From Slowdown to Fast Track: Indian Agriculture since 1995

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Ramesh Chand*

1. Introduction

Agriculture remains the most important sector of Indian Economy with 17.5% share in GDP at current prices (in 2012-13) and 54.6 per cent share in total employment or workforce (in year 2011). The sector suffered a setback for some years after the mid 1990’s, and this slowdown had several consequences including widespread agrarian distress. It was a great challenge and formidable task to arrest the decline and reverse the slowing growth of agriculture sector. Several initiatives were taken by the central and state governments to address this challenge. It’s a matter of great pride that India has succeeded in reversing the slowdown in agriculture. The last nine years (2004-05 to 2012-13) have witnessed revival of growth rate to the level of 3.75%. This is an overall and signal achievement in agriculture which has resulted in many other achievements.

Besides growth per se the quality of growth has also seen considerable improvement and there has been progress relating to inclusiveness, regional equity, and nutrition security. Though these achievements are highly significant and unique in many respects, there is not adequate appreciation or realization about these in the country. Many of us seem to be obsessed with achievements of green revolution and not willing to acknowledge the recent accomplishments as these are not concentrated on revolution around one or two crops, or, concentrated in a particular geographic region. Second, high food inflation has overshadowed progress on production front. Proper understanding of the decline and improvement in performance of agriculture since the mid 1990s is very important for shaping the future of Indian agriculture. This document compares the performance of agriculture in the recent years with the preceding decade and provides an update on the achievements of the sector in recent 10 years or so. It

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also discusses, with evidence, how and when the turnaround in agriculture took place, for developing proper understanding of India’s agriculture growth story. The paper also draws lessons from the experiences of the last two decades for future growth and development of the sector.

2. Growth Trend and Composition

The country achieved close to 5 per cent average annual rate of growth in agriculture during 8th Plan (1992-93 to 1996-97) and fixed a target of 4.5% growth for the 9th Plan (1997-2002). Against this target, the actual growth rate turned out to be 2.48 per cent during the 9th as well as 10th Plan. The target growth rate was fixed at 4% for 11th Plan and the same has been kept for the 12th Plan. Unlike the previous two Five Year Plans, the 11th Plan recorded an average growth rate of 4.06 per cent in the GDP of agriculture sector including forestry and fishing. The growth rate during 2012-13, which is the first year of the 12th Plan, has been 1.4% and the advance estimate for 2013-14, which is the second year of 12th Plan, puts the growth rate at 4.6%. The growth rates reveal that after growing at 2.5 per cent for 10 years, during 9th and 10th Plan, agriculture growth in the subsequent period has accelerated to 3.75 per cent level. It is interesting to find out precisely in which year the turnaround in growth rate took place, and how the period after turnaround compares with the corresponding period before turnaround.

According to a study done by Ramesh Chand and Parappurathu (2012) agriculture GDP witnessed a structural break in the year 1995-96, which brought down the growth trajectory, followed by another break in the year 2004-05, which turned the growth path upward. The same can also be seen from the decadal trend growth rates in the agricultural GDP beginning with the decade 1971-72 to 1980-81 and ending with the decade 2003-04 to 2012-13 (Fig. 1). When ten years
period is used to estimate trend growth rates two clear breaks are observed, one in 1996-97 and another in 2005-06.

The above evidence clearly points out that the performance of agriculture during the last two decades can be divided in two phases: phase I from 1995-96 to 2005-06 representing a period of slowdown in agriculture, and, phase II beginning with year 2005-06 representing a period of recovery and acceleration in growth. Further, a comparison of growth rates achieved during the decade beginning from 2004-05 is made with the previous two decades. The data on GDP of the sector (agriculture and allied) after 2004-05 is available till year 2012-13 i.e. for nine years. The trend growth rates in GDP during recent decade (nine years only) at constant prices and for similar two previous periods is presented in Fig 2. This shows that Indian agriculture moved on a growth trajectory of 3.15 per cent per annum during 1988-89 to 1996-97 which plummeted to 1.92 per cent in the next nine years. This was a very low growth having several adverse effects on farm economy and livelihood of farming community and posed a serious threat to the national food security.

Some initiatives were taken towards the end of 10th Plan and during 11th Plan to revive the sector. Consequently, the growth rate accelerated to 11th Plan to 2012-13. It is a matter of pride for the country that agriculture sector moved back on long term growth trajectory and now approaching targeted growth rate of 4 per cent.

