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Research Article

A study on changes in the cropping pattern in Chandrapur district

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SUMMARY : An attempt has been made to study the extent of change in cropping pattern over a period of time in Chandrapur district of Vidarbha region. The study was based on time series data for a period of 11 years beginning from 1999-00 to 2009-10. The cropping pattern was measured by Spearman's rank correlation coefficient. The total change over the period was examined with the help of concordance coefficient 'W'. The analysis reveals that there is a no shift in the cropping pattern between 1999-00 and 2009-10 in the Chandrapur district of Vidarbha region. However, the acreage allocation between different crops was observed during the period of study.

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BACKGROUND AND OBJECTIVES

Cropping pattern refers to the area under different crops. Numbers of crops are grown in an area depending on its feasibility, productivity and needs. Usually, when dominant crops occupy more than seventy per cent of the gross cropped area in a given area forms the major crop occupied by different crops. Cropping pattern of any place is a function of climatic elements, their periodicity in terms of seasons, nature of soils, physiography and man introduced factors like use of fertilizer, irrigation etc. Changes of shift in the cropping pattern exhibit a change in the proportion of area under different crops. The selection of crops in the cropping pattern depends on number of factors. As such cropping pattern plays a vital role in determining the level of agricultural growth of an area. Hence a study of the cropping pattern over a period of time will help in determine the factors that have caused the change. The objective of the paper was to study the extent of change in the cropping pattern over a period of time.

RESOURCES AND METHODS

The data for the present study has been obtained from Statistical abstract of Maharashtra state published by the Government of Maharashtra. The data pertain to the period 1999-00 to 2009-10. To test whether there is any change in the cropping pattern in the Vidarbha region, Spearman's rank correlation coefficient, Concordance coefficient have been used as follows:

Spearman's rank correlation co-efficient:

$$^{\circ}_{sj} = 1 - [6\ \rho\ \{d^2\ (i)\}/\{n(n^2-1)\}]$$

where,

ρ = rank correlation coefficient

d(i) = difference between two ranks allotted according to criteria s and j to i-th unit,

n = units ranked

s/j = 1…….m = ranking criteria

Concordance co-efficient:

$$W = \frac{\rho\ dif^2}{\frac{1}{2}\ m^2\ (n^3 - n) - nt}$$

where,

w = concordance coefficient,

$dif^2 = (X-x)^2$,

m = number of years,

n = number of observations,

t = number of observations in a group tied for a given rank

Based on the share of each crop to the gross cropped area, percentage was worked out and ranks were assigned. Thereafter Spearman's rank correlation coefficients have been worked out between the rankings of different crops between the years. The total change over the period was examined with the help of concordance coefficient 'w'. It has to be noted that if the correlation coefficient and the value of 'w' is statistically significant the cropping pattern has not changed significantly. On the contrary, if it is not significant it means that the cropping pattern has changed significantly.

OBSERVATIONS AND ANALYSIS

The area as well as the percentage to the total cropped area for different crops for the year 1999-00 to 2009-10 for the Chandrapur district is presented in Table 1. The major food crops cultivated are soybean, rice, jowar, tur, gram and wheat, whereas, the major commercial crop cultivated in Chandrapur district is cotton. Further, groundnut, safflower, sunflower etc. are also cultivated in the region.

Table 1: Cropping pattern of the Chandrapur district

Sr. No.	Year	1999-00			2000-01		2001-02		2002--03		2003-04		2004-05	
		Area	%	Rank	Area	%	Area	%	Area	%	Area	%	Area	%
1.	Rice	1352	26.66	1	1437	26.96	1463	31.42	1532	31.56	1425	32.07	1427	28.16
2.	Wheat	211	4.16	7	342	6.42	229	4.92	245	5.05	204	4.59	315	6.22
3.	Jowar	931	18.36	3	819	15.37	587	12.60	609	12.54	414	9.32	474	9.35
4.	Other cereals	10	0.20	9	31	0.58	15	0.32	7	0.14	6	0.14	18	0.36
	Total cereals	2504	49.38		2629	49.32	2294	49.26	2393	49.29	2049	46.12	2234	44.08
5.	Tur	252	4.97	6	274	5.14	269	5.78	274	5.64	268	6.03	264	5.21
6.	Gram	156	3.08	8	170	3.19	100	2.15	117	2.41	105	2.36	226	4.46
7.	Other pulses	490	9.66	5	448	8.41	278	5.97	317	6.53	229	5.15	368	7.26
	Total pulses	898	17.71		892	16.74	647	13.89	708	14.58	602	13.55	858	16.93
8.	Groundnut	2	0.04	12	3	0.06	1	0.02	1	0.02	1	0.02	0	0.00
9.	Safflower	3	0.06	11	1	0.02	0	0.00	0	0.00	0	0.00	0	0.00
10.	Soybean	1133	22.34	2	1259	23.62	1161	24.93	1138	23.44	1230	27.68	1456	28.73
11.	Sunflower	4	0.08	10	0	0.00	0	0.00	0	0.00	0	0.00	2	0.04
	Total oilseeds	1142	22.52		1263	23.70	1162	24.95	1139	23.46	1231	27.71	1458	28.77
12..	Cotton	527	10.39	4	546	10.24	554	11.90	615	12.67	561	12.63	518	10.22
	Grand total	5071	100.00		5330	100.00	4657	100.00	4855	100.00	4443	100.00	5068	100.00

Table 1 contd….

