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Full Length Research Paper

Agricultural diversification in the Upper Krishna river basin, India

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Irrigation is essential for assured agricultural yield. Regular water supply to crops along with other inputs goes to a long way in increasing the production and productivity of the agriculture sector. The areas of Maharashtra like Sangli, Satara, Solapur, Vidarba, Marathawada are permanently declared as district which is less than state average. This argument can be proved with the irrigation ratio, as it is only 17%. The present paper is base on primary data, and an attempt was made to evaluate the change due to irrigation, agricultural pattern, and land use, use of technology and irrigation intensity. It also deals with socio-economic effects on the drought affected regions in general and the farmers of Upper Krishna river basin in particular, with special reference to Karad Taluka. The statistical data of the 72% farmers are small and marginal farmers, whereas only 28% of farmers hold land above 5 acres. The average land holding in the region is 4.42% acres, overall skewed distribution of land holding is observed in the Upper Krishna river basin. The Herfindal Index was 0.87 in the region which suggests the mono-crop culture of sugarcane. The per capita income in the sample study was Rs. 42,207.46. It was much higher than national average. In the sample region, out of the total, 96.7% of the farmers used organic fertilizers in the year 2010 to 2011. Their S.D. and variance value was less than sugarcane. Correlation between cost of cultivation and income from sugarcane is 0.94. It is highly positive correlation. Moderate positive (0.45) correlation is observed between cultivation cost and income from Bhusar crops. And, the correlation between cultivation cost and income from vegetable is 0.96. It is highly positive and more than the sugarcane. The analysis of statistical data along with the evaluation of socio economic changes gives certain conclusions which add new dimensions to the existing body of the knowledge available on the subject. The paper is also significant in the context of agricultural planning and policy making.

Key words: Drought region, cropping pattern, land holding.

INTRODUCTION

Irrigation is essential for assured agricultural yield. It can be done by small tanks and ponds available in the farms and nearby areas. Regular water supply to crops along with other inputs promotes development in the production and productivity of the agriculture sector. Areas like Sangli, Satara, Solapur, Vidarba, Marathawada are known as rain shadow areas. Khandala, Koregaon, Maan, Dahiwadi, Khatav talukas are rain fed. Only 17 % irrigation is available in the Satara district which is less than state average. Again some crops like paddy and sugarcane require plenty of water. Adequate and continuous supply of water is essential to protect the drought prone areas in India as well as in Maharashtra. Indian farming still gambles with the monsoon. So, it affects the development of agriculture.

An attempt was made to evaluate the change due to irrigation in the agricultural pattern, land use, use of technology, irrigation intensity and other socio-economic effects on the drought regions in general, and the farmers, in particular, of Krishna river basin with special reference to Karad Taluka.

Objectives of the study

The following are the main objectives of the present study:

1. To study the land use and cropping pattern in upper zone of Krishna river basin with special reference to Karad Taluka.
2. To study the input prices and costs of various crops in the upper zone of Krishna river basin.
3. To study the socio-economic impact of the Krishna river on the farmers in Karad Taluka.
4. To study the change in agricultural practices in Karad Taluka.

RESEARCH DESIGN

The Krishna River rises from a place with an elevation of 1337 m north of Mahabaleshwar.. The Krishna River is one of the longest rivers in India (District Census Handbook- Satara, 1991 and 2001). The origin of this river is at Mahabaleshwar in Maharashtra. It flows through the States of Maharashtra, Karnataka and Andhra Pradesh. The mythology connected with the river is that the source of the river is a fountain rising from the mouth of the statue of a cow. The statue is in a temple of Lord Shiva in the city of Mahabaleshwar. The tributaries Venna and Koyana are said to be Siva and Brahma themselves. The tributaries of the Krishna River are Ghataprabha, the Malaprabha, the Bhima, the Tungabhadra, the Musi, Koyna Rivers. The river basin of the Krishna stretches for an area of 258,948 km^2. The river has an average annual surface water potential of 78.1 km^3 and covers 8% of the total geographical area of India (District Socio-economic Survey –Satara -1991, 2001 and 2011).