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1 According to Ramesh Chand and Parappurathu (2012) the structural breaks occurred in the years 1995-96 and 2004-05 while ten years growth trends indicate structural breaks in years 1996-97 and 2005-06. For the sake of uniformity in period for comparing growth rates we take years 1996-97 and 2004-5 as the years that mark differentiation in growth performance.
2.1 Stability and Resilience

Agriculture performance is subject to year to year fluctuations due to vagaries of nature and high dependence on rainfall. Because of this, agricultural output often witnessed decline and negative growth. During the ten years period from 1973-74 to 1982-83, GDP of agriculture and allied sectors experienced a negative growth in 3 years. In the subsequent two decades year to year rate of change turned negative in 3 and 4 years respectively. It is the first time in the history of Indian agriculture that GDP of agriculture and allied sectors did not witness a single year with negative growth in output for more than a decade (Table 1). Thus, GDP of agriculture and allied sectors, which used to decline in 30 to 40 per cent cases, did not face a decline in the recent decade. The output level of agriculture (crop plus livestock) also did not show decline, at 2004-05 (constant) prices, after the year 2002-03, despite reports of adverse effect of climate change and severe drought in year 2009-10. This is a clear indication of stability and resilience developed in the sector.

Table 1: Frequency of decline in GDP agriculture and allied sectors at 2004-5 prices, during the last 4 decades

<table>
<thead>
<tr>
<th>Period</th>
<th>Frequency of negative growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74 to 1982-83</td>
<td>3</td>
</tr>
<tr>
<td>1983-84 to 1992-93</td>
<td>3</td>
</tr>
<tr>
<td>1993-94 to 2002-03</td>
<td>4</td>
</tr>
<tr>
<td>2003-04 to 2012-13</td>
<td>0</td>
</tr>
</tbody>
</table>

The reasons underlying this stability are expansion of irrigation, technology for drought proofing, contingency plans for each district to face monsoon aberrations, development of alternative crops and varieties suitable for seasonal variations, and broadening of production base in the country.

2.2 Broad based Growth

The increase in agricultural output was not confined to a few segments or commodity groups or to dominant products. Rather, the growth has been experienced across the board. Within the subsectors, crop sector recorded 3.3% and fruits and vegetables recorded 5.3% annual rate of growth. Livestock output increased at 4.8 per cent per annum while fishery sector recorded 4.5%
growth rate. The rate of growth in the recent decade has been historical in most cases. Growth rate of crop sector in recent nine years (2003-04 to 2011-12) has been 75 per cent higher than the previous decade (Table 2). The growth rate in livestock and horticulture was higher by 41 per cent and fisheries by 48 per cent over the preceding nine years period.

Table 2: Trend growth rate in output of various sub sectors of agriculture: Per cent

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop sector</td>
<td>2.97</td>
<td>1.87</td>
<td>3.28</td>
</tr>
<tr>
<td>Livestock</td>
<td>4.10</td>
<td>3.43</td>
<td>4.84</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>4.29</td>
<td>3.79</td>
<td>5.33</td>
</tr>
<tr>
<td>Fishery sector</td>
<td>7.22</td>
<td>3.02</td>
<td>4.48</td>
</tr>
</tbody>
</table>

3. Performance of Field Crops

Performance of group of commodities and individual commodity reveals achievements at disaggregate level. This is seen from the progress in total physical output and productivity. Production and productivity are compared by taking average of two years namely 1995-96 and 1996-97, 2003-04 and 2004-05, and 2011-12 and 2012-13. This was done to even out effect of very good and bad years.

Between 1995-97 and 2003-05, foodgrain production in India increased from 190 to 206 million tonne (mt) registering an increase of 16 mt in 8 years. In the next 8 years, foodgrain production increased by more than 50 mt and reached 257 mt by 2011-13 (Fig 3). Almost same trend holds for cereals whose production increased from 177 mt in 1995-97 to 192 mt in 2003-05 and reached 240 mt in the recent two years. Rice, wheat and maize witnessed a record increase in their production after 2003-05. Maize production in the country was below 10 mt till 1995-96 and crossed level of 21 mt in year 2010-11. Thus, maize production in the country doubled in 15 years.

