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Short Communication

PERFORMANCE AND GENETIC ESTIMATES OF MASS SELECTED POPULATIONS IN CASTOR UNDER RAINFED CONDITIONS

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As variations were noted for flowering and capsule number in castor varieties HC-6, HC-8 and JI-35 mass selection was practised for three cycles beginning with 1991. The population CCP-1 developed by interbreeding by allowing free flow of genes among selected lines of above varieties also underwent mass selection. The selection criterion was high yield together with earliness. Ten entries viz., HC-6 (E), HC-6 (M), HC-8 (E), HC-8 (M), JI-35 (E), JI-35 (M), CCP-1 (E), CCP-1 (M), Aruna and GCH-4 each with five rows of 5 m length were grown during Kharif, 1994 under rainfed conditions in a randomised block design with three replications. All recommended cultural practices and plant protection measures were adopted to raise a good crop. The crop received a total rainfall of 669.8 mm in 39 rainy days. During the crop growth, three dry spells each beyond 10 days occurred. The first dry spell (11 days) occurred when the crop was 24 days old. The second dry spell (12 days) occurred when the crop was 53 days old (coincided with flowering of primaries and early secondaries) and persisted. The third dry spell of 15 days occurred at 74 days after sowing coinciding with flowering of secondaries and tertiaries. Observations on plant, spike and seed characters were recorded from five random plants in each plot. Days to 50% flowering was recorded on plot basis. Analysis of variance for the design was done and the phenotypic and genotypic coefficients of variation, heritability in broad sense were computed.

The variability in each of the character was significant (Table 1). HC-8 (M) recorded higher yield (46.6 g/pl) than early version (32.3 g/pl). In entries JI-35, HC-6 and CCP-1 the early versions had higher yield, showing that three cycles of mass selection have proved effective [1].

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Table 1. Performance of castor genotypes for various characters during kharif 1994

Character	HC-8 (E)	HC-8 (M)	JI-35 (E)	JI-35 (M)	HC-6 (E)	HC-6 (M)	CCP-1 (E)	CCP-1 (M)	Aruna	GCH-4	CD (0.05)
Plant height (cm)	58.3	58.2	67.8	66.3	70.0	68.9	61.5	57.1	67.2	56.0	3.87
Total spike length (cm)	24.1	27.7	22.5	23.2	25.2	22.8	23.0	23.7	18.4	20.6	1.68
Effective spike length (cm)	19.8	25.3	19.4	16.7	18.1	18.7	18.9	17.9	14.3	16.7	2.24
Unfilled seed no.(p)	28.6	17.6	20.7	11.0	20.3	26.1	14.2	6.4	11.6	13.1	0.80
Unfilled seed wt. (p) (g/p1)	1.6	2.2	2.1	0.8	1.3	1.6	0.9	0.9	0.8	1.0	0.08
Unfilled seed no. (s)	12.3	13.5	24.3	22.6	16.3	54.5	20.9	14.2	14.7	7.6	3.01
Unfilled seed wt (s) (g/pl)	1.3	2.5	2.3	2.3	1.9	5.2	2.4	1.6	1.9	0.7	0.42
No. of green leaves	14.2	13.9	14.7	20.7	17.8	17.1	19.7	19.8	22.5	9.5	2.03
No. of secondaries	0.5	0.8	0.8	1.6	1.2	0.6	1.3	1.3	1.4	0.6	0.34
Number of tertiaries	0.2	0.3	0.1	0.7	0.2	0.1	0.2	0.8	0.6	0.1	0.18
Capsule number (p)	37.8	48.6	36.2	35.7	36.1	36.0	30.1	29.5	23.6	26.5	2.31
Capsule wt.(p) (g/p1)	32.5	31.3	28.4	26.4	30.9	20.9	20.6	21.7	15.7	16.7	2.13
Filled seed no. (p)	69.7	117.8	82.9	84.3	80.5	80.1	70.8	78.6	51.6	60.2	1.24
Capsule number (s)	41.5	59.7	179.0	50.9	114.7	81.1	74.8	62.8	66.3	68.2	9.61
Capsule wt. (s) (g/p1)	36.0	51.0	120.0	47.5	105.7	68.0	66.9	50.7	56.6	69.8	5.08
Filled seed no. (s)	67.0	134.9	307.1	111.4	215.2	188.1	172.0	152.7	147.6	27.5	8.07
Days to 50% flowering	56.3	60.7	55.0	58.0	39.0	57.3	52.7	55.0	65.7	56.7	2.23
Days to 50% flowering (s)	78.3	90.7	79.3	82.7	65.0	84.3	82.3	85.0	83.0	86.3	3.81
Seed wt. (p) (g/pl)	11.9	18.5	18.2	16.7	18.6	12.7	11.9	12.6	8.9	14.7	1.71
Seed wt (s) (g/pl)	20.4	28.1	66.9	22.5	62.3	39.6	36.6	30.7	34.6	37.2	5.53
Total yield (g/p1)	32.3	46.6	85.1	39.2	81.0	52.3	48.5	43.3	43.5	55.1	5.97

