

A Study Cropping Intensity And Changing Cropping Pattern In Maharashtra

Dr Deshmukh.M.S , Professor, Department of Economics, Shivaji University, Kolhapur

Shinde Varsha Tanaji, Research Student, Dept of Economics, Shivaji University, Kolhapur

Abstract: - In the present paper an attempt is made to study cropping intensity and changing cropping pattern in Maharashtra. Agricultural land use is the basic structural unit of natural resources. The cropping pattern is influenced by physical socio cultural, economic, technological and organizational factor. Cropping intensity has also continuously increased from 105.3% in 1960-61 to 134.68% in 2014-15. The study shows that Compound Growth Rate cropping intensity is 0.53 it higher cropping intensity in Maharashtra. The Coefficient of Variation shows that net sown area is 1.42% and gross cropped area is 6.88%. The total Coefficient of Variation in cropping intensity is 7.72%. The highest cropping intensity recorded in Bhandra is district 136 whereas lowest registered in Wardha district is 100 of the state. Results of the study reveal that cropping pattern is diverse with medium level cropping intensity in agriculture state.

Keywords: - Cropping Intensity, Cropping Pattern, Production, Yield, and Agriculture.

Introduction: - Cropping intensity plays an important role in the agricultural development of any region. Higher cropping intensity shows intensive use of land for agricultural purpose. Since the early days of 'Green Revolution' there are signs of imbalance in cropping pattern. The cropping pattern depends on of which irrigation is an important pattern refers to change in proportion of area under different crops at two different times. Technological changes of mid-sixties caused significant shifts, in land utilization, in favor of crops like wheat and rice at the cost of area under coarse cereals, pulses and oil seeds. The single most important element in crop production strategy in the post-green revolution period is improved agricultural technology. This technology is in the form of high yielding plant varieties, intensive cultivation, and greater use of fertilizers, increased irrigation and better technique's for ploughing, harvesting and plant protection. High yielding varieties have been developed for a number of crops but their impact on production, productivity and costs varies across crops and regio

Objectives of Study:-

1. To identify Cropping Intensity in Maharashtra.
2. To Study the Changing Cropping Pattern in Maharashtra.
3. To identify Area, Production and Yield in Maharashtra.
4. To give suggestion for solving the problems identified.

Review of Literature:-1.**Chhetri (2011)** He has studied Climate Sensitive Measure of Agricultural Intensity: Case of Nepal. This paper proposes a new climate sensitive measure of agricultural intensity a crop potential index which can be used to assess the production potential of region. The advantage of the CPI is apparent its ability to set a theoretical upper limits the production potential crops in specific climatic region.

2.**Erb, Haberel, Jepsen, Kuemmerl, Lintner, Muller, Verurg and Reenberg (2013)**They have article studied a Conceptual Framework For Analyzing And Measuring Land-Use Intensity. The research aimed at studying land-use intensity or change there in over time will have to integrate the three dimensions outlined above systematically in a conceptual framework. In this article suggest the analysis and monitoring of land use intensity should follows an integrate conceptual framework that focuses on three dimensions of land-use intensity.

3.**Nayak (2014)** He has article studied Rural Infrastructure and Cropping Study Intends to Verify the Role of Rural Infrastructure in Raising Cropping Intensity. The study conclude that there is regional in the development of rural infrastructure, regional disparity is lesser in cropping intensity and infrastructure has a significant impact on cropping intensity in agriculture out of the three categories of infrastructure physical infrastructure has an edge over social and financial infrastructure.

4.**Siebert, Portmanu, Doll (2010)** They have article studied Global Pattern Cropland Use Intensity. The study shows that intensification of agricultural land use is a strategy that may be able to significantly improve global food security. There exist large uncertainties regarding extent of cropland harvested crop area and therefore cropping intensity at larger scales.

5.**Zhang, Dong, Zhou, Xu, Wang, Ouyang, Xiao (2013)**They have article studied Increasing Cropping Intensity Index on Response to Climate Warming in Tibetan Plateau China. The study conclude that a significant increase of cropping intensity in some regions in response to climate

warming. This study provides some implications for reclamation and the priority should be given to highly suitable area. Meanwhile the land reclamation should be avoided in the unsuitable area or marginally suitable area.

