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Nature of Gene Action for Yield and Yield Components in Sesame (sesamumindicum L.)

Abstract

In the study of gene action for yield and 14 yield components in 8 x 8 dialled for (F_1) indicated preponderance of non-additive genetic variance for all the characters. Days to maturity and Number of seed/capsule was more exhibited over dominance suggesting preponderance of dominant genes the distribution of genes with positive and Negative effects were asymmetrical for all the traits.

Keywords: Dialled – Crossing between Two Varieties, Traits – Characters, Asymmetrical – Non Homogeneous

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Introduction

Knowledge regarding the nature and magnitude of gene action governing the inheritance of yield and yield components is essential for formulating efficient breeding strategies for the important crop. The present study was undertaken to estimate the nature of gene action for different quantitative characters through genetic component analysis if F_1 and F_2 of a 8 x 8 diallel cross of sesame.

Aim of the Study

The object of this work was to estimates the parameter for several important charters in eight diverse genotype of sesame.

Materials and Methods

All single crosses excluding reciprocals were made using Eight diverse genotype of sesame. (TKG-22, JTS-8, TKG-306, RT-54, JLT-7, GT-2, N-32, RT-125) Eight parents and twenty eight cross in F1 and F2 were grown during 2009 in a complete randomized block design, with three replication, each F1 plot consist of 6 meter long single row space30 cm. apart, the seed to seed distance 10 cm. observation were recorded on 16 plants from each replicant. For F_2 plot consist of 4 rows, 6cm long with a space30 cm. between rows and 10 cm. between plants. Observations were recorded on 25 plants. Genetic analysis of the data was done as per Haymen (1953) and Haymen and Zink (1954).

Result and Discussion

The estimated values of additive genetic variance ($\widehat{D}$) were positively and highly significant for days to 50% flowering, days to maturity, number of capsule on main branches, capsule length, 1000 seed weight, oil content and oil yield/plant indicated the importance of additive genetic variance in the expression on these characters other characters such as plant height, number of branches/plant, number of fruiting nodes/plant, number of capsule on branches, number of capsule/plant, Seed capsule and seed yield had also positive as indicated in the enclosed table, but non significant estimates showing the importance of additive genetic variance for these characters.

The dominant components H_1 exhibited positive significant, estimated for days to 50% flowering days to maturity, number of capsule on main branches, capsule length, 1000 seed weight, oil content and oil yield/plant which were indicative of non genetic variance of these traits, however other two characters number of branches/plant, number of capsule/plant were non significant. Another measure of the dominance variance (H_2) was also significant for all the characters exhibited highly significant positive values indicated the presence of dominance genes.

The third important dominance effect h^2 showing the presence of dominance or recessive genes. The characters days to 50% flowering, days to maturity, number of branches/plant, number of fruiting nodes/plant, number of capsule on branches, number of capsule/plant, capsule length, 1000 seed weight, and seed yield/plant exhibited these positive significant

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estimates as indicated in the enclosed table. These indicating the presence of dominance excessive recessive genes, another characters viz. plant height, number of capsule on main stem, number of seed/capsule and oil content possessed but non significant values.

These characters having the positive significant estimates have been indicated the presence of dominance genes. The estimates of the preponderance of f reveled that days to maturity, number of capsule on main stem, had positive significant values, however the remaining characters showed positive values. The estimates of mean degree of dominance viz. ($\widehat{h1}/\widehat{D}$) indicated that all the characters showed the value of mean degree of dominance greater than one suggesting the presence of over dominance.

The distribution of genes with positive and negative effects in the parents was calculated as per formula $H_2/4H_1$ (Haymen (1953) and Haymen and Zink (1954). The distribution of positive and negative genes exhibiting dominance in the characters, thus for all the characters its distribution positive and negative genes in the parents was unequal. The important component of genetic variance, which major proportion of total dominance and recessive genes in the parents was calculated from the ratio of $[(4DH_1)^{1/2}+F] / [(4DH_1)^{1/2}-F]$. (Haymen (1953) and Haymen and Zink (1954)).

