



**Original Research Article**

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## **Effect of Sowing Dates on Seed Yield, Oil Yield and Economics of Different Safflower Genotypes**

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### **A B S T R A C T**

In order to investigate the “Effect of Sowing Dates On Seed yield, Oil Yield and Economics Of Different Safflower Genotypes”, an experiment was conducted on a split plot design with 4 replications during the year 2015-16 at AICRP on Safflower, VNMKV, Parbhani (M.S.). The experiment consisted of 9 treatment combinations comprising 3 dates of sowing (15<sup>th</sup> October, 30<sup>th</sup> October and 15<sup>th</sup> November) as main plots and 3 cultivars (Annigeri-1, NARI-6 and NARI-57) as subplots. The study revealed that, sowing date affected the seed yield and oil yield. The sowing of safflower during first fortnight of October i.e. 15<sup>th</sup> Oct. gave the highest seed yield. The oil yield of safflower also found significantly superior under 15<sup>th</sup> Oct. followed by 30<sup>th</sup> October date of sowing. The yield of safflower decreases as the crop sown at an interval of fifteen days after second date of sowing. Similar results were also obtained in gross monetary returns, net monetary returns and B: C ratio. Significantly higher seed yield was observed by variety Annigeri-1 ( $1019 \text{ kg ha}^{-1}$ ) followed by NARI-57 ( $956 \text{ kg ha}^{-1}$ ) and lowest seed yield was recorded with NARI-6 ( $857 \text{ kg ha}^{-1}$ ). Similar trend was also observed in respect of GMR, NMR and B:C ratio. Interaction effect on seed, oil yield, oil content, GMR, NMR and B:C ratio was found non significant.

#### **Keywords**

Safflower, Sowing date, Genotype, Seed Yield, Oil, Economics

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### **Introduction**

Safflower (*Carthamus tinctorius* (L.) is an important *rabi* oilseed crop of Maharashtra apart from its superior adaptability to scanty moisture conditions, it produces oil rich in poly unsaturated fatty acids (linoleic acid 78%) which plays an important role in reducing the blood cholesterol level. It has been under cultivation in India either for its colored

florets and muchvalued oil. Generally it is known as *Kusum* or *Kardi*. As safflower is a salt tolerant crop, hence suitable for command areas of Jayakwadi and Purna. It has wider range of elasticity both in rainfed as well as irrigated conditions due to its deep root system, xerophytic characters, thorniness and waxy coating of leaves, thus reducing the moisture use as compared to other *rabi* crops. The cost of cultivation of safflower crop is

low with highest B:C ratio with minimum irrigations. This will result into increase in productivity of safflower there by sustaining the production in irrigated command areas.

The most important production factors in safflower are both soil and ambient temperature and soil moisture. Hence, sowing date assumes greater significance. Any delay in sowing resulted drastic reduction in seed yield and oil content. Sowing of the crop at right time have a quite important. Early sowing with improved variety is one of most cost effective ways of increasing crop yields. Similar results were reported earlier by Daltalabet *et al.*, (2013) and Sahu and Thakur (2013). Cultivar selection is also a key management component in any cropping system even more critical in sowing date for crop production. All the varieties may not be suitable for timely as well as the late sowing. The field and quality properties of safflower are largely determined by ecological factors and cultivation techniques. Similar results were reported earlier by Soleymani *et al.*, (2011) and Daltalabet *et al.*, (2013).

Since it costs no more to plant early than late and grow improved variety than local, yields can be increased significantly by earlier planting without incurring any additional cost of production. Under Indian conditions time of sowing of crop varies with the choice of the crop, variety, availability of soil moisture and irrigation facility. However, there are specific reasons for achieving high crop yields. Under dryland conditions, sowing of crop depends on the receipt of rainfall and availability of soil moisture. Early sowing utilizes the soil moisture more effectively. The crop put forth early vigour, growth and development resulting in higher production. Due to delayed sowing, the rate of decline in yield varies from 4 to 80 kg/day/ha. Delayed sowing leads to reduction in yield because of the prevalence of pest and disease, poor germination due to low

temperature, poor plant stand and severe terminal drought. Most oilseed crops have an indeterminate growth habit; adaptation is influenced by tolerance to high temperature and drought stress. The recommended sowing time of west Maharashtra and Marathwada is last week of September to mid October (Reddy and Patil, 1995).

Sowing time and varieties plays an important role in crop husbandry and remains to be prominent factor in deciding seed as well as oil yield. One of the possible ways to boost the seed yield is to sow the high yielding varieties at appropriate time. Optimum sowing time is important non-monetary input and if managed properly helps to enhance seed yield. So the aim of this study was to evaluate the “Effect of Sowing Dates On Seed yield, Oil Content and Economics Of Different Safflower Genotypes”.

## Materials and Methods

To evaluate the “Effect of sowing dates on seed, oil yield and Economics of safflower genotypes”, an experiment was conducted during the year 2015-16 at All India Coordinated Research Project on safflower, at VNMKV, College of Agriculture, Parbhani (M.S.). A set of 9 treatment combinations comprising 3 dates of sowing (15<sup>th</sup> October, 30<sup>th</sup> October and 15<sup>th</sup> November) as main plots and 3 cultivars (Annigiri-1, NARI-6 and NARI-57) as subplots laid out in split plot design with 4 replications. This study was carried out to determine the effect of optimum sowing time for achieving highest seed and oil yield.

