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Okra Leaf Cotton, its Commercial Utilization in Sindh

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Abstract: Studies were under taken to assess the yield, earliness and insect pest resistance of some newly developed okra leaf strains compared with normal leaf commercial varieties CRIS-9 and NIAB-78. Accordingly, almost all the okra leaf mutants yielded better than NIAB-78. Out of nine okra leaf strains, throb were better yields, two equally good and four gave low yield than CRIS-9 the second check variety. Highest yielding okra leaf strain produced 27 and 35 percent higher yield than CRIS-9 and NIAB-78 respectively. Okra leaf strains were documented as early maturing, whitefly tolerant and boll rot disease resistant. Realizing the better performance of okra leaf strains with reduced insecticide applications, the commercial utilization of these varieties in Sindh can not be ignored and may prove better replacement of current cultivars.

Key words: Okra leaf, upland cotton, heterozygous, super okra, open canopy, earliness, boll rot

Introduction

Okra leaf (gene symbolized as Lo) a mutant found in certain stocks of American upland 6:ottan$_i$ and a super okra leaf (gene Ls) a newly developed mutant, that has greater reduction of leaf area than okra leaf, so that the heterozygous super okra is indistinguishable from homozygous okra. The leaf shape alleles including a sub-okra (Lu) and normal leaf (L) are the members of allelic series at the 'L' locus on chromosome 15 of 'D' genome Stephens (1945), Green (1953) and Endrizzi and Kohel (1966).

The advantage of okra *and* super okra cottons has been substantially explained in the suppression of boll rot, due to within canopy micro climatic changes by allowing comparatively more sunlight and less lamina dew position, thereby creating unfavorable environments for the development of boll rot organisms. The okra leaf varieties are also documented for their early maturity, whitefly and pink bollworm resistance, and less trash content. Okra leaf permits reasonable weed control without excessive usage of herbicides and produces yields as good as or better than normal leaf.

Andries *et al*. (1969) and Jones (1982) observed that okra leaf shape was associated with significantly higher flowering rate during the first six weeks of fruiting. They also opined that okra leaf cotton was ready for harvest about one to two weeks earlier than normal and has a positive effect on yield due to reduction in boil rot disease. Jones (1982) observed that okra leaf shape affords some gains in earliness, exerts favorable impact on some important pests, provides safety margin against inadequacy of light within the canopy, permits reasonable weed control without excessive usage of herbicides and produces yields as good as or better than normal leaf. Okra and super okra leaf shape mutants give open plant canopy. Mature okra leaf plants have about 40 percent less foliage than normal leaf varieties and permit 70 percent more sunlight to penetrate the canopy by Jones (1972).

Okra leaf confers resistance to banded wing whitefly Jones *et al*. (1975). Wilson and George (1982) indicated that okra leaf has considerable value against pink bollworms. Wilson (1986) showed that okra leaf breeding stocks in certain backgrounds have a modest level of resistance to pink bollworm and yield as much or more lint than do normal leaf cultivars. Butler *et al*. (1986) tested 15 cotton strains in Israel against whitefly and observed lowest whitefly population on okra leaf cottons.

Jones and Andries (1967) reported that okra leaf caused highly significant reduction in boll rot incidence, increased earliness, lint percentage, boll size and micronaire at one of the two test locations. Further, Andries *et al*. (1972) conformed that okra and super okra leaf canopy caused significant reduction in boll rot. Okra leaf significantly increased yield, but super okra caused a slight reduction in yield. Both leaf shapes substantially increased earliness, lint percentage and micronaire value. Okra leaf shape had no effect on fiber length.

El-Zik and Thaxton (1993) in their recent studies compared yield, earliness and fiber traits of okra leaf cotton with the normal leaf. They reported that okra leaf produced less or equal lint yield, earlier in maturity, less or equal in lint percent, also produced longer, stronger and equally uniform fiber.

Keeping in view the previous studies that okra leaf varieties are tolerant to some major insects like whitefly, Heliothis and pink bollworm (Table 1) and boll rot disease, CCRI, Sakrand worked on breeding for okra leaf cotton varieties. These studies were under taken to evaluate the performance of these strains against normal leaf commercial checks NIAB-78 and CRIS-9 in respect of yield, earliness and insect/disease resistance.

