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Character Association and Path Coefficient Analyses for Yield and Component Traits in Castor (*Ricinus communis* L.)

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ABSTRACT

Correlation and path coefficient analyses were carried out with 52 genotypes of castor for yield and component traits. The character association studies revealed that seed yield plant^{-1} upto 180 days had positive significant correlation with total length of primary raceme, effective length of primary raceme, secondary branches plant^{-1}, total length of secondary raceme, effective length of secondary raceme, tertiary branches plant^{-1}, effective length of tertiary raceme, 100 seed weight of primary raceme, 100 seed weight of secondary raceme, 100 seed weight of tertiary raceme, oil content, harvest index and seed yield plant^{-1} at 120 days. Seed yield plant^{-1} upto 150 days showed significant positive association with seed yield plant^{-1} upto 180 days at both phenotypic and genotypic levels. The path analysis indicated that total length of primary raceme, secondary branches plant^{-1}, effective length of secondary raceme, effective length of tertiary raceme, 100 seed weight of primary raceme, 100 seed weight of tertiary raceme, harvest index, seed yield plant^{-1} at 120 days and seed yield plant^{-1} upto 150 days exerted direct positive association with seed yield plant^{-1} upto 180 days.

Key words : Castor, Character Association, Path analysis

Seed yield is the resultant of a number of quantitative characters. Although the knowledge of association plays a very important role in selection, it becomes ambiguous if number of components are more. In such a situation it is essential to partition the correlation coefficient into components of direct and indirect effects in order to provide the relative importance of the causal factors. In view of above, the present study was taken to identify the important yield attributes through correlation and path analyses in castor as was also performed by Muthiah *et al.,* (1982) .

MATERIAL AND METHODS

The present study was carried out with 52 genotypes of castor (*Ricinus communis* L.), in randomized block design with two replications at Agricultural College Farm, Bapatla during kharif 2008-09. The inter- and intra-row spacing adapted was 90cm x 60cm. Each genotype was sown in 3 rows of 3m length and observations were recorded on ten plants or on plot basis from each genotype per replication for characters *viz.,* days to 50% flowering of primary raceme, stem length to primary raceme, number of nodes to primary raceme, total length of primary raceme, effective length of primary raceme, days to 80% maturity of primary raceme, secondary branches plant^{-1}, days to 50% flowering of secondary raceme, number of nodes to secondary raceme, stem length to secondary raceme, total length of secondary raceme, effective length of secondary raceme, days to 80% maturity of secondary raceme, number of tertiary branches plant^{-1}, days to 50% flowering of tertiary raceme, number of nodes to tertiary raceme, stem length to tertiary raceme, effective length of tertiary raceme, days to 80% maturity of tertiary raceme, 100 seed weight of primary raceme, 100 seed weight of secondary raceme, 100 seed weight of tertiary raceme, oil content, L/B ratio of seed, harvest index, seed yield plant^{-1} at 120 days, seed yield plant^{-1} upto 150 days and seed yield plant^{-1} upto 180 days. The data were statistically analyzed to estimate genotypic correlation after z transformation, phenotypic correlation coefficients and path coefficient analysis following the procedure of Falconer (1964) and Dewey and Lu (1959) respectively.

RESULTS AND DISCUSSION

Genotypic correlation coefficients in general were higher than phenotypic correlation coefficients (Table 1). Total length of primary raceme, effective length of primary raceme, secondary branches plant^{-1}, total length of secondary raceme, effective length of secondary raceme, tertiary branches plant^{-1}, effective length of tertiary raceme, 100 seed weight of primary raceme, 100 seed weight of secondary raceme, 100 seed weight of tertiary raceme, oil content, harvest index, seed yield plant^{-1} at 120 days and seed yield plant^{-1} upto 150 days showed significant positive association with seed yield plant^{-1}

Table 1. Phenotypic (above diagonal) and genotypic (below diagonal) correlations for 28 characters in 52 castor (*Ricinus communis* L.) genotypes

