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GENETIC DIVERSITY BASED ON COMPONENTS OF FODDER YIELD IN OATS *(AVENA SATIVA* L.)

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Fodder resources are meagre in our country. Oats, being a new crop yielding palatable fodder, offers much scope for improvement through breeding. Selection of genetically diverse varieties is important for the exploitation of heterosis and for the development of desirable recombinants. An assessment of the nature and magnitude of diversity between varieties will help to choose better ones. The multivariate analysis of genetic divergence suggested by Mahalanobis (1936) is an effective tool for making such assessment. The present study has been undertaken to choose better varieties of oats for use in breeding programmes.

Materials and Methods

The study was conducted at the farms of Rajasthan College of Agriculture, Udaipur during 1975—76. The 32 varieties of oats were grown in Randomised Block design with four replications. Each variety was sown in two lines with fifteen plants in each line. Spacing within row was 25 cm. and between rows was 30 cm. Four plants were selected at random from each variety for recording observations. Characters such as plant height, number of tillers, leaf area and number of leaves, which are the important components of fodder yield in oats, were studied.

The D- between two populations were analysed and the populations were grouped into clusters by the method described by Rao (1952).

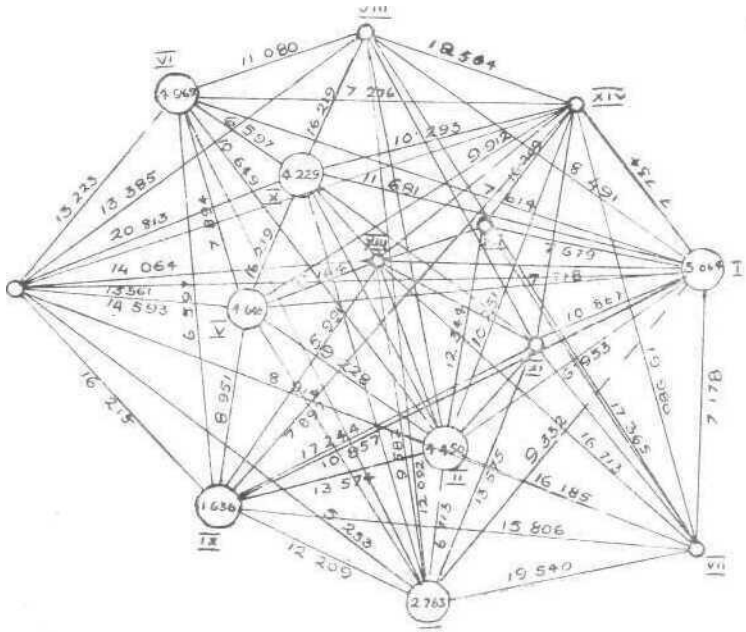
Results and Discussion

The analysis of variance indicated highly significant difference between varieties in respect of all the characters. The analysis of variance of the characters studied are presented in Table 1.

All possible covariances of the characters were worked out and the correlated variables were transformed into uncorrelated variables using variance covariance matrix.

The actual values of D^2 for the 496 combinations of 32 varieties were computed. All the values except one were significant at one percent level. After computation of the D^2 values of the populations, the 32 varieties were

STATISTICAL DISTANCE AMONG GROUP OF
OF OATS



Clusters	varieties
I	1, 2, 7, 8, 11, 24, 25
II	3, 5, 13,
III	4, 16, 20, 29
IV	6
V	9, 21, 28
VI	10, 14, 18, 26
VII	12
VIII	18
IX	17, 31
X	• 9 a?
XI	22
XII	23
XIII	30
XIV	32

Table 1

ANOVA

Mean sum of squares of characters studied

Source	df	Plant height	Number of tillers	Leaf area	Number of leaves
Replication	3	: 124.67	14.93	87.37	51.54
varieties	31	511.18**	36.46**	927.63**	931.58**
Error	93	40.58	1.71	74.22	37.02

** Significant at 1% level.

grouped into 14 dusters by adopting Tocher's method. The clusters and its varieties are given in Table 2.

Among the clusters, number I was the largest containing seven varieties followed by cluster III and IV which contained four varieties each. The cluster II and V had only three varieties and IX and X comprised of two varieties each. The rest of the varieties formed independent clusters.

Table 2

Cluster number (1)	Varieties (2)
I.	E. C. 55197, Flamingold, E. C. 54833, E. C. 43536, I. C. 1819, Acacea E. C. 86444.
II.	E. C 99162, Reed 19, E. C. 99161.
III.	Kent, E. C. 96573, E. C. 43666, . X—27,
IV.	E. C. 99166.
V.	E. C. 99164, I. C. .1820, N. P. 101.
VI.	E. C. 99167, E. C. 99165, I. C. 1829, E. C. 96529.
VII.	E. C. 43655.
VIII.	E. C. 99163.
IX.	E. C. 43535, E. C. 84834,
X.	E. C. 54937, Rapida.
XI.	Algerion.
XII.	E. C. 96552.
XIII.	E. C. 86445.
XIV.	E. C. 96531.

