Evaluation of Advance Generation Populations of *G.hirsutum* cotton for High GOT% and High yield under North zone irrigated conditions

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Objectives

A. **Identification of donors for GOT %> 40.**

(1) Collection from out side sources

(2) From germplasm

(3) From breeding material

B. To develop high yielding genotypes with GOT% > or = 40%

Methodology

(I) Attempting of simple crosses.

(ii) Single plant selections in F_2 and advance generations

Practical Utility

Historically, Indian cotton breeders have focused on seed cotton yield, quality, maturity and host plant resistant traits. Advances in breeding for increased lint yields has slowed down perhaps because of its relatively low heritability and high environmental interaction. Approaches to enhance lint yield by increasing GOT% (presently around 35%) should help breeder to break the productivity barriers in response to global competition.

The present study has helped in developing material with broad genetic base and superior donor lines and development of parents with high productivity. Taking into average seed cotton yield as 25q/ha every 1% increase in GOT will result 25Kg lint yield /ha increase and targeted 5-7% shall result 125 to 175 Kg/ha lint yield increase in addition to enhancement in seed cotton yield of the candidate genotype

Studies on Inheritance Pattern of Seed and Lint Traits in Cotton (*Gossypium hirsutum*)

Number of seeds per boll, GOT and lint index exhibit high narrow sense heritability (h2 n.s.) due to the presence of additive gene action, whereas seed weight per boll, seed index and lint yield possess low heritability.

The genetic analysis suggested that number of seeds per boll, GOT and lint index could be upgraded through full-or half-sib family, pedigree and progeny selection, while exploitation of hybrid vigour would probably be the way to achieve the genetic progress in seed weight per boll, seed index and lint yield. Workers who achieved hybrid vigour for GOT% are Ansari et al (1993), Panwar et al (2008) and Mohammad et al (2003)

Dr. A. B. Joshi's Work

Delinking of negatively associated desirable (high yield) and undesirable (poor fibre quality) traits had been a breeding challenge in cotton. Joshi and his students could address this problem by indigenous breeding/selection strategies. Cotton varieties known as JK series (J stands for Joshi and K for Kadappa, student of Joshi and well-known cotton breeder in Karnataka) combining high ginning outturn and high fibre strength and fineness in high-yield backgrounds are the outcome of this effort. It was his belief that yield stagnation at low levels for long in cotton could be breached by exploitation of hybrid vigour (E. A. SIDDIQ CURRENT SCIENCE, VOL. 99, NO. 12, 25 DECEMBER 2010, pp1847-48)

Small and Medium Enterprise Development Authority SMEDA) GOVERNMENT OF PAKISTAN

Area & Production of Pakistan

The area under cotton cultivation has not changed appreciably over the last ten years. The annual cotton crop growing area is about 3 million hectares. In the future, if Pakistan has to increase production, it shall have to come mainly from increase in yield and higher GOT (Ginning Out Turn percentage), and not area. Agriculture department of province of Punjab has laid criteria for the approval of new cotton varieties - GOT not less than 40%, staple length not less than 27mm, micronaire not more than 4.8, strength 95,000 psi, uniformity ratio not less than 48 and boll size not less than 4gm .

Detailed Selection Procedure&Methodology

1. In the first year crosses shall be attempted between agronomically superior 5 varieties like H-1098i ,F-1861,F-1378 ,F-846,LH-1134, H-1226, CSH-3129,LH-2108,LH-2107, RS-875 and F2164 (11) with high GOT% lines (16).

2. In the second year Higher yielding (in comparison to agronomically superior parent) one or two F_1s out of 16crosses of each variety with GOT% hybrid vigour >40% shall be selected

3. In third year about 200 plants in F_2 raised of each cross shall be ginned and higher yielding plants with GOT% > =40% shall be selected.

4. In fourth year higher yielding F_3 plants (about 200) of each cross with GOT% >40% shall be raised and plants with GOT% >40% shall be selected.