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Days to 50% Flowering of Primary Raceme	-	0.52**	0.87**	0.29**	0.31**	0.88**	0.12	0.84**	0.12	0.45**	0.26**	0.20*	0.76**	-0.07
2	Stem Length to Primary Raceme	0.53**	-	0.52**	0.39**	0.39**	0.47**	0.10	0.51**	0.25**	0.56**	0.34**	0.34**	0.47**	0.06
3	Nodes to Primary Raceme	0.94**	0.55**	-	0.36**	0.39**	0.78**	0.07	0.74**	0.11	0.44**	0.23*	0.20*	0.66**	-0.10
4	Total Length of Primary Raceme	0.30**	0.39**	0.38**	-	0.92**	0.31**	0.11	0.25**	-0.18	0.33**	0.43**	0.44**	0.14	0.04
5	Effective Length of Primary Raceme	0.32**	0.40**	0.42**	0.95**	-	0.40**	0.07	0.36**	-0.08	0.41**	0.44**	0.47**	0.28**	0.00
6	Days to 80% maturity of Primary Raceme	0.88**	0.48**	0.84**	0.31**	0.42**	-	0.16	0.88**	0.18	0.55**	0.28**	0.25**	0.84**	-0.05
7	Secondary Branches Plant^{-1}	0.13**	0.11	0.11	0.12	0.10	0.18	-	0.24*	-0.10	0.07	0.33**	0.33**	0.27**	0.44**
8	Days to 50% Flowering of Secondary Raceme	0.85**	0.52**	0.80**	0.26**	0.37**	0.89**	0.27**	-	0.31**	0.61**	0.37**	0.35**	0.91**	-0.07
9	Nodes to Secondary Raceme	0.12	0.26**	0.13	-0.19*	-0.08	0.18	-0.10	0.32**	-	0.52**	0.02	0.07	0.28**	-0.35**
10	Stem Length to Secondary Raceme	0.46**	0.56**	0.47**	0.33**	0.42**	0.55**	0.07	0.61**	0.54**	-	0.33**	0.32**	0.51**	-0.25**
11	Total Length of Secondary Raceme	0.27**	0.35**	0.24*	0.44**	0.45**	0.28**	0.35**	0.37**	0.01	0.33**	-	0.95**	0.33**	0.14
12	Effective Length & Secondary Raceme	0.21*	0.35**	0.21*	0.46**	0.49**	0.25**	0.35**	0.35**	0.06	0.32**	0.96**	-	0.32**	0.16
13	Days to 80%maturity of Secondary Raceme	0.77**	0.47**	0.72**	0.15	0.29**	0.86**	0.29**	0.92**	0.29**	0.51**	0.34**	0.33**	-	-0.04
14	Tertiary Branches Plant^{-1}	-0.09	0.06	-0.09	0.05	0.00	-0.05	0.50**	-0.07	-0.40**	-0.27**	0.15	0.17	-0.04	-
15	Days to 50% Flowering of Tertiary Raceme	0.77**	0.45**	0.72**	0.07	0.19*	0.79**	0.22**	0.91**	0.44**	0.52**	0.29**	0.29**	0.89**	-0.03
16	Nodes to Tertiary Raceme	-0.12	-0.26**	-0.07	-0.15	-0.10	-0.10	0.05	-0.08	0.06	-0.22*	-0.15	-0.10	-0.01	0.15
17	Stem Length to Tertiary Raceme	-0.36**	-0.12	-0.40**	0.04	0.00	-0.38**	-0.07	-0.41**	-0.24*	-0.37**	-0.03	-0.02	-0.43**	0.45**
18	Effective Length of Tertiary Raceme	-0.15	-0.05	0.01	0.28**	0.28**	-0.16	0.41**	-0.07	-0.25**	-0.12	0.48**	0.52**	-0.05	0.51**
19	Days to 80%maturity Of Tertiary Raceme	0.76**	0.42**	0.74**	0.07	0.20*	0.80**	0.27**	0.88**	0.38**	0.48**	0.34**	0.33**	0.91**	-0.05
20	100 Seed Wt of Primary Raceme	-0.07	-0.08	0.12	0.39**	0.37**	0.02	-0.10	0.00	0.01	0.05	0.18	0.13	-0.04	-0.04
21	100 Seed Wt of Secondary Raceme	0.06	0.05	0.26**	0.43**	0.47**	0.15	0.01	0.11	-0.04	0.15	0.28**	0.26**	0.09	0.10
22	100 Seed Wt of Tertiary Raceme	0.04	0.05	0.16	0.44**	0.41**	0.12	-0.08	0.00	0.05	0.12	0.28**	0.27**	0.00	0.12
23	Oil Content (%)	0.00	0.13	0.10	0.32**	0.21*	-0.05	0.34**	0.00	-0.05	-0.13	0.26**	0.22**	-0.01	0.21*
24	L/B Ratio of Seed	-0.07	-0.06	-0.09	0.01	-0.06	-0.16	-0.04	-0.12	0.00	-0.19*	-0.03	-0.06	-0.01	0.09
25	Harvest Index (%)	-0.23*	-0.36**	-0.19*	0.08	0.08	-0.20*	0.16	-0.18	-0.50**	-0.42**	0.25**	0.28**	-0.17	0.30**
26	Seed Yield Plant^{-1} at 120	-0.49**	-0.38**	-0.37**	0.07	-0.07	-0.65**	-0.02	-0.61**	-0.27**	-0.42**	0.03	0.08	-0.72**	0.09
27	Seed Yield Plant^{-1} at 150	-0.49**	-0.24*	-0.40**	0.27**	0.29**	-0.41**	0.14	-0.39**	-0.37**	-0.26**	0.29**	0.37**	-0.36**	0.23*
28	Seed Yield Plant^{-1} at 180	0.09	0.02	0.15	0.43**	0.45**	0.13	0.49**	0.18	-0.30**	-0.05	0.57**	0.65**	0.16	0.34**

