ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

GEOGRAPHICAL ANALYSIS OF TRENDS IN PRODUCTION OF MAJOR CROPS IN LOWER SINA BASIN

Dr. Arjun Nanaware,

Dept. of Geography,

P. G. Teaching & Research Centre ,

Shri Shivaji Mahavidylalaya, Barshi.

Email Id- arjunnanaware32@gmail.com

Abstract

Agriculture satisfy basic need of food through producing agricultural commodities. Simple way we can measure agricultural productivity by production of crops. Agricultural production means the creation of agricultural goods available for use of man and other animates. Trends in production could be defined as general direction and tendency of production. The study of trends in production is an important because it gives clue about performance of particular crops. It is also important from the view point of future plan to maintain food protection. Therefore an attempt is made here to analyse trends in production of major crops in lower Sina basin. The study is based on secondary data. To find out trends of production of crops, computer analysis is worked out. The correlation between time ('X') as independent variable and production (Y) as dependent variable is computed. The linear regression equation Y = a + bx is employed. The study reveals that the highest positive trend in production of Sugarcane in Karmala tahsil, followed by Madha tahsil is a result of Sina Kolegaon project, Bhima Sina Joint Cannel.

Key wards: Production, Correlation, Coefficient of Determination, Regression.

Introduction

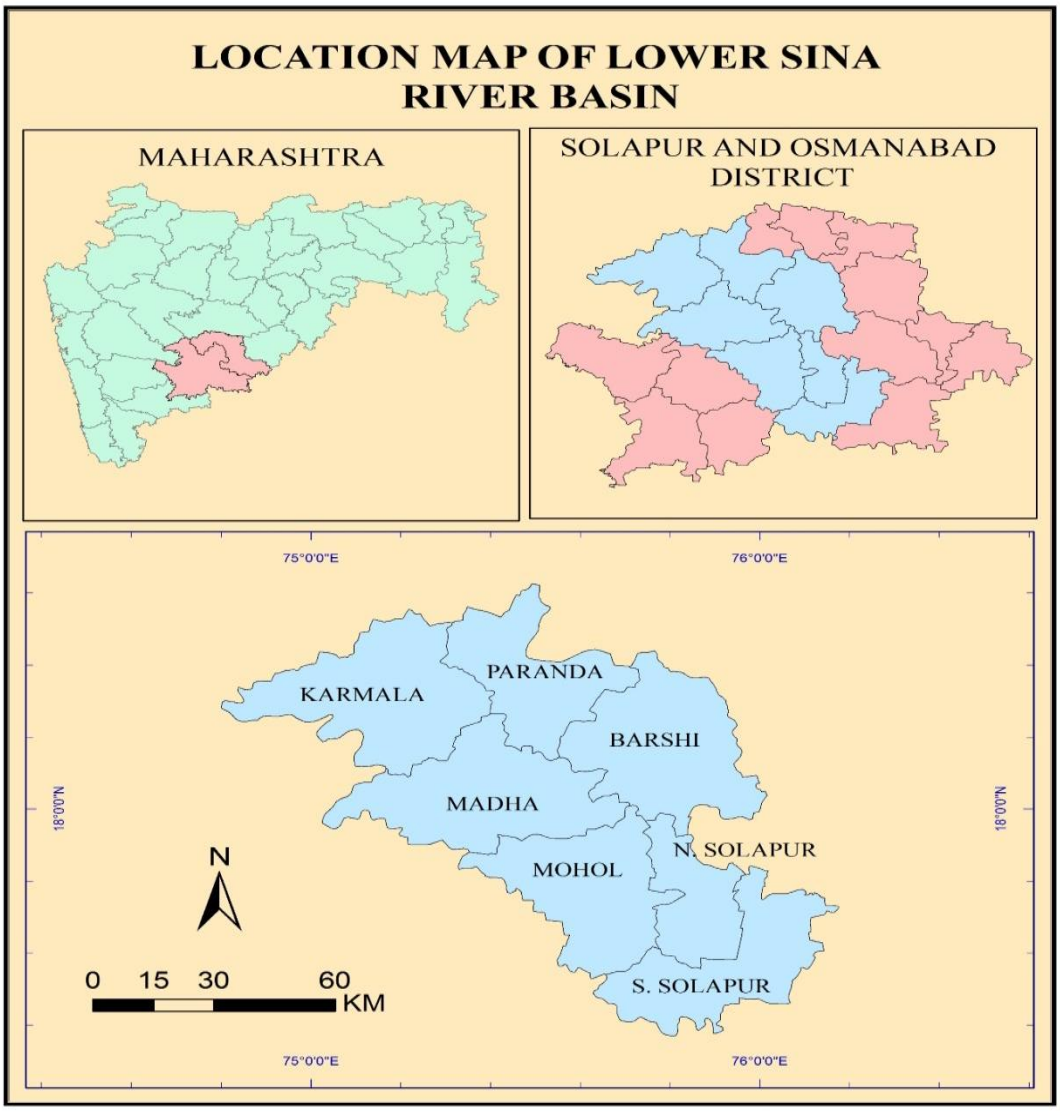
Agriculture satisfies basic need of food through producing agricultural commodities. Agricultural productivity is main aspect of agricultural geography. Agricultural productivity could be defined as the ratio of output to input in relation to land, labour, capital and overall resources employed in agriculture (Noor Mohammad and Abdul Majeed, 1992). Simple way we can measure agricultural productivity by production of crops. Production means the act or process of producing or the creation of goods available for use (Merriam-Webster' dictionary, 2004). Agricultural production means the creation of agricultural goods available for use of man and other animates. Trends in production of crops are an important aspect of study of agricultural productivity. Trend means a general direction and tendency of events, or turn away in a specified direction (Illustrated Oxford dictionary, 2006). Trends in production could be defined as general direction and tendency of production. A trend

