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Short Communication

Selection for combining premature-flowering resistance with high fibre yield in tossa jute

D. Kumar and S. M. Palve

Division of Crop Improvement, Central Research Institute for Jute and Allied Fibres, Barrackpore 743 101

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The present study was carried out in tossa jute (*Corchorus olitorius* L.) to select cross combinations between parents with high general combining ability for fibre yield and to carry forward the segregating generations for selecting transgressive segregates that can be used as high yielding varieties capable of being sown earlier than the existing varieties without risk of premature-flowering rendering them to be better fitted in multiple cropping sequence.

Eleven good performing genotypes of which seven directly selected shortlisted exotic lines, collected recently from Kenya and Tanzania by International Jute Organization, *viz.*, KEN/DS/030C, KEN/DS/038C, KEN/DS/068C, TAN/SM/046C, TAN/SM/074C, KEN/SM/024C and KEN/BL/071C showing high degree of premature-flowering resistance with good agromorphological features mainly plant height, basal diameter and optimum growth habit and four well adapted indigenous varieties *viz.*, JRO 7461, JRO 524, JRO 7835 and JRO 36E having high fibre yield and moderately resistant to premature-flowering were intermated in non-reciprocal diallel cross fashion in 1993 kharif. The resultant 55 single crosses and eleven parents were evaluated in 1994 in randomized block design with 3 replications. Each entry consisted of single row of 3m length. The row to row and plant to plant distances were 30 cm and 5-7 cm respectively. Standard agronomical practices were followed to raise the crop. Random 10 plants were harvested from each entry to assess fibre yield. Data on fibre yield were subjected to diallel analysis following Model 1, Method 2 of Griffing [1].

Seven cross combinations were chosen and carried forward by modified bulk method up to F_4 generation. At F_4 generation in 1997, 65 individual plants from each population were selected. Seeds of these individual plants were increased in off-season (November-February). In the next year these 455 lines were grown under two natural thermophotoperiodic regimes through manipulation of sowing dates *viz.*, early March and middle of March to assess the degree of premature-flowering resistance of these lines.

Ten promising lines with highest degree of premature-flowering resistance were selected and subjected to microplot yield trial along with ruling check varieties, JRO 524 and JRO 7835, for consecutive two years (1999 and 2000) in randomized block design with 3 replications. The sowing was done in middle of March. The plot size was 3.0 m × 4.5 m. In between rows and plants distances were 30 cm and 5-7 cm respectively. On an average 825 plants were raised in each plot. Net plots were harvested and plot yield data were scored.

Diallel analysis of variances showed that both general and specific combining ability for fibre yield were highly significant indicating the importance of both additive and non additive genetic components in the manifestation of this character. Ratio of additive genetic variance to total genetic variance (heritability, narrow sense) was low for fibre yield in tossa jute suggesting that this character was largely determined by non-additive genetic component of heritable variance as was also reported in another cultivated species of jute, *C. capsularis*, by Kumar *et al.* [2] and Kumar and Palve [3]. However, Saha *et al.* [4] observed predominant role of additive genetic component for fibre yield in the same species. Such a difference in expression of genetic components controlling yield simply indicates parental sample difference in genetic make up. In view of low heritability the response to selection would be obviously slow for fibre yield.

Out of 11 parents only two commercial varieties *viz.*, JRO 524 and JRO 7835 were the desirable combiners for fibre yield (Table 1). However, SM/024C also showed numerically high gca effect though not significant. The only other parent, JRO 36E, showed positive though very low gca effect for this character.

All other seven parents *viz.*, DS/030C, DS/038C, DS/068C, SM/046C, SM/074C, BL/071C and JRO 7461 showed negative gca effects. Since this species is predominantly self-poilinated, the utilization of dominance component in absence of male sterile line is not possible. Hence seven crosses *viz.*, DS/038C × JRO 524, DS/068C × JRO 7835, SM/046C × SM/024C, SM/024C × JRO 7835, SM/024C × JRO 36E, JRO 524 × JRO 36 E and JRO 7835 × JRO 36E between parents showing high gca effect for one or both parents and high sca effects for their hybrids were chosen to select transgressive segregates for high fibre yield coupled with highest degree of premature-flowering resistance from the advanced generation of these crosses.