**= Significany at 1% level, *= Significant at 5% level

Table 1. Phenotypic (above diagonal) and genotypic (below diagonal) correlations for 28 characters in 52 castor (*Ricinus communis* L.) genotypes

		15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	Days to 50% Flowering of Primary Raceme	0.76**	-0.11	-0.35**	-0.14	0.75**	-0.07	0.06	0.04	0.00	-0.07	-0.21*	-0.48**	-0.45**	0.08
2	Stem Length to Primary Raceme	0.44**	-0.26**	-0.12	-0.05	0.41**	-0.08	0.05	0.04	0.12	-0.06	-0.33**	-0.37**	-0.22*	0.02
3	Nodes to Primary Raceme	0.67**	-0.06	-0.38**	0.01	0.68**	0.10	0.22*	0.15	0.08	-0.09	-0.19*	-0.34**	-0.36**	0.13
4	Total Length of Primary Raceme	0.07	-0.13	0.04	0.26**	0.08	0.37**	0.41**	0.41**	0.27**	0.02	0.06	0.07	0.25**	0.41**
5	Effective Length of Primary Raceme	0.19*	-0.08	0.00	0.25**	0.19*	0.34**	0.44**	0.38**	0.20*	-0.06	0.06	-0.06	0.28**	0.42**
6	Days to 80% maturity of Primary Raceme	0.78**	-0.08	-0.37**	-0.14	0.79**	0.03	0.14	0.11	-0.04	-0.14	-0.17	-0.63**	-0.39**	0.12
7	Secondary Branches Plant^{-1}	0.19*	0.05	-0.07	0.32**	0.25**	-0.10	-0.01	-0.05	0.21*	-0.04	0.14	-0.03	0.12	0.41**
8	Days to 50% Flowering of Secondary Raceme	0.90**	-0.08	-0.40**	-0.06	0.87**	0.00	0.10	0.00	0.01	-0.12	-0.17	-0.60**	-0.36**	0.16
9	Nodes to Secondary Raceme	0.43**	0.07	-0.23*	-0.22*	0.36**	0.02	-0.04	0.04	-0.04	0.01	-0.42**	-0.27**	-0.35**	-0.29**
10	Stem Length to Secondary Raceme	0.52**	-0.21*	-0.36**	-0.11	0.48**	0.04	0.15	0.12	-0.10	-0.18	-0.38**	-0.41**	-0.24*	-0.04
11	Total Length of Secondary Raceme	0.29**	-0.14	-0.03	0.43**	0.33**	0.17	0.26**	0.27**	0.21*	-0.03	0.24*	0.02	0.29**	0.53**
12	Effective Length & Secondary Raceme	0.28**	-0.08	-0.02	0.49**	0.32**	0.13	0.25**	0.26**	0.18	-0.06	0.27**	0.06	0.35**	0.59**