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

in production is a function of number of factors such as changes in climatic elements, prices of agricultural commodities, irrigation and other technical inputs.

Rational of the study

Agriculture can contribute significantly to overall development as it provides increase food surplus to the growing population, helps to expand the secondary and tertiary sectors, increase rural incomes and improves the welfare of the rural population of the region (Abdul Munir, 1992). In order to do rational and scientific planning for the agricultural development of an area it is an important to assess the trends in production of crops. The study of trends in production is an important because it gives clue about performance of particular crops. It is also important to maintain future plan of food protection. Considering growth of population in developing and under developed countries the study of trends in production is very important, therefore an attempt is made here to analyse trends in production in lower Sina basin.



ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

Figure -1

The Study Area

The Study area is located in South central part of Maharashtra state. It is situated between 17^0 18' to 19^0 15' North Latitudes and 74^0 30'to 76^0 15' East Longitudes. It is a part of Deccan plateau. The average height of lower Sina basin is 748 meters above from mean sea level. Sina River was originated near Ahmadnagar city it has two chief sources, one near Jamgaon about 20-kilometer West of the town of Ahmadnagar and the another near Jeur about 16 kilometers to its North east. The study region is bounded to the North by upper Sina basin, to the East by Manjra sub basin No 4, to the West by upper Bhima basin No 17 and 18 and to the South by Karnataka State. Its shape is roughly rectangular. It's East side covered by large area of the Balaghat Ranges and Uneven with patches of low-level plain. The total geographical area of Sina basin is 12742 square kilometers and total length of river is 300 kilometers out of them 180 kilometers is of in lower basin. Lower Sina basin consist of total seven tahsil of Maharashtra State, out of them six tahsil are of Solapur district i.e. Karmala, Barshi, Madha, Mohol, North Solapur, South Solapurand and one tahsil are Osmanabad District i.e. Paranda.

Objectives

The main objectives of this paper are to analyse trends in production of major crops in Sina basin and to estimate rate of change in production of crops with the help of 'b' coefficient.

Hypothesis

The rate of positive change in cash crop production is higher than the cereals and pulses.

Data collection and Methodology

In order to meet these objectives the relevant information and data is collected and used for the year of 1991 to 2015 are based on the secondary sources. Information and data regarding production is collected from Socio-economic Review and District Statistical Abstract of Solapur and Osmanabad district 1991-92 to 2014-15 and Chief Statistical Office of Agriculture Maharashtra state Pune.

