Study No. 74

PROMOTION OF OILSEED CROP (SAFFLOWER) IN NON TRADITIONAL AREAS OF MADHYA PRADESH

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CHAPTER-I

INTRODUCTION

Oilseeds are rich sources of proteins (18 to 40 per cent). Soybean is richest and contains 40 per cent proteins. Oilseeds are also rich sources of fats and sources of many vitamins (B & E) and some minerals viz. phosphorus and iron. Since oilseeds are good sources of proteins and fats these can be used for preparation of milk substitutes. Oils are used in the preparation of paints, vegetable ghee, etc.

Oilseeds production in the country was 108 lakh tonnes in 1985-86. It increased to 201 lakh tonnes in 1992-93. The production during 1993-94 reached 215 lakh tonnes. It was 215 lakh tonnes in 1994-95 also. However, in order to maintain the existing production trend and to attain self sufficiency in oilsand vegetable oils, the oilseeds production has to be increased to 260 lakh tonnes by 2000 AD. This will need all out efforts by all the state governments.

1.1 Oilseeds Production Programme of the Technology Mission

In May, 1986 the Government of India appointed a Technology Mission on Oilseeds to harness the best of production, processing and management technology to accelerate self reliance in oilseeds and vegetable oils. The four pronged strategy adopted by the mission included—

(i) improving oilseeds crop technology;
(ii) improving processing and post harvest technology;
(iii) strengthening input services to farmers;
(iv) improving institutions connected with the industry and marketing.

The different facets of the strategy are listed below-

1. Area Expansion

In area expansion the potential for expansion of area under different situations is to be identified. Since there is not much scope in increasing the net cultivated area the increase in area under oilseeds has to be brought out by increasing cropping intensity and changing cropping pattern. Sequential cropping in double cropping system, inter cropping, diversion of area from low

economy crops to remunerative oilseed crops, substitution of crops in problematic area have to be followed. The details of these are following.

a) Sequential Cropping

Soybean in kharif fallow, groundnut in paddy fallow, sunflower in kharif fallow, toria after paddy harvesting, summer sesamum, safflower under limited moisture condition in traditional areas and non-traditional areas are some examples.

b) Inter Cropping

Soybean as inter crop with maize; cotton, etc., with sugarcane and young plantation crops; with upland paddy, sunflower/sesamum in groundnut; mustard in sugarcane, potato, wheat and gram and linseed in wheat, gram, and lentil.

c) Diversion of Area from Low Economy Crops to Remunerative Oilseed Crops

Low yielding minor millets are to be replaced by groundnut and, upland paddy by soybean. Groundnut and soybean should replace minor millets. Sunflower/safflower should replace minor millets, low yielding pulses, desi cotton and rabi jowar. Low yielding rainfed wheat should be replaced be mustard.

d) Substitution of Crops in Problematic Areas

Growing of soybean in kharif instead of growing of cotton in all the three seasons and replacing of rabi/summer paddy with groundnut. Replacement of paddy with groundnut and replacement of wheat with mustard. Sunflower/safflower as pure crop at the tail end of command areas of irrigation projects.

2. Productivity Increase

Productivity of oilseeds can be increased with the use of improved varieties, optimum seed rate and timely sowing. It can also be improved with presowing treatments of seed, use of fertilizers in recommended doses including rhizobium culture, application of gypsum and application of micro nutrients. Control of weeds, through mechanical and chemical methods, timely plant protection measures and use of improved farm implements and life saving irrigation can also increase the productivity.

To motivate the farmers to implement the above strategy increased and timely availability of quality seeds and improved varieties at reasonable prices are to be ensured. Educating the farmers to prevent and control pests and diseases, organising demonstrations on their fields, making available improved implements, popularising the use of sprinkler irrigation and popularising rhizobium culture, gypsum etc. are to be followed.

3. Input Supply and Support Services

The main aspects of this system are following.

(i) Production and Distribution of Seed

This includes production and supply of breeder's seed, production of foundation seed, seed village programme, distribution of certified seed, distribution of input kits, opening of new retail outlets and infrastructure development.

(ii) Assistance to NSC/SFCI for Production and Distribution of Seed

Assistance is to be provided for production of foundation seed, organizing seed village programme, distribution of certified seed, distribution of seed input kits/minikits, assistance to NSC for monitoring breeders seed and assistance to NSC and SFCI for infrastructure development.

The cost of breeders seed is to be reimbursed to the NSC and SFCI. Assistance has to be provided at the rate of Rs.300 per quintal for distribution of seed of oilseed crops.

(iii) Plant Protection

Under this programme seed treatment for each oilseed crop is to be undertaken. Demonstrations on integrated pest management including use of resistant varieties to pests and diseases, cultural practices like summer ploughing and destruction of stubbles, monitoring of pest situation, mechanical control through collection and destruction of egg masses, biological control by conserving natural parasites, predators and pathogens, need based use of pesticides, training and motivations for community for IPM technology, control of root grub by deep summer ploughing and soil treatment of seed by chemicals, are the various aspects.

(iv) Demonstrations

The components of demonstration programme are front line demonstrations by ICAR and demonstrations by States.

(v) Improved Farm Implements

This should include making available improved implements needed for land preparation, sowing and fertilizer placement, harvestors and decorticators etc. The farmers have to be encouraged to shift to power driven implements. Implements like power tillers with rotovators should be encouraged.

(vi) Rhizobium Culture and Phosphate Solubilising Bacteria

Rhizobium culture is one of the cheapest input in increasing production of groundnut and soybean. An assistance of Rs.25 per hectare has been provided for supply of Rhizobium/PSB culture to farmers.

(vii) Gypsum/Pyrite/Liming Agents Distribution

Gypsum/Pyrites are the cheapest sources of sulphur.

(viii) Micro-nutrients

In light soils deficiency of zink and boron is noticed, whereas, in heavy soils iron deficiency is noticed.

(ix) Training of Farmers

Funds have been provided under Oilseeds Production Programme (OPP) for organising farmers training programmes at the rate of Rs.10,000 per batch of 50 farmers per training.

Production of a crop rests on a number of factors such as soil fertility, weather conditions, irrigation availability, availability and application of other inputs, profitability as compared to other crops, marketing facility, remunerative prices etc. Oilseeds are no exception.

1.2 National Oilseeds & Vegetable Oils Development (NOVOD) Board

NOVOD Board is a statutory organisation under the administrative control of Union Ministry of Agriculture. The programmes of the Board are precursor (that precedes or forerunner) to Oilseeds Production Programmes (OPP) for area expansion under oilseed

crops. The programmes are implemented largely through the state departments of agriculture in non traditional areas, i.e. the districts which are not covered under oilseed production programme of Technology Mission on Oilseeds (TMO).

The significant contributions of the NOVOD Board are as under.

1) Introduction of soybean cultivation in newer areas i.e. Andhra Pradesh, Gujarat, Punjab and North Eastern States.

2) Promotion of sunflower cultivation during non traditional seasons of rabi or summer in Haryana, Punjab and Uttar Pradesh.

3) To harness residual moisture through safflower cultivation in Madhya Pradesh.

4) Popularisation of high yielding varieties of rapeseed and mustard in Manipur and Nagaland.

NOVOD sponsored development programmes on 4 oilseeds viz. soybean, sunflower, safflower and rapeseed and mustard are in operation in 7 states. It wanted agro economic research studies to be conducted for these crops in the concerned states (Table 1.1).

Table 1.1 Details of NOVOD sponsored development programmes

S.No.	Oilseed Crop	States covered	Total amount released during 1992-93 to 1994-95 (Rs.lakhs)
1.	Soybean	Andhra Pradesh	118.98
		Nagaland	22.75
2.	Sunflower	Haryana	40.93
		Punjab	87.25
		Uttar Pradesh	71.14
3.	Safflower	Madhya Pradesh	87.40
4.	Rapeseed & Mustard	Manipur	23.44
		Nagaland	16.16

Thus Agro-Economic Research Centre for Madhya Pradesh, Jabalpur was asked to conduct the study in Madhya Pradesh for safflower.

NOVOD informed that in Madhya Pradesh the implementing agency was the Directorate of Agriculture and that 7 districts viz. Indore, Durg, Sagar, Ujjain, Shajapur, Chhattarpur and Dhar were included.

1.3 Objectives of the study

i) To analyse the area coverage under the crops viz. soybean, sunflower, safflower and rapeseed & mustard specially in Non-Traditional Areas (NTAS).

ii) To evaluate the economic gains accrued from the introduction/promotion of oilseed crops.

iii) To identify the implementation bottlenecks at field level.

iv) To identify the factors motivating/demotivating the farmer.

1.4 Reference Year(s)

The study will cover the information pertaining to the five years i.e. 1992-93, 1993-94, 1994-95, 1995-96 and 1996-97.

1.5 Sample Design

The Directorate of Agriculture, M.P., Bhopal was approached and on the suggestion of the concerned officials, two districts viz. Durg and Shajapur were selected for the study. As suggested by NOVOD Board 100 farmers (50 farmers per selected two districts) formed the sample.

In each of the selected districts two blocks namely Saja block and Bemetra block from Durg district and Mohan Badodiya block and Shajapur block from Shajapur district were selected and from two blocks (One district) 5 villages were selected. From each of the selected villages 10 farmers (safflower growers) were selected by random sampling.

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CHAPTER-II

OILSEEDS DEVELOPMENT IN INDIA AND MADHYA PRADESH

2.1 Oilseeds Development in India

The total area under oilseeds in India was 25,259.8 thousand hectares in 1994-95. It tended to increase from year to year from 21,896.6 thousand hectares in 1988-89. The production of oilseeds increased from 18,033.2 thousand tonnes in 1988-89 to 21,416.8 thousand tonnes in 1994-95. It generally increased from year to year with minor fluctuations. The yield of oilseeds in kg./hectare was 824 in 1988-89. It decreased in the year 1989-90 to 742 kg./hectare. It again increased to 771 kg. in 1990-91 but decreased to 719 kg. in 1991-92. In subsequent years it increased continuously and was 848 kg.per hectare in 1994-95 (Table 2.1).

Table 2.1 Area, production and yield of oilseeds in India, 1988-89 to 1994-95

Year	Area (thousand ha.)	Production (thousand tonnes)	Yield (kg./ha.)
1988-89	21,896.6	18,033.2	824
1989-90	22,799.5	16,923.7	742
1990-91	24,147.5	18,608.7	771
1991-92	25,886.2	18,599.8	719
1992-93	25,235.7	20,106.5	797
1993-94	26,897.1	21,495.5	799
1994-95	25,259.8	21,416.8	848

Among oilseeds groundnut and rapeseed and mustard were two most important on the basis of coverage of area and contribution to production. While groundnut occupied 31.36 per cent of the area, rapeseed and mustard occupied 24.65 per cent. Again, while groundnut contributed 38.54 per cent to the production, rapeseed and mustard contributed 27.47 per cent. Soybean was third important oilseed. It occupied 15.80 per cent of the area and contributed 18.52 per cent of the production (Table 2.2).

Table 2.2 Area and production of different oilseeds in India, 1994-95

S. No.	Oilseed crop	Area		Production	
		Area (lakh ha.)	Percentage to total	Production (lakh tonnes)	Percentage to total
1.	Groundnut	79.22	31.36	82.55	38.54
2.	Castor	7.87	3.15	8.50	3.97
3.	Sesamum	20.34	8.04	6.18	2.89
4.	Rapeseed & Mustard	62.30	24.65	58.84	27.47
5.	Linseed	9.64	3.82	3.25	1.52
6.	Soybean	39.93	15.80	39.66	18.52
7.	Other Oilseeds	33.30	13.18	15.19	7.09
	Total Oilseeds	252.60	100.00	214.17	100.00

Among the different states of India, Madhya Pradesh contributed highest area to total oilseeds (4,811.2 thousand hectares) representing 19.06 per cent. However, with respect to production the contribution of the state was second highest, the first being of Gujarat. While Gujarat contributed 17.31 per cent of total production, the contribution of Madhya Pradesh was 16.75 per cent. This was because of lower yields per hectare. On the criterion of yield per hectare the rank of Madhya Pradesh was sixth among all the states (Table 2.3).

Table 2.3 Area, production and yield of oilseeds in different states, 1994-95

S. No.	State	Area (thousand ha.)		Production (thousand tonnes)		Yield kg. per ha.	
		Area	Percentage	Production	Percentage	Yield	Rank
1.	Madhya Pradesh	4,811.2	19.06	3,587.4	16.75	746	6
2.	Rajasthan	3,486.8	13.80	2,831.0	13.22	812	5
3.	Gujarat	3,042.2	12.04	3,707.6	17.31	1,219	3
4.	Andhra Pradesh	3,004.2	11.89	2,145.6	10.02	714	7
5.	Maharashtra	2,660.4	10.53	1,814.3	8.47	682	8
6.	Karnataka	2,556.2	10.12	1,586.5	7.41	621	10
7.	Uttar Pradesh	1,716.4	6.79	1,439.6	6.72	839	4
8.	Tamil Nadu	1,417.4	5.61	1,989.5	9.29	1,404	1
9.	Haryana	625.6	2.48	871.7	4.07	1,393	2
10.	Orissa	453.6	1.80	295.1	1.38	651	9
11.	Other states	1,485.8	5.88	1,148.5	5.36	-	-
	All India	25,259.8	100.00	21,416.8	100.00	848	-

The analysis of data for different oilseeds showed that in India the largest area was occupied by groundnut. The second largest area was under rapeseed and mustard. Soybean had third largest area and sesamum came fourth. In Madhya Pradesh the largest area was under soybean. The second and third largest area was claimed by rapeseed and mustard and linseed respectively. In the case of production at all India level the trend was similar to that of area. In Madhya Pradesh the production of soybean was highest followed by rapeseed and mustard. However, the third place was occupied by groundnut. As regards contribution of Madhya Pradesh to different oilseeds it was noted that the state ranked first in the cases of area under soybean, niger seed and linseed. In the case of rapeseed and mustard the rank of the state was third. As regards production the state ranked first in the case of soybean and linseed. The state claimed second rank in the case of nigerseed. A comparison of the yields of different oilseeds of the state with other states showed that yields of all the oilseeds were quite lower in the state. The rank of the state as regards yield was fifth in soybean and nigerseed. In the case of all other oilseed crops the rank was still lower(VI on wards) (Table 2.4).

It is thus concluded that although the state contributed higher in area and production of different oilseeds to all India, the yield levels of all the oilseeds in the state were quite lower than other states. This proves that the emphasis should be to produce oilseeds more intensively adopting recommended practices including fertilizer doses.

As regards safflower the highest area (485.4 thousand hectares or 62.92 per cent of total area of safflower in the country) and production (259.5 thousand tonnes or 61.96 per cent of total safflower production) was obtained in Maharashtra. The second state in importance was Karnataka with 257.9 thousand hectares or 33.43 per cent of total safflower area and 150.6 thousand tonnes of production of 35.96 per cent of the total safflower production. Other states contributed less than 20 thousand hectares of area and less than 6 thousand tonnes of production each. The area of this crop in Madhya Pradesh was 4.3 thousand hectares or only 0.56 per cent of total safflower area in the country and the production was 1.1 thousand tonnes or 0.26 per

Table 2.4 Area, production and yield of different oilseeds in India and Madhya Pradesh, 1994-95

Oilseed crop	India			Madhya Pradesh					
	Area (thousand ha.)	Production (thousand tonnes)	Yield (kg./ ha.	Area (thousand ha.)	Rank among the states	Production (thousand tonnes)	Rank among the states	Yield Kg./ha.	Rank among the states
Soybean	3,992.5	3,666.0	918	2,909.5 (72.87)	I	2,586.6 (70.56)	I	889	V
Groundnut	7,922.1	8,255.1	1,042	280.9 (3.55)	VI	229.2 (2.78)	VI	816	VI
Sunflower	1,970.1	1,204.4	611	15.1 (0.77)	VIII	4.7 (0.40)	VIII	311	VIII
Sesamum	2,033.9	617.9	304	226.7 (11.15)	IV	47.2 (7.64)	VI	208	VIII
Niger seed	588.8	196.1	333	219.6 (37.29)	I	44.2 (22.54)	II	201	V
Castor seed	787.2	849.7	1,079	6.6 (0.84)	VIII	2.1 (0.25)	VIII	318	VI
Rapeseed & Mustard	6,230.0	5,884.1	944	678.6 (10.89)	III	522.9 (8.89)	IV	771	VIII
Linseed	963.7	324.7	337	469.9 (48.76)	I	149.4 (46.01)	I	318	VI
Safflower	771.5	418.8	543	4.3 (0.56)	V	1.1 (0.26)	V	256	VI
Total Oilseeds	25,259.8	21,416.8	848	4,811.2 (19.05)	I	3,587.4 (16.75)	II	746	VI

Figures in parentheses show percentage to India.

cent of total safflower production. The resultant yield per hectare was 256 kg. In the matter of yield per hectare Karnataka topped the list with 584 kg, followed by Maharashtra with 535 kg. Madhya Pradesh had lowest yield of 256 kg.per hectare among all the states (Table 2.5).

Table 2.5 Area, production and yield of safflower in different states, 1994-95

State	Area (thousand ha.)		Production (thousand tonnes)		Yield (kg./ha.)	
	Area	Percentage	Production	Percentage	Yield	Rank
Maharashtra	485.4	62.92	259.5	61.96	535	2
Karnataka	257.9	33.43	150.6	35.96	584	1
Andhra Pradesh	19.1	2.47	5.6	1.34	293	5
Orissa	4.4	0.57	1.8	0.43	409	4
Madhya Pradesh	4.3	0.56	1.1	0.26	256	6
Bihar	0.4	0.05	0.2	0.05	500	3
All India	771.5	100.00	418.8	100.00	543	--

2.2 Oilseeds Development in Madhya Pradesh

Madhya Pradesh is an important pulses and oilseeds growing state. Out of the total area of 231.66 lakhs hectares under pulses in the country Madhya Pradesh claimed 51.83 lakh hectares or 22.4 per cent. Similarly of the total area of 252.60 lakh hectares under oilseeds in the country Madhya Pradesh had 56.63 lakh hectares or 22.4 per cent.

