https://doi.org/10.29321/MAJ.10.A02483

Madras agric. J. 71 (6) 361—364 June 1984.

VARIABILITY PARAMETERS IN GUAR*

J. N. REDDY[1] and S. C. GUPTA[2]

Studies on different genetic parameters namely, genotypic and phenotypic variances, genetic coefficient of variation, phenotypic coefficient of variation, heritability, expected genetic advance and genetic gain were conducted on forty strains of guar (*Cyamopsis tetragonoloba* (L.) Taub.) High genotypic and phenotypic variances were observed for number of pods per plant and plant height. Highest genetic and phenotypic coefficient of variations were recorded for number of branches per plant. Heritability was moderate to high in almost all the characters studied except gum content and grain yield per plant. Number of branches per plant, number of pods per plant and number of clusters per plant exhibited high genetic gain. These characters also had high heritability estimates.

Success of a breeding programme is largely dependent on the extent of genetic variability present in the population. Greater the diversity in the material, better are the chances for evolving promising and desired types. A detailed study of the extent of variability in different characters associated with yield and a knowledge on their heritability in relation to their contribution towards yield are the prime requisites for an efficient plant breeding programme. With this aim, the present investigation was carried out in guar to estimate different variability parameters.

MATERIAL AND METHODS

The present investigation was conducted during kharif 1980 at the experimental field of Rajasthan College of Agriculture, Udaipur, with forty genotypes of guar. The experiment was laid out in a randomized block design with three replications. Row to row and plant to plant distances, were maintained at 45 cm and 25 cm. respectivey.

Five plants were selected at random in each of the genotype and observations on 12 characters namely, days to 50 per cent maturity, plant height, number of branches per plant, number of pods per plant, number of clusters per plant, number of pods per cluster, pod length, number of grains per pod, 1000 - grain weight, crude endosperm percentage, gum content and grain yield per plant were recorded and analysed statistically. The genotypic and phenotypic variances were calculated according to Panse and Sukhatme (1967). The coefficient of variations were worked our as per Burton (1952). Heritability in broad sence was calculated by the formula

Department of Genetics & Plant Breeding Rajasthan College of Agriculture. Udaipur.
*Part of the thesis submitted to the Sukhadia University, Udaipur for the award of M. Sc. (Ag.) degree in Plant Breeding and Genetics.
1. Ph. D. Scholar 2. Geneticist

proposed by Burton and Devane (1953) and Johnson et al. (1955) and genetic advance as per Johnson et al. (1955).

RESULTS AND DISCUSSION

The range, mean, genotypic and phenotypic variability, genetic and phenotypic coefficient of variations, heritability, expected genetic advance and genetic gain are presented in Table 1.

The genotypes showed significant differences for all the characters studied. Among the different characters studied, number of pods per plant and plant height exhibited high genotypic and phenotypic variability followed by other characters. Tne genotypic and phenotypic variances of different characters do not provide any clear indication regarding the variability. Hence, the estimation of genetic and phenotypic coefficient of variations help to compare the range of genetic and phenotypic variability shown by the plant characters. High values of genetic and phenotypic coeffietient of variations for number of branches per plant indicated that selection for this trait will be much effective. Minimum genetic (2.7) and phenotypic (3.5) coefficient of variations were recorded for days to 50 per cent maturity. Whereas, maximum genetic (25.3) and phenotypic coefficient of variations (32.8) were observed for number of branches per plant. The high genetic coefficient of variation for number of branches per plant followed by other characters was also reported by Dabas et al . (1982) in guar.

Burton (1952) suggested that genetic coefficient of variation along with heritability estimates would give a better idea about the efficiency of selection. In the present study, a wide range of heritability from 38.73 per cent for grain yield per plant to 93.16 per cent was recorded for crude endosperm percentage. All the characters studied except gum content and grain yield per plant showed moderate to high values of heritability along with little differences between genetic and phenotypic coefficient of variations, thereby indicating less environmental influences on these characters. Therefore, these characters can be used in making selection of superior genotypes on the basis of genotypic expression. High heritability estimates in guar were also reported by Mital *et al.* (1969) for pod length, and Dabas *et al.* (1982) for 100-seed weight and plant height. Sanghi *et al.* (1964) reported lower values of heritability for grain yield per plant in guar.

