

Original Research Article

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Effect of Planting Time and Genotypes on Seed Yield, Quality Parameters and Economics on Safflower

G. Somanagouda^{1*}, T. T. Bhandiwaddar¹ and Manjula Maralappanavar²

¹AICRP on Sorghum, MARS, UAS, Dharwad-58005, India

²Genetics & Plant Breeding, ARS, Hebballi Farm, Dharwad-580 005, India

*Corresponding author

ABSTRACT

A field experiment was conducted of Agricultural Research Station, Annigeri, University of Agricultural Sciences, Dharwad during *rabi* season of 2015-16, under rainfed conditions. The experiment was laid out in a split-plot design and replicated thrice. Main plots consists of three date of sowing – D₁: 1-10-2015, D₂: 15-10-2015, D₃: 31-10-2015 and three sub plots, genotypes, G₁-A₁, G₂-NARI-6 and G₃-NARI-57. Among the different date of sowing significantly higher seed yield (946 kg ha⁻¹) was observed in 1st date of sowing as compared to third date of sowing (783 kg ha⁻¹). Among the genotype, Annigeri-1, recorded significantly higher yield (1033 kg ha⁻¹) as compared to other two genotypes NARI-6 (799 kg ha⁻¹) and NARI-57 (825 kg ha⁻¹), with respect to oil content and oil yield no significantly difference were observed with different date of sowing. Among the genotypes, NARI-6, recorded significantly higher oil content (34.41%) as compared to Annigeri-1 (28.83%).

Keywords

Oil content,
Annigeri-1,
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Economics

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Introduction

Safflower growth and productivity are influenced by many factors such as genotype, environment and agronomic practices. It is mainly grown in semi-arid regions for use as vegetable and industrial oil. Safflower is a crop species which is well adapted to dry and salty land conditional since it is a strongly tap-rooted annual plant which is resistant to

saline conditions, drought stress and can reach the deep lying water (1, 13). Also low production costs and low water and nutrient need appeal to farmers as an alternative to other crops.

However, safflower yields are generally lower than the yield of other oilseed crops (4, 5, 10). The importance of safflower as oilseed crop has increased in recent years, especially with

the increasing interest in the production of biofuels. Safflower, in general, performs better when it succeeds a short duration legumes like mungbean, blackgram and groundnut (during *kharif*) than cereal crops like sorghum and maize due to favourable moisture regimes and residual fertility.

Hence, it offers an excellent opportunity for doubling the existing level of cropping intensity and there by steps up returns from rainfed, farming in many conventional monos cropped areas. Growing of groundnut during *kharif* and safflower during *rabi* season in sequence in areas where the rainfall is fairly well distributed from June to October found advantageous under suitable nutrient management practices. Safflower oil preferred for its higher poly unsaturated acid (78% linoleic acid) which reduces blood cholesterol level (3).

Currently, sufficient data on safflower production management is lacking. Therefore, the key objectives of the present study were to determine the effect of planting time and genotypes to optimize seed yield and quality parameters for the production of the safflower.

Materials and Methods

A field experiment was conducted at Agriculture Research Station, Annigeri (15° 8' N, 75° 7' E and 624.8m amsl), University of Agricultural Sciences, Dharwad as part of All-India Coordinated Research Project on Safflower during *rabi* seasons of 2015-16 under rainfed condition.

The soil is clayey in texture (Vertisol) with pH of 7.95, bulk density of 1.27 dS/m and available N:P:K of 224, 21 and 342 kg per ha. The experiment included two factors; three varieties and three sowing periods laid out in split-plot design with three replications. First

sowing was done on 1st October 2015, but second and third sowing were taken up at 15 days interval after first and second sowing, respectively (7, 8).

Results and Discussion

100 seed weight (g)

Among the date of sowing, significantly higher 100 seed weight (4.56 g) recorded is 1st October, 2015 sowing as compared to other two date of sowing, with respect to genotypes, significantly higher 100 seed weight (5.29 g) recorded in 1st October, 2015 sowing as compared to other two date of sowing (2). Interaction between DAS and genotypes did not any significant difference (Table 1).