Simple random sampling method was adopted to study the present work. Out of a total of 220 villages, (GOI Population Census-2001and 2011 –At a Glance) we worked on 20 villages in Karad Taluka in Satara District. Satara is the leading district in Maharashtra as well as all over India. A systematic random sampling method was adopted for selecting the villages. Out of 17343 families (GOI Population Census-2001and 2011 –At a Glance) of cultivators, a total of 120 were interviewed. The proportion of sampling is 0.70%.

In the first stage, systematic random sampling of the villages in the Karad taluka was made on the basis of their location and settlement from upper command of the river to lower command of the river; thus, we selected odd villages randomly.The households from all these sample villages were classified into four groups:

1. Marginal farmers (up to 1 ha)
2. Small farmers (1.01 to 2 ha)
3. Semi medium (2.01 to 4 ha)
4. Medium farmers (above 4 ha)

In the second stage of sampling, the households sampling was made with a restriction of 1 to 4 classes of the farmers as aforementioned. The proportional representation of marginal, small, semi medium and medium landholders was ensured.

Sources of data collection

Primary data used for this study was collected from the household census in the sample villages during 2010 to 2011. Special interviews of sample farmers in sample villages, discussion with leading farmers and field observations visits are also undertaken for the present study.

Data processing and use of quantitative techniques

In order to find out the degree of diversification in cropping pattern, we adopt Herfindahl Index Number of diversification:

Herfindahl Index (H.I.) = 1 – H

The Herfindahl Index Number was computed by taking the sum of squares of acreage / hectares in proportion of each crop out of the total cropped area:

$$H.I. = \sum_{i=1}^{n} Pi^2$$

Where 'n' is the total number of crops and Pi respondents' average proportion of 'ith' crop out of total cropped area, with increase in diversification.

This index takes the value of one when there is a complete specialization and approaches 0 when 'n' gets larger, which indicates that diversification is perfect. Hence, the Herfindahl Index is bounded by 0 and 1. Since H.I. is a measure of concentration, it was transformed by subtracting it from 1, that is, 1 - H.I. The transformed value of H.I. avoids confusion to compare it with other indices.

Apart from aforementioned, many other quantitative techniques were used, such as correlation, S.D., variance and percentage in the analysis of the collected data.

RESULTS

Size of landholding

Size of landholding is one of the important aspects of economic diversification. With the change in the size of landholdings, the cropping pattern is also positively changed (Bryan, 1991). Cropping pattern becomes stagnant as soon as the size of holding reaches to particular optima. The size of farm is a matter of great importance for attaining a certain level of development (Gurjar, 1994). It is a pointer to the extent in which the time and resources of the farmers are fully utilized.

One important feature of Indian agriculture is the skewed distribution of land among various categories of the cultivators (Chand and Singh, 1985). Upper Krishna river basin is no exception to this. The size of holding in KRB shows a close correlation to the size of population. Largest numbers of holdings are small and marginal. The pattern of total landholding and total cultivated area in the river basin is shown in Table 1.

Table 1 explains the land holding pattern of sample families. 11.7% of families have holding of below one acre of land. 60% of families were holding 1 to 5 acres of land. Merely 72% of farmers belonged to small and marginal farmers. About 28% farmers hold land above 5 acres. The average land holding in the region was 4.42% acres, maximum farmers were holding 2 acres of land and single farmers from a village holding 40 acres of land which was the maximum and 0.28 acre land holding was minimum, in the sample study. The S.D and variance of total land holding were 4.35 and 18.87 respectively in the region. Table 1 further shows that the farmers were having

Table 1. Land size of sample families.

