over check variety RS 2013. Similarly 6 lines were found to have micronaire value between 3.2 to 4.0 and 8 lines had significantly higher tenacity (g/tex) over the check variety.

In this study, an attempt was also made to develop breeding stocks with biotic resistance in addition to high yield and fibre quality characters. Among the different lines tested, the low percentage of damaged bolls was recorded in TCH 1648, Rai 7B SP12, TCH 1695, TCH 1696 and TCH 1691 which may be due to low preference of bolls by bollworm larvae. The introgresed material involving wild species might have contributed to bollworm resistance. These results were also confirmed by the earlier reporters [2]. The introgressed lines were also screened for jassid resistance and jassid population/leaf under unprotected conditions. All the lines have jassid infestation below ETL and showed tolerance against jassid attack and confirming the results of earlier workers [3]. Hence, these lines can be used as a best source for improving jassid resistance of cultivated landraces. Data on CLCuV were also recorded in field condition by visual diagnosis. The CLCuV is transmitted from cotton to cotton by whiteflies. So, this problem can be managed most effectively by introducing resistance/tolerance in the cultivated varieties. The 9 lines *viz.*, IH-35, IGM102, IGM27, IGM106, MSH-SP-91, MSH-345, Rai 11-3, Rai 4A-2 and TCH 1652 were found resistant against CLCuV reaction. The results of the present study have demonstrated that in general, wide differences existed in productivity potential and plant type of selected introgressed lines. Wide range for seed cotton yield, fibre quality traits, resistance to CLCuV and tolerance to jassid and bollworms determining the plant type facilitate the identification of a new sources that would be worthwhile to use in hybridization with landraces to generate diverse, but adapted genetic material.

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