Agricultural Growth Analysis – A Study of Maharashtra State

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ABSTRACT

The present paper attempts to analyze agricultural growth of principle crops in Maharashtra state of India during the pre- and post-reform period up to 2009-10. The agricultural performance was evaluated on the basis of estimates of compound annual growth rates and coefficients of variation of area, production and yields per hectare of principal crops in Maharashtra state. The study found that total foodgrains production which decelerated during the early post-reform period over pre-reform period, picked up during later post-reform period. The output instability in total foodgrains remained low during all the periods under study. The output growth rate of wheat maize and sugarcane crops has accelerated during the post-reform periods mainly due to area expansion. In pulses arhar and gram improved output growth performance during post-reform periods. But the coarse cereals like bajra, small millets and ragi have registered dismal output performance during the post-reform periods due to loss of area.

Key Words – Pulses Growth, Cereals production, Foodgrains Growth, Maharashtra agriculture

Introduction:

According to studies of Panagariya (2004), Virmani (2004) and RBI’s (2004) the variance of growth rates during the 1980s was statistically significantly higher than that in the 1990s. As per the Reserve Bank of India study (2004) for industry the variability in growth rate had doubled during the post-reform period and it is the agriculture and allied activities sector which mainly contributed to the decline in the variability in the overall gross domestic product during 1990s. So it is important not only to study agricultural output growth but also the instability in agriculture.

State level agriculture performance deserves much closer attention than national level because liberalization has reduced the degree of control exercised by the centre in many areas leaving much greater scope for state level initiatives. Maharashtra state is considered as one of the progressive states in India, but it has been reported to be a deficit state for long, when one considers the major pursuit of economic activity i.e. agriculture. Maharashtra state accounts for 9.4 per cent of the geographical area and 9.3 per cent of the population of the country. It is the third largest state in population and area in India. The present paper attempts to analyze the growth and instability performance of agriculture in Maharashtra state during the pre- and post-reform periods up to 2009-10.

The present research paper is divided into three sections. The section I describes coverage and nature of the analysis, section II analyzes the growth analysis of the major crops during the pre- and post-reform periods in the state of Maharashtra and at the end the conclusions of the present study are presented in section III.

Section I: Coverage and Nature of Analysis

The present study is based on purely secondary data. The secondary data about area, yield and production of principal crops in Maharashtra state are collected for the period from 1981-82 to 2009-10. In order to present and analyse the growth and instability, this entire period of twenty years has been divided into three sub-periods viz; 1981-82 to 1990-91. Period I as the pre-reform period, 1991-
92 to 2000-01, Period II as the early post-reform period and 2001-02 to 2009-10, period III, as the early post-reform period.

The required secondary data used in the study are compiled from the published sources such as Agricultural Statistics - 2011, Agricultural Statistics Division, Directorate of Economics & Statistics, Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India and data published by Centre for Monitoring Indian Economy (CMIE), Mumbai on India’s agricultural sector - 2009.

In the present study, performance of some major crops like rice, jowar, bajra, maize, ragi, small millets, wheat, gram, arhar, other pulses, total foodgrains, cotton and sugarcane are considered for the purpose of analysis. The agriculture performance is evaluated on the basis of estimates of compound annual growth rates in area, production and yields per hectare of principal crops in Maharashtra state. We have estimated annual compound growth rates of area, production and yield of major agricultural crops selected for this study by fitting the exponential function of the form,

\[ Y = A B^t \]

For the operational purpose, it becomes a semi – log function of the form:

\[ \log Y = a + bt \]

Where,

- \( a = \log A \)
- \( b = \log B \)
- \( Y = \) stands for Area/ Production/ yield,
- \( a, b = \) are constants, and
- \( t = \) the time span.

The compound annual growth rate is given as under:

\[
\text{Compound annual growth rate} = (\text{Antilog } b - 1) \times 100.
\]

For the purpose of measurement of variability of area, production and yield of agricultural crops, coefficients of variation have been worked out. For the purpose of analysis coefficient of variation below 25 per cent is termed as low, between 25 to 35 per cent as medium and 35 per cent and above as high.

