

**‘An Analytical Study of the Impact of Climatic Changes on Agriculture Crop Pattern and Agricultural Productivity in the Vidarbha Region’  
(2011- 12 onwards)**

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**Introduction:** - As we are dreaming of ‘Viksit Bharat’ by the year 2047, an agriculture sector has to play important role in the Indian economy. As of now agriculture sector is performing the most crucial role in Indian economy. When it comes to the employment generating by the sector, it was fifty-five percentage of all the total employment generated by the Indian economy in the fiscal year 2022-23. And it is still providing fifteen percentage of contribution to the India’s gross domestic product. According to economic survey of India 2022-23, the Indian agriculture sector has been growing at an average annual growth rate of 4.6 per cent during the last six years. It grew by 3.0 per cent in 2021-22 compared to 3.3 per cent in 2020- 21. In recent years, India has also rapidly emerged as the net exporter of agricultural products. In 2020-21, exports of agriculture and allied products from India grew by 18 per cent over the previous year. During 2021-22, agricultural exports reached an all-time high of US\$ 50.2 billion.

**Impacts of Climate Change on Indian Agriculture**

Indian agriculture is highly prone to the risks due to climate change; especially to drought, because 2/3rd of the agricultural land in India is rainfed and even the irrigated system is dependent on monsoon rain. Flood is also a major problem in many parts of the country, especially in eastern part, where frequent flood events take place. In addition, frost in north-west, heat waves in central and northern parts and cyclone in eastern coast also cause havoc. In recent years, the frequency of these climatic extremes is getting more due to the increased atmospheric temperature, resulting in increased risks with substantial loss of agricultural production.

**Following reviews of certain journal articles have taken to justify study**

**Nadkarni and Deshpande (1982)** argue that the problem of unstable productivity in the agriculture is one of the less important than the problem of growth in agriculture and instability in productivity or yields per hectare cannot be attributed exclusively to natural or climatic factors. The analysis was carried out for Karnataka state for the period from 1955-56 to 1975-76. Author noted that concentrated growth efforts in area with assured rainfall or irrigation can avert increased instability. The major problem of agriculture is not unfavorable prices so much as insecurity both on the production and price front.

**Bhalla and Tyagi (1989)** estimated the spatial pattern of the levels and growth in agriculture output in the country by taking 19 major crops. Author noted that with adaption of new seed fertilizer technology, agriculture in major part of India has undergone a significant transformation. Yield level of some crops have experienced phenomenal rise, thereby accelerating the growth of agriculture output in some state.

**Kumar (2001)** in his study a comprehensive analysis of agriculture performance and productivity of Indian agriculture has revealed that the changes in cropping pattern have been taking place as a result of substitution of low productivity crops by those which have shown impressive performance on productivity growth. The yield growth was main factor for output growth in India and a change in cropping pattern has also contributed considerably.

**Kalamkar (2003)** has examined the contribution of various components to the growth of agriculture output in Maharashtra during the period 1960-61 to 1997-98, by using seven factor decomposition model developed by Minhas and Vaidyanathan. He noted that the productivity growth was the major factor that accounted for the growth of crop output in the state. The growth in the production kharif jowar, paddy, bajra, rabi jowar, wheat and cotton is mainly on account of growth in yield however production of gram and tur increased due expansion of area.

**Shanmughan and Soundararajan (2008)** have decomposed the agriculture output growth obtained in 15 major states of India for the period 1994-95 to 2003-04. They concluded that technological progress and technical efficiency are the two key sources of agriculture growth and they are declined in recent period. It is necessary to invest in information dissemination tools because the major problem they have identified that of technical efficiency, the rectification of which can provide new channel of agriculture growth for India.

#### **The following objectives are the base of the study**

To study the impact of climatic changes on crops pattern in given period, analyzing the relation between crops pattern and agricultural productivity under specified period. Find the impact of climatic changes on farmer income, study the impact of climatic changes on economic inequality. and to study the impact of climatic changes on area of crops planting.

