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Is Cultivation of Safflower Variety PBNS-86 in Marathwada Region is Profitable ?

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ABSTRACT: Safflower (*Carthamus tinctorius* L.), origin – India, Afghanistan and Ethiopia, a member of the Asteraceae family, is a versatile, winter-spring growing, minor oilseed crop in India and Australia, offering key benefits to diverse summer and winter crop systems as well as components of mixed production system. The major safflower growing states in India are Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Rajasthan and Gujarat. Maharashtra and Karnataka are the two most important safflower growing states accounting for 72 per cent and 23 per cent of the area and 63 per cent and 35 per cent production, respectively. In Parbhani district area under safflower crop was 15.06 hundred hectors with production of 14.76 tones and productivity of 980 kilogram per hectares during year 2022-23. Using Multistage sampling design two tehsil *viz.*, Parbhani and Sonpeth, from Parbhani district were selected for study. This Paper is focused to economic impact of improved safflower variety PBNS-86. Use of this variety change to farmer's income. Economic impact analysis can benefit farmers in several ways. It helps them understand how changes in market conditions, government policies, or environmental factors may affect their income and livelihood.

Keywords: Safflower, Seed, Impact, Profit regression.

INTRODUCTION

Safflower is one of humanity's oldest crops. It was first cultivated in Mesopotamia, with archaeological traces possibly dating as early as 2500BC. Safflower is grown in around 60 countries around the world. Although safflower is considered a minor crop with less than 1 million hectares planted, producing around 500,000MT each year. Safflower seed is an important alternative oil crop because of its high oil content (27 to 32 percent), which content protein (11 to 17 percent), moisture (4 to 7) percent and linoleic acid (55 to70 percent). Cold pressed safflower oil possesses high nutritional and pharmaceutical values due to its noticeable amounts of bioactive compounds and essential fatty acids. Safflower oil contains healthful fats called unsaturated fatty acids. When consumed in moderation, it may offer health benefits, such as blood sugar control, better heart health, and lower levels of inflammation. People can use it topically to treat dry skin, and it is safe to use when cooking at high temperatures. In Maharashtra during 2022-23, area under safflower production was 32 thousand hectares with production of 22.9 thousand tones and productivity of 715.1 kilogram per hectare. In Parbhani district area under safflower crop was 15.06 hundred hectors with production of 14.76 tones and productivity of 980 kilogram per hectares during year 2022-23. This area is increasing every year. Focus of the study was to observed utilization of safflower PBNS-86 variety recommended by VNMKV. Economic impact selected farmers are Main produce was observed high in adopters i.e. (15 quintals) and non-adopters (12 quintals) per hectare. The main produce was achieved highest by adopters, which was achieved by using the proper production technology and efficient utilization of resources.

METHODOLOGY

Sampling Procedure: The study was conducted in Parbhani district of Maharashtra state in year 2022-23. Parbhani district is one of the leading Safflower growing districts of Maharashtra. Out of 9 talukas of Parbhani district, purposively selected 2 talukas *viz.*, Parbhani and Sonpeth. Three villages were selected randomly from each taluka. And, total 6 villages were selected for the study. A random sampling procedure was followed for the selection of the twenty adopters and non-adopters from each village. Thus, 60 PBNS-86 adopters and 60 non-adopters were selected for the study.

Analytical Technique:

Partial budgeting technique and profit regression. Economic impact of PBNS-86 we will studied with help the partial budgeting technique. The technique is an analytical tool for determining answers to the first question about impact on profitability. Secondly, impact

of adoption variety on farmers income will be assessed with the help of profit regression.

$Y = a + bX + E$

Where,

Y = Dependent variable

X = Independent variable

a = Intercept

b = Slope

E = Error

RESULTS AND DISCUSSIONS

A. Economic impact of PBNS-86 adopters on income

Hired labour used efficiency and higher by adopter was 30.33 man-days and non-was 28.21 man-days respectively. The per hectare utilization of machinery was found to be lower in adopters was 17.85 hours and non-adopters 19.1 respectively. Average bullock was used higher by adopters it was 3.83 and non-adopter 2.83 respectively.

Table 1: Physical inputs and outputs of adopters and non-adopters.

Sr. No.	Particulars	Unit	Adopter	Non-Adopter
I	**Input used**			
1	**Labour requirement**			
a	i) Family Labour	Days	19.25	30.67
	ii) Hired Labour	Days	30.33	28.21
b	Bullock Labour	Pair days	3.83	2.83
c	Machinary	Hrs	17.85	19.1
d	Seed	Kg	9.83	11.33
e	Seed Treatment	g	29.5	22.5
f	Manure	Qtl	3.61	3.1
g	Fertilizers			
h	N	Kg	34.04	38.22
i	P	Kg	21.48	23.36
j	K	Kg	0	0
k	Plant protection	lit	2.2	3.2
II	**Output Obtained**			
1	Main Produce	Qtl	15	12
2	By Produce	Qtl	0	0

In case of adopters and non-adopters per hectare utilization of seed was lower for adopters with 9.83 kg and for non-adopters it was 11.33 kg per hectare. Use of nitrogen was observed lower in adopters i.e., 34.04 kg per hectare and non-adopters i.e. 38.22. While the use of phosphorus was lower adopters 21.48 kg and non-adopters 23.36 kg per hectare respectively. Plant protection 2.2 litre was used by adopters and for non-adopters it was 3.2 litres. Family labour was used efficiently and lower adopters was 19.25 man-days and non-adopters it was 30.67 man-days and efficiency and higher by adopter was 30.33 man-days and non-was 28.21 man-days respectively.

