Agri. Res. J. Kerala, 1977, 15 (2) 128—132

ANALYSIS OF GENETIC PARAMETERS ON DRY MATTER YIELD AND ITS COMPONENTS IN FODDER OATS (AVENA SATIVA L.)*

P. S. NAIR and Y. K. GUPTA

College of Agriculture, Udaipur, Rajasthan

The success ot breeder in improving a crop depends on the existance and exploitation ot genetic variability to the fullest extent. The estimation ot genetic variability alone is insufficient to give a complete intormation about the magnitude ot improvement that can be achieved. Therefore, estimation ot parameters like heritability, genetic advance, genetic gain and genetic co-efficient of variation are indispensable. Hence, the investigation has been designed on thirty two varieties of fodder oats to evaluate the above genetic parameters.

Metcrials and Methods

The analysis of fifteen characters of thirty two varieties of fodder oats was done to find out the genetic variability, heritability, expected genetic advance, genetic gain and genetic coefficient of variation. The varieties were sown in randomised block design with four replications at the campus of College of Agriculture, Udaipur and data were collected from four plants each from each variety in each replication. The methods suggested by Lush (1949) and Allard (1960) for genetic advance, Panse and Sukhatme (1961) for genetic variability, Burton and Devane (1953) for heritability and Johnson *et al.* (1955) for genetic gain and genetic coefficient of variation were used for the analysis.

Results and discussion

The mean values, range, standard deviation and critical difference for the fifteen characters are given in Table 1. All the characters were analysed for variance. It revealed highly significant differences between varieties. The data are presented in Table 2. High genotypic and phenotypic variances were observed in total green yield, green weight of stem, number of leaves, leaf area, green weight of leaves, number of tillers and plant height. Heritability values, expected genetic advance, genetic gain, and genetic coefficient of variation, obtained in respect of the 15 characters are given in Table 3.

All characters except percentages of dry weight crude protein and ash content showed more than ninety per cent heritability values. High heritability

Part of M. Sc. (Ag.) thesis submitted by the Senior author to the University of Udaipur.

Table 1

SI. No.	Characters	Mean	Range	S. Ed	C. D. at 5% level
1.	Days to flag leaf emergence	92.085	68.000—108.300	0.301	1.544
2.	Days to maturity	110.515	85.500—125.750	0.311	1.572
3.	Plant height	125.522	106.650—156.200	3.190	8.957
4.	Number of tillers	11 671	5.200— 17.325	0.652	1.803
5	Number of leaves	56.054	24.775— 85.200	3.042	8.536
6.	Leaf angle	28.775	22.375— 35.125	0.733	2.049
7.	Leaf area	52.756	28.025— 87.800	4.309	12.100
8.	Green weight of stem	115.803	45.000—189.225	10.141	28.473
9.	Green weight of leaves	46.997	11.767— 90.627	4.943	13.879
10.	Total green yield	159.117	56.750—279.857	14.415	40.477
11.	Stem/leaf ratio	2.591	1.991— 3.887	0.073	0.249
12.	Total drymatter yield	40.736	15.625— 63.425	2.932	8 233
13	Per cent dry weight	27.764	24.300— 36.125	1.024	2.877
14.	Per cent crude protein	10.208	10.637— 16.600	0.828	2.325
15.	Per cent ash content	10.950	8.400— 13.800	1.157	2.296

Table 2

Sl. No.	Characters	Genotypic variance	Phenotypic variance	Error variance
I,	Days to flag leaf emergence	100.7543	101.0622	1 2043
2	Days to maturity	97.6854	98.0000	1.2473
3.	Plant height	117.6519	127.7863	40.5763
4.	Number of tillers	8.6931	9.1158	1.7068
5.	Number of leaves	223.6452	232.8872	37.0224
6.	Leaf angle	10.0916	106251	2 1398
7,	Leaf area	219.6572	231 9114	74.2239
8.	Green weight of stem	999.3724	1102.2112	411.3739
9.	Green weight of leaves	209.0634	273.4815	97.6739
10.	Total green yield	2036.4552	2244.2215	831.03 7
11.	Stem/leaf ratio	0.2409	0.2442	0.0128
12.	Total drymatter y/eld	92.6571	101.2532	34.4012
13.	Per cent dry weight	8.3576	9.4116	4.2224
14.	Per cent erude protein	1.5384	2.2248	2.7457
15.	Per cent ase content	2.3259	2.6791	2.6800

values were exhibited by the characters like plant height, panicle length and heading data in the studies conducted by Petr and Frey (1966). Bhagmal *et al.* (1970) found high heritability values for days to maturity, tiller number, number of leaves, leaf length and breadth and stem / leaf ratio in oats. Heritability values indicated the stability in genetic action. The high heritability values imply that selection for those characters based on the phenotypic variances would be meaningful.