Table 1 contd….

Sr. No.	Year	2005-06		2006-07		2007-08		2008-09		2009-10		
		Area	%	Area	%	Area	%	Area	%	Area	%	Rank
1.	Rice	1430	30.33	1337	27.19	1392	27.14	1613	30.09	1577	31.88	2
2.	Wheat	213	4.52	295	6.00	341	6.65	360	6.72	300	6.07	5
3.	Jowar	311	6.60	301	6.12	240	4.68	193	3.60	61	1.23	8
4.	Other cereals	1	0.02	7	0.14	3	0.06	0	0.00	0	0.00	11
	Total cereals	1955.00	41.46	1940.00	39.45	1976.00	38.53	2166.00	40.41	1938.00	39.18	
5.	Tur	254	5.39	234	4.76	234	4.56	326	6.08	167	3.38	7
6.	Gram	193	4.09	224	4.56	286	5.58	333	6.21	305	6.17	4
7.	Other pulses	165	3.50	388	7.89	411	8.01	400	7.46	227	4.59	6
	Total pulses	612.00	12.98	846.00	17.21	931.00	18.15	1059.00	19.76	699.00	14.13	
8.	Groundnut	1	0.02	0	0.00	0	0.00	2	0.04	0	0.00	11
9.	Safflower	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	11
10.	Soybean	1646	34.91	1617	32.89	1725	33.63	1621	30.24	1819	36.78	1
11.	Sunflower	2	0.04	28	0.57	23	0.45	12	0.22	2	0.04	9
	Total oilseeds	1649.00	34.97	1645.00	33.46	1748.00	34.08	1635.00	30.50	1821.00	36.82	
12.	Cotton	499	10.58	486	9.88	474	9.24	500	9.33	488	9.87	3
	Grand total	4715	100.00	4917	100.00	5129	100.00	5360	100.00	4946	100.00	

Table 2 : Spearman's rank correlation between the years in the cultivation of crops in Chandrapur district

Years	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1998-99	1	0.990877	0.966943	0.967127	0.936431	0.936991	0.884043	0.886737	0.863324	0.866153	0.823772
1999-00	0.990877	1	0.986262	0.984359	0.967455	0.971047	0.928737	0.930979	0.912854	0.917163	0.882098
2000-01	0.966943	0.986262	1	0.998711	0.993053	0.979582	0.95382	0.943541	0.926712	0.94324	0.914929
2001-02	0.967127	0.984359	0.998711	1	0.989486	0.972478	0.941558	0.9323	0.914705	0.935493	0.902878
2002-03	0.936431	0.967455	0.993053	0.989486	1	0.988564	0.977814	0.966965	0.954695	0.969331	0.951089
2003-04	0.936991	0.971047	0.979582	0.972478	0.988564	1	0.987062	0.989453	0.982029	0.983318	0.968181
2004-05	0.884043	0.928737	0.95382	0.941558	0.977814	0.987062	1	0.991552	0.987519	0.984105	0.987533
2005-06	0.886737	0.930979	0.943541	0.9323	0.966965	0.989453	0.991552	1	0.998318	0.989159	0.986981
2006-07	0.863324	0.912854	0.926712	0.914705	0.954695	0.982029	0.987519	0.998318	1	0.990579	0.991131
2007-08	0.866153	0.917163	0.94324	0.935493	0.969331	0.983318	0.984105	0.989159	0.990579	1	0.990066
2008-09	0.823772	0.882098	0.914929	0.902878	0.951089	0.968181	0.987533	0.986981	0.991131	0.990066	1

Note: All rank correlation co-efficients are significant at the 0.01 level (two-tailed).

Rice crop topped in the cropping pattern with 27 per cent area in 1999-00 and increased to 32 per cent in 2009-10. While soybean crop was second in the rank, it showed an increasing trend from 1998-99 (22.34 per cent) to 2009-10 (36.78 per cent) and topped in the cropping pattern. Moreover, the decreased extent of land for cotton and jowar was compensated with increasing area of land under soybean. Jowar crop which ranked third in the cropping pattern with 18.36 per cent in 1999-00 decreased to 1.23 per cent in 2009-10. Cotton crop which ranked fourth in the cropping pattern with 10.39 per cent in 1999-00 decreased to 9.87 per cent in 2009-10. The gross cultivated land was 5071 hectare in 1999-00 and it decreased to 4946 hectare in 2009-10.

To test whether there is a shift in the cropping pattern, Spearman's rank correlation co-efficient method was used. Rank was assigned to each crop on the basis of its percentage to the total cropped area. Rank co-efficients of correlations were worked out for each pair of years.

The correlation co-efficient between the pairs of years in the cropping pattern from 1999-00 to 2009-10 in Chandrapur district is presented in Table 2. All the correlation co-efficients were statistically significant at one per cent level (two-tailed). Therefore, it can be inferred that there was no shift in the crop pattern in the Chandrapur district. However, some deviations do occur.

Further, the total change over the period 1999-00 to 2009-10 was examined by the test of concordance (Used by Ramasubban, 1963). The concordance coefficient was found to be 0.86248 and the value is significant at one per cent level. Hence, it can be concluded that there was no significant change in the cropping pattern between the years.

Conclusion:

From this study it is concluded that though there is no shift in the cropping pattern between 1999-00 and 2009-10 in the Chandrapur district of Vidarbha region. However, the acreage allocation between different crops was observed during the period of study.

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