Pulse production in India stagnated around 13 mt for 15 years from 1990-91 to 2005-06. It showed record growth in year 2010-11 with output climbing up by 25% in one year, from 14.6 mt to 18.2 mt. Oilseed production showed marginal increase between 1995-97 to 2003-05, only 1.6 mt in 8 years (Fig. 3). Thereafter, oilseed production witnessed increase of 5.6 mt in 8 years and reached at 30.4 mt during 2011-13. It is pertinent to mention that almost entire increase in oilseed production happened due to increase in output of soybean.
Fig. 3: Production of major field crops, 1995-97, 2003-05 and 2011-13
Soybean and cotton have shown miraculous growth with doubling of output in about 8 years. India now produces 13.4 mt of soybean and 34.6 million bales of cotton as against the production of 7.3 mt of soybean and 15.1 million bales of cotton in 2003-5. Indian agriculture witnessed another very noteworthy achievement in raising output of sugarcane. Sugarcane production was close to 300 million tonne in year 1999-2000 and faced decline thereafter. Cane production recovered in year 2006-07 in a big way. Current level of sugarcane output is 350 mt and India is having large surplus of sugar.

According to the second advance estimates of crop output for the year 2013-14, issued by the Ministry of Agriculture on 14.2.2014, foodgrain production is expected to reach 263 million tonnes with pulses production approaching 20 mt. Similarly, oilseed production during 2013-14 is estimated to reach 33 mt, which is 10 per cent higher than 2012-13.

Trend growth rates in production of major field crops are presented in Table 3. The growth rate in many crops during 1994-95 to 2003-04 was negative, which has been reversed in the recent decade. In other cases there has been sharp acceleration. It is worth mentioning that cotton production followed double digit growth in last 10 years while soybean, maize and gram experienced more than 5 per cent annual growth. Output of pulses, which was stagnating for quite some time, also moved on a rising trend in recent years with growth rate of more than 3 per cent.

Table 3: Trend growth rate in physical output of selected crops/groups: Per cent

<table>
<thead>
<tr>
<th>Crop/group</th>
<th>1994-95 to 2003-04</th>
<th>2003-04 to 2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food grains</td>
<td>0.71</td>
<td>2.66</td>
</tr>
<tr>
<td>Cereals</td>
<td>0.81</td>
<td>2.61</td>
</tr>
<tr>
<td>Pulses</td>
<td>-0.64</td>
<td>3.31</td>
</tr>
<tr>
<td>Rice</td>
<td>0.62</td>
<td>1.99</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.03</td>
<td>3.60</td>
</tr>
<tr>
<td>Maize</td>
<td>4.43</td>
<td>5.51</td>
</tr>
<tr>
<td>Gram</td>
<td>-2.37</td>
<td>5.59</td>
</tr>
<tr>
<td>Pigeonpea</td>
<td>0.14</td>
<td>2.05</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>-1.65</td>
<td>2.47</td>
</tr>
<tr>
<td>Soybean</td>
<td>3.35</td>
<td>7.61</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>-0.47</td>
<td>4.01</td>
</tr>
<tr>
<td>Cotton</td>
<td>-2.23</td>
<td>10.46</td>
</tr>
</tbody>
</table>
The impressive growth rates of agriculture sector have turned India as top producer of some commodities in the world, raised production level of several commodities above domestic demand, created surplus for export and also improved competitiveness of Indian agriculture in global markets.

### 3.1 Growth Driven by Productivity

Area, productivity and change in area allocation among crops are the three sources of growth of crop sector. The net sown area in the country did not show any increase for a long period now. The land use statistics show that there was no increase in the area share of horticulture crops, which are considered high value crops, after 2005-06, though there have been some shift in the cropping pattern. Therefore, almost entire growth of crop sector in the country resulted from increase in productivity per unit of land.

Level and growth in productivity of major crops are presented in Fig 4. It shows average productivity of two years namely 1995-96 and 1996-97, 2003-04 and 2004-05, and 2011-12 and 2012-13. Two years average was taken to even out very good and bad years.

India’s productivity of rice was 1.84 tonnes per hectare during the mid 1990s and it increased to 2 tonnes per hectare by 2003-05. In the next eight years the productivity increased to 2.4 tonnes. In the case of wheat there was very small increase in productivity during 1995-97 to 2003-05, but next eight years recorded close to 0.5 tonne increase. Similar kind of increase was achieved in the case of maize. Productivity of gram is now close to 1 tonne per hectare. Productivity of soybean remained below 1.1tonne per hectare for a long time. After 2003-5 soybean yield has risen to 1.28 tonne per hectare. Cotton crop has seen productivity increase from 313 kg per hectare during 2003-05 to 487 kg during 2011-13. The only crop to witness decline, though small, is groundnut.

![Fig. 4: Productivity level of major crops: kg/hectare](image-url)
Increase in productivity was also small in the case of mustard and the country is still below yield level of 1.2 tonne per hectare.

