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HETEROSIS, POTENCE RATIO AND INBREEDING DEPRESSION IN ROSELLE (*HIBISCUS SABDARIFFA* (L.) VAR. *ALTISSIMA*)

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ABSTRACT

Heterosis, potence ratio and inbreeding depression were studied in three intervarietal crosses of roselle in F_1 and F_2 generations, respectively. Significant heterosis was observed for days to flowering, basal diameter, fibre weight, seed yield and oil content.

Key words: Heterosis, potence ratio, inbreeding depression, roselle.

Roselle (*Hibiscus sabdariffa* (L.) var. *altissima*) is an important substitute of jute. It can be exploited further for production of hybrids due to its cross-pollinated nature, convenience in crossing, and more seeds set per capsule. Information on hybrid vigour and inbreeding depression is not available, hence the present study has been undertaken.

MATERIALS AND METHODS

Five parents, 3 F_1s and 3 F_2 populations were grown in randomised block design with three replications. The plot consist of 2 rows, 6 m long, with the spacing of 30 x 30 cm. The recommended cultural practices were followed. Observations for eleven metric traits were recorded on 30 random plants in each treatment. Heterosis and inbreeding depression were estimated as suggested by [1, 2] and potence ratio was worked out as per [3].

RESULTS AND DISCUSSION

The results on performance of parents, F_1 and F_2 for 11 characters are presented in Table 1. Heterosis over better parent (BP), potence ratio and inbreeding depression for the same characters are given in Table 2.

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Table 1. Performance of parents, F_1 and F_2 populations for various quantitative characters in roselle

Character	Parents					F_1			F_2		
	ER-77	HS-7910	AR-77	AR-51	AR-95	X1	X2	X3	X1	X2	X3
Height at fibre harvest (cm)	129.8	235.7	214.4	174.3	139.1	256.7	248.2	202.9	209.1	187.9	204.8
Height at seed harvest (cm)	141.7	242.6	217.8	174.3	139.1	254.2	247.2	198.0	218.1	199.4	212.7
Basal diameter at fibre harvest (cm)	1.2	1.6	1.4	1.5	0.9	2.5	2.0	1.8	1.6	1.4	1.4
Basal diameter at seed harvest (cm)	1.1	1.6	1.3	1.4	0.9	2.5	2.0	1.6	1.5	1.4	1.4
Days to flower	121.3	141.1	138.4	134.8	141.1	125.4	132.3	128.9	128.1	135.5	131.0
Green weight (g)	67.9	181.8	127.5	140.8	97.8	230.1	236.5	227.6	187.2	113.7	119.7
Fibre length (cm)	93.1	195.5	177.7	134.4	109.8	221.0	208.5	171.0	156.8	157.5	153.2
Fibre weight (g)	4.3	10.8	9.2	138.5	3.8	15.7	17.8	12.9	9.5	7.5	7.1
Fibre percentage	17.7	10.3	11.7	15.2	17.7	16.9	12.1	11.9	9.8	11.7	11.6
Seed yield per plant (g)	8.6	10.7	8.8	8.4	8.3	44.7	11.2	13.3	11.2	7.9	5.8
Oil content (%)	17.7	17.6	10.1	18.1	18.4	17.7	19.0	18.2	17.4	18.4	18.0

X1—ER-77 x HS-7910; X2—AR-77 x AR-51, and X3—AR-77 x AR-95.

Heterosis over better parent (BP) was significant for basal diameter and seed yield in the cross ER-77 x HS-7910 but not for fibre or oil yield. In the cross AR-77 x AR-51, heterosis was significant for fibre weight and oil content. Inbreeding depression was also significant for fibre weight which indicates the possibility of getting high yield only in the hybrid generation. Unlike fibre yield, oil content did not have significant inbreeding depression which means that selection can be done effectively in F_2 generation for oil yield. Significant heterosis was observed for basal diameter. Basal diameter is highly correlated with fibre yield [4]. In the cross AR-77 x AR-95, significant BP heterosis was recorded for days to flower, for which inbreeding depression was not significant. This is a convenient situation for the development of short duration hybrids.

From the present study it is concluded that heterosis can be exploited in the cross ER-77 x HS-7910 for seed yield, in AR-77 x AR-51 for fibre and oil yield, and in AR-77 x AR-95 for development of short duration hybrids of roselle.

Table 2. BP Heterosis, potence ratio and inbreeding depression for different characters in roselle

Character	ER-77 x HS-7910			AR-77 x AR-51			AR-77 x AR-95		
	heterosis (%)	P.R.	I.D.	heterosis (%)	P.R.	I.D.	heterosis (%)	P.R.	I.D.
Height at fibre harvest	18.9	1.40	18.6	15.8	2.50	24.3*	- 5.2	0.69	- 0.9
Height at seed harvest	4.8	1.23	14.2	13.5	2.35	19.3	- 9.1	0.50	- 7.4
Basal diameter at fibre harvest	55.5**	5.11	38.4**	37.2*	19.35	31.0*	27.5*	6.89	- 7.7*
Basal diameter at seed harvest	60.4**	4.82	39.2**	13.1	4.08	15.2	27.5	2.16	15.4
Days to flower	3.3	- 0.59	- 2.2	1.8	- 2.30	- 2.4	- 6.9**	8.32	- 1.6
Green weight	26.6	1.85	18.6	67.9	15.31	51.9	78.5	7.74	47.4
Fibre length	13.0	1.50	29.0**	17.3	2.42	24.5**	- 3.8	0.80	4.6**
Fibre weight	44.5	2.50	39.2	92.4*	23.47	55.8**	40.1	2.37	45.3
Fibre percentage	- 37.1	- 3.74	- 33.0	- 21.4	0.68	- 14.1	- 40.6	0.74	1.3
Seed yield per plant	291.6*	33.70	73.5**	- 16.2	0.20	26.6	46.7	7.40	52.7
Oil content	- 0.8	- 0.20	1.7	4.6*	28.0	3.0	- 1.0	- 0.10	1.1

*,**Significant at 5% and 1% levels, respectively.

P.R.—potence ratio, I.D.—inbreeding depression.

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