The result reveled days to maturity and number of seed/capsule was more than to exhibited over dominance two suggesting preponderance of dominant genes with the number of effective factor showing dominance as measured by the ratio h^2/H_2 where nearing unity for days to 50% flowering, number of capsules/plant, capsule length and seed yield/plant the expected environmental variance. Similar finding have been reported by Dixit (1976), Chavan et.al. (1985) and Godwat and Gupta (1985) however Sharma and Chauhan (1984) Banerjee and Coli (2009) reported.

Conclusion

On the basis of result and discussion we can conclude that after cross between 8 varieties of sesamumindicum for fourteen characters there are many difference seen in genetic parameters as well as in morphological characters of eight varities of sesamumindicum as shown in table - 1

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Observation Table

Estimation of Genetic Components of Variation in F_1

Component	Days To 50% Flowering	Days to Maturity	Plant Height (Cm)	No .of Branches/ Plant	No. of Fruiting Nodes/ Plant	No. of Capsules on Main Stem	No. of Capsules on Branches	No .of Capsules /Plant	No of Seeds Capsule	Capsule Length (Cm)	1000 Seed Weight (G)	Oil Content %	Seed Yield /Plant (G)	Oil Yield /Plant(G)
D	7.62**	20.84**	94.47	0.87	505.46	250.73**	571.22	209.94	31.54	0.012	0.108**	17.224**	2.884	107.96
	±2.29	±2.87	±55.87	±0.96	±346.39	±25.17	±559.08	±648.87	±15.54	±0.025	±0.003	±3.69	±2.564	±63.06
F	10.73	27.14**	122.104	0.66	313.14	326.4**	899.42	433.06	56.28	0.012	0.021	6.014	2.244	85.52
	±5.46	±6.85	±132.74	±2.33	±818.55	±59.54	±321.16	±1533.29	±36.89	±0.01	±0.042	±8.774	±6.104	±149.08
H_1	49.65**	74.29**	484.86**	9.22**	3521.3**	360.61**	7501.71**	8362.14	130.48**	0.07**	0.42**	36.98**	41.974**	1099.97**
	±5.31	±6.664	±128.53	±2.27	±795.96	±57.92	±1285.34	±1491.72	±35.89	±0.11	±0.039	±8.71	±5.944	±145.03
H_2	41.89**	58.39**	417.91**	8.42**	3164.42*	224.74**	6465.6**	3344.29**	97.9**	0.046**	0.38**	27.59**	37.804**	988**
	±5.13	±5.79	±111.78	±1.96	±692.82	±50.39	±1118.21	±1297.79	±31.25	±0.014	±0.03	±7.42	±5.664	±126.17
h^2	44.004**	49.96**	114.04	12.65**	2571.05*	11.55	5607.77**	5977.25**	28.1	0.05**	0.133**	0.027**	41.704**	955.72**
	±3.08	±3.87	±74.95	±1.3	±464.62	±33.78	±749.9	±870.34	±20.92	±0.021	±0.008	±4.969	±3.454	±84.6
E	0.23	0.33	24.37	0.13	7.76	3.19	13.9	14.52	2.1	0.03	0.033	0.126	0.194	5.77
	±0.73	±0.93	±18.59	±0.29	±115.43	±8.3	±186.33	±216.26	±5.08	±29.96	±0.025	±1.208	±0.824	±20.99
(H1/D)1/2	2.553	1.888	2.265	3.255	2.639	1.199	3.624	6.311	2.034	2.415	1.972	1.465	3.815	3.192
H2/4H1	0.211	0.196	0.215	0.228	0.225	0.156	0.215	0.100	0.188	0.164	0.226	0.187	0.225	0.225
$\frac{(4DH1)1/2+F}{(4DH1)1/2-F}$	1.762	2.053	1.798	1.264	1.266	3.374	1.555	1.391	2.563	1.522	1.104	1.271	1.227	1.283
h2/H2	1.050	0.856	0.273	1.502	0.812	0.051	0.867	1.787	0.287	1.087	0.350	0.001	1.103	0.967