Main produce was observed high in adopters i.e. (15 quintals) and non-adopters (12 quintals) per hectare. The main produce was achieved highest by adopters, which was achieved by using the proper production technology and efficient utilization of resources. Similar result observed by Kumar *et al.* (2019).

Per hectare cost of cultivation of adopters were studied and depicted in table 1.2. It revealed that cost for hired male was per unit Rs. 300. Average total cost for hired human labour was Rs. 7212.50 and average total cost for hired female was Rs. 1572.92. In case of bullock labour average cost was Rs.1916.67. Average machinery charges was Rs. 8927.08. Expenditure on seeds was average Rs. 983.33. Cost required for seed treatment was Rs. 147.50. Cost for manure was average Rs. 1806.25. In case of fertilizer expenditure on Nitrogen was average Rs. 395.90 for adopters. Phosphorus was used in small quantity, so average cost for phosphorus was Rs. 1353.19. In case of plant protection the average expenditure by adopters was Rs. 770. Thus, average total working capital was Rs. 26302.72.

Average Cost A of adopters was observed to be Rs. 29467.88. Cost B which includes indirect expenses like rental value of land and interest on working capital was Rs. 48843.04. Cost C which includes family labour was noticed average Rs. 71435.39. Gross produce per hectare for adopters was Rs. 15 Qtls. Contributing average total cost of Rs. 102755.10. Benefited cost ratio of adopters was found more than non-adopters and it was 1.44. Net profit of adopters was Rs. 31319.71 which was more than non-adopters.

Table 2: Per hectare cost of cultivation of adopters.

Sr. No.	Particulars	Unit	Quantity used	Rate per unit	Total cost	Percent
1	Hired human labour(male)	Days	24.04	300	7212.50	10.10
	Hired human labour(Female)	Days	6.29	250	1572.92	2.20
2	Bullock labour	Pair Days	3.83	500	1916.67	2.68
3	Machinery	Hrs.	17.85	500	8927.08	12.50
4	Seed	Kg/q	9.83	100	983.33	1.38
	Seed Treatment		29.50	5	147.50	0.21
5	Manure	Kg/tonnes	3.61	500	1806.25	2.53
6	Fertilizers	N(kg)	34.04	11.63	395.90	0.55
		P (kg)	21.48	63	1353.19	1.89
		K (kg)	0.00	0	0	0.00
7	Herbicides	gm/kg/lit	1.22	550	660	0.92
8	Plant protection					
	Insecticides Dimethoate	gm/kg/lit	2.20	350	770	1.08
	fungicides	gm/kg/lit	0	0	0	0.00
10	Land revenue	Rs.	0	0	557.38	0.78
11	**Total WC**				26302.72	36.82
12	Depreciation on implements	Rs.			1060.95	1.49
13	Expenses on acquisition of inputs	Rs.			526.05	0.74
14	Interest on working capital @6%	Rs.			1578.16	2.21
15	**Cost A**	Rs.			29467.88	41.25
16	Rental value of land	Rs.			17125.85	23.97
17	Interest on fixed capital @12%	Rs.			2249.30	3.15
18	Cost B (Cost A+14+15)				48843.04	68.37
19	Family human labour (Male)	Days	13.08	300	3924.00	5.49
	Family human labour (Female)	Days	6.17	250	1542.50	2.16
20	Cost C i.e. Total cost per ha.	Rs.			71435.39	
	Yield					
	Gross Produce	Qtl	15	6850.34	102755.10	
	B:C Ratio	Rs.			1.44	
	Net profit	Rs.			31319.71	

Table 3: Per hectare cost of cultivation of non-adopters.