Table 3

Sl. No.	Characters	Heritability	Expected genetic advance	Genetic gain	G. C. V.
1.	Days to flag leaf emergence	99.696	20.640	2.241	8.940
2.	Days to maturity	99 681	20.326	18.392	10.903
3.	Plant height	92.065	25.438	20 265	8.636
4.	Number of tillers	95.285	5.928	50.792	25.364
5.	Number of leaves	96.028	30.176	53,833	26.672
6.	Leaf angle	95.009	6.379	22.168	11.053
7.	Leaf area	94 713	29.715	56 325	28.092
8.	Green weight of stem	90.670	62.013	53.550	27.288
9.	Green weight of leaves	91 158	36.769	78.237	33.688
10.	Total green yield	90.742	88.561	54.256	27.770
11	Stem/leaf ratio	98.686	1.004	38.749	18.950
12.	Tota! drymatter yield	91.506	18.060	46.543	8.714
13.	Per cent dry weight	88 799	5.613	5.612	10.410
14	Per cent crude protein	69.147	2.119	17 357	10.163
15.	Per cent ash content	86.567	2.925	26.712	13.881

The total green yield per plant had the highest value of expected genetic advance. The minimum value observed was in stem / leaf ratio. The high genetic advance at five percent selection pressure indicated that genetic variation was mainly due to additive gene action (Panse 1957). Therefore, selection based on the values of expected genetic advance would lead to a shift towards the increase in drymatter yield of fodder oats.

It is understood that the characters recording higher values for genetic gain and genetic coefficient of variation were due to the contribution of additive effect of genes and selection based on those characters could be effective for the improvement of the crop. Green weight of leaves, leaf area, total green

weight, number of leaves, green weight of stem and number of tillers had high values of genetic gain. Moderately high genetic coefficient of variation was observed in green weight of leaves, leaf area, total green yield green weight of stem, number of leaves and number of tillers. Phul *et al.* (1972) had also reported high genetic gain in forage yield and number of leaves.

Number of leaves, leaf area, green weight of stem, green weight Of leaves and total green yield had comparatively high values of heritability, genetic advance, genetic gain and genetic coefficient of variation. The present study indicated that considerable improvement in the population can be brought about by selection based on those characters.

Summary

The analys; of fifteen characters of thirty two varieties of oats for its heritability, expected genetic advance, genetic gain and genetic coefficient of variation revealed that the number of leaves, leaf area, number of tillers and plant height had high values in heritability, expected genetic advance and genetic coefficient of variation. Selection based on those characters would lead to an increasing drymatter accumulation in fodder oats.

സംഗ്രഹം

ഓട്സിന്റെ പതിനഞ്ചു ഘടകങ്ങളെ പഠന വിധേയമാക്കിയതിൽ, ചെടിയിലെ ഇലകളുടെ എണ്ണം, ഇലയുടെ വിസ്തീർണ്ണം, ആകെയുള്ള ഇലകളെ ചെടിയുടെ പൊക്കം എന്നിവ അടിസ്ഥാനമാക്കി rosgggrro തരം തിരിക്കലിൽ നിന്നും കാലിത്തീറ്റ വിളയുടെ വർദ്ധനവു ണ്ടാക്കാമെന്നും തെളിയുന്നു.

RF.FERENCFS

Allard, R. W. 1960. Principles of plant breeding. John wiley and Sons, *Inc*., New York.

Bhagmal, Mehra K. L., and Katiyar D. S. 1970. Heritable and nonheritable variations in fodder oats. SABRAO Newsl. 2, 31—36.

Burton. G. W. and Devane E. M. 1953. Estimation of heritability in tall fescue. *Agron. J.* 45 478—81.

Johnson, H. W. Robinson, H. F. and Comstock R. E. 1955 Estimation of genetic environmental variability in Soy bean. *Agron J.* 47, 314—318.

Lush, J. L. 1949. Animal breeding plans. Iowa State Univ: Press. Ames. Iowa pp. 473.

Panse, V. G. 1957. Genetics of quantitative characters in relation to plant breeding. *Indian J. Genet.* 17, 318—28.

Panse, V. G. and Sukhatme, P. V. 1961. Statistical methods for Agricultural Workers. I. C. A. R., New Delhi.

Petr, R C. and Frey, K. J. 1966. Genotypic correlation, dominance and heritability of quantitative characters in oats. *Crop Sci. 6,* 259—262

Phul. P. S., Mehndiratta, P. D. and Manmohan Singh 1972. Quantitative variability in fodder oats. *Indian J. Agric. Sci.* 42, 562—564.

(M. S. received: 9-2-1977)