13	Days to 80%maturity of Secondary Raceme	0.88**	-0.01	-0.43**	-0.04	0.89**	-0.04	0.08	0.00	-0.02	0.00	-0.15	-0.70**	-0.34**	0.14
14	Tertiary Branches Plant^{-1}	-0.04	0.15	0.41**	0.38**	-0.04	-0.04	0.13	0.12	0.14	0.06	0.22*	0.08	0.22*	0.31**
15	Days to 50% Flowering of Tertiary Raceme	-	0.11	-0.38**	-0.10	0.95**	-0.02	0.08	0.01	-0.03	0.07	-0.23*	-0.63**	-0.47**	0.04
16	Nodes to Tertiary Raceme	0.11	-	0.26**	0.14	0.14	0.09	0.08	0.15	0.08	0.24*	0.01	0.08	0.04	0.01
17	Stem Length to Tertiary Raceme	-0.39**	0.27**	-	0.16	-0.43**	0.02	0.17	0.11	0.03	-0.07	0.06	0.38**	0.43**	0.16
18	Effective Length of Tertiary Raceme	-0.12	0.14	0.17	-	-0.06	0.25*	0.33**	0.27**	0.24*	0.10	0.50**	0.35**	0.55**	0.67**
19	Days to 80%maturity Of Tertiary Raceme	0.96**	0.14	-0.44**	-0.05	-	0.02	0.13	0.05	0.06	0.07	-0.17	-0.60**	-0.42**	0.10
20	100 Seed Wt of Primary Raceme	-0.02	0.09	0.02	0.28**	0.03	-	0.74**	0.70**	0.44**	0.18	0.21*	0.27**	0.23*	0.32**
21	100 Seed Wt of Secondary Raceme	0.09	0.08	0.18	0.38**	0.13	0.78**	-	0.64**	0.26**	0.01	0.21*	0.18	0.32**	0.42**
22	100 Seed Wt of Tertiary Raceme	0.01	0.15	0.12	0.38**	0.06	0.75**	0.70**	-	0.38**	0.10	0.16	0.22*	0.28**	0.38**
23	Oil Content (%)	-0.03	0.09	0.03	0.33**	0.07	0.51**	0.31**	0.46**	-	0.09	0.17	0.29**	0.28**	0.37**
24	L/B Ratio of Seed	0.08	0.26**	-0.07	0.11	0.07	0.19*	0.02	0.12	0.14	-	-0.06	-0.06	-0.15	-0.13
25	Harvest Index (%)	-0.26**	0.00	0.06	0.60**	-0.18	0.24*	0.25**	0.19*	0.25**	-0.08	-	0.33**	0.55**	0.62**
26	Seed Yield Plant^{-1} at 120	-0.65**	0.08	0.39**	0.39**	-0.62**	0.29**	0.18	0.23*	0.35**	-0.07	0.37**	-	0.54**	0.31**
27	Seed Yield Plant^{-1} at 150	-0.50**	0.05	0.45**	0.66**	-0.47**	0.26**	0.34**	0.31**	0.33**	-0.15	0.64**	0.57**	-	0.72**
28	Seed Yield Plant^{-1} at 180	0.05	0.00	0.18	0.78**	0.10	0.37**	0.45**	0.44**	0.43**	-0.15	0.70**	0.31**	0.71**	1.00