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

Collected rough data are processed. To find out trends of production, computer analysis is worked out. The correlation between time ('X') as independent variable and production (Y) as dependent variable is computed. The linear regression equation $Y = a + bx$ is employed, which is used by N.B.K. Reddy and Y.V. Ramanaiah (1992), where Y is the index number of the element and x is the time. The goodness of fit of a trend line measured to know how well the regression line fits the data and the extent to which the regression accounts for the variation in the observed values of the dependent variable. This is quantified by coefficient of determination (r2). The rate of change in dependant variable is estimated with the help of 'b' coefficient. On the basis of these statistical techniques the result and conclusion are drawn.

Result and Discussion

Trends in Production of Jowar

The table 1 shows that lower Sina basin as a whole has light negative trend in production of Jowar during the period of investigation which is amounted to -0.0736. The coefficient of determination (r^2) states that the tune of negative trend is 0.005 percent. The 'b' coefficient indicates that with the increase of one year time period, Jowar production decreases by 329.8 tones in lower Sina basin as a whole. The tahsil level analysis reveals both positive and negative trends in production of Jowar during the period of investigation. The positive trend is recorded in four tahsil i.e. North Solapur, South Solapur, Barshi and Karmala. The high positive trend is found in North Solapur tahsil, where as low positive trend is found in Karmala tahsil. The negative trend in production of Jowar is recorded in three tahsil i.e. Madha, Mohol and Paranda. The highest negative trend in production of Jowar in Madha tahsil is because of area under Jowar is converted in to area under Sugarcane and fruit crops with the development of surface irrigation facility. The 'b' coefficient indicates that with the increase of one year time period, Jowar production decreases by 440.6 tones in Madha tahsil alone.

Trends in Production of Wheat

As per as the trends in production of Wheat in the lower Sina Basin are concerned region as a whole has low positive trend in production of Wheat, the (r) value in this regard is at +0.29 while r^2 value is 0.084. The 'b' coefficient indicates that with the increase of one year time period, the Wheat production increase by 284 tones in the study region as a whole.

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

Table 1: Trends in Production of Selected Crops in Lower Sina Basin (1991-92 to 2014-15)

Jowar				Wheat		
Tahsil	R	r^2	Regression equation	r	r^2	Regression equation
Karmala	0.14145	0.1	y = 446.8x - 86667	0.32824	0.107	y = 107.3x - 21203
Barshi	0.17407	0.128	y = 416.9x - 80964	-0.0329	0.001	y = -9.848x + 23139
Madha	-0.4868	0.097	y = -440.6x + 90385	-0.0528	0.002	y = -20.49x + 44227
Mohol	-0.0743	0.001	y = 110.4x - 19919	-0.0493	0.002	y = -16.55x + 36148
N. Solapur	0.40242	0.159	y = 173.6x - 34401	0.19369	0.037	y = 58.09x - 11386
S.Solapur	0.28964	0.125	y = 811.4x - 2E+06	0.41674	0.173	y = 141.1x - 27942
Paranda	-0.3247	0.084	y = -595.7x + 1E+06	0.13519	0.018	y = 24.41x - 47479
Region	-0.0736	0.005	y = -329.8x + 79684	0.29001	0.084	y = 284.0x - 54929
Maize				Tur		
Tahsil	R	r^2	Regression equation	r	r^2	Regression equation
Karmala	0.2147	0.046	y = 264.8x - 52639	-0.05	0.003	y = -24.53x + 51734
Barshi	-0.2942	0.086	y = -364.4x + 73369	0.04	0.001	y = 18.85x - 35310
Madha	0.35293	0.124	y = 210.8x - 41728	-0.45	0.205	y = -183.4x + 37151
Mohol	0.12808	0.016	y = 49.77x - 95748	-0.37	0.135	y = -135.5x + 27528
N. Solapur	0.37451	0.14	y = 11.46x - 22688	-0.13	0.016	y = -44.2x + 91276
S.Solapur	0.16186	0.026	y = 25.88x - 50944	-0.39	0.155	y = -349.2x + 70309
Paranda	-0.1226	0.015	y = -11.93x + 24349	0.47	0.225	y = 154.9x - 30694
Region	0.09925	0.009	y = 186.4x - 35500	-0.4438	0.196	y = -563.0x + 1E+06
Gram				Groundnut		
Tahsil	R	r^2	Regression equation	R	r^2	Regression equation
Karmala	-0.0253	0	y = -11.31x + 25491	0.16043	0.025	y = 3.212x - 6323.
Barshi	0.01389	0	y = 6.846x - 9881.	-0.1777	0.031	y = -3.949x + 8053.
Madha	0.31871	0.101	y = 97.65x - 19358	0.0275	0	y = 0.955x - 1649.
Mohol	-0.0406	0.001	y = -12.31x + 27197	-0.3115	0.097	y = -47.76x + 96268
N. Solapur	-0.3176	0.1	y = -88.36x + 17869	-0.6757	0.456	y = -22.19x + 44705
S.Solapur	0.07697	0.005	y = 29.93x - 57137	-0.1343	0.018	y = -4.137x + 8509.
Paranda	0.23755	0.056	y = 85.91x - 16810	-0.1156	0.013	y = -3.604x + 7489
Region	0.0732	0.005	y = 108.3x - 19732	-0.4273	0.182	y = -77.48x + 15705
Sugarcane						
Tahsil	R	r2	Regression equation			
Karmala	0.38867	0.151	y = 87591x - 2E+08			