The same was the case with production. Of the total production of 141.17 lakh tonnes of pulses in the country Madhya Pradesh shared 30.98 lakh tonnes or 21.9 per cent. In the case of oilseeds of the total production of 214.17 lakh tonnes in the country Madhya Pradesh shared 49.50 lakh tonnes or 23.1 per cent. (Table 2.6)

Table 2.6 Area and production of crops in Madhya Pradesh and India, 1995-96

S. No.	Crop	Area (in lakh hectares)			Production (in lakh tonnes)		
		Madhya Pradesh	India*	Percentage	Madhya Pradesh	India*	Percentage
1.	Cereals	124.04	1003.82	12.4	149.75	1,769.76	8.5
2.	Pulses	51.83	231.66	22.4	30.98	141.17	21.9
3.	Kharif food grains	93.91	815.00	11.5	87.28	1,146.17	7.6
4.	Rabi food grains	175.87	1,235.48	14.2	180.73	1,910.93	9.5
5.	Oilseeds	56.63	252.60	22.4	49.50	214.17	23.1
6.	Fibres	5.29	76.85	6.9	4.10	140.29	2.9

* As per final forecast for 1994-95 released by the Directorate of Economics and Statistics, Ministry of Agriculture and Cooperation, Govt. of India.

As mentioned earlier Madhya Pradesh had highest area under oilseeds and second highest production among all the states of India. However, with respect to yield the state ranked sixth among all the states.

The area under oilseeds was 3,218.0 thousand hectares in 1988-89. It continuously increased from year to year and was 5,323.3 thousand hectares in 1993-94. In 1994-95, however, the area decreased to 4,811.2 thousand hectares. The production in 1988-89 was 2,347.7 thousand tonnes. It increased to 3,191.4 thousand tonnes by 1990-91. In the next year (1991-92) it decreased to 2,979.8 thousand tonnes. In the subsequent two years it increased and was 4,735.1 thousand tonnes in 1993-94. The production dipped to 3,587.4 thousand tonnes in the last year (1994-95). During this period there was quite a fluctuation in yield per hectare. It ranged between 654 kg. in 1989-90 and 890 kg. in 1993-94. In the last year (1994-95) the yield per hectare was 746 kg. (Table 2.7). Thus no trend was noticed on regards production and yield during the year 1988-89 to 1994-95.

Table 2.7 Area, production and yield of oilseeds in Madhya Pradesh, 1988-89 to 1994-95

Year	Area (thousand ha.)	Production (thousand tonnes)	Yield (kg./ha.)
1988-89	3,218.0	2,347.7	730
1989-90	3,617.9	2,364.4	654
1990-91	3,977.1	3,191.4	802
1991-92	4,363.6	2,979.8	683
1992-93	4,812.8	3,583.4	745
1993-94	5,323.3	4,735.1	890
1994-95	4,811.2	3,587.4	746

As is well known Madhya Pradesh is called the soybean state of India and rightly so because as high as 67.97 per cent of the total area under oilseeds is occupied by soybean and the crop contributed as high as 78.63 per cent to total production of oilseeds. Rapeseed and Mustard although occupied much smaller percentage of area (12.29) and production (11.82) was second important oilseed. Other oilseeds were of minor importance occupying less than 8.00 per cent of area under oilseeds and 6.00 per cent of production (Table 2.8).

Table 2.8 Area and production of oilseed crops in Madhya Pradesh, 1995-96

S. No.	Oilseed crop	Area (lakh hectares)		Production (lakh tonnes)	
		Area	Percentage	Production	Percentage
1.	Groundnut	2.52	4.45	2.60	5.25
2.	Castorseed	0.02	0.04	0.01	0.02
3.	Sesamum	1.83	3.23	0.46	0.93
4.	Rapeseed & Mustard	6.96	12.29	5.85	11.82
5.	Linseed	4.22	7.45	1.18	2.38
6.	Soybean	38.49	67.97	38.92	78.63
7.	Other Oilseeds	2.59	4.57	0.48	0.97
	Total Oilseeds	56.63	100.00	49.50	100.00

Among the 45 districts of the state only 17 districts had more than 2.00 per cent area each of the oilseeds area of the state. Incidentally these districts contributed more than 2.00 per cent each to the production of the state. There seems to be concentration of oilseeds area in Ujjain division. All the 5 districts of the division contributed significant percentage of area of oilseeds and considerable production to the state production. Ujjain district contributed highest percentage of 6.93 to oilseed area and 8.59 per cent to production of oilseeds. The district with highest yield of oilseeds (1,274 kg. per hectare) was Ratlam which belonged to Ujjain division (Table 2.9).

Table 2.9 Area, production and yield of oilseeds in important oilseeds growing districts, Madhya Pradesh 1995-96

S. No.	District	Area (thousand ha.)	Percentage of oilseed area to oilseed area of the state	Production (thousand tonnes)	Percentage of oilseed production to total oilseed production of the state	Yield Kg./ha.
1.	Chhindwara	193.8	3.44	165.5	3.35	854
2.	Seoni	125.8	2.23	115.8	2.34	921
3.	Sagar	151.3	2.69	141.4	2.86	935
4.	Indore	203.5	3.61	224.4	4.53	1,108
5.	Dhar	230.0	4.08	210.4	4.25	915
6.	Ujjain	390.4	6.93	425.2	8.59	1,089
7.	Mandsaur	327.3	5.81	296.3	5.99	905
8.	Ratlam	177.9	3.16	226.6	4.58	1,274
9.	Dewas	224.5	3.99	225.8	4.56	1,006
10.	Shajapur	282.6	5.02	277.2	5.60	981
11.	Morena	255.9	4.54	274.7	5.55	1,073
12.	Shivpuri	152.9	2.71	119.1	2.41	779
13.	Guna	128.3	2.28	106.2	2.15	828
14.	Sehore	217.9	3.87	224.8	4.54	1,032
15.	Betul	197.0	3.50	155.0	3.13	787
16.	Rajgarh	201.0	3.57	132.6	2.68	660
17.	Hoshangabad	294.0	5.22	338.1	6.83	1,150

Of the 45 districts Datia and Panna were of least importance as far as oilseeds were concerned. Datia contributed the least percentage of 0.35 to oilseeds area of the state and Panna district contributed least proportion of 0.21 to the state production. Further, of all the districts of the state Narsinghpur had the highest yield of 1598 kg. per hectare of oilseed and Sidhi had the lowest yield of 223 kg. per hectare.

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CHAPTER-III

SAFFLOWER DEVELOPMENT PROGRAMME IN MADHYA PRADESH AND SELECTED DISTRICTS

3.1 Recommended Practices of Safflower Cultivation

Safflower is one of the oilseeds dependent on rainfall. It is resistant to drought conditions and safflower oil is good for heart patients as it controls the cholesterol in the blood. The crop is ready in 130-140 days in dry condition. The oil content ranges from 30 to 35 per cent. The crop does well in soil of good water holding capacity. In irrigated condition the crop can be taken in light soils.

Soil Preparation

The soil should be ploughed 2-3 times and should be free from stubbles. To guard against termites and cut worms, 4 per cent endosulfan @ 20 kg. per hectare should be mixed in the soil.

Varieties

Jawahar Kusum-1 (JSF-1) and A-1 (Shweta) are recommended as these are comparatively resistant to aphids. These are ready in 130-140 days. Among the varieties without spines JSI-7 is found suitable. However, the yield from spineless variety is 20 per cent less than the spined variety.

Seed and Sowing

The recommended seed rate is 20 kg./ha. Seed rate of spineless variety JSI-7 is 15 kg./ha. Prior to sowing the seed should be dipped in water for 48 hours and the water should be changed every 12 hours. Thereafter the seed should be taken out and dried in shade for 3-4 hours. The seed should be treated with thirum, Captan or Bavestin @ 3 g/kg. of seed and should be sown immediately. Sowing should be done from second week of October to first week of November. In irrigated conditions sowing can be done till the end of November. Late sown crop is prone to aphids. Sowing should be done in rows. The row to row distance should be 40-50 cms. and plant to plant distance, 20-25 cms.

Fertilizer Application

In irrigated crop two third of nitrogen should be applied at the time of sowing and the rest at first irrigation. The N,P,K requirement of the crop is as under-

Unirrigated/irrigated	Kg. per hectare		
	N	P	K
Unirrigated	20-30	15-20	10
Irrigated	40-50	20-40	20

Interculture

Within 20-25 days of germination thinning should be done so that plant to plant distance is between 20-25 cms. Weeding and mulching should be done whenever necessary. This can also be done by harrowing. Prunning of the upper portion of the plant helps in branching and results in larger number of fruits per plant.

Irrigation

In the event of cracking of soil the crop should be irrigated. First irrigation should be applied immediately after sowing, second between 40 to 50 days and third between 80 to 90 days. One third of the nitrogen should be applied at first or second irrigation.

Plant Protection

The crop should be protected against aphids, fruit fly and safflower caterpillar.

(i) Aphids

a) Sowing should be done early (mid October to first week of November). By doing early sowing the insect attack is reduced.

b) Aphid resistant varieties such as JSF-1 or A-1 should be used.

(ii) Fruitfly

a) The attack of this insect can be avoided by early sowing.

b) The affected buds and flowers should be plucked and destroyed.

c) In the case of high infestation nuvacron 36 E.C. @ 750 ml. or endosulfan 35 E.C. @ 1000 ml. should be sprayed. If necessary second spraying should be done after 15-20 days.

(iii) Safflower Caterpillar

Endosulfan 35 E.C. @ 1000 ml. or quinolphos 25 E.C.@ 1000 ml./ ha. should be sprayed.

The diseases of safflower are root rot, rust and powderymildew.

(a) Root rot

To avoid this disease the seed should be treated before sowing.

(b) Rust

3 per cent solution of Diathane Z-78 (3 gms. per litre of water) should be sprayed.

(c) Powderymildew

Carathane (15 gms. in 100 litres of water) should be sprayed or soluble sulphur 0.25 per cent (250 gms.in 100 litres of water) should be sprayed.

Harvesting

When the leaves turn yellow and get dried, the crop should be harvested. For protection against spines, hand gloves should be used. The yield of unirrigated crop is between 10 to 12 qtls per hectare and that of irrigated crop is between 20 to 25 qtls/ha.

3.2 Place of Safflower in the Cropping Pattern of Madhya Pradesh

The gross cropped area of Madhya Pradesh stood at 25,586.6 thousand hectares in 1996-97. It was 23,922.1 thousand hectares in 1992-93. Between this reference period the area tended to increase from year to year. The variation in area under different crops showed that the area under paddy, wheat, pea, lentil increased from year to year. Among the oilseeds soybean, rapeseed and mustard showed increasing trend while other oilseeds viz. groundnut, sesamum, niger seed, castor seed, sunflower and safflower showed decreasing trend.

Safflower is grown in rabi season in Madhya Pradesh. As indicated earlier the area under this crop declined from year to year since 1992-93 and stood at 1,621 hectares in 1996-97. Not only the area of this crop declined from year to year but also the crop contributed very insignificantly to the cropping pattern of the state. In 1996-97 the area contribution was only 0.01 per cent to the gross cropped area of the state. Among all the oilseed crops of the state safflower contributed lower percentage than oilseeds like soybean, rapeseed and mustard, linseed, groundnut, niger seed, sesamum, castorseed and even the newly introduced crop of sunflower (Table 3.1).

Although safflower is rabi crop it is not grown as irrigated crop. It is a catch crop grown on the remanent soil moisture left after the harvest of kharif crop. The area of safflower, was 5,873 hectares in 1992-93 in the state. It steadily decreased in the subsequent three years and was 1,569 hectares in 1995-96. It increased to 1,621 hectares in 1996-97. Thus the area generally declined during the last 5 years. The production of safflower in 1992-93 stood at 1,476 tonnes. It continuously declined from year to year till 1995-96 to be 393 tonnes. In the last year (1996-97) it increased slightly to 423 tonnes. In the case of yield no trend was visible and it ranged between 239 kg. per hectare to 265 kg. per hectare in different years (Table 3.2). As observed earlier the yield of safflower in Madhya Pradesh was lowest among all the states.

Table 3.2 Area, production and yield of safflower, Madhya Pradesh, 1992-93 to 1996-97

Year	Area (ha.)	Production (Tonnes)	Yield(Kg./ha.)
1992-93	5,873	1,476	252
1993-94	4,566	1,190	262
1994-95	2,373	563	239
1995-96	1,569	393	254
1996-97	1,621	423	265

Among the safflower growing districts Raipur and Durg were most important contributing 12.89 and 11.54 per cent to total area of safflower in Madhya Pradesh. Other important districts were Sagar, Mandsaur, Rajnandgaon and Shajapur (Table 3.3).

Table 3.1 Cropping pattern, Madhya Pradesh, 1992-93 to 1996-97

(Area-thousand hectares)

Crop	1992-93		1993-94		1994-95		1995-96		1996-97	
	Area	%	Area	%	Area	%	Area	%	Area	%
Paddy	5,160.5	21.57	5,220.3	20.93	5,349.4	21.57	5,344.4	21.25	5,396.4	21.09
Jowar	1,423.0	5.95	1,287.6	5.16	1,042.6	4.20	994.2	3.95	922.4	3.60
Bajra	157.0	0.66	152.1	0.61	141.6	0.57	134.5	0.53	139.8	0.55
Maize	908.3	3.80	903.6	3.62	858.0	3.46	857.4	3.41	847.4	3.31
Wheat	3,671.9	15.35	4,148.0	16.63	4,193.1	16.91	4,019.8	15.98	4,327.2	16.91
Barley	81.9	0.34	84.7	0.34	86.6	0.35	92.0	0.37	83.9	0.33
Other Cereals & Millets	1,099.1	4.59	1,053.3	4.22	995.5	4.01	962.0	3.82	923.5	3.61
Total Cereals	12,501.7	52.26	12,849.6	51.51	12,666.8	51.07	12,404.3	49.31	12,640.6	49.40
Gram	2,345.7	9.81	2,341.9	9.39	2,751.7	11.09	2,660.2	10.57	2,512.6	9.82
Urad	569.8	2.38	574.3	2.30	506.5	2.04	500.0	1.99	534.7	2.09
Moong-Moth	148.6	0.62	141.6	0.57	125.0	0.50	121.2	0.48	120.6	0.47
Kulthi	146.9	0.61	148.5	0.59	146.4	0.59	139.0	0.55	135.0	0.53
Teora	601.8	2.52	682.5	2.74	707.9	2.86	681.3	2.71	638.4	2.49
Pea	119.8	0.50	141.9	0.57	169.9	0.68	186.1	0.74	185.9	0.73
Lentil	375.0	1.57	398.3	1.60	429.2	1.73	499.7	1.99	512.1	2.00
Arhar	424.2	1.77	428.6	1.72	356.5	1.44	376.5	1.50	372.4	1.45
Other Pulses	20.1	0.08	21.9	0.09	12.0	0.05	19.0	0.08	22.3	0.09
Total Pulses	4,751.9	19.86	4,879.5	19.57	5,205.1	20.98	5,183.0	20.61	5,034.0	19.67
Sugercane	62.9	0.26	53.2	0.21	66.3	0.27	75.3	0.30	71.6	0.28
Total spices	203.6	0.85	234.7	0.94	236.7	0.96	249.9	0.99	262.1	1.03
Total fruits & vegetables	220.2	0.92	232.1	0.93	241.8	0.98	248.8	0.99	262.4	1.03
Other Food Crops	0.6	2.51	0.1	Neg	0.1	Neg	--	--	--	--
Total Food Crops	17,740.9	74.16	18,249.2	73.16	18,416.8	74.25	18,161.3	72.20	18,270.7	71.41
Groundnut	258.8	1.08	276.9	1.11	266.2	1.07	251.7	1.00	254.7	1.00
Sesamum	216.0	0.90	234.9	0.94	190.0	0.77	182.5	0.73	178.0	0.70
Soybean	3,054.0	12.77	3,415.0	13.69	3,225.2	13.01	3,849.2	15.30	4,165.8	16.28
Nigerseed	208.1	0.87	220.4	0.88	218.9	0.88	216.4	0.86	210.7	0.82
Castorseed	7.3	0.03	5.6	0.02	4.8	0.02	2.4	0.01	3.2	0.01
Rapeseed & Mustard	637.1	2.66	697.4	2.80	665.1	2.68	696.1	2.77	734.7	2.87
Sunflower	28.6	0.12	18.4	0.07	12.9	0.05	9.9	0.04	10.4	0.04
Safflower	5.9	0.02	4.6	0.02	2.4	Neg.	1.6	Neg.	1.6	0.01
Linseed	397.0	1.66	450.2	1.81	463.0	1.87	422.5	1.68	399.7	1.56
Other Oilseeds	35.6	0.15	37.7	0.15	30.1	0.12	31.0	0.12	32.6	0.13
Total Oilseeds	4,848.4	20.26	5,361.1	21.49	5,078.6	20.47	5,663.3	22.51	5,991.1	23.42
Total Fibers	485.1	2.03	507.2	2.03	493.1	1.99	529.3	2.10	534.5	2.09
Total Drugs	19.6	0.08	21.8	0.09	21.3	0.09	26.5	0.11	27.9	0.11
Total Fodder	824.3	3.45	800.8	3.21	788.9	3.18	768.7	3.06	757.1	2.95
Other Non-Food Crops	3.7	0.02	3.8	0.02	4.9	0.02	5.6	0.02	5.0	0.02
Total Non-Food Crops	6,181.1	25.84	6,694.7	26.84	6,386.8	25.75	6,993.4	27.80	7,315.9	28.59
Gross Cropped Area	23,922.1	100.00	24,943.9	100.00	24,803.6	100.00	25,154.7	100.00	25,586.6	100.00

Table 3.3 Area of safflower in important safflower growing districts, Madhya Pradesh, 1992-93 to 1996-97

District	Area (hectares)					Percentage of 1996-97
	1992-93	1993-94	1994-95	1995-96	1996-97	
Ujjain	1219	259	75	74	32	1.97
Indore	933	431	158	34	60	3.70
Shajapur	702	394	132	75	86	5.30
Raipur	530	350	319	260	209	12.89
Dhar	376	59	18	7	24	1.48
Ratlam	370	132	43	3	14	0.86
Jhabua	361	22	-	6	1	-
Durg	203	272	236	178	187	11.54
Rajnandgaon	173	121	159	100	102	6.29
Rajgarh	153	85	33	19	37	2.28
Mandsaur	139	344	236	144	147	9.07
Bilaspur	123	408	75	123	15	0.93
Panna	117	-	-	-	2	-
Dewas	116	200	67	60	44	2.71
Sehore	80	358	18	18	67	4.13
Sagar	71	733	426	168	154	9.50
Hoshangabad	59	33	7	20	15	0.92
Seoni	25	61	72	38	49	3.02
Betul	11	136	103	37	75	4.63

By the criterion of contribution to total safflower production of the state Raipur (13.00) and Durg (10.64) districts came first and second. Other important safflower producing districts were Sagar, Indore, Rajnandgaon , Mandsaur and Shajapur (Table 3.4). The yield of safflower per hectare was highest (633 kg.) in Indore district and was followed by Ratlam (463 kg.), Rajnandgaon and Sehore (343 kg. each) and Shajapur (337 kg.) (Table 3.5).