**= Significany at 1% level, *= Significant at 5% level

Table 2. Direct and indirect effects (genotypic) between seed yield plant^{-1} and components in 52 genotypes of Castor (*Ricinus communis* L.)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Days to 50% Flowering of Primary Raceme	**0.654**	0.343	0.617	0.193	0.210	0.577	0.088	0.555	0.078	0.299	0.174	0.136	0.501	-0.061
2	Stem Length to Primary Raceme	-0.050	**-0.096**	-0.053	-0.038	-0.039	-0.046	-0.010	-0.049	-0.025	-0.054	-0.033	-0.033	-0.046	-0.006
3	Nodes to Primary Raceme	0.517	0.303	**0.548**	0.206	0.231	0.460	0.062	0.437	0.070	0.258	0.134	0.112	0.395	-0.052
4	Total Length of Primary Raceme	0.107	0.141	0.136	**0.361**	0.342	0.114	0.044	0.092	-0.067	0.119	0.160	0.165	0.054	0.017
5	Effective Length of Primary Raceme	-0.201	-0.252	-0.263	-0.593	**-0.625**	-0.260	-0.064	-0.229	0.051	-0.262	-0.281	-0.304	-0.180	-0.001
6	Days to 80% maturity of Primary Raceme	-0.606	-0.330	-0.577	-0.216	-0.286	**-0.687**	-0.121	-0.609	-0.125	-0.380	-0.191	-0.171	-0.588	0.033
7	Secondary Branches Plant^{-1}	0.069	0.056	0.059	0.064	0.053	0.091	**0.517**	0.138	-0.053	0.037	0.179	0.181	0.150	0.259
8	Days to 50% Flowering of Secondary Raceme	0.385	0.234	0.361	0.116	0.166	0.403	0.121	**0.454**	0.145	0.277	0.168	0.158	0.419	-0.030
9	Nodes to Secondary Raceme	0.003	0.007	0.003	-0.005	-0.002	0.005	-0.003	0.008	**0.026**	0.014	0.000	0.002	0.008	-0.010
10	Stem Length to Secondary Raceme	-0.060	-0.074	-0.062	-0.043	-0.055	-0.072	-0.009	-0.080	-0.070	**-0.131**	-0.044	-0.042	-0.067	0.036
11	Total Length of Secondary Raceme	-0.351	-0.458	-0.323	-0.585	-0.593	-0.366	-0.456	-0.489	-0.017	-0.439	**-1.320**	-1.264	-0.447	-0.200
12	Effective Length & Secondary Raceme	0.329	0.550	0.325	0.725	0.771	0.395	0.555	0.553	0.090	0.512	1.516	**1.583**	0.516	0.275
13	Days to 80%maturity of Secondary Raceme	-0.437	-0.270	-0.410	-0.085	-0.164	-0.488	-0.166	-0.526	-0.166	-0.292	-0.193	-0.186	**-0.570**	0.021
14	Tertiary Branches Plant^{-1}	0.003	-0.002	0.003	-0.001	0.000	0.002	-0.016	0.002	0.012	0.009	-0.005	-0.005	0.001	**-0.031**
15	Days to 50% Flowering of Tertiary Raceme	-0.631	-0.368	-0.588	-0.057	-0.157	-0.645	-0.180	-0.743	-0.362	-0.428	-0.241	-0.237	-0.732	0.026
16	Nodes to Tertiary Raceme	0.018	0.039	0.010	0.022	0.015	0.014	-0.007	0.013	-0.009	0.033	0.023	0.014	0.001	-0.022
17	Stem Length to Tertiary Raceme	-0.101	-0.035	-0.112	0.011	-0.001	-0.106	-0.020	-0.114	-0.068	-0.102	-0.009	-0.005	-0.121	0.127
18	Effective Length of Tertiary Raceme	0.013	0.004	-0.001	-0.023	-0.024	0.014	-0.034	0.006	0.021	0.010	-0.040	-0.044	0.004	-0.043
19	Days to 80%maturity Of Tertiary Raceme	0.681	0.377	0.663	0.065	0.177	0.723	0.245	0.793	0.340	0.435	0.308	0.295	0.818	-0.042
20	100 Seed Wt of Primary Raceme	-0.064	-0.069	0.103	0.341	0.320	0.016	-0.084	-0.003	0.007	0.040	0.157	0.113	-0.031	-0.036
21	100 Seed Wt of Secondary Raceme	-0.028	-0.026	-0.126	-0.213	-0.231	-0.073	-0.003	-0.053	0.020	-0.076	-0.139	-0.129	-0.043	-0.050
22	100 Seed Wt of Tertiary Raceme	0.007	0.009	0.029	0.081	0.074	0.022	-0.015	0.000	0.010	0.023	0.052	0.050	-0.001	0.021
23	Oil Content (%)	0.002	-0.049	-0.038	-0.115	-0.077	0.019	-0.126	0.001	0.018	0.048	-0.097	-0.082	0.004	-0.076
24	L/B Ratio of Seed	0.004	0.004	0.006	0.000	0.004	0.010	0.002	0.007	0.000	0.011	0.002	0.003	0.001	-0.005
25	Harvest Index (%)	-0.025	-0.040	-0.021	0.009	0.009	-0.022	0.018	-0.020	-0.055	-0.047	0.027	0.032	-0.018	0.033
26	Seed Yield Plant^{-1} at 120	0.328	0.260	0.251	-0.045	0.045	0.435	0.012	0.415	0.185	0.284	-0.020	-0.051	0.483	-0.064
27	Seed Yield Plant^{-1} at 150	-0.474	-0.235	-0.389	0.258	0.287	-0.400	0.139	-0.379	-0.359	-0.250	0.283	0.356	-0.352	0.220
28	Seed Yield Plant^{-1} at 180	0.09	0.02	0.15	0.43**	0.45**	0.13	0.49**	0.18	-0.30**	-0.05	0.57**	0.65**	0.16	0.34**