Research Methodology and Database:-For accomplishing the objectives of the study secondary data were collected. The necessary secondary data for completing the investigation will be collected mainly from published sources in academic libraries, records, books and journals, articles, government reports, websites, newspapers, daily archives, economy survey government of Maharashtra, secondary data will be collected to obtain the background material from the persons knowledgeable in different aspect of the topics as also the academicians.

The researcher will use the different farm efficiency index such as, cropping intensity index, etc.

$$\bullet \text{ Cropping Intensity} = \frac{\text{Gross cropped Area}}{\text{Net Sown Area}} * 100$$

Researcher will use the important statistical techniques to analyze and interpret the data. The various tools such as percentage, Compound Growth Rate, Coefficient of Variation, etc. and to process the data software like Excel will be used.

Results and Discussion:-

A) Cropping Intensity in Maharashtra The concept of cropping intensity implies reuse land during in agricultural year for production of crops. The study of in cropping intensity any region reflects the different physical and socio-economic factors influencing agricultural land helps in a particular area in planning. The total cropped area as a percentage of net sown area gives a measure of land use efficiency or cropping intensity which also refers to the number of crops raised on a filed during agricultural year. The scope for expanding the net sown area having already reached a saturation level and potential for raising yield nearly exhausted in many crops and regions, stepping up incidence of multiple cropping will be necessary to augment agricultural production. Cropping intensity refer to the number of crops cultivated in a specific agricultural field during an agricultural year. It is the ratio of net sown area to gross cropped area.

Table No.1 Cropping Intensity of Maharashtra (Area in Thousand Hectares)

Sr.No.	Years	Net Sown Area	Gross Cropped Area	Cropping Intensity
1	1960-61	17878	18823	105.3
2	1970-71	17668	18737	106.05
3	1980-81	18299	19242	107.33
4	1990-91	18004	20324	112.88
5	2000-01	17636	22405	127.04
6	2001-02	17631	22388	126.98
7	2002-03	17579	22190	126.23
8	2003-04	17490	22368	127.89
9	2004-05	17461	22260	127.84
10	2005-06	17473	22556	129.09
11	2006-07	17478	22557	129.05
12	2007-08	17473	22655	129.65
13	2008-09	17422	22454	128.88
14	2009-10	17402	22612	129.93
15	2010-11	17406	23175	133.14
16	2011-12	17386	23106	132.9
17	2012-13	17344	23116	133.27
18	2013-14	17368	23380	134.61
19	2014-15	17337	23350	134.68
	C.G.R	-0.07	0.47	0.53
	C.V	1.42	6.88	7.72

Source: - Commissionerate of Agriculture Government of Maharashtra.

Table 1 reveals that the cropping intensity of Maharashtra from 1960-61 to 2014-15. It shows that the continuously increasing cropping intensity in Maharashtra. In year 1960-61 the cropping intensity in

Maharashtra is 105.3, become increasing continuously i.e. 134.68 in 2014-15 year. Table indicates that the Compound Growth Rate in cropping intensity is 0.53 it shows that higher cropping intensity in Maharashtra. The Coefficient of Variation shows that the net sown area is 1.42% and gross cropped area is 6.88%. The total Coefficient of Variation in cropping intensity is 7.72%. It shows that higher variation in net sown area and gross cropped area in Maharashtra.

