

VARIABILITY AND CORRELATION IN SAFFLOWER

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ABSTRACT

Twenty-eight diverse genotypes of safflower studied for the extent of genetic variability for yield and yield components revealed that maximum difference between GCV and PCV under rainfed and irrigated cropping was observed for number of heads and branches per plant indicating the susceptibility of these traits to environment. In general, the spiny types performed under irrigated condition and the non-spiny genotypes under rainfed conditions. The dwarf genotypes recorded high seed yield under irrigated conditions and the non-spiny genotypes under rainfed conditions. The dwarf genotypes recorded high seed yield under irrigated conditions and the intermediates under rainfed condition. Number of branches and heads were interrelated under both conditions.

KEY WORDS : Safflower, Variability, Correlation

Information on the nature and range of variability in the germplasm of safflower (*Carthamus tinctorius* L.) is meagre. The present study was undertaken to find out the extent of genetic variability for yield components and to assess the magnitude of genetic divergence among the genotypes by raising them under two environment *viz.*, rainfed and irrigated conditions.

MATERIALS AND METHODS

Twenty eight genotypes of safflower from different geographical sources involved in the study consisted of 12 of Indian origin and the rest representing eight different countries. They were classified as spiny and non-spiny. Based on the height of the plant, the genotypes were also grouped in to dwarf, medium and tall and their relative performance was evaluated for eight characters *viz.*, plant height, number of branches, number of heads, diameter of the head, seed per head, seed yield per plant, 1000 seed weight and oil content (%).

The investigations were carried out separately under rainfed and irrigated conditions during December 1977 to March 1978 in the fields of School of Genetics, Tamil Nadu Agricultural University, Coimbatore in simple randomised block design with three replications, adopting a spacing of 45 cm x 15 cm.

The statistical parameters like mean, standard deviation, coefficient of variation (cv) and standard error were calculated. The genotypic and phenotypic variances and genotypic and

phenotypic correlations coefficients were worked out (Johnson *et al.*, 1955; Al-Jibouri *et al.*, 1958). The significance of correlation coefficients was tested following snedecor (1961).

RESULTS AND DISCUSSION

All genotypes were taller under rainfed condition than irrigated condition. The behaviour in height expression was analysed by grouping them into tall (70.0 cm), medium (60.0 to 70.0 cm) and dwarf (< 60.0 cm). The genotypes of different classes under rainfed environment failed to maintain their classes under irrigated condition (Table 1). When means of genotypes according to geographical origin were considered, the minimum and maximum were recorded by Indian genotypes under rainfed situation. Under irrigated cropping the lowest was recorded by a genotype from Spain and the highest by an Egyptian genotype.

The lowest cv was recorded by PI 209291 under rainfed and PI 248827 under irrigated

Table 1. Range of coefficient of variation for eight characters in safflower

Characters	Range of C.V.	
	Rainfed	Irrigated
Seed yield per plant	27.93-81.36	21.33-79.90
Plant height	8.73-20.08	8.74-17.33
Number of branches	21.13-60.78	15.97-43.62
Number of heads	27.18-77.83	21.65-48.09
Diameter of the head	3.01-22.22	4.70-34.42
Number of seeds per main head	18.47-58.82	22.90-86.70
Weight of 1000 seeds	6.77-65.34	2.56-20.23

Table 2. Characteristics of stable genotypes

Genotype number	Seed yield				Number of heads				Number of seeds per main heads				1000 seed weight			
	Rainfed		Irrigated		Rainfed		Irrigated		Rainfed		Irrigated		Rainfed		Irrigated	
	x	CV	x	CV	x	CV	x	CV	x	CV	x	CV	x	CV	x	CV
PI 250525	14.47	27.93	15.11	27.53	10.37	36.08	13.30	21.65	48.33	37.60	60.40	55.42	52.18	6.77	48.69	9.54*
PI 248852	13.68	33.97	14.59	34.00	17.17	28.43	14.50	33.41	35.00	22.21	31.80	24.05	34.97	12.20	38.38	9.93*
K-1	18.32	65.24	13.16	36.85	18.06	70.52	14.10	48.09	29.42	50.96	28.20	54.76	37.49	12.27	40.07	12.21**
PI 199901	17.49	32.80	10.27	57.83	20.51	34.40	15.30	42.60	26.69	26.67	28.40	40.30	49.53	15.14	43.84	9.76**
PI 248383	12.27	43.54	18.25	22.53	17.33	35.53	16.40	28.67	31.75	58.82	23.30	26.36	45.52	8.20	41.21	3.45+

* Both rainfed and irrigated condition; ** Rainfed condition; + Irrigated condition.

conditions. The genotypes PI 250838, PI 248864, PI 198845, PI 250076 and PI 199901 recorded almost similar percentages of cv in both environments. PI 253387 and PI 209291 exhibited high cv values under irrigation. In both rainfed and irrigated conditions, the lowest cv was recorded by Indian genotypes, while the maximum cv was registered by an Egyptian genotypes.

For number of branches, the genotype PI 248827 showed highest variation under rainfed condition. Both under rainfed and irrigated conditions, the spiny genotypes registered maximum CV. In both the conditions, Indian genotypes recorded the maximum CV.

The dwarf genotypes had wide range of CV for number of heads as compared to medium or tall genotypes. Under both the environments, the maximum CV value for number of head was recorded by Indian genotypes. The genotypes exhibited wide variation for diameter of the head. A more pronounced variation was registered in genotypes CTS 7403, PI 248827 and PI 250596. High and low CV were noticed in spiny genotypes. The dwarf group recorded the maximum coefficient of variation under irrigated condition. The Indian genotypes PI 199901 and PI 248849 recorded the minimum CV under rainfed and irrigated conditions.

The variability of genotypes for seeds per head was wider under irrigated conditions. The genotypes PI 198209 was stable under both environments for mean number of seeds as well as for CV. The genotypes PI 250525 and PI 251289 had the lowest CV for 1000 seed weight under rainfed and irrigated conditions. The highest CV values were recorded by the medium tall types under both environments. A wide variation was noticed for CV for seed yield per plant in both

situations. The genotypes PI 250525 and PI 253387 recorded minimum CV both under rainfed and irrigated conditions. The Sudan genotype PI 237548 had high value of CV under irrigated condition (Table 2).

Phenotypic and genotypic variance

High phenotypic and genotypic variance were evident for the character plant height, branches per plant, heads per plant, 1000 seed weight and oil content under rainfed condition, indicating the existence of wide genetic variability among the genotypes, while low variance were observed for characters like diameter of head and seed per head. Under rainfed condition, the PCV estimate was maximum (36.55) for seed yield per plant and minimum (7.59) for diameter of the head. Highest GCV (38.89) was observed for number of seeds per head, while the lowest GCV (12.53) was for diameter of the head under irrigated environment. Oil content was observed to the least influenced by environments. Simple correlation between yield and six components indicated wide variation in inter-relationship of characters both in magnitude and direction between rainfed and irrigated environments. The number of branches and number of heads per plant were inter-related under both the conditions of testing.

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