Even though heritability estimates provide useful indication of the rela-

Table 1. Genetic parameters for different characters in guar (*Cyamopsis tetragonoloba* (L.) Taub.)

Characters	Range	Mean + S.Em.	Genotypic variance	Phenotypic variance	Genetic coefficient of variation (%)	Phenotypic coefficient of variation (%)	Heritability (%)	Expected genetic advance	Genetic grain (%)
Days to 50 per cent maturity	89.0—104.6	98.1±1.22	7.4	11.9	2.7	3.5	62.4	4.4	4.2
Plant height	70.9—105.3	83.0±2.09	40.4	53.6	7.6	8.8	75.4	11.3	13.6
Number of branches per plant	0.4 — 10.4	7.6±0.89	3.8	6.1	25.3	32.3	61.5	3.1	40.9
Number of pods per plant	31.6 — 59.6	46.9±1.73	41.4	49.3	13.7	14.9	83.9	12.1	25.9
Number of clusters per plant	5 6 — 15.6	12.5±0.42	3.5	4.0	14.9	16.1	87.0	3.6	28.7
Number of pods per cluster	3.2 — 5.6	3.7±0.15	0.1	0.2	10.9	13.1	69.7	0.7	18.7
Pod length	3.9 — 6.1	5.0±0.09	0.1	0.1	6.2	6.9	79.0	0.5	11.3
Number of grains per pod	6.9 — 8 8	8.2±0.11	0.1	0.1	3.2	4.0	66.5	0.4	5.4
1000-grain weight	26.6 —35.6	32.7±0.48	3.0	3.7	5.3	5.9	81.0	3.2	9.8
Crude endosperm percentage	31.1 —40.0	34.8±0 31	3.9	4.2	5:6	5.8	93.1	3.9	11.3
Gum content	20 2 —32.2	25.8±1.54	6.7	13.9	10.0	14.4	48.2	3.7	14.3
Grain yield per plant	8.0 —16.1	11.3±1.03	2.0	5.2	12.5	20.1	38.7	1 8	16.0

tive value of selection based on phenotypic experssion. Johnson *et al.* (1955) suggested that heritability and genetic advance when calculated together are more useful in predicting the resultant effect of selection. In the present study, the characters namely, number of branches per plant, number of pods per plant and number of clusters per plant exhibited higher values of genetic advance as percentage of mean (genetic gain) along with higher estimates of heritability. It may be due to predominance of additive gene effects (Panse, 1957). Therefore, it appears that selection for these characters would be effective and satisfactory for practical purpose. High genetic advance along with high heritability was also reported in guar by Sanghi *et al.* (1964) and Dabas *et al.* (1982) for number of pods per plant.

The senior author is grateful to the Head, Department of Genetics and plant Breeding and to the Dean, Rajasthan College of Agriculture, Udaipur for providing the necessary facilities during the course of this investigation.

REFERENCES

BURTON, G. W. 1952. Quantitative inheritance in grasses. Proc. 6th Intn. Grassland cong., 1 : 277-283.

BURTON, G. W. and E. H. DEVANE. 1953. Estimating heritability in tall fescue (Festuca arundinaceae) from replicated clonal material. Agron. J., 45 : 478-481.

DABAS, B. S., S. P. MITAL and V. ARUNACHALAM, 1982. An evaluation of germplasm accessions in guar. Indian J. Genet., 42 : 56-59.

JOHNSON, H. W., H. F. ROBINSON, and R. E. COMSTOCK, 1955. Estimates of genetic and environmental variability in soybean. Agron. J., 46 : 314-318.

MITAL, S. P., V. SWARUP, M. M. KOHLI and H. B. SINGH, 1969. Variablity in guar, Indian J. Genet., 29 : 98-103.

PANSE, V. G. 1957. Genetics of quantitative characters in relation to plant breeding. Indian J. Genet., 17 : 318-328.

PANSE V. G. and P. V. SUKHATME 1967. Statistical methods for Agricultural workers ICAR. New Delhi.

SANGHI, A. K., M. P. BHATNAGAR, and S. K. SHARMA, 1964. Genotypic and phenotypic variability in yield and other quantitative characters in guar. Indian J. Genet., 24 : 164-167.