Table No. 2 District-wise changes Cropping Intensity in Maharashtra

Sr. No.	Disrict	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11
1	Thane	123	150	131	130	110	110
2	Raigad	105	105	108	108	114	115
3	Ratanagri & Shindudurg	103	103	105	103	124	102
4	Nashik	101	116	117	126	109	109
5	Dhule	113	110	111	109	114	125
6	Jalgaon	106	108	114	124	109	103
7	Ahamadnagar	105	107	111	114	109	104
8	Pune	103	107	108	118	122	118
9	Solapur	-	103	104	103	106	107
10	Sangli	104	102	101	110	126	130
11	Satara	108	93	117	121	129	130
12	Kolhapur	105	105	108	115	113	121
13	Aurangabad & Jalna	104	106	111	128	104	119
14	Parbhani	105	105	118	115	113	123
15	Beed	106	107	125	125	109	116
16	Osamanabad & Latur	103	104	113	126	125	125
17	Buldhna	103	104	108	106	128	131
18	Akola	100	101	107	104	118	118
19	Amravti	100	100	103	120	130	119
20	Yavtmal	72	101	103	106	121	115
21	Wardha	72	101	101	101	101	100
22	Nagapur	101	102	104	106	123	121
23	Bhandra	107	130	130	130	130	136
24	Chandrpur & Gadchiroli	107	107	107	113	113	116
25	Nanded	105	103	108	103	108	116
26	Nadurbar	-	-	-	-	108	104
27	Gondia	-	-	-	-	-	125
28	Vashim	-	-	-	-	-	109
29	Hingoli	-	-	-	-	-	130
30	Palghar	-	-	-	-	-	110(2014)

Source: - National Bank for Agriculture and Rural Development Mumbai (1999), Agriculture at glance all District (2010) and Socio-Economics Abstract of Sangli District (2014)

Table 2 indicate that District wise changes cropping intensity of Maharashtra from 1960-61 to 2010-11. Statistical data shows that cropping intensity high in Bhandra, Buldhana, Satara and Sangli districts is 136, 131, 130, and 130 respectively. The cropping intensity medium in Dhule, Osamanabad and Latur, Gondia and Parbhani is 125, 121, 125, and 123 and lower in Ratanagri and Shindudurg, Jalgaon, Ahamadnagar, Wardha, Nadurbar is 102, 130, 104, 100, and 104 respectively. It shows that higher cropping intensity in Bhandra is 136 district and lower in Wardha district is 100. During the study period 1960-61 to 2010-11 trend of increasing cropping intensity and highest in Bhandra district of Maharashtra.

B) Cropping pattern in Maharashtra: Cropping pattern means the proportion of area under various crops at a point of time. The crops statistics published by government are used to denote cropping pattern. Cropping pattern is however, a dynamics concept as it changes over space and time. The cropping patterns of a region are closely influenced by geo climatic, socio-cultural, economic, historical and political, factors. The environment imposes limit on growth and distribution of plant and animals. The role of man in cultivation certain crop a region is also quite important. Man, by his technological advancement can ameliorate the physical limits.

Table No. 3 Changing Cropping pattern of Maharashtra (Area in '1000 Hectares)

Crops	Area (1960-61)	% to GCA	Area (1970-71)	% to GCA	Area (1980-81)	% to GCA	Area (1990-91)	% to GCA	Area (2000-01)	% to GCA	Area (2010-11)	%
Rice	1300	6.09	1352	7.21	1459	7.43	1597	7.3	1512	6.99	1516	6.54
Wheat	907	4.18	812	4.34	1063	5.41	867	3.97	754	3.49	1307	5.64
Jowar	6284	33.38	5703	30.44	6469	32.93	6300	28.82	5094	23.56	4060	17.54
Bajra	1635	8.86	2039	10.88	1534	7.81	1940	8.87	1800	8.33	1035	4.47
All Cereals	10606	56.34	10320	55.08	10376	52.82	11136	50.94	9824	45.44	8985	38.77
All Pulses	2349	12.48	2566	13.69	2715	13.82	3257	14.9	3557	16.45	4038	17.42
All Foodgrains	12955	68.82	12886	68.77	13611	69.29	14393	65.84	13382	61.9	13023	56.19
Sugarcane	155	0.82	204	1.09	319	1.62	536	2.45	687	3.18	1041	4.49
Cottan	2500	13.2	2750	14.68	2550	12.98	2721	12.45	3077	14.23	3942	17.01
Groundnut	1083	5.75	904	4.82	695	3.54	864	3.95	490	2.27	395	1.7
All Oilseeds	1864	9.9	1718	9.17	1780	9.06	2826	12.93	2559	11.84	3628	15.65
Gross Cropped Area	18823	100	18737	100	19642	100	21859	100	21619	100	23175	100

Source: - Economic survey of Maharashtra 2015-16.