Yield Comparison and Boll Rot Disease Incidence Trials: The yield performance and boll rot disease resistance of okra leaf strains against normal leaf checks NIAB-78 and CRIS-9 was evaluated during 1997-98 season in randomized complete block design trial replicated four times. The trial received recommended agronomic practices without

Table 1: Host plant resistance effects of okra leaf on major insects

Insect	Effect	Reference
Whitefly (*Bemisia tailed*)	Reduced numbers	-
Heliothis spp.	Reduced numbers	-
Pink bollworm	Increased egg/larval mortality	Wilson and George (1982) and Wilson (1986)

Table 2: Average performance of okra leaf strains compared with two checks at CCRI, Sakrand

Strains	Seed cotton yield (kg ha^{-1})	Lint percent	Staple Length (mm)	Uniformity ratio (%)	Boll rot disease incidence (%)
CRIS-285	1450 c	34.4	27.2	55.8	1.2
CRIS-289	1374 c	33.6	27.4	55.4	1.8
CRIS-291	1527 c	37.6	28.1	54.8	0.9
CRIS-299	1298 c	35.0	27.5	53.7	1.3
CRIS-306	1450 c	40.6	25.6	52.6	1.1
CRIS-310	1985 a	36.0	26.4	52.7	0.5
CRIS-312	1298 c	40.3	25.6	56.6	2.2
CRIS-381	1374 c	31.5	28.3	59.5	1.8
CRIS-385	1603 b	36.0	28.1	54.3	0.8
NIAB-78 (Check)	1298 c	35.0	26.5	54.4	6.9
CRIS-9 (Check)	1450 c	36.0	26.5	52.9	6.0

Table 3: Earliness comparison of okra leaf strains with normal leaf commercial varieties during 1997-98 at CCRI, Sakrand

Strains	Bolls formed			Bolls opened		Percent opening 150 clap
	90 dap	120 dap	150 dap	120 dap	150 dap	
CRIS-285	15	29	43	21	38	88.4
CRIS-289	12	22	32	15	26	81.2
CRIS-291	18	37	48	25	41	85.4
CRIS-299	13	24	34	16	29	85.3
CRIS-306	14	30	41	19	37	90.2
CRIS-310	22	45	61	31	55	90.2
CRIS-312	11	21	30	13	23	76.7
CRIS-381	13	24	41	16	33	80.5
CRIS-385	17	32	44	22	38	86.4
NIAB-78 (Check)	12	23	40	19	32	80.0
CRIS-9 (Check)	10	21	39	19	31	79.5

Table 4: Average population (per leaf) of sucking complex on okra leaf strains compared with commercial varieties during 1997-98 at CCRI, Sakrand

	Population per leaf		
Strains	Thrips	Jassid	Whitefly
CRIS-285	3.81	0.89	0.87
CRIS-289	4.07	0.36	0.81
CRIS-291	3.64	0.59	0.92
CRIS-299	4.18	1.17	0.73
CRIS-306	3.88	0.95	0.95
CRIS-310	2.32	0.33	0.90
CRIS-312	3.37	1.21	0.82
CRIS-381	3.85	1.01	1.01
CRIS-385	3.89	0.73	0.79
NIAB-78 (Check)	4.83	0.98	1.91
CRIS-9 (Check)	4.53	1.03	1.89

insecticide applications. The yield, quality characters and boll rot disease incidence data are presented in Table 2. The yield data revealed that almost all the okra leaf strains yielded better than NIAB-78 the check variety, which is grown on approximately 85 percent area of Sindh. Out of nine okra leaf strains, three were better yielders, two equally good and four gave low yield than CRIS-9, the second check variety of Sindh. Highest yield of 1985-kg ha^{-1} was produced by CRIS-310, which was 27 percent higher than CRIS-9 and 35 percent than NIAB-78.

The data for lint percent revealed that two okra leaf strains ginned above 40 percent, only three okra leaf strains out of nine, recorded less lint percent than normal leaf checks. The same trend was observed in staple length and uniformity ratio data.

As regards boll rot disease, data presented in Table 2 indicated that all the okra leaf strains recorded minimum disease incidence as against two normal leaf checks. The boll rot disease incidence ranged from 0.5 to 2.2 percent in okra leaf strains as against 6.0 and 6.9 percent of CRIS-9 and NIAB-78 respectively. These findings confirm the previous findings of Jones and Andries (1967) and Andries *et al.* (1972) that okra leaf varieties are resistant/tolerant to boll rot disease.

Earliness Comparison Trials: Earliness comparisons were also conducted in okra leaf strains against normal leaf commercial varieties NIAB-78 and CRIS-9. The data presented in Table 3 revealed that all the okra leaf varieties were earlier by 2 to 11 percent than normal leaf standards except CRIS-312, which was about 35 percent late when compared at 150 days after planting. These studies confirm the previous results of Andries *et al*. (1969) and Jones (1982) that okra leaf trait enhances earliness.

Sucking Complex Resistance Trials: Okra leaf strains were also tested for their resistance against sucking complex (thrips, jassid and whitefly) infestation during 1997-98 in an untreated plot. The data presented in Table 4 revealed that all the okra leaf strains recorded less thrips infestation than the normal leaf checks. Mix trend of jassid population was observed in both leaf shapes. Okra leaf strains recorded minimum whitefly populations when compared with normal leaf commercial varieties NIAB-78 and CRIS-9. These results are in conformity with those of Jones *et al*. (1975) and Butler *et al*. (1986).

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