#### **Following hypothesis have verified during the study**

One Climatic changes have negatively impacted income of people due to Changes in Cropping Pattern. Two Farmers have adopted change in crop pattern according to climatic changes. Three Climatic changes have negatively impacted production and productivity of agriculture in the region.

#### **Average cost of cultivation/ production of principal crops in Vidarbha in year 2022-23**

The average cultivation cost for various product in Vidarbha in year 2022-23 are recorded as following. In cultivation of paddy, A2 cost in Vidarbha is ₹ 78,392 per hectare. In case of bajra, A2 and A2+FL costs per hectare in Maharashtra is ₹ 38,148. Among pulses, in tur farming, A2 and A2+FL costs per hectare in Maharashtra is ₹ 57,193 and per hectare A2 and A2+FL costs of moong in Maharashtra is ₹ 32,005. For soybean, per hectare A2 and A2+FL costs in Vidarbha is ₹ 41,930.

#### **Findings-**

#### **Area and Production of principal crops in Vidarbha:**

S. N	Crops	Area (000 ha)			Production (000 MT)		
		2021-22	2022-23	Percent Change	2021-22	2022-23	Percent Change
1	Rice	955	1002	6	2,133	3,181	11
2	Cotton	1,510	1,410	-15	3,791	4,101	5
3	Soyabean	2,200	2,320	8	2,340	2,780	20
4	Jowar	35	14	-60	56	13	-37
6	Bajra	64	40	-25	110	72	-30
7	Total Pulses	1,292	884	-20	1,022	420	-30

Sources- Economic Survey of Maharashtra 2022-23 and Ministry of Agriculture of Maharashtra.

The above chart gives the details of area and production of principal crops in Vidarbha during the cropping year 2021-22 and 2022-23. The area under rice cultivation was 955 thousand hectars in 2022 had slightly increased in 2023 to 1002 ha the change was about 6 percent. The production of

rice in same year was 2,133 MT and it had increased to 3,181 Mt in 2023, the change in production was 11 percent more than previous year.

For the cotton area under this crop was 1,510 thousand ha in 2022, it was decreased to 1,410 thousand ha in the year 2023 the decreased about to 15 percent. Production of cotton in the year 2022 was 3,791 MT and it was increased to 4,101 MT in 2023 the change production was about to 5 percent more than the previous year.

In the case of soyabean area under this crop has increased in 2022-23, it was 8 percent more than it of 2022. For the jowar and bajra area under these crops has decreased during this period. Area under jowar has decreased about to 60 percent in 2023 from the previous year. And for the bajra it was 25 percent less than the previous year.

In case of the production of soyabean it was 20 percent higher in 2023 than the year 2022. And for the jowar and bajra the production of both crops has decreased significantly in 2022 and 2023 respectively.

The area under total pulses (Tur, Mung, Udid) was 20 percent less in 2023 than the previous year 2022. It was 1,292 thousand ha in 2021-22, decreased to 884 thousand ha in 2022-23. The production of pulse in 2021-22 was 1,022 MT it has decreased to 422 MT in 2022-23 the change was nearly 30 percent.

Changes in the cropping pattern over a period of time shows that area under Food grains shows declined trend. In 2021-22 area under Food grains was 60 percent, which decreased to 50 percent in 2022-23, due to reduction in total cereal crops area. In 2021-22, cereal crops occupied area declined from 55.94 percent to 40.44 percent in 2022-23. Area under Jowar and bajra has shown declining trends while for rice had increasing trends during 2021-22 to 2022-23. In case of pulses, area under these crops has decreased from 20 percent in 2021-22 to about 25 percent in 2023.

### **Conclusion**

Over the period of time the trends are towards an increase in the production of Rice, soyabean in the period of 2021-22 to 2022-23. It is to be noted that the total production as well as per hectare production is increased. The state government provides high yields varieties of seeds, chemical fertilizers and the new technology which also caused changes on the cropping pattern and farmers motivated to cultivate these crops. It is to be noted that the production and yield of Jawar, Bajara, are shown unsatisfactory output performance in the region. All these crops were mostly depending upon monsoon. Insufficient and erratic monsoon resulted in the low productivity of these crops.

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