Achievements in productivity of most of the crops during 2003-05 to 2011-13 are much higher than the achievements of previous 8 years. This is revealed by the annual compound growth rate in yield between 1995-97 and 2003-5 and between 2003-05 and 2011-13 presented in Fig. 5. During the last eight years productivity of rice and wheat increased by more than 2% per annum. Productivity growth rate in 8 years before 2003-05 was 1.25 and 0.37 per cent. The growth rate in maize increased from 2.21% to 3.08% between the 8 years period before and after 2003-05. Rate of productivity growth has been highest in cotton, 5.7% per year. It seems that the National Food Security Mission, which focused on cereals and pulses, is playing a role in raising their productivity, and, poor performance of oilseed crops indicates need for similar kind of mission or approach for oilseed crops. High growth in productivity of cotton is largely attributable to spread of Bt cotton cultivation. Pigeonpea productivity growth changed from negative to positive growth after 2003-05.
4. Performance of Horticultural Crops

India produced 114 mt of fruits and vegetables in the mid 1990’s. In next 8 years production increased to 143 mt. Between 2003-05 and 2011-13 production of fruits and vegetables increased to 235 mt. Both vegetable as well fruit production increased by more than 60% in 8 years after 2003-05 which is much higher than the growth in the previous period. These growth rates have taken fruit production to 77 mt and vegetable production to 158 mt during 2011-13 (Fig. 6).

The increase in production of onion and potato has been remarkable. Onion production increased from 6.18 mt in 2003-5 to 16.9 mt in 2011-13. Production of potato, which increased by less than 2 mt in 8 years before 2003-5 showed an increase of nearly 20 mt in recent 8 years.

The growth rates in the production of horticulture crops during the decade 1994-95 to 2003-04 and 2003-04 to 2012-13 reveal grand success of the horticulture in the second decade (Table 4). Growth rate in fruits and vegetables accelerated from 2.64% during 1994-95 and 2003-04 to 6.26% during 2003-04 to 2012-13. Among vegetables, onion production recorded 13% annual growth while potato production increased by 8.9% per year. Among various fruits, highest growth is observed in banana, 7.57%.

Table 4: Trend growth rate in production of fruits and vegetables

<table>
<thead>
<tr>
<th>Crops</th>
<th>1994-95 to 2003-04</th>
<th>2003-04 to 2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and vegetables</td>
<td>2.64</td>
<td>6.26</td>
</tr>
<tr>
<td>Vegetables</td>
<td>3.24</td>
<td>6.37</td>
</tr>
<tr>
<td>Fruits</td>
<td>1.53</td>
<td>6.04</td>
</tr>
<tr>
<td>Banana</td>
<td>0.92</td>
<td>7.57</td>
</tr>
<tr>
<td>Mango</td>
<td>0.96</td>
<td>4.44</td>
</tr>
<tr>
<td>Citrus</td>
<td>4.50</td>
<td>5.34</td>
</tr>
<tr>
<td>Onion</td>
<td>3.07</td>
<td>12.98</td>
</tr>
<tr>
<td>Potato</td>
<td>2.90</td>
<td>8.94</td>
</tr>
</tbody>
</table>
Fig. 6: Production of fruits and vegetables in India, 1995-97, 2003-5, 2011-13
5. Performance of Livestock and Fishery Produce

Data on livestock production is available till year 2011-12. The progress in production was seen by dividing post 1995-96 period in two phases viz. 1995-96 to 2003-4 and 2003-4 to 2011-12 (Fig.7). Here, two years average has not been taken as production of livestock products moved on a smooth trend. Milk and egg production has been rising steadily for a long period. India produced 127.9 mt of milk and 66.5 billion eggs during 2011-12. Production of meat has seen a big change after year 2006-07. In a short period of 4 years after 2007-08 meat production in India increased by about 40 per cent and the country is now producing more than 5.5 mt of meat including poultry meat.
Between the marine and inland fish production the share of the latter is rising. During 1995-96, India produced 2.7 mt of marine fish and 2.2 mt of inland fish. In the next 8 years marine fish production recorded small increase while inland fish production showed sizable increase of 50% which raised the output to 5.3 mt. Total fish output in the country has increased from 6.4 mt in 2003-4 to 8.7 mt in 2011-12.

