

ASSESSMENT OF GENETIC VARIATION IN NEWLY DEVELOPED SUNFLOWER HYBRIDS UNDER LOW RAINFALL SITUATION

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Sunflower hybrids were evaluated for variability, heritability and genetic advance for eight traits [plant height (cm), head diameter (cm), test (100 seed) weight (g), days to maturity, volume weight (g/100ml seed), husk content (%), seed yield per plant (g) and oil content (%)]. Significant variation among the genotypes was evident for all the characters. The magnitude of phenotypic coefficient of variation (PCV) was higher than that of the genotypic coefficient of variation (GCV) for all the traits studied. High heritability coupled with high genetic advance was observed for seed yield per plant indicating the preponderance of additive gene effects for these traits.

Keywords: GCV; Genetic advance; Heritability; Sunflower; Variability.

In self-pollinated crops, pure line selection is commonly utilized for crop improvement. However, it can equally be employed for improvement in cross-pollinated crops subject to the creation of variability. Hybridization is one of the efficient methods for creation of variability. This variability is more intensified in F_2 and subsequent generations in cross-pollinated crop like sunflower. Inbred development in sunflower is possible by using phenotypic selection in highly variable hybrids depending upon the magnitude of variability parameters. Therefore, in present investigation efforts were made to find out magnitude of variability present for seed yield and its component characters in sunflower hybrids.

Eighteen newly developed sunflower hybrids, under All India Coordinated Research Project on Sunflower in the country, in two sets of trials were evaluated during kharif 2003. These experiments were conducted in randomized block design in five rows plot of 4.5 m length. The row and row within plant has spaced at 60 and 30 cms, respectively. The crop was irrigated as and when required. All the improved cultural practices were followed uniformly.

Eight characters like plant height (cm), head diameter (cm), test weight (g), days to maturity, volume weight (g/100ml), husk content (%), seed yield per plant (g) and oil content (%) were measured by selecting competitive plants in each entry.

The data was subjected to analysis of variance on the procedure of Panse and Sukhatme¹, the variability parameters like genotypic and phenotypic coefficient of

variation were estimated for each characters using the procedure of Burton², the heritability (%) in broad sense was worked out as per the procedure of Lush³. Similarly, genetic advance and genetic advance as expressed percent of mean were estimated as per the procedure of Johnson *et al.*⁴

The mean, range and variability parameters are presented separately for set-1 and set-2 in Table 1 and Table 2. The results revealed that the high mean and high range for seed yield was observed in hybrids tested in set-2. The analysis of variance for all the characters in both the sets of hybrids revealed significant difference. In general differences between GCV and PCV for all the characters in set-1 were in narrow sense and wider differences were noticed in set-2 indicating that the influence of environment in expression of all the characters in set-2 was more. The results of Rama Subrahmanyam *et al.*⁵ and Fatima *et al.*⁶ were confirmative to present finding.

However, at the same time, the characters, viz; test weight and days to maturity in both sets of hybrids showed least differences between GCV and PCV values indicating their by that these characters influenced least to the environment. The magnitude of GCV values for seed yield per plant, plant height and husk content was high enough in set-1, whereas in set-2, GCV magnitude was high for seed yield per plant, plant height and oil content. This indicated the availability of high genetic potential for onward exploitation. The results of Fatima *et al.*⁶ for seed yield per plant in this regard are highly confirmative.

Table 1. Estimates of Range, Mean, P.C.V., G.C.V., Heritability (B.S.), Genetic advance and Genetic advance as percent of mean in sunflower (SET-1).

Character	Mean	Range	Mean sum of squares	Coefficient of variation		Heritability		Genetic advance as expressed percent of mean
				Genotypic (%)	Phenotypic (%)	Broad sense (%)	Genetic advance	
Plant height (cm)	122.60	89-142	703.74	576.08	580.57	99.23	54.44	44.56
Head diameter (cm)	15.85	13.8-18.2	3.43	21.62	25.52	84.72	3.51	22.15
Test seed weight (g)	4.18	2.9-6.1	2.02	48.26	49.34	97.81	2.89	69.23
Days to maturity	87.56	81-93	19.26	22.00	24.39	90.20	8.59	9.81
Volume weight (g/100ml)	38.91	31.1-49.5	34.79	89.41	99.33	90.01	11.53	29.63
Husk content (%)	36.80	25-49.4	87.05	236.54	256.06	92.38	18.47	50.2
Seed yield/plant (g)	41.91	25-55	273.08	651.58	662.58	98.34	33.76	80.55
Oil content (%)	36.06	25-46.5	56.39	156.39	169.05	92.51	14.88	41.26

Table 2. Estimates of Range, Mean, P.C.V., G.C.V., Heritability (B.S.), Genetic advance and Genetic advance as percent of mean in sunflower (SET-2).

Character	Mean	Range	Mean sum of squares	Coefficient of variation		Heritability		Genetic advance As expressed Percent of mean
				Genotypic (%)	Phenotypic (%)	Broad Sense (%)	Genetic Advance	
Plant height (cm)	126.75	95-149	438.91	346.28	388.52	89.13	40.74	32.15
Head diameter (cm)	16.98	13.1-20.6	6.13	36.09	48.60	74.25	4.39	25.88
Test seed weight (g)	4.80	3.6-6.6	1.27	26.46	31.19	84.82	2.14	44.54
Days to maturity	91.93	82-98	57.17	62.19	63.87	97.36	15.37	16.72
Volume weight (g/100ml)	42.56	30.4-50.9	33.44	78.57	92.92	84.56	10.95	25.74
Husk content (%)	35.28	21.3-50	23.45	66.48	159.95	41.56	6.43	18.23
Seed yield/plant (g)	52.45	36-65	206.89	394.45	407.47	96.81	29.15	55.58
Oil content (%)	37.07	23.6-46.3	47.86	129.10	135.86	95.03	13.89	37.48

The estimates of heritability for all characters, except head diameter in set-1 and head diameter, test weight, volume weight and husk content in set-2, were found to be higher which is amenable to least role of environment in the expression of these characters. Contrary to this, the observations on heritability have been reported by Fatima *et al.*⁶, except days to maturity, were found high enough.

The seed yield per plant and plant height in both the sets of hybrids were associated with high heritability and high genetic advance and were found with the involvement of additive type of gene action for these characters. Similar observations were made by Reddy⁷.

In view of the above situation, the hybrid 64A43 (set-1) ranked first⁸ on all India basis for seed yield, will be large number of plants for plant height in F₂ generation. The dwarf recombinant inbreds with high seed yield potential can be isolated from F₂ population of this hybrid. The second hybrid PAC-309 in set-2 seems promising in this regard.

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