To conclude it may be mentioned that the yield in kg. per hectare of safflower was lowest in Madhya Pradesh and among the

Table 3.4 Production of safflower in important safflower growing districts, Madhya Pradesh, 1992-93 to 1996-97

District	Production (tonnes)					Percentage of 1996-97
	1992-93	1993-94	1994-95	1995-96	1996-97	
1. Ujjain	259	65	15	18	8	1.89
2. Indore	220	102	37	20	38	8.98
3. Shajapur	209	140	45	25	29	6.86
4. Raipur	116	78	67	72	55	13.00
5. Dhar	87	13	4	2	5	1.18
6. Ratlam	149	61	20	1	6	1.42
7. Jhabua	84	5	--	1	--	--
8. Durg	4	58	41	35	45	10.64
9. Rajnandgaon	24	44	59	35	35	8.27
10. Rajgarh	44	22	8	4	9	2.13
11. Mandsaur	31	80	55	31	31	7.33
12. Bilaspur	6	84	15	25	3	0.71
13. Panna	2	--	--	--	--	--
14. Dewas	31	64	20	19	14	3.31
15. Sehore	39	140	8	7	23	5.44
16. Sagar	15	155	91	40	38	8.98
17. Hoshangabad	13	7	2	6	4	0.95
18. Seoni	46	15	16	7	9	2.13
19. Betul	2	26	20	7	15	3.55

Table 3.5 Yield of safflower in important safflower growing districts, Madhya Pradesh, 1992-93 to 1996-97

District	Yield (kg./hectare)					Rank of 1996-97
	1992-93	1993-94	1994-95	1995-96	1996-97	
1. Ujjain	212	251	200	243	250	8
2. Indore	236	237	234	587	633	1
3. Shajapur	298	355	341	333	337	4
4. Raipur	209	223	210	277	263	7
5. Dhar	231	220	219	219	223	12
6. Ratlam	403	462	463	463	463	2
7. Jhabua	233	223	--	243	247	9
8. Durg	202	213	174	197	241	11
9. Rajnandgaon	341	364	371	350	343	3
10. Rajgarh	289	259	231	220	242	10
11. Mandsaur	223	233	233	215	211	15
12. Bilaspur	268	206	200	203	213	14
13. Panna	228	--	--	--	--	--
14. Dewas	267	32	299	317	321	5
15. Sehore	482	391	452	392	343	3
16. Sagar	225	211	214	238	247	9
17. Hoshangabad	220	212	228	284	280	6
18. Seoni	200	246	222	181	217	13
19. Betul	206	191	194	199	200	16

districts the more important were Raipur, Durg, Sagar, Mandsaur, Rajnandgaon, Shajapur, Indore and Ratlam. Of the two selected districts. Durg is a paddy area and the farmers grow safflower as a supplementary crop after paddy along with gram, teora, lentil etc. In Shajapur district safflower is grown after the harvest of soybean.

3.3 Progress of Safflower Development Programme in Madhya Pradesh

Under the auspices of NOVOD Board, the Government of Madhya Pradesh received an amount of Rs.27,43,300 in 1992-93 for the safflower development. A total number of 10 districts were selected. Of the total amount received an amount of Rs.21,55,650 was spent and the remaining amount was refunded to the NOVOD Board. In 1993-94 the amount spent was Rs.34,56,932. The total number of districts was 10. However, 3 districts selected in 1992-93 were dropped out of the programme. These were Raipur, Jhabua and Guna. The three districts added were Durg, Rajnandgaon and Sagar. In 1994-95 the amount spent was Rs.17,18,975. The number of districts selected was 12. The new districts selected in that year were Mandsaur, Dewas, Damoh and Chhatarpur. Two districts of 1993-94 namely, Indore and Rajgarh were dropped out. In 1995-96 the amount spent on the programme was Rs.18,11,301. The number of districts in that year got reduced to 10 as Mandsaur, Ujjain, Shajapur, Ratlam and Dhar of 1994-95 were dropped out from the programme and Raisen, Seoni and Betul were added. In 1996-97 the expenditure incurred on the programme was Rs.9,30,626. The number of districts remained the same (10) as in 1995-96, Ujjain, Ratlam, Shajapur, Indore, Raipur, Rajgarh and Mandsaur were again added and Sagar district was dropped out.

As regards the number of districts included in the programme it was observed that although the number remained 10 in most of the reference years the districts included were not consistently same. It was only Bilaspur district which was included in the programme for all the five years of the reference period. A total number of five districts got included in the programme for four years each. The districts were Ujjain, Ratlam, Shajapur, Durg and Rajnandgaon. The districts included for three

years of the programme numbered four. These were Dhar, Rajgarh, Indore, and Sagar. Five districts, namely, Raipur, Mandsaur, Dewas, Damoh and Chhatarpur were in the programme only for two years each. Jhabua, Guna, Raisen, Seoni and Betul were the five districts which were benefitted for only one year of the reference period (Table 3.6). Thus there was no consistency in the selection of districts in the programme.

Table 3.6 Number of districts included in the safflower development programme in different years, Madhya Pradesh

S.No.	District	No.of years	Years in which included in the programme
1.	Bilaspur	5	1992-93, 93-94, 94-95, 95-96, 96-97
2.	Ujjain	4	1992-93, 93-94, 94-95, 96-97
3.	Ratlam	4	1992-93, 93-94, 94-95, 96-97
4.	Shajapur	4	1992-93, 93-94, 94-95, 96-97
5.	Durg	4	1993-94, 94-95, 95-96, 96-97
6.	Rajnandgaon	4	1993-94, 94-95, 95-96, 96-97
7.	Dhar	3	1992-93, 93-94, 94-95
8.	Rajgarh	3	1992-93, 93-94, 96-97
9.	Indore	3	1992-93, 93-94, 96-97
10.	Sagar	3	1993-94, 94-95, 95-96
11.	Raipur	2	1992-93, 96-97
12.	Mandsaur	2	1994-95, 96-97
13.	Dewas	2	1994-95, 95-96
14.	Damoh	2	1994-95, 95-96
15.	Chhatarpur	2	1994-95, 95-96
16.	Jhabua	1	1992-93
17.	Guna	1	1992-93
18.	Raisen	1	1995-96
19.	Seoni	1	1995-96
20.	Betul	1	1995-96

It was noted that the expenditure incurred on the programme generally decreased from year to year. While it was Rs.21 lakhs in 1992-93 and Rs.34 lakhs in 1993-94 it decreased to Rs.17 lakhs in 1994-95. Although the expenditure slightly increased to Rs.18 lakhs in 1995-96 it slumped by 50 per cent in 1996-97 to be only Rs.9 lakhs. The percentage of financial achievement to target was 78.58 in 1992-93. In 1993-94 it was 79.00. In 1994-95 it dropped to 35.97 only. In 1995-96 the

percentage increased by about 15.00 to be 49. 15. In the last year of the reference period (1996-97) the picture of achievement was dismal as in that year only one fourth (24.20) of the targetted expenditure could be incurred (Table 3.7).

Table 3.7 Amount targetted to be spent, amount actually spent and number of districts selected in safflower development programme, Madhya Pradesh

Year	Target amount (in Rs.)	Amount spent (in Rs.)	Percentage of amount spent to target	No.of districts in the programme
1992-93	27,43,300	21,55,650	78.58	10
1993-94	43,76,000	34,56,932	79.00	10
1994-95	47,79,400	17,18,975	35.97	12
1995-96	36,85,000	18,11,301	49.15	10
1996-97	38,45,000	9,30,626	24.20	10

The safflower development programme included the items of field demonstrations, minikits distribution, financing for thereshers, training of farmers, distribution of hand gloves and distribution of rotovators. If we note the financial achievement on different items of the programme the picture does not look better. In 1993-94 only the percentage of achievement to target on different items looked somewhat respectable. The achievement on demonstrations was 79.48, on minikits 77.22, on threshers, 103.04, training 46.00, hand gloves 27.92 and rotovators 49.50. In 1994-95 the percentage of achievement except on sale of threshers (76.66) on all other items was very poor. In 1995-96 the achievement on minikit distribution was quite high (79.16) but for all other items the achievement was poor. In 1996-97 the percentage of achievement to target was only around 25 per cent on all the items (Table 3.8).

Similar situation was noticed when physical achievements were compared with the physical targets (Table 3.9).

3.4 Safflower Development Programme in Selected Districts

As mentioned earlier Durg and Shajapur districts were selected for the study on the advice of state government officials.

Table 3.8 Financial targets and achievements, safflower development programme, Madhya Pradesh

(Figures-Rupees)

S. No.	Item	1993-94		1994-95		1995-96		1996-97	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations	30,00,000	23,84,322 (79.48)	33,50,000	10,72,355 (32.01)	27,50,000	14,31,725 (52.06)	27,50,000	7,27,018 (26.44)
2.	Minikits	5,76,000	4,44,774 (77.22)	6,98,400	2,98,988 (42.41)	4,10,000	3,24,576 (79.16)	7,20,000	1,83,608 (25.50)
3.	Threshers	5,00,000	5,15,211 (103.04)	4,30,000	3,29,632 (76.66)	5,00,000	50,000 (10.00)	2,50,000	--
4.	Trainings	1,00,000	46,000 (46.00)	82,000	18,000 (21.95)	--	--	1,00,000	20,000 (20.00)
5.	Hand Gloves	1,50,000	41,875 (27.92)	1,44,000	--	25,000	5,000 (20.00)	25,000	--
6.	Rotovators	50,000	24,750 (49.50)	75,000	--	--	--	--	--
	Total	43,76,000	34,56,932 (79.00)	47,79,400	17,18,975 (35.97)	36,85,000	18,11,301 (49.15)	38,45,000	9,30,626 (24.20)

Data for 1992-93 was not available

Table 3.9 Physical targets and achievements, safflower development programme, Madhya Pradesh

S. No.	Item	1993-94		1994-95		1995-96		1996-97	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations (Hectares)	6,000	5,511.50 (91.86)	6,700	2,537.10 (37.87)	5,000	3,105.50 (62.11)	5,000	1,781.80 (35.64)
2.	Minikits (Number)	8,000	6,751 (84.39)	9,700	4,146 (42.74)	5,000	3,948 (78.96)	10,000	3,224 (32.24)
3.	Threshers (Number)	50	62 (124.00)	41	40 (97.56)	100	10 (10.00)	50	--
4.	Trainings (Number)	100	46 (46.00)	12	3 (25.00)	--	--	10	2 (20.00)
5.	Hand Gloves (Number)	10,000	2,497 (24.97)	9,600	158 (1.65)	1,000	200 (20.00)	1,000	--
6.	Rotovators (Number)	2	1 (50.00)	3	--	--	--	--	--

Data for 1992-93 was not available.

The progress of the programme in these districts is described below :

3.4.1 Durg District

Durg is one of the eastern districts of the state located in paddy zone. Agriculture in the district is mainly dependent on rainfall which though higher (1286.3 m.m.) in magnitude is erratic in distribution leading to higher intensity rainfall alternating with periods of moisture stress(Table 3.10).

Table 3.10 Yearly average rainfall, Durg district, Madhya Pradesh

Year	Rainfall in mms.
1992	923.2
1993	887.7
1994	1426.4
1995	1350.6
1996	1290.2
Normal	1286.3

A topo-sequence of four broad groups of soils viz. Bhata (Tikara), Matasi, Dorsa and Kanhar occur in the district.

Seventy to ninety eight per cent of the culturable area in different parts of the district is under rainfed agriculture. The adoption pattern of recommended practices is low and variable. The important crops of the district are paddy (52.62 per cent), wheat (2.21 per cent), gram (8.00 per cent), teora (23.35 per cent) and linseed (4.93 per cent). Safflower was grown on an area around 200 hectares contributing about 0.02 per cent area (Table 3.11).

In 1992-93 the area was 203 hectares. In 1993-94 the area increased to 272 hectares. In the subsequent years, however, there was a declining trend and the area in 1996-97 was 187 hectares. Since the area of safflower declined from year to year there was no question of replacement of area of some other crop by safflower.

As regards production it was only 4 tonnes in 1992-93. It suddenly increased to 58 tonnes in 1993-94. Thereafter the production declined to 41 tonnes in 1994-95 and to 35 tonnes in 1995-96. In 1996-97 it again increased to 45 tonnes.

The yield of safflower was 202 kg./hectare in 1992-93.

Table 3.11 Cropping pattern, Durg district, Madhya Pradesh, 1992-93 to 1996-97

(Area-thousand hectares)

Crop	1992-93		1993-94		1994-95		1995-96		1996-97	
	Area	%	Area	%	Area	%	Area	%	Area	%
Paddy	398.4	52.39	410.2	51.51	430.1	52.56	424.6	51.94	422.9	52.62
Jowar	1.0	0.13	0.1	0.01	0.4	0.05	0.2	0.03	0.3	0.04
Maize	0.1	0.01	0.1	0.01	0.2	0.02	0.1	0.01	0.1	0.01
Wheat	17.1	2.25	17.0	2.14	17.5	2.14	17.9	2.19	17.8	2.21
Barley	--	--	--	--	--	--	0.1	0.01	--	--
Other small millets	30.4	4.00	27.7	3.48	18.9	2.31	20.5	2.50	18.9	2.35
Total cereals	447.0	58.78	455.1	57.15	467.1	57.08	463.4	56.68	460.0	57.23
Gram	61.2	8.05	59.9	7.52	66.1	8.08	67.0	8.20	64.4	8.00
Urad	11.6	1.53	12.5	1.56	11.2	1.37	8.2	1.00	8.8	1.09
Moong-moth	0.6	0.08	0.7	0.09	0.5	0.06	0.6	0.07	0.7	0.08
Kulthi	0.9	0.12	0.9	0.11	1.1	0.14	1.3	0.16	1.2	0.15
Teora	171.8	22.59	190.6	23.94	195.9	23.94	199.7	24.43	187.7	23.35
Pea	0.6	0.08	0.6	0.08	0.6	0.07	0.5	0.06	0.7	0.08
Lentil	4.8	0.63	5.5	0.69	6.5	0.79	6.0	0.73	6.4	0.80
Arhar	6.9	0.91	5.4	0.68	4.7	0.58	5.3	0.65	4.8	0.60
Other pulses	0.2	0.03	0.4	0.05	0.2	0.02	0.2	0.03	--	--
Total pulses	258.6	34.02	276.5	34.72	286.8	35.05	288.8	35.33	274.5	34.15
Total food grains	705.6	92.80	731.6	91.87	753.9	92.13	752.2	92.01	734.5	91.38
Sugarcane	0.1	0.01	0.1	0.01	0.1	0.01	0.1	0.01	0.1	0.01
Spices	3.4	0.45	2.9	0.37	2.3	0.28	2.0	0.25	2.2	0.27
Fruits & vegetables	13.1	1.72	13.2	1.66	13.1	1.60	14.4	1.76	15.0	1.87
Total food crops	722.2	94.98	747.8	93.91	769.4	94.02	768.7	94.03	751.8	93.53
Groundnut	1.6	0.21	2.4	0.30	1.1	0.14	0.8	0.10	0.8	0.10
Sesamum	1.7	0.22	2.8	0.35	1.9	0.23	1.4	0.17	1.9	0.24
Soybean	1.6	0.21	2.9	0.36	3.0	0.37	4.7	0.57	7.9	0.98
Rapeseed & mustard	0.5	0.07	0.5	0.06	0.5	0.06	0.4	0.05	0.6	0.07
Sunflower	--	--	--	--	--	--	0.1	0.01	0.3	0.04
Safflower	0.2	0.03	0.3	0.04	0.2	0.02	0.2	0.03	0.2	0.02
Linseed	31.7	4.17	38.9	4.89	41.4	5.07	40.4	4.94	39.6	4.93
Castorseed	0.1	0.01	--	--	--	--	--	--	--	--
Other oilseeds	0.1	0.01	--	--	0.1	0.01	--	--	--	--
Total oilseeds	37.5	4.93	47.8	6.00	48.2	5.90	48.0	5.87	51.3	6.38
Total fibres	0.1	0.01	0.2	0.03	0.1	0.01	0.1	0.01	--	--
Total drugs	--	--	--	--	0.1	0.01	--	--	--	--
Total fodder	0.3	0.04	0.1	0.01	0.1	0.01	0.2	0.03	0.2	0.02
Other nonfood crops	0.3	0.04	0.4	0.05	0.4	0.05	0.5	0.06	0.5	0.07
Total nonfood crops	38.2	5.02	48.5	6.09	48.9	5.98	48.8	5.97	52.0	6.47
Gross cropped area	760.4	100.00	796.3	100.00	818.3	100.00	817.5	100.00	803.8	100.00

In 1993-94 it increased to 213 kg/hectare. In 1994-95 and 1995-96 it was 174 and 197 kg./hectare respectively. In 1996-97 it reached the highest level of 241 kg./hectare (Table 3.12).

Table 3.12 Area, production and yield of safflower in Durg district, Madhya Pradesh, 1992-93 to 1996-97

Particulars	YEARS				
	1992-93	1993-94	1994-95	1995-96	1996-97
Area (hectares)	203	272	236	178	187
Production (tonnes)	4	58	41	35	45
Yield (kg/hectare)	202	213	174	197	241

3.4.2 Progress of Safflower Development Programme

In 1993-94 an amount of Rs.3,84,500 was targetted to be spent on different aspects. Against this the amount actually spent was Rs.4,33,800 or 12.82 per cent more than the targetted amount. In 1994-95 the targetted amount was Rs.6,21,400 and the amount actually spent was Rs.4,00,368. In other words the actual expenditure was 64.43 per cent of the targetted amount. In 1995-96 the amount targetted to be spent was far lower than the previous year (Rs.3,79,000). The amount actually spent was Rs.2,54,000 or 67.02 per cent of the targetted amount. It will thus be observed that in 1994-95 the targetted amount increased quite substantially but the proportion of amount actually spent declined. In 1995-96 the targetted amount as well as the amount actually spent were lower than 1994-95. The percentage of achievement, however, was slightly higher in 1995-96. If we observe the percentage of actual expenditure to target amount of different items it would be noted that the percentage was quite high in 1993-94 on all the aspects of the programme. In 1994-95 the percentage of expenditure on demonstrations and minikit distribution came down but the percentage of expenditure on sale of threshers was 150 per cent that of the target. In 1995-96 expenditure was incurred only on demonstrations and minikit distribution. No amount was spent on sale of threshers. It may be concluded that in the year 1993-94 the percentage of expenditure to target was quite higher on all the items. In the latter years the percentage generally decreased (Table 3.13).