All livestock and fishery products showed higher growth after 2003-04 compared to 1994-95 to 2003-04 (Table 5). Milk production growth accelerated after 2003-04, from 3.78% per annum to 4.72% per annum. Growth in production of egg accelerated from 5.69 to 6.2 per cent. After 2003-04, growth rate in marine as well as inland fishery witnessed acceleration. Output of marine fish increased by less than 1 per cent a year during the 10 years period before 2003-04. The growth rate picked up to 2 per cent in the recent decade. Inland fish experienced more than 5.5% annual increase during 1995-96 to 2003-04 which further increased to close to 6 per cent.

<table>
<thead>
<tr>
<th>Product</th>
<th>1994-95 to 2003-04</th>
<th>2003-04 to 2011-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>3.78</td>
<td>4.72</td>
</tr>
<tr>
<td>Egg</td>
<td>5.69</td>
<td>6.20</td>
</tr>
<tr>
<td>Marine fish</td>
<td>0.71</td>
<td>2.01</td>
</tr>
<tr>
<td>Inland fish</td>
<td>5.55</td>
<td>5.99</td>
</tr>
<tr>
<td>Total fish</td>
<td>3.04</td>
<td>4.30</td>
</tr>
</tbody>
</table>

6. Agricultural Growth at State Level

India is a geographically diverse country with considerable variations in agricultural performance across the states. Performance of various states in terms of growth rate in NSDP agriculture and allied sectors during 2004-5 to 2011-12 at constant prices is presented in Table 6. This period corresponds to the recovery phase in Indian agriculture. The growth rate across states varies from (-) 1.15% in Kerala to 5.91% in Chattisgarh. The states like Madhya Pradesh, Karnataka, Rajasthan, Jharkhand and Chattisgarh achieved more than 5% annual growth rate in agriculture, and Gujarat, Tamil Nadu, Maharashtra and Andhra Pradesh, exceeded the national target of agriculture growth. Haryana, recorded close to 4% annual growth in NSDP agriculture even with high level of productivity. In east India, both Assam and Bihar recorded more than 3% annual growth.
Uttar Pradesh and Odisha are still stuck in low growth trap. The state of Punjab comes at the bottom in the list of states which recorded positive growth in agriculture, with only 1.5% annual growth. In the North West Himalayan region, agriculture growth rate in Jammu & Kashmir and Uttarakhand was around 2% whereas agriculture was stagnant in the state of Himachal Pradesh. In West Bengal, agriculture sector was growing at about 2% per annum. Agriculture sector was found to be shrinking in the state of Kerala.

Though Punjab has reached a high level of productivity, the low level of agriculture growth in the state is a matter of serious concern as agriculture accounts for 31 % of state’s economy, which is the highest among all the states. Slow growth of agriculture in Odisha and Uttar Pradesh is also a matter of concern as productivity level in these states is low. The state of Uttar Pradesh, which alone accounts for one eighth of national output of agriculture sector, can make major difference to national growth rate if agriculture sector moves fast in the state.

7. Achievements in Export and Foreign Exchange Earnings

India has not only improved self-sufficiency in food and agriculture, it has also emerged as large agricultural exporting country. It is now the

<table>
<thead>
<tr>
<th>State</th>
<th>Trend growth rate</th>
<th>State</th>
<th>Trend growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chhatisgarh</td>
<td>5.91</td>
<td>Haryana</td>
<td>3.94</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>5.76</td>
<td>Assam</td>
<td>3.84</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>5.63</td>
<td>Bihar</td>
<td>3.32</td>
</tr>
<tr>
<td>Karnataka</td>
<td>5.59</td>
<td>Odisha</td>
<td>2.67</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>5.22</td>
<td>Uttar Pradesh</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jammu &amp; Kashmir</td>
<td>2.04</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>4.94</td>
<td>West Bengal</td>
<td>1.98</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>4.84</td>
<td>Uttarakhand</td>
<td>1.95</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>4.21</td>
<td>Punjab</td>
<td>1.49</td>
</tr>
<tr>
<td>Gujarat</td>
<td>4.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Himachal Pradesh</td>
<td>-0.09</td>
</tr>
<tr>
<td>All India</td>
<td>3.70</td>
<td>Kerala</td>
<td>-1.15</td>
</tr>
</tbody>
</table>
largest exporter of rice in the world. The export of rice has increased from 3.4 million tonne in year 2004-05 to more than 10 mt in year 2012-13. India is also close to occupy top position in export of meat. Overall achievements in agriculture trade are quite impressive. Export volume increased from US$ 3.2 billion in 1991-92 to $6.2 billion in 2001-02. In the next ten years it increased more than 6 times and reached $39 billion in year 2011-12. The growth in export has been much larger than the growth in import of agriculture sector (Fig 8).