Size in acre	Total landholders	%	Perennial irrigated	%	Seasonal irrigated	%	Dry land	%
Up to 1	14	11.7	26	21.7	5	4.2	11	9.2
1.01 to 2	33	27.5	35	29.2	4	3.3	12	10
2.01 to 5	39	32.5	37	30.8	2	1.7	6	5
5.01 to 10	33	27.5	21	17.5	3	2.5	4	3.3
Above 10	1	0.8	1	0.8	0	0	0	0
Total	120	100	120	100	14	11.7	33	27.5
Mean	4.42		3.26		0.34		0.74	
Medan	3		2		0		0	
Mode	2		2		0		0	
S.D.	4.35		2.74		1.29		1.67	
Variance	18.87		7.5		1.66		2.78	
Mini	0.28		0.28		0		0	
Maxi	40		20		10		10	

Source: Primary data.

Table 2. Herfindal Index of agricultural diversification in the Taluka.

Crops	Wheat	Jawar	Sugarcane	Soybean	Groundnut	Fodder	Vegetable	Rice	Total	Herfindal Index
Land Acre	70.3	68.9	241.59	28.5	52.15	22.81	35.55	24	543.8	0.87
%	12.93	12.97	44.43	5.24	9.59	4.19	6.54	4.41	100	

Source: Primary data.

more perennial irrigated land compare to seasonal and dry land. 21.7% of farmers hold up to 1 acre of irrigated land, and more than 50% farmers hold up to 2 acres perennial irrigated land and 30.8% farmers were holding 2 to 5 acres irrigated land. The 18% farmers were holding more than 5 acres perennial irrigated land. Only 11.7 and 27.5% farmers were holding less than five acres of seasonal irrigated and dry land, respectively in the sample study. The averages land holding of perennial irrigated, seasonal and dry land are 3.26, 0.34 and 0.74 acres in the Karad taluka. The minimum and maximum land holding of perennial irrigated were 0.28 to 20 acres, but the minimum and maximum size of land holding of seasonal and dry land is same, that is, 0.28 and 10 acres in the sample study. The S.D. and variance of perennial irrigated, seasonal and dry land were 2.74 and 7.5, 1.29 and 1.66, and 1.67 and 2.78, respectively. In brief, Table 1 shows overall skewed distribution of land holding in the Karad taluka.

Cropping pattern

The land is mainly used for agriculture as an important economic resource and the cropping pattern, depends upon the prices and available inputs (Chand, 1996).

Table 2 shows the cropping pattern with Herfindal Index. Out of total cultivated area, nearly about 44.43% area was under sugarcane crop; which is a dominant cash crop in the region. Wheat and jawar were cultivated on 13% of each land followed by groundnut 9.59% and cultivated area under soybean, rice, fodder and vegetables ranged between 4.19 and 6.54 5% in total cultivation. The Herfindal Index was 0.87 in the region. It indicates the mono-crop culture of sugarcane.

Table 3 shows the incomes from various crops; maximum income centralized to sugarcane crop is 73.41%. It indicates that three-fourth of income is earned from sugarcane agriculture. The out of the total, share of wheat, jawar, soybean, groundnut, rice fodder, and vegetables is one-fourth in the Krishna river basin. The lowest income is earned from fodder cultivation. The per capita income in the sample study is Rs. 42,207.46. It is much higher than the national average.

Input cost and prices

Fertilizers

The potentialities of improved seeds can be realized only through a balanced use of fertilizers (Chand, 1999a).

Table 3. Income distributions among sample farmers (amount in 000 Rs.).

Crops	Wheat	Jawar	Sugarcane	Soybean	Groundnut	Fodder	Vegetable	Rice	Total	Per capita income
Income	1943	1188	22835.5	1134.4	1700	346	1044	916	31106.9	42.207
%	6.25	3.82	73.41	3.65	5.46	1.11	3.36	2.94	100	

Source: Primary data.

Table 4. Use of fertilizers per household in kg.