Bold and diagonal values indicates direct effect

Residual effect= SQRT (1-1.0531)

Table 2. Direct and indirect effects (genotypic) between seed yield plant^{-1} and components in 52 genotypes of Castor (*Ricinus communis* L.)

		15	16	17	18	19	20	21	22	23	24	25	26	27
1	Days to 50% Flowering of Primary Raceme	0.503	-0.077	-0.236	-0.098	0.495	-0.048	0.038	0.026	-0.003	-0.045	-0.148	-0.318	-0.318
2	Stem Length to Primary Raceme	-0.043	0.025	0.012	0.005	-0.040	0.008	-0.005	-0.004	-0.013	0.006	0.034	0.037	0.023
3	Nodes to Primary Raceme	0.393	-0.037	-0.219	0.004	0.404	0.065	0.140	0.087	0.057	-0.050	-0.104	-0.204	-0.219
4	Total Length of Primary Raceme	0.025	-0.053	0.014	0.101	0.026	0.141	0.156	0.160	0.114	0.003	0.030	0.024	0.096
5	Effective Length of Primary Raceme	-0.119	0.061	0.003	-0.175	-0.123	-0.229	-0.294	-0.254	-0.132	0.038	-0.049	0.041	-0.184
6	Days to 80% maturity of Primary Raceme	-0.540	0.065	0.259	0.111	-0.551	-0.013	-0.102	-0.081	0.037	0.109	0.136	0.443	0.283
7	Secondary Branches Plant^{-1}	0.113	0.025	-0.036	0.210	0.141	-0.050	0.003	-0.042	0.178	-0.021	0.084	-0.009	0.074
8	Days to 50% Flowering of Secondary Raceme	0.411	-0.038	-0.184	-0.034	0.400	-0.002	0.049	0.000	-0.001	-0.055	-0.082	-0.279	-0.177
9	Nodes to Secondary Raceme	0.012	0.002	-0.006	-0.007	0.010	0.000	-0.001	0.001	-0.001	0.000	-0.013	-0.007	-0.010
10	Stem Length to Secondary Raceme	-0.068	0.029	0.048	0.015	-0.063	-0.006	-0.020	-0.016	0.017	0.025	0.055	0.055	0.034
11	Total Length of Secondary Raceme	-0.388	0.201	0.042	-0.634	-0.452	-0.238	-0.373	-0.374	-0.349	0.042	-0.324	-0.040	-0.384
12	Effective Length & Secondary Raceme	0.458	-0.152	-0.028	0.827	0.519	0.205	0.415	0.435	0.354	-0.090	0.451	0.119	0.580
13	Days to 80%maturity of Secondary Raceme	-0.509	0.005	0.247	0.027	-0.518	0.020	-0.049	0.002	0.007	0.007	0.095	0.408	0.206
14	Tertiary Branches Plant^{-1}	0.001	-0.005	-0.014	-0.016	0.001	0.001	-0.003	-0.004	-0.007	-0.003	-0.009	-0.003	-0.007
15	Days to 50% Flowering of Tertiary Raceme	**-0.820**	-0.094	0.320	0.100	-0.789	0.014	-0.072	-0.011	0.029	-0.062	0.211	0.529	0.411
16	Nodes to Tertiary Raceme	-0.017	**-0.150**	-0.041	-0.021	-0.021	-0.013	-0.012	-0.022	-0.014	-0.039	0.000	-0.012	-0.007
17	Stem Length to Tertiary Raceme	-0.109	0.076	**0.280**	0.048	-0.123	0.005	0.050	0.034	0.009	-0.020	0.018	0.110	0.127
18	Effective Length of Tertiary Raceme	0.010	-0.012	-0.014	**-0.084**	0.004	-0.024	-0.032	-0.032	-0.028	-0.010	-0.050	-0.033	-0.056
19	Days to 80%maturity Of Tertiary Raceme	0.866	0.128	-0.394	-0.044	**0.900**	0.026	0.120	0.050	0.062	0.063	-0.164	-0.554	-0.420
20	100 Seed Wt of Primary Raceme	-0.015	0.076	0.015	0.244	0.025	**0.872**	0.684	0.653	0.448	0.169	0.210	0.252	0.228
21	100 Seed Wt of Secondary Raceme	-0.043	-0.038	-0.087	-0.185	-0.066	-0.385	**-0.491**	-0.342	-0.153	-0.010	-0.121	-0.090	-0.168
22	100 Seed Wt of Tertiary Raceme	0.003	0.026	0.022	0.069	0.010	0.137	0.127	**0.183**	0.085	0.021	0.034	0.042	0.056
23	Oil Content (%)	0.013	-0.033	-0.012	-0.121	-0.025	-0.187	-0.114	-0.169	**-0.365**	-0.052	-0.089	-0.128	-0.121
24	L/B Ratio of Seed	-0.005	-0.016	0.004	-0.007	-0.004	-0.012	-0.001	-0.007	-0.009	**-0.061**	0.005	0.004	0.009
25	Harvest Index (%)	-0.029	0.000	0.007	0.066	-0.020	0.027	0.027	0.021	0.027	-0.009	**0.111**	0.041	0.071
26	Seed Yield Plant^{-1} at 120	0.435	-0.054	-0.265	-0.263	0.416	-0.195	-0.124	-0.155	-0.237	0.046	-0.252	**-0.675**	-0.386
27	Seed Yield Plant^{-1} at 150	-0.487	0.044	0.441	0.642	-0.454	0.254	0.333	0.300	0.322	-0.149	0.627	0.556	**0.973**
28	Seed Yield Plant^{-1} at 180	0.05	0.00	0.18	0.78**	0.10	0.37**	0.45**	0.44**	0.43**	-0.15	0.70**	0.31**	0.71**

