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## Correlation studies for oil yield in F<sub>3</sub> generation of sunflower (*Helianthus annuus* L.)

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### Abstract

F<sub>3</sub> generation of thirty-five progenies of sunflower were selected for the correlation study to assess the association among yield and its components. Observations were recorded on fourteen traits *viz.*, days to first flowering, days to maturity, plant height, head diameter, powdery mildew Percentage Disease Index, 100 seed weight, volume weight, seed shape, seed colour, stripes on the margin, stripes between the margin, seed yield per plant, oil content and oil yield. Character association analysis revealed strong positive association of oil yield per plant with plant height, head diameter 100-seed weight, seed yield and oil content. Hence synchronized selection of these characters would contribute for the improvement of the oil yield per plant.

**Keywords:** Sunflower, oil yield, correlation

### Introduction

Sunflower is one of the important edible oilseed crops grown in the world after soybean and groundnut. Sunflower oil is a rich source of linoleic acid (64 %) and oleic acid (25-30%). Sunflower (*Helianthus annuus* L.) belongs to the family "Asteraceae" is the world's fourth major oilseed crop Rodriguez *et al.* (2002)<sup>[7]</sup>. Yield is the most economic character in almost all of the crops. Yield, a complex character which is highly influenced by several other characters known as yield contributing characters. These yield components are related among themselves and with yield either favourably or unfavourably. Information of genetic system controlling yield and its components is useful in understanding the prepotency of the parents and thus benefit to select parents possessing in-built genetic potential. For efficient selection, programme interrelationship between yield and its components is inevitable and mutual association of plant characters, which is determined by correlation coefficient and is used to find out the degree (strength), mutual relationship between various plant characters and the component character on which selection can be relied upon the genetic improvement of yield.

### Materials and methods

The experiment material comprising of thirty-five progenies of F<sub>3</sub> generation of single cross COSF7B X 343 B along with their parents (COSF7B and 343 B). These progenies were raised at the Department of Oilseeds, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore during *kharif* 2018. The characters studied were days to first flowering, days to maturity, plant height, powdery mildew Percentage Disease Index, head diameter, 100 seed weight, volume weight, seed shape, seed colour, stripes on the margin, stripes between the margin, seed yield per plant, oil content and oil yield. Phenotypic ( $r_p$ ), genotypic ( $r_g$ ) correlation coefficients were calculated using the formulae given by Al-Jibouri *et al.* (1958)<sup>[1]</sup>

### Results and discussion

Simple correlation coefficients among the yield and yield component characters in sunflower are presented in Table 1.

### Oil yield vs other characters

Oil yield was highly significant and positively correlated with seed yield per plant (0.882). Other researchers Suzer (1998)<sup>[12]</sup>, Kothai *et al.* (2007)<sup>[13]</sup>, Mijić *et al.* (2009)<sup>[15]</sup> and Singh *et al.* (2018)<sup>[9]</sup> indicated a positive relationship of different intensity between grain and oil yield. Plant height (0.535), head diameter (0.638), 100-seed weight (0.449), oil content (0.588) were

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recorded significantly correlated with oil yield. The results were in line with the findings of Chikkadevaiah *et al.* (2002)<sup>[2]</sup>, Subrahmanyam *et al.* (2002)<sup>[11]</sup>, Mijić *et al.* (2009)<sup>[5]</sup> and Sivamurugan (2011)<sup>[10]</sup>. The characters days to first flowering, days to maturity, volume weight, stripes between the margin had non-significant and positive association with oil yield whereas characters such as Percentage Disease Index, seed colour, seed stripes on the margin had non-significant negative association with yield.

#### Between other characters

Days to maturity, plant height, head diameter and 100 seed weight had significantly positive correlation with seed yield per plant such results were similar with the findings of Lakshminarayana *et al.* (2004)<sup>[4]</sup>. Plant height showed

significant and positive correlation with head diameter. Similar results were reported by Chikkadevaiah *et al.* (2002)<sup>[2]</sup> Head diameter exerted significant positive correlation with 100-seed weight. These findings related to the results of Sasikala (2000)<sup>[8]</sup> and Moorthy (2004)<sup>[6]</sup>. The correlation between 100-seed weight and seed yield per plant was found to be significant and positive. The similar results were reported in earlier findings of Lakshminarayana *et al.* (2004)<sup>[4]</sup>. Volume weight per 100 ml had significant and positive correlation with oil content. From the above discussion, it may be concluded that differential association was observed among these component characters. The characters *viz.*, plant height, head diameter 100-seed weight and volume weight were considered as important selection indices for both oil and seed yield improvement.

**Table 1:** Estimates of correlation coefficients between seed yield and yield contributing traits in F<sub>3</sub> population of sunflower (*Helianthus annuus* L.)

	Days to first flowering (days)	Days to maturity (days)	Plant height (cm)	Head diameter (cm)	Powdery mildew severity (PDI)	Seed yield (g / plant)	100 seed weight (g)	Volume weight (g/100 ml)	Seed shape (score)	Seed colour (score)	Stripes on the margin (score)	Stripes between the margin (score)	Oil content (%)	Oil yield (g/plant)
Days to first flowering (days)	1	.528**	.514**	.343*	-.098	.277	.104	-.090	-.051	-.073	-.045	-.164	.113	.266
Days to maturity (days)		1	.532**	.556**	.052	.420*	.242	-.016	-.153	.082	-.055	-.036	-.077	.302
Plant height (cm)			1	.592**	-.006	.566**	.044	-.014	-.196	-.208	-.049	-.110	.188	.535**
Head diameter (cm)				1	.016	.791**	.496**	.010	-.197	-.105	-.017	-.066	-.008	.638**
Powdery mildew severity (PDI)					1	-.022	-.181	-.035	-.065	.120	.306	-.102	-.271	-.122
Seed yield (g / plant)						1	.516**	.066	-.037	-.123	-.106	-.010	.145	.882**
100 seed weight (g)							1	-.143	.438**	.090	.040	.217	.079	.449**
Volume weight (g/100ml)								1	.121	-.071	.206	.321	.399*	.251
Seed shape (score)									1	-.128	.172	.324	.123	.019
Seed colour (score)										1	-.225	-.231	-.089	-.132
Stripes on the margin (score)											1	.597**	-.011	-.085
Stripes between the margin (score)												1	.164	.067
Oil content (%)													1	.588**
Oil yield (g/plant)														1

\*\* Significance at 0.01 probability level \*Significance at 0.05 probability level

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