Table 3.13 Financial targets and achievements in the safflower development programme in Durg district, Madhya Pradesh, 1993-94 to 1996-97

(Figures-Rupees)

S. No.	Item	1993-94		1994-95		1995-96		1996-96	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations	2,50,000	3,07,000 (122.80)	4,50,000	2,67,740 (59.50)	2,75,000	2,00,000 (72.73)	2,75,000	N.A.
2.	Minikits	72,000	86,800 (120.56)	86,400	72,928 (84.41)	54,000	54,000 (100.00)	72,000	N.A.
3.	Threshers	30,000	30,000 (100.00)	40,000	60,000 (150.00)	50,000	--	25,000	N.A.
4.	Trainings	22,500	--	12,000	--	--	--	--	N.A.
5.	Hand Gloves	10,000	10,000 (100.00)	8,000	--	--	--	10,000	N.A.
6.	Rotovators	--	--	25,000	--	--	--	--	N.A.
	Total	3,84,500	4,33,800 (112.82)	6,21,400	4,00,368 (64.43)	3,79,000	2,54,000 (67.02)	3,82,000	

Data for 1992-93 was not available

The percentage of physical achievements to targets showed similar trend to financial achievements with some variation (Table 3.14).

3.4.3 Shajapur District

Shajapur is the western district of the state and comes under cotton - jowar zone. The rainfall in the region and moisture retention characteristics of the soils are very well suited to raising of two sequencial crops in a year (Table 3.15).

Table 3.15 Yearly average rainfall, Shajapur district, Madhya Pradesh

Year	Rainfall in mms.
1992	607.5
1993	1,008.7
1994	1,024.8
1995	889.4
1996	1,282.8
Normal	977.2

The soils of the region are medium black with variable depths. The clay content generally varies from 30-35 per cent. The important crops of the district are wheat (13.70 per cent), gram (16.82 per cent), jowar (7.09 per cent), soybean (43.55 per cent) and maize (4.58 per cent) (Table 3.16).

The area under safflower was 702 hectares in 1992-93. In 1993-94, however, it dropped to 394 hectares. In the remaining years it further decreased and was only 85 hectares in 1996-97. The production of safflower showed a similar trend. In 1992-93 the production was 209 tonnes. It got reduced to 140 tonnes in 1993-94. In the remaining years of the reference period it further decreased and was 29 tonnes in 1996-97. The yield per hectare was 298 kg. in 1992-93. It increased to 355 kg in 1993-94. Thereafter it slightly decreased in the remaining years to be 337 kg in 1996-97 (Table 3.17).

Table 3.14 Physical targets and achievements in the safflower development programme in Durg district, Madhya Pradesh, 1993-94 to 1996-97

S. No.	Item	1993-94		1994-95		1995-96		1996-97	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations (Hectares)	500	700 (140.00)	900	806 (89.56)	500	500 (100.00)	500	N.A.
2.	Minikits (Number)	1,000	1,400 (140.00)	1,200	1,073 (89.42)	750	750 (100.00)	1,000	N.A.
3.	Threshers (Number)	3	3 (100.00)	4	6 (150.00)	10	--	5	N.A.
4.	Trainings (Number)	10	10 (100.00)	1	--	--	--	1	N.A.
5.	Hand Gloves (Number)	800	300 (37.50)	800	158 (19.75)	100	--	100	N.A.
6.	Rotovators (Number)	--	--	1	--	--	--	--	N.A.

Data for 1992-93 was not available

Table 3.16 Cropping pattern, Shajapur district, Madhya Pradesh, 1992-93 to 1996-97

(Area-thousand hectares)

Crop	1992-93		1993-94		1994-95		1995-96		1996-97	
	Area	%	Area	%	Area	%	Area	%	Area	%
Paddy	1.4	0.25	1.2	0.19	1.0	0.16	0.9	0.14	0.9	0.14
Jowar	91.8	16.38	81.1	13.29	63.2	10.22	53.4	8.59	46.6	7.09
Bajra	0.4	0.07	0.1	0.02	0.1	0.02	--	--	--	--
Maize	29.7	5.30	31.6	5.18	29.1	4.70	32.0	5.15	30.1	4.58
Wheat	43.4	7.75	79.3	13.00	78.5	12.69	65.8	10.59	90.1	13.70
Berley	0.1	0.02	0.2	0.03	0.2	0.03	0.2	0.03	0.1	0.01
Total cereals	166.8	29.77	193.5	31.71	172.1	27.82	152.3	24.50	167.8	25.52
Gram	81.0	14.46	90.2	14.78	98.5	15.92	104.3	16.78	110.6	16.82
Urad	1.9	0.34	3.3	0.54	2.6	0.42	2.3	0.37	3.2	0.49
Moong-moth	2.4	0.43	2.0	0.33	1.5	0.24	1.1	0.18	0.9	0.14
Pea	0.2	0.04	0.3	0.05	0.2	0.03	0.2	0.03	0.2	0.03
Lentil	1.2	0.21	1.6	0.26	1.7	0.28	2.0	0.32	2.9	0.44
Arhar	4.9	0.87	5.6	0.92	4.4	0.71	3.8	0.61	3.0	0.46
Total pulses	91.6	16.35	103.0	16.88	108.9	17.60	113.7	18.29	120.8	18.38
Sugarcane	1.5	0.27	1.2	0.20	1.2	0.20	1.4	0.22	1.4	0.21
Total spices	7.9	1.41	10.6	1.73	10.9	1.76	12.1	1.95	14.7	2.24
Total fruits & vegetables	2.7	0.48	3.1	0.51	3.6	0.58	4.2	0.68	5.7	0.87
Total food crops	270.5	48.28	311.4	51.03	296.7	47.96	283.7	45.64	310.4	47.22
Groundnut	3.4	0.61	2.8	0.46	2.5	0.40	1.9	0.31	1.6	0.24
Sesamum	0.6	0.11	0.5	0.08	0.3	0.05	0.4	0.06	0.3	0.05
Soybean	221.5	39.53	231.9	38.00	256.2	41.42	274.8	44.21	286.3	43.55
Rapeseed & Mustard	0.9	0.16	1.3	0.21	1.6	0.25	2.4	0.38	2.1	0.32
Sunflower	6.4	1.14	5.0	0.82	4.1	0.66	2.8	0.45	1.8	0.28
Safflower	0.7	0.12	0.4	0.07	0.1	0.02	0.1	0.02	0.1	0.01
Linseed	0.2	0.04	0.3	0.05	0.3	0.05	0.1	0.02	0.2	0.03
Total oilseeds	233.7	41.71	242.2	39.69	265.1	42.85	282.5	45.45	292.4	44.48
Cotton	0.7	0.12	0.7	0.12	0.4	0.06	0.4	0.06	0.3	0.05
Total drugs	0.1	0.02	0.1	0.02	0.1	0.02	--	--	--	--
Total fodder	55.3	9.87	55.8	9.14	56.2	9.09	55.0	8.85	54.3	8.25
Other nonfood crops	--	--	--	--	0.1	0.02	--	--	--	--
Total nonfood crops	289.8	51.72	298.8	48.97	321.9	52.04	337.9	54.36	347.0	52.78
Gross cropped area	560.3	100.00	610.2	100.00	618.6	100.00	621.6	100.00	657.4	100.00

Table 3.17 Area, production and yield of safflower in Shajapur district, Madhya Pradesh, 1992-93 to 1996-97

Particulars	YEARS				
	1992-93	1993-94	1994-95	1995-96	1996-97
Area (hectares)	702	394	132	75	85
Production (tonnes)	209	140	45	25	29
Yield (kg/hectare)	298	355	341	333	337

3.4.4 Progress of Safflower Development Programme

The amount targetted to be spent on the programme in 1993-94 was Rs.4,25,400. On the other hand the amount actually spent was Rs.2,79,440 or 65.69 per cent of the targetted amount. In 1994-95 the targetted amount decreased slightly to Rs.4,22,000 but the amount actually spent was very small and formed only 35.55 per cent of the targetted amount. In the last year i.e. 1996-97 the targetted amount further decreased to Rs.3,84,500. The amount actually spent was Rs.1,73,676 or 45.17 per cent of the targetted amount. Thus it will be noted that the targetted amount to be spent decreased from year to year. The amount actually spent also decreased gradually. The percentage of amount spent to amount targetted in general decreased during the reference years. Among the various aspects of the programme the amount spent to amount targetted was quite high in the case of threshers. As regards demonstrations the percentage utilization decreased from 62.00 in 1993-94 to 16.67 in 1994-95 but again increased to 48.42 in 1996-97. In other aspects there was no consistency in either targets or achievements (Table 3.18).

The physical targets and achievements showed a similar trend to those of financial targets and achievements (Table 3.19).

3.5 Price of Safflower and its Variations

Government of India announces minimum support prices for different crops. In the case of safflower the support price declared for 1992-93 was Rs.640 per quintal. It increased in

Table 3.18 Financial targets and achievements in the safflower development programme in Shajapur district, Madhya Pradesh, 1993-94 to 1996-97

(Figures-Rupees)

S. No.	Item	1993-94		1994-95		1995-96		1996-96	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations	3,00,000	1,86,000 (62.00)	3,00,000	50,000 (16.67)	--	--	2,75,000	1,33,168 (48.42)
2.	Minikits	50,400	43,400 (86.11)	72,000	--	--	--	72,000	40,508 (56.26)
3.	Threshers	50,000	49,040 (98.08)	30,000	1,00,000 (333.33)	--	--	25,000	--
4.	Trainings	10,000	1,000 (10.00)	8,000	--	--	--	10,000	--
5.	Hand Gloves	15,000	--	12,000	--	--	--	2,500	--
6.	Rotovators	--	--	--	--	--	--	--	--
	Total	4,25,400	2,79,440 (65.69)	4,22,000	1,50,000 (35.55)	--	--	3,84,500	1,73,676 (45.17)

Data for 1992-93 was not available

Table 3.19 Physical targets and achievements in the safflower development programme in Shajapur district, Madhya Pradesh, 1993-94 to 1996-97

S. No.	Item	1993-94		1994-95		1995-96		1996-97	
		Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
1.	Demonstrations (Hectares)	600	600 (100.00)	600	100 (16.67)	--	--	500	324.80 (64.96)
2.	Minikits (Number)	700	400 (57.14)	1,000	--	--	--	1,000	494 (49.40)
3.	Threshers (Number)	5	8 (160.00)	3	10 (333.33)	--	--	5	--
4.	Trainings (Number)	10	1 (10.00)	1	--	--	--	1	--
5.	Hand Gloves (Number)	1,000	--	800	--	--	--	100	--
6.	Rotovators (Number)	--	--	--	--	--	--	--	--

Data for 1992-93 was not available

subsequent years from year to year and was Rs.825 in 1996-97 (Table 3.20).

Table 3.20 Minimum support price of safflower declared by Government of India for 1992-93 to 1996-97

Year	Support price (in Rs.)
1992-93	640
1993-94	720
1994-95	760
1995-96	800
1996-97	825

The arrivals and prices of safflower and other competitive crops were collected for Bhatapara mandi of Raipur district and Shajapur mandi of Shajapur district for the 5 year period (1992-93 to 1996-97). The breakup of arrivals and prices was for four seasons of harvest, post harvest, sowing and pre harvest. It was observed that the arrivals were maximum in harvest season followed by post harvest season. The arrivals were meagre in sowing and pre harvest seasons. Inversely the prices were comparatively lower in the harvest season and tended to increase in the post harvest, sowing and pre harvest seasons.

In Durg district the fact that the prices were inversely related to arrivals proved to be true for other competitive crops also. As far as price per quintal is concerned it was noted that prices of gram, mustard, lentil, linseed and coriander,- the competitive crops-were higher than those of safflower in all the years of the reference period for all the seasons. Only two crops viz. wheat and teora fetched lower price per quintal than safflower in all the years and all the seasons (Table 3.21).

In Shajapur mandi the arrivals of safflower were observed only in harvest and post harvest seasons. There was no arrival in either sowing or pre harvest seasons. Again, the arrivals in harvest season were highest. The post harvest season arrivals were nominal. As in the case of Bhatapara mandi, the harvest season prices were lowest and increased slightly in the post harvest season. The comparison of prices received per quintal of safflower with other crops showed that the prices

Table 3.21 Arrivals and prices of safflower and other competing crops, Bhatapara mandi, Raipur district, Madhya Pradesh, 1992-93 to 1996-97

Crop	Year (Oct.to Sept.)	Arrivals in quintals					Price per quintal in rupees									
		Total arrivals	Harvest	Post harvest	Sowing	Pre harvest	Average Price		Harvest		Post harvest		Sowing		Pre harvest	
							Mini.	Maxi.	Mini.	Maxi.	Mini.	Maxi.	Mini.	Maxi.	Mini.	Maxi.
Wheat	1992-93	281.00	112.65	45.24	121.10	2.00	370	460	390	420	370	462	393	440	410	415
	1993-94	148.60	98.45	21.85	60.30	8.00	380	500	400	500	400	500	380	480	410	500
	1994-95	98.45	33.00	18.10	47.35	—	390	520	500	510	500	520	390	500	--	--
	1995-96	101.35	17.65	15.95	63.65	4.10	370	587	370	500	500	587	375	510	500	500
	1996-97 (up to June'97)	516.20	166.85	187.45	72.20	89.70	500	885	500	672	500	690	500	575	550	885
Gram	1992-93	26,232.85	8,742.95	8,877.92	6,229.11	2,382.87	700	1,350	800	925	790	1,350	700	800	825	900
	1993-94	16,697.18	3,753.95	12,633.43	194.40	115.40	750	1,750	750	930	950	1,450	1,240	1,500	760	1,715
	1994-95	60,199.05	8,735.70	48,240.55	2,108.35	1,114.45	670	1,600	1,050	1,150	670	1,150	1,300	1,600	950	1,500
	1995-96	38,732.56	6,420.00	15,416.15	8,536.50	8,359.91	640	1,750	700	1,100	900	1,750	640	900	700	870
	1996-97 (up to June'97)	18,049.05	10,670.70	1,488.45	3,855.05	2,034.35	971	1,725	971	1,500	1,050	1,688	1,070	1,600	1,001	1,725
Teora	1992-93	47,859.81	23,319.92	15,737.08	5,608.88	3,193.93	360	775	360	515	430	575	380	775	490	560
	1993-94	57,076.71	19,876.66	33,252.65	3,799.15	148.25	480	900	480	645	530	580	550	900	545	800
	1994-95	1,01,710.05	17,242.45	70,201.90	10,955.40	3,310.30	390	615	435	500	390	491	450	615	425	500
	1995-96	28,808.70	10,876.30	10,381.20	5,511.95	2,039.25	420	1,061	580	750	675	1,057	420	1,061	460	600
	1996-97 (up to June'97)	27,990.00	12,236.75	13,724.25	1,815.40	213.60	600	1,052	625	1,040	600	805	990	1,052	900	1,041
Safflower	1992-93	116.50	49.35	--	67.15	--	440	746	440	618	--	--	640	746	--	--
	1993-94	253.85	1,595.70	855.55	--	2.60	775	860	790	850	775	850	--	--	860	860
	1994-95	6,126.30	4,211.15	1,879.50	35.65	--	800	1,180	840	1,180	830	1,055	800	875	--	--
	1995-96	4,506.55	3,119.30	1,384.25	--	3.00	800	1,100	900	1,100	920	1,070	--	--	800	1,011
	1996-97 (up to June'97)	2,201.05	1,481.35	719.70	--	--	800	970	800	970	890	957	--	--	--	--
Linseed	1992-93	147.45	76.00	12.00	59.45	--	831	1,182	831	980	1,130	1,150	1,050	1,182	--	--
	1993-94	2,044.90	1,658.40	379.00	--	7.50	990	1,150	990	1,150	1,050	1,105	--	--	1,100	1,120
	1994-95	9,459.50	195.90	9,223.50	35.95	5.40	1,174	1,300	1,180	1,220	1,187	1,250	1,174	1,174	1,300	1,300
	1995-96	417.45	274.50	142.95	--	--	1,200	1,420	1,200	1,420	1,200	1,400	--	--	--	--
	1996-97 (up to June'97)	320.40	94.25	226.15	--	--	1,200	1,455	1,299	1,455	1,200	1,450	--	--	--	--
Lentil	1992-93	4,985.18	2,010.85	1,735.68	480.30	658.35	560	730	580	615	580	730	600	730	560	660
	1993-94	5,456.65	2,991.65	2,382.10	64.70	18.20	720	1,000	750	960	900	950	720	1,000	725	810
	1994-95	11,857.35	5,694.95	5,805.85	235.15	121.40	900	1,290	1,140	1,165	900	1,250	1,090	1,290	950	1,137
	1995-96	3,035.75	2,006.20	448.80	26.40	554.35	1,100	1,755	1,100	1,365	1,150	1,755	1,075	1,691	1,200	1,305
	1996-97 (up to June'97)	4,662.75	2,542.60	2,103.95	14.55	1.65	1,050	1,645	1,100	1,400	1,050	1,290	1,600	1,645	1,410	1,500
Mustard	1992-93	26.55	0.70	13.15	12.45	0.25	800	950	725	725	800	950	693	930	800	800
	1993-94	7.40	0.10	7.30	--	--	1,000	1,000	1,000	1,000	1,000	1,000	--	--	--	--
	1994-95	14.30	--	14.30	--	--	1,150	1,150	--	--	1,150	1,150	--	--	--	--
	1995-96	1.20	1.20	--	--	--	1,060	1,060	1,060	1,060	--	--	--	--	--	--
	1996-97 (up to June'97)	4.95	--	4.95	--	--	1,000	1,000	--	--	1,000	1,000	--	--	--	--
Coriander	1992-93	126.50	113.35	2.00	6.30	4.85	800	2,300	840	1,110	2,300	2,300	1,150	1,150	800	850
	1993-94	41.45	29.40	--	11.80	0.25	700	1,200	800	825	--	--	700	1,200	750	750
	1994-95	5.80	4.45	1.35	--	--	1,110	1,111	1,110	1,110	1,111	1,111	--	--	--	--
	1995-96	131.45	51.85	63.25	--	16.35	1,150	1,271	1,271	1,271	N.A.	N.A.	--	--	1,150	1,240
	1996-97 (up to June'97)	54.30	52.50	1.80	--	--	1,251	2,300	1,251	1,251	2,300	2,300	--	--	--	--

received for gram, mustard and coriander were higher than safflower in all the years and in all the seasons, whereas, the prices of wheat were lower than the prices of safflower (Table 3.22).

