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Research Note

Association analysis for oil yield yield and component traits in sunflower

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Abstract
Simple correlation analyses was studied in 35 hybrids along with 12 parents of sunflower in order to understand the relationship between yield and its component characters. Observations were recorded on 11 traits *viz.*,50% flowering, plant height, head diameter, volume weight, 100-seed weight, hull weight, kernel weight, hull percentage, oil content, seed yield per plant and oil yield per plant. The results revealed that all the observed traits are important as selection indices for oil and seed yield improvement programme. It may also be noted that the oil content had significant and negative association with hull per cent and no association with hull weight. The association between oil content and hull per cent might be due to the derived data from hundred seed weight and also kernel weight. Tratis viz., plant height, days to 50 per cent flowering, head diameter, volume weight, kernel weight, hull content and 100-seed weight, oil content and seed yield per plant are important and hence due emphasis should be given in selection programme for oil yield per plant.

Key words: Sunflower, oil yield, hull per cent, kernel content, oil content, correlation

Sunflower (*Helianthus annuus* L.) has become an important oil crop in the world. Higher seed and oil yield is one of the objective of sunflower researchers. Yield is a complex entity and inheritance of yield depends upon a number of characters which are often polygenic in nature and are highly affected by environmental factors. Interrelationship between yield and its components is important for efficient selection programme. Earlier Fick *et al*. (1974), Skoric et al.(1974), Green (1980) and Joksimovic *et al*. (1999) used simple correlation analysis to study the relationships between oil yield and the other sunflower plant traits. Therefore, the present investigation has undertaken to study the mutual association among oil yield and its component traits in Sunflower.

In this present investigation, 47 genotypes consist of 35 hybrids and 12 inbreds of sunflower were studied. The genotypes were raised in a randomized block design with two replication in the Oil seeds farm, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University; Coimbatore during June- Sept, 2011. In each replication, each entry was raised in two rows of 4.5m length adopting a spacing of 60 cm between the rows and 30 cm between the plants within each row. Normal agronomic practices were followed under irrigated condition. The data were recorded on five randomly selected plants in each entry of each replication for oil yield and its contributing traits viz, days to 50% flowering, plant height (cm), head diameter, volume weight (g per 100ml), 100-seed weight (g), hull weight (g/100 seeds), kernel weight (g/100 seed), hull per cent, oil content (%), seed yield per plant (g) and oil yield per plant (g). The data collected were statistically analyzed for simple correlation utilizing the formula suggested by Aljibouri *et al.* (1985).

Simple correlation coefficients among the yield and yield component characters in sunflower are presented in Table 1. Yield is a complex character and it is a function of several component characters. Hence selection based on yield performance alone may give a biased result and led to ambiguity. A study of nature and degree of association of component characters with yield assumes greater importance for fixing up characters that play a decisive role in influencing yield. Selection would therefore be more effective, if it is based on component characters rather than directly on yield. Correlation coefficient analysis measures the mutual relationship between various characters. It is used to determine the component characters on which selection can be done for improvement in yield.

In the present investigation, all traits had significant and positive correlation with oil yield per plant except hull per cent. The oil yield per plant had significant and negative correlation with hull per cent. The same trend of association was observed for seed yield and other traits. These results are confirmed with the earlier findings of Devender Kumar *et al.* (2002), Vidhyavathi *et al.* (2005), Ravi *et al.* (2006) and Sowmya *et al.* (2010). Hence all these traits are important traits in the oil and seed yield important programme.

With regard to inter correlation among yield component traits, oil content had significant and positive association with all traits except, days to 50% flowering, hull weight and hull per cent. Oil content had significant and negative association with hull per cent. Hull per cent showed significant and positive association with hull weight while it showed significant and negative association with head diameter and volume weight. The trait kernel weight and 100-seed weight had significant and positive association with all traits. Hull weight recorded significant and positive association with all traits except volume weight. Volume weight had significant and positive association with plant height and head diameter as reported by Chikkadeviah *et al*. (2002) and Loganathan *et al*. (2006). Head diameter had significant and positive association with days to 50% flowering and plant height. Plant height showed significant and positive association with days to 50 %flowering.

The above results indicated that all the observed traits are important as selection indices for oil yield improvement programme. It may also be noted that the oil content had significant and negative association with hull per cent but no association with hull weight. This result may be surprising as most of the sunflower breeding programme aims for less hull content. The association between oil content and hull per cent might be due to the derived data and and also influenced by the hundred seed weight and kernel weight. Hence the thickness of hull need to be given importance instead of hull per cent.

From the above discussion, it may be concluded that plant height, days to 50 % flowering, head diameter, volume weight, kernel weight, hull weight and 100-seed weight, oil content and seed yield per plant are important in deciding the oil yield. Hence these traits should be given due emphasis during selection programme for oil yield per plant.

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Table 1. Simple Correlation coefficients between yield and yield component characters

Characters	Plant height (cm)	Head diameter (cm)	Volume weight (g/100ml)	100- seed weight (g)	Hull weight (g/100 seed)	Kernel weight (g/100 seed)	Hull per cent	Oil content (%)	Seed yield per plant (g)	Oil yield per plant(g)
50% flowering (days)	0.66**	0.58**	-0.01	0.31**	0.24*	0.32**	-0.04	0.07	0.56**	0.51**
Plant height (cm)	.	0.72**	0.25*	0.36**	0.25*	0.38**	-0.10	0.28**	0.60**	0.59**
Head diameter (cm)		.	0.42**	0.65**	0.44**	0.69**	-0.23*	0.40**	0.83**	0.80**
Volume weight (g/100ml)			.	0.37**	0.13	0.45**	-0.42**	0.65**	0.35**	0.46**
Hundred seed weight (g)					0.88**	0.98**	0.08	0.35**	0.72**	0.70**
Hull weight (g/100 seeds)						0.76**	0.53**	0.05	0.48**	0.42**
Kernel weight (g/100 seed)						.	-0.13	0.46**	0.77**	0.78**
Hull percent								-0.50**	-0.25*	-0.34**
Oil content (%)									0.45**	0.62**
Seed yield per plant (g)										0.98**

*,** Significant at 5 and 1% respectively