Table 3 shows that the changing cropping pattern of Maharashtra from 1960-61 to 2010-11. During the study period cropping pattern showing increasing trend. In year 1960-61 to 2010-11 gross cropped area becomes increasing continuously in year 1960-61 is 18823 hundred hectares to 2010-11 is 23175 hundred hectares. Table showing that Jawar in gross cropped area are decreases year by year i.e. Jawar 6284 hundred hectares in 1960-61 year its decreasing year 2010-11 is 4060 hundred hectares area. There as need is much need to take appropriate steps for increasing the area of Jawar, Bajra and Groundnut as area under has rapidly declined over period in the state. During the study period 1960-61 to 2010-11 all food grains area showing increasing trend year by year. From the period 1960-61 is 0.82% sugarcane area in production it increasing goes up in 4.49% in the year 2010-11.

Table No. 4 Production in Crops of Maharashtra (Production in '1000 MT)

Sr No	Crops	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2014-15
1	Rice	1369	1662	2315	2344	1930	2691	2946
2	Wheat	401	440	886	909	948	2301	1308
3	Jowar	4224	1557	4409	5929	3988	3452	2109
4	Bajra	489	824	697	1115	1087	1123	538
5	All Cereals	6755	4737	8647	10740	8497	12317	9267
6	All Pulses	989	677	825	1441	1637	3096	1681
7	All Foodgrains	7744	5414	9472	12181	10134	15413	10948
8	Sugarcane (MT)	10404	14433	23706	38154	49569	85691	91538
9	Cottan (lint)	1673	484	1224	1875	1803	7473	3577
10	Groundnut	800	586	541	979	470	470	379
11	All Oilseeds	0	753	728	1882	2099	5056	2278

Source: - Economic survey of Maharashtra 2015-16.

Table 4 indicate that production in crops of Maharashtra from 1960-61 to 2014-15. During the study period 1960-61 to 2014-15 crops in production is showing increasing trend year by year, but Bajra production decreased in 2014-15 year. Table shows that production of crops is increased continuously. It is observed that the improved agricultural technologies on crops productivity is positive

and importance of increasing agricultural productivity with improvement on the adoption and use improved agricultural technology that increasing agricultural production.

5 Yield in Crops of Maharashtra (Kg per Hectares)

Table No.

Sr. No	Crop	1960-61	1970-71	1980-81	1990-91	20009-01	2010-11	2014-15
1	Rice	1054	1229	1587	1467	1277	1775	1900
2	Wheat	442	542	834	1049	1256	1761	1225
3	Jowar	672	273	681	941	783	850	641
4	Bajra	299	404	544	575	604	1086	622
5	All Cereals	637	459	788	964	865	1371	1150
6	All Pulses	421	264	304	442	460	767	493
7	All Foodgrains	598	420	692	846	757	1183	954
8	Groundnut	739	649	648	1132	958	1290	1160
9	Cottan	0	438	426	666	820	1394	541
10	Sugarcane	10404	14433	23706	38154	49569	85691	91538
11	All Oilseeds	114	30	82	117	100	322	145

Source: - Economic survey of Maharashtra 2015-16.

Table 5 reveals that the yield in crops of Maharashtra from 1960-61 to 2014-15. It shows that the continuously yield in crops increasing trends year by year. It is observed that increasing with the yield of total crops. Table indicate that the yield in crops all food grains in Maharashtra is 598, become increasing its continuously i.e. 1900 year 2014-15. It is shows that highest yield in sugarcane and lowest yield all oilseeds in crop of Maharashtra.

Conclusion and Recommendation:-Crop intensity of irrigation, consumption of energy inputs, crop combination, crop rotation, mixed cropping and relay cropping etc. high intensity shows the higher level of agricultural development. Thus, higher cropping intensity means that a higher portion of the net area is being cropped more than once during one agricultural year. In this present study region needs to adoption a forestation, irrigation facilities, rural communication and development of farmers and labours. The diversified nature of land use pattern, cropping intensity, irrigation intensity and cropping pattern of all district has increased the cropping intensity of the land. Rice, Wheat, Jawar and Bajra have been found as major cultivated crops agriculture state which covered more than fifty percent area of the gross cropped area. The diversified nature of land use pattern and cropping pattern Maharashtra has increased cropping intensity of the land. Results of the study reveal that cropping pattern is diverse with medium level cropping intensity in agriculture state.

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