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Correlation studies in safflower (*Carthamus tinctorius* L.) for seed yield and yield related traits

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Abstract

The present study on "Correlation studies in safflower (*Carthamus tinctorius* L.) for seed yield and yield related traits" was undertaken to estimate the association of yield and yield contributing characters. The set of 63 genotypes along with three checks 'A-1, PBNS-12, PKV Pink' were evaluated at the field of Oilseeds Research Unit, Dr. PDKV, Akola during *rabi* 2018-2019.

Correlation studies revealed that, the seed yield per plant was significantly and positively correlated with plant height, number of branches per plant, number of capitula per plant, number of seeds per capitulum, 100 seed weight and volume weight whereas negatively and non significantly with days to 50% flowering, days to maturity and oil content.

Keywords: Correlation, safflower, seed yield

Introduction

Safflower (*Carthamus tinctorius* L.) is one of the oldest oilseed crops and is widely grown under the hot, dry climate of the Middle East, the centre of its origin and diversity. It belongs to the family Compositae or Asteraceae. In the wild genus *Carthamus* is reported to have 25 species (Yuan *et al.*, 1989) [15]. Amongst the species of *Carthamus*, only safflower (*Carthamus tinctorius* L.) is grown worldwide containing 24 pairs of chromosomes. Safflower flowers are known to have many medicinal properties for curing several chronic diseases and they are widely used in Chinese herbal preparations (Li and Mundel, 1996) [6]. It is an important oilseed crop as it contains 78 per cent of PUFA (Linoleic Acid) which is useful for heart patients as it reduces blood cholesterol levels (Nimbkar 2002) [8]. It also contains 16-20 per cent mono saturated fatty acid (Oleic Acid) and only 8 per cent saturated fatty acid 2-3 per cent stearic acid, 6-8 per cent palmitic acid (Hamdan *et al.*, 2011) [4]. Improvement in the seed yield per plant is an important activity of plant breeding. The ultimate seed yield is a complex process that will be affected by many genetic and non-genetic factors. Correlation coefficient is an important statistical constant which indicate the degree of association among the various characters. In order to know the magnitude of association of the seed yield with other yield influencing traits, correlation analysis is an effective tool. This will help in constructing a suitable plant type and combining desirable expression of different yield components. The present investigation therefore was planned to evaluate the genetic correlation studies in germplasm accessions of safflower.

Material and methodology

The experimental material consisted of 63 germplasm lines of safflower along with three checks A-1, PBNS-12 and PKV Pink. These were evaluated in augmented design, in a single row plot of five metre length at the field of Oilseeds Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during *rabi* season 2018-19. The experimental design consisted of seven block design with each block containing nine germplasm lines and three checks. Checks were common for every block. All recommended cultural practices were followed to raise a good crop. The observations were recorded on five randomly selected plants for ten quantitative traits viz., days to 50% flowering, days to maturity, plant height (cm), number of

branches per plant, number of capitula per plant, number of seeds per capitulum, volume weight (g/100ml), 100 seed weight (g), oil content (%) and seed yield per plant (g). The data were subjected to simple correlation analysis as per Singh and Choudhary (1977)^[14].

Result and discussion

Genetic variability and correlation among seed yield and yield attributes help in identifying a suitable genotype with desired characteristics. This study aimed at selecting such desirable genotypes. The success of selection depends on the choice of selection criteria for improvement of seed yield. Correlation coefficient analysis could indicate significant relationship among the evaluated traits. The correlation coefficient between ten traits is presented in table 1.

Correlation analysis showed that days to 50% flowering (-0.10) and days to maturity (-0.05) were negatively correlated with seed yield per plant. These results were in conformity with the results obtained by Anjani (2005)^[1], Salunkhe (2014)^[12].

Plant height (0.30*) had significant positive association with seed yield per plant. Number of branches per plant (0.38**) was significantly and positively correlated with seed yield per plant. similar results recorded by Pavithra (2016)^[10], Semahegn *et al.* (2016)^[13], Salunkhe (2014)^[12].

Positive and significant association of number of capitula per plant (0.72**) with seed yield was obtained. These results were in conformity with the results obtained by Pattar (2014)^[9], Gujar (2018)^[2] and Mohamed (2018)^[7].

Number of seeds per capitulum (0.32**) was positively and significantly associated with seed yield per plant. Similar results were obtained by Pushpavalli *et al.* (2017)^[11] and Mohamed (2018)^[7].

Significant positive association between 100 seed weight (0.39**) and seed yield per plant was obtained. Pushpavalli *et al.* (2017)^[11], Gujar (2018)^[2], Jadhav *et al.* (2018)^[5] obtained similar results.

Volume weight (0.47**) was positively and significantly associated with seed yield per plant.

Negative and non-significant association of oil content (-0.18) with seed yield per plant was observed. Existence of strong negative association between these components was also reported by Hoshang *et al.* (2013)^[3], Salunkhe (2014)^[12] and Pattar (2014)^[9]. The special breeding strategies such as reciprocal recurrent selection are to be adopted for simultaneous improvement of both the traits

This study also indicates that a high yield in general correlate with low oil content. However, a genotype with both high yield and high oil content could be more useful for strengthening breeding programme.

Table 1: Simple correlation among ten yield contributing characters of safflower genotypes

	Days to 50% flowering	Days to maturity	Plant height (cm)	No. of branches/plant	No. of capitula/plant	No. of seeds/capitulum	100 seed wt. (g)	Volume wt. (g/ 100 ml)	Oil content (%)	Seed yield/plant (g)
Days to 50% flowering	1.00	0.60	0.28*	-0.03	-0.16	0.22	-0.05	-0.28*	0.42**	-0.10
Days to maturity		1.00	0.25*	0.14	-0.02	0.08	0.03	-0.10	0.34**	-0.05
Plant height (cm)			1.00	0.21	0.21	0.39**	0.08	0.21	0.31*	0.30*
No. of branches/plant				1.00	0.37**	0.25*	-0.03	0.32**	0.09	0.38**
No. of capitula/plant					1.00	0.23	0.30*	0.41**	-0.16	0.72**
No. of seeds/capitulum						1.00	-0.02	0.15	0.17	0.32**
100 seed weight (g)							1.00	0.33**	-0.31*	0.39**
Volume weight (g/100 ml)								1.00	-0.08	0.47**
Oil content (%)									1.00	-0.18
Seed yield/ plant (g)										1.00

Note: * Significance at 5% level

** Significance at 1% level

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