Range	Organic		Chemical		Trolley range	Compost	
	Respondent	%	Respondent	%		Respondent	%
0	04	3.3	02	1.7	0	09	7.5
100 - 500	51	42.5	61	50.8	1 - 5	69	57.5
501 - 1000	20	16.7	47	39.2	6 - 10	13	10.8
1001 - 2000	08	6.7	09	7.5	11 - 20	21	17.5
2001 - 5000	24	20	01	0.8	Above 20	08	6.7
5001 - 10000	12	10	0	0			
Above 10000	01	0.8	0	0			
Total	120	100	120	100	Total	120	100
Mean	2308		626.6			6.9	
Median	725		500			3	
Mode	500		500			2	
S.D.	3621.9		402.95			8.5	
Variance	13118879		162372.9			72	
Minimum	100		200			1	
Maximum	30000		3200			35	

Source: Primary data.

Fertilizers were the source of nutrients that are essential for vigorous growth (Chand, 1999b).

The farmers in K.R.B. applied two types of fertilizers, one was compost fertilizer and another was chemical fertilizer. 98% of farmers used chemical fertilizers to increase agricultural production. On the other hand, only 1.2 and 0.8% of farmers were exclusively using only compost and chemical fertilizers respectively in the sample area. Use of chemical fertilizers is one of the indicators of agricultural development, but its application should not go beyond a certain limit. If so, the productivity of soil deteriorates due to high level of pH and Ece (Fukuda, 1976). In support of the compost and manure, farmers should use chemical fertilizer (N.P.K) in a proportionate manner for speedy growth of the crops. Use of chemical fertilizers depends on the availability of irrigation water (Chitale Committee Report, 1998). Use of N.P.K (Nitrogen, Phosphate and Potash) is not possible without irrigation facility. The K.R.B. gives sufficient access to the N.P.K.

In the sample area, out of the total, 96.7% farmers were used to organic fertilizers. It was purchased from sugar factories, where they are shareholders. This type of fertilizers is better for increasing productivity of land. Due to environment awareness, out of the total, 93.3% of farmers used chemical fertilizers, followed by 85.8% which used compost fertilizers. It is a good beginning towards sustainable agriculture that the farmers are using compost and organic fertilizers for increasing the per hectare yield.

Table 4 analyses the farmers approach towards sustainable agricultural development. More than 97% of farmers use organic whereas 92.5% farmers use compost manures for sustaining agriculture productivity, but highest proportion was chemical fertilizers. Out of the total farmers, 42.5 and 50.8% of farmers used up to 1000 kg of organic and chemical fertilizers respectively during 2010 to 2011. But the single farmer used more than 2000 kg of chemical fertilizers.

Farmers also used domestic as well as purchased compost manures for land. 7.5% of farmers did not use compost manures. More than two-third of the farmers used up to 10 trolleys of compost manure. Eight farmers used more than 20 trolleys of manure. Only one farmer used 35 trolleys manure. It was the highest use of compost manures in the year 2010 to 2011. Besides that, single farmers used more than 30000 kg of organic manures. It was the maximum use of organic manures in

Table 5. Total amount spent on fertilizers (Rs. in 000).

Range	Organic		Chemical		Compost			
					Purchased		Own	
	Resp.	%	Resp.	%	Resp.	%	Resp.	%
0	04	3.3	02	1.7	42	35	36	30
2-5	60	50	42	35	33	27.5	50	41.7
5-10	24	20	33	27.5	24	20	24	20
10-15	06	5	08	6.7	07	5.8	06	5
15-20	02	1.7	09	7.5	09	7.5	04	3.3
20-25	14	11.7	05	4.2	03	2.5	0	0
25-50	09	7.5	18	15	02	1.7	0	0
Above 50	01	0.	03	2.5	0	0	0	0
Total	120	100	120	100	120	100	120	100
Mean	10647.5		13370		6291		4000	
Median	5000		8000		4000		3000	
Mode	5000		5000		5000		5000	
S.D.	11888		13745		7779		4257	
Variance	141329237		188951663		60523459		18125641	
Minimum	2000		2000		2000		2000	
Maxim	80000		55000		40000		20000	

Source: Primary data.