Table 3

Average intra and inter cluster distance ($\overline{D^2}$ values)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
I	5.064	6.953	9.332	11.353	7.718	7.614	7.178	8.491	10.857	11.681	10.867	7.679	9.044	7.734
II		4.450	6.713	8.194	9.228	10.649	16.185	7.477	13.574	15.368	8.3[illegible]	12.3[illegible]5	10.059	10.251
III			2.763	5.[illegible]53	11.342	10.339	19.540	12[illegible]2	12.299	16.431	13.575	15.166	9.58[illegible]	11.198
IV					14.593	13.223	22.518	13.385	10.21[illegible]	[illegible]813	13.872	17.670	14.064	13.561
V					4.649	7.894	15.254	9.957	8.851	8.182	9.675	8.463	6.164	8.812
V					4.229	4.969	21.260	11.080	6.587	10.344	14.829	8.054	8.928	7.226
VII							X	17.365	15.806	18.473	16.761	19.085	16.713	18.880
IX								X	15.835	16.218	5.48[illegible]	8.[illegible]6	12.531	12.506
X									1.636	8.315	7.244	10.821	5.891	7.887
XI										4.229	7.225	9.700	7.821	10.293
XII											X	5.311	13.791	16.209
XIII												X	8.104	11.787
XIV													X	9.444
														X

The maximum D^2 value was obtained in the comparison of clusters IV VII (D^2 = 507.096), and the minimum was between clusters XI and XII = 28.211). The average intra and inter clusters distances (D^2 values and $\sqrt{D^2}$ values) are shown in Table 3 and Figure-1.

The varieties having low D^2 values were grouped together in each cluster. The intra cluster group means of the four characters are presented in Table 4.

Table 4

Intra cluster group means of characters

Cluster Number	Number of varieties	Plant height	Number of tillers	Leaf area	Number of leaves
;	•1	129.243	13.161	62.968	60.222
II	2	135.025	10.341	63916	43.458
Ill	I	112.556	7.538	62.025	34.706
IV	!	132.350	6.125	77.975	34.400
V	3	130 233	12.091	35.166	59.342
VI	4	117.550	12.536	48.662	67.575
VII	i	131.550	14.700	46.875	17.650
VIII	I	148.150	13.950	69 675	66.200
IX	2	107.303	12.500	24.087	65.987
X	2	108.850	10.387	29.437	42.962
XI	(	156.200	13.325	54.300	63.400
XII	I	129.825	17.325	49.625	85.200
XIII	!	114.600	11.500	31.150	49.025
XIV	1	110.325	13.575	60.575	62.900
Grand Mean		125.522	11.671	52.756	56 054

The overall D^2 values between two populations represent a complex variable made up of the combination of relatively simple variables. Out of the 496 comparisons the highest D^2 value was found in the 6-12 comparison. The inter cluster divergence of the four variables was minimum between the clusters

IV and VII. In cluster IV the group mean for leaf area was high whereas in VII it was medium with minimum number of leaves. Cluster XII was unique for its maximum number of tillers and number of leaves. The intercluster divergence between IV and XII was also very high. The results, therefore indicate genetic divergence between the varieties based on the mean values of the component characters fodder yield in oats.

The expression of genotypes in respect of various characters is an important factor for the determination of the best possible classification based on genetic diversity. Mehndiratta *et al* (1971) found in fodder sorghum that plant height, stem girth, number of leaves and length of leaves were the major contributors to the divergence in the material. The clusters IV, VI, VII, IX and XII exhibited comparatively large divergence between them. The major contributors for the divergence were number of tillers, leaf area and number of leaves, which were found to be the more important component of drymatter yield in fodder oats (Nair & Gupta, 1976). Hence, much improvement of the crop for the increase of drymatter could be expected from the recombinents in the segregating generations of the crosses between the clusters, which had large divergence.

Summary

The nature and magnitude of the genetic diversity of 32 varieties of oats was assessed by multivariate analysis using D" statistics. The 32 varieties could be clustered into fourteen groups. Out of these, five clusters were found to be more divergent than the others. These could be used as parents for further breeding,

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ഓട്സിന്റെ 32 ജനസ്കളെ D² സ്റ്റാറ്റിസ്റ്റിക്സ് പ്രകാരം 14 വ്യത്യസ്ത സംഘങ്ങളാക്കിയതിൽ അഞ്ചു സംഘങ്ങളെ ഏറ്റവും കൂടുതൽ വ്യത്യാസങ്ങളുള്ളതാണ്. അതുകൊണ്ട് ഈ അഞ്ചു സംഘങ്ങളിലെ ജനസ്കരം, കൂടുതൽ ഉല്പാദനശേഷിയുള്ള സങ്കരയിനങ്ങളെ ഉല്പാദിപ്പിക്കുന്നതിനുപയോഗിക്കാം.

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