For ensuring good germination, healthy and good quality seeds were used with 20 kg ha<sup>-1</sup> with planting geometry of 45 x 20 cm. The recommended dose of fertilizer (60 N + 40 P<sub>2</sub>O<sub>5</sub>kg/ha) was applied to safflower. Full dose of P<sub>2</sub>O<sub>5</sub> and half dose of N were applied at the

time of sowing in the furrow below the seed. Remaining half dose of N was applied at stage of crop at 30-35 DAS. The oil content of safflower seed was estimated using the Nuclear Magnetic Resonance (NMR) method (Model Oxford mQA 6005).

$$\text{Oil yield (kg ha}^{-1}\text{)} \\ \text{Oil content (\%)} \times \text{Seed yield (kg ha}^{-1}\text{)} \\ = \frac{\text{---}}{100}$$

Oil yield  $\text{kg ha}^{-1}$  was calculated from oil percentage and seed yield. The data collected was analyzed by using statistical procedure of analysis of variance as described by Panse and Sukhatme (1971).

## Results and Discussion

### Effect of sowing dates

The sowing dates showed the significant effect on seed yield and oil yield of safflower. Crop sown on 15<sup>th</sup> October gave the highest seed yield of  $1042 \text{ kg ha}^{-1}$  which was at par with sowing of crop on 30<sup>th</sup> October ( $972 \text{ kg ha}^{-1}$ ). Deokaret *et al.*, (1984) obtained the highest yield by sowing of safflower in the 41<sup>st</sup> MW at Dry Farming Research Station, Solapur. Patel *et al.*, (1997) also reported that the seed yield (18.40 qt/ha) and straw yield(52.32 qt/ha) were highest with sowing of safflower at 41<sup>st</sup> MW. The results are in conformity with those findings of Rajput *et al.*, (2007). This might be due to convenient temperature for longer time favourable for germination as well as vegetative and reproductive growth of plants. The oil yield of safflower also found significantly superior with 15<sup>th</sup> October of sowing ( $277.06 \text{ Kg ha}^{-1}$ ) followed by 30<sup>th</sup> October of sowing ( $245.64 \text{ Kg ha}^{-1}$ ). Similar results were reported by Patel *et al.*, (1996) and Koduri *et al.*, (2003). They reported that maximum oil content (26.67 %) and oil yield ( $277.060 \text{ Kg ha}^{-1}$ ) were recorded under sowing

in 41st MW. The sowing on 41st MW might have improved root development and ultimately better nutritional environment within plants resulted in increase in oil yield. The lowest seed and oil yield was recorded with third date of Sowing (15<sup>th</sup> November) viz, 818 and  $203.548 \text{ Kg ha}^{-1}$  respectively. The yield of safflower decreases as the crop sown at an interval of fifteen days after second date of sowing. Oil content was not influenced by sowing dates. Similar results were also obtained in gross monetary returns (Rs 34389  $\text{ha}^{-1}$ ), net monetary returns (Rs 13389  $\text{ha}^{-1}$ ) and B: C ratio (1.64). A trial was conducted on safflower under irrigated conditions at Phaltan, Maharashtra and observed that crop sown on 12<sup>th</sup> October recorded significantly highest gross returns (Rs. 30947/ha), net returns (Rs.2228/ha) and B:C ratio (0.9) than other sowing dates respectively (Anonymous, 2014).

### Effect of varieties

Significantly higher seed yield was observed by variety Annigiri-1( $1019 \text{ kg ha}^{-1}$ ) followed by NARI-57 ( $956 \text{ kg ha}^{-1}$ ) and significantly lowest seed yield was recorded in NARI-6 ( $857 \text{ kg ha}^{-1}$ ). Similar trend was also observed in respect of oil yield, GMR, NMR and B:C ratio. Oil content was not influenced by varieties. This might be due to the higher values of the growth and yield attributes viz. plant height, no. of branches, leaves, leaf area, dry matter, wt. of capitula plant<sup>-1</sup>, no. of seeds capitula<sup>-1</sup>, number of effective capitula plant<sup>-1</sup> and seed index. These findings are in concurrence with those of Patel *et al.*, (1996) and Anonymous, 2000.

### Interaction effect

The interaction effect between sowing date and varieties was not found significant in respect of seed yield, oil content, oil yield, GMR, NMR and B:C ratio.

**Table.1** Effect of sowing dates on Seed yield, oil yield, oil content and economics of different safflower varieties

Treatments	Seed yield (kg ha <sup>-1</sup> )	Oil content (%)	Oil Yield (kg ha <sup>-1</sup> )	GMR	COC	NMR	B:C ratio
				(Rs.ha <sup>-1</sup> )			
<b>Sowing dates</b>							
D <sub>1</sub> : 15 <sup>th</sup> October	1042	26.67	277.06	34389	21000	13389	1.64
D <sub>2</sub> : 30 <sup>th</sup> October	972	25.41	245.64	32060	21000	11060	1.53
D <sub>3</sub> : 15 <sup>th</sup> November	818	24.93	203.54	26989	21000	5989	1.29
S.E. ±	23.17	1.07	12.98	764.61	---	764.61	---
C.D. at 5%	81.74	NS	45.79	2697.32	---	2697.32	---
<b>Varieties</b>							
V <sub>1</sub> : Annigiri-1	1019	23.82	241.04	33622	21000	12622	1.60
V <sub>2</sub> : NARI-6	857	25.01	214.76	28278	21000	7278	1.35
V <sub>3</sub> : NARI-57	956	28.17	270.44	31537	21000	10537	1.50
S.E. ±	29.12	0.93	12.12	961.00	---	961.00	---
C.D. at 5%	87.19	2.78	42.66	2877.41	---	2877.41	---
<b>Interaction</b>							
S.E. ±	40.13	1.85	18.61	1324.34	---	1324.34	---
C.D. at 5%	NS	NS	NS	NS	----	NS	---
G.M.	944	25.67	242.080	31146	21000	10146	1.49

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