Sr. No.	Particulars	Unit	Quantity used	Rate per unit	Total cost	Percent
1	Hired human labour (male)	Days	19.67	300	5900	8.73
	Hired human labour (Female)	Days	8.54	250	2135.42	3.16
2	Bullock labour	Pair Days	2.83	500	1416.67	2.10
3	Machinery	Hrs.	19.10	500	9550.00	14.13
4	Seed	Kg/q	11.33	110	1246.30	1.84
	Seed Treatment		25.50	5	127.50	0.19
5	Manure	Kg/tonnes	3.10	500	1550.00	2.29
6	Fertilizers	N(kg)	38.22	11.63	444.50	0.66
		P (kg)	23.36	63	1471.68	2.18
		K (kg)	0.00	0	0	0.00
7	Herbicides	gm/kg/lit	2.10	570	1197	1.77
8	Plant protection					
	Insecticides Dimethoate	gm/kg/lit	3.20	400	1280	1.89
	fungicides	gm/kg/lit	0	0	0	0.00
10	Land revenue	Rs.	0	0	557.92	0.83
11	**Total WC**				26876.98	39.77
12	Depreciation on implements	Rs.			1089.28	1.61
13	Expenses on acquisition of inputs	Rs.			537.54	0.80
14	Interest on working capital @6%	Rs.			1612.62	2.39
15	**Cost A**	Rs.			30116.41	44.56
16	Rental value of land	Rs.			13470.22	19.93
17	Interest on fixed capital @12%	Rs.			1814.09	2.68
18	Cost B (Cost A+14+15)				45400.72	67.18
19	Family human labour (Male)	Days	20.88	300	6262.50	9.27
	Family human labour (Female)	Days	9.79	250	2447.92	3.62
20	Cost C i.e. Total cost per ha.	Rs.			67581.36	
	Yield					
	Gross Produce	Qtl	12	6735.11	80821.32	
	B:C Ratio	Rs.			1.20	
	Net profit	Rs.			13239.96	

Per hectare cost of cultivation of adopters were studied and depicted in table. It revealed that cost for hired male was per unit Rs. 300. Average total cost for hired human labour was Rs. 5900 and average total cost for hired female was Rs. 2135.42. In case of bullock labour average cost was Rs. 1416.67. Average machinery charges was Rs. 9550 utilization of cost higher than adopters. Expenditure on seeds was average Rs. 1246.30 cost of seeds higher than adopters. Cost required for seed treatment was Rs. 127.50. Cost for manure was average Rs. 1550. In case of fertilizer expenditure on Nitrogen was average Rs. 444.50 for adopters. Phosphorus was used in small quantity, so average cost for phosphorus was Rs. 1471.68. In case of plant protection the average expenditure by adopters was Rs. 1280. Thus, average total working capital was Rs. 26876.98.

Average Cost A of non-adopters was observed to be Rs. 30116.41. Cost B which includes indirect expenses like rental value of land and interest on working capital was Rs. 45400.72. Cost C which includes family labour was noticed average Rs. 67581.36. Gross produce per hectare for non-adopters was Rs. 12 Qtls. Contributing average total cost of Rs. 80821.32. Benefited cost ratio of non-adopters was found less than adopters and it was 1.20. Net profit of non-adopters was Rs. 13239.96 which was less than adopters. Similar result observed that adopters and non-adopters by Rao *et al.* (2010) and Singh *et al.* (2019).

Table 4: Economic impact of PBNS-86 adopters on income.

Sr. No.	Variables	Coefficients	Standard Error
1	Intercept	-106.9151936	2600.258553
2	Dummy Variable	7.232818713*	212.4646657
3	Age	-9.876009983	121.8743342
4	Education	24.40099347	15.83256426
5	Family Size	-13.49586822	74.23105734
6	Occupation	-1.536321686	129.7822813
7	Safflower Area	-203.8518917*	681.0376461
8	Yield	5607.436004**	48.84356504
9	Total Area	-186.0213964	121.2050707
10	Family Type	-47.29290391	222.2838553
11	Source of Information	107.6162321**	83.76424844
12	Past Experience	25.8310369	122.6273596
13	Annual Income	-0.000286433***	0.00101228
14	Loan	0.003140396	0.006944906
15	Social Participation	-166.4156795	358.3230362
16	Valuation of Assets Position	0.00063684**	0.000331893

Note: *,**,*** represent significance at 10%, 5%, 1%, respectively.

Estimated the impact of PBNS-86 variety on farmers income using profit regression at the result are presented in Table 4. The PBNS-86 adopter benefited in term of getting superior quality of source seeds; guidance on package of practices; and information and updates on government support programmes and input-making dummy variable has significance positive effect on farmer's income.

In addition to safflower area, yield, annual income, valuation of assets and source of information under the cultivation has a significance positive effect on PBNS-86. Farming the main occupation has a significance negative influence on farmer's income. Total area, age, education, family size, family type, past experience, loan and social participation has significance negative influence on farmer's income small holding farmer get lower profit as compare to large holding farmers. Similar result observed by Kumar *et al.* (2020); Gajja *et al.* (2014).

CONCLUSIONS

Using data 2022-23, adopters and non-adopters per hectare utilization of seed, nitrogen, and phosphorus was lower for adopters than the non-adopters. In case of adopters average Cost A of adopters was observed to be Rs. 29467.88. Cost B was Rs. 48843.04. Cost C average was Rs. 71435.39 and non-adopters average Cost A of non-adopters was observed to be Rs. 30116.41. Cost B was Rs. 45400.72. Cost C was noticed average Rs. 67581.36. Benefited cost ratio were having high adopters than the non-adopters. Estimated the impact of PBNS-86 variety on farmers' income using profit regression there are positive significance like safflower area, yield, source of information, annual income and valuation of assets.

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