Coefficient of variation (C. V.) has been computed as under:

\[
\text{C. V.} = \frac{\sigma}{\bar{X}} \times 100
\]

Where,

- \( \sigma = \) Standard deviation of crop area/ production/ yield,
- \( \bar{X} = \) Mean (value) of crop area/ production/ yield.

Section II: Growth Analysis of the Principal Crops in Maharashtra

Foodgrains output growth has declined from 2.95 per cent during the pre-reform period to 0.24 per cent during the early post-reform period, mainly due to decline in yield per hectare component. But thereafter foodgrains output growth picked up during the later post-reform period to 2.55 per cent per annum due to yield growth. Output instability in foodgrains has remained low during all the periods in Maharashtra.
Table I
Compound Annual Growth Rates and Coefficients of Variation in Area, Production and yield of
Principal Crops in Maharashtra

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>P</td>
<td>Y</td>
</tr>
<tr>
<td>Rice</td>
<td>0.17</td>
<td>0.31</td>
<td>0.14</td>
</tr>
<tr>
<td>Jowar</td>
<td>-0.52</td>
<td>2.49</td>
<td>3.11</td>
</tr>
<tr>
<td>Bajra</td>
<td>2.20</td>
<td>7.34</td>
<td>5.03</td>
</tr>
<tr>
<td>Maize</td>
<td>3.56</td>
<td>0.06</td>
<td>-3.38</td>
</tr>
<tr>
<td>Ragi</td>
<td>-1.25</td>
<td>1.48</td>
<td>4.18</td>
</tr>
<tr>
<td>Small Millets</td>
<td>-3.55</td>
<td>16.54</td>
<td>4.18</td>
</tr>
<tr>
<td>Wheat</td>
<td>-3.71</td>
<td>16.40</td>
<td>3.00</td>
</tr>
<tr>
<td>Gram</td>
<td>4.74</td>
<td>15.66</td>
<td>6.12</td>
</tr>
<tr>
<td>Arhar</td>
<td>4.12</td>
<td>13.73</td>
<td>-0.98</td>
</tr>
<tr>
<td>Other Pulses</td>
<td>0.85</td>
<td>5.92</td>
<td>5.20</td>
</tr>
<tr>
<td>Total Foodgrains</td>
<td>0.30</td>
<td>2.39</td>
<td>2.64</td>
</tr>
<tr>
<td>Cotton</td>
<td>-0.18</td>
<td>2.48</td>
<td>4.01</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>0.19</td>
<td>13.30</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Notes: 1. CGR = Compound Growth Rate
2. C V =Coefficient of Variation
3. For Ragi , Small Millets data is up to 2006-07 and for Other Pulses data is up to 2005-06
Source: Growth Rates and Coefficients of Variation are estimated on the basis of data collected from ‘India’s Agricultural Sector’, Centre for Monitoring Indian Economy, Mumbai, 2009 and Agriculture Statistics - 2011, Department of Agriculture and Cooperation, Ministry of Agriculture accessed through www. agricoop.nic.in

The upward revision of minimum support prices for foodgrains was sharper during the period of economic reforms as compared to that during the pre-reform period (RBI 2004). In Maharashtra state increase in per hectare fertilizer consumption was sluggish during 1990-91 to 2000-01 as compared, to 1980-81 to 1990-91 (CMIE 2005). It picked up later and reached to 99.28 kg/ha in 2005-06 (CMIE 2009). Irrigated area under total foodgrains has increased from 9.6 per cent in 1980-81 to 14.8 per cent in 2000-01 and 16.8 per cent in 2008-09 (GOI 2004, 2010). Thus it shows weak link between total foodgrains output performance and increase in minimum support price during the early post-reform period. But the positive link was observed between total foodgrains output performance
and fertilizer consumption during post-reform periods. The poor irrigation facility expansion is the main concern for agriculture development in Maharashtra.

