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Research Article

Impact of Safflower (*Carthamus tinctorius* L.) Varieties under Different Row Spacing on Growth and Yield

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ABSTRACT

A field experiment entitled "Performance of safflower (Carthamus tinctorius L.) varieties under different row spacing" was conducted during the rabi season of 2015 at AICRP on safflower, V.N.M.K.V., Parbhani with a view to find out the suitable row spacing for safflower on growth, seed yield, oil content and oil yield of safflower. The experiment was laid out in factorial randomized block design with five spacing S_1-30 cm x 20 cm, S_2-45 cm x 20 cm, S_3-60 cm x 20 cm, S_4- 75 cm x 20cm, S_5-90 cm x 20 cm. and two varieties V_1- Annegeri -1 and V_2- NARI- 38 in three replications. Each experimental unite was repeated three times 5.4 x 4.0 m^2 size in gross plot and it was of 4.5 x 3.6 m^2 size in net plot. From the result of experiment can be concluded that among different varieties of safflower Annegeri -1 (V_1) produced significantly higher growth characters and yield followed by NARI-38 (V_2). The variety Annegeri -1 (V_1) produced significantly higher yield when sown with S_2-45 cm x 20 cm. Sowing of safflower at S_2-45 cm x 20 cm spacing was found better for higher yield was followed by S_1-30 cm x 20 cm. The interaction effects of varieties x spacings were found to be non- significant.

Key words: *Carthamus, Vit. B_1, B_1, B_2, C and E.*

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 polyunsaturated fatty acids (Linoleic acid, 78%) which play an important role in reducing the blood cholesterol level. For centuries, it has been under cultivation in India for its coloured florets and much valued oil. Safflower is the only one native to Iran. Safflower (*Carthamus tinctorius* L.) belongs to the family of Asteraceae. Safflower petals have many medicinal and therapeutic values. These petals contain 16 amino acid, minerals and Vit. B_1, B_1, B_2, C and E. The use of petals either directly as medicinal or in medicinal preparation is reported to active blood circulation, regulate menstruation cycle, reduce pain and cure fracture.

Safflower contains a small amount of oleic acid, linoleic acid, linolenic acid, flavonoids, amino acids and polysaccharides[11]. India ranks first in area (51 %) and production (37 %) in the world.

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The safflower production in the country during 2014-15 was 90.12 lakh tonnes with a productivity of 515 Kg ha^{-1} and Area was 174.95 lakh ha. In Maharashtra the production was 1.13 lakh tonnes a productivity of 645 kg ha^{-1} and Area 1.76 lakh ha^{1}. Since a majority of safflower varieties grown in India were spiny, collecting flowers from them was tedious, time-consuming and labour-intensive. However, with the national releases of non-spiny varieties, it is now possible in India to collect flowers economically by hand without the help of a machine.

The important factor which plays an important role in assessing the performance of the plant type is the morphological structure of the plant contributing towards the growth and yield of crop under prevailing soil moisture nutrient regimes and management level of the crop owing to xerophytic characteristics. And as such plant population per unit area becomes important factor for realization of higher productivity.

MATERIAL AND METHODS

The field experiment was conducted during *rabi* season of 2015-16 at research farm of All India Coordinated Research Project on Safflower, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra). The soil of experimental field was clayey in texture. It was low in nitrogen, medium in phosphorus and high in potash, while medium in organic carbon and slightly alkaline in nature. Field experiment was laid out in Factorial Randomized Block Design having three replications each containing total ten treatments. Main plot contain five spacings as, 30 cm x 20 cm (S_1), 45 cm x 20 cm (S_2), 60 cm x 20 cm (S_3), 75 cm x 20 cm (S_4), 90 cm x 20 cm (S_5) and two varieties Annegeri- 1 (V_1), NARI- 38 (V_2). Recommended dose of fertilizer was applied at the time of sowing and top dressing through Urea, Diamononium phosphate (DAP), Single super phosphate (SSP) and Murat of potash (MOP) a 60:40:00 NPK kg/ha. Recorded growth parameters at various stages of crop and finally seed yield was measured in the given experiment.