3.6 Efforts by Other Institutions for Safflower Development

Besides the efforts made by the state department of agriculture for the production of safflower, institutions like Marico Industries and State Agriculture Universities at Jabalpur and Raipur also contributed their might. A brief description of these follow.

3.6.1 Marico Industries Limited

Marico Industries is an important company manufacturing safflower oil having a brand name "Safola". The company is interested in propagation, production, and procurement of safflower. It has following staff for Madhya Pradesh.

1. One Assistant Manager, Agricultural Development
2. Field Assistants (2): one each at Raipur & Shajapur
3. In Chhattisgarh region there are 3 field workers one each at Bemetera, District Durg; Mungeli, District Bilaspur and Rajnandgaon.
4. In western Madhya Pradesh two field workers one each at Shajapur and Ujjain are positioned.

Marico Industries sponsored a project titled "Agricultural Extension Management for enhancing safflower productivity and coverage in Madhya Pradesh and Maharashtra" in coordination with the National Institute of Agricultural Extension Management, Hyderabad. Under this project it arranged following workshops.

1. Diagnostic Workshop at Bhopal on 27th, 28th & 29th July 1996.
2. Diagnostic Workshop at Pune on 4th & 5th October, 1996.

In these workshops farmers, officials of Marico Industries, the Officials of the Directorate of Agriculture of the concerned state governments and officials and scientists of the state Agricultural Universities participated. The problem of enhancing productivity of safflower was thoroughly discussed and suggestions were offered. It was noted that the problem of enhancing

Table 3.22 Arrivals and prices of safflower and other competing crops, Shajapur mandi, Shajapur district, Madhya Pradesh, 1992-93 to 1996-97

Crop	Year. (Oct. to sept.)	Arrivals in quintals					Price per quintal in rupees									
		Total arrivals	Harvest	Post harvest	Sowing	Pre harvest	Average price		Harvest		Post harvest		Sowing		Pre harvest	
							Mini.	Maxi.	Mini.	Maxi.	Mini.	Maxi	Mini.	Maxi.	Mini.	Maxi.
Wheat	1992-93	1,822	1,333	78	268	143	275	425	275	396	310	388	300	409	300	425
	1993-94	46,008	43,549	2,528	6	5	327	533	327	533	341	455	418	428	472	503
	1994-95	71,428	44,623	26,537	267	1	330	581	330	494	362	581	350	463	395	480
	1995-96	15,333	10,118	3,603	1,066	546	350	671	361	671	350	650	350	493	411	481
	1996-97 (up to July'97)	72,402	44,617	27,610	90	85	444	852	444	802	470	615	792	852	792	800
Gram	1992-93	6,316	4,846	1,297	24	149	541	1,037	600	1,053	600	1,037	541	811	600	825
	1993-94	12,101	7,786	4,301	--	14	700	1,437	700	1,437	841	1,290	--	--	1,000	1,259
	1994-95	14,743	6,181	8,490	10	62	701	1,275	765	1,101	711	1,090	701	1,275	751	1,021
	1995-96	22,420	11,603	10,574	122	121	600	1,225	648	1,070	800	1,225	600	756	608	692
	1996-97 (up to July'97)	17,788	8,373	9,401	3	11	800	1,501	900	1,366	852	1,501	800	1,000	700	871
Safflower	1992-93	426	380	46	--	--	600	780	600	741	666	780	--	--	--	--
	1993-94	52	52	--	--	--	775	860	775	860	--	--	--	--	--	--
	1994-95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1995-96	25	--	25	--	--	800	1,050	--	--	1,050	1,050	--	--	--	--
	1996-97 (up to July'97)	8	8	--	--	--	840	851	840	851	--	--	--	--	--	--
Mustard	1992-93	313	283	30	--	--	572	826	572	766	700	826	--	--	--	--
	1993-94	755	480	275	--	--	801	1,120	801	975	828	1,120	--	--	--	--
	1994-95	2,383	1,028	1,355	--	--	800	1,228	855	1,228	800	1,153	--	--	--	--
	1995-96	2,448	1,573	731	144	--	692	1,200	692	1,167	850	1,082	1,040	1,200	--	--
	1996-97 (up to July'97)	1,766	1,220	546	--	--	800	1,204	800	1,081	900	1,204	--	--	--	--
Coriander	1992-93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1993-94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1994-95	210	208	2	--	--	800	1,145	800	1,145	901	1,065	--	--	--	--
	1995-96	18	17	1	--	--	751	1,554	791	1,554	751	751	--	--	--	--
	1996-97	118	118	--	--	--	1,157	2,251	1,157	2,257	--	--	--	--	--	--

productivity would have to be similtaneously dealt with on three fronts viz. technology development, altering economic variables and optimising extension system.

Apart from holding workshops, Marico Industries undertook following activities for enhancing the safflower development programme.

i) Jeep Campaign
ii) Result demonstrations
iii) Farmers training cum seed distribution camp
iv) Farmers day/Field day.
v) Farmers tours
vi) Kusum day
vii) Procurement centres for safflower produce at Bhatapara and Shajapur
viii) Trainers training programmes
ix) Supply of safflower seed to farmers

Besides these, the Marico Industries arranged to collect data on the economics of production of crops such as gram, wheat and safflower under both irrigated and unirrigated conditions.

It was concluded that irrigated gram earned highest profit per hectare of Rs.7861. The profit per hectare of irrigated mustard was Rs.7,146 and that of irrigated wheat was Rs.6593.50. The profit per hectare of irrigated safflower came only fourth and lowest (Rs.6,498.50). The profit per hectare of unirrigated safflower was lowest among all the competing rabi crops, both irrigated and unirrigated. It goes to prove that this crop could not compete with other crops both under irrigated and unifrigated conditions and that it was grown in unirrigated conditions where other crops could not thrive (Table 3.23).

Table 3.23 Economics of production of safflower and other competing crops, Shajapur district, Madhya Pradesh, 1995-96

(Figures-Rupees per hectare)

Particulars	Safflower (Irrig.)	Safflower (Unirrig.)	Wheat (Irrig.)	Gram (Irrig.)	Gram (Unirrig.)	Mustard (Irrig.)	Mustard (Unirrig.)
Output	10,500.00	5,600.00	11,250.00	12,500.00	6,000.00	10,200.00	6,800.00
Input	4,001.50	2,400.00	4,656.50	4,639.00	2,635.00	3,054.00	1,442.00
Profit	6,498.50	3,200.00	6,593.50	7,861.00	3,365.00	7,146.00	5,358.00

Source of data -Marico Industries Ltd.

In Raipur district field demonstrations on selected 16 farms were conducted jointly by Marico Industries, Dharamsi Chemical Company and Voltas Ltd. in 1996-97. It was observed that profit per hectare of safflower was Rs.3,287.65. This meant that profit per hectare of safflower was lowest among all the competitive crops if observations of both Raipur and Shajapur districts were taken together.

3.6.2 State Agriculture Universities

There are two state Agriculture Universities in Madhya Pradesh. These are

1. Jawahar Lal Nehru Krishi Vishwa Vidyalaya, Jabalpur
2. Indira Gandhi Krishi Vishwa Vidyalaya, Raipur

Continuous and coordinated research work is being done by these universities and their affiliated farms. Feasibility studies and studies on crop rotations, fertiliser doses, varietal trials, inter cropping and economics of different competing crops are undertaken. Result demonstrations on the farmers fields are also arranged.

3.6.3 Directorate of Agriculture, Madhya Pradesh, Bhopal

Directorate has a post of Joint Director, Oilseeds, stationed at Bhopal. At the divisional levels Joint Directors Agriculture are incharge. At district level Deputy Directors of Agriculture and Sub Divisional Officers are actively involved. At the block level Senior Agricultural Development Officers and Agricultural Development Officers implement the programme. At the village level Rural Agricultural Extension Officers implement the agricultural development programmes.

The Directorate undertakes following activities for safflower development.

1. Crop demonstrations
2. Minikits distribution
3. Farmers training
4. Distribution and adjustment of subsidy
5. Distribution of power threshers
6. Distribution of hand gloves.

-x-x-x-x-

CHAPTER IV

ECONOMICS OF SAFFLOWER PRODUCTION

This chapter describes the results obtained from primary data related to the selected farms/farmers raising safflower, the socio-economic conditions, land particulars and cost of cultivation of safflower alongwith the competing crops. Net returns from safflower vis-a-vis other crops, factors motivating/demotivating the farmers to raise the crop are presented. In all 100 farmers (50 farmers each from selected two districts of Durg and Shajapur) were selected.

4.1 Households by Castes

Of the selected households 3 belonged to scheduled castes and 1 to scheduled tribe. The maximum number of households (70) belonged to backward castes and 26 to other castes. While all the scheduled castes farmers belong to small size of holdings, the lone scheduled tribe farmer belonged to medium size category (Table 4.1).

Table 4.1 Distribution of sample households by castes, Madhya Pradesh

Size group	Durg					Shajapur					Total				
	No.of H.H's	SC	ST	BC	OC	No.of H.H's	SC	ST	BC	OC	No.of H.H's	SC	ST	BC	OC
Marginal	4	-	-	4	-	5	-	-	2	3	9	-	-	6	3
Small	10	1	-	8	1	12	2	-	7	3	22	3	-	15	4
Semi-medium	8	-	-	5	3	8	-	-	6	2	16	-	-	11	5
Medium	19	-	-	16	3	18	-	1	14	3	37	-	1	30	6
Large	9	-	-	3	6	7	-	-	5	2	16	-	-	8	8
Total	50	1	-	36	13	50	2	1	34	13	100	3	1	70	26

4.2 Literacy of the Heads of Households

Of the 100 heads of households as many as 89 were literate. Of these 26 were educated up to primary level of schooling, 27 up to middle

school level and 24 were educated up to higher secondary level. Twelve heads of households were graduates and postgraduates. It was observed that larger proportion of farmers belonging to medium and large size groups had higher educational achievement than those belonging to marginal and small categories (Table 4.2).

Table 4.2 Educational status of the heads of the sample households, Madhya Pradesh

Size group	Durg					Shajapur					Total				
	I	P	M	HS	G	I	P	M	HS	G	I	P	M	HS	G
Marginal	-	2	2	-	-	-	1	4	-	-	-	3	6	-	-
Small	2	5	1	2	-	1	3	1	5	2	3	8	2	7	2
Semi-medium	1	3	2	1	1	-	1	3	4	-	1	4	5	5	1
Medium	4	7	4	3	1	2	4	4	4	4	6	11	8	7	5
Large	-	-	3	4	2	1	-	3	1	2	1	-	6	5	4
Total	7	17	12	10	4	4	9	15	14	8	11	26	27	24	12

I= Illiterate, P= Primary, M= Middle, HS= Higher Secondary
G= Graduate & above.

4.3 Workers and Non Workers

About 71 per cent of the total members of the sample households were workers. The percentage of workers was highest in the small size group followed by medium, semi-medium, marginal and large size groups (Table 4.3).

4.4 Membership of Different Institutions

Of the total heads of households 8 were not members of any type of institution. Of the remaining 92 heads of households all were members of the Primary Agriculture Credit Societies. In addition to being members of PAC's 19 were members of Cooperative Marketing Societies, 26 were members of Dairy Cooperative Societies and 22 were members of other types of societies. It was also observed that non members generally belonged to marginal and small categories of farms (Table 4.4).

Table 4.3 Workers and Non-workers, selected households, Madhya Pradesh

Size group	Durg								Shajapur								Total							
	Males		Female		Children		Total		Males		Females		Children		Total		Males		Females		Children		Total	
	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW
Marginal	5	1	5	1	5	6	15 (65.22)	8 (34.78)	5	2	5	2	3	2	13 (68.42)	6 (31.58)	10	3	10	3	8	8	28 (66.67)	14 (33.33)
Small	21	4	20	2	21	12	62 (77.50)	18 (22.50)	20	2	16	6	13	10	49 (73.13)	18 (26.87)	41	6	36	8	34	22	111 (75.51)	36 (24.49)
Semi-medium	19	3	18	2	9	10	46 (75.41)	15 (24.59)	14	6	10	5	7	7	31 (63.27)	18 (36.73)	33	9	28	7	16	17	77 (70.00)	33 (30.00)
Medium	43	10	40	8	18	17	101 (74.26)	35 (25.74)	47	11	35	16	24	10	106 (74.13)	37 (25.87)	90	21	75	24	42	27	207 (74.20)	72 (25.80)
Large	13	9	10	12	15	11	38 (54.29)	32 (45.71)	21	7	16	7	16	12	53 (67.09)	26 (32.91)	34	16	26	19	31	23	91 (61.07)	58 (38.93)
Total	101	27	93	25	68	56	262 (70.81)	108 (29.19)	107	28	82	36	63	41	252 (70.59)	105 (29.41)	208	55	175	61	131	97	514 (70.70)	213 (29.30)

W-Workers
N W-Non Workers

Table 4.4 Membership of heads of households of different institutions

Size group	Durg						Shajapur						Total					
	NM	PACS	M	D	O	T	NM	PACS	M	D	O	T	NM	PACS	M	D	O	T
Marginal	-	4	-	-	-	4	1	4	1	3	-	5	1	8	1	3	-	9
Small	3	7	-	-	-	10	1	11	2	2	2	12	4	18	2	2	2	22
Semi-medium	-	8	2	-	-	8	-	8	1	3	3	8	-	16	3	3	3	16
Medium	3	16	2	-	-	19	-	18	6	13	11	18	3	34	8	13	11	37
Large	-	9	1	-	-	9	-	7	4	5	6	7	-	16	5	5	6	16
Total	6	44	5	-	-	50	2	48	14	26	22	50	8	92	19	26	22	100

NM= Non members, M= Marketing, D= Dairy, O= Others, T= Total

4.5 Land Particulars of the Sample Farms

Among the sample farms maximum number (37) belonged to medium size group and 22 to small category of farms. Sixteen farms each belonged to semi-medium and large size groups. The total operated area of the selected farms was 632.96 hectares. Of the total operated area 50.33 per cent was irrigated. The percentage of irrigated area was more on larger size of holdings. The percentage of irrigated area was higher (69.06 per cent) in Shajapur district than Durg district (33.90 per cent). Operated area is equal to owned area minus leased out area plus leased in area. None of the selected farmers leased out any area. The leased in area formed 10.11 per cent of operated area in Durg district. Shajapur farmers did not lease in any area (Table 4.5).

4.6 Cropping Pattern

In Durg district the gross cropped area of selected farms increased from 472.26 hectares in 1992-93 to 513.21 hectares in 1996-97. The increase was gradual. Being a paddy area, paddy formed 51.91 per cent of the gross cropped area. Teora, a cover crop of paddy, formed 23.85 per cent. Safflower was grown both as pure crop and mixed crop. As a pure crop it was grown on an area of 1.65 hectares in 1992-93. The area generally decreased from year to year and was only 0.50 hectare in

Table 4.5 Land particulars of the sample farms, Madhya Pradesh, 1996-97

(Area-hectares)

Size group	Durg							Shajapur							Total							
	No.of H.H's	Owned land		Leased in land		Total operated land			No.of H.H's	Owned land		Leased in land		Total operated land			No.of H.H's	Owned land		Leased in land		Total operated land		
		I.	Un.	I.	Un.	I.	Un.	Total		I.	Un.	I.	Un.	I.	Un.	Total		I.	Un.	I.	Un.	I.	Un.	Total
Marginal	4	-	2.83	1.01	6.28	1.01	9.11	10.12	5	3.00	1.20	-	-	3.00	1.20	4.20	9	3.00	4.03	1.01	6.28	4.01	10.31	14.32
Small	10	4.05	9.81	-	10.52	4.05	20.33	24.38	12	11.20	6.90	-	-	11.20	6.90	18.10	22	15.25	16.71	-	10.52	15.25	27.23	42.48
Semi-medium	8	8.50	11.94	-	4.55	8.50	16.49	24.99	8	12.80	10.30	-	-	12.80	10.30	23.10	16	21.30	22.24	-	4.55	21.30	26.79	48.09
Medium	19	48.77	73.45	8.90	2.84	57.67	76.29	133.96	18	82.20	17.60	-	-	82.20	17.60	99.80	37	130.97	91.05	8.90	2.84	139.87	93.89	233.76
Large	9	43.11	100.70	-	-	43.11	100.70	143.81	7	95.00	55.50	-	-	95.00	55.50	150.50	16	138.11	156.20	-	-	138.11	156.20	294.31
Total	50	104.43	198.73	9.91	24.19	114.34 (33.90)	222.92 (66.10)	337.26 (100.00)	50	204.20	91.50	-	-	204.20 (69.06)	91.50 (30.94)	295.70 (100.00)	100	308.63	290.23	9.91	24.19	318.54 (50.33)	314.42 (49.67)	632.96 (100.00)

I. - Irrigated

Un. - Unirrigated

the year 1996-97. This formed only 0.10 per cent of the gross cropped area. The area under mixed crop increased in the case of mixture of gram and safflower. In other mixtures the area generally showed a declining trend. Two things are clear : firstly, safflower formed insignificant proportion of cropped area and secondly, the area under pure crop of safflower and mixed crop of safflower except that with gram generally decreased. It indicated that safflower has not made any headway in the district and there was no question of its replacing any other crop, although there was an increase in the gross cropped area (Table 4.6). (See also appendix table A 4.1)

Table 4.6 Cropping pattern, selected farms, Durg district, 1992-93 to 1996-97

Crop	Area - hectares					Percentage of 1996-97
	1992-93	1993-94	1994-95	1995-96	1996-97	
Paddy	251.40	258.99	263.04	267.10	266.41	51.91
Soybean	2.82	2.92	3.43	3.73	4.03	0.79
Soybean + Arhar	2.12	2.67	2.92	3.43	3.43	0.67
Kodo + Arhar	3.83	3.33	3.54	3.54	3.33	0.65
Urad + Til	7.79	8.09	8.09	8.19	8.59	1.67
Wheat	3.13	3.13	3.64	4.04	4.24	0.83
Gram	21.64	20.83	22.46	23.26	25.09	4.89
Teora	117.36	120.81	121.21	122.82	122.42	23.85
Safflower	1.65	1.50	1.80	0.70	0.50	0.10
Mustard	-	2.02	2.82	2.22	2.22	0.43
Coriander	-	-	0.20	3.24	2.62	0.51
Lentil	-	-	6.48	8.30	9.30	1.81
Linseed	-	-	8.59	11.62	12.83	2.50
Gram + Safflower	6.08	6.27	10.13	10.70	11.94	2.33
Linseed + Safflower	23.37	23.78	13.08	10.94	10.75	2.09
Lentil+Safflower	14.16	15.38	11.62	8.91	6.98	1.36
Mustard + Safflower	-	-	0.61	0.40	0.20	0.04
Coriander + Safflower	-	2.43	4.65	0.81	0.61	0.12
Spices, fruits & Vegetables	9.51	9.51	9.62	10.12	10.72	2.09
Other crops	7.40	5.14	3.98	6.81	7.00	1.36
Gross cropped area	472.26	486.80	501.91	510.88	513.21	100.00

Note : Other crops include jowar, maize, urad, moong-moth, pea, groundnut, sesamum, sunflower etc.