the sample study. However, one farmer used 32 quintiles chemical fertilizers for increasing in the agricultural production. The average use of organic and chemical fertilizers was 2308 and 626.6 kg in upper zone of Krishna river basin. It indicates that the farmers give preference to organic manures. Similarly, use of compost manures is also higher. The average use of compost manures was about 7 trolleys. It elaborates that farmers give more preference to compost manures as like organic. The S.D. and variance of organic and chemical fertilizers were about 3622, 13118879 and 403162373 respectively in the basin. In brief, Table 4 stresses the use of organic and compost manures in the sample area. Its comparative study suggests that in the sample study, the ratio of the use of compost manures is higher than the chemical fertilizers during 2010 to 2011.

Expenditure on fertilizers

Table 5 explains the expenses of fertilizers per respondent. Of the total, 70 and 35% of farmers spent between Rs. 2000 and Rs. 5000 on organic and chemical fertilizers respectively during 2010 to 2011 in UKRB. Moreover, 25 and 35% of farmers spent the Rs. 5000 to Rs. 15000 on purchasing of organic and chemical fertilizers. Single farmer spent Rs. 80000 for the organic manures. It was the maximum amount spent for organic manures in the region. However, three farmers each spent more than Rs. 50000 amount on chemical fertilizers. Among them, single farmer spent Rs. 55000 for use of chemical fertilizers. It was the maximum amount spent for purchasing the chemical fertilizers. Table further shows that, the average amount spent on organic, chemical and compost manures was Rs. 10647.5, 13370 and 6291 respectively in the year 2010 to 2011. The maximum farmers used Rs. 5000 for purchase of organic, chemical and compost manures in the UKRB. The S.D. and variance of amount spent on chemical fertilizers was higher than organic and compost manures. In brief, Table 5 shows that the amount spent on chemical fertilizers was higher than the amount spent on manures, but the used quantity of chemical fertilizers was less than others. It means the prices of chemical fertilizers are higher. The farmers were purchasing compost manures rather than domestic. The maximum amount spent on purchasing compost manures was Rs. 40,000 and domestic was Rs. 20,000 during the year 2010 to 2011.

Cost of pesticides

Table 6 explains the expenses on pesticides. In the present period, the use of pesticides and insecticides are increased due to H.Y. V. seeds, weather condition and climatic changes. Out of the total, 75% of farmers use pesticides and insecticides for protecting crops from diseases. Among them, 35% of farmers spent minimum amount of Rs. 200 to 500 for this purpose whereas maximum amount spend for the same purpose is between Rs. 1000 to 2000. Only two farmers spent more

Table 6. Cost of pesticides.

Range (Rs.)	Respondent	%
0	29	24.2
200 - 500	42	35
501 - 1000	11	9.2
1001 - 2000	23	19.2
2001 - 5000	13	10.8
Above 5000	02	1.7
Total	120	100
Mean	1188	
Median	355	
Mode	2000	
S.D.	1765	
Variance	3113465	
Minimum	200	
Maximum	10000	

Source: Primary data.

than Rs. 5000 in the target area. The average amount spent for this purpose was Rs. 1188. The minimum and maximum amount spent of purchase the pesticides and insecticides were Rs. 200 and 10000, respectively, in UKRB. The S.D. and variance was 1765 and 3113465 respectively in the sample study.

Cultivation cost

Table 7 shows the cultivation costs of different crops in the UKRB. The expense on sugarcane cultivation is more than other crops. Out of the total, 15% of farmers spent between Rs. 2000 to 10,000, and 72.5% of farmers spent Rs. 10,000 to 50,000 for cultivation of sugarcane as primary charges. Only 10% of farmers spent more than Rs.1 lakh amount for cultivation of sugarcane. Among them, single farmer spent Rs. 3 lakh for same. It was the maximum cultivation cost in the sample study. The minimum was Rs. 5000. The average cultivation costs of sugarcane, bhusar and vegetables were Rs. 37925, 4808 and 2116 respectively in the region. The mode values of cost of cultivation were Rs. 20,000, 10,000 and 2000 for sugarcane, bhusar and vegetables, respectively.