Bold and diagonal values indicates direct effect residual effect= sqrt (1-1.0531)

upto 180 days at phenotypic and genotypic levels after z transformation. This is in agreement with Giriraj *et al.,* (1973) and Mehta and Vashi (1998). Earliness is most desirable in castor and the components of earliness in castor like days to 50 % flowering of primary raceme, days to 80% maturity of primary raceme, days to 50% flowering of secondary raceme, days to 80% maturity of secondary raceme, days to 50% flowering of tertiary raceme, days to 80% maturity of tertiary raceme were correlated significantly and positively among themselves and days to 50% flowering of primary raceme showed significant negative association with seed yield plant^{-1} at 120 days and seed yield plant^{-1} upto 150 days. Obviously decrease in any one of the characters would lead to the earliness. Oil content showed high positive significant correlation with 100 seed weight of primary raceme, 100- seed weight of secondary raceme, 100- seed weight of tertiary raceme and number of secondary braches per plant.

The path analysis indicated that total length of primary raceme, secondary branches plant^{-1}, effective length of secondary raceme, effective length of tertiary raceme, 100 seed weight of primary raceme, 100 seed weight of tertiary raceme, harvest index, seed yield plant^{-1} at 120 days and seed yield plant^{-1} upto 150 days exerted direct positive effect and positive significant association with seed yield plant^{-1} upto 180 days. Whereas effective length of primary raceme ,number of tertiary racemes plant^{-1}, effective length of tertiary raceme, 100 seed weight of secondary raceme, showed negative direct effect (Table 2).

Effective length of primary raceme, which showed strong and positive association with seed yield plant^{-1} upto 180 days gave negative direct effect. This is in accordance with Golakia *et al.,* (2007). The positive association of effective length of primary raceme with seed yield per plant upto 180 days seems to be due to its indirect influence *via* total length of primary raceme, number of seconday racemes, effective length of secondary raceme, number of tertiary racemes, 100 seed weight of primary raceme, 100 seed weight of tertiary raceme. Hence, the above characters may be given due weightage while practicing the selection for high seed yield per plant upto 180 days in castor.

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