I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS) Rating : 3.03

# Comparative Productivity and Profitability of Non-spiny Safflower to other *rabi* Crops and Intercropping Systems

**S. M. Gobade*[1], C. B. Patil* and A. K. Gore***

***ABSTRACT:*** *The field investigation experiment was conducted during* rabi *season of 2011 at farm of All India Coordinated Research Project (AICRP) on safflower, VNMKV Parbhani (Maharashtra) it was observed that various* rabi *crops and intercropping system tested in* rabi *season, in comparison to spiny safflower (Annigeri-1) and other* rabi *crops and intercropping systems, non-spiny safflower cultivars* viz., *PBNS-40, SSF-658 and NARI-6 gave maximum seed yield, safflower equivalent yield (SEY) and petal yield.*

***Key words****: Non-spiny , Safflower, Intercropping, SEY.*

## INTRODUCTION

The vegetable oil of oilseed crop is an integral part of the diet of human beings. The involvement of oil and oil products as the major constituents of all balanced dietary patterns emphasis their importance. Besides the dietary needs, the vegetable edible oils have numerous mechanical, industrial, medicinal and therapeutic uses too. Hence, the achievement of self sufficiency in production of edible oils is essentially credit worthiness to the nation. The review of past experiences indicated that there has been serious imbalance in the availability through the domestic production and demand of oils in the country. So our annual per capita consumption of oils and fats remained only 14.8 kg as against 41 kg in developed countries and 26 kg world average (Hegde 2012). 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. It posses deep root system which binds soil particle and thus, prevent erosion.

The average safflower productivity in the Maharashtra 509 kg ha$^{-1}$ (Anonymous, 2012). Some of the major reason given for decline in area and production of safflower in India and Maharashtra is like higher remuneration than safflower obtained for competing crops like sorghum and gram over the years, low oil content of 30% or less, due to spiny nature harvesting is difficult manually. Petal yield is another good alternative source of income to farmer from safflower. Petals have great export potential. Petals can be used in preparation of refreshing herbal tea. Florets are used to colour and flavor soups, rice, sauces, bread and pickle (Sarojini *et al*., 1995). 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.

There is a continuous decline in area under safflower during last decade due to other competing crops and constraints. In order to exploit full potential of non-spiny safflower with its edible oil and petal values, it was felt necessary to undertake present study in *rabi* season to compare productivity and profitability of non-spiny safflower with other *rabi* crops and intercropping systems including spiny safflower which are generally practiced in the Marathwada region of Maharashtra.

## MATERIAL AND METHODS

The experiment was laid out in field plot number A-4 at AICRP on safflower, Vasantrao Naik Marathwada

* Vasantrao Naik Marathwada Agriculture University Parbhani 431 402, [1]*E-mail : gobadeagricos@gmail.com*

Krishi Vidyapeeth, Parbhani during *rabi* season of 2011. the soil of experimental plot was clayey in texture, moderate in organic carbon, poor in nitrogen, medium in available phosphorus and high in potash and slightly alkaline in reaction. Geographically, Parbhani is situated at 409 m mean sea level altitude $19^0$ 16' North latitude and $76^0$ 47' east longitude and has a subtropical climate. The experiment consists of 10 treatments *viz;* $T_1$ PBNS-40(Non spiny), $T_2$ SSF-658 (Non spiny.), $T_3$ NARI-6 (Non spiny.), $T_4$ Annigeri-1 (spiny), $T_5$ (Chickpea sole), $T_6$ (Linseed sole), $T_7$ (Sorghum sole), $T_8$ Chickpea + safflower (3:1), $T_9$ Linseed + safflower (3:1) and $T_{10}$ Sorghum + safflower (2:1) in randomized block design along with three replications. Gross and net plot sizes were 5.4 x 6 $m^2$ and 3.6 x 4.8 $m^2$, respectively. The sowing was done by dibbling method on 24th October, 2011.

## RESULT AND DISCUSSION

It was observed from Table 1 that , Seed yield, straw yield, biological yield and safflower equivalent yield (SEY) of safflower and other *rabi* crops were significantly influenced by different cropping system

Generally, seed yield, straw yield and biological yield (kg $ha^{-1}$) of safflower and other *rabi* crops were highest in sole cropping and lowest in their respective intercroppings.