As can be seen from Figure 8, both the export as well as import increased at similar pace during 1991-92 to 2001-02. Till 2004-05, the net surplus of agricultural trade did not cross US $ 5 billion in any year. The recent decade has seen exponential growth in net foreign exchange contribution of agriculture which has raised the trade surplus to US $ 23 billion (Fig. 9).
8. Initiatives and Factors Underlying the Achievements

The spectacular performance of agriculture in the last decade has resulted from strong policy and institutional support provided to the sector. The major contributing factors are:

- Improvement in terms of trade for agriculture in the last 10 years and remunerative prices for farm produce.
- Higher use of productivity enhancing inputs like fertilizer and quality seed
- Expansion of irrigation and increase in agricultural investments supported by public sector capital formation
- Substantial increase in the supply of institutional credit to agriculture.
- Achievements in technology and strengthening of extension
- Initiatives like NFSM, RKVY and BGREI and other missions and programmes.

8.1 Better Prices

Terms of trade between agriculture and non-agriculture, represented by ratio of implicit price deflators of agriculture GDP to non-agriculture GDP, followed a decline of 7 per cent between 1997-98 and 2004-05. Thereafter, agricultural prices received by farmers increased at a faster rate under the influence of the substantial hike in the minimum support prices, higher level of foodgrain procurement by government agencies, strong domestic demand and rise in international prices. Between 2004-5 and 2011-12, agricultural prices relative to non-agricultural prices have risen by about 30 percent (Fig. 10). Better pricing environment provided incentive to farmers to use more and better input and adopt modern technology.
Increase in the Minimum Support Prices (MSP) by the government has played an important role in increase in real agriculture prices after 2004-05, particularly for cereals, where MSP is backed by procurement. Increase in the MSP of selected crops during 9 years between 2004-05 and 2012-13 and previous 9 years i.e. 1995-96 to 2004-05 is presented in the Fig.11. In most of the crops, increase in the MSP in the recent 9 years was more than double the increase in the previous 9 years. MSP of pigeonpea and groundnut increased by 177 and 147 per cent during 2004-05 to 2012-13 as compared to 74 and 67 per cent in 9 years before 2004-05. The increase given to MSP of gram was slightly lower than that in the earlier period. Rapeseed mustard was the only crop where hike in MSP after 2004-05 was lower at 47% compared to 98 % in the previous period.

It is also seen from the Fig. 11 that increase given to MSP of most of the crops during 1995-96 to 2004-05 was only slightly higher than the increase in WPI, which was 54%. The increase in MSP of all crops except rapeseed/mustard was substantially higher than the increase in overall prices in the country after 2004-05.
8.2 Higher Use of Material Inputs

Supply of certified or quality seed in the country increased by about 50% between 1997-98 and 2004-05 (Fig. 12). In the next 8 years seed supply increased by more than 100%. As seed is the carrier of technology, the growth in supply of quality seed has been a major factor for increase in agriculture production in recent years. Similarly, use of fertilizer which showed a meager increase of 14% during 1997-98 to 2004-05 increased by 50% in next 7 years, from 18.4 million tonne (mt) of NPK in 2004-05 to close to 28 mt in year 2011-12 (Fig 13).

8.3 Electricity Consumption and Irrigation Expansion

Consumption of electricity for agriculture purposes and expansion of gross irrigated area are closely linked (Fig. 14). Electricity consumption in agriculture sector was 85.7 thousand GWh in year 1995-96. The consumption increased to 97.2 thousand GWh by the year 1998-99 and sharply declined thereafter. It reached bottom level in year 2001-2 and then started increasing slowly. The consumption of electricity in agriculture picked up in year 2006-07.
and the upward trend continued thereafter. The electricity consumption reached 129 thousand GWh in year 2010-11. Between 1998-99 and 2005-06 electricity consumption in agriculture declined by 7% and in next 5 years it increased by as much as 43%.

Expansion in gross irrigated area showed somewhat similar pattern as seen in electricity consumption in agriculture. During the ten years period from 1995-96 to 2004-05 gross irrigated area increased by 10 million hectare from 71.4 million hectare to 81.1 million hectare. The provisional data available for the recent years shows an increase of 8.3 million hectare in the next six years.