In Shajapur district the gross cropped area of selected farms in 1992-93 was 540.10 hectares. It registered a steady increase and was 576.50 hectares in 1996-97. Of the crops grown soybean was most important and formed 48.14 per cent of the gross cropped area. Gram (21.37 per cent) and wheat (13.24 per cent) were other important crops. Safflower was grown only on 1.47 per cent of the gross cropped area. Unlike Durg district it was grown as a pure crop. During the reference period the area decreased from 35.00 hectares in 1992-93 to 8.50 hectares in 1996-97. Thus safflower has not shown any promise on the selected farms. It has not replaced any other crop. On the contrary, it has lost ground (Table 4.7) (See also appendix table A 4.2).

Table 4.7 Cropping pattern, selected farms, Shajapur district, 1992-93 to 1996-97

Crop	Area - Hectares					Percentage of 1996-97
	1992-93	1993-94	1994-95	1995-96	1996-97	
Soybean	265.80	266.50	270.80	271.70	277.50	48.14
Jowar+Urad+ Arhar	8.30	8.30	8.50	7.70	6.70	1.16
Groundnut	3.00	3.20	3.10	4.80	5.30	0.92
Wheat	68.60	71.50	77.20	73.70	76.30	13.24
Gram	104.00	115.80	117.30	119.10	123.20	21.37
Safflower	35.00	26.60	15.80	13.40	8.50	1.47
Mustard	9.50	9.60	10.80	10.20	12.00	2.08
Coriander	16.10	18.10	19.30	21.30	22.10	3.83
Spices, fruits & Vegetables	22.60	20.60	24.30	32.30	35.10	6.09
Other crops	7.20	8.00	8.20	7.20	9.80	1.70
Gross cropped area	540.10	548.20	555.30	561.40	576.50	100.00

Note - Other crops include jowar, maize, moong, moth, pea, lentil, sesamum, sunflower, etc.

4.7 Economics of Production of Different Crops

In regard to the economy of production of different crops respondents were asked to give the yields and prices obtained for different crops during the year. The crops for which information on yield and prices was obtained were : wheat, gram, mustard, coriander, lentil, linseed and safflower. All these crops are supposed to be competitive crops of safflower which is grown in rabi season. On the basis of minimum yield and minimum price and on the basis of maximum yield and maximum price values of output for both the situations were arrived at for all the above mentioned crops. In Durg district the value of output per hectare was highest (Rs.7,208) in the case of minimum yield and minimum price for gram. In the case of maximum yield and maximum price the value of output was highest for coriander (Rs.15,510). In the case of minimum yield and minimum price the value of output was second highest for coriander (Rs.6,387). The value of output for maximum yield and maximum price was second highest for gram (Rs.13,816). In both the cases of minimum yield and minimum price and maximum yield and maximum price the value of output was third, fourth and fifth for wheat, mustard and lentil.

It is worth noticing that the value of output for safflower was lowest in both the cases of minimum yield and minimum price and maximum yield and maximum price.

In shajapur district the value of output in the case of minimum yield and minimum price and maximum yield and maximum price was highest for wheat (Rs.14,300 and Rs.28,350 respectively). The value of output was second highest in the case of minimum yield and minimum price for gram (Rs.9,900). In the case of maximum yield and maximum price the value of output was second highest for coriander (Rs.21,000). In both the situations the value of output was least for safflower as in the case of Durg district.

It is thus concluded that the value of output for safflower was lowest in both the cases of minimum yield and minimum price and maximum yield and maximum price. It was true for farmers of both the districts(Table 4.8) (See also appendix table A 4.3 to A 4.6).

Table 4.8 Value of output per hectare of different crops in the situations of minimum and maximum yields and prices, selected farms, Madhya Pradesh

Crop	Durg		Shajapur	
	Minimum (yield & price)	Maximum (yield & price)	Minimum (yield & price)	Maximum (yield & price)
Wheat	5,245.10	13,208.80	14,300.00	28,350.00
Gram	7,208.00	13,816.80	9,900.00	19,250.00
Mustard	4,800.00	8,040.00	9,000.00	12,000.00
Coriander	6,387.50	15,510.00	9,000.00	21,000.00
Lentil	3,937.50	7,012.50	-	-
Linseed	3,000.00	4,712.50	-	-
Teora	3,150.00	6,000.00	-	-
Safflower	1,600.00	2,850.00	1,600.00	2,975.00

4.8 Net Return Per Hectare of Different Crops

The most important economic measure for selection of crop is net return per hectare. This measure was calculated for the selected farms. It was noted that in Durg district the net return per hectare was highest (Rs.10,303) for coriander. It was second highest (Rs.8,852) for wheat. Gram (Rs.8,152), mustard (Rs.6,036), teora (Rs.5,087), lentil (Rs.4,955) and linseed (Rs.4,861) followed. The net return per hectare was lowest (Rs.2,700) for safflower, the crop in question. This again proves that among all the competing crops safflower earned least net return per hectare and, therefore, least profitable (Table 4.9).

In Shajapur district, as in Durg district, coriander was the crop with highest net return of Rs.24,798. Wheat was the crop with second highest net return of Rs.11,024. Gram earned net return of Rs.10,582 and was the crop with third highest net return. Thus the sequence of crops according to net return per hectare was similar to that of Durg district. Moreover, safflower earned the lowest net return per hectare of Rs.2,811. This again was in line with the result obtained in Durg district (Table 4.10).

Table 4.9 Output, input and net return per hectare of different crops, selected farms, Durg district, Madhya Pradesh

Crop		Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat							
	Output	11,097	14,230	12,646	12,523	13,827	12,865
	Input	3,434	4,671	4,110	3,690	4,159	4,013
	Net return	7,663	9,559	8,536	8,833	9,668	8,852
Gram							
	Output	11,631	13,559	12,015	11,869	13,487	12,132
	Input	3,966	3,845	4,150	4,051	3,890	3,980
	Net return	7,665	9,714	7,865	7,818	9,597	8,152
Mustard							
	Output	-	-	8,074	8,178	8,789	8,347
	Input	-	-	2,613	2,207	2,113	2,311
	Net return	-	-	5,461	5,971	6,676	6,036
Coriander							
	Output	-	-	15,734	13,878	16,777	15,463
	Input	-	-	5,094	4,781	5,605	5,160
	Net return	-	-	10,640	9,097	11,172	10,303
Lentil							
	Output	-	-	6,872	6,511	6,909	6,764
	Input	-	-	1,888	1,826	1,713	1,809
	Net return	-	-	4,984	4,685	5,196	4,955
Linseed							
	Output	-	-	5,959	5,611	6,037	5,869
	Input	-	-	1,020	1,069	935	1,008
	Net return	-	-	4,939	4,542	5,102	4,861
Teora							
	Output	5,213	6,807	5,530	5,475	6,756	5,956
	Input	828	916	909	923	768	869
	Net return	4,385	5,891	4,621	4,552	5,988	5,087
Safflower							
	Output	4,028	4,419	4,398	4,311	4,609	4,353
	Input	1,637	1,691	1,621	1,713	1,587	1,650
	Net return	2,391	2,728	2,777	2,598	3,022	2,700

Table 4.10 Output, input and net return per hectare of different crops, selected farms, Shajapur district, Madhya Pradesh

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat						
Output	15,897	17,794	16,811	15,948	16,645	16,619
Input	5,786	5,759	6,244	5,876	4,310	11,024
Net return	10,111	12,035	10,567	10,072	12,335	11,024
Gram						
Output	14,052	16,803	15,072	14,496	16,652	15,415
Input	4,784	5,263	5,061	4,031	5,028	4,833
Net return	9,268	11,540	10,011	10,465	11,624	10,582
Mustard						
Output	-	11,112	11,165	11,510	12,968	11,689
Input	-	2,671	3,285	2,980	3,075	3,003
Net return	-	8,441	7,880	8,530	9,893	8,686
Coriander						
Output	-	30,680	30,257	31,479	33,500	31,479
Input	-	6,695	7,220	6,134	6,675	6,681
Net return	-	23,985	23,037	25,345	26,825	24,798
Safflower						
Output	4,276	4,686	4,440	4,340	4,768	4,502
Input	1,630	1,796	1,653	1,710	1,668	1,691
Net return	2,646	2,890	2,787	2,630	3,100	2,811

4.9 Input Output Ratio of Different Crops

One of the economic measures of profitability was input-output ratio. It gives the value of output per rupee of expenditure. On this count, in Durg district, teora, linseed and lentil crops excelled all other crops. This was because of the fact that these were cover crops grown on the remanant moisture after paddy. Not many intercultural operations were undertaken and no irrigation was done resulting in low input cost and high input output ratio. Although safflower was also grown like above mentioned crops the value of output was comparatively very low and therefore even with low input cost the input-output ratio was lowest. Similar situation was noticed in Shajapur district (Table 4.11).

Table 4.11 Input output ratio for different crops, selected farms, Madhya Pradesh

Crop	Durg District						Shajapur District					
	Marginal	Small	Semi-medium	Medium	Large	Over-all	Marginal	Small	Semi-medium	Medium	Large	Over-all
Wheat	3.23	3.05	3.08	3.39	3.32	3.20	2.75	3.09	2.69	2.71	3.86	2.97
Gram	2.93	3.53	2.89	2.93	3.47	3.05	2.94	3.19	2.98	3.60	3.31	3.19
Mustard	-	-	3.09	3.71	4.16	3.61	-	4.16	3.40	3.86	4.22	3.89
Coriander	-	-	3.09	2.90	2.99	3.00	-	4.58	4.19	5.13	5.02	4.71
Lentil	-	-	3.64	3.57	4.03	3.74	-	-	-	-	-	-
Linseed	-	-	5.84	5.25	6.46	5.82	-	-	-	-	-	-
Teora	6.30	7.43	6.08	5.93	8.79	6.85	-	-	-	-	-	-
Safflower	2.46	2.61	2.71	2.52	2.90	2.64	2.62	2.61	2.69	2.54	2.86	2.66

4.10 Factors Motivating or Demotivating to take up the Crop

As observed above the overall performance of safflower was not encouraging. The factors motivating/demotivating were noted. As many as 95 of the 100 farmers agreed that they grew safflower because of the programme associated benefits such as seed minikits, fertilizer and other inputs offered at subsidised rates. Nearly half of the farmers were convinced about the benefits of intercropping of safflower crop. Almost all agreed that in the dry rabi season this crop gave them some returns than having no crop. Half of the farmers were convinced about the low investment and low risk involved in the crop. One fourth of the farmers accepted that the crop acted as a fence. However, about 80 per cent of the farmers were not inclined to grow this crop if the benefits of the programme were withdrawn. All the selected farmers faced one or the other problem. All of them faced the problem of seed availability and marketing of the crop. Other problems included attack by birds, poor germination, prone to frost, and problems of harvesting (due to spines) and threshing (Table 4.12).

4.11 Opinion Regarding Crops Cultivated

The competing crops of safflower were wheat, gram, mustard, coriander, teora, linseed and lentil. As regards comparative advantages of growing wheat crop, of the 100 farmers 67 grew wheat and all of them affirmed that market facilities, profitability and suitability for home consumption were the virtues of the crop. Gram was grown by 95 of the 100 farmers. All of them were convinced that the crop had better marketing facility, better price and, therefore, the higher profitability. Nearly all of them were convinced about the utility for the home consumption. Mustard crop was grown by 28 farmers. All of them appreciated the relative high price and profitability of the crop. While 22 of 28 or about 80 per cent farmers did not face marketing problem an equal number said that the product was also useful for home consumption. Coriander was grown by 33 of the selected farmers. Being a cash crop all of them were convinced about the relatively high price obtained and profitability of the crop. Marketing was also no problem and 6 of 33 or 18.18 per cent farmers put forward the utility of the crop for home consumption. Teora was grown by all

Table 4.12 Factors motivating or demotivating to take up the crop, selected farms, Madhya Pradesh

Factor	Durg						Shajapur						Total					
	Mar-ginal	Small	Semi-medium	Medium	Large	Over-all	Mar-ginal	Small	Semi-medium	Medium	Large	Over-all	Margi-nal	Small	Semi medium	Medium	Large	Over-all
1. What factors did motivate you to grow safflower crop?																		
a) Is it the programme and associated benefits ?	4	10	8	17	6	45	5	12	8	18	7	50	9	22	16	35	13	95
b) Inter cropping	3	8	6	16	8	41	-	-	-	-	-	-	3	8	6	16	8	41
c) Increased productivity	4	10	8	19	9	50	5	12	8	18	7	50	9	22	16	37	16	100
d) Low investment and less risk	3	6	5	9	4	27	3	7	4	7	2	23	6	13	9	16	6	50
e) Fencing	2	3	3	3	1	12	1	3	2	5	2	13	3	6	5	8	3	25
2. Will you continue even after withdrawl of the programme?																		
a) Yes	-	-	2	7	4	13	-	-	-	5	3	8	-	-	2	12	7	21
b) No	4	10	6	12	5	37	5	12	8	13	4	42	9	22	14	25	9	79
3. Have you faced any problems?																		
a) Yes	4	10	8	19	9	50	5	12	8	18	7	50	9	22	16	37	16	100
b) No	-	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-
If yes, problems																		
a) Funds	2	4	2	-	-	8	3	4	2	-	-	9	5	8	4	-	-	17
b) Seed	4	10	8	19	9	50	5	12	8	18	7	50	9	22	16	37	16	100
c) Marketing	4	10	8	19	9	50	5	12	8	18	7	50	9	22	16	37	16	100
d) Other problems	2	6	5	13	6	32	2	4	3	7	3	19	4	10	8	20	9	51

the farmers of the Durg district. It proved to be profitable crop and was also used for home consumption by all the farmers. Twenty nine of the 50 farmers or 58.00 per cent farmers did not face any problem in marketing. Linseed crop was grown only in Durg district. It was grown by 37 of the 50 farmers and all of them grew because of relatively high price and high profitability. While 22 of the 37 farmers or 59.46 per cent farmers had no problem of marketing, 11 used it for home consumption also. Lentil crop was grown by 27 of the 50 farmers of Durg district. In this case also all farmers were convinced about the relatively high price and profitability of lentil. Marketing facility was no problem and the product was used for home consumption as well.

Contrary to the benefits accrued from the above mentioned crops safflower had many disadvantages. Of the 100 farmers growing the crop only 27 had no problem of marketing. Still less number of farmers (21) were convinced about the profitability of the crop and still less number (16) could obtain relative high price. Almost all the farmers agreed that they grew the crop due to associated benefits offered by the programme authorities (Table 4.13).

4.12 Factors Considered for Crop Allocation

Soil suitability, irrigation facility, relative profitability, productivity, price, marketing facility are the major factors in the allocation of area under wheat, gram, mustard, coriander, linseed and lentil. Benefits from government including support under specific oilseed programme in which availability of seed, subsidised fertilizers and other inputs were given were responsible for the allocation of area under safflower.(Table 4.14).