In case of safflower highest seed yield (1860 kg $ha^{-1}$), straw yield (3625 kg $ha^{-1}$) and biological yield (5485 kg $ha^{-1}$) were recorded by sole spiny safflower( Annigeri-1) followed by non-spiny safflower cultivar PBNS 40 (Non spiny). It is observed that the safflower is the better crop in sole cropping in this region under minimal irrigationManjithkumar *et al.* (2009), reported that yield of safflower and other *rabi* crops were always highest in sole cropping system compared to intercropping system. Singh *et al* (2009), Uke *et al*. (2009), Anonymous (2012 a), Anonymous (2012 c) and Somananagouda *et al*. (2012) reported that maximum yield of safflower was recorded by spiny safflower cultivar and which was on par with non-spiny safflower.

In case of chickpea highest seed yield (1627) , straw yield (3380) and biological yield (5006) kg $ha^{-1}$ of chickpea were recorded by sole chickpea than intercropping with safflower. Similar finding were observed by Jadhao *et al*. (1990), Paslawar and Morey (1990), Singh and Yadav (1993).

In case of linseed highest seed yield (571), straw yield (3018) and biological yield (3588) kg $ha^{-1}$ of linseed were recorded by sole linseed than intercropping with safflower. Similar finding were observed by Kulmi and Chundawat (1997).

In case of sorghum highest seed yield (2110), fodder yield (4126) and biological yield (6235) kg $ha^{-1}$of sorghum were recorded by sole sorghum than intercropping with safflower.

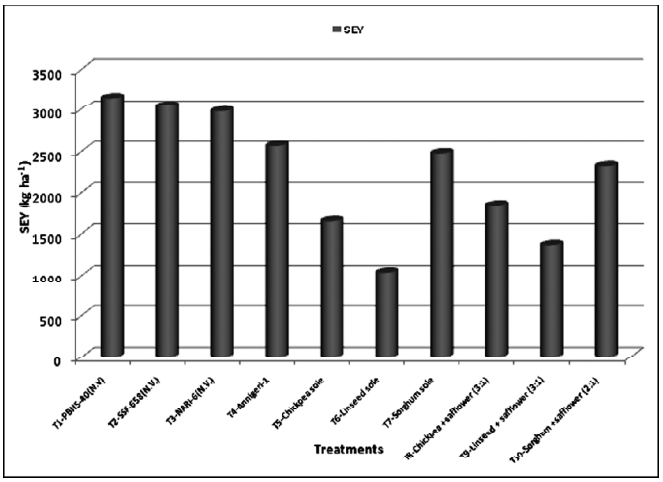


**Figure 1: Mean safflower equivalent yield (kg $ha^{-1}$) as influenced by various treatments**

In case of safflower equivalent yield (SEY) Non-spiny safflower cultivar PBNS-40 (Non spiny) recorded highest (3146 kg $ha^{-1}$) safflower equivalent yield followed by other non-spiny safflower cultivar SSF-658 (Non spiny) and NARI-6 (Non spiny) (Fig 1). The safflower equivalent yield indicates the superiority of growing of non-spiny safflower than spiny safflower and other *rabi* crops/intercropping systems. This was due to better yield and prevailing market prices (Table 26). Similar finding were observed by Anonymous (2012b), Anonymous (2012c) and Anonymous (2012d).