Expenses of ploughing per acre

Table 8 analyses per acre rate of ploughing by tractor and bullocks. The ploughing rates by tractor ranges from Rs. 1200 to 2100 per acre in different villages of UKRB. The mode value of ploughing rate of tractor was Rs. 1680. Similarly, some farmers have given preference to bullocks for ploughing. The rate of bullocks plough ranges between Rs. 1000 to 2100 per acre. The mean and mode values of bullocks plough were Rs. 1528 and Rs. 1400 in the sample study. The average rate of ploughing by tractor was Rs. 1500. It was more than the rate of ploughing by bullocks. The S.D. and variance were observed as 224 and 314, and 50133 and 98854 for tractor and bullocks plough, respectively. About 66% of farmers plug every year. But, 37 and 17% of farmers do not plug their land regularly; the plugging of land is carried out every 2 and 3 years respectively in the upper Krishna river basin.

Problem of soil salinity

Table 9 shows the soil salinity in the region. Out of the total, about 45% of farmers were affected by problem of soil salinity. Among them, 40% of farmers were having the problem of soil salinity on 0.25 to 1 acre of land, and more than 5.8% of farmers lose 1 to 2 acres of their land due to soil salinity. Accordingly, 55% of farmers' production is decreased due to soil salinity in the region. They expressed that the excessive water use, use of chemical fertilizers, mono-crop culture etc, are the major causes of soil salinity.

Agricultural surplus

Table 10 gives information about agricultural surplus incomes from sugarcane, bhusar crops and vegetables. Out of the total, 20% farmers earned income between Rs. 10,000 and 50,000. Income earning from sugarcane starts from Rs. 15000. 30 and 34.2% of farmers earnedincome between Rs. 50000 to 1 lakh and Rs. 1 lakh to 2 lakh, respectively in the year 2010 to 2011. 7.5% farmers earned income of more than 5 lakh from sugarcane. A single farmer from a village earned an income of Rs.15 lakh from sugarcane. It was the maximum in the sample study. The average income from sugarcane was Rs. 183787. The maximum farmers earned income of Rs. 80000. It was mode value of sugarcane income in the Karad taluka.

The agricultural surplus values from other crops were less than sugarcane. Only 59.2 and 31.8% respondents earned surplus income from bhusar crops and vegetables respectively. It is share also very less in the total agricultural surpluses. About 46.7% farmers earned income of Rs. 5000 to 25000 per annum from bhusar crops and about 23.3% from vegetables. Only three farmers earned income of about 1 to 5 lakh from bhusar crops. The average agricultural surplus from bhusar and vegetables was Rs. 18108 and 7033, respectively, in the sample study. The minimum and maximum surplus from bhusar and vegetables was Rs. 5000 and Rs. 5000, and Rs. 220000 and Rs. 100000 respectively, in the year 2010 to 2011. Their S.D. and variance value was less

Table 7. Agricultural cultivation cost (in Rs.).

Range	Sugarcane		Bhusar crops		Vegetables	
	Respondent	%	Respondent	%	Respondent	%
0	0	0	49	40.8	83	69.2
2000 - 5000	6	5	21	17.5	25	20.8
5001 - 10000	12	10	39	32.5	05	4.2
10001 - 25000	50	41.7	11	9.2	05	4.2
25001 - 50000	37	30.8	0	0	02	1.7
Rs. 50001 - 1 lakh	03	2.5	0	0	0	0
1 - 2 lakh	11	9.2	0	0	0	0
Above 2 lakh	1	0.8	0	0	0	0
Total	120	100	120	100	120	100
Mean	37925		4808.3		2116.6	
Median	25000		3000		2500	
Mode	20000		10,000		2000	
S.D.	42031		5135		5283	
Variance	176607773		26374719		27914846	
Minimum	5000		2000		2000	
Maximum	3,00,000		25,000		30,000	

Table 8. Expenses of ploughing per ace in Rs.