RESULT AND DISCUSSION

In table 1. The results of growth parameters are mentioned. Plant height progressively increased and reached to the maximum at harvest. Spacing of S_1-30 cm × 20 cm (119.50 cm) was found to be significantly higher plant height than the other spacing. Spacing S_1-30 cm × 20 cm was found to be at par with S_2-45 cm × 20 cm (117.39 cm) at all the growth stages. The effect of varieties on mean plant height was significant at all growth stages of crop. In general height was increased as the row spacing decreased and plant spacings increased and tendency of plant to grow tall under inadequate row space which might be due to more compitation for light and CO_2 between plants. The mean of plant height of Annegeri-1 (113.63 cm) was found significantly higher over varieties NARI-38 (105.40 cm). The mean of plant height was not influenced significant by interaction effect of spacing and varieties at all the growth stages of crop. The similar result were reported by, Masoume Mohamadzadeh *et al.*[4], Seyede Roghaye Hosseini Valiki *et al.*[9].

Maximum number of functional leaves $plant^{-1}$ (96.67), number of branches $plant^{-1}$ (20.59) and total dry matter $plant^{-1}$ (76.85 g) was observed with the spacing of S_5-90 cm × 20 cm was found to be significantly higher than the other spacings. However it was found to be at par with S_4-75 cm × 20 cm. Spacing of S_1-30 cm × 20 cm was found to be significantly lower number of functional leaves $plant^{-1}$ (75.24), number of branches $plant^{-1}$ (14.26) and total dry matter $plant^{-1}$ (131.87 g). Number of functional leaves $plant^{-1}$, number of branches $plant^{-1}$ and total dry matter $plant^{-1}$ was significantly influenced due to varieties. Annegeri-1 showed higher number of functional leaves $plant^{-1}$, number of branches $plant^{-1}$ and total dry matter $plant^{-1}$ which was significantly higher than NARI-38. This may be due to more number of leaves in wider row spacing and less number of leaves in closer spacing. The wider plant distance increased the biomass of the plant by producing healthy plant parts by receiving maximum sunlight for the process of

photosynthesis and increase the number of branches. The effect of spacing and varieties interaction on these was found to be non-significant. These results are similar with finding reported Pant and Joshi[8], Oad *et al.*[6] and Tamer Eryigit *et al.*[10].

Maximum mean of leaf area plant^{-1} were recorded at the spacing S_5-90 cm × 20 cm (198.45 dm^2) which was found to be at par with S_4-75 cm × 20 cm (184.35 dm^2) at all growth stages and these two treatments were significantly superior over the others. The spacing S_1-30 cm × 20 cm (131.87 dm^2) was found to be lower leaf area in all the growth stages. The mean of leaf area per plant was significantly influenced by the varieties at all growth stages of crop. Variety Annegeri-1 (172.90 dm^2) produced significantly superior mean leaf area plant^{-1} over other variety NARI-38 (155.34 dm^2) at all the growth stages. Increase the leaf area plant^{-1} in spacing was reported by Jadhav *et al.*[3].

The effect of spacings on seed yield was found to be significant. The maximum seed yield (1149 kg ha^{-1}) was recorded with the spacing of S_2-45 cm × 20 cm followed by spacing of S_1-30 cm × 20 cm. Sowing of safflower at S_5-90 cm × 20 cm recorded significantly lowest seed yield. The effect of varieties on yield was found to be significant. Annegeri-1 recorded highest seed yield (1099 kg ha^{-1}) over other variety NARI-38. In the spacing increasing the grain yield of safflower was observed by Abdulhabip ozel *et al.*[1], Ozel *et al.*[7]. Masoume Mohamadzadeh *et al.*[4].

CONCLUSION

It can be concluded from the studies that, In growth parameters higher plant height was observed with treatment spacing of S_1-30 cm x 20 cm and number of leaves plant^{-1}, number of branches plant^{-1}, leaf area plant^{-1} and total dry matter weight was higher with treatment spacing of S_5-90 cm × 20 cm. In variety Annegiri-1 was found better growth characters and seed yield compared to NARI-38. The variety Annegeri -1 produced significantly higher seed yield when sown with S_2-45 cm x 20 cm.

