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VARIABILITY AND CHARACTER ASSOCIATION STUDIES IN FODDER OAT (*AVENA SATIVA* L.)

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SUMMARY

The present study on variability and character association in fodder oat was carried out at Forage Research area, Department of Genetics & Plant Breeding, CCS HAU, Hisar during **rabi** 2010-11. The results revealed that the magnitude of genotype and phenotypic coefficient of variation was moderate for dry mater yield, number of fellow/m and green fodder yield. The green fodder yield had maximum positive direct on dry fodder yield followed by plant height and number of tillers/m though heritability estimated accompanied with moderate genetic advance were observed for dry matter yield and green fodder yield.

Key words : Variability, correlation, path analysis, heritability genetic advance, fodder oat

Oat (*Avena sativa* L.) is a multipurpose cereal crop grown in **rabi** season in many parts of the world. In India, it is used as green fodder, hay and silage for animals. It has excellent growth habit, quick recovery after cutting and provides good quality herbage. Furthermore, the demand for oat for human consumption has increased, particularly because of the demonstrated dietary benefits of oat whole-grain products. Oat is considered to be a nutritious source of protein, carbohydrate, fibre, vitamins, and minerals as well as of compounds with beneficial effects on health. The genotypic correlation between yield and yield attributing characters as well as path coefficient analysis are important in breeding programme. For selection programme, it is essential to have thorough knowledge about the mutual relationship among the yield and its component characters which are positively correlated. When more number of variables is considered, the association becomes more and more complex. Under such situations path coefficients would be more useful for calculating direct and indirect associations with yield. Therefore, the present study was undertaken in fodder oat to gather information on different parameters of genetic variability and association of component traits with fodder yield.

The experimental material comprised 39 divergent genotypes of oat which were grown during **rabi** 2010-11 at Forage Research Area, Department of Genetics & Plant Breeding, CCSHAU, Hisar in a randomized block design with three replications. The plants were spaced at 25 cm between the rows. All cultural practices were carried out to raise the healthy crop. Observations were recorded on five randomly selected plants for plant height (cm), days to 50 per cent flowering, number of tillers/m, green fodder yield (q/ha) and dry fodder yield (q/ha). The genotypic and phenotypic correlation coefficients were computed as suggested by Al-Jibouri *et al.* (1958). The path analysis was carried out as per Dewey and Lu (1959).

The results of present investigation revealed that the magnitude of genotypic and phenotypic coefficient of variation was moderate for dry matter yield, number of tillers/ m and green fodder yield and plant height, whereas it was low for days to 50 per cent flowering. The range of variation among the 39 genotypes of oats was 87.47 to 134.13 cm for plant height; 55.07 to 103.93 for number of tillers/m., 410.94 to 985.71 q/ha for green fodder yield; 68.92 to 195.34 q/ha for dry matter yield and 92.33 to 131.0 days for 50 per cent flowering (Table 1). High heritability estimates accompanied with moderate genetic advance were observed for dry matter yield and green fodder yield.

TABLE 1
Parameters of variability, heritability and genetic advance in oat

Characters	Plant height	No. of tillers/m	Days to 50% flowering	Green fodder yield	Dry matter yield
GCV	14.231	17.313	9.682	29.084	29.445
PCV	14.544	18.448	9.709	29.887	29.68
h^2 (Broad sense)	0.957	0.881	0.944	0.947	0.984
Genetic advance as % of mean (5%)	28.687	33.471	19.89	58.304	60.176
Range	87.47-154.43	55.07-103.93	92.33-131	410.94-985.71	68.92-195-34
Overall mean	121.48	77.33	113.08	628.34	126.91

The genotypic correlation coefficients were higher than their corresponding phenotypic correlation for all the traits under study (Table 2) which indicates a strong inherent association between the traits. The genotypic correlation coefficients analysis revealed that green fodder yield and dry matter yield had highly significant positive association among themselves and also with plant height, number of tillers/m and days to 50 per cent flowering which proved to be important components of fodder yield and direct selection for these traits would bring improvement in fodder yield in oat. Likewise, Bukhari *et al.* (2009) and Sangwan and Arora (2011) also reported similar results in fodder oat.

As the fodder yield is a complex trait and it is influenced by many factors, therefore, selection based on the basis of simple correlations without taking into consideration the interaction between the component characters can be misleading. The path coefficient analysis permits the separation of direct effects from indirect effects through other related traits by partitioning

TABLE 2
Phenotypic and genotypic correlation coefficients in oat

Characters	No. of tillers/m	Days to 50% flowering	Green fodder yield (q/ha)	Dry matter yield (q/ha)
Plant height (cm)	G= 0.4450 P= 0.4136**	G= 0.3449 P= 0.3380*	G= 0.8070 P= 0.7716**	G= 0.7532 P= 0.7291**
No. of tillers/m		G= 0.6639 P= 0.6267**	G= 0.6928 P= 0.6157	G= 0.5592 P=0.5149**
Days to 50% flowering			G= 0.6553 P= 0.6374**	G= 0.4337 P= 4277**
Green fodder yield q/ha				G= 0.8778 P= 0.8567**

G–Genotypic P–Phenotypic.
*,**Significant at P=0.05 and P=0.01 levels, respectively.

TABLE 3
Path coefficient analysis of dry matter yield and its components in oat

Character	Plant height	No. of tillers/m	Days to 50% flowering	Green fodder yield	Genotypic correlation with dry matter yield
Plant height	**0.2016**	0.0030	-0.0865	0.6384	0.7532
No. of tillers/m	-0.0007	**0.0066**	-0.1666	0.7198	0.5592
Days to 50% flowering	-0.0006	0.0044	**-0.2509**	0.6808	0.4337
Green fodder yield	-0.0013	0.0046	-0.1644	**1.0389**	0.8778

Residual effect = 0.4408.

the genotypic correlation coefficients.

Path coefficient analysis revealed that characters like green fodder yield had maximum positive direct effect on dry fodder yield followed by plant height and number of tillers/meter while character days to 50 per cent flowering exhibited negative direct effect (Table 3). Similarly green fodder yield also maximum indirect effect on dry matter yield via No. of tillers/m, Days to 50% flowering and plant height which revealed that indirect selection through these traits would bring further improvement in both green as well as dry matter yield. The residual effect was 0.4408 indicating the adequacy of the characters chosen for the study. These results are in full agreement with those obtained earlier by Bukhari *et al.* (2009) and Sangwan and Arora (2011) in fodder oat.

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