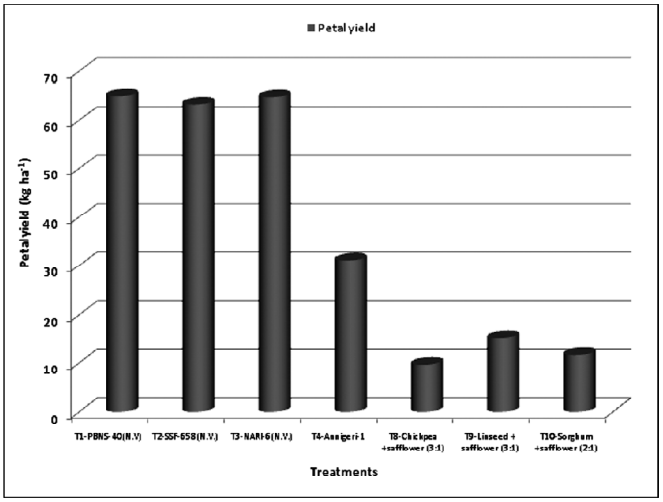


**Figure 2: Mean petal yield (kg $ha^{-1}$) of safflower as influenced by various treatments**

**Table 1**
**Seed yield and straw yield, of safflower and other *rabi* crops as influenced by various treatments**

| | *Seed yield (kg ha$^{-1}$)* | | | | *Straw yield (kg ha$^{-1}$)* | | | |
|---|---|---|---|---|---|---|---|---|
| *Treatments* | *Safflower* | *Chickpea* | *Linseed* | *Sorghum* | *Safflower* | *Chickpea* | *Linseed* | *Sorghum (Fodder)* |
| $T_1$-PBNS-40 (Non spiny) | 1671 | – | – | – | 3536 | – | – | – |
| $T_2$-SSF-658 (Non spiny) | 1611 | – | – | – | 3415 | – | – | – |
| $T_3$-NARI-6 (Non spiny) | 1503 | – | – | – | 3305 | – | – | – |
| $T_4$-Annigeri-1 (Spiny) | 1860 | – | – | – | 3626 | – | – | – |
| $T_5$-Chickpea sole | – | 1627 | – | – | – | 3380 | – | – |
| $T_6$-Linseed sole | – | – | 571 | – | – | – | 3018 | – |
| $T_7$-Sorghum sole | – | – | – | 2110 | – | – | – | 4126 |
| $T_8$-Chickpea + safflower (3:1) | 114 | 1496 | – | – | 240 | 3234 | – | – |
| $T_9$-Linseed + safflower (3:1) | 170 | – | 473 | – | 309 | – | 2520 | – |
| $T_{10}$-Sorghum + safflower (2:1) | 133 | – | – | 1685 | 248 | – | – | 2932 |
| SE± | 134 | – | – | – | 158 | – | – | – |
| CD at 5% | 413 | – | – | – | 485 | – | – | – |
| **General mean** | **1009** | **1561** | **522** | **1898** | **2097** | **3307** | **2768** | **3529** |

**Table 2**
**Biological yield, safflower equivalent yield (SEY) and petal yield (kg ha$^{-1}$) of safflower and other *rabi* crops as influenced by various treatments**

| | *Biological yield (kg ha$^{-1}$)* | | | | *SEY* | *Petal yield* |
|---|---|---|---|---|---|---|
| *Treatments* | *Safflower* | *Chickpea* | *Linseed* | *Sorghum* | *(kg ha$^{-1}$)* | *(kg ha$^{-1}$)* |
| $T_1$-PBNS-40(Non spiny) | 5206 | – | – | – | 3146 | 65.00 |
| $T_2$-SSF-658(Non spiny) | 5025 | – | – | – | 3048 | 63.27 |
| $T_3$-NARI-6(Non spiny) | 4807 | – | – | – | 2971 | 64.80 |
| $T_4$-Annigeri-1(Spiny) | 5485 | – | – | – | 2563 | 31.05 |
| $T_5$-Chickpea sole | – | 5006 | – | – | 1644 | – |
| $T_6$-Linseed sole | – | – | 3588 | – | 1034 | – |
| $T_7$-Sorghum sole | – | – | – | 6235 | 2474 | – |
| $T_8$-Chickpea +safflower (3:1) | 354 | 4729 | – | – | 1845 | 9.64 |
| $T_9$-Linseed + safflower (3:1) | 479 | – | 2991 | – | 1371 | 15.24 |
| $T_{10}$-Sorghum +safflower (2:1) | 380 | – | – | 4617 | 2322 | 11.57 |
| SE± | 167 | – | – | – | 130 | 3.190 |
| CD at 5% | 515 | – | – | – | 386 | 9.830 |
| **General mean** | **3105.12** | **4867** | **3290** | **5426** | **2241** | **37.22** |