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Table 4.13 Opinion regarding crops cultivated, selected farms, Madhya Pradesh

Size group	Wheat						Gram					Mustard				
	No.of sample households	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Home requirement)	No. reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Home requirement)	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Home requirement)
Durg district																
Marginal	4	2	2	-	2	2	3	3	3	3	3	-	-	-	-	-
Small	10	3	3	-	3	3	8	8	8	8	8	-	-	-	-	-
Semi-medium	8	3	3	-	3	3	8	8	8	8	8	2	2	2	2	2
Medium	19	6	6	-	6	6	17	17	17	17	15	2	2	2	2	1
Large	9	6	6	-	6	6	9	9	9	9	6	4	4	4	4	3
Overall	50	20	20	-	20	20	45	45	45	45	40	8	8	8	8	6
Shajapur district																
Marginal	5	4	4	-	4	4	5	5	5	5	5	-	-	-	-	-
Small	12	10	10	-	10	10	12	12	12	12	12	3	2	3	3	2
Semi-medium	8	8	8	-	8	8	8	8	8	8	8	3	2	3	3	3
Medium	18	18	18	-	18	18	18	18	18	18	16	8	6	8	8	6
Large	7	7	7	-	7	7	7	7	7	7	7	6	4	6	6	6
Overall	50	47	47	-	47	47	50	50	50	50	48	20	14	20	20	17
Total																
Marginal	9	6	6	-	6	6	8	8	8	8	8	-	-	-	-	-
Small	22	13	13	-	13	13	20	20	20	20	20	3	2	3	3	2
Semi-medium	16	11	11	-	11	11	16	16	16	16	16	5	4	5	5	5
Medium	37	24	24	-	24	24	35	35	35	35	31	10	8	10	10	7
Large	16	13	13	-	13	13	16	16	16	16	13	10	8	10	10	9
Overall	100	67	67	-	67	67	95	95	95	95	88	28	22	28	28	23

Size group	Coriander					Safflower					Teora					Linseed					Lentil				
	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Home requirement)	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Programme and associated benefits)	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Other(Home requirment and less input cost)	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Others(Home requirement)	No.reporting the crop	Marketing facility	Relative price	Relative profitability	Other(Home requirement)
Durg district																									
Marginal	-	-	-	-	-	4	1	-	1	4	4	2	-	4	4	1	1	1	1	1	2	1	2	2	2
Small	-	-	-	-	-	10	3	2	1	10	10	5	-	10	10	5	3	5	5	2	4	2	4	4	2
Semi-medium	3	1	3	3	1	8	2	-	2	8	8	4	-	8	8	6	3	6	6	2	3	1	3	3	2
Medium	2	2	2	2	2	19	5	4	5	17	19	12	-	19	19	16	9	16	16	4	10	7	10	10	5
Large	4	2	4	4	2	9	1	2	2	6	9	6	-	9	9	9	6	9	9	2	8	5	8	8	4
Overall	9	5	9	9	5	50	12	8	11	45	50	29	-	50	50	37	22	37	37	11	27	16	27	27	15
Shajapur district																									
Marginal	-	-	-	-	-	5	2	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small	1	1	1	1	1	12	3	1	3	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Semi-medium	4	2	4	4	-	8	1	2	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medium	12	8	12	12	-	18	7	3	3	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large	7	5	7	7	-	7	2	2	2	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Overall	24	16	24	24	1	50	15	8	10	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total																									
Marginal	-	-	-	-	-	9	3	-	2	9	4	2	-	4	4	1	1	1	1	1	2	1	2	2	2
Small	1	1	1	1	1	22	6	3	4	22	10	5	-	10	10	5	3	5	5	2	4	2	4	4	2
Semi-medium	7	3	7	7	1	16	3	2	3	16	8	4	-	8	8	6	3	6	6	2	3	1	3	3	2
Medium	14	10	14	14	2	37	12	7	8	35	19	12	-	19	19	16	9	16	16	4	10	7	10	10	5
Large	11	7	11	11	2	16	3	4	4	13	9	6	-	9	9	9	6	9	9	2	8	5	8	8	4
Overall	33	21	33	33	6	100	27	16	21	95	50	29	-	50	50	37	22	37	37	11	27	16	27	27	15

Table 4.14 Factors considered for crop allocation, selected farms, Madhya Pradesh

Size group	Wheat						Gram							Mustard						Coriander				Safflower			Teora				Linseed				Lentil			
	Soil suitability	Irrigation facility	Profitability	Productivity	Requirement of home consumption	Requirement for fodder	Soil suitability	Irrigation facility	Profitability	Price	Productivity	Marketing facility	Requirement for fodder	Soil suitability	Irrigation facility	Profitability	Price	Marketing facility	Productivity	Profitability	Price	Marketing facility	Irrigation facility	Benefit from government including support under specific oilseeds programme	Availability of seed facility	Cover crop	Cover crop	Some crops grown as per tradition	Requirement of home consumption	Requirement for fodder	Profitability	Soil suitability	Price	Marketing facility	Profitability	Soil suitability	Price	Marketing facility
Durg district																																						
Marginal	2	2	2	2	2	2	3	3	3	3	3	3	1	-	-	-	-	-	-	-	-	-	-	4	4	2	4	4	4	2	1	1	1	1	2	1	1	1
Small	3	3	3	3	3	3	8	8	8	8	8	8	5	-	-	-	-	-	-	-	-	-	-	10	10	8	10	10	10	8	5	3	5	4	4	2	4	2
Semi-medium	3	3	3	3	3	3	8	8	8	8	8	8	6	2	2	2	2	1	1	3	3	3	3	8	8	8	8	8	6	5	6	3	6	2	3	3	3	1
Medium	6	6	6	6	6	6	17	17	17	17	17	15	12	2	2	2	2	2	2	2	2	2	2	19	19	16	19	19	16	11	16	12	16	10	10	10	10	8
Large	6	6	6	6	4	4	9	9	9	9	9	7	4	4	4	4	4	3	4	4	4	4	4	9	9	7	9	9	4	2	9	7	9	7	8	8	8	6
Overall	20	20	20	20	18	18	45	45	45	45	45	41	28	8	8	8	8	6	7	9	9	9	9	50	50	41	50	50	40	28	37	26	37	24	27	24	26	18
Shajapur district																																						
Marginal	4	4	4	4	4	4	5	5	5	5	5	5	5	-	-	-	-	-	-	-	-	-	-	5	5	3	-	-	-	-	-	-	-	-	-	-	-	-
small	10	10	10	10	10	10	12	12	12	12	12	12	10	3	3	3	3	2	1	1	1	1	1	12	12	10	-	-	-	-	-	-	-	-	-	-	-	-
Semi-medium	8	8	8	8	8	8	8	8	8	8	8	8	6	3	3	3	3	2	1	4	4	4	4	8	8	6	-	-	-	-	-	-	-	-	-	-	-	-
Medium	18	18	18	18	15	12	18	18	18	18	18	18	13	8	8	8	8	6	4	12	12	12	12	18	18	15	-	-	-	-	-	-	-	-	-	-	-	-
Large	7	7	7	7	3	3	7	7	7	7	7	7	4	6	6	6	6	5	6	7	7	7	7	7	7	6	-	-	-	-	-	-	-	-	-	-	-	-
Overall	47	47	47	47	40	37	50	50	50	50	50	50	38	20	20	20	20	15	12	24	24	24	24	50	50	40	-	-	-	-	-	-	-	-	-	-	-	-
Total																																						
Marginal	6	6	6	6	6	6	8	8	8	8	8	8	6	-	-	-	-	-	-	-	-	-	-	9	9	5	4	4	4	2	1	1	1	1	2	1	1	1
Small	13	13	13	13	13	13	20	20	20	20	20	20	15	3	3	3	3	2	1	1	1	1	1	22	22	18	10	10	10	8	5	3	5	4	4	2	4	2
Semi-medium	11	11	11	11	11	11	16	16	16	16	16	16	12	5	5	5	5	3	2	7	7	7	7	16	16	14	8	8	6	5	6	3	6	2	3	3	3	1
Medium	24	24	24	24	21	18	35	35	35	35	35	33	25	10	10	10	10	8	6	14	14	14	14	37	37	31	19	19	16	11	16	12	16	10	10	10	10	8
Large	13	13	13	13	7	7	16	16	16	16	16	14	8	10	10	10	10	8	10	11	11	11	11	16	16	13	9	9	4	2	9	7	9	7	8	8	8	6
Overall	67	67	67	67	58	55	95	95	95	95	95	91	66	28	28	28	28	21	19	33	33	33	33	100	100	81	50	50	40	28	37	26	37	24	27	24	26	18

Note : Please refer table 4.13 for "No.of sample households" and "No.reporting the crop".

CHAPTER V

SUMMARY AND CONCLUSIONS

5.1.1 Oilseeds are rich sources of proteins. They are also rich sources of fats and vitamins B and E and minerals like phosphorus and iron. In order to attain self sufficiency in oilseeds, the oilseeds production has to be increased to 260 lakh tonnes by 2000 AD.

In May, 1986 the Government of India appointed a technology mission on oilseeds. The objectives were :

(i) to improve oilseed technology,
(ii) to improve processing and post harvest technology,
(iii) to strengthen input services to farmers, and,
(iv) to improve institutions connected with the industries.

National oilseed and Vegetable Oil Development (NOVOD) Board is under the administrative control of the Union Ministry of Agriculture. Its programmes are implemented through the State Departments of Agriculture in Non-Traditional Areas. The programmes included (i) introduction of soybean in Andhra Pradesh, Gujarat, Punjab and North Eastern States (ii) promotion of sunflower cultivation in Haryana, Punjab and Uttar Pradesh (iii) safflower cultivation in Madhya Pradesh and, (iv) cultivation of HYV of rapeseed and mustard in Manipur and Nagaland. NOVOD Board wanted Agro-Economic Research Centres to conduct research studies on these crops in the concerned states. This Centre was, therefore, asked to conduct the study for safflower in Madhya Pradesh.

5.1.2 Objectives of the study were following :

(i) To analyse the area coverage under safflower specially in Non-Traditional Areas (NTA's)

(ii) To evaluate the economic gains accrued from the introduction/ promotion of oilseed crops.

(iii) To identify the implementation bottlenecks at field level.

(iv) To identify the factors motivating/demotivating the farmer.

5.1.3 Data pertaining to five years viz.1992-93-93, 1993-94,1994-95, 1995-96 and 1996-97 was collected and analysed.

5.1.4 On the advice of Directorate of Agriculture, Bhopal two districts viz. Durg and Shajapur were selected for the study. In each of the selected districts two blocks were selected and from two blocks five villages were selected. From each of the selected villages 10 farmers (safflower growers) were selected by random sampling to have a total sample of 100 farmers.

5.2.1 The area under oilseeds in India in 1988-89 was 21,896.6 thousand hectares. It generally increased from year to year and was 25,259.8 thousand hectares in 1994-95. The production of oilseeds in 1988-89 was 18,033.2 thousand tonnes. It increased, with minor fluctuations, to 21,416.8 thousand tonnes in 1994-95. The yield of oilseeds was 824 kg/hectare in 1988-89. It stood at 848 kg/hectare in 1994-95. In between the two reference years there was wide fluctuations in the yield. Among the different oilseeds, groundnut, rapeseed and mustard and soybean were most important. Madhya Pradesh contributed highest area to total oilseeds area of the country (19.06 per cent). In respect of production the state was second important, the first being Gujarat. On the criterion of yield per hectare the rank of Madhya Pradesh was sixth among all the states. In Madhya Pradesh the largest area was under soybean. The second and third positions were claimed by rapeseed and mustard and linseed. In the state the production of soybean was highest followed by rapeseed and mustard. The third position was occupied by groundnut. However, the yields of all the oilseeds in the state were quite lower. It is thus concluded that although the state contributed higher to area and production of different oilseeds to all India, the yield levels of all the oilseeds in the state were quite lower than other states. This proves that the emphasis should be to produce oilseeds more intensively adopting recommended practices including fertiliser doses. As regards safflower the highest area and production was in Maharashtra. The second state in importance was Karnataka. The area of safflower in Madhya Pradesh was 4.3 thousand hectares or only 0.56 per cent of total safflower area in the country. The production was 1.1 thousand tonnes or 0.26 per cent of total Safflower production. Madhya Pradesh had lowest yield of 256 kg/hectare among all the states.

5.2.2 Of the total area of 252.60 lakh hectares under oilseeds in the country Madhya Pradesh had 56.63 lakh hectares or 22.4 per cent.

Of the total production of 214.17 lakh tonnes in the country Madhya Pradesh shared 49.50 lakh tonnes or 23.1 per cent. The area under oilseeds was 3,218.0 thousand hectares in 1988-89. It increased from year to year and was 5,323.3 thousand hectares in 1993-94. In 1994-95, however, the area decreased. The production in 1988-89 was 2,347.7 thousand tonnes. It went up to 3,587.4 thousand tonnes in 1994-95, with large fluctuations during this period. No trend was noticed as regards production and yield during the years 1988-89 to 1994-95.

Madhya Pradesh is called the soybean state of India because as high as 67.97 per cent of the total area under oilseeds is occupied by soybean and the crop contributed 78.63 per cent to total production of oilseeds. Rapeseed and mustard was second important oilseed . Among the 45 districts of the state only 17 districts had more than 2 per cent area each, of the oilseed area of the state. Ujjain division of the state has the concentration of oilseeds area. Ujjain district contributed highest percentage to oilseeds area and highest percentage to production of oilseeds. The district with highest yield of oilseeds was Ratlam.

5.3.1 Safflower is a drought resistant crop and matures in 130 to 140 days. Jawahar Kusum-1 (JSF-1) and A-1 (Shweta) are recommended varieties for the state. The crop suffers mainly from aphids, fruit fly and cater pillars. The yield of unirrigated crop is in between 10-12 quintals and that of irrigated crop, 20-25 quintals per hectare.

5.3.2 Between the years 1992-93 to 1996-97 the gross cropped area of the state increased steadily. The area under paddy, wheat, pea, lentil increased from year to year. Among oilseeds soybean, rapeseed and mustard showed increasing trend, whereas, groundnut, sesamum, niger seed, castorseed, sunflower and safflower showed decreasing trend. The area under safflower not only decreased from year to year but also the crop contributed very insignificantly (0.01 per cent of the gross cropped area). The production of safflower in 1992-93 was 1,476 tonnes. It declined from year to year till 1995-96 to be 393 tonnes. In 1996-97 it increased slightly to 423 tonnes. In the case of yield no trend was visible and it ranged between 239kg.

and 265 kg. per hectare. The important safflower growing districts were Raipur, Durg, Sagar, Mandsaur, Rajnandgaon and Shajapur.

5.3.3 Progress of safflower development programme was evaluated on the basis of grant received from NOVOD Board, amount spent on the programme and the percentage of amount spent to amount received. It was noted that the expenditure incurred on the programme generally decreased from year to year. Similarly the percentage of amount spent to amount received also generally decreased from year to year. If we note the financial achievements on different items of the programme the picture does not look better. The percentage of achievement to target on different items decreased from year to year. Similar situation was noticed when physical achievements were compared with physical targets.

5.3.4 In Durg district safflower was grown on an area of 200 hectares contributing about 0.02 per cent of gross cropped area. Since 1992-93 the area under safflower declined from year to year and there was no question of replacement of area of some other crop by safflower. Production and yield did not show any trend during the last five years.

5.3.5 It was observed that in Durg district the proportion of amount spent to amount targetted declined in 1994-95 from 1993-94. In 1995-96 the percentage was slightly higher. If we observe the percentage of amount spent to amount targetted on different items it is concluded that the percentage on most of the items declined. The percentage of physical achievements to targets showed similar trend to financial achievements with some variation.

5.3.6 The important crops of Shajapur district were wheat, gram, jowar, soybean and maize. The area under safflower was 700 hectares in 1992-93. In the subsequent years it decreased and was 85 hectares in 1996-97. The production and yield of safflower also declined from year to year. In this district also the percentage of amount spent to amount targetted, in general, decreased during the reference years. The percentage of amount spent to amount targetted for different items decreased from year to year. The physical targets and achievements showed a similar trend to those of financial targets and achievements.

5.3.7 The arrivals and prices of safflower and other competing crops were collected from Bhatapara mandi of Raipur district and Shajapur mandi of Shajapur district for the five year period (1992-93 to 1996-97). It was observed that in Bhatapara mandi of Raipur district arrivals were maximum in harvest season followed by post harvest seasons. The arrivals were meagre in sowing and pre harvest seasons. Inversely the prices were comparatively lower in the harvest season and tended to increase in post harvest, sowing and pre harvest seasons. The price per quintal of gram, mustard, lentil, linseed and coriander were higher than those of safflower in all the years and all the seasons. Only two crops viz. wheat and teora fetched lower prices per quintal than safflower in all the years and all the seasons. Similar situation was noted in Shajapur mandi. The prices received for gram, mustard and coriander were higher than safflower in all the years and all the seasons, whereas, the prices of wheat were lower than those of safflower.

5.3.8 Besides the efforts made by, the state department of agriculture for safflower development, institutions like Marico Industries and State Agricultural Universities at Jabalpur and Raipur contributed their might. Marico Industries has field staff in both the selected districts of Durg and Shajapur. It arranged a couple of workshops involving farmers, officials of Marico Industries, Officials of the Directorate of Agriculture and officials and scientists of State Agricultural Universities. It undertook activities like jeep compaign, result demonstrations, farmers' training camps, farmers' day, kusumday, etc. It also collected data on economics of production of rabi crops including safflower. The data indicated that profit per hectare of irrigated safflower was lower than irrigated mustard, irrigated gram and irrigated wheat. The profit per hectare of unirrigated safflower was lowest among all the competing rabi crops, both irrigated and unirrigated. It goes to prove that this crop could not compete with other crops both under irrigated and unirrigated conditions and that it was grown in unirrigated conditions where other crops could not thrive. It was also observed that profit per hectare of safflower was lowest among all the competitive crops if observations of both Raipur and Shajapur districts were taken together.

5.3.9 Agriculture universities at Jabalpur and Raipur conducted feasibility studies and studies on crop rotations, fertilizer doses,

varietal trials, intercropping and economics of different crops.

The Directorate of Agriculture undertook crop demonstrations, minikits distribution, farmers' training, distribution and adjustment of subsidy, distribution of power thereshers and distribution of hand gloves.

5.4.1 Of the selected 100 households 3 belonged to scheduled castes and 1 to scheduled tribe. Seventy households belonged to backward castes and 26 to other castes. Of the 100 heads of households 89 were literate. Of these 26 were educated upto primary level, 27 up to middle school level and 24 were educated upto higher secondary level. Twelve heads of households were graduates and post graduates. It was observed that larger proportion of farmers belonging to medium and large size groups had higher educational achievement than those belonging to marginal and small categories. About 71 per cent of the total family members were workers. Of the total heads of households 8 were not members of any type of institution. Remaining 92 heads of households were members of Primary Agriculture Credit Societies. In addition 19 were members of Cooperative Marketing Societies, 26 members of Dairy Cooperative Societies and 22 were members of other types of societies.

5.4.2 Among the sample farms, maximum number (37) belonged to medium size group and 22 to small size group. Sixteen farms each belonged to semi-medium and large size groups. Of the total operated area 50.33 per cent was irrigated. The percentage of irrigated area was higher (69.06) in Shajapur district than Durg district (33.90). It was also observed that the percentage of irrigated area was higher on larger size of farms. In Durg district paddy formed 51.91 per cent of the gross cropped area. Teora formed 23.85 per cent. Safflower was grown as a pure crop on 1.65 hectares in 1992-93. The area decreased from year to year and was only 0.50 hectare in 1996-97. This formed only 0.10 per cent of the gross cropped area. It is clear that safflower has not made any head way in the district and there was no question of its replacing any other crop, although there was an increase in the gross cropped area. In Shajapur district soybean was most important and formed 48.14 per cent of the gross cropped area. Gram and wheat were other important crops. Safflower was grown only on 1.47 per cent of the gross cropped area. The area decreased from 35 hectares in 1992-93 to 8.50 hectares in 1996-97. Thus safflower has not shown any promise on the selected farms. It has not replaced any other crop. On the contrary, it has lost ground.

5.4.3 In Durg district the value of output per hectare was highest for gram in the case of minimum yield and minimum price. In the case of maximum yield and maximum price the value of output per hectare was highest for coriander. Other crops claiming third, fourth and fifth positions were wheat, mustard and linseed. It is worth noting that the value of output for safflower was lowest in both the cases of minimum yield and minimum price and maximum yield and maximum price. Similar situation was noted in Shajapur district.

5.4.4 In Durg district the net return per hectare was highest for coriander. It was second highest for wheat. Gram, mustard, teora, lentil and linseed were other important crops as far as net return per hectare. The net return per hectare was lowest for safflower showing that safflower earned least net return per hectare and, therefore, least profitable among all the crops. In Shajapur district the sequence of crops according to net return per hectare was similar to Durg district. Safflower earned lowest net return per hectare as in Durg district.

5.4.5 In Durg district the input output ratio was highest for teora followed by linseed and lentil. This was because of the fact that not many intercultural operations and no irrigation was done. This resulted in low input cost and high input output ratio. For safflower the input output ratio was lowest. Similar situation was noticed in Shajapur district.

