gca effects of the parents. The performance of the crosses does not correspond with *per se* performance of the parents but well related with *gca* effects of the parents. These findings are in agreement with the earlier results of Sankara (1983) in sunflower. As such, improvement of seed yield could be possible only by the improvement of component characters like plant height, head diameter, number of leaves and 100 seed weight. The parents which have good general combining ability for these yield components could be utilised in hybridization programme for improving the yield of sunflower. Breeding methods like genotypic recurrent selection for exploiting the characters governed by additive gene effects and reciprocal recurrent selection for those characters governed by non-additive gene action could be further employed to improve the seed yield and oil content in sunflower.

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GENETIC PARAMETERS AND INTER-RELATIONSHIP ANALYSIS IN LUCERNE (MEDICAGO SATIVA L.)

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ABSTRACT

The genetic variability and correlations were worked out in forty two F_1 progenies of the diallel crosses of seven parental varieites of lucerne for four characters. Analysis of variance revealed highly significant differences for all the characters. Seed yield expressed a maximum genotypic coefficient of variability and genetic advance as per cent of means with low heritability values, whereas plant height recorded the maximum heritability value. Green fodder yield was significantly and positively correlated with seed yield, branch number and plant height.

Key Words : Lucerne, Variability, Correlation.

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Table 1. Genetic parameters of four characters in Lucerne

Character	Range	Mean	G.C.V	P.C.V	h^2 (%)	G.A.as % of mean
Seed yield (g)	0.05–0.89	0.34	30.30	82.58	13.46	22.9
Green foder yield (kg)	0.53–2.85	1.76	11.80	28.13	17.61	10.2
Plant height (cm)	53.55–75.20	67.29	5.74	9.61	35.69	7.0
Branch Number/plant	5.60–2350	14.19	15.30	26.28	33.93	18.3

Lucerne (*Medicago sativa* L.) is a perennial herb of temperate Europe, Asia and North Africa. Leaves and stems are source of a commercial chlorophyll and also a source of vitamin A, C and E. In India it is extensively cultivated as a fodder crop. The crop contains wide range of variability which can be exploited for varietal improvement. It is a very important leguminous fodder enriched with protein. For developing high yielding varieties of lucerne, genetic variability and association of characters with yield in the F_1 progenies of diallel crosses of seven parental varieties were studied.

MATERIALS AND METHODS

Forty two F_1 progenies of diallel crosses of seven parental varieities viz., Anand 2, Atir 3, Co 1, T 3, SS 627, IGFRI 71-18 and IGFRI 71-28 were grown in randomized block design with two replications. Plant to plant distance of 30 cm was maintained in three metre long rows, spaced 50 cm apart. The experiment was conducted in the Department of Forage Crops in Tamil Nadu Agricultural University. Five plants from each F_1s were randomly selected for recording data on plant height, branch number, green fodder yield and seen yield. Eleven cuts were taken during a year and from that the green fodder yield per plant per year was calculated. After 11 cuts, the plants were left for seed production and seed yield per plant was recorded. Coefficient of variation (Burton, 1951), heritability in broad sense (Johnson *et al.*, 1955), genetic advance (Lush, 1949) and correlation coefficient (Miller *et al.*, 1958) were estimated.

RESULTS AND DISCUSSION

The analysis of variance revealed highly significant differences among the genotypes for all the four characters studied (Table 1). The maximum genotypic coefficient of variation was observed for seed yield per plant. Swarup and Chaugale (1962) opined that genetic coefficient of variation alone is not sufficient for the determination of the amount of heritable variation. Heritable variation may be effectively used with greater degree of accuracy when heritability was studied in conjunction with genetic advance. Johnson *et al.*, (1955) suggested that heritability and genetic advance when considered together were more useful for predicting the resultant effect of selecting best individuals than heritability or genetic advance considered alone. A high genetic gain along with high heritability shows the most effective condition of selection.

The maximum heritability value of 35.69 percent was recorded by plant height followed by branch number (33.93 percent). Generally estimates of heritability of forage in lucerne are low (Bolton, 1962). In the present study, heritability value for green fodder yield was 17.61 percent and still lower in seed yield (13.46 percent). Branch number per plant showed modernately high heritability and genetic advance (18.38). Such a value of high heritability and high genetic gain may be attributed to additive gene action (Panse, 1987). It therefore appears that selection for these characters should be effective for practical purposes. High heritability with very low genetic gain (7.07 percent) was observed in plant height.

Table 2. Genotypic (upper diagonal) and phenotypic (lower diagonal) Correlation coefficients among the four characters in Lucerne

Character	Seed yield	Green fodder yield	Plant height	Branch Number/plant
Seed yield (g)	1	1.433**	0.650**	0.147
Green foder yield (kg)	0.087	1	1.049**	1.093**
Plant height (cm)	0.003	0.598**	1	0.568**
Branch Number	0.010	0.714**	0.509**	1

** Significant at P = 0.01

This indicated that in this character, non-additive gene action was operative (Liang and Walter, 1968).

The results on correlation indicated that genotypic and phenotypic correlations followed the same trend and in general the genotypic correlations were higher than phenotypic correlations (Table 2). The seed yield was strongly and positively correlated with green fodder yield and plant height only at genotypic level. The association of green fodder yield with plant height and branch number was strong and positive both at genotypic and phenotypic levels, as reported by Vagra *et al* (1970) and Song and Walton (1975). At both the levels plant height showed strong positive association with branch number.

From the above it was observed that seed yield, green fodder yield and plant height were positively inter-correlated whereas branch number showed significant positive relation with seed yield. But branch number, green fodder yield and plant height were significantly interrelated. So increasing the branch number simultaneously may increase the green fodder yield and plant height which in turn may increase the seed yield. This result was in accordance with Bolton (1962).

Selection for tall plants with more tillers may result in increased green fodder yield and seed yield as these characters exhibited significant mutual relationships and also showed moderately high heritability values. Hence these two characters may be used for selecting high yielding progenies in lucerne.

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