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

Barshi	-0.0954	0.009	y = -21407x + 4E+07
Madha	0.29434	0.086	y = 42625x - 8E+07
Mohol	-0.1222	0.014	y = -18038x + 4E+07
N. Solapur	0.13804	0.019	y = 13963x - 3E+07
S. Solapur	0.21126	0.044	y = 50282x - 1E+08
Paranda	0.13386	0.017	y = 3468.x - 7E+06
Region	0.23145	0.053	y = 15848x - 3E+08

Source: Complied by researcher, on the basis of Socio-economic Review and district Statistical Abstract of Solapur and Osmanabad district 1991-92 to 2011-15, Chief Statistical Office of Agriculture Maharashtra state Pune.

Tahsil level analysis reveals both positive and negative trends. The table 1 indicates that the positive trend in production of Wheat is found in the tahsil of South Solapur, Karmala, North Solapur and Paranda. The high positive trend in production of Wheat is found in South Solapur tahsil. The light negative trend in the production of Wheat is recorded in Barshi, Madha and Mohol tahsil, because area under Wheat is converted in to area under cash crops with the development of surface irrigation facility.

Trends in Production Maize

The lower Sina Basin as whole has very marginal positive trends in the production of Maize during the period of investigation. It is amounted to 'r' = +0.09925 and r^2 = 0.009. The tahsil level analysis shows both positive and negative trends in the production of Maize. The moderate positive trend in production of Maize is recorded in North Solapur and Madha tahsil. The (r) and (r^2) value in this regard is to be at +0.37,+0.35 and 0.14, 0.12 respectively. The low positive trend in production of Maize is recorded in South Solapur, Karmala and Mohol tahsil, the table 1 indicates that the light negative trend in the production of Maize is found in Barshi and Paranda tahsil.

Trends in Production of Tur

The table 1 exhibits that the lower Sina Basin as whole as moderate negative trend in production of Tur during the period of investigation due to area under Tur is converted in to the area under cash crop such as sugarcane fruits and vegetables. This negative trend is amounted to -0.0438 (r) value and 0.196 (r^2) value. The 'b' coefficient indicates that with the increase of one year time period, the Tur production decreases by 563 tones in the lower Sina basin. Tahsil level analysis reveals both

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

positive and negative trends in the production of Tur. The Barshi and Paranda tahsil shows positive trends in production of Tur. It is moderate positive in Paranda and marginal positive Barshi tahsil. The table 1 shows that the negative trend in production of Tur is found in Karmala, Madha, Mohol, North Solapur and South Solapur tahsil. It is moderate negative in Madha, Mohol and South Solapur tahsil, because area under Tur is converted in to area under Sugarcane due to the development of surface irrigation facilities of Bhima-Sina joint canal.

Trends in Production of Gram

The Lower Sina Basin has whole has very little positive trend in production of Gram during the period of investigation which is amounted to 'r' = +0.732 and r^2 value in this regard is 0.005. But tahsil level analysis reveals both positive and negative trend in production of Gram. Four tahsil i.e. Madha, Paranda, South Solapur, and Barshi shows low positive trend in production of Gram, whereas North Solapur, Mohol, and Karmala tahsil shows negative trend in production of Gram because area under Gram is converted in to area under Sugarcane with the development of surface irrigation.

