

EVALUATION OF SOME VARIETIES AND HYBRIDS OF CASTOR (*RICINUS COMMUNIS* L.)

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SUMMARY

An evaluation of some varieties and hybrids of castor indicated that the early maturing varieties NPH1, VI-9, RC-11, R-63 and JI44 were superior in yield to the long duration check varieties such as Campinas, Amarela and Sipeal-1. The variety NPH1 was found to be superior in yield to the best hybrid of F-B x R-63, while the rest four were comparable to the productive hybrids. It is suggested that these varieties could be cultivated in semi-arid Northeastern Brazil. Among the fourteen hybrids studied, one F₁ hybrid of 48-2 x S. No. 17 showed perceptible degree of heterosis.

INTRODUCTION

A major part of castor (*Ricinus communis* L.) production in Brazil comes from the northeastern states characterized by low yields ranging from

400 to 800 kg/ha (6). Considering the drought resistant nature of this crop, there is every need to identify promising castor varieties with early maturity and high yield potential suited to the agro-climatic conditions of semi-arid regions of Brazil, not only to stabilize agricultural production of the region, but also to support the oil seed processing industry which is facing a crisis due to lack of adequate raw material (2).

The monoecious nature of castor plant, as well as the availability of pistillate castor genotypes favour the development of productive hybrid varieties (7).

A study was therefore conducted to evaluate some varieties of castor as well as their hybrids.

2. MATERIALS AND METHODS

Nine Indian varieties viz., NPH-1, RC-11, VI-9, JI-44, R-63, H. O, 48-2, SNo-17 and 157B, one North American variety F-B and three Brazilian varieties viz., Amarela, Campinas and Sipeal-1 of castor were evaluated in a randomized block design with three replications

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during the period from September 1981 to March 1982 (first season) in the fields of the Dept.^o de Fitotecnia, CCA, UFC at Fortaleza, Brazil. During this period crosses were also made separately among the first ten varieties and seeds of eighteen F₁ hybrids were produced as per the crosses indicated in Table I. Subsequently, during November 1982 to May 1983 (second season), all the above mentioned thirteen varieties and the eighteen hybrids were evaluated in a randomized block design with three replications in the fields of the Unidade de Pesquisa do Litoral-EPACE at Pacajus. In both cases the net plot size consisted of a single row of 5.0m spaced at 1.0m with an inter-plant spacing of 50cm within a row. In both seasons the crop received four irrigations and was fertilized at the rate of 40kg N, 50kg P₂O₅ and 40kg K₂O per hectare. Days to flowering and maturity were calculated in the second season, as the number of days from emergence to first flower opening and maturity of the capsules leading to harvest, respectively. The yield of all plants in net plot were added up and averaged to yield per plant. The yield data were analyzed as per the standard statistical methods (3). In the case of hybrids, heterosis for seed yield was calculated as percent higher yield over the better parent.

3 RESULTS AND DISCUSSION

The data pertaining to days to flowering and maturity and yield per plant in respect of the varieties and hybrids and heterosis for yield in the case of hybrids are presented in Table I. Considering the performance of the varieties alone, it can be observed that the strains NPH1, VI-9, RC-11, R-63, JI-44, H. O. and S. No. 17 expressed higher yields as compared to the varieties Amarela, Campinas and sipeal-1 in each season, as well as, when mean yields of both seasons were considered. Apart from their higher levels of yield, these

seven varieties exhibited striking earliness in flowering and maturity than the rest of the varieties. Among them, while VI-9 gave the highest yield in the first season, NPH1 yielded the highest in the second season. Of these seven, the varieties NPH1, VI-9, Rc-11, R63 and JI44 represent the most productive genotypes with early flowering and maturity, a combination which renders them suitable for cultivation under semi-arid conditions characterized by periodical moisture stress (4).