In cereals wheat and maize crops have registered significant increase in both, output growth and output instability during the early post-reform period over pre-reform period. The output growth of wheat and maize has further increase to 9.87 and 16.04 per cent per annum respectively during later post-reform period. In case of both these crops area expansion played the dominant role in significant output growth acceleration during the post-reform period over pre-reform period in Maharashtra. Irrigated area under wheat was 45.4 per cent in 1980-81, which increased to 76.8 per cent in 1992-93 and 87.1 per cent in 2000-01. In Maharashtra state, irrigated area under maize has increased from 8.1 per cent in 1980-81 to 34.4 per cent 1992-93, but thereafter it declined to 18.4 per cent in 2000-01 and 14.7 per cent in 2008-09 (GOI 2004, 2010).

Other cereal crops like rice, jowar have registered deceleration in output growth during the early post-reform period over pre-reform period. Rice and jowar output growth which was negative during early post-reform period, succeeded in registering positive but insignificant growth of 0.20 and 0.15 per cent per annum respectively during later post-reform period due to yield growth.

The crops of bajra and small millets registered deceleration in output growth rate during post reform periods over pre-reform period. Both of these crops had negative output growth rate mainly due to loss of area. Ragi output has registered negative growth rate during all the periods, mainly due to decline in area component. Output instability in ragi was observed to be low during these periods.

Arhar and gram crops have registered an increase in output growth rates during the post-reform period over pre-reform period. In case of arhar, yield component and in case of gram area component played important role in output growth acceleration during the early post-reform period over pre-reform period. The output growth in gram has further increased to 13.4 per cent per annum during later post-reform period due to both yield and area expansion. Whereas arhar output growth has slowed down during later post-reform period.

Other pulses output growth has significantly declined from 6.11 per cent during pre-reform period to 1.13 per cent during early post-reform period. It has further declined to -9.06 per cent per annum during later post-reform period due to loss of both yield and area. Output instability in other pulses has marginally increased from low (21.11 per cent) during pre-reform period to medium (25.56 per cent) during early post-reform period and 34.75 per cent in later post-reform period.

In case of commercial crops, cotton output growth rate has marginally increased from 3.83 per cent during pre-reform period to 4.11 per cent during early post-reform period mainly due to expansion in area component. It further increased to 12.42 per cent per annum during the later post-reform period, but this time due to yield growth. In case of sugarcane, the other important commercial crop in Maharashtra state, output growth rate has significantly increased from 1.03 per cent during pre-reform period to 4.21 per cent during early post-reform period to 11.04 per cent per annum during later post-reform period, mainly due to area expansion. The output instability in sugarcane and cotton has increased during the later post-reform period in Maharashtra.

Section III: Conclusions

Foodgrains output growth has declined from 2.95 per cent during the pre-reform period to 0.24 per cent during the early post-reform period, mainly due to decline in yield per hectare component. But thereafter foodgrains output growth picked up during the later post-reform period to 2.55 per cent per annum due to yield growth. Output instability in foodgrains has remained low during all the periods in Maharashtra.
In cereals wheat and maize crops have registered significant continuous increase in both, output growth and output instability during the post-reform periods over pre-reform period. In case of both these crops area expansion played the dominant role in significant output growth acceleration. Rice and jowar crops which had negative output growth rates during early post-reform period, succeeded in registering positive but insignificant growth of 0.20 and 0.15 per cent per annum respectively during later post-reform period due to yield growth. The commercial crops like cotton and sugarcane have also registered significant output growth performance during post-reform periods. In case of sugarcane area expansion and yield growth in cotton contributed in their output growth. The output instability in sugarcane and cotton has increased during the later post-reform period in Maharashtra.

In pulses arhar and gram crops have registered an increase in output growth rates during the post-reform periods over pre-reform period. The crops of bajra, small millets and ragi registered deceleration in output growth rate during post-reform periods over pre-reform period due to loss of area. The supply of coarse cereals to people through public distribution system will encourage its production

References:

Centre for monitoring Indian Economy, 2005 and 2009, India’s Agricultural Sector’, Mumbai