8.4 Enhanced Institutional Credit Supply

Rising monetization and commercialization, and modernization of agriculture require increased supply of institutional credit for meeting the production cost and cost of farm investments. Farmers’ own resources are not adequate to meet these requirements. Meeting credit requirement from private sources is not only costly but also often exploitative. Therefore, credit supply by institutional agencies is crucial for encouraging use of modern farm inputs, purchase of farm assets and machinery and for making investments in land, and other fixed assets. It was brought out by the Situation Assessment Survey that farmers’ dependence on private (non-institutional) sources for meeting their credit need had risen from 33.75% during 1991 to 38.9% in 2002 (NSSO, 2005). The data on supply of institutional credit to agriculture sector shows a very sharp increase since 2004-5 (Fig. 15). Supply of short, medium and long term credit to agriculture in nominal terms increased four times, from Rs. 1.25 lakh crore to Rs. 5.11 lakh crore. In the same period cost of inputs used in agriculture increased by 2.2 times only, from Rs. 1.75 lakh crore to Rs. 3.85 lakh crore. Proper way of examining

![Graph showing supply of institutional credit to agriculture](image-url)
improvement and adequacy of credit supply is the ratio between supply of institutional credit and value of inputs used in the sector. During 2004-5, supply of institutional agriculture credit in a year constituted 71% of value of inputs used in agriculture sector at current prices. In the next two years institutional credit supply exceeded the value of inputs used in agriculture. By the year 2011-12, institutional credit supplied to agriculture turned out to be 33% higher than value of inputs used in the sector. This trend indicates that proportion of credit requirement of agriculture sector met by institutional sources has seen substantial increase during 2004-5 to 2011-12.

8.5 Technology Generation and Delivery

The slowdown in agricultural growth after mid 1990s, despite awfully low level of productivity in several crops and states, was a disturbing development, particularly for the policymakers of the country. While looking at the causes for this slowdown and options to revive growth the Planning Commission alluded to “Technology Fatigue” setting in agriculture (Planning Commission, 2007). The counter argument has been that there is a policy fatigue rather than technology fatigue which was responsible for slowdown in agriculture growth (Narayanamoorthy, 2007). TFP growth in agriculture, which is used as an indicator of contribution of R&D, had reached 0.5 per cent towards 2004-05 (Ramesh Chand et al., 2012). The Eleventh Plan emphasized critical role of agricultural research and the need for strong extension to close down the already existing yield gap and to move up the yield frontier. Several initiatives were taken in this direction.

As seed is the carrier of technology a lot of emphasis was given by the ICAR Institutes and State Agricultural Universities on raising the seed production. The net impact of these have been that the share of public sector in quality seed production increased from 53 per cent in year 2005-06 to 63 per cent in 2009-10. Similarly, public sector institutes also came with large number of hybrids after 2004-05 and increased their share in total hybrids to 24 per cent by 2009-10 which was below 10 per cent in 2001-02 (Malik and Ramesh Chand, 2011). There have been some notable achievements in the National Agricultural Research System like the breakthrough in basmati varieties, improved wheat varieties with resistance to rusts, single cross hybrid maize, hybrids of oilseed crops, improved varieties of soybean and gram. Better varieties and hybrids in horticulture and
modern reproduction interventions and disease management in livestock, genetic upgradation of some fish species and new packages have created opportunities for output growth.

The Eleventh plan also witnessed better linkages between R&D and extension and coordination among extension agencies. Technology delivery has been further strengthened by expanding the network of Krishi Vigyan Kendras to each district. The number of KVKs has risen from 277 at the end of 9th Five Year Plan to 637 in the 2nd year of 12th Plan. More than half of the KVKs were established after the year 2001-02. KVKs are different type of institution than conventional public extension agencies. They are set up under the patronage of ICAR, and most of them are part of the ICAR Institutes or State Agricultural Universities. Though their reach is small compared to public extension system of states, KVKs are equipped to provide high quality and intense frontline extension which is expected to have stronger dissemination power.

Though the role of R&D and extension institutions cannot be quantified like the other inputs they have made definite contribution for revival of growth rate after 2004-05 which is evident from the increase in TFP growth\(^2\). It looks like there has been some resurgence in R&D and technology dissemination which is leading to improvement in TFP growth in recent years.

### 8.6 Initiatives

Two major initiatives namely National Food Security Mission and Rashtriya Krishi Vikas Yojana launched during the Eleventh Plan showed promising results. A couple of other initiatives have been launched recently. They include: (1) Bringing Green Revolution to Eastern Region (2) Nutri-Cereals programme (3) Crop Diversification in the Original Green Revolution States which face the Problem of Stagnating Productivity and Depleting Water Resources due to Over-exploitation (4) Accelerated Fodder Development Programme (5) Vegetable Initiatives for Urban clusters (6) Promotion of Oil Palm (7) National Mission for Protein Supplements (8) Rainfed Area Development Programme. Besides contributing to agricultural production these initiatives are meant to address various types of imbalances in production and regional development and address specific problems of large magnitude requiring focused attention.