Among the hybrids studied, Fls. of F-B x R-63, 48-2xRc11, 157B x VI-9 gave the highest yields ranging from 203.3 to 230.7g per plant in that order. The hybrids of F-B x R-63, 157B x VI-9, 48-2 x SNo. 17 and 157B x 48-2, however, exhibited 16.8%, 12.1%, 54.6% and 15.3% yield increases, respectively, over their better parents. Rest of the hybrids did not show any superiority over the better parent involved in the cross combination. Lack of higher levels of heterosis and significant degrees of inbreeding depression despite its allogamous nature (5) makes castor an interesting material for genetic investigations. Despite the absence of higher levels of heterosis for yield in a large number of hybrids studied, observation of perceptible degree of heterosis at least in the case of one cross viz., 48-2 x SNo. 17 indicates the possibility of developing heterotic hybrids of castor selecting appropriate parents (1).

Considering the performance of the varieties and the hybrids together, it is evident that the variety NPH-1 significantly excelled the most productive hybrid of F-B x R-63 in yield, while the varieties RC11, R63 and VI-9 are well comparable to the first four productive hybrids in yield in addition to their early flowering and maturity. These varieties shall be of substantial use in the semi-arid regions of Brazil, in view of their superiority in yield over the presently available long duration varieties such as Amarela, Campinas and Sipeal-1.

TABLE I

PERFORMANCE OF CASTOR VARIETIES AND HYBRIDS

SNo	PARENT/CHECK/ F ₁ HYBRID	Days to		Yield per plant (g)			Heterosis for yield
		Flowe- ring	Matu- rity	First season	Second season	Mean	
	<i>Parents</i>						
01	NPH 1	29	115	140.0	275.0	207.5	
02	RC 11	30	120	128.3	237.1	182.7	
03	VI-9	27	117	196.7	181.4	189.1	
04	JI 44	27	116	110.0	160.0	135.0	
05	R-63	27	110	148.1	197.5	172.8	
06	H. O.	30	120	112.2	92.0	102.1	
07	F-B	36	125	58.8	92.0	75.4	
08	48-2	32	122	68.4	91.1	79.8	
09	S. No. 17	27	120	72.1	93.8	83.0	
10	157-B	50	150	67.2	80.0	73.6	
11	Amarela (Check)	63	165	32.5	41.2	36.9	
12	Campinas (Check)	65	170	28.0	35.3	31.7	
13	Sipeal-1 (Check)	52	138	63.8	94.7	79.3	
	<i>F₁-Hybrids</i>						
14	F. B. x R-63	30	120	—	230.7	—	16.8
15	48-2 x RC 11	34	125	—	216.0	—	—
16	157B x VI-9	34	126	—	203.3	—	12.1
17	NPH 1 x 48-2	32	121	—	171.1	—	—
18	48-2 x SNo. 17	27	120	—	145.0	—	54.6
19	VI-9 x NPH-1	28	117	—	139.8	—	—
20	RC-11 x 48-2	33	121	—	138.9	—	—
21	RC-11 x H. O.	32	120	—	136.4	—	—
22	48-2 x JI-44	27	115	—	126.9	—	—
23	VI-9 x RC-11	29	118	—	117.3	—	—
24	VI-9 x 48-2	27	116	—	109.3	—	—
25	157B x 48-2	39	127	—	105.0	—	15.3
26	H.O x NPH-1	30	117	—	97.5	—	—
27	VI-9 x SNo. 17	31	121	—	94.3	—	—
28	H.O x VI-9	30	120	—	92.5	—	—
29	SNo. 17 x JI-44	30	120	—	76.0	—	—
30	JI-44 x RC 11	35	125	—	71.7	—	—
31	JI-44 x SNo. 17	39	130	—	65.1	—	—
	SEm [±]	—	—	7.2	9.7	—	—
	CD at 5%	—	—	21.8	31.2	—	—

4. RESUMO

A avaliação de alguns cultivares e híbridos de mamona revelou que os cultivares precoces NPH1, VI-9, RC11, R63 e J144 foram melhores em produção do que as testemunhas Campinas, Amarela e Sipeal-1 com maturação tardia. O Cultivar NPH1 foi superior em produção ao melhor híbrido de F-B x

R63, enquanto os outros quatro restantes comportaram-se igualmente aos híbridos produtivos. Sugere-se que os cultivares NPH1, V19, RC11, R63 e JI44 poderiam ser cultivados nas regiões semi-áridas do nordeste do Brasil. Dentre os 14 híbridos estudados, apenas o híbrido F₁ de 48-2 x S.No. 17 mostrou grau perceptível de heterose para produção.

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