5.4.6 As many as 95 of the 100 selected farmers opined that they grew safflower because of the programme associated benefits such as seed minikits, fertiliser and other inputs offered at subsidised rates. Most of the farmers were convinced about the benefits of inter cropping of safflower crop. They agreed that in the dry rabi season this crop gave them some return than having no crop. Many farmers were convinced about the low investment and low risk involved except the aphids attack in the crop. However, about 80 per cent farmers were not inclined to grow this crop if the benefits of the programme were withdrawn. All the farmers faced the problem of seed availability and marketing of the crop. Other problems included attack by birds, poor germination, susceptibility to frost and problems of harvesting and threshing due to spines.

5.4.7 The competing crops of safflower were wheat, gram, mustard, coriander, teora, linseed and lentil. All these crops were grown because of good marketing facilities, profitability per hectare, and suitability for home consumption. Contrary to these benefits, safflower had many disadvantages. Marketing was the problem for three fourths of the selected farmers. Only one fifth were convinced about the profitability of the crop and only one sixth could obtain relative high price. Almost all the farmers agreed that they grew the crop due to associated benefits offered by the programme authorities.

Among the implementation bottlenecks following need mention.

(i) The field workers at the village level are burdened with many activities and extension work of many crops. Safflower is treated as economically least profitable crop and, therefore, gets low priority among various crop development programmes. Since Marico Industries has taken lot of interest in safflower development, the departmental staff thinks that extension work of this crop is the work of Marico Industries and avoid doing any work for safflower development.

(ii) During reference period the experience of farmers with regard to germination of safflower seed was very poor. Due to that experience farmers hesitate to grow safflower.

(iii) Extension staff is unable to provide knowledge to the farmers regarding recommended practices. Therefore yield of safflower is far lower than the estimated yield.

Policy Implications and Suggestions

Safflower is grown in the state and selected districts as a rabi crop in the areas devoid of irrigation facilities. Since the crop is resistant to drought conditions it is grown in the low moisture conditions where no other crop can survive. As regards profitability it was observed that even with lowest levels of inputs the profitability per hectare and input ratio were lowest for this crop among all the competing crops. The farmers could afford to grow this crop only because of support from the government in the form of subsidised inputs like seed, fertilizers, pesticides etc. The opinion of the farmers is not in favour of cultivation of the crop. The results of the safflower development programme have not been encouraging. In terms of percentage of amount spent on programme to targetted amount and physical achievements against physical targets the performance can be termed dismal. A thorough review of the programme be done before continuing it in future.

Appendix table A 4.1 Cropping pattern on different size groups, selected farms, Durg district, Madhya Pradesh, 1992-93 to 1996-97

(Area-hectares)

Crop	Marginal					Percentage of	Small					Percentage of	Semi-medium					Percentage of
	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97
Paddy	7.69	7.49	7.69	7.79	8.63	56.11	18.31	18.41	18.41	18.51	18.62	49.50	19.02	19.42	20.64	20.23	21.43	45.21
Soybean	--	--	--	--	--	--	0.20	0.20	0.30	0.30	0.30	0.80	0.20	0.30	0.30	0.20	0.30	0.63
Soybean+ Arhar	0.10	0.15	0.20	0.20	0.20	1.30	0.20	0.30	0.30	0.40	0.40	1.06	0.20	0.40	0.40	0.40	0.40	0.65
Kodo+Arhar	0.20	0.20	0.20	0.20	0.20	1.30	0.30	0.30	0.30	0.30	0.30	0.80	0.30	0.40	0.61	0.81	1.01	2.13
Urad+Til	0.30	0.40	0.40	0.30	0.30	1.95	0.61	0.61	0.61	0.81	0.61	1.62	0.81	1.01	1.21	1.01	1.21	2.55
Wheat	0.30	0.30	0.40	0.40	0.40	2.60	0.40	0.40	0.61	0.61	0.61	1.62	0.61	0.61	0.61	0.81	0.81	1.71
Gram	0.40	0.40	0.60	0.60	0.60	3.90	2.02	2.02	2.43	2.43	2.63	6.99	3.03	3.03	3.24	3.64	4.05	8.54
Teora	3.24	3.64	3.84	3.84	3.64	23.67	8.50	8.60	8.50	8.70	8.70	23.13	7.80	8.90	9.31	8.50	8.90	18.78
Safflower	0.20	0.20	0.10	0.20	0.10	0.65	0.15	0.30	0.40	0.10	0.10	0.27	0.30	0.30	0.40	0.10	0.10	0.21
Mustard	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.40	0.20	0.20	0.42
Coriander	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.20	0.20	0.42
Lentil	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.20	0.40	0.85
Linseed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.81	0.40	0.85
Gram+ Safflower	0.20	0.20	0.30	0.20	0.20	1.30	0.61	0.40	0.61	0.40	0.40	1.06	0.81	1.62	2.43	2.02	1.42	2.99
Linseed+ Safflower	0.40	0.30	0.20	0.20	0.20	1.30	1.62	1.72	1.72	1.42	1.62	4.31	2.02	1.62	2.34	2.02	2.43	5.13
Lentil+ Safflower	0.20	0.30	0.40	0.30	0.40	2.60	1.21	1.21	1.21	1.62	1.31	3.48	1.11	1.21	1.72	1.62	0.81	1.71
Mustard+ Safflower	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.40	0.40	0.20	0.42
Coriander+ Safflower	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.01	0.61	0.61	1.29
Spices, fruits & vegetables	--	--	--	--	--	--	0.81	0.81	1.01	1.01	1.01	2.68	1.01	1.01	1.21	1.21	1.41	2.97
Other crops	0.41	0.06	0.24	0.34	0.51	3.32	1.52	1.42	1.01	1.01	1.01	2.68	1.01	0.81	1.01	1.01	1.11	2.34
Gross cropped area	13.64	13.64	14.57	14.57	15.38	100.00	36.46	36.70	37.62	37.62	37.62	100.00	38.23	40.64	47.24	45.40	47.40	100.00

Appendix Table A 4.1 Cropping pattern on different size groups, selected farms, Durg district, Madhya Pradesh, 1992-93 to 1996-97

(Area-hectar

Crop	Medium					Percentage of	Large					Percentage of
	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97
Paddy	100.15	105.22	109.27	109.67	108.46	54.69	106.23	108.45	107.03	110.90	109.27	50.94
Soybean	1.21	1.01	1.21	1.41	1.41	0.71	1.21	1.41	1.62	1.82	2.02	0.94
Soybean+ Arhar	0.61	0.61	0.81	0.81	0.81	0.41	1.01	1.21	1.21	1.62	1.62	0.76
Kodo+Arhar	1.01	0.81	0.81	0.81	0.81	0.41	2.02	1.62	1.62	1.42	1.01	0.47
Urad+Til	2.83	2.43	2.43	2.63	2.83	1.43	3.24	3.64	3.24	3.44	3.64	1.70
Wheat	0.81	0.81	0.81	1.01	1.21	0.61	1.01	1.01	1.21	1.21	1.21	0.56
Gram	4.86	4.86	5.26	5.26	6.07	3.06	11.33	10.52	10.93	11.33	11.74	5.47
Teora	47.64	49.39	50.39	51.20	50.18	25.31	50.18	50.28	49.17	50.58	51.00	23.78
Safflower	0.40	0.30	0.30	0.20	0.10	0.05	0.60	0.40	0.60	0.10	0.10	0.05
Mustard	--	--	0.40	0.40	0.40	0.20	--	2.02	2.02	1.62	1.62	0.76
Coriander	--	--	0.20	0.61	0.40	0.20	--	--	--	2.43	2.02	0.94
Lentil	--	--	2.02	2.02	2.42	1.22	--	--	4.46	6.08	6.48	3.02
Linseed	--	--	--	0.40	2.02	1.02	--	--	8.59	10.41	10.41	4.85
Gram+ Safflower	2.03	1.01	2.74	3.22	4.86	2.45	2.43	3.04	4.05	4.86	5.06	2.36
Linseed+ Safflower	9.62	10.33	6.80	7.30	6.30	3.18	9.71	9.81	2.02	--	0.20	0.09
Lentil+ Safflower	5.56	6.58	6.27	5.97	4.06	2.05	6.08	6.08	2.02	--	0.40	0.19
Mustard+ Safflower	--	--	0.21	--	--	--	--	--	--	--	--	--
Coriander+ Safflower	--	--	0.81	0.20	--	--	--	2.43	2.83	--	--	--
Spices, fruits & vegetables	3.85	4.05	3.95	4.05	4.45	2.24	3.84	3.64	3.45	3.85	3.85	1.79
Other crops	2.63	1.82	1.11	2.43	1.51	0.76	1.83	1.03	0.61	2.02	2.86	1.33
Gross cropped area	183.21	189.23	195.80	199.60	198.30	100.00	200.72	206.59	206.68	213.69	214.51	100.00

Appendix table A 4.2Cropping pattern on different size groups, selected farms, Shajapur district, Madhya Pradesh, 1992-93 to 1996-97

(Area-hectares)

Crop	Marginal					Percentage of	Semi-medium					Percentage or	Medium					Percentage of
	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97
Soybean	4.20	4.20	4.20	4.20	4.20	51.22	17.20	17.20	16.60	17.60	17.20	49.28	21.90	21.90	22.10	22.30	22.30	52.47
Jowar+Urad+ Arhar	--	--	--	--	--	--	0.70	0.70	1.10	0.70	0.70	2.00	0.80	0.80	0.60	0.40	0.40	0.94
Groundnut	--	--	--	--	--	--	--	--	--	--	--	--	0.40	0.40	0.40	0.40	0.40	0.94
Wheat	1.00	1.20	1.60	1.40	1.60	19.51	5.80	5.80	6.20	5.80	6.20	17.77	3.60	3.60	5.40	6.10	6.80	16.00
Gram	1.20	1.40	1.40	1.80	1.80	21.95	5.40	5.60	6.40	6.40	6.60	18.91	4.20	4.40	6.20	7.00	6.80	16.00
Safflower	1.00	0.80	0.40	0.40	0.30	3.66	2.80	2.80	2.40	2.00	1.80	5.16	7.40	7.40	1.60	0.80	0.40	0.94
Mustard	--	--	--	--	--	--	1.20	1.20	0.80	1.20	1.20	3.44	0.20	0.20	1.00	0.80	1.00	2.35
Coriander	--	--	--	--	--	--	0.30	0.30	0.40	0.40	0.60	1.72	2.00	2.40	2.60	2.60	2.60	6.12
Spices, fruits and vegetables	0.20	0.20	0.20	0.20	0.30	3.66	0.40	0.40	0.40	0.60	0.60	1.72	0.60	0.60	2.00	2.00	1.80	4.24
Other crops	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gross cropped area	7.60	7.80	7.80	8.00	8.20	100.00	33.80	34.00	34.30	34.70	34.90	100.00	41.10	41.90	41.90	42.40	42.50	100.00

Crop	Medium					Percentage of	Large					Percentage of
	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97	1992-93	1993-94	1994-95	1995-96	1996-97	1996-97
Soybean	91.80	91.80	93.30	90.80	93.30	47.78	130.70	131.40	134.60	136.80	140.50	47.53
Jowar+Urad+ Arhar	2.60	2.60	3.00	3.00	2.60	1.33	4.20	4.20	3.80	3.60	3.00	1.01
Groundnut	1.40	1.40	0.90	2.40	2.40	1.23	1.20	1.40	1.80	2.00	2.50	0.85
Wheat	22.40	22.40	22.90	21.10	23.20	11.88	35.80	38.30	41.10	39.30	38.50	13.03
Gram	28.30	35.30	36.70	35.50	36.90	18.89	64.90	69.10	66.60	68.40	71.10	24.05
Safflower	15.00	9.00	7.40	6.20	4.00	2.05	8.80	6.60	4.00	4.00	2.00	0.68
Mustard	1.70	2.20	3.40	4.20	4.80	2.46	6.40	6.00	5.60	4.00	5.00	1.69
Coriander	7.20	7.40	7.80	7.80	8.40	4.30	6.60	8.00	8.50	10.50	10.50	3.55
Spices, fruits and vegetables	13.60	13.60	13.20	20.20	18.50	9.47	7.80	5.80	8.50	9.30	13.50	4.57
Other crops	1.20	1.20	1.20	1.20	1.20	0.61	6.00	6.80	7.00	6.00	9.00	3.04
Gross cropped area	185.20	186.90	189.80	192.40	195.30	100.00	272.40	277.60	281.50	283.90	295.60	100.00

Appendix table A 4.3 Yield and price per hectare of different crops in the situation of minimum yield and minimum price, different size groups, Durg district, Madhya Pradesh

(Yield-kg/hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-medium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	917	605	889	625	897	615	904	590	927	600	889	590
Gram	705	1,060	680	1,100	688	1,090	715	1,090	720	1,100	680	1,060
Mustard	--	--	--	--	480	1,050	500	1,000	510	1,100	480	1,000
Coriander	--	--	--	--	365	1,800	380	1,950	375	1,750	365	1,750
Lentil	350	1,150	370	1,150	350	1,200	375	1,180	400	1,125	350	1,125
Linseed	270	1,200	285	1,235	250	1,225	275	1,250	290	1,250	250	1,200
Teora	450	725	500	810	485	850	460	800	475	700	450	700
Safflower	200	800	200	800	225	800	265	810	250	825	200	800

Appendix table A 4.4 Yield and price per hectare of different crops in the situation of maximum yield and maximum price, different size groups, Durg district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-mudium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	1,403	870	1,479	880	1,368	845	1,407	840	1,501	880	1,501	880
Gram	720	1,680	730	1,560	737	1,600	769	1,680	808	1,710	808	1,710
Mustard	--	--	--	--	610	1,150	640	1,150	670	1,200	670	1,200
Coriander	--	--	--	--	425	3,000	450	2,900	470	3,300	470	3,300
Lentil	400	1,600	400	1,550	410	1,600	425	1,650	425	1,625	425	1,650
Linseed	300	1,300	295	1,385	310	1,400	320	1,450	325	1,400	325	1,450
Teora	525	950	550	990	575	950	580	1,000	600	950	600	1,000
Safflower	250	800	265	850	300	900	300	925	300	950	300	950

Appendix table A 4.5 Yield and price per hectare of different crops in the situation of minimum yield and minimum price, different size groups, Shajapur district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-midium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	2,600	550	2,750	550	2,700	600	2,800	600	2,900	600	2,600	550
Gram	900	1,100	950	1,200	950	1,100	1,000	1,125	900	1,500	900	1,100
Mustard	--	--	900	1,000	900	1,100	950	1,150	950	1,100	900	1,000
Coriander	--	--	450	2,000	480	2,000	460	2,500	475	3,200	450	2,000
Safflower	200	800	200	800	250	825	250	825	225	800	200	800

Appendix table A 4.6 Yield and price per hectare of different crops in the situation of maximum yield and maximum price, different size groups, Shajapur district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-medium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	3,000	600	3,000	650	3,100	700	3,150	800	3,150	900	3,150	900
Gram	1,000	1,500	1,050	1,500	1,050	1,500	1,050	1,700	1,100	1,750	1,100	1,750
Mustard	--	--	950	1,100	1,000	1,100	1,000	1,150	1,000	1,200	1,000	1,200
Coriander	--	--	500	2,200	575	2,750	600	3,000	600	3,500	600	3,500
Safflower	300	800	300	820	275	850	290	850	350	850	350	850

Appendix table A 4.3 Yield and price per hectare of different crops in the situation of minimum yield and minimum price, different size groups, Durg district, Madhya Pradesh

(Yield-kg/hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-medium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	917	605	889	625	897	615	904	590	927	600	889	590
Gram	705	1,060	680	1,100	688	1,090	715	1,090	720	1,100	680	1,060
Mustard	--	--	--	--	480	1,050	500	1,000	510	1,100	480	1,000
Coriander	--	--	--	--	365	1,800	380	1,950	375	1,750	365	1,750
Lentil	350	1,150	370	1,150	350	1,200	375	1,180	400	1,125	350	1,125
Linseed	270	1,200	285	1,235	250	1,225	275	1,250	290	1,250	250	1,200
Teora	450	725	500	810	485	850	460	800	475	700	450	700
Safflower	200	800	200	800	225	800	265	810	250	825	200	800

Appendix table A 4.4 Yield and price per hectare of different crops in the situation of maximum yield and maximum price, different size groups, Durg district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-mudium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	1,403	870	1,479	880	1,368	845	1,407	840	1,501	880	1,501	880
Gram	720	1,680	730	1,560	737	1,600	769	1,680	808	1,710	808	1,710
Mustard	--	--	--	--	610	1,150	640	1,150	670	1,200	670	1,200
Coriander	--	--	--	--	425	3,000	450	2,900	470	3,300	470	3,300
Lentil	400	1,600	400	1,550	410	1,600	425	1,650	425	1,625	425	1,650
Linseed	300	1,300	295	1,385	310	1,400	320	1,450	325	1,400	325	1,450
Teora	525	950	550	990	575	950	580	1,000	600	950	600	1,000
Safflower	250	800	265	850	300	900	300	925	300	950	300	950

Appendix table A 4.5 Yield and price per hectare of different crops in the situation of minimum yield and minimum price, different size groups, Shajapur district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-midium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	2,600	550	2,750	550	2,700	600	2,800	600	2,900	600	2,600	550
Gram	900	1,100	950	1,200	950	1,100	1,000	1,125	900	1,500	900	1,100
Mustard	--	--	900	1,000	900	1,100	950	1,150	950	1,100	900	1,000
Coriander	--	--	450	2,000	480	2,000	460	2,500	475	3,200	450	2,000
Safflower	200	800	200	800	250	825	250	825	225	800	200	800

Appendix table A 4.6 Yield and price per hectare of different crops in the situation of maximum yield and maximum price, different size groups, Shajapur district, Madhya Pradesh

(Yield-kg./hectare)
(Price-Rupees/quintal)

Crop	Marginal		Small		Semi-medium		Medium		Large		Overall	
	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price	Yield	Price
Wheat	3,000	600	3,000	650	3,100	700	3,150	800	3,150	900	3,150	900
Gram	1,000	1,500	1,050	1,500	1,050	1,500	1,050	1,700	1,100	1,750	1,100	1,750
Mustard	--	--	950	1,100	1,000	1,100	1,000	1,150	1,000	1,200	1,000	1,200
Coriander	--	--	500	2,200	575	2,750	600	3,000	600	3,500	600	3,500
Safflower	300	800	300	820	275	850	290	850	350	850	350	850