Rate	Tractor		Bullocks	
	Respondents	%	Respondents	%
1000	0	0	16	13.3
1200	6	5	4	3.3
1400	3	2.5	41	34.2
1500	23	19.2	8	6.7
1600	42	35	15	12.5
1700	2	1.7	4	3.3
1800	15	12.5	9	7.5
2000	27	22.5	21	17.5
2100	2	1.7	2	1.7
Total	120	100	120	100
Mean	1680.8		1528	
Median	1600		1400	
Mode	1600		1400	
S.D.	224		314	
Variance	50133.7		98854	
Minimum	1200		1000	
Maximum	2100		2100	

Source: Primary data.

than sugarcane. Correlation between cost of cultivation and income from sugarcane is 0.94. The correlation is highly positive. Moderate positive (0.450) correlation is observed between cultivation cost and income from bhusar crops. And, the correlation between cultivation cost and income from vegetable is 0.96. It is highly positive and more than sugarcane.

Farmers opinion regarding new trends in agriculture

Table 11 explains the researcher take on the farmers'

Table 9. Soil salinity.

Range in acre	Respondent	%
0	65	54.2
0.25 - 1	48	40
1.01 - 2	7	5.8
Total	120	100

Source: Primary data.

Table 10. Agricultural surplus in terms of income (in Rs.).

Range	Sugarcane		Bhusar Crops		Vegetables	
	Respondent	%	Respondent	%	Respondent	%
0	0	0	49	40.8	83	69.2
5000-10000	0	00	08	6.7	10	8.3
10001-25000	09	7.5	48	40	18	15
25001-50000	15	12.5	11	9.2	07	5.8
Rs. 50001 - 1 lakh	36	30	0	0	02	1.7
1 - 2 lakh	41	34.2	1	0.8	0	0
2 - 5 lakh	10	8.3	2	1.7	0	0
5 - 10 lakh	08	6.7	0	0	0	0
Above 10 lakh	01	0.8	0	0	0	0
Total	120	100	120	100	120	100
Mean	1,83,787.5		18,108.3		7033.3	
Median	1,10,000		12,000		15,000	
Mode	80,000		20,000		15,000	
S.D.	2233435.6		36311.4		16488.3	
Variance	54492191859		1318517577		271864425	
Minimum	15,000		5000		5,000	
Maximum	15,00,000		2,20,000		100,000	

Source: Primary data.

Table 11. Farmers' opinion regarding new trends in agriculture.

Opinion	Yes		No		Total	
	Respondents	%	Respondents	%	Respondents	%
Use of HYVS	114	95	06	5	120	100
Implementation of newly seeds	110	91.7	10	8.3	120	100
Intercrops	105	87.5	15	12.5	120	100

Source: Primary data.

opinion regarding new trends in agriculture sector. Out of the total, 95 and 91.7% of farmers agreed to use of H.Y.V. seeds and implementations of newly seeds for increase productivity. 87.5% of farmers opted for intercrops such as maize, groundnut, cereals, soybean, vegetables etc; moreover, few farmers gave preference to turmeric and onion species as an intercrop. One farmer produced 35 quintiles of turmeric as an intercrop.

Conclusion

The areas of Maharashtra like Sangli, Satara, Solapur, Vidarba, Marathawada are permanently declared as

districts with less than state average. This argument can be proven with the irrigation ratio of only 17%. The average land holding in the region is 4.42% acres, overall skewed distribution of land holding is observed in the Upper Krishna river basin. The Herfindal Index was 0.87 in the region which suggests the monocrop culture of sugarcane. The per capita income in the sample study was Rs. 42,207.46. It was much higher than national average. Correlation between cost of cultivation and income from sugarcane is 0.94. It is a highly positive correlation. Moderate positive (0.45) correlation is observed between cultivation cost and income from bhusar crops. And, the correlation between cultivation cost and income from vegetable is 0.96. It is highly positive and more than the sugarcane.

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