Seed yield (kg/ha)

Among the date of sowings, however, the crop sown during first fortnight of October (1-15 Oct.) recorded significantly higher seed yield (937 kg/ha) as compared with latter sowing dates. Among the safflower cultivars, significantly the highest seed yield was recorded with A-1 (1033 kg/ha) as compared with the yield of NARI-6 and NARI-57. The newly released genotypes (NARI-6 and NARI-57) did not perform as well as age old and locally very popular cultivar (A-1) under dryland ecosystem of northern Karnataka. Although interactions between planting date and genotypes were non-significant early sowing (1-15 of October) with A-1 variety recorded higher seed yield of 1127 kg/ha, than other combinations. Further, late sowing not only exposed the crop to warmer temperature, especially during second year all through the growing period until maturity but also exhausted residual soil moisture much faster for the crop to experience soil moisture, thus affected seed yield. Irrespective of initial stored soil moisture and rains during post-rainy season, early sowing (1-1, Oct.) has

been found to be optimum to realize higher yields and among the three varieties tested the good old A-1 variety seems to be more adapted to extremes of northern dry zone and performed much better than NARI-6 and NARI-57 (11, 12, 15).

Quality parameters

Oil content (%)

Among the genotypes NARI-6 recorded significantly higher oil content (34.41%) as

compared to A₁. But it was on par NARI-57. However, oil content did not show any significant differences with respect to date of sowing. Interaction between DAS and genotypes also did not significant difference (6, 14).

Oil yield (kg/ha)

Oil yield did not show any significant difference with respect to date of sowing, genotypes and interaction between date of sowing and genotypes (9).

Table.1 Influence of planting time and genotypes on seed yield and quality parameters

Treatments	100 seed wt	Seed yield (kg/ha)	Oil content (%)	Oil yield (kg/ha)
Main plots: Genotypes				
D ₁ : 1-10-2015	4.56	946	32.37	302
D ₂ : 15-10-2015	4.04	928	32.36	299
D ₃ : 31-10-2015	4.21	783	32.85	254
SEm _±	0.10	38	0.47	12
CD (P=0.05)	0.34	131	NS	NS
Sub Plots: Date of sowing				
G ₁ -A ₁	5.29	1033	28.83	297
G ₂ -NARI-6	3.82	799	34.41	275
G ₃ -NARI-57	3.69	825	34.35	281
SEm _±	0.14	29	0.80	11
CD (P=0.05)	0.41	87	2.38	NS
Interaction				
D ₁ G ₁	5.87	1127	27.81	313
D ₁ G ₂	3.99	895	34.68	310
D ₁ G ₃	3.81	818	34.62	282
D ₂ G ₁	4.65	1019	29.65	302
D ₂ G ₂	3.82	793	35.46	282
D ₂ G ₃	3.65	972	31.98	313
D ₃ G ₁	5.36	955	29.04	278
D ₃ G ₂	3.65	710	33.09	235
D ₃ G ₃	3.61	684	36.44	249
SEm _±	0.22	56	1.23	20
CD (P=0.05)	NS	NS	NS	NS

Table.2 Influence of planting time and genotypes on economics

Treatments	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
Main plots: Genotypes			
D ₁ : 1-10-2015	28936	12436	1.75
D ₂ : 15-10-2015	22383	5883	1.36
D ₃ : 31-10-2015	23088	6588	1.40
SEm₊			
CD (P=0.05)			
Sub Plots: Date of sowing			
G ₁ -A ₁	26502	10002	1.61
G ₂ -NARI-6	25983	9483	1.57
G ₃ -NARI-57	21922	5422	1.33
SEm₊			
CD (P=0.05)			
Interaction			
D ₁ G ₁	31543	15043	1.91
D ₁ G ₂	25062	8562	1.52
D ₁ G ₃	22901	6401	1.39
D ₂ G ₁	28518	12018	1.73
D ₂ G ₂	22210	5710	1.35
D ₂ G ₃	27222	10722	1.65
D ₃ G ₁	26747	10247	1.62
D ₃ G ₂	19876	3376	1.20
D ₃ G ₃	19142	2642	1.16
SEm₊	-	-	-
CD (P=0.05)			

Economics

With respect to date of sowing, highest gross return (28936 Rs./ha), net return (12436 Rs./ha) and B:C ratio (1.75) recorded in 1st October, 2015 as compared to other two date of sowing (Table 2). Among the genotypes A₁ genotype recorded highest gross return (26502 Rs./ha), net return (10002 Rs./ha) and B:C ratio (1.61) as compared to other two genotypes. Interaction between date of sowing and genotypes recorded highest gross return (31543 Rs./ha), net return (15043 Rs./ha) and B:C ratio (1.91) as compared to other combinations.

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