

PARENT OFF-SPRING RELATIONSHIP IN SUNFLOWER (*Helianthus annuus* (L.))

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Correlation regression, heritability and path coefficient for four economic traits in the parental and off-spring populations of sunflower Co. 1 were estimated. High positive associations of plant height, diameter of capitulum and seeds/capitulum with seed yield were observed. Considerable degree of heritability was also observed for these traits. The highest positive direct effects on seed yield were shown by head diameter and seeds capitulum.

Sunflower (*Helianthus annuus* L.) by virtue of its cross pollinated nature exhibits great variability for different economic characters. The present study was initiated to understand the effect of selection on the relationship between chosen characters in sunflower variety Co 1.

MATERIALS AND METHODS

Sunflower Co 1 was raised under isolation in 10 m long 30 cm apart rows having plants spaced at 15 cm, at the Tamil Nadu Agricultural University Coimbatore during *Rabi* 1982. Single plants showing variation for duration (65, 70 days), plant height (70, 80, 90 cm) and diameter of capitulum (10, 12, 14 cm) were marked from the population. Ten plants under each category were selected and observation on plant height, diameter of capitulum, seeds/capitulum and seed yield/capitulum were recorded. Progenies of the selected 180 single plants were raised in a randomised block design experiment with two replications during *kharif* 1983. Five plants in each progeny group in each replication were marked at random for recording observations. Since no distinct variation for duration was observed in the off-spring generation, data on this

trait were not taken for statistical analysis.

Total correlation and regression coefficients between parent and off-spring lines were worked out. Estimates of heritability were derived using the formula of Mahmud and Kramer (1951). Phenotypic and genotypic correlations between the different traits of the off-spring lines were calculated as outlined by Miller *et al.*, (1958). Path coefficient analysis was computed to estimate the direct and indirect effects contributing to the total genotypic correlations (Dewey and Lu, 1959).

RESULTS AND DISCUSSION

The total correlation between the parent and off-spring lines for three out of the four characters studied was significant (Table 1). Highly significant correlation was observed between the parents and off spring for plant height and diameter of capitulum combined with considerable heritability estimates. The regression coefficients for plant height and diameter of capitulum estimated between parents and off - spring, were also significant and positive. The high magnitude of correlation and regression coefficients combined with fairly high heritability estimates indicate that these

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characters are important for the purpose of selection. The correlation coefficients between the different traits of parental lines with different traits of the offspring showed varying degrees of association (Table 2.). The significant correlation of seed yield of the offspring with plant height, diameter of capitulum and seeds/capitulum of the parent indicates the importance of the reliability of these characters for selection for seed yield in the progeny. This has been further corroborated by the high magnitude of heritability observed for these traits. This observation is in consonance with the earlier findings of Ayyasamy *et al.* (1977) and Srivastava and Mishra (1976) in sunflower. By the principles of population genetics the correlation between parent and offspring is 0.5. The correlations observed in excess of 0.5 in the present study indicate the limited inbreeding in the parental populations.

The phenotypic and genotypic correlations among the different characters were highly significant and positive (Table 3). Significant correlations among seed yield, plant height and head diameter have been reported earlier by Ayyasamy *et al.* (1977). In the present study, besides plant height and head diameter, the importance of seeds/capitulum is also realised as evidenced

from its significant positive association with seed yield coupled with fairly high estimate of heritability.

The path analysis (Table 4) revealed that the diameter of capitulum had a profound positive direct effects followed by seeds/capitulum on the seed yield. Pathak *et al.* (1983) have earlier reported the maximum positive direct effects of seeds/head on the seed yield of sunflower. The indirect effects of plant height and seeds/capitulum exercised through diameter of capitulum were also considerably high and positive. In contrary, the negative direct effects [of plant height besides negative indirect effects] of diameter of capitulum and seeds capitulum through plant height, were observed. The residual effect in the present study was 0.308, indicating that about 70 per cent of the variability in yield has been accounted for by the three traits viz., diameter of capitulum, seeds/capitulum and plant height, utilised in this investigation.

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Table 1; Correlation regression and heritability estimates between parent off-spring with reference to individual traits in sunflower

Characters	Correlation (a)	Regression (b)	Heritability % (h ²)
Plant height	0.7192**	0.5620**	64.39
Diameter of capitulum	0.4914**	0.2568*	36.60
Seeds capitulum	0.4844*	0.2116	42.97
Seed yield/capitulum	0.3418	0.1619	35.60

* Significant at 5% level; ** Significant at 1% level

Table 2: Correlation between parents and off-spring with reference to different traits in sunflower

Parental traits	off-spring traits			
	Plant height	Diameter of capitulum	Seeds/capitulum	Seed yield/capitulum
Plant height	0.7192**	0.4980*	0.6710**	0.4580**
Diameter of capitulum	0.2389	0.4914*	0.4319	0.4716*
Seeds/capitulum	0.1765	0.5165*	0.4844*	0.5211*
Seed yield/capitulum	0.0455	0.1560*	0.3662	0.3418

* Significant at 5% level; ** Significant at 1% level

Table 3 Phenotypic and genotypic correlation between seed yield and its components in sunflower

Characters	Diameter of capitulum	Seeds/capitulum	Seed yield/capitulum
plant height	0.767** (0.785**)	0.650** (0.694**)	0.757** (0.761**)
Diameter of capitulum		0.617** (0.567*)	0.947** (0.984**)
Seeds/capitulum			0.662** (0.734**)

Values in parentheses denote the genotypic correlation

* Significant at 5% level; ** Significant at 1% level

Table 4: Path coefficients for seed yield and its components in sunflower

Characters	Plant height	Diameter of capitulum	Seeds/capitulum
Plant height	<u>-0.098</u>	0.670	0.189
Diameter of capitulum	-0.057	<u>0.854</u>	0.187
Seeds/capitulum	-0.058	0.520	<u>0.272</u>

Underlined figures denote direct effects) Residual effect $p_x = 0.308$

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