Trends in Production of Groundnut

The table 1 exhibits that the study region as a whole has moderate negative trend in production of Groundnut, which is amounted to 'r' = -0.4273 and r^2 = 0.182 and regression equation in this regard is y = -77.48x + 15705. The 'b' coefficient indicates that with the increase of one year time period, the groundnut production decreases by 77.48 tones in the lower Sina basin. Most of the tahsil shows, negative trend in production of Groundnut. The high negative trend is recorded in North Solapur, which is amounted to 'r' = -0.6757 and coefficient of determination 0.456 percent. The 'b' coefficient indices that with the increase of one year time period, Groundnut production is decreased by 22.19 tones only in North Solapur tahsil and it is mainly due to the labour problem and area under Groundnut was gone under area under sugarcane. Only two tahsil nainly Karmala and Madha shows little positive trend in production of Ground nut.

Trends in Production Sugarcane

The table 1 reveals that the study region as whole has, low positive trend in the production of sugarcane which is amounted to 'r' = +0.2814 and r^2 = 0.053. All tahsils shows positive trend in the production of Sugarcane except Mohol and Barshi

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

tahsil, these two tahsil shows marginal negative trend in production of sugarcane because Sugarcane production is depend on availability of perennial irrigation. The moderate positive trend is recorded in Karmala, which is amounted to (r) = +0.38867and coefficient of determination is amounted to be at 0.151. The'b' coefficient indices that with the increase of one year time period, the Sugarcane production is increases by 42625 tones in Madha tahsil alone and it is due to the Sina Kolegaon Project and Bhma-Sina joint canal.

Conclusions

The study reveals that there is great influence of geographical factors on production of crops in lower Sina basin. The highest negative trend in production of Jowar in Madha tahsilis in mainly due to the area under Jowar is converted in to area under Sugarcane and fruit crops with the development of surface irrigation facility. The 'b' coefficient indicates that with the increase of one year time period, Jowar production decreases by 440.6 tones in Madha tahsil alone. High positive trend in production of wheat in South Solapur tahsil is a result of development of surface irrigation facilities and use of high yielding varieties. The 'b' coefficient indicates that production of Wheat increases by 141.1 tones with increase of one year time period in south Solapur tahsil. The Lower Sina basin as whole has negative trend in the production of Jower, Tur and Groundnut because farmer turn toward cash crops with the development of surface irrigation facilities. The highest positive trend in production of Sugarcane in Karmala tahsil, followed by Madha is a result of Sina-Kolegaon project, Bhima Sina Joint cannel and development of technological factors. The'b' coefficient indices that with the increase of one year time period, the Sugarcane production is increases by 42625 tones in Madha tahsil alone.

Recommendations

1. The negative trend in the production of Jower, Tur and Groundnut indicates that there may be deficiency of these commodity in future therefore it is recommended that awareness should be made among the farmers regarding to cultivate these basic food crops along with the cash crops.
2. The study also reveals that the most of the area under cereals and pulses are converted into area under Sugarcane and Sugarcane is water consuming crop, which leads to water scarcity therefore it is recommended that awareness should be

ISSN: 2278-4632
Vol-10 Issue-5 No. 5 May 2020

made among the farmers regarding water literacy and minimize the area under sugarcane by cultivating other cash crops instead of sugarcane.

References

Abdul Munir (1992): Agricultural Productivity and Regional Development, New Dimensions in Agricultural Geography, Vol. 8, Anthropogenic Dimensions in Agriculture, Concept Publishing Company, New Delhi 110059. Pp.85.

Illustrated Oxford dictionary (2006): Oxford University Press, Oxford, New yok. Pp/888.

Merriam-Webster' dictionary (2004): Merriam-Webster' Collegiate DictionaryEleventhEdition, Goyal Publisher& Distributors Pvt.Ltd, Delhi. Pp. 991

Noor Mohammad and Abdul Majeed (1992): Determinants of Agricultural Productivity in Arid Regions, New Dimensions in Agricultural Geography, Vol. 8, Anthropogenic Dimensions in Agriculture, Concept Publishing Company, New Delhi 110059. Pp.103.

Reddy N. B. K and Ramanaiah Y. V. (1992): Ghanging Pattern of Agricultural landscape in Drought Prone Areas, New Dimensions in Agricultural Geography, Vol. 5, Spatial Dimensions of Agriculture, Concept Publishing Company, New Delhi 110059. Pp.222.