E : Early M : Medium p : Primaries, s : Secondaries, g/p1 : grams/plant

Table 2. Genetic parameters of variation for yield and its components in castor during kharif 1994

Character	Range	Mean ± SE	GCV (%)	h^2_b (%)	GA (% of mean)
Plant height (cm)	56.0-70.0	63.1 ± 1.20	7.5	74.7	13.3
Total spike length (cm)	18.4-27.7	23.1 ± 0.53	9.5	77.3	17.3
Effective spike length (cm)	14.3-25.3	18.5 ± 0.64	12.7	69.1	22.0
Unfilled seed number (P)	6.4-28.6	16.9 ± 1.24	41.1	99.3	84.7
Unfilled seed wt. (p) (g/p1)	0.8-2.2	1.3 ± 0.09	42.1	98.8	84.6
Unfilled seed number (S)	7.6-54.4	20.1 ± 2.38	64.4	97.4	131.3
Unfilled seed wt. (s) (g/p1)	0.7-5.2	2.2 ± 0.22	51.8	93.9	104.5
Number of green leaves	9.5-22.5	17.0 ± 0.78	21.5	86.6	41.2
Number of secondaries	0.5-1.6	1.0 ± 0.10	31.9	63.8	50.5
Number of tertiaries	0.1-0.8	0.3 ± 0.06	95.8	75.6	121.2
Capsule number (P)	23.6-48.6	34.0 ± 1.32	20.1	94.6	40.3
Capsule wt. (p) (g/p1)	15.7-32.5	24.5 ± 1.17	24.4	94.0	49.0
Filled seed number (P)	51.6-117.8	77.7 ± 3.11	22.6	99.8	46.7
Capsule number (S)	41.5-179.0	79.9 ± 7.25	49.3	97.1	100.5
Capsule wt. (S) (g/p1)	36.0-120.2	67.2 ± 4.75	39.0	98.2	79.9
Filled seed number (S)	27.5-307.1	152.3 ± 13.78	50.9	99.5	105.0
Days to 50% flowering (P)	39.0-65.7	55.6 ± 1.29	12.0	94.7	24.1
Days to 50% flowering (S)	65.0-90.7	81.7 ± 1.41	7.7	84.3	14.6
Seed wt. (P) (g/pl)	8.9-18.6	14.5 ± 0.67	21.8	87.3	42.1
Seed wt. (S) (g/pl)	20.4-66.9	37.9 ± 2.91	39.5	93.6	78.9
Total yield (g/pl)	32.3-85.1	52.7 ± 3.24	31.8	94.0	63.8

P : Primaries; S : Secondaries

The total yield of early versions (E) of JI-35, HC-6 and CCP-1 was 85.1, 81.0 and 48.5 g/p1 as compared to that of medium versions (M) with 39.2, 52.3 and 43.3 g/p1 respectively. The higher total yield in each of these versions is contributed more through the seed weight of secondaries than the seed weight of primaries. This is due to the better yield components of secondaries as compared to the primaries in the early versions of JI-35, HC-6 and CCP-1 and medium version in

HC-8 as compared to the medium versions of JI-35, HC-6 and CCP-1 and early version of HC-8.

These results show that yield of secondaries and its components played a vital role in the mass selection processes. Only JI-35 (E) and HC-6 (E) out yielded the hybrid check GCH-4. But HC-8 (M) JI-35, HC-6 (E), HC-6 (M), CCP-1 (E) out yielded that varietal check Aruna (Table 1).

In HC-8 the earliness for 50% flowering for primaries was 4.4 days and 12.4 days for secondaries. In JI-35 the earliness was by only three days for primaries and 3.4 days for secondaries while in HC-6 it was 18.3 days for primaries and 19.3 days for secondaries. In CCP-1 it was 2.3 days for primaries and 2.7 days for secondaries. The results show that the earliness in HC-6 was maximum followed by HC-8, JI-35 and CCP-1.

The estimates of genetic parameters (Table 2) show a wide range in the mean. The phenotypic and genotypic coefficient of variation (%) were high [2] for unfilled seed number, unfilled seed weight (S), number of tertiaries, capsule number (S), and seed number (S). This revealed that most of these characters were of secondaries offering a wider scope of selection.

A maximum heritability was recorded by seed number (P) 99.8 while the minimum was recorded by number of secondaries (63.8). The heritability for yield components of primaries and secondaries viz., capsule number, capsule weight, seed number and seed weight was recorded above 90% (except for seed weight of primaries with 87.3%) with higher (or similar) values by secondaries over primaries. The genetic advance over mean (%) ranged from 13.3 for plant height to 131.3 for unfilled seed number (S). The secondary components had higher estimates of genetic advance. Thus both heritability and genetic advance were found to be high for secondaries over the primary yield components viz., capsule number, capsule weight, seed number and seed weight indicating higher selective value for these characters.

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