\(^2\)According to an ongoing study at NCAP, the growth in TFP of agriculture sector has almost doubled after 2004-05.
As required for success of these initiatives, they are receiving strong financial support. However, R&D component of agriculture sector is facing serious resource constraint. Committee after committee has recommended raising of public funding for agricultural R&D to around 1.5 per cent of GDP agriculture but the level of funding is stuck around 0.5 per cent. Rather than increase in research resource allocation, NARS is facing a cut in the budgetary allocation for the last two years. This is an aberration, requiring attention, in the overall strategy of increased focus on agriculture which has delivered rich dividend for the sector and the country during the previous decade.

9. Conclusions and Lessons

During the last two decades, since mid 1990s, Indian agriculture has moved through two distinct phases. The period from mid 1990s to mid 2000s witnessed slowdown of agriculture growth from above 3.5 per cent to below 2 per cent. This has been followed by a sharp turnaround in year 2005-06 which took agriculture back to above 3.75% growth. Interestingly, most of the factors which resulted in revival of growth are the same that pulled down agriculture growth. The slowdown was caused by deterioration in terms of trade for agriculture, or, decline in real prices received by farmers, stagnation in fertilizer use and irrigation, decline in power supply to agriculture, and sluggish growth of quality seeds. After 2004-05, all these factors witnessed a sharp increase leading to accelerated growth rate in all segments of agriculture through increase in productivity. Increase in production was much higher than the increase in domestic demand. This resulted in a high growth in agricultural export and increase in share of export in domestic production. Net trade of agriculture (export-import) has risen not only in absolute value but also as share of domestic production.

It is creditable that food prices in India remained quite stable during the global food crisis. This could be possible because India’s agricultural performance started improving before the crisis and the country had enough food to safeguard against the global price shocks.

The most important factor for improved and impressive performance of agriculture, post 2004-05, has been the increase in the prices received by the farmers. This was a result of hike given to MSP, increase in foodgrain procurement, increase in global agricultural prices and strong domestic demand for food. Favourable prices induced farmers to use better seed, apply higher
doses of inputs, take better care of crops and livestock, and adopt improved technology and methods of production. This process was further aided by liberal supply of institutional credit, and irrigation expansion. Slowdown of agriculture growth and its recovery in response to changes in price and non price factors clearly establish that Indian farmers respond rather strongly to various types of incentives. It also refutes to some extent the argument that the interest in farming is diminishing. We find the interest depends on profitability from farming.

Recent resurgence in agriculture and low level of productivity in most of the states indicate India has potential for sustaining high level of growth in agriculture for couple of years. Thus agriculture growth can help the country to raise sagging growth rate of the overall economy.

State level comparison of agriculture growth offers useful lessons. With the same set of national policies and macro environment some states achieved more than 5 per cent growth and some could not grow even at 3 per cent. Low growth states, particularly Uttar Pradesh and Odisha, can learn a lot from the experience of the states like Chhatisgarh, Jharkhand, Rajasthan, Karnataka and Madhya Pradesh.

While significant gains are achieved in the productivity of major crops the oilseed crops did not show much growth. Because of this, India’s dependence on import of edible oil has risen to more than 10 million tonne in year 2012-13, almost same as export of rice from the country. Edible oil import accounts for more than 50 per cent of domestic use. Such high dependence on imports can pose serious threat and we need to reduce level of this import.

It is a challenge to maintain the growth tempo achieved during 2004-05 to 2013-14. As no country can afford to keep real agricultural prices rising for a very long time, therefore, ways and means have to be devised to sustain profitability incentive. Moreover, global agricultural prices are projected to stay flat in next decade. One way to maintain price or profitability incentive for farmers is to increase their share in final prices paid by consumers and other end users. The second source is through the promotion of resource saving or yield enhancing technologies. The agricultural development strategy in the last ten years has focused on production and MSPs. For a long time, significant progress has not been made in agricultural markets like reforms in market regulation, development of infrastructure, entry of modern capital, and development of new models of marketing. Thus, agricultural marketing
has not moved to the next stage of development (Ramesh Chand, 2012). Agricultural development strategy should be expanded to bring marketing in its fold to improve competition, reduce inefficiency and harness market innovations. This should enable farmers to get better prices and higher share in prices paid by end users without adding to inflation. Without this, it will be very difficult to sustain the agricultural achievements of the last decade in the coming years.

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