Sales prices: Safflower- Rs. 2207 qtl$^{-1}$, Chickpea- Rs. 2232 qtl$^{-1}$, Linseed- Rs. 4000 qtl$^{1}$, Sorghum- Rs. 2002 qtl$^{-1}$, Safflower petals- Rs. 500 kg$^{-1}$, Sorghum fodder- Rs. 3 kg$^{-1}$

In case of petal yield of safflower highest petal yield of safflower was recorded in sole stands as compared to intercropping due to less plant population. Non-spiny safflower cultivars *viz*., PBNS-40, SSF-658 and NARI-6 recorded higher petals yield of safflower than spiny cultivar Annigeri-1 (Fig 2). Shinde *et al* (2009), Anonymous (2012b), Anonymous (2012b) reported that the highest petal yield of safflower always highest recorded by non-spiny safflower cultivars over spiny cultivars of safflower due to convenience in harvesting.

## REFERENCES

Anonymous, (2012a), Evaluation of performance of different varieties and hybrids of safflower under Chhattisgarh Plains, *Annual Progress Report of safflower 2011-12 (DOR)*, pp. 93-94.

Anonymous, (2012b), Comparative productivity and profitability of safflower to other *rabi* crops/system, *Annual Progress Report of safflower 2011-12 (DOR)*, pp. 95-96.

Anonymous, (2012c), Comparative productivity and profitability of safflower to other *rabi* crops/system, *Annual Progress Report of safflower 2011-12 (DOR)*, pp. 96-97.

Anonymous, (2012d), Comparative productivity and profitability of safflower to other *rabi* crops/system, *Annual Progress Report of safflower 2011-12 (DOR)*, pp. 96-97.

D. M. Hegde, (2012), Carrying capacity of Indian agriculture: Oilseeds, *Current Sci*., **102**(06): 867-873.

Jadhao P. N., P. D. Bhalerao, P. V. Thorve and K. T. Nagre (1990), Productivity and economics of safflower intercropping with linseed and gram, *PKV. Res J*., **14**(2): 115-118.

Kulmi G. S., and R. S. Chundawat, (1997), Production potential and economics of chickpea (*Cicer arientinum*) based intercropping systems under irrigated condition, *Crop Res*., **13**(1): 19-25.

Manjithkumar B. R., C. P. Mansur, P. M. Salimath, S. C. Alagundagi and I. M. Sarawad, (2009), Influence of different row proportions on yield components and yield of *rabi* crops under different intercropping systems, *Karnataka J. Agric. Sci*., **22**(5): 1087-1089.

Paslwar A. N. and D. K. Morey, (1990), Studies on parallel cropping of linseed, safflower and sesamum with chickpea and spraying of paras photosynth under dryland, *PKV Res. J,* **14**(1): 70-74.

Sarojini G., Nirmala G. and Nagaraj G., (1995), Utility and acceptability of safflower petal powder as food ingredient, *J. Oilseeds Res*., **12**(2): 299-300.

Singh D. K. and D. S. Yadav, (1993), Production potential and economics of chickpea (*Cicerc arientinum*) based intercropping system under rainfed condition, *Ind. J. Agron.,* **(3):** 424-429.

Singh M. K., S. S. Rao, N. K. Motiramani and A. A. Khan, (2009), Performance of safflower, (*Carthamus tinctorius* L.) varieties in Chhattisgarh state of India, *J. Oilseeds Res*., **26:** 612-613.

Somanagouda G., F. M. Dargannavar, M. P. Basavarjappa, D. N. Kumbrekar and R. S. Patil, (2012), Effect of fertilizer Level on seed yield and economics of different safflower cultivar, *J. Oilseed Res* (29 spl. Issue), 260-261**.**

Uke P. C., A. N. Paslawar, M. M. Wakode, A. B. Deshmukh and S. N. Deshmukh, (2009), Effect of plant density on productivity of new safflower genotypes, *J. Oilseed Res.*, 26**:** 317-319.