5. Process shall continue and in F_6 material shall be bulked for each cross for GOT% > =40% separately

F_1's attempted between 11 agronomically superior varieties and high GOT germplasm lines

Male and Female parents of crosses attempted in 2012-13

Sr. No.	Female Parents	Sr. No.	Male Parents (High GOT% 37 to 41%)
1	H-1098	1	IC-359508
2	**F-1861**	2	IC-357333
3	F-1378	3	IC-358382
4	LH-2107	4	IC-357203
5	LH-2108	5	IC-357631
6	F-2164	6	IC-356665
7	F-846	7	IC-358479
8	LH-1134	8	SA-1237
9	CSH-3129	9	IC-357726
10	H-1226	10	EC-356785
11	**RS-875**	11	EC-359059
		12	EC-358002
		13	EC-357032
		14	EC-359044
		15	EC-SA-668
		16	EC-SA-524

Details of Experiment

Date of Sowing: 28/04/2016

No.of F_5 populations= 19 (of Crosses of RS-875xSA-524 and F1861xSA-668)

No.of rows & Replications=3

Plot area=10.33sqm

Spacing=67.5x30cm

Date of Final picking=11/11/2016

No.of Checks=2(H-1226& F-1861)

Table: Top 5 genotypes in Replicated evaluation of 19 F5 selections of selected crosses

Genotype/Population	Seed Cotton Yield (Kg/ha)	Lint yield (Kg/ha)	GOT %	Boll weight (g)	Boll No. /plant	Plant height (cm)	No. of Monopod	No. of Sympods	Plant Stand (Out of 34)
RS875xSA524 P12	2304.52	935.60	40.60	3.02	23.90	115.00	0.33	13.93	29.67
F1861xSA668 P15	2202.85	848.00	38.50	2.65	22.20	125.00	0.57	13.38	30.67
RS875xSA524 P4	2198.01	857.22	39.00	2.85	20.37	112.00	0.80	13.13	28.67
F1861xSA668 P57	1931.73	772.4	40.00	2.83	22.90	144.20	1.57	11.73	27.33
F1861xSA668 P6	1849.42	730..5	39.50	2.58	27.90	148.17	1.13	16.80	27.00
H 1226 (Check)	1717.37	59249	34.50	2.80	19.10	136.33	1.20	12.33	29.67
F1861 (Check)	1751.09	593.40	34.00	2.90	17.67	133.50	1.17	12.00	23.00
CD	292.21	80.69	1.01	0.25	3.93	19.43	0.64	2.13	2.74
CV (5%)	14.63	29.54	5.95	5.38	11.07	9.61	12.28	10.15	6.83

Table: Fibre properties of Top 5 genotypes in evaluation of 19 F5 selections of selected crosses

Genotype/Population	UHML (mm)	UI	Strength	MIC
RS875xSA524 P12	26.8	81	25.2	4.5
F1861xSA668 P15	26.9	82	26.1	4.7
RS875xSA524 P4	26.7	82	25.1	4.3
F1861xSA668 P57	27.3	82	26.4	4.4
F1861xSA668 P6	26.8	82	26.5	4.7
H 1226 (Check)	27.7	82	25.8	4.5
F1861 (Check)	27.9	82	26.6	4.4

Entomological and Pathological Data

Entry	Jassid Grade	Sucking Pests /3 Leaves			PDI
		Leaf hopper	White Fly	Thrips	
F1861xSA668 P15	1	1.30	9.53	2.90	23.89
RS875xSA524 P12	1	0.80	9.47	3.03	22.22
RS875xSA524 P4	1	9.40		2.70	21.11
F1861xSA668 P57	1	1.23	9.93	3.53	30.00
RS875xSA524 P15	1	1.17	10.53	2.60	23.33
H 1226 (Check)	1	1.57	13.87	2.73	20.56
F1861 (Check)	1	1.57	12.33	3.57	22.22

Single plant view of RS875xSA524 P12 Sponsored in AICCIP compact type trial 2017 as CSH-3824

Field View of RS875xSA524 P12 (F-5 Compact)
Sponsored in AICCIP Compact type trial 2017 as CSH-3824

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Field view of CSH-3075

Single plant of CSH-3075

Field view of CSH-3129 (Single Plant as well as Field)


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