Table 1: Plant height, Number of leaves plant^{-1}, Number of branches plant^{-1}, Leaf area plant^{-1}, Total dry matter weight and seed yield as influenced by treatments of spacings and varieties at harvest

Treatments	Plant height (cm)	Number of leaves plant^{-1}	Number of branches plant^{-1}	Leaf area plant^{-1} (dm^2)	Total dry matter weight (g plant^{-1})	Seed yield (kg ha^{-1})
Spacings (S)						
S_1- (30 cm × 20 cm)	119.50	75.24	14.26	131.87	40.50	1082
S_2- (45 cm × 20 cm)	117.39	83.65	16.24	143.00	44.95	1149
S_3- (60 cm × 20 cm)	108.42	87.16	18.14	162.94	53.28	950
S_4- (75 cm × 20 cm)	103.65	94.03	19.00	184.35	71.35	922
S_5- (90 cm × 20 cm)	98.60	96.67	20.59	198.45	76.85	830
S.E.±	3.47	2.98	0.53	56.42	2.09	32.19
C.D.at 5%	10.31	8.87	1.59	167.64	6.21	95.52
Varieties (V)						
V_1- (Annegeri-1)	4.90	89.15	18.59	172.90	59.76	1099
V_2- (NARI-38)	NS	82.01	16.70	155.34	55.01	874
S.E.±	4.90	1.71	0.33	35.68	1.32	20.36
C.D.at 5%	NS	5.10	1.00	106.02	3.93	60.41
Interaction (S×V)						
S.E.±	4.90	4.22	0.75	79.80	2.96	45.53
C.D.at 5%	NS	NS	NS	NS	NS	NS

REFERENCES

1. Abdulhabip, Z.E.L., Tuncay Demurbulek, M., Atilla, G.R., and Osman, O., Effects of different sowing date and intra row spacing on yield and some agronomic traits of safflower (*Carthamus tinctorius* L.) under HarrPlainos arid condition. *Turkish Journal of Agriculture.* **28:** 413-419 (2004).
2. Anonymous., Safflower: package and practices for increasing production. *Annual Progress Report of safflower 2013-14 (DOR)*. pp 83-94 (2014).
3. Jadhav, P.J., Bachchhav, S.M., Jadhav, A.S. and Bote, N.L,. Pattern of leaf area and dry matter production as influenced by nitrogen, row spacing and plant density of soybean. *Journal of Maharashtra Agriculture University*. **49(7):** 400-403 (1994).
4. Masoume Mohamadzadeh., Seyed ataollah Siadat., Norof, M.S. and Rahim Naseri., The effects of planting date and row spacing on yield, yield components and associated traits in winter safflower under rain fed conditions. *American-Eurasian Journal of Agriculture and Environmental Sciences*. **10(2):** 200-206 (2011).
5. Mohtasham Mohammadi and Rohmatollah Karimizadeh., Response of safflower to row spacing and Intra-row plant distance in semi- warm dryland condition. *Agrilculture and Forestry*. **59(2):** 147-155 (2013).
6. Oad, F. C., Samo, M.A., Qayyum, S.M and Zoad, N.L., Inter and intra row spacing effect on the growth seed yield of different sowing date and intra row spacing on yield and oil content of safflower. *Asian Journal of plant sciences*. **1(1):** 18-19 (2002).
7. Ozel, A., Demirbilek, T and Gur, M.T., Copur effects of different sowing date and intrarow spacing on yield and some agronomic traits of safflower (*Carthamus tinctorius* L.) under Harran Plain's arid conditions. *Turkish Journal of Agriculture and Forestry*. **28:** 413-419 (2004).
8. Pant, R. and Joshi, M.C., A note on response of soybean variety 'Bragg' to plant population and plant geometry in kumaon hills. *Pantnagar Journal of Research*. **2(2):** 226 (1977).
9. Seyede Roghaye Hosseini Valiki., Sobhanallah Ghanbari., Sajedeh Golmohammadzadeh and Karim Riahi Kiasari., Effect of different plant density on growth and yield of three cultivars of sesame (Sesamum indicum L.*) An International Journal.* **7(1):** 1524-1528 (2015).
10. Tamer Eryigit., Bunyamin Yildirim., Kumlay, A.M. and Sezgin Sancaktaroglu., The Effects of different row distances and nitrogen fertilizer rates on yield and yield components of safflower under micro climatic conditions of Igdir Plain, Turkey. 3rd international conference on biological, chemical and environmental sciences (BCES-2015) Kualalumpur. (2015).
11. Zhang Caiying., Duan Huiju., Zhang Liguah., Rong Guanzhe., Zhang and Duan, H.J., Studies on performance of civil soybean and exotic soybean under the environment of Baoding. *Soybean Sciences*. **19(4):** 372-376 (2000).