

VARIABILITY STUDIES FOR YIELD AND YIELD COMPONENTS IN SUNFLOWER  
(*Helianthus annuus* L.)

V.Thirumala Rao

Department of Genetics and Plant Breeding

RARS, Polasa, Jagtial, Karimnagar -505 529, Andhra Pradesh, India

**ABSTRACT:** A field experiment was conducted with 94 genotypes including three checks to study the variability for different characters. The range of variation for different characters indicated wide differences among the genotypes. The genotypic and phenotypic variation (GCV and PCV) was high for seed yield per plant, test weight and number of filled seeds was indicated these characters amenable for improvement by selection. Non additive gene action was observed for days to maturity, days to 50% flowering, oil content and number of leaves per plant. High heritability coupled with high genetic advance as percent of mean for the traits viz., number of filled seeds per plant, test weight and seed yield per plant indicated the additive gene action controlling these traits.

**Key words:** Genetic advance, genetic variability, heritability, sunflower

## INTRODUCTION

India is among the largest vegetable oil economies in the world next only to USA and China. In the agricultural economy of India, oilseeds are important next to food grains. Sunflower is the one of the important oilseed crop after Groundnut, Rapeseed-Mustard and Soyabean. Sunflower is an important crop for production of healthy edible oil for cardiac problems due to which sunflower oil has great demand in commerce. Breeding programmes aimed at development of cultivars with high yield and yield components. The seed yield of sunflower (*Helianthus annuus* L.) is a complex character, which is highly influenced by environmental variations. Information on nature and magnitude of variability present in a population due to genetic and non genetic causes is an important prerequisite for systematic breeding programme. An attempt was made in the present investigation to assess the variability, heritability and genetic advance of some quantitative characters in a set of genotypes.

## MATERIALS AND METHODS

The experiment consist 94 genotypes including three checks were sown in randomized complete block design (RBD) with two replications at agricultural college farm, Hyderabad during Kharif, 2007. Each genotype was raised in 5m length with spacing of 60 x 30 cm. Recommended agronomic practices were followed to raise good crop. Observations were recorded on days to 50% flowering, days to maturity, plant height (cm), number of leaves per plant, head diameter (cm), number of filled seeds per head, test weight (g) and seed yield per plant (g). The data were recorded on five randomly selected plants in each entry in each replication. The coefficient of variation was calculated as per Burton (1952). Heritability in broad sense and genetic advance were calculated as per Johnson et al., (1955).

## RESULTS AND DISCUSSION

The success of any breeding programme depends upon the extent of genetic variability in base population and it is essential to subject a population for selection for achieve improvement in a particular trait. Analysis of variation indicated that the mean squares of the genotypes were highly significant for all the characters taken under study. This indicates that there is enough variability in the present material.

The range of variation, as well as genotypic and phenotypic coefficient of variation was high for seed yield per plant followed by test weight and number of filled seeds indicating the scope of improvement through simple selection procedure for obtaining high yield. Plant height, head diameter, number of leaves per plant and oil content registered moderate phenotypic and genotypic co-efficient of variation. Low variability was observed for days to 50% flowering and days to maturity. This is due to presence of both positive and negative alleles for these characters in the population (table-1 and 2).

**Table.1 ANOVA for seed yield and Yield attributes in sunflower**

Character	Mean sum of squares		
	Replications	Treatments	Error
Days to 50% flowering	0.851	36.450**	1.73
Days to maturity	0.531	33.710**	1.26
Plant height	66.96	1433.148**	17.95
Number of leaves per plant	1.36	25.06**	2.27
Head diameter	0.001	8.95*	0.81
Number of filled seed per head	736.08	25667.187**	285.85
Test weight	0.228	2.793**	0.057
Seed yield/plant	3.780	80.836**	1.311
Oil Content	8.884	40.375**	0.567

\*\* Significant at 1 per cent level \*Significant at 5 per cent level

**Table.2 Estimates of variability, heritability and genetic advance in sunflower**

Character	PCV (%)	GCV (%)	Heritability in Broadense ( $H^2$ )	Genetic advance	GA as percent of Mean
Days to 50% flowering	7.42	7.24	95.25	8.37	14.56
Days to maturity	4.72	4.64	96.25	8.14	9.37
Plant height	21.44	21.31	98.75	54.45	43.63
Number of leaves per plant	13.63	12.99	90.92	6.63	25.53
Head diameter	17.25	16.44	90.88	3.96	32.30
Number of filled seed per head	25.73	25.58	98.89	230.76	52.41
Test weight	28.64	28.34	97.94	2.38	57.79
Seed yield/plant	34.33	34.05	98.38	12.88	69.57
Oil Content	13.09	12.99	98.60	9.12	26.58

High heritability estimates are observed for all the characters studied, which indicates the dependence of phenotypic expression reflecting the genotypic ability to transmit genes to their off springs. Heritability in conjunction with genetic advance would give more reliable index of selection value (Johnson et al 1955). A combination of high heritability and genetic advance was observed for seed yield per plant, test weight and number of filled seeds per head which shows that these characters are amenable for improvement by selection, particularly through mass selection. (Krishnawat and Sharma, 1988; Ashok et al., 2000). Such values of high heritability and genetic gain may attribute to additive gene effect (Panse, 1957).

Thus direct selection can be employed for improving these traits. The characters oil content, days to maturity, days to 50% flowering, number of leaves per plant exhibit high heritability and low genetic advance as percent of mean, which indicates the presence of dominance and epistatic effect. In this situation, selection based on family may be followed for improving these specific characters (Pathak et al., 1986). Seed yield and oil content are two important characters in sunflower. It is desirable to evolve hybrids with high seed yield coupled with high oil percent. High variability, heritability and genetic advance as percent of mean were observed for seed yield indicating additive gene action controlling the trait. While the character oil percent showed moderate variability, high heritability and moderate genetic advance as percent of mean. The results are in agreement with the findings of Perumal and Rajashekar (1994) and Patil et al., (1996).

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