Out of 455 elite lines, 10 lines showed highest degree of premature-flowering resistance as they flowered after 100 days under both sowing dates. Performance of these short-listed lines in microplot yield trials in 1999 and 2000 is presented in Table 2. From analysis of variance these lines showed highly significant differences amongst them for fibre yield, indicating presence of genotypic difference. Some of the promising lines *viz.*, JRO 2365, JRO 2362, JRO 2366, JRO 2361 and JRO 2360 yielded significantly and critically higher than the ruling check varieties and outyielded JRO 524 by 25-44% and JRO 7835 by 13-30%. All these five high yielding lines were selections from crosses between exotic germplasm and well adapted variety. All these lines showing premature-flowering resistance in middle of March sowing were found suitable for sowing even earlier than the existing varieties without any risk of premature-flowering and thereby allowing transplantation of paddy after jute in multiple cropping system.

Table 1. Fibre yield performance of 7 selected crosses and their parents along with their sca and gca effects

Cross	F_1		Female parent		Male parent	
	Mean g/plant	sca effect	Mean g/plant	gca effect	Mean g/plant	gca effect
DS/038C × JRO 524	18.40	26.59	9.70	–2.32	15.00	11.97*
DS/068C × JRO 7835	19.27	35.72*	12.50	–1.70	15.33	10.89*
SM/046C × SM/024C	18.17	27.97	12.67	–2.42	14.10	8.35
SM/024C × JRO 7835	15.30	14.08	14.10	8.35	15.33	10.89*
SM/024C × JRO 36E	16.53	8.05	14.10	8.35	12.80	1.17
JRO 524 × JRO 36 E	17.07	9.77	15.00	11.97*	12.80	1.17
JRO 7835 × JRO 36E	17.80	18.18	15.33	10.89*	12.80	1.17

*Significant at P = 0.05

Table 2. Performance of the selected elite tossa jute lines

Line/variety	Pedigree	Fibre yield (q/ha)			Rank	Increase % over ruling check varieties	
		1999	2000	Mean		JRO 524	JRO 7835
JRO-2360	DS/038C × JRO 524	26.73	27.00	26.87	5	24.80	12.99
JRO-2361	DS/038C × JRO 524	27.10	27.09	27.09	4	25.82	13.92
JRO-2362	DS/068C × JRO 7835	28.70	28.79	28.75	2	33.53	20.90
JRO-2363	SM/046C × SM/024C	25.61	25.73	25.67	7	19.23	7.95
JRO-2364	SM/024C × JRO 7835	25.61	25.98	25.80	6	19.83	8.49
JRO-2365	SM/024C × JRO 7835	31.06	30.89	30.98	1	43.89	30.28
JRO-2366	SM/024C × JRO 36E	27.79	27.99	27.89	3	29.54	17.28
JRO-2367	JRO 524 × JRO 36E	22.85	22.92	22.89	11	6.32	–3.74
JRO-2368	JRO 524 × JRO 36E	24.37	24.53	24.45	9	13.56	2.82
JRO-2369	JRO 7835 × JRO 36E	25.73	25.50	25.62	8	18.99	7.74
JRO-524 (Check Var. 1)	Sudan green × JRO 632	20.98	22.08	21.53	12	-	–9.46
JRO-7835 (Check Var. 2)	Sudan green × JRO 632	23.78	23.77	23.78	10	10.45	-
F. Test		H.S.*	H.S	H.S			
SE (m)		0.38	0.25	0.26			
CD 5%		0.78	0.52	0.54			

* H. S. dentoes highly significant

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